CDM-700

High-Speed Satellite Modem
Installation and Operation Manual

IMPORTANT NOTE: The information contained in this document supersedes all previously published information regarding this product. Product specifications are subject to change without prior notice.

Part Number MN/CDM700.IOM Revision 3

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High-Speed Satellite Modem
Installation and Operation Manual

Comtech EF Data is an ISO 9001
Registered Company.

Part Number MN/CDM700.IOM
Revision 3
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- Ship the product back to Comtech EF Data. (Shipping charges should be prepaid.)

For more information regarding the warranty policies, see Warranty Policy, p. xiv.

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Preface

About this Manual

This manual provides installation and operation information for the Comtech EF Data CDM-700 satellite modem. This is a technical document intended for earth station engineers, technicians, and operators responsible for the operation and maintenance of the CDM-700.

Conventions and References

Metric Conversion

Metric conversion information is located on the inside back cover of this manual. This information is provided to assist the operator in cross-referencing English to Metric conversions.

Cautions and Warnings

Indicates information critical for proper equipment function.

WARNING indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

Indicates a hazardous situation that, if not avoided, may result in minor or moderate injury. CAUTION may also be used to indicate other unsafe practices or risks of property damage.

Reporting Comments or Suggestions Concerning this Manual

Comments and suggestions regarding the content and design of this manual will be appreciated. To submit comments, please contact the Comtech EF Data Technical Publications Department: techpub@comtechefdata.com

Electrical Safety

The CDM-700 Satellite Modem has been shown to comply with the following safety standard:

- EN 60950: Safety of Information Technology Equipment, including electrical business machines

The equipment is rated for operation over the range 100 - 240 volts AC. It has a maximum power consumption of 75 watts, and draws a maximum of 0.75 mA.

The user should observe the following instructions:

Fuses

The CDM-700 is fitted with two fuses - one each for line and neutral connections. These are contained within the body of the IEC power inlet connector, behind a small plastic flap.

Note: Refer to Physical Description section for fuse data.

FOR CONTINUED OPERATOR SAFETY, ALWAYS REPLACE THE FUSES WITH THE CORRECT TYPE AND RATING.

Environmental

The CDM-700 must not be operated in an environment where the unit is exposed to extremes of temperature outside the ambient range 0 to 50°C (32° to 122°F), precipitation, condensation, or humid atmospheres above 95% RH, altitudes (un-pressurized) greater than 2000 meters, excessive dust or vibration, flammable gases, corrosive or explosive atmospheres.

Operation in vehicles or other transportable installations that are equipped to provide a stable environment is permitted. If such vehicles do not provide a stable environment, safety of the equipment to EN60950 may not be guaranteed.

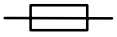
Installation

The installation and connection to the line supply must be made in compliance to local or national wiring codes and regulations.

The CDM-700 is designed for connection to a power system that has separate ground, line and neutral conductors. The equipment is not designed for connection to power system that has no direct connection to ground.

The CDM-700 is shipped with a line inlet cable suitable for use in the country of operation. If it is necessary to replace this cable, ensure the replacement has an equivalent specification. Examples of acceptable ratings for the cable include HAR, BASEC and HOXXX-X. Examples of acceptable connector ratings include VDE, NF-USE, UL, CSA, OVE, CEBEC, NEMKO, DEMKO, BS1636A, BSI, SETI, IMQ, KEMA-KEUR and SEV.

International Symbols:

Symbol	Definition		Symbol	Definition
~	Alternating Current			Protective Earth
	Fuse			Chassis Ground

Telecommunications Terminal Equipment Directive

In accordance with the Telecommunications Terminal Equipment Directive 91/263/EEC, this equipment should not be directly connected to the Public Telecommunications Network.

CE Mark

Comtech EF Data declares that the CDM-700 Modem meets the necessary requirements for the CE Mark.

RoHS Compliancy

This unit satisfies (with exemptions) the requirements specified in the European Union Directive on the Restriction of Hazardous Substances, Directive 2002/95/EC, (EU RoHS).

EMC (Electromagnetic Compatibility)

In accordance with European Directive 89/336/EEC, and European Directive 1999/5/EC (Radio Equipment and Telecommunications Equipment) the CDM-700 Modem has been shown, by independent testing, to comply with the following standards:

***EN 301 489-1 v1.4.1: 2002* Electromagnetic compatibility and Radio spectrum Matters (ERM);**
ElectroMagnetic Compatibility (EMC) standard for radio equipment and services;
Part 1: Common technical requirements

Emissions: EN 55022 Class A - Limits and methods of measurement of radio interference characteristics of Information Technology Equipment.

(Also tested to FCC Part 15 Class B)

Immunity: EN 50082 Part 1 - Generic immunity standard, Part 1: Domestic, commercial and light industrial environment.

Additionally, the CDM-700 has been shown to comply with the following standards:

EN 61000-3-2	Harmonic Currents Emission
EN 61000-3-3	Voltage Fluctuations and Flicker
EN 61000-4-2	ESD Immunity
EN 61000-4-4	EFT Burst Immunity
EN 61000-4-5	Surge Immunity
EN 61000-4-6	RF Conducted Immunity
EN 61000-4-8	Power Frequency Magnetic Field Immunity
EN 61000-4-9	Pulse Magnetic Field Immunity
EN 61000-4-11	Voltage Dips, Interruptions, and Variations Immunity
EN 61000-4-13	Immunity to Harmonics

In order that the Modem continues to comply with these standards, observe the following instructions:

- Connections to the transmit and receive IF ports (Type N or Type F connectors) should be made using a good quality coaxial cable - for example 50 Ω or 75 Ω.
- All 'D' type connectors attached to the rear panel must have back-shells that provide continuous metallic shielding. Cable with a continuous outer shield (either foil or braid, or both) must be used, and the shield must be bonded to the backshell.
- The equipment must be operated with its cover on at all times. If it becomes necessary to remove the cover, the user should ensure that the cover is correctly re-fitted before normal operation commences.

Warranty Policy

This Comtech EF Data product is warranted against defects in material and workmanship for a period of two years from the date of shipment. During the warranty period, Comtech EF Data will, at its option, repair or replace products that prove to be defective.

For equipment under warranty, the customer is responsible for freight to Comtech EF Data and all related custom, taxes, tariffs, insurance, etc. Comtech EF Data is responsible for the freight charges **only** for return of the equipment from the factory to the customer. Comtech EF Data will return the equipment by the same method (i.e., Air, Express, Surface) as the equipment was sent to Comtech EF Data.

Limitations of Warranty

The foregoing warranty shall not apply to defects resulting from improper installation or maintenance, abuse, unauthorized modification, or operation outside of environmental specifications for the product, or, for damages that occur due to improper repackaging of equipment for return to Comtech EF Data.

No other warranty is expressed or implied. Comtech EF Data specifically disclaims the implied warranties of merchantability and fitness for particular purpose.

Exclusive Remedies

The remedies provided herein are the buyer's sole and exclusive remedies. Comtech EF Data shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Disclaimer

Comtech EF Data has reviewed this manual thoroughly in order that it will be an easy-to-use guide to your equipment. All statements, technical information, and recommendations in this manual and in any guides or related documents are believed reliable, but the accuracy and completeness thereof are not guaranteed or warranted, and they are not intended to be, nor should they be understood to be, representations or warranties concerning the products described. Further, Comtech EF Data reserves the right to make changes in the specifications of the products described in this manual at any time without notice and without obligation to notify any person of such changes.

If you have any questions regarding your equipment or the information in this manual, please contact the Comtech EF Data Customer Support Department.

Chapter 1. INTRODUCTION

The Comtech EF Data CDM-700 (Figure 1-1) is High-Speed Satellite Modem, hereinafter referred to as "the modem," is intended for simplex or duplex operations with a range multi-port data interfaces. The modem operates in broadcast, circuit restoration, point-to-point and point–to-multipoint applications.

Early Rev - Chassis

Rev A or Later Chassis

Figure 1-1. CDM-700 Satellite Modem

Item	Rev A or Later Chassis	Early Rev - Chassis
1:1 and 1:N Redundancy	Supports 1:1 and 1:N Redundancy	Single Thread Only. Not Field Upgradable
Front Panel	Round Button + Arrow Keys	Diamond Shape Keys

1.1 Standard Features

The CDM-700 is a high data-rate satellite modem, intended for simplex or duplex operation. The following features are available in the modem:

- Compact: 1 RU, 22 inches (56 cm) deep with low power consumption
- (Optional) 52 to 88 and 104 to 176 MHz frequency range
- (Optional) 950 to 1950 MHz frequencies
- Combines multiple data streams into a single carrier (2.5% overhead).
- Data rate range: 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 (E3/T3/STS-1), 2 independent channels
  - ♦ CDI-50: OC-3 Interface
  - ♦ CDI-60: HSSI Interface
  - ♦ CDI-70: 10/100/1000Base-T (GbE) Ethernet Interface
- Adaptive Equalizer
- Unit Management/ M&C, Standard Features
  - ♦ Front panel keypad and vacuum florescent display
  - ♦ Ethernet 10/100 BaseT for firmware upgrades plus Telnet and SNMP device management
  - ♦ RS-232 or RS-485
  - ♦ USB1.1 Port for firmware upgrades
- Asymmetric data rates
- Standard 1.5 ppm internal reference or external reference

Notes:

1. Subsequent to Rev A chassis is require for support of 1:1 or 1:N operation.
2. Prior to Rev A chassis are not field upgradeable to support 1:1 or 1:N operation.

1.1.1 Software – Flash Upgrading

The internal software is 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, e-mail, or on disk. The upgrade can be performed without opening the unit by simply connecting either to the modem Ethernet port or the USB1.1 port

1.1.2 Turbo Product Coding (TPC)

The modem has Turbo Product Coding (TPC) available. TPC simultaneously offers increased coding gain and lowers decoding delay. The TPC rates are:

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

1.2 Major Assemblies

Table 1-1. Major Assemblies

Later Unit Part Number	Early Unit Part Number	Item (See Note 1)
PL/12000-1	PL/10012-1	Framing Card
PL/10002-1	PL/10002-1	70 / 140 MHz Modulator Card
PL/10003-1	PL/10003-1	70 / 140 Demodulator Card, 75 Ω
PL/10003-2	PL/10003-2	70 / 140 Demodulator Card, 50 Ω
PL/12113-1	PL/11230-1	L-Band Modulator Card, 50 Ω
PL/11571-1	PL/11571-1	L-Band Demodulator Card, 50 Ω
PL/10004-1	PL/10004-1	Generation 3 Turbo FEC Card

Data Interface Modules	
PL/10008-1	CDI-10, Dual E3 / T3 / STS-1 G.703 Data Interface Card
PL/11043-1	CDI-50-1, Single Mode OC-3 (Optical)/STM-1 (Copper) Interface Card
PL/11043-2 (Note 2)	CDI-50-2, Multiple Mode OC-3 (Optical)/STM-1 (Copper) Interface Card
PL/11582-1 (Note 3)	CDI-60, HSSI Interface
PL/11509-1 (Earlier Units)	CDI-70, Gigabit Ethernet Interface Card with RJ-45 female connector
PL/11509-3 (Later Units)	CDI-70, Gigabit Ethernet Interface Card with RJ-45 female connector
KT/12139-1	Blank Interface Panel

Notes:

1. Later units required for 1:1 and 1:N Redundancy. Earlier units are not field upgradeable.
2. Check with factory for availability.
3. The PL/11509-1 is upgradeable to PL/11509-3 (functionality with a reflash of PL/11509-1 card via the Gigabit Ethernet port.)

1.3 FAST and Hardware Options

The CDM-700 is extremely flexible and powerful, and incorporates a large number of optional features. Below are listed standard, hardware and FAST (software) options. A customer can order features today and upgrade later to meet needs.

Table 1-2 shows what other options are available:

Table 1-2. FAST and Hardware Options

How Installed	Description
Standard (Note 1)	**Tier 1**, Turbo Coding, QPSK, 8-PSK to 15 Msymbol/s (38.176 Mbps @ 7/8)
Fast (Note 1)	**Tier 2**, Turbo Coding, QPSK, 8-PSK to 22.5 Msymbol/s (57.264 Mbps @ 7/8)
Fast (Note 1)	**Tier 3**, Turbo Coding, QPSK, 8-PSK to 30 Msymbol/s (76.352 Mbps @ 7/8)
Fast (Note 1)	**Tier 4**, Turbo Coding, QPSK, 8-PSK to 37.5 Msymbol/s (95.440 Mbps @ 7/8)
Fast (Note 1)	**Tier 5**, Turbo Coding, QPSK, 8-PSK to 45 Msymbol/s (114.528 Mbps @ 7/8) (Fits in 54 MHz Transponder)
Fast (Note 1)	**Tier 6**, Turbo Coding, QPSK, 8-PSK to 64 Msymbol/s (155.520 Mbps @ 7/8) (Fits in 72 MHz Transponder)
Fast (Note 1)	**Tier 7**, Turbo Coding, 16-QAM with Equalizer to 15 Msymbol/s (50.901 Mbps @ 7/8)
Fast (Note 1)	**Tier 8**, Turbo Coding, 16-QAM with Equalizer to 22.5 Msymbol/s (76.352 Mbps @ 7/8)
Fast (Note 1)	**Tier 9**, Turbo Coding, 16-QAM with Equalizer to 30 Msymbol/s (101.803 Mbps @ 7/8) (Fits in 36 MHz Transponder)
Fast (Note 1)	**Tier 10**, Turbo Coding, 16-QAM with Equalizer to 37.5 Msymbol/s (127.253 Mbps @ 7/8)
Fast (Note 1)	**Tier 11**, Turbo Coding, 16-QAM with Equalizer to 45 Msymbol/s (152.704 Mbps @ 7/8)
Fast (Note 1)	**Tier 12**, Turbo Coding, 16-QAM with Equalizer to 64 Msymbol/s (155.52 Mbps @ 7/8), (Fits in 54 MHz Transponder)
Fast (Note 1)	**Tier 13**, Turbo Coding, 64-QAM with Equalizer to 64 Msymbol/s (155.520 Mbps @ 7/8) (Fits in 36 MHz Transponder)
Hardware	Tx 70/140 MHz IF With BNC 50Ω or 75Ω Impedance Tx L-Band IF with Type N Female
Hardware	Rx 70/140 MHz IF With BNC 50Ωor 75Ω Impedance Rx L-Band with Type N Female
Hardware (Note 2)	CDI-10 Dual E3 / T3 / STS-1 G.703 Data Interface Card
Hardware (Note 2)	CDI-50 Single Mode OC-3 (Optical) and STM-1 (Copper) Interface Card
Hardware (Note 2)	CDI-60 HSSI Interface Card
Hardware (Note 2)	CDI-70 1000 Base-T (GbE) Ethernet Interface

Notes:

1. Data rates are rounded. See Chapter 10, Summary of Specifications, for the full range.
2. See Chapter 3 for allowable Data Interface configurations for Slot 1 and Slot 2.

1.4 What's New in This Release

- Packet size: Increased from 1528 to 1632 bytes
- Public MIBs: Added per RFC-2233
- VLAN: Support for VLAN tagging. Added Note: VLAN is not supported in 1:1 and 1:N redundancy applications.
- Added CDI-70 Gigabit Ethernet Controls:
  - Auto Crossover: Adjust to straight through crossover cables.
  - LAN to WAN Learning Enable/Disable: Allows user selection to Enable/Disable LAN (user) to WAN (Satellite) Learning. Note: there is no WAN to LAN Learning.
  - Auto-Negotiation Report: Notifies whether 10, 100, or 1000 BaseT is active.

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Chapter 2. INSTALLATION

2.1 Unpacking

Inspect shipping containers for damage. If shipping containers are damaged, keep them until the contents of the shipment have been carefully inspected and checked for normal operation.

The modem and manual are packaged in pre-formed, reusable, cardboard cartons containing foam spacing for maximum shipping protection.

Do not use any cutting tool that will extend more than 1 inch into the container. This can cause damage to the modem.

Unpack the modem as follows:

1. Cut the tape at the top of the carton indicated by OPEN THIS END.
2. Remove the cardboard/foam space covering the modem.
3. Remove the modem, manual, and power cord from the carton.
4. Save the packing material for storage or reshipment purposes.
5. Inspect the equipment for any possible damage incurred during shipment.
6. Check the equipment against the packing list to ensure the shipment is correct.
7. Refer to the following sections for further installation instructions.

2.2 Mounting

If the CDM-700 is to be mounted in a rack, ensure that there is adequate clearance for ventilation, particularly at the sides. In rack systems where there is high heat dissipation, forced air-cooling must be provided by top or bottom mounted fans or blowers. Under no circumstance should the highest internal rack temperature be allowed to exceed 50°C (122°F).

IMPORTANT

The CDM-700 has short rear support brackets mounted to the side of the chassis - two cooling fans are mounted on the right-hand side of the unit.

2.2.1 Method A: Optional Rear-Mounting Installation Bracket

Install optional installation brackets (Figure 2-1) using mounting kit KT/6228-2:

Mounting Kit KT/6228-2 (Optional)		
Quantity	**Part Number**	**Description**
2	HW/10-32SHLDR	Screw, #10 Shoulder
4	HW/10-32FLT	Washer, #10 Flat
2	HW/10-32SPLIT	Washer, #10 Split
2	HW/10-32HEXNUT	Nut, #10 Hex
2	FP/6138-1	Bracket, Rear Support
4	HW/10-32x1/2RK	Bolt, #10 Rack Bracket

The tools required for this installation are a medium Phillips™ screwdriver and a 5/32-inch SAE Allen™ Wrench.

The CDM-700 is assembled into the equipment rack as shown in:

Step	Procedure
1	Secure the #10 shoulder screws to the unit chassis through the rear right and left side mounting slots, using the #10 flat washers, #10 split washers, and #10 hex nuts as shown.
2	Install the rear support brackets onto the equipment rack threaded rear mounting rails, using the #10 rack bracket bolts.
3	Mount the unit into the equipment rack, ensuring that the shoulders of the #10 shoulder screws properly engage into the rear support bracket slots.

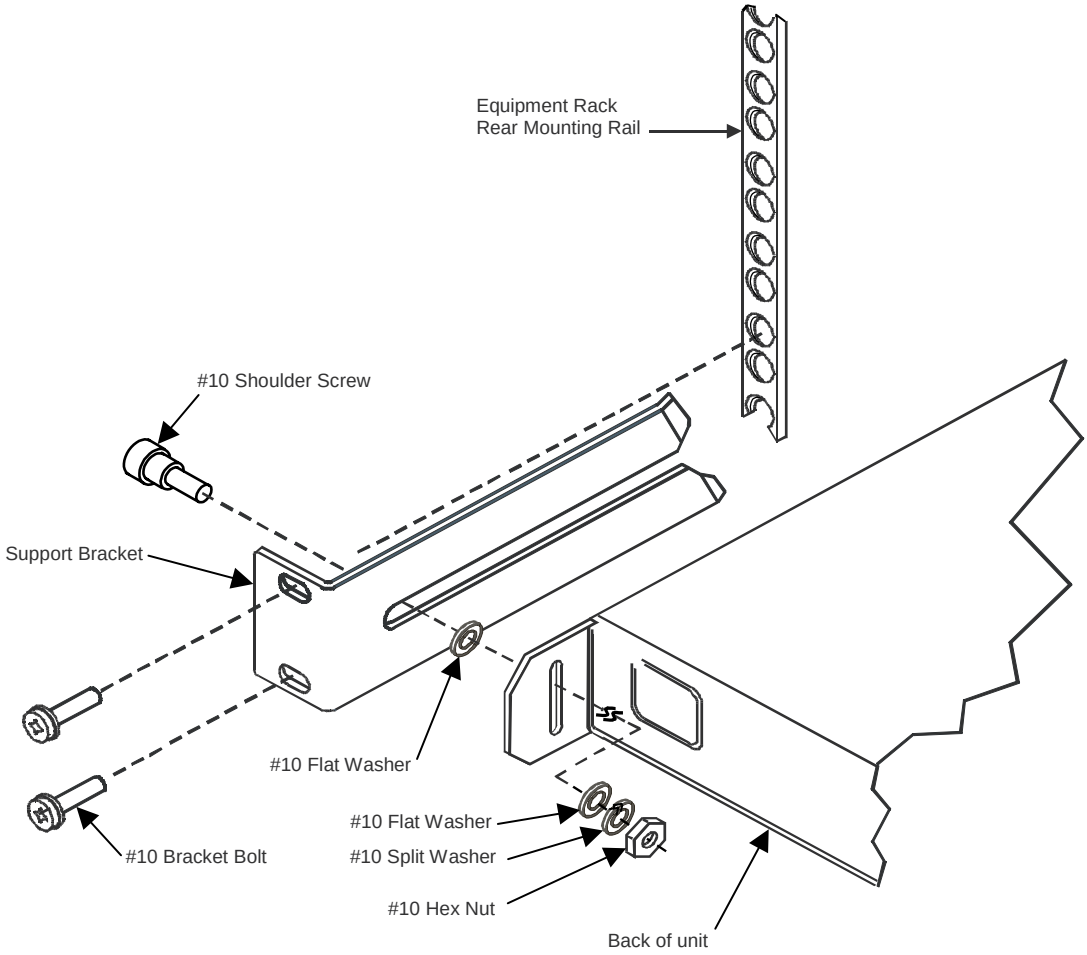


Figure 2-1. Installation of the Optional Mounting Brackets

2.2.2 Method B: Optional Installation of Side-Railings

Install optional side-railings (FP/SL0006), as follows:

Quantity	Part Number	Description
2	FP/SL0006	Side-Railings

Use standard shop tooling. Install the side-railings with customer-furnished standard shop hardware.

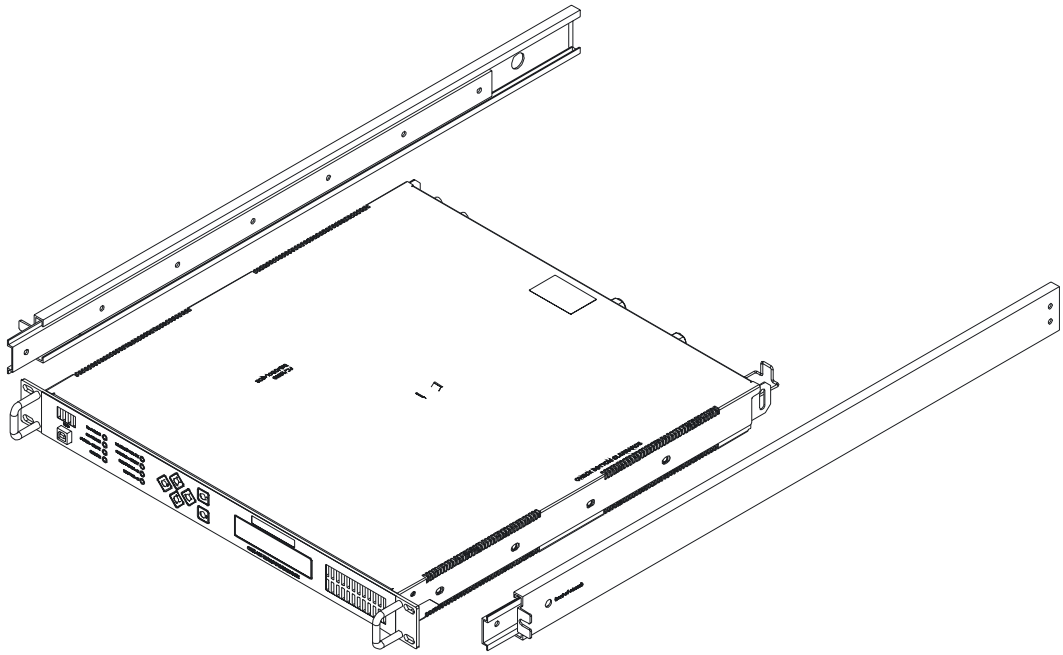


Figure 2-2. Installation of Side-Railings, FP/SL0006

Chapter 3. FUNCTIONAL DESCRIPTION

3.1 Description

The CDM-700 has two fundamentally different types of interfaces - IF and data.

- The data interface connects with the customer's equipment (assumed to be the **D**ata **T**erminal **E**quipment [DTE]) and the modem (assumed to be the **D**ata **C**ommunications **E**quipment [DCE]). The data interface is usually full duplex but the modem also operates in simplex Tx only and Rx only applications. (Note, the current version supports duplex and Rx only operation.)

- The IF interface provides interface with the satellite via the uplink and downlink equipment and will operate in full duplex or simplex modes.

Tx data is accepted by the terrestrial interface where line receivers convert the clock and data signals for further processing. A small **F**irst-**I**n-**F**irst **O**ut (FIFO) follows the terrestrial interface to facilitate various clocking selections. The clock and data are passed to the Framer Card where the data from all enabled[1] ports on the data interface are combined together in a **Mu**ltiple**x**er (Mux) and aligned into a frame structure and sent to the **F**orward **E**rror **C**orrection (FEC) encoder. In the FEC encoder, the data is differentially encoded, scrambled, and then encoded. Following the encoder, the data is fed to the modulator where Tx digital filters perform spectral shaping on the data signals. The resultant I and Q signals are then fed to the remainder of the modulator for QPSK/8-PSK/16-QAM/ 64-QAM modulation. The carrier is generated by a frequency synthesizer, and the I and Q signals directly modulate this carrier to produce an IF output signal.

[1] On all interfaces each port is enabled or disabled. An enabled port operates at the data rate programmed for that port. A disabled port is not included or zero data rate.

The Rx IF signal is digitally IF sampled, converted, demodulated and split into an in-phase (I) and a quadrature (Q) component. An **A**utomatic **G**ain **C**ontrol (AGC) circuit maintains the desired signal level constant over a broad range. After the IF sampling the processing is all digital including demodulator, phase lock loops, Nyquist filters and adaptive equalizer. The resultant demodulated signal is fed, in soft decision form, to the selected FEC decoder. After decoding, the recovered clock and data pass to the Framer card where the error corrected data stream is **Demu**ltiple**x**ed (Demux) and directed to the individual data ports of each data interface. Depending upon the type of data interface, the data passes to the Plesiochronous/Doppler buffer, which has a programmable size, or alternatively bypasses the buffer. From here, the receive clock and data signals are routed to the terrestrial interface, and are passed to the externally connected DTE equipment.

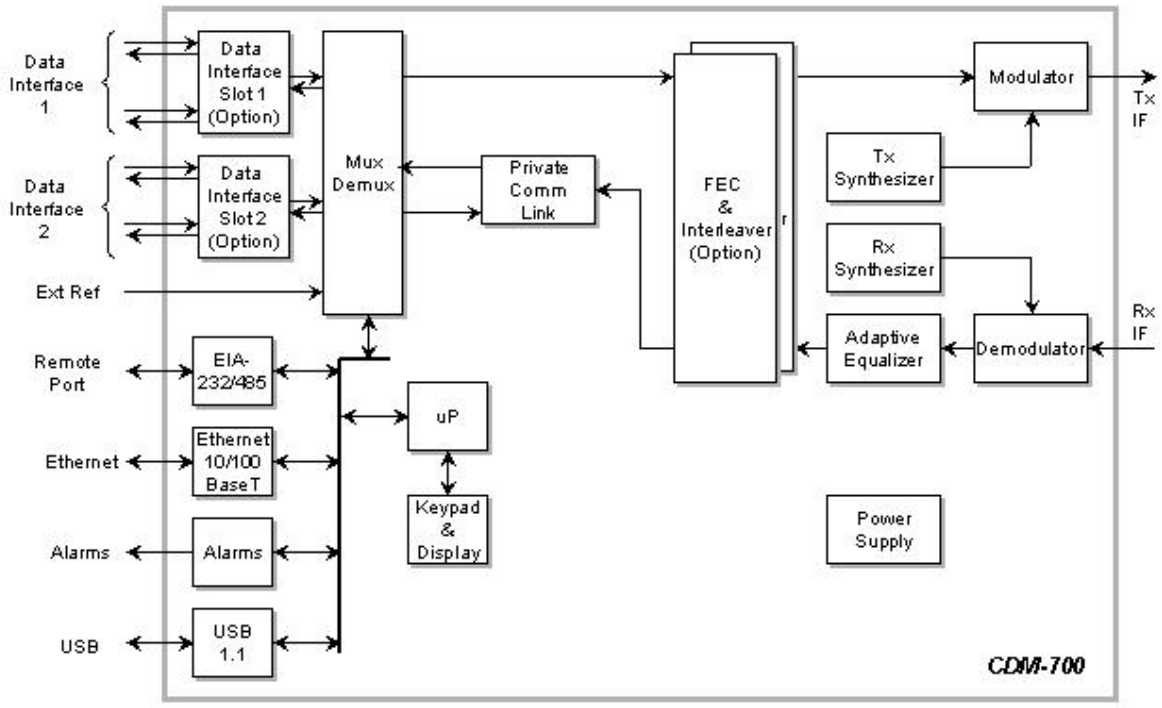
Physically the CDM-700 modem comprises several main card assemblies. Refer to Figure 3-1 for a functional block diagram.

- Data Interface: There are two slots at the rear of the modem that where accept the available data interfaces are plugged into the modem. The data interfaces are single port and multi-port type:
  - A single port interface provides a duplex path. Most are capable of simplex Tx and Rx operation as well as full duplex operation
  - A multi-port interface has more than one data interface. For example, the Dual G.703 (CDI-10) interface has two ports and each Tx/Rx port is independently programmed for E3, T3, or STS-1 operation.
- The Framer card is part of the base modem and includes the Mux/Demux and microcontroller. It also provides the remote and Ethernet ports plus the alarm interface. The keypad and display are also controlled from the framer card.
- FEC: There are two expansion slots for error correction. Currently, one is used. These slots are within the modem and require removal of the cover to access. They look similar to SIM memory modules and are located near the front of the chassis on the Framer card.
- The Modulator card (70/140 MHz or L-Band) is a plug-in board that sits atop the Framer Card.
- The Demodulator card (70/140 MHz or L-Band) also plugs into the Framer Card.

3.2 Interfaces Cards

The two interface slots and multi-port interfaces provide a simple way to use standard telecom interfaces and to fill the gap in standard data rates between 52 and 155 Mbps by multiplexing data streams together. The standard telecom interfaces are G.703, E3, T3, STS-1 and HSSI at the lower end and STM-1 or OC-3 at the top end with a large unserved range between the two ends.

Interface Card	Mbps
CDI-10 Dual E3 / T3 / STS-1 G.703 Data Interface Card	34.368 / 44.736 / 55.184
CDI-50-1 OC-3 / STM-1 Single Mode and G.703 coaxial Interface	155.52 (Fixed)
CDI-60 HSSI Interface Card	1.5 to 70
CDI-70 1000 Base-T (GbE) Ethernet Interface	1.5 to 155.52



Block Diagram Of CDM-700

Figure 3-1. CDM-700 Modem Block Diagram

Operating with multiple interfaces allows greater efficiency:

- The transponder operates with less backoff and at higher efficiency with a single-carrier and this translates into higher throughput.
- Operating with a single carrier requires fewer modems than operating with multiple carriers. The impact of one versus multiple modems in many applications is less of an impact than the monthly transponder expense, but it is part of the overall ease of operation.

For additional information see the applicable section in the manual for each interface.

3.2.1 Data Interfaces And Data Transfer Across The Link

Data into a port (a port is a Tx / Rx pair) at one end of the link is transferred to the same port at the other end. If HSSI is plugged into Slot 1 then a HSSI card is plugged into Slot 1 at the other end of the link for proper data transfer. Transfer of data between the Gigabit Ethernet card in Slot 1at the near end to the HSSI card in Slot 1 at the distant end is not allowed.

When considering 1:N redundancy refer to the CRS-300 manual to see how it is possible to mix some data interfaces within the same switch for a cost effective solution.

3.2.2 Simplex and Asymmetric Operation

The CDM-700 is available in a full duplex or Rx only configuration, and mixing of 70/140 MHz and L-Band in the same chassis is not allowed. Most of the interfaces allow turning off the Tx or Rx side of the data interface, and this configures the disabled port to 0 Mbps. The composite data rate must lie within range of the allowable range for the chosen modulation and code rate.

Asymmetric operation is allowed on most interfaces. The OC-3 / STM-1 is an exception, and it operates only at 155.52 Mbps. Asymmetric operation of the G.703 is also possible, although seldom used. Here is an example of Tx (E3) and Rx (DS3):

CDM-700 At Near End				**CDM-700 At Distant End**			
Slot 1				**Slot 1**			
Port 1		**Port 2**		**Port 1**		**Port 2**	
Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx
E3	Disable	Disable	DS3	Disable	E3	DS3	Disable

Notice the in this example data is transferred across the link to the same port and the same slot.

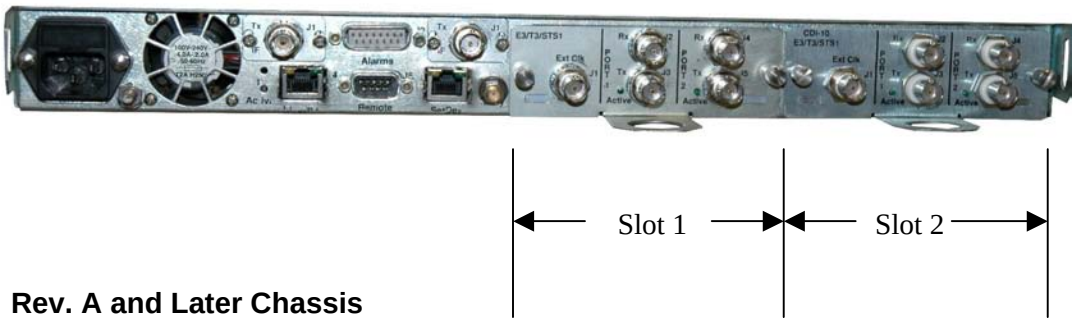
Asymmetric operation of the Gigabit Ethernet and HSSI interfaces is also allowed and simpler to configure.

3.3 Allowable Data Interfaces In Slot 1 and Slot 2

Interfaces are allowed in Slot 1 and Slot 2 as follows:

Slot 1	Slot 2
CDI-10 Dual G.703 CDI-10 Dual G.703 CDI-10 Dual G.703 CDI-10 Dual G.703	None CDI-10 (Dual G.703) CDI-60 (HSSI) CDI-70 (Gigabit)
CDI-50 OC3 (Optical Single Mode or Copper)	None
CDI-60 HSSI CDI-60 HSSI CDI-60 HSSI	None CDI-60 (HSSI) CDI-70 (Gigabit)
CDI-70 Gigabit CDI-70 Gigabit	None, CDI-70 (Gigabit)
None	CDI-10 (Dual G.703) CDI-60 (HSSI) CDI-70 (Gigabit)

Rev. – Chassis



Rev. A and Later Chassis

Figure 3-2. Rear Panel View

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Chapter 4. PHYSICAL DESCRIPTION

4.1 Introduction

The CDM-700 is constructed as a 1RU high rack-mounting chassis, which can be freestanding, if desired. Rack handles at the front facilitate removal from and placement into a rack. Figure 4-1 shows the front panel of the modem.

Prior to Rev. A

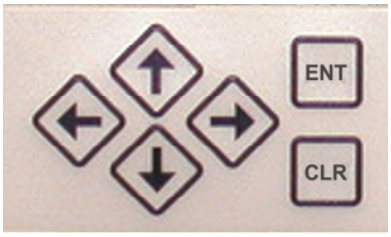
Subsequent to Rev. A

Figure 4-1. CDM-700 Satellite Modem

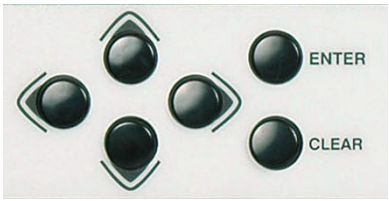
4.2 Front Panel

The CDM-700 front panel features a **V**acuum **F**luorescent **D**isplay (VFD), a keypad, and eight **L**ight-**E**mitting **D**iodes (LED) indicators. The user enters data via the keypad, and messages are displayed on the VFD. The LEDs indicate, in a summary fashion, the status of the unit.

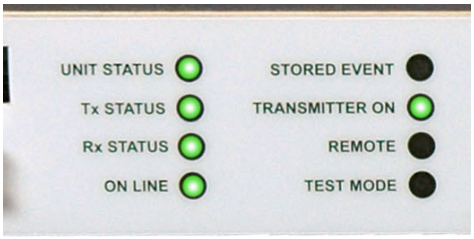
The VFD is an active display showing 2 lines, each of 24 characters. It produces a blue light, the brightness of which can be controlled by the user. It has greatly superior viewing characteristics compared to a **L**iquid **C**rystal **D**isplay (LCD), and does not suffer problems of viewing angle or contrast.



Earlier Keypad
The keypad has six individual keyswitches, mounted directly behind a fully sealed membrane overlay. They have a positive'click' action, which provides the user with tactile feedback. These six switches are identified as [↑], [↓], [→], [←] arrows, **ENT** (Enter) and **CLR** (Clear). The functions of these keys are described in the '**FRONT PANEL OPERATION'** section.



Later Keypad
Function – Same as Eariler



There are eight LEDs and one USB port on the front panel. The behavior of these LEDs is described in the '**FRONT PANEL OPERATION'** section.

4.3 Rear Panel

Prior to Rev. A

Subsequent to Rev. A

Figure 4-2. CDM-700 Rear Panel

External cables are attached to connectors on the rear panel of the CDM-700. These comprise:

- IEC Line Input connector
- Tx and Rx IF Connectors (Depends upon 70/140 MHz or L-Band)
- Data Interface connectors (depends upon installed interface)
- External Reference connector
- Ethernet
- Alarm Form C connector
- Remote Control connector (EIA-232/EIA-485)
- SerDes (private communications link)
- Form C Alarm connector
- Remote Control connector

4.3.1 IEC Line Input Connector

It also is fitted with two fuses - one each for line and neutral connections (or L1, L2, where appropriate). These are contained within the body of the connector, behind a small plastic flap.

- Use T1.75A, (slow-blow) 20mm fuses.

IMPORTANT

For continued operator safety, always replace the fuses with the correct type and rating.

4.3.2 Rx and Tx IF Connectors, J1 and J3

These connectors depend upon whether 70/140 or L-Band operation is chosen. Refer to Chapter 5.

4.3.3 10/100 Ethernet Remote Port Connector, J4

The **Ethernet** connector is a RJ45 female type.

4.3.4 SerDes (Private Communications Link), J6

The **SerDes** connector is a RJ45 female type. This connector is a private communications link and NOT for customer use.

4.3.5 External Reference Connector, J7

The **Ext Ref** (External Reference) input is a female SMA connector used to supply a master reference to the entire chassis. The clocks on the Framer Card and the Modulator and Demodulator Synthesizers are locked to this input, when it is used.

4.3.6 Alarm Form C Connector, P1

The **Alarms** connector is a 15-pin 'D' type male (DB15-M). This provides the user with access to the Form-C relay contacts, which indicate the fault status of the unit. These are typically connected to an external fault monitoring system, often found in satellite earth stations. In addition, the receive I and Q demodulator samples are provided on this connector. Connecting these signals to an oscilloscope in X,Y mode will provide the receive signal constellation diagram, which is a useful diagnostic aid. A pin also is provided which can mute the transmit carrier. This requires that the pin be shorted to ground, or a TTL ‘low’. The Renduancy feature must be disabled when using alarm connector to view I and Q samples.

As an aid to antenna pointing, or for driving step-track equipment, an analog AGC signal is provided on Pin 2 of this connector.

4.3.7 Remote Control Connector (RS-232/RS-485), P2

The **Remote Control** connector is a 9-pin 'D' type male (DB9-M). Access is provided to remote control ports of the modem, both RS-232 and RS-485.

4.3.8 Data Interface Connector

Refer to Chapter 5. Connector Pinouts and the Appendicies for applicable interface.

4.4 Dimensional Envelope

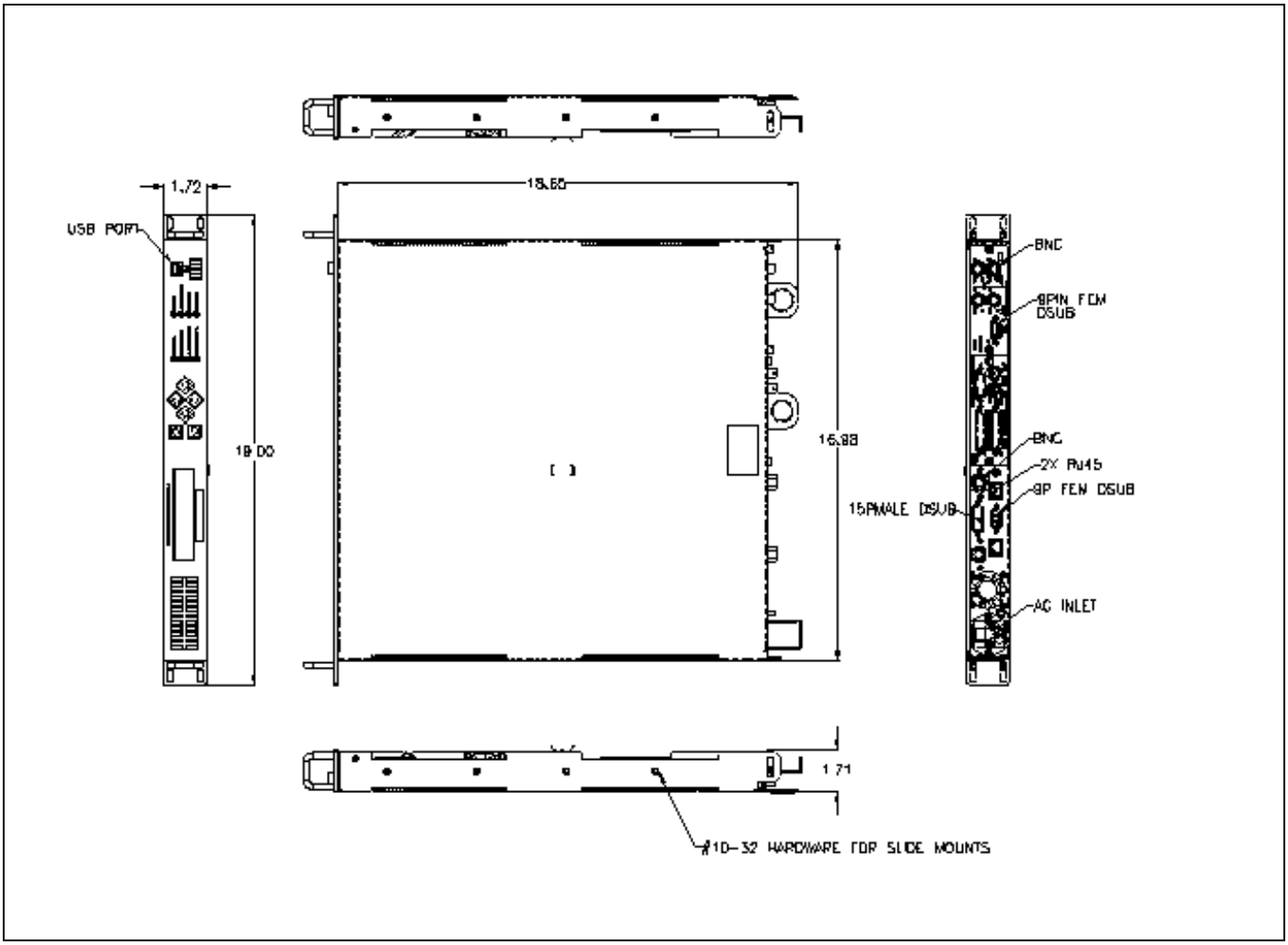


Figure 4-3. CDM-700 Dimensional Envelope (70/140 MHz)

Chapter 5. CONNECTOR PINOUTS

5.1 External Connections

External cables are attached to connectors on the rear panel of the CDM-700. These comprise: Figure 5-1 shows the rear panel of the CDM-700 along with the reference designations for the main chassis and two typical data interfaces in Slot 1 and Slot 2

Prior to Rev A (70/140 MHz)

Subsequent to Rev. A (70/140 MHz)

Figure 5-1. Chassis Rear Panel

Refer to the applicable Data Interface chapter for pinouts.

The initially released chassis and the Rev A chassis differ as follows:

Earlier Chassis	Rev A and Later Chassis
J6: RJ-45, SerDes	J6: 9 Pin D-F, Async Channel
J7: SMA-F, External Input	J7: BNC-F, External Input

Rev A chassis or later is required for support of 1:1 and 1:N operation.

Modem Rear Panel Connectors for Earlier Chassis

Name	Ref. Desig.	Connector Type	Function
Tx IF Output	J1	BNC, female	70/140 MHz IF Output
		Type N, Female	L-Band IF Output
Rx IF Input	J3	BNC, female	70/140 MHz IF Input
		Type N, female	L-Band IF Input
10/100 Ethernet	J4	RJ45, female	Ethernet Management
SerDes	J6	RJ45, female	Private communications link
Ext Ref	J7	SMA, female	External reference input
Alarm	P1	15-pin D male	Alarm connector and Form C contacts
RS232/485	P2	9-pin, D male	Remote Port
AC INPUT	NONE	IEC 320	Prime Power Input
GROUND	NONE	10-32 Stud	Grounding

Note: The chassis above does not support 1:1 or 1:N operation and is not upgradeable.

Modem Rear Panel Connectors for L-Band, Rev A and Later Chassis

Name	Ref. Desig.	Connector Type	Function
Tx IF Output	J1	BNC, female	70/140 MHz IF Output
		Type N, Female	L-Band IF Output
Rx IF Input	J3	BNC, female	70/140 MHz IF Input
		Type N, female	L-Band IF Input
10/100 Ethernet	J4	RJ45, female	Ethernet Management
Async Channel	J6	9-pin D, female	Async Engineering Channel
Ext Ref	J7	BNC, female	External reference input
Alarm	P1	15-pin D male	Alarm connector and Form C contacts
RS232/485	P2	9-pin, D male	Remote Port
AC INPUT	NONE	IEC 320	Prime Power Input
GROUND	NONE	10-32 Stud	Grounding

Note: This chassis is required for 1:1 or 1:N operation

The European EMC Directive (EN55022, EN50082-1) requires using properly shielded cables for DATA I/O. These cables are double-shielded from end-to-end, ensuring a continuous ground shield.

5.1.1 Tx / Rx Connector Pinout, J1, J3

The IF interface connectors are shown below:

Ref Des	Description	70/140 MHz	L-Band
J1	Tx-IF Output	BNC Female	Type N female
J3	Rx-IF Input	BNC Female	Type N female

5.1.2 10/100 Ethernet Management Port Connector Pinout, J4

The Ethernet management connector is a RJ45 female type.

Pin #	Description	Direction
1	Tx+	Out
2	TX-	Out
3	Rx+	In
4	N/A	
5	N/A	
6	Rx-	In
7	N/A	
8	N/A	

5.1.3 SerDes Port Connector, J6 (Initial Chassis)

RJ-45: Private communications link – not available for customer use.

5.1.4 ASYNC Connector Pinout, J6 (Rev A And Later Chassis)

9-pin D Female

Pin #	Description	Direction
1	Ground	
2	RS-232 Transmit Data	Out
3	RS-232 Receive Data	In
4	Not Used	
5	Not Used	
6	RS-485 Receive Data B *	In
7	RS-485 Receive Data A *	In
8	RS-485 Transmit Data B	Out
9	RS-485 Transmit Data A	Out

∗ **Use for 2-wire RS-485 operation**

5.1.5 External Reference Input (Main Chassis), J7

The Ext Ref (External Reference) input is a female SMA connector for the earlier chassis, and is a BNC female on Rev A or later chassis. It is used to supply a master reference to the entire chassis. The clocks on the Framer Card and the Modulator and Demodulator Synthesizers are locked to this input, when it is used.

Some data interfaces have an Ext-Clk input for synchronizing the data sources. See the individual data interface card for details.

5.1.6 Alarm Connector Pinout, P1

The Remote connector is a 15-Pin D male type, with threaded jack nuts.

Normal Mode			
Pin #	**Description**	**Name**	**Direction**
8	Rx Traffic (De-energized, Faulted)	Rx-NC	I/O
15	Rx Traffic (Energized, No Fault)	Rx-NO	I/O
7	Rx Traffic	Rx-COM	I/O
14	Tx Traffic (De-energized, Faulted)	Tx-NC	I/O
6	Tx Traffic (Energized, No Fault)	Tx-NO	I/O
13	Tx Traffic	Tx-COM	I/O
5	Unit Fault (De-energized, Faulted)	Unit-NC	I/O
12	Unit Fault (Energized, No Fault)	Unit-NO	I/O
4	Unit Fault	Unit-Com	I/O
11	Rx I Channel (Constellation Monitor)	Rx-I	O
3	Rx Q Channel (Constellation Monitor)	Rx-Q	O
10	No Connection	NC	NC
2	AGC Voltage (Rx signal level, 0-10 volts)	AGC	O
9	Ext Carrier Off	EXT-OFF	I
1	Ground	GND	Gnd

Initial modems do not support 1:1 redundancy. There is no upgrade program to support redundancy.

This mode of operation is available only in the Rev A chassis or later.

1:N (CRS-300/700) And 1:1 Mode (CRS-170A, CRS-180)			
Pin #	**Description**	**Name**	**Direction**
8	Program Relay NC	PR-NC	I/O
15	Program Relay NO	PR-NO	I/O
7	Program Relay COM	PR-COM	I/O
14	Clock Detect	Clk Det	I
6	Aux Tx Enable	Red_Out_4	O
13	No Connection	NC	NC
5	Fused -12 VDC Output (160 mA max)	-12VDC	O
12	Fused +12 VDC Output (160 mA max)	+12VDC	O
4	Online	Red_In_2	I
11	Serial Clock	Red_Out_1	O
3	Serial Data	Red_Out_2	O
10	Receive Serial Data – auxiliary channel	Red_In_3	I
2	Transmit Serial Data – auxiliary channel	Red_Out_3	O
9	Ext Carrier Off	Red_In_1	I
1	Ground	GND	Gnd

5.1.7 RS-232/485 Remote Port Connector Pinout, P2

The Remote connector is a 9-Pin D male type, with threaded jack nuts.

Pin #	Description	Direction
1	Ground	
2	RS-232 Transmit Data	Out
3	RS-232 Receive Data	In
4	Not Used	
5	Not Used	
6	RS-485 Receive Data B See Note	In
7	RS-485 Receive Data A See Note	In
8	RS-485 Transmit Data B	Out
9	RS-485 Transmit Data A	Out

Use for 2-wire RS-485 operation

5.2 Data Interfaces

Refer to the applicable Data Interface appendix for pinout information.

Chapter 6. FRONT PANEL OPERATION

6.1 Description

Figure 6-1. Front Panel View

The user can fully control and monitor the operation of the CDM-700 from the front panel (Figure 6-1), using the keypad and display. Nested menus are used, which display all available options, and prompt the user to carry out a required action.

The display has two lines each of 24 characters. On most menu screens, the user will observe a flashing solid block cursor, which blinks at a once-per-second rate. This indicates the currently selected item, digit, or field. Where this solid block cursor would obscure the item being edited (for example, a numeric field) the cursor will automatically change to an underline cursor.

If the user were to display the same screen for weeks at a time, the display could become 'burnt' with this image. To prevent this, the unit has a 'screen saver' feature, which will activate after 1 hour. The top line of the display will show the Circuit ID (which can be entered by the user) and the bottom line will show the circuit Eb/No value (if the demod is locked) followed by 'Press any key....'. The message moves from right to left across the screen, then wraps around. Pressing any key will restore the previous screen. The behavior of the front panel LEDs is described below in Table 6-1.

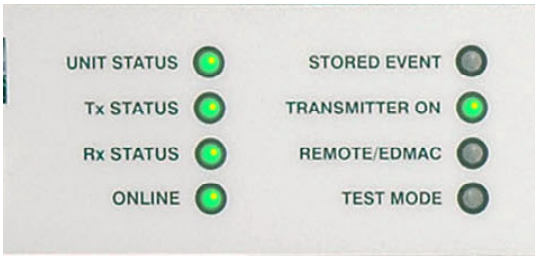


Table 6-1. Front Panel LED Indicators

LED	Color	Condition
Unit Status	Green	No Unit Faults or Alarms exists
	Orange	No Unit Faults, but a Traffic fault exists
	Red	A Unit Fault exists
Tx Status	Green	No Tx Traffic Faults or Alarms exists
	Orange	A Tx Traffic Alarm exists
	Red	A Traffic Fault exists
	Off	Unit not configured for Modulator
Rx Status	Green	No Rx Traffic Faults or Alarms exists
	Orange	A Rx Traffic Alarm exists
	Red	A Rx Fault exists
	Off	Unit not configured for Demodulator
On line	Green	The Unit is On Line, and carrying traffic
	Off	The Unit is Off Line (standby) – forced by externally connected 1:1 or 1:N redundancy system
Stored Event	Orange	There is a Stored Event in the log, which can be viewed from the front panel, or retrieved via the remote control interface
	Off	There are no Stored Events
Transmitter On	Green	Transmitter is currently on. This indicator reflects the actual condition of the transmitter, as opposed to the programmed condition.
	Off	Transmitter is currently OFF.
Remote	Green	The Unit is in Remote Communication Mode. Local monitoring is possible, but no local control
	Off	The Unit is in Local Mode – remote monitoring is possible, but no remote control
Test Mode	Green	A Test Mode is selected (Example: IF Loopback)
	Off	There is no Test Mode currently selected.

IMPORTANT

In general, the Alarm relay state will reflect the state of the Front Panel LEDs. For instance, if the Unit Status LED is red, the Unit Alarm relay will be active, etc. The one exception is the Transmit Traffic relay. This will only be activated if a Transmit Traffic Fault exists – it does not reflect the state of the Tx carrier.

The keypad is shown in Figure 6-2:

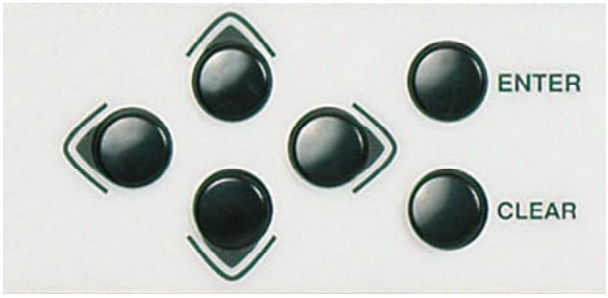


Figure 6-2. Keypad

ENTER	This key is used to select a displayed function or to execute a modem configuration change.
CLEAR	This key is used to back out of a selection or to cancel a configuration change, which has not been executed using [**ENTER**]. Pressing [**CLEAR**] generally returns the display to the previous selection.
Left, Right [←], [→]	These arrows are used to move to the next selection or to move the cursor functions. At times, they may also used to move from one section to another.
Up, Down [↑], [↓]	These arrows are used primarily to change configuration data (numbers). At times, they may also be used to move from one section to another.

IMPORTANT

The keypad has an auto-repeat feature. If a key is held down for more than 1 second, the key action will repeat, automatically, at the rate of 15 keystrokes per second. This is particularly useful when editing numeric fields, with many digits, such as frequency or data rate.

6.2 Data Rate Range

Notes:

1. For detailed data rate range, refer to the Summary of Specifications, Chapter 10.
2. The maximum range depends upon the data rate option ordered.

6.3 Menu Matrix

Para	Title	Remarks
6.4	**Opening Screen**	
6.5	**Main Menu**	**Select: Config; Monitor; Test; Info, Save/Load; Util**
6.5.1	**Config**	**Select: Remote; Tx; Rx; Intfc1; Intfc2; Ref, AUX**
6.5.1.1	Config: Remote Control: Local Control	Select: Local; Serial; Ethernet
6.5.1.2	Config: Tx	Select: Mod; Code; Freq: Data; Sym; Pwr; Scram
6.5.1.3	Config: Rx	Select: Dem; Code; Freq: Data; Sym; Descram; EbNo; Mask
6.5.1.4	Config: Intfc1 (CDI-10 Dual G.703)	Select: Alarm, Port 1, Port 2, Ext-Clk
6.5.1.5	Config: Intfc2 (CDI-10 Dual G.703)	Select: Alarm, Port 1, Port 2, Ext-Clk
6.5.1.6	Config: Intfc1 (CDI-50 OC-3)	Select: Tx, Rx, Mode
6.5.1.7	Config: Intfc1 (CDI-60 HSSI)	Select: Tx, Rx, CTS/RTS
6.5.1.8	Config: Intfc1 (CDI-70 Gigabit Ethernet)	Select: Tx, Rx, Man, Stats, SWOP
6.5.1.9	Config: Ref	Frequency Reference
6.5.1.10	Config: AUX	Select: Ena/Dis Force (1:1)
6.5.2	**Monitor**	**Select: Alarms; Rx-Params; Event-Log**
6.5.2.1	Monitor: Alarms	Select: Live Alarms; Tx; Rx; Unit
6.5.2.2	Monitor: Rx-Params	Select: Eb/No, BER, ΔF, BUF, RSL
6.5.2.3	Monitor: Stored Events	Select: View; Clear-All
6.5.3	**Test**	**Select: Norm; IF; Dig; I/O; RF; Tx-Cw; Tx-1,0**
6.5.4	**INFO**	**Select: Rem; Tx; Rx; 1:1 Intf1 Intf2**
6.5.5	**Save/Load**	**Select: Save; Load**
6.5.6	**Utility**	**Select: RT-CLK; Ref; ID; Display; Firmware; FAST**
6.5.6.1	Utility: FAST	Select: Cnfg; View

Figure 6-3. Menu Matrix

6.4 Opening Screen

This screen is displayed whenever power is first applied to the unit:

```
CDM-700 Modem
Firmware Version X.X.X
```

The bottom line displays the internal software version. Press [**ENTER**] to go to the Main Menu screen.

The following menus are presented using a CDI-10 G.703, CDI-60 HSSI, and CDI-70 GBEI Interfaces. The CDI-10 G.703 Interface is used to present all menus. The difference is noted in CONFIG: INTF1, where each interface is specifically referenced.

6.5 Main Menu

```
SELECT: Config  Monitor
Test Info Save/Load Util
```

The following choices are presented:

Config	Permits the user to fully configure the modem.
Monitor	Permits the user to monitor the alarm status of the unit, to view the log of stored events, and to display the Receive Parameters screen.
Test	Permits the user to configure the modem into one of several Test modes.
Info	Provides a summary view of key modem parameters.
Save/Load	Permits the user to save and retrieve up to 10 different modem configurations.
Util	Permits the user to perform miscellaneous functions, such as setting the Real-Time Clock, adjusting the display brightness, etc.

6.5.1 CONFIG

```
CONFIG:  Remote  Tx   Rx
Intfc1   Intfc2  Ref AUX
```

The sub-branches available are:

Remote (Remote Control)	Permits the user to define whether the unit is being controlled locally, or remotely. (see Important Note.)
Tx (Transmit)	Permits the user to define, on a parameter-by-parameter basis, the Tx configuration of the unit. These menu sub-branches would be used if the user wished to change, for example, just the Tx Frequency.
Rx (Receive)	Permits the user to define, on a parameter-by-parameter basis, the Rx configuration of the unit. These menu sub-branches would be used if the user wished to change, for example, just the RX data rate.
Intfc1 Intfc2	Permits the user to configure Interfaces plugged into Slot 1 or Slot 2 on the back of the unit. The menus change depending on then type of interface. Current initially supported types are the Dual E3/T3/STS-1 Interface and the GbE interface cards.
Ref	Permits the user to configure the source of the modem reference frequency.
AUX	Enables Redundancy. In 1:1 operation allows the online unit to force switchover.+

IMPORTANT

The modem may be monitored over the remote control bus at any time. When in Local mode, however, configuration parameters may only be changed through the front panel. Conversely, when in Remote mode, the unit may be monitored from the front panel, but configuration parameters may only be changed via the remote control bus.

6.5.1.1 Config: Remote Control: Local Remote

```
Remote Control: Local
Serial Ethernet    (◄ ► E)
```

Select **Local**, **Serial**, or **Ethernet** by using the ◄ ► arrow keys , then press [**ENTER**].

LOCAL (Selecting this enables Front Panel Control.)

If **Serial** was selected:

```
Serial Config:  Interface
Baudrate           (◄ ► E)
```

If **Interface** was selected:

```
M&C Bus Interface:    RS232
RS485-2W  RS485-4W  (◄ ► E)
```

Select **RS232**, **RS485-2W** (2-wire), or **RS485-4W** (4-wire) using the ◄ ► arrow keys, then press [**ENTER**].

Note: At this point the user will be further prompted to enter the bus address.

If **RS232** was selected:

```
In RS232 Mode the Bus
Address is fixed at 0000
```

If either **RS485 (**2W or 4W**)** was selected, the user will be further prompted:

```
RS485 Bus Address: 0001
                 (◄ ►▲▼ E)
```

Edit the **RS485** bus address of this unit. This is accomplished by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. The user should then press **ENTER**. The valid range of addresses is from 1 to 9999.

If **Baudrate** was selected:

```
Local M&C Bus Baud Rate:
 38400 Baud          (▲▼ E)
```

Edit the **Baud** rate of the remote control bus, connected locally to the M&C computer. The value is changed using the ▲ ▼ arrow keys. The user should then press [**ENTER**]. Values of 2400, 4800, 9600, 19200, 38400, and 57600 baud are possible

Note: The Asynchronous character format is FIXED at 8 data bits, 1 stop bit, and No parity (8-N-1)

If **Ethernet** was selected:

```
Ethernet Config: Gateway
Address MAC SNMP    (◀ ▶E)
```

If **Gateway** was select:

```
Ethernet IP Gateway:
192.168.001.127          (◀ ▶▲▼ E)
```

The IP Gateway address is the default address that the modem will send all IP responses when the message originated from a source outside the modems local attached network.

If **Address** was select:

```
Ethernet IP Address/Range:
010.006.030.139/16       (◀ ▶▲▼ E)
```

The operator uses this menu to set the modem's management IP address and subnet mask (range). This is the address used by external applications to access and control the modem using the SNMP, HTTP or Telnet interfaces. This also is the address used to upgrade the device firmware using FTP.

If **MAC** was select:

```
M&C Port MAC Address:
00-06-B0-00-47-12
```

This is a read only window which displays the factory program MAC address for the Ethernet management interface.

If **SNMP** was selected:

```
SNMP:  Community  Traps
               (◄ ► E)
```

This is a read only window which displays sub-menus enable setting of the destination IP address for SNMP traps.

If **Community** was select:

```
SNMP Community:
Read           (▲ ▼ E)
```

This menu is the entry point into setting the **Read**, **Write**, and **Trap** community strings used for SNMP. Use the ▲ ▼ arrow keys to toggle between **Read**, **Write**, and **Trap**. Use [**Enter**] to drop into the next level menu.

If **Read** was select:

```
Read Community: (◄ ►▲▼ E)
public
```

Edit the **Read** Community string, using the ◄ ► and ▲ ▼ arrow keys. The string is a maximum 20 characters in length. The cursor selects the position on the bottom line (◄ ►) and the character is then edited (▲ ▼). The following characters are available:

Space a-z {|}!”#$%&’()*+,-./ 0123456789 :;<>?@ and A-Z []^_`.

If **Write** was select:

```
Write Community: (◄ ►▲▼ E)
private
```

Edit the **Write** Community string, using the ◄ ► and ▲ ▼ arrow keys. The string is a maximum 20 characters in length. The cursor selects the position on the bottom line (◄ ►) and the character is then edited (▲ ▼). The following characters are available:

Space a-z {|}!”#$%&’()*+,-./ 0123456789 :;<>?@ and A-Z []^_`.

If **Trap** was select:

```
Trap Community: (◄ ► ▲ ▼ E)
comtech
```

Edit the Trap Community string, using the ◄ ► and ▲ ▼ arrow keys. The string is a maximum 20 characters in length. The cursor selects the position on the bottom line (◄ ►) and the character is then edited (▲ ▼). The following characters are available:

Space a-z {|}!”#$%&’()*+,-./ 0123456789 :;<>?@ and A-Z []^_`.

If **Trap** was select:

```
SNMP Trap IP Address:
1 2          (◄ ►E)
```

Select **1** or **2** to access/modify Trap IP Address #1 or #2, using the ◄ ► arrow keys.

If **1** was select:

```
SNMP Trap IP Address #1
000.000.000.000 (◄ ► ▲ ▼)
```

Edit the SNMP Trap Address field, using the ◄ ► and ▲ ▼ arrow keys. The cursor selects the position on the bottom line (◄ ►) and the character is then edited (▲ ▼).

If **2** was select:

```
SNMP Trap IP Address #2
000.000.000.000 (◄ ► ▲ ▼)
```

Edit the SNMP Trap Address field, using the ◄ ► and ▲ ▼ arrow keys. The cursor selects the position on the bottom line (◄ ►) and the character is then edited (▲ ▼).

6.5.1.2 Config: Tx

```
Tx: Mod Code Freq Data
Sym Pwr Scram    (◄ ► E)
```

The modem symbol rate is a function of the modulation type, code rate, and data rate. If a change to one of these parameters produces a value outside the allowable symbol rate range, the invalid symbol rate is not programmed into the modem.

For example; if the data rate is increased at one of the interfaces and the symbol rate exceeds the limit it is possible that changing the modulation type or code rate will bring the symbol rate within range.

IMPORTANT

All possible choices are presented at all times. If an option is not installed (either Hardware or FAST) or valid, the ◄ ► arrow keys will force the cursor to skip past the unavailable choice.

Config: Tx: Modulation

```
Tx Modulation: Type Inv
α              (◄ ► E)
```

Select the **Tx Modulation** Type. Use the ◄ ► arrow keys to scroll through all the choices. The user should then press [**ENTER**].

If **Type** was selected:

Config: Tx: Modulation: Type

```
Tx Mod: Q 8P  16Q  64Q
                  (◄ ► E)
```

Symbol Rate	Description
QPSK	Valid for all FEC Types
8-PSK	Valid for all FEC Types
16-QAM	Valid for all FEC Types
64-QAM	Valid for all FEC Types

If **Inv** was selected:

Config: Tx: Modulation: Inv

```
Tx Spectrum:        Normal
Inverted               (◄ ► E)
```

When **Normal** is selected the spectral sense of the carrier has the default transition to I and Q constellation points. Selecting **Inverted** causes the I and Q transition points to move in the opposite sense. The selection of the Inverted also can correct for spectral inversion in the uplink or downlink.

If α was selected:

Config: Tx: Modulation: α

```
Tx (α)  Rolloff %: 25  35
                     (◄ ► E)
```

The rolloff or α dictates how fast the spectral edges of the carrier are attenuated beyond the 3 dB bandwidth. With 25% rolloff the edge falls off more quickly than the 35%.

Config: Tx: Code Rate

```
Tx Code Rate: 3/4  7/8
                       (◄ ► E)
```

Code Rate	Description
3/4	Valid for all Modulation Types
7/8	Valid for all Modulation Types (actual 20/23)

Config: Tx: Frequency

```
Tx IF Freq: 0000.0000 MHz
                (◄ ► ▲ ▼ E)
```

Edit the **Tx IF Frequency**. This is accomplished by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. The user should then press [**ENTER**]

- 70/140 MHz. The ranges of frequencies are from 52 to 88 MHz and from 104 to 176 MHz with a resolution of 100 Hz.
- L-Band. The ranges of frequencies are from 950 to 1950 MHz. .

Config: Tx: Data Rate

```
Tx Comp Data Rate (Mbps)
000.000000                  (E)
```

Status only menu, press **ENT** or **CLR** to exit.

In the display, the Data Rate is the **Composite Data Rate**. It is the sum of data rates for all enabled Tx ports on Intfc1 and Intfc2, as measured at the data input connector (customer-interface). The **Symbol Rate** (following menu) is the rate transmitted at the Tx IF connector and corresponds to the **Composite Data Rate** plus overhead (2.5%) and includes the effects of coding and modulation.

Composite Data Rate = $\sum$ Port-Data Rates

Ports = all enabled ports for Intfc1 and Intfc2 and depends upon the interfaces installed in Slot 1 and Slot 2.

Symbol Rate = 1.025 ***Composite Data Rate** /(m *CR), where:

m = the modulation index (2 for QPSK, 2 for 8-PSK, 4 for 16-QAM, 5 for 32-QAM, 6 for 64-QAM)

CR = Code Rate (3/4, etc)

Programming of this modem is not the same as conventional modems because the architecture differs. The incorporation of an internal statistical multiplexer/demultiplexer, and the multi-port interfaces makes the configuration more consistent if the user sets the data rate for each port on the interface. The data rate for each port is programmed under the **Config: Intfc1** and **Config: Intfc2** menus.

Config: Tx: Symbol Rate

```
Tx Sym Rate:
00.000000  Msps (E)
```

Status only menu. See the description under **Config:Tx:Data Rate**. The symbol rate shown in this example is for a composite data rate of 34.368 Mbps (E3) when the modulation is QPSK and the code rate is 3/4.

Config: Tx: Pwr

70/140 MHz Only

```
Tx Power: Level
On/Off Imped          (◄ ► E)
```

Select **Level**, **On**, **Off**, or **Imped**, using the ◄ ► arrow keys. The user should then press [**ENTER**]

L-Band Only

```
Tx Power: Level
On/Off           (◄ ► E)
```

Select **Level** or **On/Off**, using the ◄ ► arrow keys. The user should then press [**ENTER**]

Config: Tx: Pwr: Level

```
Tx Output Power Level:
-24.9 dBm         (◄ ►▲▼ E)
```

Edit the **TX Power Level**. This is accomplished by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys the user should then press [**ENTER**]. Valid ranges are +5 to -20 dBm for 70/140 MHz units and -5 to -25 dBm for L-Band units.

Config: Tx: Pwr: On/Off

```
Tx Output State:    Off  On
Rx–Tx_Inhibit        (◄ ► E)
```

Select **Off**, **On**, or **Rx-TX_Inhibit**, using the ◄ ► arrow keys. The user should then press [**ENTER**].

RTI (Rx–Tx Inhibit)	Prevents the Tx carrier from being transmitted, until the demodulator is locked. To avoid the Tx Carrier from being turned Off when the demodulator loses lock for a very short period of time, the demodulator must be unlocked continuously for period of 10 seconds before the Tx carrier is inhibited. This time interval is fixed.

IMPORTANT

With this feature enabled it will not affect the internal IF Loopback feature. But, if an external IF Loopback is attempted (connecting an external cable from the Tx IF output to the Rx IF input), then this feature will not function. (The Tx carrier cannot turn On until the demodulator is locked and the demodulator cannot lock, because the Tx output is Off.) The result is that the demodulator will not lock, and the Tx carrier will not turn On.

USE THE RTI FEATURE WITH EXTREME CARE.

Config: Tx: Pwr: Imped

IMPORTANT

The Imped(ance) selection is only available when the 70/140 MHz Modulator card is installed.

70/140 MHz

```
TX Impedance: (Ohms)
50  75                (◄ ► E)
```

This menu is displayed only when the 70/140 MHz modulator is installed.

70/140 MHz	Select **50** or **75 Ω**, using the ◄ ► arrow keys, then press [**ENTER**].
L-Band	Not Applicable (Fixed **50 Ω**)

Config: Tx: Scrambler

```
Tx Scrambling: Default-On
Off                    (◄ ► E)
```

Options are:

Default-On	The proprietary scrambler is selected.
Off	No Scrambling.

The options are displayed all of the time, but the ◄ ► arrow keys will force the cursor to skip past an unavailable choice.

6.5.1.3 Config: Rx

```
Rx: Dem Code Freq Data
Sym Descrm EbNo Mask (◄ ► E)
```

The modem symbol rate is a function of the modulation type, code rate, and data rate. If a change to one of these parameters produces a value outside the allowable symbol rate range, the invalid symbol rate is not programmed into the modem.

For example; if the data rate is increased at one of the interfaces and the symbol rate exceeds the limit changing the modulation type or code rate may bring the symbol rate within range.

IMPORTANT

All possible choices are presented at all times. If an option is not installed (either Hardware or FAST) or valid, the ◄ ► arrow keys will force the cursor to skip past the unavailable choice.

Config:Rx: Dem

```
Rx Dem: Type Inv Acq α
Adap-Eq         (◄ ► E)
```

Select the **Tx Demodulation** Type. Use the ◄ ► arrow keys to scroll through all the choices. The user should then press [**ENTER**].

Config:Rx: Demod: Type

```
Rx Type: Q  8P  16Q  64Q  (◄ ► E)
```

Symbol Rate	Description
Q	Valid for all FEC Types
8P	Valid for all FEC Types
16Q	Valid for all FEC Types
64Q	Valid for all FEC Types

Config:Rx: Demod: Inv

```
Rx Spectrum: Normal
Inverted          (◄ ► E)
```

When **Normal** is selected the spectral sense of the carrier has the default transition to I and Q constellation points. Selecting **Inverted** causes the I and Q transition points to move in the opposite sense. The selection of the Inverted also can correct for spectral inversion in the uplink or downlink.

Config:Rx: Demod: Acq

```
Demod Acquisition Range:
+ /- 099 kHz       (▲▼E)
```

Edit the acquisition search range of the demodulator (the value entered here determines the amount of frequency uncertainly the demodulator will search over in order to find and lock to an incoming carrier). Editing the value is accomplished by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. The user should then press [**ENTER**].

The range varies from ± 0 kHz to ± 100 kHz.

The value entered here determines the amount of frequency uncertainty the demodulator will search over in order to find and lock to an incoming carrier.

Config:Rx: Demod: α

```
Rx (α) Rolloff %:   25   35
                    (◄ ► E)
```

The **Rolloff** or **α** dictates how fast the spectral edges of the carrier are attenuated beyond the 3 dB bandwidth. With 25% rolloff the edge falls off more quickly than the 35%.

Config:Rx: Demod: Adap-Eq

```
Rx Adaptive Equalizer:
Off On                (◄ ► E)
```

The adaptive equalizer helps correct for linear distortion in the rest of the link. Linear distortion includes amplitude and phase that would occur due to imperfect filtering effects, but it does not include distortion due to non linear amplifiers.

Config:Rx: Code Rate

```
Rx Code Rate: 3/4  7/8
                   (◄ ► E)
```

IMPORTANT

All possible choices are presented at all times. If an option is not installed (either Hardware or FAST) or valid, the ◄ ► arrow keys will force the cursor to skip past the unavailable choice.

Code Rate	Description
3/4	Valid for all Modulation Types
7/8	Valid for all Modulation Types (actual 20/23)

Config: Rx: Freq

```
Rx IF Freq: 0000.0000 MHz
                    (◄ ► ▲ ▼ E)
```

Edit the **Rx Frequency**. This is accomplished by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. The user should then press [**ENTER**].

- 70/140 MHz: The range of frequencies is from 52 to 88 MHz and from 104 to 176 MHz, with a resolution of 100 Hz.
- L-Band: The range of frequencies is from 950 to 1950 with a resolution of 100 Hz.

Config: Rx: Data Rate

```
Rx Comp Data Rate (Mbps):
000.000000        (E)
```

Status only menu. Press ENT or CLR to exit.

In the display, the Data Rate is the **Composite Data Rate (**ref to para 6.2). It is the sum of data rates for all enabled Tx ports on Intfc1 and Intfc2, as measured at the data input connector (customer-interface). The **Symbol Rate** (following menu) is the rate transmitted at the Tx IF connector and corresponds to the **Composite Data Rate** plus overhead (2.5%) and includes the effects of coding and modulation.

Composite Data Rate = $\sum$ Port-Data Rates

Ports = all enabled ports for Intfc1 and Intfc2 and depends upon the interfaces installed in Slot 1 and Slot 2.

Symbol Rate = 1.025 ***Composite Data Rate** /(m *CR), where:

m = the modulation index (2 for QPSK, 2 for 8-PSK, 4 for 16-QAM, 5 for 32-QAM, 6 for 64-QAM)

CR = Code Rate (3/4, etc)

Config: Rx: Symbol

```
Rx Comp Data Rate:
00.000000   Msps     (E)
```

Status only menu. See the description under Config:Rx:Data Rate. The symbol rate shown in this example is for a composite data rate of 34.368 Mbps (E3) when the modulation is QPSK and the code rate is 3/4.

Config: Rx: Descrambling

```
Descrambling: Default-On
Off              (◄ ► E)
```

Options are:

Default-On	The proprietary scrambler is selected.
Off	No descrambling

The options are displayed all of the time, but the ◄ ► arrow keys will be force the cursor to skip past an unavailable choice.

Config: Rx: Eb/No

```
Eb/No Alarm: Threshold
Alarm/Fault             (◄ ► E)
```

Select **Threshold** or **Alarm/Fault**, using the ◄ ► arrow keys. The user should then press [**ENTER**]

Config: Rx: EbNo: Threshold

```
EbNo Alarm Threshold:
2.0 dB              (◄ ►▲▼ E)
```

Edit the Eb/No alarm point. This is accomplished by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. The user should then press **ENTER**.

The range of values is from 0.1 to 16.0 dB. The user may select a value here, and if the Eb/No falls below this value, a receive traffic fault will be generated.

Config: Rx: EbNo: Alarm/Fault

```
EbNo Alarm:
Alarm  Fault  Mask   (◄ ►E)
```

Select choice to defining the EbNo Alarm as an Alarm or a Fault or completely Mask the alarm. This choice effects operation in 1:1 redundancy only.

Config: Rx: Mask

```
Rx Alarm Mask:
AGC  BER         (◄ ►  E)
```

Select **AGC** or **BER**, using the ◄ ► arrow keys. The user should then press [**ENTER**]

Config: Rx: Mask: AGC

```
AGC Alarm:
Active   Mask     (◄ ►E)
```

Select choice to either Activate or Mask the AGC Alarm. This choice effects operation in 1:1 redundancy only.

Config: Rx: Mask: BER

```
BER Alarm:
Active   Mask     (◄ ►E)
```

Select choice to either **Activate** or **Mask** the BER Alarm. This choice effects operation in 1:1 redundancy only.

IMPORTANT

The following specified Config:Intfc1 menu would depend on the installed interface. Config: Intfc2 is very similar to Intfc1. Interface menus are presented in an order that may not be represented of the unit.

Additional data interfaces will be added to this section as they are introduced. If an interface is not recognized, then UNKNOWN is displayed. In this case, a later version of firmware may be required to operate with the data interface.

6.5.1.4 Config: Intfc1 (CDI-10 Dual G.703)

Interface	Slot 1	Slot 2
CDI-10 Dual G.703 (E3/T3/STS1)	Installed	CDI-10 Dual G.703 or None

```
Intfc1 E3/T3/STS1: Alarm
Port1  Port 2  Ext-Clk
```

Select **Alarm, Port1, Port2** or **Ext-Clk**, using the ◄ ► arrow keys. The user should then press [**ENTER**]

There are two independent Tx/Rx port pairs on an CDI-10 G.703 Interface. There is common reference, which may be used as a Rx Buffer reference clock for either port.

Config: Intfc1: Alarm

```
Intfc1 Alarm/Fault:
Ext-Clk
```

To configure the loss of External Clock as either an Alarm or a Fault press [**ENTER**]

Config: Intfc1: Alarm: Ext-Clk

```
Intfc# Ext-Clk Alarm/Fault:
Alarm  Fault  Mask   (◄ ► E)
```

Select **Alarm**, **Fault or Mask**, using the ◄ ► arrow keys. The user should then press [**ENTER**]. This selection will effect the reporting status if the event of loss of External Clock and subsequently the switching logic when the modem is in a 1:1 redundancy configuration.

Config: Intfc1: Port1

```
Intfc1 Port1 E3/T3/STS1:
Type Line-Code Tx Rx (◄ ► E)
```

Select **Type, Line-Code, Tx** or **Rx**, using the ◄ ► arrow keys. The user should then press [**ENTER**].

Config: Intfc1: Port1: Type

```
Intfc1 Port1 Type: E3  T3
STS1  34.368 Mbps   (◄ ► E)
```

This menu allows selection port type for the interface. The selections are E3, T3, STS-1. Upon entering the menu the cursor blinks below the currently active interface and its data rate is shown:

E3	34.368 Mbps
T3	44. 768 Mbps
STS-1	51.85 Mbps

Config: Intfc1: Port1: Line-Code

```
Intfc1 Port1      E3CODE
(HDB3S):  On  Off      (◄ ► E)
```

The **Line-Code** selected depends upon the Port Type selection. The choices for E3 **HDB3** are On or Off. T3 and STS-1 choices are **B3ZS** On or Off. Selecting Off means the modem is treating the data stream as alternate-mark-inversion (AMI) or no line coding.

The menu allows enabling or disabling of the line code based upon the selected port type from an ealier menu. This menu shows the E3 Code, indicating E3 was selected in Port 1. In parenthesis is shown the applicable line code followed by the On or Off selection to enable or disable line coding. The available selections and corresponding line codes are:

E3 Code	(HDB3)
T3 Code	(B3ZS)
STS-1 Code	(B3ZS)

Config: Intfc1: Port1: Tx

```
Intfc1 Port1 Tx:  Alarms
Inv  Data  Ena/Dis     (◄ ► E)
```

Select **Alarms, Inv, Data** or **Ena/Dis**, using the ◄ ► arrow keys. The user should then press [**ENTER**].

Config: Intfc1: Port1: Tx: Alarms

```
Intfc1 Port1 Tx Alarms:
Tx-Data   Tx-AIS       (◄ ► E)
```

Select **Tx-Data** or **Tx-AIS**, using the ◄ ► arrow keys to configure each as an Alarm or Fault condition. The user should then press [**ENTER**].

Config: Intfc1: Port1: Tx: Alarms: Tx-Data

```
Tx Data Alarm:
Alarm  Fault  Mask      (◄ ► E)
```

Select **Alarm**, **Fault or Mask**, using the ◄ ► arrow keys. The user should then press [**ENTER**]. This selection will effect the reporting status if the event of detection of loss of Tx Cable and subsequently the switching logic when the modem is in a 1:1 redundancy configuration.

Config: Intfc1: Port1: Tx: Alarms: Tx-AIS

```
Tx-AIS Alarm:
Alarm   Fault  Mask    (◄ ► E)
```

Select **Alarm**, **Fault or Mask**, using the ◄ ► arrow keys. The user should then press [**ENTER**]. This selection will effect the reporting status if the detection of a Tx AIS condition and subsequently the switching logic when the modem is in a 1:1 redundancy configuration.

Config: Intfc1: Port1: Tx:Inv

```
Intfc1 Port1 Tx Data:
Normal   Inverted            (◄ ► E)
```

Select **Normal** or **Inverted**, using the ◄ ► arrow keys to control data inversion (added for compatibility with certain older equipment).

Config: Intfc1: Port1: Tx: Data

If Port1 Tx is Disabled (see next section) this menu will show the following.

```
Intfc1 Port 1 Data Rate
Tx: Disabled  (E)
```

If Port1 Tx is Enabled, This menu will show the data rate associated to this port. This is a status only window with the data being selected via the Intfc1:Port1:Type menu.

```
Intfc1 Port 1 Data Rate
Tx: 34.368000
```

Pressing **ENT** reveals the the following status menu. This display shows the **Composite Tx Data Rate** (Mbps) that is the sum of all enabled terrestrial ports. The **Symbol Rate** (Msps) is the IF Symbol Rate based on the **Composite Data Rate**, Overhead, Modulation, and Coding.

```
Comp Tx Data/Sym Rate:
034.36800/23.484800  (E)
```

Config: Intfc1: Port1: Tx: Ena/Dis

```
Intfc1 Port1 Status:
Enable Disable       (◄ ► E)
```

Select **Enable** or **Disable**, using the ◄ ► arrow keys. The user should then press [**ENTER**]. This selection is use to activiate and deactiviate the transmit side of Port1. **Disabling** the Tx port deactivates it and changes the data rate to 0.

Config: Intfc1: Port1: Rx

```
Intfc1 Port1 Rx: Alarms
Inv Data Buf Clk Ena/Dis (◄ ► E)
```

Select **Alarms, Inv, Data, Buf, Clk** or **Ena/Dis**, using the ◄ ► arrow keys. The user should then press [**ENTER**].

Config: Intfc1: Port1: Rx : Alarms

```
Intfc1 Port1 Rx Alarms:
Rx-AIS  Buffer-Slip  (◄ ► E)
```

Select **Rx-AIS** or **Buffer-Slip**, using the ◄ ► arrow keys to configure each as an Alarm or Fault condition. The user should then press [**ENTER**].

Config: Intfc1: Port1: Rx : Alarms: Rx-AIS

```
Rx-AIS Alarm:
Alarm  Fault  Mask  (◄ ► E)
```

Select **Alarm**, **Fault or Mask**, using the ◄ ► arrow keys. The user should then press [**ENTER**]. This selection will effect the reporting status if the detection of a Rx AIS condition and subsequently the switching logic when the modem is in a 1:1 redundancy configuration.

Config: Intfc1: Port1: Rx : Alarms: Buffer-Slip

```
Buffer Slip Alarm:
Alarm  Fault  Mask  (◄ ► E)
```

Select **Alarm**, **Fault or Mask**, using the ◄ ► arrow keys. The user should then press [**ENTER**]. This selection will effect the reporting status if the detection of a Buffer Slip condition and subsequently the switching logic when the modem is in a 1:1 redundancy configuration.

Config: Intfc1: Port1: Rx:Inv

```
Intfc1 Port1 Rx Data:
Normal   Inverted          (◄ ► E)
```

Select **Normal** or **Inverted**, using the ◄ ► arrow keys to control data inversion (added for compatibility with certain older equipment).

Config: Intfc1: Port1: Rx: Data

If Port1 Rx is Disabled (see next section) this menu will show the following.

```
Intfc1 Port 1 Data Rate
Rx: Disabled  (E)
```

If Port1 Rx is Enabled, This menu will show the data rate associated to this port. This is a status only window with the data being selected via the Intfc1:Port1:Type menu.

```
Intfc1 Port 1 Data Rate
Rx: 34.368000
```

Pressing **ENT** reveals the the following status menu. This display shows the **Composite Rx Data Rate** (Mbps) that is the sum of all enabled terrestrial ports. The **Symbol Rate** (Msps) is the IF Symbol Rate based on the **Composite Data Rate**, Overhead, Modulation, and Coding.

Config: Intfc1: Port1: Rx: Buffer

```
Intfc1 Port1 Rx Buffer:
Frame-Type Size ReCenter
```

Select **Frame-Type, Size** or **Recenter**, using the ◄ ► arrow keys. The user should then press [**ENTER**].

Config: Intfc1: Port1: Rx: Buffer: Frame-Type

```
Intfc1 Port1 Rx Frame:
G.751  (1536 Bits)  (▲▼ E)
```

The Frame Type and the number of bits in the frame are displayed depending upon the choice selected in the Port Type (E3/T3/STS-1) menu. For example G.751 (1536 Bits) shows the frame when the Port Type is E3. The available Frame Type / (Bits) are:

Type	Frame Type (Frame Size - Bits)
E3	None - default G.751 (1536 Bits) G.753 (2148 Bits)
T3	None - default G.752 (4760 Bits)
STS-1	None - default STS-1 (6480 Bits)

The minimum buffer size is determined by the the number of bits in the frame and the maximum buffer size is based upon the integral number of frames that can fit in the buffer memory.

Config: Intfc1: Port1: Rx: Size

```
Intfc1 Port1 Rx Buffer:
10.0 mSec (0344,064 Bits)     (▲▼ E)
```

Edit the Rx Buffer Size. This is accomplished by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. The user should then press **ENTER**.

The Rx Buffer is programmed in 0.5 ms steps rounded to the increment closest to an integral number of bits based upon the Frame Type. The maximum buffer size is:

G.751	61 ms
G.752	44 ms
G.753	61 ms
STS-1	40 ms

The Rx buffer has a minimum value of 0.5 ms (default). Selecting the minimum value and programming Rx-CLK for Rx-SAT disables the buffer and sets it to minimum.

Config: Intfc1: Port1: Rx: ReCenter

```
Intfc1 Port1 Rx Buffer:
(65%) Re-Center          (E)
```

The percentage (65%) indicates the current buffer fill status. Selecting **Re-Center** resets the buffer to the midpoint (50%).

Config: Intfc1: Port1: Rx: Clk

```
Intfc1  Port1  Rx Clk:
Rx-Sat  Tx-Terr  Ext-Clk
```

Select **Rx-Sat, Tx-Terr** or **Ext-Clk**, using the ◄ ► arrow keys. The user should then press [**ENTER**]. This selection determines which source clocks the output of the Rx Buffer for delivering data to the Rx port at the user interface.

Rx-Sat (default)	Effectively disables the Rx Buffer because the input and output clocks are the same. Normally, the Rx Buffer is set for minimum when Rx-Sat is selected.
Tx-Terr	Uses the clock from the Tx input to clock out the Rx Buffer.
Ext-Clk	Derives a clock from a signal input to the Ext-Clk connector on the E3/T3/STS-1 Interface Card.

Config: Intfc1: Port1: Rx: Ena/Dis

```
Intfc1  Port1  Rx Status:
Enable  Disable        (◄ ► E)
```

Select **Enable** or **Disable**, using the ◄ ► arrow keys. The user should then press [**ENTER**]. This selection is use to activiate and deactiviate the receive side of Port1. **Disabling** the Rx port deactivates it and changes the data rate to 0.

Config: Intfc1: Port2

```
Intfc1  Port2  E3/T3/STS1:
Type Line-Code Tx Rx (◄ ► E)
```

The menus for Port 2 are the same as those for Port 1 and are not repeated. Refer to Port 1 menus.

Config: Intfc1: Ext-Clk

```
Intfc1  Ext-Clk  Freq
1.000 Mbps        (▲▼ E)
```

The menu sets the frequency of the input to the Ext-Clk connector on the E3/T3/STS-1 Interface Card. The Ext-Clk Frequency source selections are 0 (None), 1, 2, 5, 10, 2.048, 34.368, 44.736, and 51.84 MHz. The input level ranges from 0.5 to 5.0 volts peak-to-peak.

6.5.1.5 Config: Intfc2 (CDI-10 Dual G.703)

The CDM-700 can be configured with a second CDI-10 Dual G.703 Interface board plugged into interface Slot2 (Intf2). The menus repeat except that "Intfc2" shows instead of "Intfc1".

6.5.1.6 Config: Intfc1 (CDI-50 OC-3 Interface)

The menus for the CDI-50 OC-3 optical and STM-1 copper Interface are shown in this section.

```
Intfc1  OC-3:
Tx   Rx    Mode    (◄ ► E)
```

Select **Tx, Rx** or **Mode**, using the ◄ ► arrow keys. The user should then press [**ENTER**].

Config: Intfc1: OC-3: Tx

```
Intfc1 OC-3 Tx:
Data   Ena/Dis        (◄►E)
```

Select **Data** or **Ena/Dis**, using the ◄ ► arrow keys. The user should then press [**ENTER**].

Config: Intfc1: OC-3: Tx: Data

```
Intfc1 Tx Data Rate:
155.520000 Mbps  (◄►E)
```

This is a status only menu showing the data rate of the interface. If the Tx is Disabled the data rate value will be replaced with "Disabled".

Config: Intfc1: OC-3: Tx: Ena/Dis

```
Intfc1 Tx Status:
Enable  Disable (◄►E)
```

Select **Enable** or **Disable**, using the ◄ ► arrow keys. The user should then press [**ENTER**]. This selection is use to activiate and deactiviate the Tx side of this interface. **Disabling** the Tx side deactivates it and changes the data rate to 0.

Note: Disabling the Tx side also will turn off the output power.

Config: Intfc1: OC-3: Rx

```
Intfc1 OC-3 Rx:  Data
Buf  Clk  Ena/Dis   (◄►E)
```

Select **Data, Buff, Clk** or **Mode**, using the ◄ ► arrow keys. The user should then press [**ENTER**].

Config: Intfc1: OC-3: Rx: Data

```
Intfc1 Rx Data Rate:
155.520000 Mbps
```

This is a status only menu showing the data rate of the interface. If the Tx is Disabled the data rate value will be replaced with "**Disabled**".

Config: Intfc1: OC-3: Rx: Buf

```
Intfc1 Rx Buffer:
Size  ReCenter   (◄►E)
```

Select **Size** or **ReCenter** using the ◄ ► arrow keys. The user should then press [**ENTER**].

Config: Intfc1: OC-3: Rx: Buf: SIze

```
Intfc1 Rx Buffer Size:
10.0 mSec (1555.200 Bits)   (◄►E)
```

Edit the Rx Buffer Size. This is accomplished by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. The user should then press **ENTER**.

The range of values is from 00.0 to 26.0 mSec.

Config: Intfc1: OC-3: Rx: ReCenter

```
Intfc1 Buffer Fill:
(046%)  ReCenter   (◄►E)
```

The percentage (046%) indicates the current buffer fill status. Selecting **Re-Center** resets the buffer to the midpoint (50%).

Config: Intfc1: OC-3: Rx: Clock

```
Intfc1 Rx Clock:
Rx-Sat  Tx-Terr  Internal    (◄►E)
```

Select **Rx-Sat, Tx-Terr** or **Internal**, using the ◄ ► arrow keys. The user should then press [**ENTER**]. This selection determines which source clocks the output of the Rx Buffer for delivering data to the Rx port at the user interface.

Rx-Sat (default)	Effectively disables the Rx Buffer because the input and output clocks are the same. Normally, the Rx Buffer is set for minimum when Rx-Sat is selected.
Tx-Terr	Uses the clock from the Tx input to clock out the Rx Buffer.
Internal	The **Internal Clock** comes from the modem. It is derived from either the **Ext Ref** (J7) or **Int Ref** oscillator (10 MHz) in the main part of the modem, not from the data interface.

Config: Intfc1: OC-3: Rx: Ena/Dis

```
Intfc1 Rx Status:
Enable  Disable    (◄►E)
```

Select **Enable** or **Disable**, using the ◄ ► arrow keys. The user should then press [**ENTER**]. This selection is use to activiate and deactiviate the Rx side of this interface. **Disabling** the Rx side deactivates it and changes the data rate to 0.

Config: Intfc1: OC-3: Mode

```
Intfc1 Line Mode
Optical  Coax     (◄►E)
```

Select **Optical** or **Coax**, using the ◄ ► arrow keys. The user should then press [**ENTER**].

6.5.1.7 Config: Intfc1 (CDI-60 HSSI)

The menus are shown for the HSSI Interface installed in Slot1. The CDM-700 support either a single HSSI Interface (Intfc1) or Dual HSSI interfaces (Intfc1 and Intfc2). The menu are not shown for Intfc2 but they are identical to Intfc1.

```
Intfc1  HSSI:
Tx Rx CTS/RTS    (◄►E)
```

There is a single port on an CDI-60 HSSI Interface. Select **Tx, Rx** or **CTS/RTS**, using the ◄ ► arrow keys. The user should then press [**ENTER**].

Config: Intfc1: HSSI: Tx

```
Intfc1  Tx
Data Clock Enable    (◄►E)
```

Select **Data, Clock** or **Enable**, using the ◄ ► arrow keys. The user should then press [**ENTER**].

Config: Intfc1: HSSI: Tx: Data

```
Intfc1  Tx Data:
Datarate Invert      (◄►E)
```

Select **Datarate** or **Invert**, using the ◄ ► arrow keys. The user should then press [**ENTER**].

Config: Intfc1: HSSI: Tx: Datarate

```
Intfc1  Data Rate:
Tx: 032.000000 Mbps
```

Edit the Tx Data Rate. This is accomplished by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. The user should then press **ENTER**.

The range of values is from 1.0 to 70.0 Mbps. Note that the modem Symbol Rate limits of 1.0 to 64.0 Msps makes some choices of Modulation Type, FEC Coding and Data Rate selection invalid.

Config: Intfc1: HSSI: Tx: Invert

```
Intfc1  Tx Data Invert:
Normal Inverted      (◄►E)
```

Select **Normal** or **Inverted**, using the ◄ ► arrow keys to control data inversion (added for compatibility with certain older equipment).

Config: Intfc1: HSSI: Tx: Clock

```
Intfc1  Tx Clock:
Normal  Inverted    (◄►E)
```

Select **Normal** or **Inverted**, using the ◄ ► arrow keys to control clock inversion (added for compatibility with certain older equipment).

Config: Intfc1: HSSI: Tx: Enable

```
Intfc1  Tx Enable:
Enable  Disable    (◄►E)
```

Select **Enable** or **Disable**, using the ◄ ► arrow keys. The user should then press [**ENTER**]. This selection is use to activiate and deactiviate the Tx side of this interface. **Disabling** the Tx side deactivates it and changes the data rate to 0.

Config: Intfc1: HSSI: Rx

```
Intfc1  Rx:
Data  Buffer  Clock  Enable    (◄►E)
```

Select **Data, Buffer, Clock** or **Enable**, using the ◄ ► arrow keys. The user should then press [**ENTER**].

Config: Intfc1: HSSI: Rx: Data

```
Intfc1  Rx Data:
Datarate  Invert  (◄►E)
```

Select **Datarate** or **Invert**, using the ◄ ► arrow keys. The user should then press [**ENTER**].

Config: Intfc1: HSSI: Rx: Datarate

```
Intfc1  Data Rate:
Rx: 032.000000 Mbps
```

Edit the Rx Data Rate. This is accomplished by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. The user should then press **ENTER**.

The range of values is from 1.0 to 70.0 Mbps. Note that the modem Symbol Rate limits of 1.0 to 64.0 Msps makes some choices of Modulation Type, FEC Coding, and Data Rate selection invalid.

Config: Intfc1: HSSI: Rx: Invert

```
Intfc1  Rx Data Invert:
Normal Inverted      (◄►E)
```

Select **Normal** or **Inverted**, using the ◄ ► arrow keys to control data inversion (added for compatibility with certain older equipment).

Config: Intfc1: HSSI: Rx: Buffer

```
Intfc1  Rx Buffer:
Size  ReCenter    (◄►E)
```

Select **Size** or **ReCenter** using the ◄ ► arrow keys. The user should then press [**ENTER**].

Config: Intfc1: HSSI: Rx: Buffer: Size

```
Intfc1 Rx Buffer Size:
10.0 mSec (0343,680 Bits) (▲▼◄►E)
```

Edit the Rx Buffer Size. This is accomplished by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. The user should then press **ENTER**.

The range of values is from 5.0 to 32.0 mSec in 0.1 msec increments.

Config: Intfc1: HSSI: Rx: Buffer: ReCenter

```
Intfc1 Rx Buffer Fill:
(046%) ReCenter   (◄►E)
```

The percentage (046%) indicates the current buffer fill status. Selecting **Re-Center** resets the buffer to the midpoint (50%).

Config: Intfc1: HSSI: Rx: Clock

```
Intfc1 Rx Clock:
Source  Invert    (◄►E)
```

Select **Source** or **Invert** using the ◄ ► arrow keys. The user should then press [**ENTER**].

Config: Intfc1: HSSI: Rx: Clock: Source

```
Intfc1  Rx Clock:
Rx-Sat Tx-Terr Internal   (◄►E)
```

Select **Rx-Sat, Tx-Terr** or **Internal**, using the ◄ ► arrow keys. The user should then press [**ENTER**]. This selection determines which source clocks the output of the Rx Buffer for delivering data to the Rx port at the user interface.

Rx-Sat (default)	Effectively disables the Rx Buffer because the input and output clocks are the same. Normally, the Rx Buffer is set for minimum when Rx-Sat is selected.
Tx-Terr	Uses the clock from the Tx input (TT) to clock out the Rx Buffer.
Internal	Derives a clock from the internal 10 Mhz reference clock.

Config: Intfc1: HSSI: Rx: Clock: Invert

```
Intfc1 Rx Clock Invert:
Normal  Inverted    (◄►E)
```

Select **Normal** or **Inverted**, using the ◄ ► arrow keys to control clock inversion (added for compatibility with certain older equipment).

Config: Intfc1: HSSI: Rx: Enable

```
Intfc1 Rx Enable:
Enable Disable    (◄►E)
```

Select **Enable** or **Disable**, using the ◄ ► arrow keys. The user should then press [**ENTER**]. This selection is use to activiate and deactiviate the Rx side of this interface. **Disabling** the Rx side deactivates it and changes the data rate to 0.

Config: Intfc1: HSSI: Tx: RTS/CTS

```
Intfc1 CTS/RTS:
Normal  Fault
```

Select **Normal** or **Fault** using the ◄ ► arrow keys. The user should then press [**ENTER**]. RTS is the same as TA and CTS is the same as CA. The selections operate as follows:

Normal: CTS = RTS
Fault: CTS = RTS when no fault is present. CTS is not asserted when a fault is present.

6.5.1.8 Config: Intfc1 (CDI-70 Gigabit Ethernet)

The menus for the CDI-70 Gigabit Ethernet Interface are shown in this section. There is a single RJ-45 port on CDI-70 Gigabit Interface

```
Intfc1  Gigabit Ethernet:
Tx  Rx  Man  Stats SWOP  (◄►E)
```

Select **Tx, Rx, Man**, **Stats**, or **SWOP** (**Sw**ith **Op**eration) using the ◄ ► arrow keys. The user should then press [**ENTER**].

Config: Intfc1: Gigabit Ethernet: Tx

```
Intfc1  Tx
Data Enable Alarm          (◄►E)
```

Select **Data**, **Enable**, or **Alarm** using the ◄ ► arrow keys. The user should then press [**ENTER**].

Config: Intfc1: Gigabit Ethernet: Tx: Data Rate

```
Intfc1 Data Rate:
Tx: 075.000000 Mbps        (◄►▲▼E)
```

Edit the Tx Data Rate. This is accomplished by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. The user should then press **ENTER**. The range of values is from 1.0 to 155.0 Mbps. Note that the modem Symbol Rate limits of 1.0 to 64.0 Msps makes some choices of Modulation Type, FEC Coding, and Data Rate selection invalid.

If Tx:Disable is displayed the port is turned Off (0 Mbps).

Config: Intfc1: Gigabit Ethernet: Tx: Ena/Dis

```
Intfc1 Tx Enable:
Enable  Disable        (◄►E)
```

Select **Enable** or **Disable**, using the ◄ ► arrow keys. The user should then press [**ENTER**]. This selection is use to activiate and deactiviate the Tx side of this interface. **Disabling** the Tx side deactivates it and changes the data rate to 0.

Config: Intfc1: Port1: Tx: Alarms: Tx-GBEI Cable

```
GBEI Tx Cable Alarm:
Alarm Fault Mask         (◄►E)
```

Select **Alarm**, **Fault**, or **Mask**, using the ◄ ► arrow keys. The user should then press [**ENTER**]. This selection will effect the reporting status if the event of detection of loss of GBEI Cable.

Config: Intfc1: Gigabit Ethernet: Rx

```
Intfc1 Rx:
Data  Enable           (◄►E)
```

Select **Data** or **Enable**, using the ◄ ► arrow keys. The user should then press [**ENTER**].

Config: Intfc1: Gigabit Ethernet: Rx: Data Rate

```
Intfc1 Data Rate:
Rx: 000.000000        (◄►▲▼E)
```

Edit the Rx Data Rate. This is accomplished by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. The user should then press **ENTER**.The range of values is from 1.0 to 155.0 Mbps. Note that the modem Symbol Rate limits of 1.0 to 64.0 Msps makes some choices of Modulation Type, FEC Coding and Data Rate selection invalid.

If Rx:Disable is displayed the port is turned Off (0 Mbps).

Config: Intfc1: Gigabit Ethernet: Rx: Ena/Dis

```
Intfc1 Rx Enable:
Enable  Disable        (◄►E)
```

Select **Enable** or **Disable**, using the ◄ ► arrow keys. The user should then press [**ENTER**]. This selection is use to activiate and deactiviate the Rx side of this interface. **Disabling** the Rx side deactivates it and changes the data rate to 0.

Config: Intfc1: Gigabit Ethernet: Man

```
Intfc1 Management IP:
192.168.001.001/30  (▼▲◄►E)
```

Edit the Gigabit Ethernet interface management IP address and Mask Range. This is accomplished by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. The user should then press **ENTER**.

This is the IP address that can be used for 1 of 2 purposes.

- First, PING can be used with this IP address as a diagnostic tool to ensure the interface is active and the external cabling in properly connected.
- Second, this is the IP address that will be used in the event that new firmware is provided by CEFD for the CDI-70 Gigabit Ethernet interface.

Config: Intfc1: Gigabit Ethernet: Stats

```
Intfc1 Statistics:
View   Clear        (◄►E)
```

Select **View** or **Clear**, using the ◄ ► arrow keys. The user should then press [**ENTER**].

Config: Intfc1: Gigabit Ethernet: Rx: Stats: View

```
FPGA Link Errors
   00000000000000000000    (▼▲E)
```

Use the ▲ ▼ arrow keys to scroll through all of the statistics and counters available. The statisics for the Gigabit Ethernet Interface are shown in the following table:

GBEI Statistics Summary	
1000Base-T Link Statistics	FPGA Link Errors – Indicates the number of HDLC link errors that have occurred on the Rx WAN interface FPGA Overrun Errors – Indicates the number of times that a GBEI buffer overrun has occurred in the Rx direction FPGA Rx Packets – Indicates the number of Ethernet packets received from the WAN FPGA Overflow Errors – Indicates the number of times that a GBEI buffer overrun condition has occurred FPGA Tx Packet Count – Indicates the number of Ethernet packets transmitted to the WAN LAN Good Octets (In) – The sum of lengths of all good Ethernet frames received from the LAN LAN Bad Octets (In) – The sum of lengths of all bad Ethernet frames received from the LAN LAN Unicast (In) – The sum of good frames received from the LAN that have a unicast destination MAC address LAN Broadcast (In) – The sum of good frames received from the LAN that have a broadcast destination MAC address LAN Multicast (In) – The sum of good frames received from the LAN that have a multicast destination MAC address LAN Pause (In) – The number of good flow control frames received from the LAN LAN Undersize (In) – Total frames received from the LAN with a length of less than 64 octets but with a valid FCS LAN Fragments (In) – Total frames received from the LAN with a length of less than 64 octets and an invalid FCS LAN Oversize (In) – Total frames received form the LAN with a length greater than the maximum size of octets but with a valid FCS LAN Jabber (In) – Total frames received form the LAN with a length greater than the maximum size of octets but with an invalid FCS LAN Rx Err (In) – Total frames received from the LAN for which an error was detected at the PHY

GBEI Statistics Summary	
	LAN FCS Err (In) – Total frames received from the LAN with a CRC error which was not counted in the Fragments or Rx Err totals LAN Octets (Out) – The sum of the lengths of all Ethernet frames transmitted to the LAN LAN Unicast (Out) – The sum of frames transmitted to the LAN that have a unicast destination MAC address LAN Broadcast (Out) -) – The sum of frames transmitted to the LAN that have a broadcast destination MAC address LAN Multicast (Out) -) – The sum of frames transmitted to the LAN that have a multicast destination MAC address
WAN Port Statistics	WAN Octets (Out)) – The sum of the lengths of all Ethernet frames which are forwarded to the MPEG processing logic for MPEG extraction and transmission to the WAN WAN Unicast (Out)) – The number of good frames with unicast destination MAC addresses which are forwarded to the MPEG processing logic for MPEG extraction and transmission to the WAN WAN Broadcast (Out)) – The number of good frames with broadcast destination MAC addresses which are forwarded to the MPEG processing logic for MPEG extraction and transmission to the WAN WAN Multicast (Out)) – The number of good frames with multicast destination MAC addresses which are forwarded to the MPEG processing logic for MPEG extraction and transmission to the WAN WAN Good Octets (IN) - The sum of lengths of all good Ethernet frames received from the IP encapsulation logic (which contains MPEG packets received from the WAN) WAN Unicast (IN)) – The sum of good frames received from the WAN IP encapsulation logic that have a unicast destination MAC address WAN Broadcast (IN) – The sum of good frames received from the WAN IP encapsulation logic that have a broadcast destination MAC address WAN Multicast (IN) – The sum of good frames received from the WAN IP encapsulation logic that have a multicast destination MAC address

Management Port Statistics	Mng Good Octets (In) – The sum of lengths of all good Ethernet frames received from the local GBEI management processor Mng Bad Octets (In)) – The sum of lengths of all bad Ethernet frames received from local GBEI management processor Mng Unicast (In)) – The sum of good frames received from the local GBEI management processor that have a unicast destination MAC address Mng Broadcast (In)) – The sum of good frames received from the local GBEI management processor that have a broadcast destination MAC address Mng Multicast (In)) – The sum of good frames received from the local GBEI management processor that have a multicast destination MAC address Mng Pause (In)) – The number of good flow control frames received from local GBEI management processor Mng Undersize (In) – Total frames received from the local GBEI management processor with a length of less than 64 octets but with a valid FCS Mng Fragments (In) – Total frames received from the local GBEI management processor with a length of less than 64 octets and an invalid FCS Mng Oversize (In) – Total frames received form the local GBEI management processor with a length greater than the maximum size of octets but with a valid FCS Mng Jabber (In) – Total frames received form the local GBEI management processor with a length greater than the maximum size of octets but with an invalid FCS Mng Rx Err (In) – Total frames received from the local GBEI management processor for which an error was detected by its physical interface Mng FCS Err (In) – Total frames received from the local GBEI management processor with a CRC error which was not counted in the Fragments or Rx Err totals Mng Octets (Out) – The sum of the lengths of all Ethernet frames transmitted to the local GBEI management processor Mng Unicast (Out) – The sum of frames transmitted to the local GBEI management processor that have a unicast destination MAC address

	Mng Broadcast (Out) – The sum of frames transmitted to the local GBEI management processor that have a broadcast destination MAC address Mng Multicast (Out) – The sum of frames transmitted to the local GBEI management processor that have a multicast destination MAC address

Config: Intfc1: Gigabit Ethernet: SwMode (SWOP):

This section describes the menu selections for setting up VLAN operation. When **SWOP** or Switch Operation is selected from the Gigabit Interface menu the following appears.

```
Intfc1 SWOP:
AutoCx Learning Mode  (◄►E)
```

Select AutoCx, Learning , or Mode using the ◄ ► arrow keys. Press [**Enter**].

If **AutoCx** is selected:

```
Intfc1 Auto Crossover:
Enable Disable  (◄►E)
```

If **Enabled**, the gigabit ethernet interface automatically detects the type of connection and configures the interface appropriately: straight-through (MDI) or crossover (MDIX).

If **Disabled**, the gigabit ethernet port is configured as an MDI.

If **Learning** is selected:

```
Intfc1 Learning:
Enable Disable  (◄►E)
```

Learning is an Ethernet switch function that allows the LAN side (or user side) of the Gigabit Ethernet port to learn the MAC addresses of the equipment connected to the Gigabit port. If Learning mode is enabled the hub thinks the remote site network nodes are local to the hub site network and does not send the traffic over the outbound carrier to the remote site.

Learning applies only to the LAN (user) side of the port. There is no learning on the WAN (modem) side of the Gigabit Ethernet port.

If **Enabled**, the interface is in LAN-to-WAN learning mode, and the GBEI learns connections based on source MAC addresses and ingress ports. After selecting **Enabled** press [**ENTER**] and then cycle power.

If **Disabled**, the GBEI passes all packets from the LAN to the WAN. After selecting press [**ENTER**] and then cycle power.

Note: Once the learning mode is set **Enabled** or **Disabled** make sure power is cycled.

```
Intfc1:Switch Mode:
Normal VLAN_     ◄►E
```

Select **Normal** or **VLAN** using the ◄ ► arrow keys. The user should then press [**ENTER**]. The unit supports two modes of operation:

1. Normal - [Simple bridge], all packets pass unchanged, including **VLAN** tagged packets.
2. VLAN - **VLANs** can be configured on the unit.

The user may add 32 **VLANs** with IDs from 1 to 4094. The following attributes are supported to be associated with each **VLAN**.

VLAN	Tag	Direction	Comment
1… 4094	N - Native	Lan -> WAN	Only one per port. Only applies to packets from the LAN. Management traffic is specified by the Management Port PVID.
1… 4094	M - Management	END -> LAN END -> WAN LAN -> END WAN -> END	Only one per table. Defaults to 1 and can be changed to any valid entry. Will strip all packets going to the Endstation and will add the appropriate tag entry for all packets leaving the Endstation.
1…4094	T - Tagged	WAN-> LAN LAN -> WAN	If the VLAN of the packet arriving from the WAN or LAN matches the VLAN tag, the packet passes unchanged.
1… 4094	U - Untagged	WAN -> LAN	Configuring a VLAN with this attribute will identify the LAN port as a member of the VLAN. The LAN frame will be removed and the packet will go out untagged.

Use the ▼▲arrow keys on the front panel to scroll active **VLANs**.

VLAN	Attribute	Remarks
0001	Native	Add
0001	Management	Add
VLAN ID = n	Tagged/Untagged	Delete

Config: Intfc1: Gigabit Ethernet: SwMode:VLAN

```
VLAN   Attribute
0001    NATIVE   Add
```

Scroll, using the ▼▲arrow keys to view **VLANs** in the table.
To Edit the **VLAN ID** of **NATIVE VLANs**

Press [**ENTER**] and use the ▼▲ arrow keys to change the **NATIVE VLAN ID**.

Notes:

1. The Native **VLAN** cannot be deleted from the table and the attribute cannot be edited.
2. All untagged/tagged packets arriving at the LAN port will be tagged (four byte **VLAN** "frame" will be added) with the configured **VLAN ID**.
3. If the port is in "**Native**" mode, any packet arriving from the WAN that matches this **VLAN ID**, will have the **VLAN** tag removed and passed out the Ethernet.
4. If the port is in "**Native**" mode and the packet does not match the **PVID**, the **VLAN** table must be checked to determine if the packet should pass.
5. If the port is set to "tagged" mode, then the **VLAN** table is referenced to determine if the packet should pass.

```
VLAN   Attribute
0001   MNGMENT  Add
```

Press [**ENTER**] and use the ▼▲ arrow keys to change the **MNGMENT VLAN ID**.

Note: The **Management VLAN** cannot be deleted from the table and the attribute cannot be edited.

Config: Intfc1: Gigabit Ethernet :VlanCfg:VLAN

The **Add** Menu can be accessed from the scrolling to the **NATIVE** or **MANAGEMENT VLANs**.

```
VLAN   Attribute
0001    NATIVE    Add
```

Press [**ENTER**]. Select **Add** using the ◄ ► arrow keys.
Press [**ENTER**]. The following display will appear.

```
VLAN  Attribute
0000  TAGGED
```

Adjust **VLAN ID Number** using the ▼▲arrow keys.
Select **Attribute** using the ◄ ► arrow keys.
The user can toggle between **TAGGED** and **UNTAGGED** Attributes using the ▼▲arrow keys.

```
VLAN  Attribute
0003  UNTAGGED
```

Press [**ENTER**].
The **VLAN ID** will be **Added** and the Vlan Table Updated .
Editing VLAN : Select VLAN using the ▼▲arrow keys to scroll the **VLAN** selections.

```
VLAN  Attribute
0002  TAGGED   Del
```

Press [**Enter**].
Use the ▼▲ and ◄ ► arrow keys to edit the **VLAN ID** and the **Attribute**.
Press [Enter] key at the **VLAN** or the **Attribute** cursor position and the **VLAN ID** and **Attribute** will be updated in the table.
The edited **VLAN ID** will be removed from the table.

Edit Attribute:

Scroll to the **VLAN** in the table using the ▼▲ keys.
Press **[ENTER].**
Select Attribute using the ◄ ► arrow keys.
Use the ▼▲ arrow keys to edit the **Attribute TAGGED** or **UNTAGGED**.

```
VLAN  Attribute
0002  TAGGED   Del
```

Press [**Enter**] the **VLAN** and it's **Attribute** will be updated in the table.

Config: Intfc1: Gigabit Ethernet: VlanCfg:VLAN:Del
Scroll to the **VLAN** in the table using the ▼▲ **keys**.
Press [**ENTER**].

Select **Del** using the ◄ ► arrow keys. Press [**ENTER**].

```
VLAN   Attribute
0003    TAGGED  Del
```

The following display will appear.

```
Delete PVID? Yes NO
0003   TAGGED
```

Select **Yes or No** using the ◄ ► arrow keys. Press [**ENTER**].

- If Yes is selected the **PVID** will be deleted and the VLAN table updated .
- If No is selected the **PVID** will not be deleted.

6.5.1.9 Config: Ref

```
Frequency Reference:
Internal 10 MHz              (▲▼ E)
```

Select either **Internal 10 MHz**, or the **External 1, 2, 5, 10, 20 MHz** using the ▲ ▼ arrow keys. The external reference is applied to J7, Ext Ref, on the main chassis, not a data interface module.

6.5.1.10 Config: AUX

```
Redundancy Mode:
Ena/Dis  Force(1:1)    (◄►E)
```

Ena/Dis (Enable/Disable) leads to another menu to enable the modem for 1:1 or 1:N operation. The **Force (1:1)** selection is only available for usewith a 1:1 switch to force switchover.

Note: VLAN Redundancy is not supported.

```
Redundancy Mode Ena/Dis:
Enable Disable    (◄►E)
```

Select **Enable** for opration of the unit in 1:1 or 1:N redundancy configurations, and then press [**ENTER**].

```
Press ENT to Force Modem
To Standby (1:1) Only    (E)
```

This menu only works with a 1:1 switch, and only from the modem that is currently Online. The modem that is online is indicated by the Online LED on the front of the modem. Pressing **[ENTER]** causes switchover.

6.5.2 Monitor

```
Monitor: Alarms     RX-Params
Event-Log
```

Select **Alarms, RX_Params,** or **Event-Log** using ◄ ► arrow keys, then press [**ENTER]**.

6.5.2.1 Monitor: Alarms

```
Live Alarms:   Transmit
Receive   Unit       (◄ ► E)
```

IMPORTANT NOTE: The CDM-700 uses a system of ***Fault Prioritization.*** In each category of fault, only the ***highest priority*** fault is displayed. For instance, if the demodulator is unlocked, it is irrelevant if there are other receive faults present. If the demodulator then locks, but there is a fault of a lower priority present, this will then be displayed. This also holds true for the faults reported via the remote control. This system cuts down significantly on unwanted and irrelevant fault reporting. A comprehensive list of faults is shown at the end of this section.

Select **Unit**, **Receive**, or **Transmit** using the ◄ ► arrow keys, then press [**ENTER]**. Depending on the choice , one of the following menus will be shown:

Monitor: Alarms: Transmit

```
TX Traffic: Tx Synth
Unlocked            (E)
```

The screen will indicate if there are any Transmit Traffic Faults. If not, it will display '**None**'. Pressing **[ENTER]** takes the user back to the previous menu.

Monitor: Alarms: Receive

```
RX Traffic:
Demod Unlocked     (E)
```

The screen will indicate if there are any Receive Traffic Faults. If not, it will display '**None**'. Pressing **[ENTER]** takes the user back to the previous menu.

Monitor: Alarms: Unit

```
Unit Fault: FPGA Temp
Framer  Card          (E)
```

The screen will indicate if there are any Unit Faults. If not, it will display '**None**'. Pressing **[ENTER]** takes the user back to the previous menu.

LISTING OF PRIORITIZED FAULTS:

Unit Faults:

1) FPGA Load Framer Card
2) +1.5V PSU Framer Card
3) +1.5V PSU Interface Card #1
4) +1.5V PSU Interface Card #2
5) +3.3V PSU Framer Card
6) +5V PSU Framer Card
7) +12V PSU Framer Card
8) -12V PSU Framer Card
9) +18V PSU Framer Card
10) FLASH Checksum Error
11) FPGA Load FEC Card #1
12) FPGA Load FEC Card #2
13) FPGA Load Interface Card #1
14) FPGA Load Interface Card #2
15) PLL Clock Framer - 192 MHz
16) PLL Clock Framer - Ext Ref
17) FPGA Temp Framer Card
18) Modem Ambient Temp
19) Modem Cooling Fans
20) Intfc1 has been removed
21) Intfc2 has been removed
22) 1:1 Switch not present

Tx Traffic status:

1) +1.5V PSU Modulator Card
2) FPGA Load Modulator Card
3) PLL Clock Symbol Rate
4) Tx Synth Unlocked
5) Tx DCM Unlocked
6) I & Q are Inactive
7) FPGA Temp Modulator Card
8) Nyq Filter Clipping
9) Tx Data No Sig Slot1 Port1
10) Tx Data No Sig Slot1 Port2
11) Tx Data No Sig Slot2 Port1
12) Tx Data No Sig Slot2 Port2
13) Tx AIS Slot1 Port1
14) Tx AIS Slot1 Port2
15) Tx AIS Slot2 Port1
16) Tx AIS Slot2 Port2
17) Tx Clock Loss Slot1
18) Tx Clock Loss Slot2
19) Port FIFO TxFifo Empty Slot1
20) Port FIFO TxFifo Empty Slot2
21) Port FIFO TxFifo Full Slot1
22) Port FIFO TxFifo Full Slot2
23) ASI Port Tx Data Loss Slot1
24) ASI Port Tx Data Loss Slot2
25) PECL Frame Unlocked Slot1
26) PECL Frame Unlocked Slot2
27) ASI Frame not Sync'ed Slot1
28) ASI Frame not Sync'ed Slot2
29) SerDes Par Intf1->Framer
30) SerDes Par Intf2->Framer
31) SerDes Par Framer->FEC1 (ENC)
32) SerDes Par Framer->FEC2 (ENC)
33) SerDes Par FEC1 (ENC)->Framer
34) SerDes Par FEC2 (ENC)->Framer
35) SerDes Par Framer->Mod
36) Ext Ref (at J7) Fault

Rx Traffic status:

1) +1.5V PSU Demodulator Card
2) FPGA Load Demodulator Card
3) Demod Unlocked
4) FEC #1 Unlocked
5) FEC #2 Unlocked
6) Deframer Unlocked
7) Deframer Tributaries Unlock
8) FPGA Temp Demodulator Card
9) BER limit exceeded
10) AGC Level Out of Range
11) Eb/No limit exceeded
12) Deframer Trib. Packet Dump
13) SerDes Par Demod->Framer
14) SerDes Par Framer->FEC1 (DEC)
15) SerDes Par Framer->FEC2 (DEC)
16) SerDes Par FEC1 (DEC)->Framer
17) SerDes Par FEC2 (DEC)->Framer
18) SerDes Par Framer->Intf1
19) SerDes Par Framer->Intf2
20) Rx Buffer Slip Slot1 Port1
21) Rx Buffer Slip Slot1 Port2
22) Rx Buffer Slip Slot2 Port1
23) Rx Buffer Slip Slot2 Port2
24) Rx Buffer Underflow 1:1
25) Rx Buffer Underflow 1:2
26) Rx Buffer Underflow 2:1
27) Rx Buffer Underflow 2:2
28) Rx Buffer Overflow 1:1
29) Rx Buffer Overflow 1:2
30) Rx Buffer Overflow 2:1
31) Rx Buffer Overflow 2:2
32) Rx AIS Sat Data Slot1 Port1
33) Rx AIS Sat Data Slot1 Port2
34) Rx AIS Sat Data Slot2 Port1
35) Rx AIS Sat Data Slot2 Port2
36) No Ext Clk Slot1 Port1
37) No Ext Clk Slot1 Port2
38) No Ext Clk Slot2 Port1
39) No Ext Clk Slot2 Port2
40) Demodulator Synth 1 PLL
41) Demodulator Synth 2 PLL

6.5.2.2 Monitor: Rx-Params

If the user selects **Rx-Params**, the following sub-menu is displayed:

```
Eb/No >19.5dB  BER=1.0E-10
ΔF= +0.0k  Buf=48  RSL=-39
```

If the demodulator is locked, this screen shows the following:

Eb/No	This shows the value of Eb/No calculated by the demodulator. The value referred to here is the energy per information bit (Ebi), divided by the noise spectral density (No).
BER	This is an estimate of the corrected BER.
ΔF	The frequency offset of the received carrier, in kHz, with a displayed resolution of 100 Hz.
Buf	(Buffer fill state) This shows the fill state (in percent), of the receive Buffer. After a reset, it will read 50. A value <50 indicates that the buffer is emptying, and >50 indicates that it is filling.
RSL	(Receive Signal Level) A value in dBm, indicating the input power of the desired carrier, as seen by the demodulator. If the signal level is below the AGC range of the demod, this will display RSL <-99

If the demodulator is not locked, this screen shows the message **'Demod: Not Locked**', but continues to display the receive signal level. Pressing **ENTER** or **CLEAR** will take the user back to the previous menu.

```
Demod: Not Locked
             RSL=-+00
```

6.5.2.3 Monitor: Stored Events

If the user selects **Stored Events**, the following sub-menu is displayed:

```
Stored Events:      View
Clear-All            (◄ ► E)
```

Select **View** or **Clear-All**, using the ◄ ► arrow keys, then press **[ENTER]**.

Monitor: Stored Events: View

```
Log000  09/02/07  12:29;11
Info  -Power OFF     (▲▼ E)
```

The user may scroll backwards or forwards through the entries in the event log, using the ▲ ▼ arrow keys. Pressing **[ENTER]** or **[CLEAR]** will take the user back to the previous menu. The event log can store up to 255 events. When a fault condition occurs, it is time-stamped and put into the log. Similarly, when the fault condition clears, this also is recorded.

Monitor: Stored Events: Clear All

If the user selects **Clear-All**, the following screen is displayed:

```
Clear All Stored Events:
No  Yes              (◀ ▶ E)
```

If the user selects **Yes**, the event log is cleared, and the user is taken directly back to the previous menu. However, if there are faults present on the unit at this time, they will be re-time-stamped, and new log entries will be generated.

Note that **in accordance with international convention**, the date is shown in DAY-MONTH-YEAR format.

6.5.3 Test

The CDM-700 supports many useful test modes. Not all modes are available in all configurations. They depend upon the modem configuration (Duplex, Rx-Only, Tx-Only) and the data interface(s).

```
Test: Norm     IF↵  Dig↵   I/O↵
RF↵   Tx-CW  Tx-1,0   (◀ ▶ E)
```

Select **Norm, IF Loop, Dig Loop, I/O Loop, RF Loop, Tx-CW** or **Tx-1.0** using ◀ ▶ arrow keys, then press **ENTER**.

Norm	This clears any test modes or loopbacks and places the unit back into an operational state.
IF	This test mode invokes an internal IF loop (Figure 6-4). This is a particularly useful feature, as it permits the user to perform a quick diagnostic test without having to disturb external cabling. Furthermore, all of the Rx configuration parameters are temporarily changed to match those of the Tx-side. When Norm is again selected, all of the previous values are restored.
Dig	This test mode invokes a digital loopback (Figure 6-4), which loops data at the output of the encoder on the Tx-side, back into the Reed-Solomon decoder on the Rx-side. This tests all of the interface, Tx baseband circuits, FEC encoder, FEC decoder, and buffer.
I/O	This test mode invokes two distinct loopbacks (Figure 6-4). The first Loopback is an inward loop, which takes data being received from the satellite direction, and passes it directly to the modulator. Simultaneously, the outward loop is invoked, whereby data being fed to the Tx data interface is routed directly back out of the Rx data interface.
RF	This RF loop (Figure 6-4)) is almost identical to the IF loop mode. All of the Rx configuration parameters (except Rx Spectrum Invert) are temporarily changed to match those of the Tx-side, however, no internal connection is made. This is useful for performing a satellite Loopback. When Norm is again selected, all of the previous values are restored.
Tx-CW	This is a test mode, which forces the modulator to transmit a pure carrier (unmodulated).
Tx-1,0	This is a test mode, which forces the modulator to transmit a carrier modulated with an alternating 1,0,1,0 pattern, at the currently selected symbol rate. This causes single sideband spectral lines to appear, spaced at ± half the symbol rate, about the carrier frequency. This mode is used to check the carrier suppression of the Modulator. Also, it verifies gradrature and amplitude balance.

Note: Available loopbacks depend upon modem configuration and the data interface(s) installed.

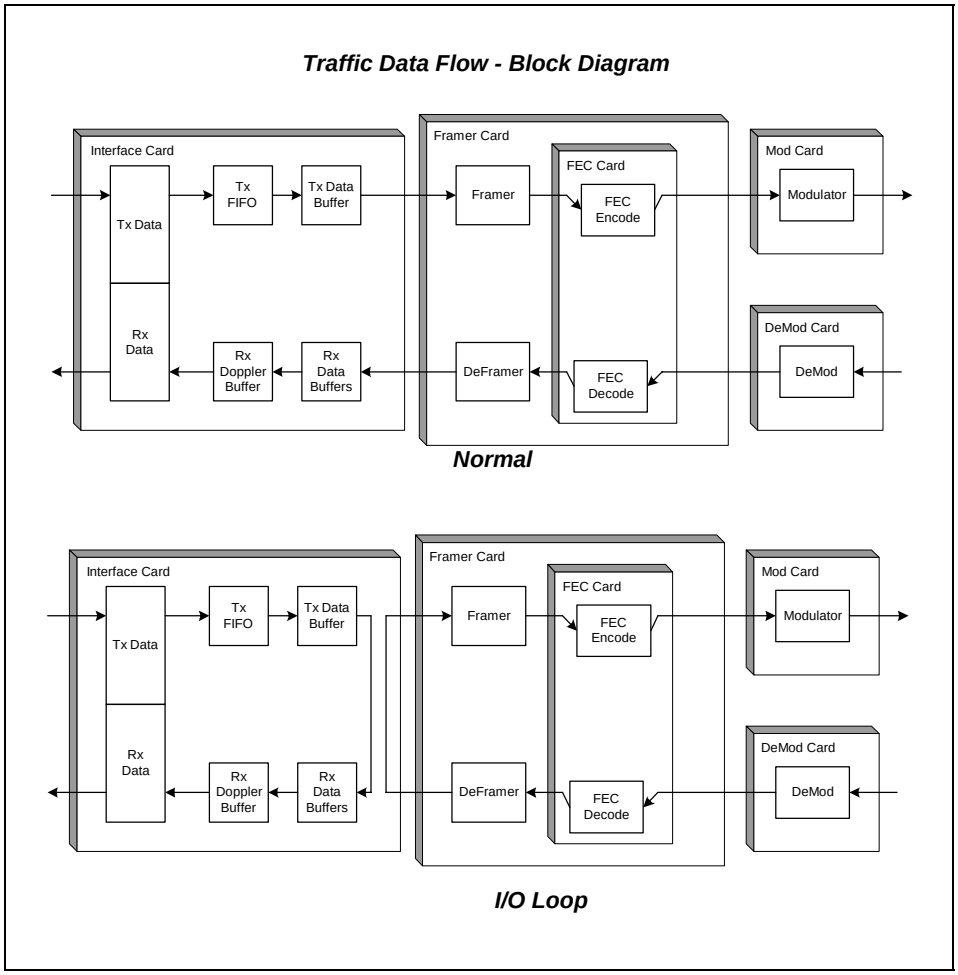


Figure 6-4. Loopback Diagrams

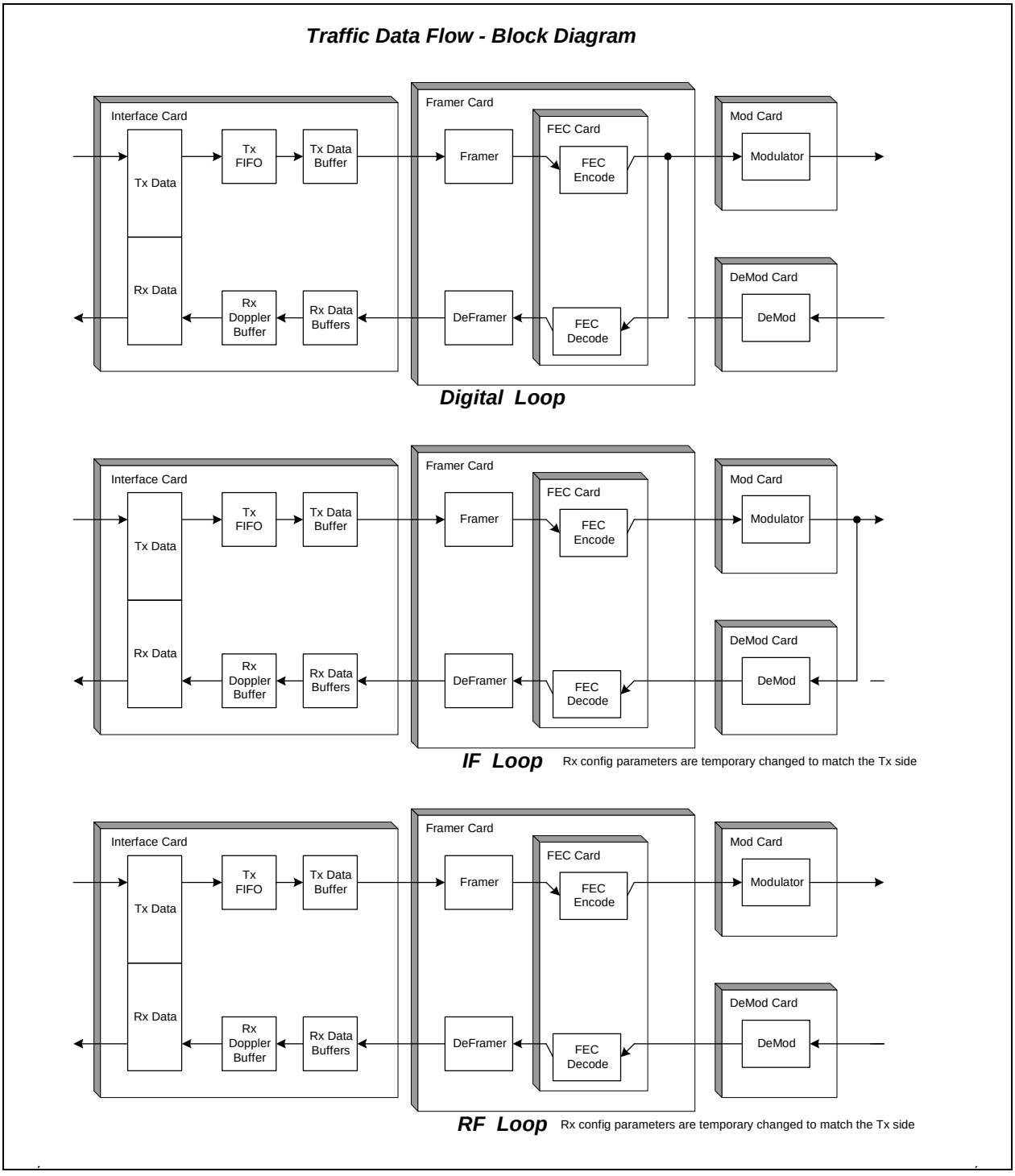


Figure 6-4. Loopback Diagrams (Continued)

6.5.4 Info

```
INFO: Rem     Tx  Rx
1:1  Intf1     Intf2
```

Note: INFO screens display information on the current configured of the modem without risking inadvertent changes.

Info:Rem

If **REM** was selected:

```
Remote M&C: 100BaseTx
010.006.030.139
```

If the modem is in Remote Mode, the physical interface type (RS232, RS485-2W or RS485-4W), device address and baud rate will be displayed as shown below:

```
Remote M&C: RS232
Address: 0000  9600 Baud
```

If the modem is in Ethernet Remote Mode, the following menu will be displayed:

```
Remote M&C: 100BaseTx
IP Addr: 010.006.030.177
```

Info: TX

```
0000.0000 000.000000 TUR
64  7/8 S     -24.9 OF N
```

A sample display of **Tx** Info is shown. The information displayed here is as follows:

Top Line: **Tx Frequency** **Data Rate** **FEC Encoder**	 Composite Tx Data Rate TUR = Turbo
Bottom line: **Modulation Type** **Code Rate** **Scrambler State** **Clocking Mode** **Output Power** **Tx Output State** **TSI State**	 Q= QPSK, 8=8-PSK, 16=16-QAM, or 64=64-QAM 3/4, 7/8 S = Scrambler On, N = Scrambler Off INT = Internal, EXT = External, LOP = Loop Level ON = on, OF = Off, EO = external off 1 = Transmit Spectral Inversion on, N = Off

Info: Rx

```
0000.0000 000.000000 TUR
64  7/8  D     +- 99k   N
```

A sample display of RX Info is shown. The information displayed here is as follows:

Top line: **Rx Frequency** **Data Rate** **FEC Decoder Type**	 Composite Rx Data Rate TUR = Turbo
Bottom line: **Demodulation Type** **Code Rate** **Descrambler State** **Clocking Mode** **Demod Sweep** **Acquisition Range** **RSI State**	 Q=QPSK, 8=8-PSK, 16=16-QAM, or 64=64-QAM 3/4, 7/8 D = Descrambler On, N = Descrambler Off SAT = Buffer Disabled, BUF = Buffer Enabled I = Receive Spectral Inversion on, N = Off

Info: 1:1

```
Redundancy State:
Serial 1:1 Link: ONLINE
```

This menu indicates if the modem is Online or Offline. It echoes the Online LED indication on the front panel.

Info: Intf1
Intf2

E3T3STS1 Interface

Port 1 Tx Enable Rx Enable.
Poet 2 Tx Enable Rx Enable.

```
P1:11
P2:00
```

```
Info Under Development
HSSI
```

```
Infor Under Development
OC3
```

Gigabit Interface

```
GBEI AutoNegotiation
Not Resolved
```

This menu indicates if the modem is **Resolved**, **Duplex**, **Speed**, or **Not Resolved**.

```
GBEI: AutoNegotiation
Half Duplex  1000 Mbps
```

GBEI Tx or Rx Not Enabled

```
GBEI AutoNegotiation
```

```
GBEI AutoNegotiation
Not Resolved
```

	Description
Resolved	Whether or not Speed and Duplex has been resolved. Note: If GBEI Tx or Rx is Off, this is always blank.
Duplex	Duplex: This is only valid if Resloved.
Speed	Speed: Only valid if resolved. 10Mbps 100Mbps 1000 Mbps

Info: Intf 2

```
Intf 2: Card
          Not Available
```

6.5.5 Save/Load

6.5.5.1 Save/Load:Configuration

```
Save/Load Configuration:
Save  Load            (◄ ► E)
```

Select **Save** or **Load**, using ◄ ► arrow keys, then press ENTER.

These sub-menus permit the user to store or load up to 10 different modem configurations in a non-volatile memory of the modem.

Save/Load: Configuration: Save

```
Save Config to Loc: 0
Empty                (▼ ▲ E)
```

Command causes the unit to store the current modem configuration in Configuration Memory location.

Save/Load: Configuration: Load

```
Load Config to Loc: 0
13:12:46  24/08/04   (▼ ▲ E)
```

Command causes the unit to retrieve a previously stored modem configuration from Configuration Memory location.

6.5.6 Utility

```
UTIL: RT-Clk Ref ID
Display Firmware FAST
```

Utility: RT-Clk

```
Edit Real-Time Clock:
13:19:57  09/02/07 (◄ ► ▲ ▼ E)
```

Edit the time and date settings of the real-time clock. This is accomplished by selecting the digit to be edit, using the ◄ ► arrow keys. The value of the digit is then changed using ▲ ▼ arrow keys. The user should press ENTER.

Note: In accordance with international convention, the date is shown in **DAY-MONTH-YEAR** format.

Utility: Ref

```
Internal 10 MHz Ref Freq
Fine Adjust:+0000
```

This is used to fine tune 10 MHz reference frequency.
The range is +2000 counts to -2000 counts.

Utility: ID

```
Edit Circuit ID:   (◄ ► ▲ ▼ E)
ABCDEFGHIJKLMNOPQRSTUVWX
```

Edit the **Circuit ID** string, using the ▲ ▼ ◄ ► arrow keys. Only the bottom line is available (0 to 24 characters). The cursor selects the position on the bottom line (◄ ►) and the character is then edited (▲ ▼). The following characters are available:

Space ( ) * + - , . / 0-9 and A-Z

When the user has composed the string, press [**ENTER]**.

Utility: Display

```
Edit Display Brightness:
100%                    (▲▼ E)
```

Edit the **Display Brightness**, using the ▲ ▼ arrow keys. The user should then press [**ENTER**].

Utility: Firmware

```
Firmware Images:
Info  Select            (◀ ▶ E)
```

Select **Info** or **Select**, using the ◀ ▶ arrow keys. The user should then press [**ENTER**].

Utility:Firmware: Info

```
Firmware Info: Bootrom
Image#1  Image#2
```

Select **Bootrom, Image#1** or **Image#2**, using the ◀ ▶ arrow keys. The user should then press [**ENTER**]. The CDM-700 contains two complete main bulk images plus a single bootrom software. This design allows the user to have two different versions of the firmware always available. See **Info:Select** below for details on how to confige and select each image.

Note: The following information is representative. Actual status is viewed in the modem menu.

Utility:Firmware: Info:	
BootRom	**Bootrom: 09/09/04** **CDM7XX_Boot 1.0.1**
Image#1	**Image#1: Bulk App Framer** **FEC Mod Demod Interfaces**
Utility:Firmware: Info: Image#1	
Bulk	**Bulk: 01/08/07** **FW10236H**
App	**App: 02/08/07** **FW10238F**
Framer	**Framer: 06/09/06** **FW10240C**
FEC	**Image#1 FEC:** **Turbo**
FEC Image	**FEC1 Image: 09/03/04** **FW10248 1.0.1**
Modulator	**Image#1 Modulator:** **Filters Modulator**
Filters	**Mod Filters: 8/31/04** **FW12176- 1.0.1**
Modulator FPGA	**Modulator: 05/16/06** **FW10242D 1.0.4**
Demodulator	**Image#1 Demodulator:** **Filters UDD Equalizer**
Filters	**Demod Filt: 11/18/03** **FW12145 1.0.1**
UDD	**Demod UDD: 03/17/06** **FW10244A 1.0.1**
Equalizer	**Demod EQ: 02/23/04** **FW10246 1.0.1**
Utility:Firmware: Info: Image#1	
Interfaces	**Image#1 Interfaces:** **E3T3 Gigabit OC-3 HSSI**
E3T3	**E3T3 Intfc: 03/21/06** **FW10249A 1.0.1**
Gigabit Ethernet	**GbE1 Intfc: 12/02/05** **FW11509D 1.1.5**
OC-3	**OC-3 Intfc: 02/23/06** **FW11043 1.1.1**
HSSI	**HSSI Intfc: 09/15/06** **FW11582B 1.0.3**

Utility: Firmware: Select

```
Current Active Image:  #1
Next Reboot Image: #1  #2
```

Select **#1** or **#2**, using the ◄ ► arrow keys. The user should then press [**ENTER**]. The next time the CDM-700 is re-booted the selected image will be loaded.

6.5.6.1 Utility: FAST

FAST is the way to enable new options in the modem. Obtain the FAST code for the new option from Comtech EF Data.

```
FAST:Cnfg View (H/W 0.03)
MainBoard S/N: 123456789
```

The FAST menu allows the user to either **Configure** (enter) a new FAST code into the unit or to enable Demo Mode, or to **View** which options are currently installed. Select **Cnfg** or **View** using the ◄ ► arrow keys, then press **ENTER**.

In addition, the user is also presented with the Hardware Revision Number, and the Main Board Serial Number. This Serial Number is a unique indentifier for the FAST upgrade process (and is different from the Chassis Serial Number) and is required to obtain a new FAST code from the factory.

```
FAST:Cnfg View
MainBoard S/N 333333333
```

Select **Cnfg** or **View**, using the ◄ ► arrow keys. The user should then press [**ENTER**].

Utility: FAST: Configuration

If the user selects **Cnfg**, then the following menu is displayed:

```
FAST Configuration:
Edit Code   Demo Mode  (◄ ► E)
```

Utility: FAST: Configuration: Edit Code

If the user selects **Edit Code**, then the following menu is displayed:

```
Edit  20 digit FAST Code:
00000000000000000000       (ENT)
```

Enter the code carefully. Use the ◄ ► arrow keys to move the cursor to each character. Use the ▲ ▼ arrow keys to edit the character, then press **ENTER**. The modem will respond with "Configured Successfully" if the new FAST option has been accepted as shown below.

Utility: FAST: Configuration: Demo Mode

If the user selects **View**, then the following menu is displayed:

```
FAST Demo Mode: Off  On
XXXXXX seconds remaining
```

Use the ◄ ► arrow keys to move the cursor to select **Off** or **On**. When **On**, the second line will display the number of seconds remaining available for the free Demo Mode. When enabled, Demo Mode allows access to ALL CDM-700 FAST options for 604800 seconds (7 full days). Demo Mode may be turned on and off an unlimited number of time until the 604800 seconds have expired. The seconds count only decrements when the mode is On. When the Demo period expires the following menu is displayed:

```
FAST Demo Mode: Off  On
  Demo Period Expired
```

IMPORTANT

CHANGING THE STATE OF DEMO MODE WILL CAUSE THE MODEM FIRMWARE TO REBOOT. ALSO, IF DEMO MODE IS ENABLED AND THE TIMER EXPIRES THE MODEM FIRMWARE WILL REBOOT.

Utility:FAST: View

If the user selects **View**, then the following menu is displayed:

```
View Options: 01      (▲▼ E)
Mod CCA           Installed
```

Use the ▲ ▼ arrow keys to scroll through each Option Number in turn. As the cursor highlights each option, the description of the option will be displayed on the bottom line, along with the information “Installed or Not Installed”. The options are shown in the following table:

Option Number	Option Type	Displayed Code	Description
01	Hardware	Mod CCA	Modulator Board Installed
02	Hardware	Demod CCA	Demodulator Board Installed
03	Hardware	TURB FEC1	Turbo FEC board installed in Slot#1
04	Hardware	Fec Slot2	Unistalled (Slot not available)
05	Hardware	Intfc #1	Installed or Uninstalled in Slot #1
06	Hardware	Intfc #2	Installed or Uninstalled in Slot #2
07	FAST	Tx QPSK	QPSK Enabled or Disabled
08	FAST	Tx 8PSK	8PSK Enabled or Disabled
09	FAST	Tx 16-QAM	16-QAM Enabled or Disabled
10	FAST	Tx 64-QAM	64-QAM Enabled or Disabled
11	FAST	Rx QPSK	QPSK Enabled or Disabled
12	FAST	Rx 8PSK	8-PSK Enabled or Disabled
13	FAST	Rx 16-QAM	16-QAM Enabled or Disabled
14	FAST	Rx 64-QAM	64-QAM Enabled or Disabled
15	FAST	Tx < 15.0 MS	Operation to 15.0 MS Enabled or Disabled
16	FAST	Tx < 22.5 MS	Operation to 22.5 MS Enabled or Disabled
17	FAST	Tx < 30.0 MS	Operation to 30.0 MS Enabled or Disabled
18	FAST	Tx < 37.5 MS	Operation to 37.5 MS Enabled or Disabled
19	FAST	Tx < 45.0 MS	Operation to 45.0 MS Enabled or Disabled
20	FAST	Tx Full Rate	Full Data Rate Enabled or Disabled
21	FAST	Rx < 15.0 MS	Operation to 15.0 MS Enabled or Disabled
22	FAST	Rx < 22.5 MS	Operation to 22.5 MS Enabled or Disabled
23	FAST	Rx < 30.0 MS	Operation to 30.0 MS Enabled or Disabled
24	FAST	Rx < 37.5 MS	Operation to 37.5 MS Enabled or Disabled
25	FAST	Rx < 45.0 MS	Operation to 45.0 MS Enabled or Disabled
26	FAST	Rx Full Rate	Full Data Rate Enabled or Disabled

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Chapter 7. FORWARD ERROR CORRECTION OPTIONS

7.1 Introduction

As standard, the CDM-700 Modem is equipped with two internal expansion slots to house Forward Error Correction (FEC) encoders/decoders. Currently a Turbo Product Coding (TPC) codec card with encoder and decoder is available that operates over the modem's full range of data and symbol rates.

- The TPC Codec provides data rate capability up to 155 Mbps and operates at Rates 3/4, and 7/8.

For high data rate applications TPC offers Eb/No performance superior to Viterbi or concatenated Viterbi and Reed Solomon coding, and the later technology is not offered.

7.2 Turbo Product Codec

Turbo coding is an FEC technique developed within the last few years, which delivers significant performance improvements compared to more traditional techniques. Two general classes of Turbo Codes have been developed, **T**urbo **C**onvolutional **C**odes (TCC), and **T**urbo **P**roduct **C**odes (TPC, a block coding technique). Comtech EF Data has chosen to implement an FEC codec based on TPC. A TPC is a 2 or 3 dimensional array of block codes. Encoding is relatively straightforward, but decoding is a very complex process requiring multiple iterations of processing for maximum performance to be achieved.

Unlike the popular method of concatenating a R-S Codec with a primary FEC codec, TPC is an entirely stand-alone method. It does not require the complex interleaving/de-interleaving of the R-S approach, and consequently, decoding delays are significantly

reduced. Furthermore, the traditional concatenated R-S schemes exhibit a very pronounced threshold effect – a small reduction in Eb/No can result in total loss of demod and decoder synchronization. TPC does not suffer from this problem – the demodulator and decoder remain synchronized down to the point where the output error rate becomes unusable. This is considered to be a particularly advantageous characteristic in a fading environment. Typically, in QPSK, 8-PSK and 16-QAM TPC modes the demod and decoder can remain synchronized ***2 – 3 dB below*** the Viterbi/R-S or TCM cases.

The CDM-700, Comtech now provides one of the best FEC technologies currently available. For high data rate operation the higher code rates are preferred to minimize the required bandwidth. This offering provides the range of TPC code rates in combination with QPSK, 8-PSK, 16-QAM and 64-QAM modulation.

7.2.1 Range of Data Rates

Note: For a detailed Data Rate Range refer to the Summary of Specifications, Chapter 10.

For additional information on composite data rate see paragraph 7.2.2.

7.2.2 Eb/No, Spectral Efficiency and Occupied Bandwidth

Configuration of this modem differs from conventional modems because the architecture uses an internal statistical multiplexer to combine multiple data inputs together to a single stream. With the multi-port interfaces data rate determination is more consistent if the user sets the data rate for each port on the interface. With the multiple ports it is necessary to first determine the composite data rate, then include the framing overhead, code rate and modulation to arrive at the symbol rate, and from this the occupied bandwidth is found. These are found as follows:

Composite Data Rate = **Σ Ports**

Ports = The data rate for all enabled ports for Interface 1 (Intfc1) and Interface 2 (Intfc2), and depends upon the interfaces installed in Slot 1 and Slot 2. Disabled ports have a data rate of zero. The data rate for each port is programmed under the Config Intfc1 and Config Intfc2 menus.

Symbol Rate = **1.025** x **Composite Data Rate** / (**m** x **CR**), where

1.025 = the framing overhead
m = 2 for QPSK, 2 8PSK, 4 16-QAM, 5 32-QAM, 6 64-QAM
CR = code rate: 3/4, 7/8 (20/23 actual), 0.95 (17/18 actual)

Occupied Bandwidth = 1.19 x **Symbol Rate**, for 35% Rolloff
= 1.15 x **Symbol Rate**, for 25% Rolloff
= 1.12 x **Symbol Rate**, for 20% Rolloff (example only)

The occupied bandwidth is the bandwidth between -10 dB points of the power spectral density.

Table 7-1 provides the Eb/No, spectral efficiency and occupied bandwidth for the 70/140 MHz, CDM-700. L-Band CDM700 will satisfy the 100 MHz composite data rate column.

Table 7-1. Eb/No, Spectral Efficiency and Occupied Bandwidth

Mode	Eb/No at BER = 10^{-5} Guaranteed (Typical in parentheses)	Eb/No at BER = 10^{-8} Guaranteed (Typical in parentheses)	Spectral Efficiency (bps / Hz)	Symbol Rate	Occupied * Bandwidth for 50 Mbps Composite Data Rate (25% Rolloff)
QPSK Rate 3/4 Turbo	3.9 dB (3.4 dB)	4.2 dB (3.7 dB)	1.46 bps/Hz	0.68 x bit rate	39.292 MHz
QPSK Rate 7/8 Turbo	4.4 dB (3.9 dB)	4.6 dB (4.1 dB)	1.70 bps/Hz	0.59 x bit rate	33.889 MHz
8-PSK Rate 3/4 Turbo	6.7 dB (6.2 dB)	7.0 dB (6.5 dB)	2.20 bps/Hz	0.46 x bit rate	26.194 MHz
8-PSK Rate 7/8 Turbo	7.3 dB (6.8 dB)	7.6 dB (7.1 dB)	2.55 bps/Hz	0.39 x bit rate	22.593 MHz
16-QAM Rate 3/4 Turbo	7.7 dB (7.2 dB)	8.0 dB (7.5 dB)	2.93 bps/Hz	0.34 x bit rate	19.646 MHz
16-QAM Rate 7/8 Turbo	8.3 dB (7.8 dB)	8.5dB (8.0 dB)	3.39 bps/Hz	0.29 x bit rate	16.945 MHz
64-QAM Rate 3/4 Turbo	12.0 dB (11.5 dB)	12.3 dB (11.8 dB)	4.39 bps/Hz	0.23 x bit rate	13.097 MHz
64-QAM Rate 7/8 Turbo	12.6 dB (12.1 dB)	12.9 dB (12.4 dB)	5.09 bps/Hz	0.20 x bit rate	11.296 MHz

* The occupied bandwidth is defined at the width of the transmitted spectrum taken at the -10 dB points on the plot of power spectral density. This equates to 1.15 x symbol rate for the CDM-700 transmit filtering.

7.3 End-to-End Processing Delay (Latency)

In many cases, FEC methods that provide increased coding gain do so at the expense of increased processing delay. However, with TPC, this increase in delay is very modest. Also, the effects of delay are more problematic at low data rates and generally negligible at higher data rates.

Delay for the Gigabit Ethernet and HSSI interface are shown in Figure 7-1 and Figure 7-2 with the Rx Buffer (HSSI) at minimum. In packet networks minimum Rx Buffer is the normal setting. Expected performance for the G.703 interface is similar to HSSI.

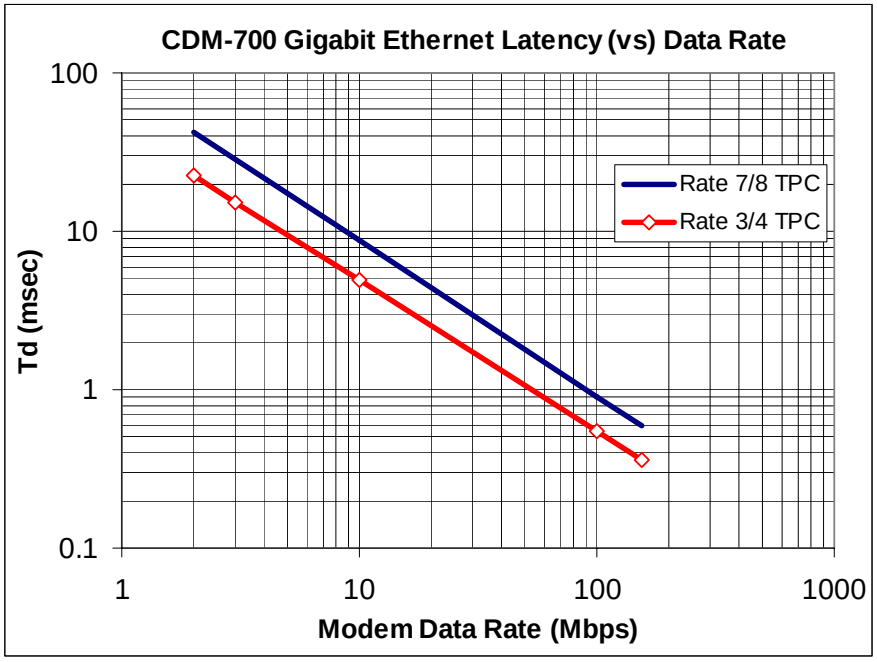


Figure 7-1. CDM-700 Gigabit Ethernet Latency With Modem In IF Loopback

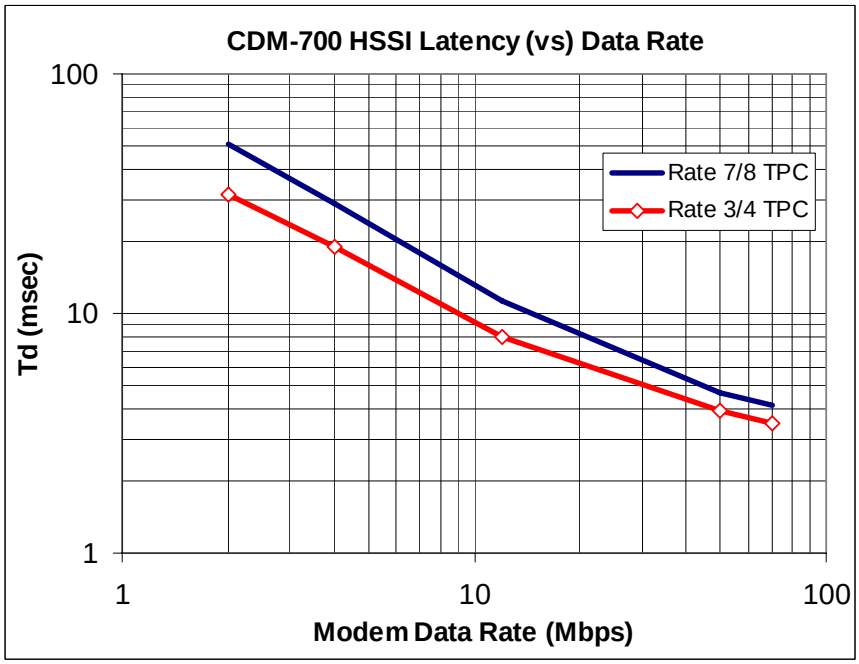


Figure 7-2. CDM-700 HSSI Latency With Modem In IF Loopback

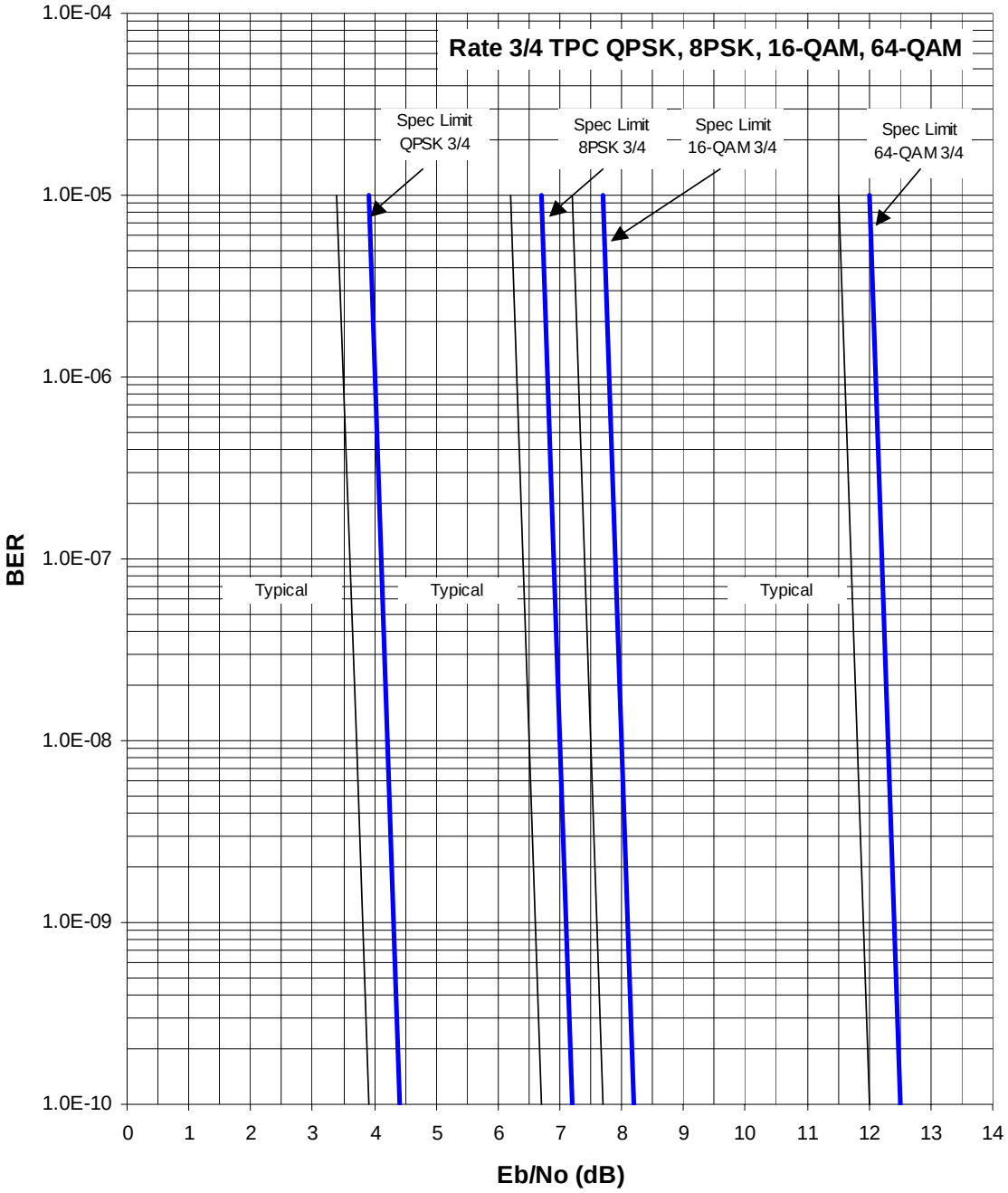


Figure 7-3. Rate 3/4 TPC QPSK, 8-PSK, 16-QAM, 64-QAM

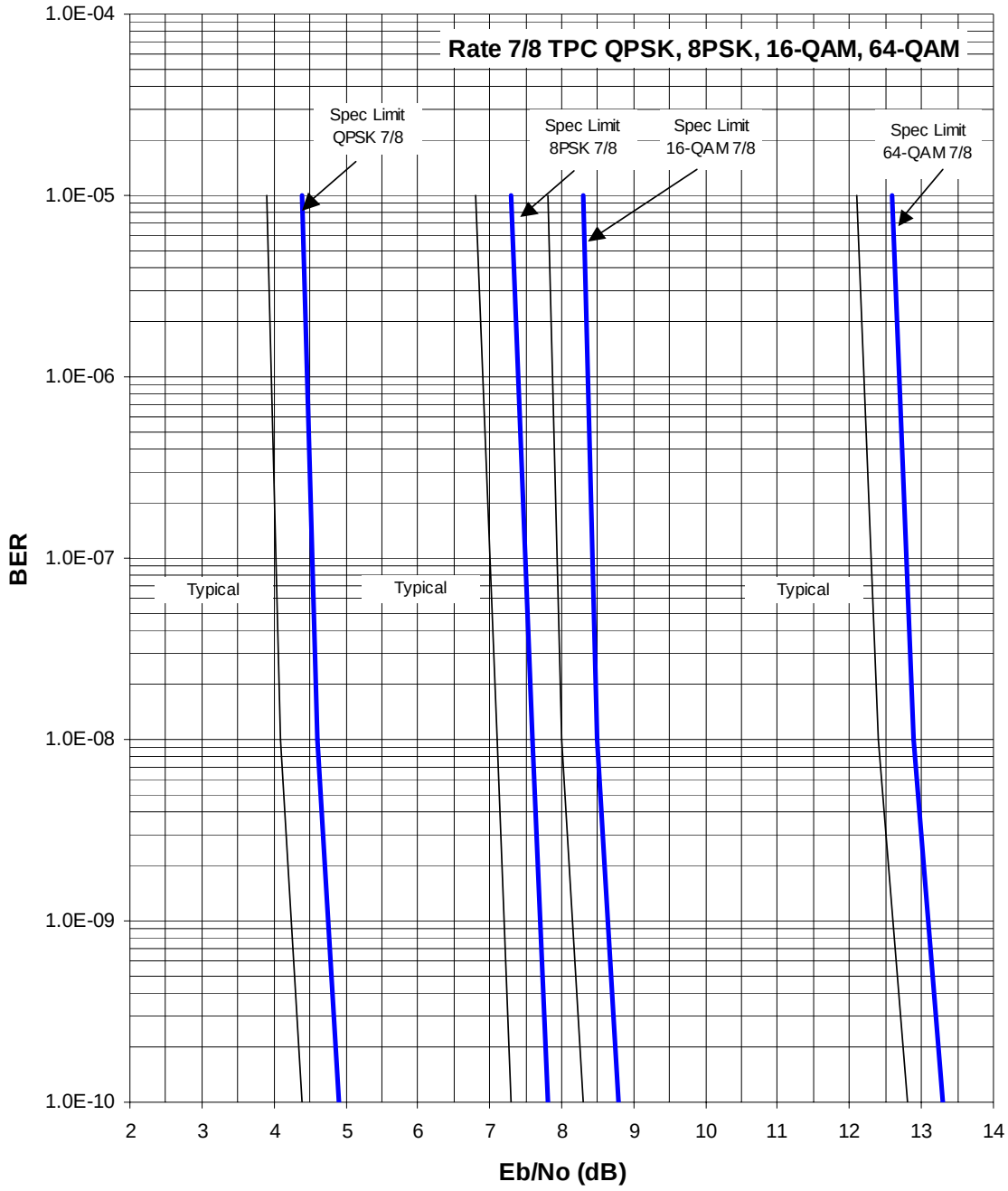


Figure 7-4. Rate 7/8 TPC QPSK, 8-PSK, 16-QAM, 64-QAM

Chapter 8. CLOCK MODES

The CDM-700 allows the simultaneous operation of multiple ports on data interfaces plugged into the two slots at the rear of the modem. For the most part, each port operates independently and generally does the clocking for each port. When dealing with satellite modems, the subject of clocking often becomes a complex issue. This section describes the various clocking options that are available with the CDM-700. Refer to the interface appendix in the manual for further information about the interface.

The CDM-700 is always **D**ata **C**ommunications **E**quipment (DCE) and is normally connected to **D**ata **T**erminal **E**quipment (DTE).

A general description of the clocking and clock modes is provided below, and Figure 8-1 presents a diagram of a typical interface. The particular clocking modes available depend upon the data interface and its characteristics

Ext Ref	This signal is applied to J7 on the rear of the modem, and it is located on the main part of the modem, not on a data interface card. The modem locks its internal IF synthesizers and signal processing circuitry to the **Ext Ref** signal. It is a low-phase noise, highly stable signal. When the **Ext Ref** is used it replaces the internal reference (**Int Ref**) oscillator (10 MHz) inside the modem, and it is the master reference for all signals in the modem. It is normally the source for ST clock.
Ext Clk	This input appears on some data interface cards and is associated only with the clock circuitry in the data interface and is not linked to the internal IF synthesizers. When an **Ext Clk** signal is used in conjunction with a G.703 port, this is the signal used to derive a signal to clock out the Rx Buffer.
Int Clk	The **Int Clk** or **Internal Clock** is the actual signal used on the data interface card. It is derived from either the **Ext Ref** or **Int Ref** oscillator in the main part of the modem, not from the data interface.
Tx-Terr	The signal sent to the modem by equipment external to the modem is the **Tx-Terr** clock. It is SD on a G.703 interface and TT on the HSSI interface. The modem dejitters and phase locks to this signal and uses it to clock data into the modem.

Rx-Sat	The clock derived from the signal received from the satellite is Rx-Sat. It is the signal sent from the distant end plus Doppler induced by the motion of the satellite. **Rx-Sat** is the clock exiting the modem (RD or RT) when the Rx Buffer is disabled.
Rx Loop-Timed	In **Rx Loop-Timed** applications **ST** is derived from the **Rx-Sat** clock. Depending upon the interface the Tx clock and Rx clock may be the same or different rates.
Buffer Enabled	When the Rx Buffer is enabled one of several clocks is available to clock receive data out of the modem and send the received data to the DTE, depending upon the data interface. The Rx Buffer Clocks include **Tx-Terr** (TT or SD), **Int Clk** (derived from **Int Ref** or **Ext Ref**) or **Ext Clk**. Some interfaces require the Tx = Rx data rate and other allow Tx ≠ Rx.

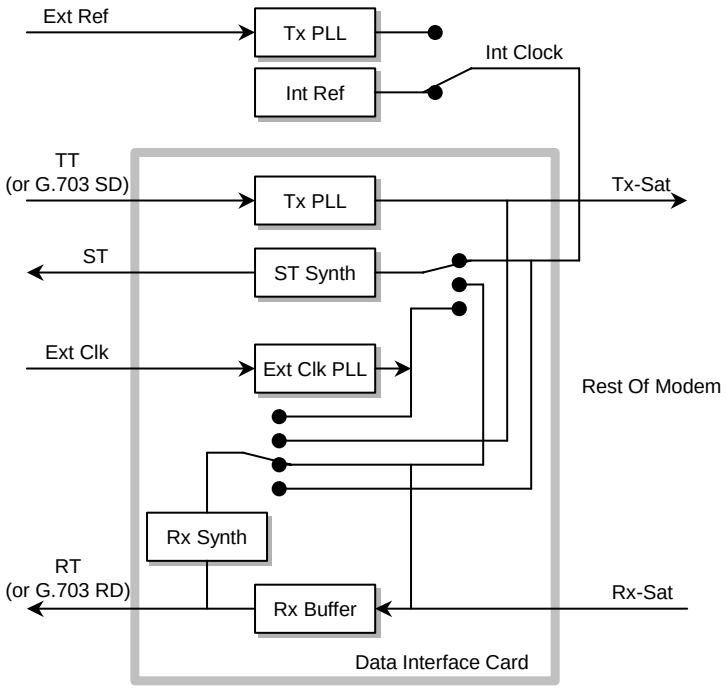


Figure 8-1. Typical Data Interface (Features Vary By Interface)

The available clocking for each module is discussed in the sections that follow.

8.1 CDI-10 Dual G.703 Interface

The CDI-10 Dual G.703 interface has two ports that operate independently at a E3, T3 or STS-1 data rate. A port is a Tx/Rx pair. Figure 8-2 shows the interface.

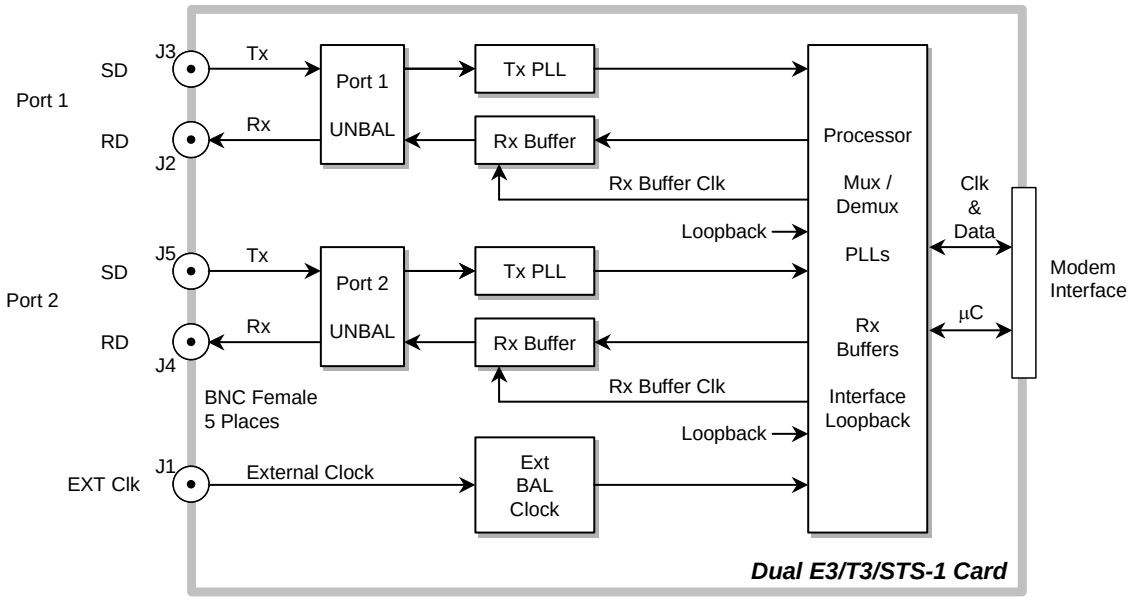


Figure 8-2. CDI-10, G.703 Dual G.703 Interface

8.1.1 CDI-10, Dual G.703 Interface Transmit Clocking

For the G.703 interface, the only clock allowed is the SD signal applied to the Tx input. Internal Clock and Rx Loop-Timed operation do not apply to G.703 applications.

8.1.2 CDI-10, Dual G.703 Interface Receive Clocking

When the Rx Buffer is disabled the receive clock is the Rx-Sat. In this mode ensure the Rx Buffer is set to minimum to reduce latency.

When the Rx Buffer is enabled the Rx clock selections are as follows:

Rx-Sat (default)	Selecting this clock disables the Rx Buffer because the input and output clocks are both Rx-Sat. Normally, the Rx Buffer is set for minimum when Rx-Sat is selected.
Tx-Terr	Uses the clock from the Tx input (SD) to clock out the Rx Buffer. The Tx and Rx data rates are the same on this interface so asymmetrical data rates where Tx ≠ Rx is not permitted. The two data ports are independent so Port 1 may have a different data rate that Port 2.
Ext-Clk	Derives a clock from a signal input to the **Ext-Clk** connector on the E3/T3/STS-1 Interface Card, not J7 on the modem.

8.2 CDI-50 OC-3 / STM-1 (Optical / Coaxial) 155.52 Mbps Interface

The CDI-50 OC-3 / STM-1 interface has one optical port and one coaxial (copper) port. Only one of the ports is active at a time and the selected port operates at 155.52 Mbps. Figure 8-3 shows the interface.

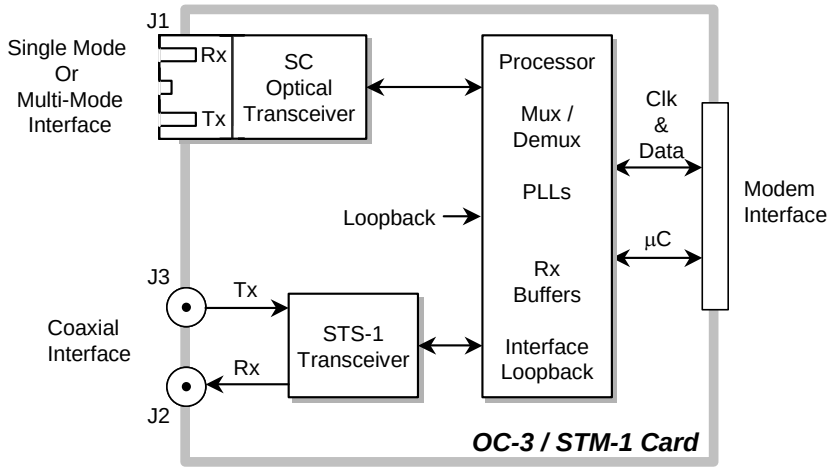


Figure 8-3. CDI-50 OC-3 / STM-1 Interface

8.2.1 CDI-50, OC-3 / STM-1 Interface Transmit Clocking

The only clock source for the interface is derived from the Tx data signal applied to the module input. Internal Clock and Rx Loop-Timed operation do not apply to this interface.

8.2.2 CDI-50, OC-3 / STM-1 Interface Receive Clocking

When the Rx Buffer is disabled the receive clock is the Rx-Sat. In this mode In this mode make sure the Rx Buffer is set to minimum to reduce latency.

When the Rx Buffer is enabled the Rx clock selections are as follows:

Rx-Sat (default)	Selecting this clock disables the Rx Buffer because the input and output clocks are both Rx-Sat. Normally, the Rx Buffer is set for minimum when Rx-Sat is selected.
Tx-Terr	Uses the clock from the Tx input to clock out the Rx Buffer. The Tx and Rx data rates are the same on this interface so asymmetric clocking where Tx ≠ Rx is disallowed.
Internal	The **Internal Clock** comes from the modem. It is derived from either the **Ext Ref** (J7) or **Int Ref** oscillator in the main part of the modem, not from the data interface.

8.3 CDI-60, HSSI Interface

The CDI-60 HSSI Interface has a single rate programmable port. Figure 8-4 shows the interface.

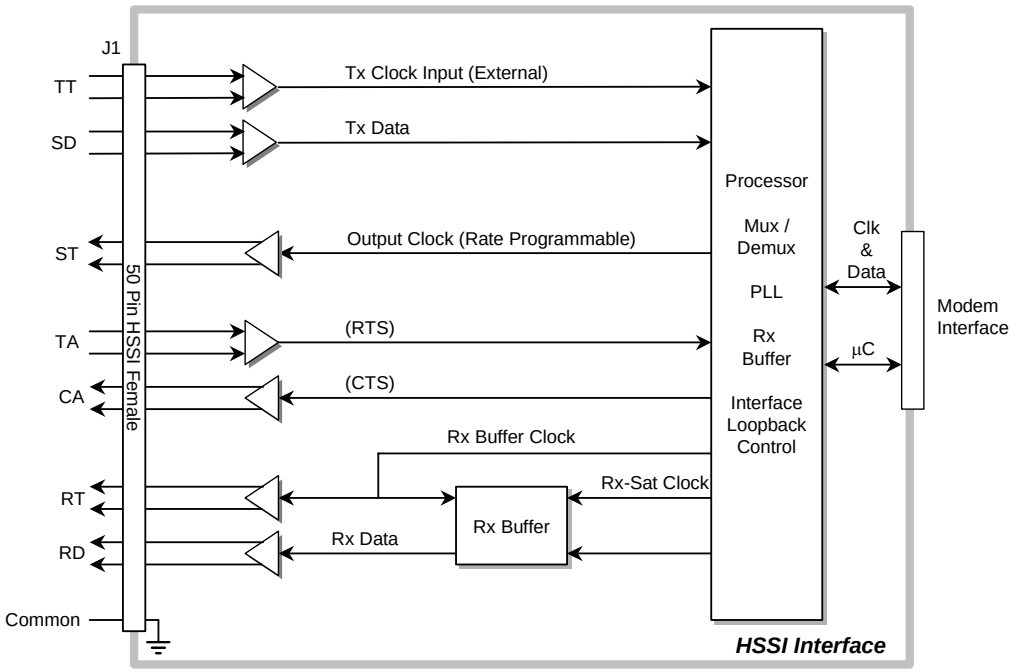


Figure 8-4. CDI-60, HSSI Data Interface

8.3.1 CDI-60, HSSI Interface Transmit Clocking

TT is the transmit clock source for the HSSI interface, and it is sent in conjunction with the data, SD, by the DTE to the modem. The data interface dejitters and phase locks to the TT clock rate. Internal clocking where ST is supplied to the DTE and TT is not returned to the modem is not allowed. Programming the Tx data rate at the interface programs the clock rate for ST sent to the DTE. When operating with HSSI interfaces always send ST to the DTE and assure that TT derived from ST is delivered to the DCE.

Rx Loop-Timed where ST is programmed to a rate derived from the Rx-Sat clock from the satellite is not available. For loop timed operation disconnect ST at the DTE and connect RT from the DCD (modem) to both RT and ST at the DTE.

8.3.2 CDI-60, HSSI Interface Receive Clocking

When the Rx Buffer is disabled the receive clock is the Rx-Sat. In this mode make sure the Rx Buffer is set to minimum to reduce latency.

When the Rx Buffer is enabled the Rx clock selections are as follows:

Rx-Sat (default)	Effectively disables the Rx Buffer because the input and output clocks are the same. Normally, the Rx Buffer is set for minimum when Rx-Sat is selected. This is the selection usually used with routers.
Tx-Terr	Uses the clock from the Tx input (TT) to clock out the Rx Buffer. The Tx and Rx data rates may differ on this interface, and asymmetric clocking where data rate for Tx ≠ Rx is allowed.
Internal	The **Internal Clock** comes from the modem It is derived from either the **Ext Ref** (J7) or **Int Ref** oscillator in the main part of the modem, not from the data interface.

8.4 CDI-70, 10/100/1000 Gigabit Ethernet Interface

There are no transmit or receive clocking options for the Gigabit Ethernet Interface. The Tx or Rx data rate is programmed into the data interface and establishes rate data is passed between the interface and the modem. Transmit data is accepted at the data interface at the native Ethernet rate and placed in a buffer for transfer to the modulator at the programmed Tx data rate. Rx data from the satellite is placed in a buffer and assembled into packets and sent to the terrestrial interface at the Ethernet rate.

Chapter 9. FLASH UPGRADING

The CDM-700 eliminates the need for updating firmware by physically replacing EPROMs. Instead, the CDM-700 modem uses 'flash memory' technology internally, and new firmware can be uploaded to the unit from an external PC, as follows:

Go to: www.comtechefdata.com
Click on: downloads
Click on: flash upgrades

This makes software upgrading very simple, and updates can now be sent via the Internet, E-mail, or on disk. The upgrade can be performed without opening the unit, by simply connecting the modem to the Ethernet port of a computer.

9.1 Gigabit Ethernet Interface FTP Upload Procedure

Note: The procedure for updating the CDI-70 (via J4 Ethernet) Gigabit Ethernet Interface firmware is outlined in Appendix E.

9.2 Base Modem FTP Upload Procedure:

1. Identify the reflashable product, firmware number, and version for download.

   The current base modem M&C version can be viewed at the top-level menu of the front panel display (press “CLR” button several times to view). Also, you can find the firmware information within the **<Util >** **<Firmware >** **<Info>** **<Image#1, Image#2 >** menu tree.

   Using serial remote control, you can query the firmware revision levels with the <0/SWR? Command. (Abbreviated)
   Or
   <0/FRW? Command (Detailed)

2. Create a temporary directory (folder) on your PC.

   Windows: Select File **> New > Folder >** and rename the New Folder to "temp" or another convenient and unused name. Assuming "temp" works, you should now have a "c:\temp" folder created.
   Note: The c: is the drive letter used in this example. Any valid writable drive letter can be used.

   CMD Prompt: At the command prompt (c:\>) type "MD temp" without quotes (MD stands for make directory). This is the same as creating a new folder from Windows. You should now have a "c:\temp" subdirectory created where c: is the drive letter used in the example.

3. Download the correct firmware file to this temporary folder.

   Access the download server with the flash firmware data files link,
   http://206.223.8.10/linksite/flashupgrades/CDM700/

   About Firmware Numbers, File Versions, and Formats:

   The flashable files on the download server are organized by product first, then by firmware number, (make sure you know the correct firmware number; see step 1) version, if applicable, and release date. The base modem bulk firmware for the CDM-700 will be **F10236***_*_* (where the asterisks show revision, version and date).

   The current version firmware release is provided. If applicable, one version prior to the current release is also available. Be sure to identify and download the desired version.

   The downloadable files are stored in two formats: *.exe (self extracting) and *.zip (compressed). Some firewalls will not allow the downloading of *.exe files. In this case, download the *.zip file instead.

For additional help with "zipped" file types, refer to "pkzip for windows", "winzip", or "zip central" help files. Pkzip for DOS is not supported due to file naming conventions.

4. Unzip the files in the temporary folder on your PC.

At least 3 files should be extracted:

a. **FW10236**x.bin, where "x" is the version (bulk image file).
b. **FW10236**x.txt, where "x" is the version (history notes).
c. README.TXT installation notes

5. Connect the client PC to the CDM-700 modem 10/100 Ethernet M&C via a hub or a switch, or directly to a PC with a crossover cable.
Verify the communication and connection by issuing a "ping" command to the modem. You can find the IP address of the modem either remotely using the <0/IPA? command or from the front panel with the **<Config> <Remote> <Remote> <Ethernet>** menus.

To PING and FTP from DOS, press the “Start” button on the Windows toolbar, and select the “Run...” option. From Win95 or Win98, type “command”. From WinNT, Win2K or WinXP, type “cmd”. You can also use the “DOS Prompt” or “Command Prompt” icons in the Start Menu. Now change to the temporary directory you created earlier with “cd c:\temp”. A quick “dir” will show the downloaded files.

6. Initiate an FTP session with the modem. The example is with a DOS window.

a. From the PC, type "ftp xxx.xxx.xxx.xxx" where "xxx.xxx.xxx.xxx" is the IP address of the CDM-700.

b. Press <Enter> twice to bypass user name and password to complete login.

c. Verify your FTP transfer is binary by typing "bin".

d. Type "prompt" then type "hash" to facilitate the file transfers.

7. Transfer the files.

Type "put **FW10236***.bin bulk:" to begin the file transfers. The destination “bulk:” must be all lower-case. It will take approximately one minute to transfer the file.

8. Verify the file transfer.

a. The PC should report that the file transfer has occurred, and the display on the modem will stop reporting “PROGRAMMING FLASH SECTOR # xx – PLEASE WAIT”.

b. Terminate the FTP session by typing "bye" and closing the DOS window.

c. Verify that the new file loaded using the procedure in step 1.

9. Change the desired image to boot using the **<Util> <Firmware> <Select>** [←] [→] arrow to change to the other image>, then reboot the modem.

10. Verify the new software versions are booting by observing the following messages on the modem display:

```
Comtech CDM-700 Modem
Firmware Version: 1.1.x
```

Chapter 10. SUMMARY OF SPECIFICATIONS

10.1 Summary of Specifications

Table 10-1. Summary of Specifications

Item	Requirement
Data Rate Range	Up to155 Mbps within symbol rate range in 1 bps steps, depending on data interface (Refer to 10.2)
Symbol Rate Range	1 to 64Msps
Data Rate Programmable	At Data Interface
Modulation Types	QPSK, 8-PSK, 16-QAM, or 64-QAM
Alpha	25% or 35% mask per DVB per Figure 10-1 and Table 10-2
FEC type	3/4, 7/8 (20/23 actual)
M&C / Remote Interface	10/100BaseT with HTTP, SNMP and Telnet or RS-232/485
Latency	<20 ms at 10 Mbps (estimated delay is 120,000 bits)
Reflash	FTP Ethernet (rear panel)
Frequency Reference: Internal Reference External Clock External Ref	Selectable 10 MHz for data and IF, stability ±1.5 ppm For data interfaces only, not IF. Clock Input depends upon data interface module. None (off), 1, 2, 5, 10 or 20 MHz for IF, internally phase locked. Input is 50 / 75Ω compatible with 0.5 to 4.0 V pp sine or square wave. Requires high stability source.
Form C	Modulator fault and demodulator fault
Multiplexing Overhead	≤ 2.5%
Agency Approval	Safety, conducted and radiated emissions (Class B) and Immunity sufficient for CE certification

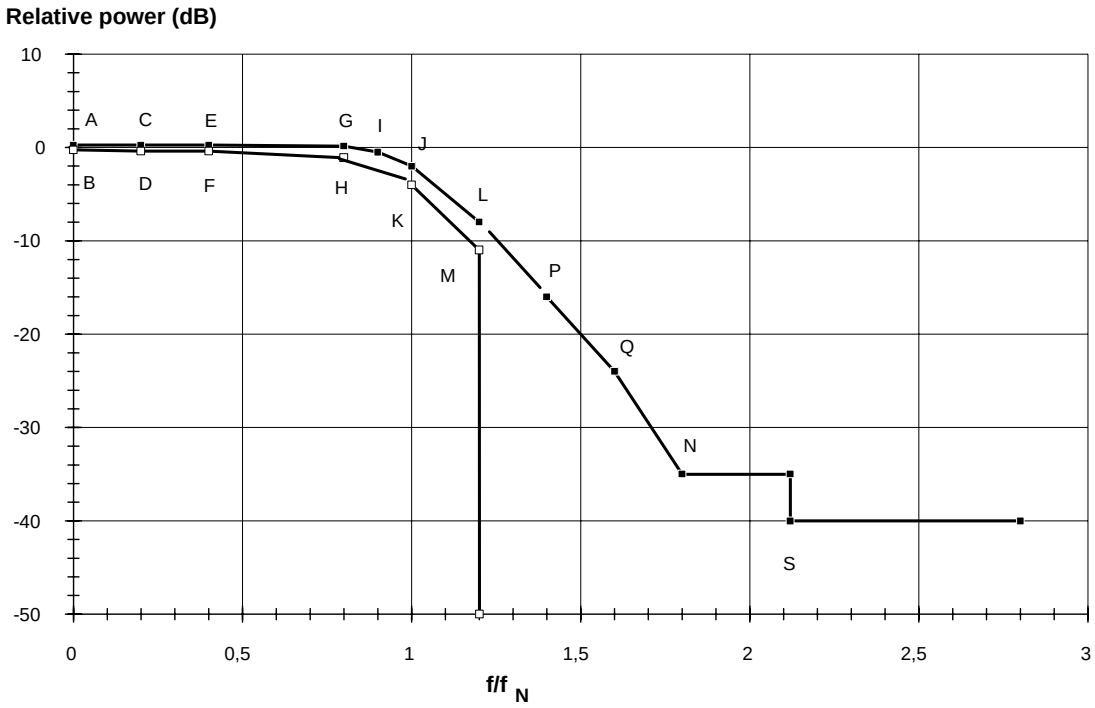


Figure 10-1. Spectral Mask

Table 10-2. Definition of Points For Spectral Mask

Point	Frequency for ∝=0,35	Frequency for ∝ =0,25	Relative power (dB)	Group delay
A	0,0 f_N	0,0 f_N	+0,25	+0,07 / f_N
B	0,0 f_N	0,0 f_N	-0,25	-0,07 / f_N
C	0,2 f_N	0,2 f_N	+0,25	+0,07 / f_N
D	0,2 f_N	0,2 f_N	-0,40	-0,07 / f_N
E	0,4 f_N	0,4 f_N	+0,25	+0,07 / f_N
F	0,4 f_N	0,4 f_N	-0,40	-0,07 / f_N
G	0,8 f_N	0,86f_N	+0,15	+0,07 / f_N
H	0,8 f_N	0,86 f_N	-1,10	-0,07 / f_N
I	0,9 f_N	0,93 f_N	-0,50	+0,07 / f_N
J	1,0 f_N	1,0 f_N	-2,00	+0,07 / f_N
K	1,0 f_N	1,0 f_N	-4,00	-0,07 / f_N
L	1,2 f_N	1,13 f_N	-8,00	-
M	1,2 f_N	1,13 f_N	-11,00	-
N	1,8 f_N	1,60 f_N	-35,00	-
P	1,4 f_N	1,30 f_N	-16,00	-
Q	1,6 f_N	1,45 f_N	-24,00	-
S	2,12 f_N	1,83 f_N	-40,00	-

10.2 Data Rate Range

CDM-700 Symbol / Data Rate Ranges By Tier

CDM-700 Tier Range (See Notes)							
	Min Symbol Rate	Max Symbol Rate				Composite Data Rate (Mbps) (Rounded)	
Tier	Msps	Msps	Modulation	Code Rate	FEC	Min	Max
QPSK & 8PSK							
1	1	15.0	QPSK	3/4	TPC	1.463415	21.951220
	1	15.0	QPSK	7/8	TPC	1.696713	25.450689
	1	15.0	8PSK	3/4	TPC	2.195122	32.926829
	1	15.0	8PSK	7/8	TPC	2.545069	38.176034
2	1	22.5	QPSK	3/4	TPC	1.463415	32.926829
	1	22.5	QPSK	7/8	TPC	1.696713	38.176034
	1	22.5	8PSK	3/4	TPC	2.195122	49.390244
	1	22.5	8PSK	7/8	TPC	2.545069	57.264051
3	1	30.0	QPSK	3/4	TPC	1.463415	43.902439
	1	30.0	QPSK	7/8	TPC	1.696713	50.901379
	1	30.0	8PSK	3/4	TPC	2.195122	65.853659
	1	30.0	8PSK	7/8	TPC	2.545069	76.352068
4	1	37.5	QPSK	3/4	TPC	1.463415	54.878049
	1	37.5	QPSK	7/8	TPC	1.696713	63.626723
	1	37.5	8PSK	3/4	TPC	2.195122	82.317073
	1	37.5	8PSK	7/8	TPC	2.545069	95.440085
5	1	45.0	QPSK	3/4	TPC	1.463415	65.853659
	1	45.0	QPSK	7/8	TPC	1.696713	76.352068
	1	45.0	8PSK	3/4	TPC	2.195122	98.780488
	1	45.0	8PSK	7/8	TPC	2.545069	114.528102
6	1	64.0	QPSK	3/4	TPC	1.463415	93.658537
	1	64.0	QPSK	7/8	TPC	1.696713	108.589608
	1	64.0	8PSK	3/4	TPC	2.195122	140.487805
See Notes	1	61.1	8PSK	7/8	TPC	2.545069	155.520000
QPSK, 8PSK & 16-QAM							
7	1	15.0	16-QAM	3/4	TPC	2.926829	43.902439
	1	15.0	16-QAM	7/8	TPC	3.393425	50.901379
8	1	22.5	16-QAM	3/4	TPC	2.926829	65.853659
	1	22.5	16-QAM	7/8	TPC	3.393425	76.352068
9	1	30.0	16-QAM	3/4	TPC	2.926829	87.804878
	1	30.0	16-QAM	7/8	TPC	3.393425	101.802757
10	1	37.5	16-QAM	3/4	TPC	2.926829	109.756098
	1	37.5	16-QAM	7/8	TPC	3.393425	127.253446

CDM-700 Tier Range (See Notes)							
	Min Symbol Rate	Max Symbol Rate				Composite Data Rate (Mbps) (Rounded)	
Tier	Msps	Msps	Modulation	Code Rate	FEC	Min	Max
11	1	45.0	16-QAM	3/4	TPC	2.926829	131.707317
	1	45.0	16-QAM	7/8	TPC	3.393425	152.704136
12	1	53.1	16-QAM	3/4	TPC	2.926829	155.520000
See Notes	1	45.8	16-QAM	7/8	TPC	3.393425	155.520000
QPSK, 8PSK, 16-QAM & 64-QAM							
13	1	32.0	64-QAM	3/4	TPC	4.390244	140.400000
See Notes	1	30.6	64-QAM	7/8	TPC	5.090138	155.520000

Notes:

1. Rate 7/8 is 20/23 actual
2. Composite Data Rate = sum of data rates at each data port at the terrestrial Interface
3. Maximum data rate is limited by the lesser of 155.52 Mbps or the available symbol rate range. Values in the Table are rounded and minor differences may appear in the actual display.
4. Composite Data rate = Symbol Rate x (Code Rate * Modulation Index / 1.025).
5. The Symbol Rate includes 2.5% overhead added to the Composite Data Rate

10.3 70/ 140 MHz Modulator

Item	Requirement
IF Frequency	52 to 88MHz / 104 to 176MHz (100Hz steps). Bandwidth of spectrum is contained within IF frequency range.
Impedance	50 / 75 Ω programmable
Return Loss	18 dB min
IF Connectors	BNC, female
Output Power	0 to -20 dBm, 0.1 dB steps. Carrier is not interrupted changing between any levels, removing data connections or hot swapping data interfaces.
Accuracy	± 0.5 dB nominal at 25°C. Within ± 0.5 dB of room temperature value over frequency and temperature range.
Harmonics & Spurs	<-55 dBc/4 kHz over 40 to 250 MHz with modulated carrier
Phase Noise	< 1 degrees RMS double-sided, 100 Hz to 1 MHz
External Tx Carrier Off	TTL low signal – path to shutoff bypasses microprocessor.
Quadrature Phase Error	< 2°
Amplitude Imbalance (I, Q)	0.2 dB maximum
Combined Amplitude Imbalance and Quadrature Phase Error	Single sideband test with suppressed sideband 35 dB minimum below unmodulated carrier.
Carrier Null	35 dB minimum below an unmodulated carrier.
Frequency Inversion	Normal or Inverted

10.4 L-Band Modulator

Item	Requirement
L-Band Frequency	950 to 1950 MHz in 100 Hz steps.
Impedance	50 Ω
Return Loss	14 dB min
IF Connectors	Type N female or optional SMA female
Output Power	-5 to -25 dBm, 0.1 dB steps. Carrier is not interrupted changing between any levels, removing data connections or hot swapping data interfaces.
Accuracy (Main Output)	± 0.5 dB nominal at room temperature. Within ± 0.5 dB of room temperature value over frequency and temperature range.
Monitor Output	Available in Tx only configuration. -20 dB ± 3 dB from main output.
Harmonics & Spurs	<-55 dBc/4 kHz over 800 to 2500 MHz with modulated carrier
Phase Noise	< 1 degree RMS double-sided, 100 Hz to 1 MHz
External Tx Carrier Off	TTL low signal – path to shutoff bypasses microprocessor.
Quadrature Phase Error	< 2°
Amplitude Imbalance (I, Q)	0.2 dB maximum
Combined Amplitude Imbalance and Quadrature Phase Error	Single sideband test with suppressed sideband 35 dB minimum below unmodulated carrier.
Carrier Null	35 dB minimum below an unmodulated carrier.
Frequency Inversion	Normal or Inverted

10.5 70 / 140 MHz Demodulator

Item	Requirement
IF Frequency	52 to 88MHz / 104 to 176MHz (100Hz steps). Bandwidth spectrum is contained within IF frequency range.
Impedance	50 Ω or optional 75 Ω
Return Loss	18 dB min
IF Connectors	BNC, female
Minimum Signal Level	Refer to Figure 10-2. S_min = -58 + 10×Log (SR), SR in Msps S_min = -58 dBm at 1 Msps S_min = -39.9 dBm at 64 Msps
AGC	45 dB minimum above S_min
Acquisition Time	Typical < 5 seconds
Acquisition	± 100kHz
Frequency Inversion	Selectable
Adaptive Equalizer	Adaptive Linear correction QAM modulations types. Corrects 3 dB linear tilt across 3 dB bandwidth of spectrum.
Composite Input Level	20 dBc composite to desired or +10 dBm maximum, whichever is smaller
FSK	CSAT / KST-2000 communications

10.6 L-Band Demodulator

Item	Requirement
IF Frequency	950 to 1950 MHz in 100 Hz steps. Bandwidth of spectrum is contained within IF frequency range.
Impedance	50 Ω
Return Loss	14 dB min
IF Connectors	Type N female or optional SMA female
Minimum Signal Level	Refer to Figure 10-2. S_min = -58 + 10xLog (SR), SR in Msps S_min = -58.0 dBm at 1 Msps S_min = -39.9 dBm at 64 Msps
AGC	45 dB minimum above S_min
Acquisition Time	Typical < 5 seconds
Acquisition	± 100kHz
Frequency Inversion	Selectable
Adaptive Equalizer	Adaptive Linear correction QAM modulations types. Corrects 3 dB linear tilt across 3 dB bandwidth of spectrum.
Composite Input Level	30 dBc composite to desired or +10 dBm maximum, whichever is smaller Test at fo ± 200 MHz with CW carrier at desired +30 dBc

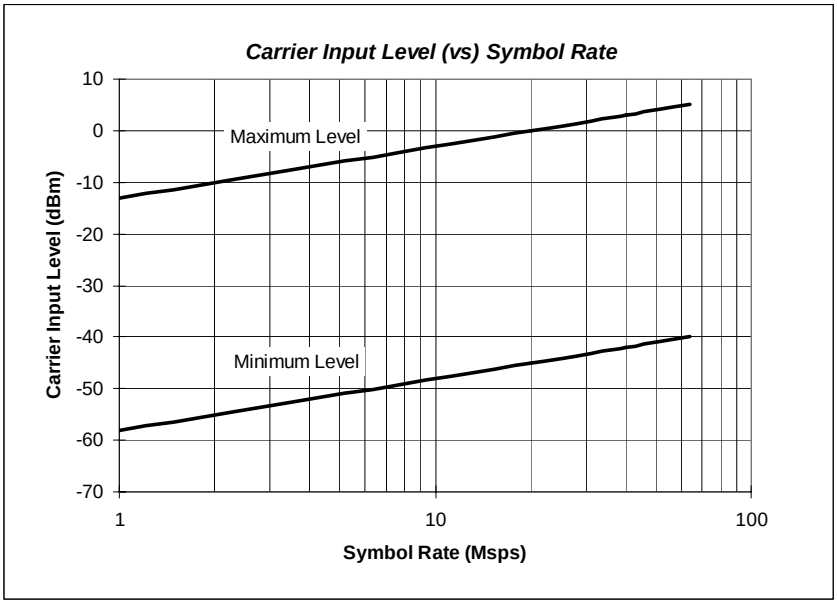


Figure 10-2. 70/140 MHz and L-Band Carrier Input Level versus Symbol Rate

10.7 BER Performance

Note: For Turbo coding and modulation types, guaranteed (typical in parenthesis)

Requirement			
		3/4	**7/8**
QPSK	10-5	3.9 (3.4)	4.4 (3.9)
	10-8	4.2 (3.7)	4.6 (4.1)
	10-10	4.4 (3.9)	4.9 (4.4)
8-PSK	10-5	6.7 (6.2)	7.3 (6.8)
	10-8	7.0 (6.5)	7.6 (7.1)
	10-10	7.2 (6.7)	7.8 (7.3)
16-QAM	10-5	7.7 (7.2)	8.3 (7.8)
	10-8	8.0 (7.5)	8.5 (8.0)
	10-10	8.2 (7.7)	8.8 (8.3)
64-QAM	10-5	12.0 (11.5)	12.6 (12.1)
	10-8	12.3 (11.8)	12.9 (12.4)
	10-10	12.5 (12.0)	13.3 (12.8)
Notes: • 16-QAM 3/4, add 0.2 dB above 51 Mbps. • 16-QAM 3/4, add 0.4 dB above 103 Mbps • 64-QAM 3/4 , operates to 32 Msps			

10.7.1 Adjacent Channel

No more than 0.5 dB Eb/No degradation in the presence of a like modulated adjacent carrier spaced 1.3 times the symbol rate from the desired carrier and 10 dB higher than the desired.

10.8 Data Interface (Optional)

Note: Additional information about the data interfaces is available in the applicable appendix.

Interface Type	Description
CDI-10	2 independent G.703 interfaces at 75Ω 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	2 types of OC-3 / STM-1 modules area available and one is selected at the time of order. Each module has two interfaces, one optical and the other copper (coaxial), and the user programs the active one
CDI-60	1 each HSSI Port
CDI-70	1 each RJ-45 Port

10.9 Environmental and Physical

Temperature: **Operating:** **Storage:**	 0 to 50°C (32 to 122°F) -25 to 85°C (-13 to 185°F)
Humidity	95% maximum, non-condensing
Power Supply Input: **AC** **DC**	 100-240 VAC (50 to 60 Hz) 48 VDC
Power Consumption:	< 75 Watt
Dimensions	19W x 18.65D x 1.75H inches (48W x 47.4D x 4.4D cm)
Weight	15 lbs (7.0 kg) approx
Agency Approvals	EMC Safety

Notes:

Chapter 11. REMOTE CONTROL

11.1 Introduction

This section describes the protocol and message command set for remote monitor and control of the CDM-700 Modem.

The electrical interface is either an RS-485 multi-drop bus (for the control of many devices) or an RS-232 connection (for the control of a single device), and data is transmitted in asynchronous serial form, using ASCII characters. Control and status information is transmitted in packets, of variable length, in accordance with the structure and protocol defined in later sections.

11.2 RS-485

For applications where multiple devices are to be monitored and controlled, a full-duplex (or 4-wire) RS-485 is preferred. Half-duplex (2-wire) RS-485 is possible, but is not preferred.

In full-duplex RS-485 communication there are two separate, isolated, independent, differential-mode twisted pairs, each handling serial data in different directions. It is assumed that there is a 'controller' device (a PC or dumb terminal), which transmits data, in a broadcast mode, via one of the pairs. Many 'target' devices are connected to this pair, which all simultaneously receive data from the controller. The controller is the only device with a line-driver connected to this pair - the target devices only have line-receivers connected.

In the other direction, on the other pair, each target has a tri-stateable line driver connected, and the controller has a line-receiver connected. All the line drivers are held in high-impedance mode until one (and only one) target transmits back to the controller.

Each target has a unique address, and each time the controller transmits, in a framed 'packet' of data, the address of the intended recipient target is included. All of the targets receive the packet, but only one (the intended) will reply. The target enables its output line driver, and transmits its return data packet back to the controller, in the other direction, on the physically separate pair.

RS 485 (full duplex) summary:

- Two differential pairs - one pair for controller to target, one pair for target to controller.
- Controller-to-target pair has one line driver (controller), and all targets have line-receivers.
- Target-to-controller pair has one line receiver (controller), and all targets have tri-state drivers.

11.3 RS-232

This a much simpler configuration in which the controller device is connected directly to the target via a two-wire-plus-ground connection. Controller-to-target data is carried, via RS-232 electrical levels, on one conductor, and target-to-controller data is carried in the other direction on the other conductor.

11.4 Basic Protocol

Whether in RS-232 or RS-485 mode, all data is transmitted as asynchronous serial characters, suitable for transmission and reception by a UART. In this case, the asynchronous character format is 8N1. The baud rate may vary between 2400 and 57,600 baud.

All data is transmitted in framed packets. The controller is assumed to be a PC or ASCII dumb terminal, which is in charge of the process of monitor and control. The controller is the only device which is permitted to initiate, at will, the transmission of data. Targets are only permitted to transmit when they have been specifically instructed to do so by the controller.

All bytes within a packet are printable ASCII characters, less than ASCII code 127. In this context, the Carriage Return and Line Feed characters are considered printable.

All messages from controller to target require a response (with one exception). This will be either to return data which has been requested by the controller, or to acknowledge reception of an instruction to change the configuration of the target. The exception to this is when the controller broadcasts a message (such as Set time/date) using Address 0, when the target is set to RS-485 mode.

11.5 Packet Structure

Controller-to-target:

Start of Packet	Target Address	Address De-limiter	Instruction Code	Code Qualifier	Optional Arguments	End of Packet
< ASCII code 60 (1 character)	 (4 characters)	/ ASCII code 47 (1 character)	 (3 characters)	= or ? ASCII code 61 or 63 (1 character)	 (n characters)	Carriage Return ASCII code 13 (1 character)

Example: <0135/TFQ=0070.2345{CR}

Target-to-controller:

Start of Packet	Target Address	Address De-limiter	Instruction Code	Code Qualifier	Optional Arguments	End of Packet
> ASCII code 62 (1 character)	 (4 characters)	/ ASCII code 47 (1 character)	 (3 characters)	=, ?, !, or * ASCII code 61, 63, 33 or 42 (1 character)	 (From 0 to n characters)	Carriage Return, Line Feed ASCII code 13,10 (2 characters)

Example: >0654/RSW=32{CR}{LF}

Each of the components of the packet is now explained.

11.5.1 Start Of Packet

Controller to Target: This is the character '<' (ASCII code 60)

Target to Controller: This is the character '>' (ASCII code 62)
Because this is used to provide a reliable indication of the start of packet, these two characters may not appear anywhere else within the body of the message.

11.5.2 Address

Up to 9999 devices can be uniquely addressed. In RS-232 applications this value is set to 0. In RS-485 applications, the permissible range of values is 1 to 9999. It is programmed into a target unit using the front panel keypad.

IMPORTANT

The controller sends a packet with the address of a target - the destination of the packet. When the target responds, the address used is the same address, to indicate to the controller the source of the packet. The controller does not have its own address.

11.5.3 Instruction Code

This is a three-character alphabetic sequence which identifies the subject of the message. Wherever possible, the instruction codes have been chosen to have some significance. For example TFQ for transmit frequency, RMD for receive modulation type, etc. This aids in the readability of the message, should it be displayed in its raw ASCII form. Only upper case alphabetic characters may be used (A-Z, ASCII codes 65 - 90).

11.5.4 Instruction Code Qualifier

This is a single character which further qualifies the preceding instruction code.

Code Qualifiers obey the following rules:

1) From Controller to Target, the only permitted values are:
   = (ASCII code 61)
   ? (ASCII code 63)

They have these meanings:

The '=' code (controller to target) is used as the assignment operator, and is used to indicate that the parameter defined by the preceding byte should be set to the value of the argument(s) which follow it.

For example, in a message from controller to target, TFQ=0950.0000 would mean 'set the transmit frequency to 950 MHz'

The '?' code (controller to target) is used as the query operator, and is used to indicate that the target should return the current value of the parameter defined by the preceding byte.

For example, in a message from controller to target, TFQ? would mean 'return the current value of the transmit frequency'

2) From Target to Controller, the only permitted values are:
   = (ASCII code 61)
   ? (ASCII code 63)
   ! (ASCII code 33)
   * (ASCII code 42)
   # (ASCII code 35)
   ~ (ASCII Code 126)

They have these meanings:

The '=' code (target to controller) is used in two ways:
First, if the controller has sent a query code to a target (for example x?, meaning 'what's the Transmit frequency?'), the target would respond with TFQ=xxxx.xxxx, where xxxx.xxxx represents the frequency in question.

Second, if the controller sends an instruction to set a parameter to a particular value, then, providing the value sent in the argument is valid, the target will acknowledge the message by replying with TFQ= (with no message arguments).

The ? code (target to controller) is only used as follows:
If the controller sends an instruction to set a parameter to a particular value, then, if the value sent in the argument is not valid, the target will acknowledge the message by replying (for example) with TFQ? (with no message arguments). This indicates that there was an error in the message sent by the controller.

The * code (target to controller) is only used as follows:
If the controller sends an instruction to set a parameter to a particular value, then, if the value sent in the argument is valid, BUT the modem will not permit that particular parameter to be changed at that time, the target will acknowledge the message by replying (for example) with TFQ* (with no message arguments).

The ! code (target to controller) is only used as follows:
If the controller sends an instruction code which the target does not recognize, the target will acknowledge the message by echoing the invalid instruction, followed by the ! character with. Example: XYZ!

The # code (target to controller) is only used as follows:
If the controller sends a correctly formatted command, BUT the modem is not in remote mode, it will not allow reconfiguration, and will respond with TFQ#.

The ~ code (target to controller) is only used as follows:
If a message was sent via a local modem to a distant end device or ODU, the message was transmitted transparently through the local modem. In the event of the distant-end device not responding, the local modem would generate a response e.g. 0001/RET~, indicating that it had finished waiting for a response and was now ready for further comms.

11.5.5 Message Arguments

Arguments are not required for all messages. Arguments are ASCII codes for the characters 0 to 9 (ASCII 48 to 57), period (ASCII 46) and comma (ASCII 44).

11.5.6 End Of Packet

Controller to Target: This is the ‘Carriage Return’ character (ASCII code 13)

Target to Controller: This is the two-character sequence ‘Carriage Return’, ‘Line Feed’. (ASCII code 13, and code 10.) Both indicate the valid termination of a packet.

11.6 Remote Commands

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Interface Type	**N/A**	**3 bytes**	**Query Only.** **Interface Type, where:** **s=Defines which interface slot (1 or 2)** **xx=Defines the interface type, where:** **00=E3/T3/STS1** **01=Reserved** **02=Reserved** **03=OC3** **04=Gigabit Ethernet** **05=HSSI** **06 - 14=Reserved** **15=Not Present** **Example: ITF=100 (indicates that interface slot 1 is an E3/T3/STS1 card.)**	**N/A**	**ITF?s**	**ITF=sxx** **(see description of arguments)**
Interface Tx Data Rate	**ITR=**	**12 bytes**	**Command or Query.** **Interface Tx Data rate, in Mbps:** **s=Defines which interface slot (1 or 2)** **c=Defines which channel (1 to 2)** **xxx.xxxxxx=Defines the transmit data rate in Mbps.** **Resolution=1 bps.** **Example: ITR=11002.047999 (which is 2.047999 Mbps) on slot 1 channel 1.** ***Note: Interface types G.703 and GbEI cannot vary in datarate.**	**ITR=** **ITR?** **ITR*** **ITR#**	**ITR?sc**	**ITR=scxxx.xxxxxx** **(see description of arguments)**
Tx Frequency	TFQ=	9 bytes	Command or Query. Tx Frequency: - IF: 52-88 MHz and 104-176 MHz. - L-Band: 950-1950 MHz. Resolution=100Hz. Example: TFQ=0140.9872	TFQ= TFQ? TFQ* TFQ#	TFQ?	TFQ=xxxx.xxxx (see description of arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Tx FEC Type	**N/A**	**1 byte**	**Query Only.** **Tx FEC coding type, where:** **0=Turbo** **Example: TFT=0 (which is Turbo coding)**	**N/A**	**TFT?**	**TFT=x** **(see description of arguments)**
Tx Modulation Type	**TMD=**	**1 byte**	**Command or Query.** **Tx Modulation type, where:** **0=QPSK** **1=8PSK** **2=16QAM** **3=Reserved** **4=64QAM** **Depending on FEC type, not all of these selections will be valid.** **Example: TMD=1 (which is 8PSK)**	**TMD=** **TMD?** **TMD*** **TMD#**	**TMD?**	**TMD=x** **(see description of arguments)**
Tx FEC Code Rate	**TCR=**	**1 byte**	**Command or Query.** **Tx Modulation Type, where:** **0 = Rate 3/4** **1 = Rate 7/8** **Depending on FEC type, not all of these selections will be valid.** **Example: TCR=0 (which is Rate 3/4)**	**TCR=** **TCR?** **TCR*** **TCR#**	**TCR?**	**TCR=x** **(see description of arguments)**
Tx Data Rate	N/A	10 bytes	Query Only. Composite Tx Data rate, in Mbps. Resolution=1 bps. Example: TDR=002.047999 (which is 2.047999 Mbps)	N/A	TDR?	TDR=xxx.xxxxxx (see description of arguments)
Tx Alpha Rolloff	TAR=	1 byte	Command or Query Tx Alpha Rolloff, where: 1 = 25% 2 = 35% Example: TAR=1 (which is a Tx Alpha Rolloff of 25%)	TAR= TAR? TAR* TAR#	TAR?	TAR=x (see description of arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Tx Spectrum Invert	TSI=	1 byte	Command or Query. Tx Spectrum Invert selection, where: 0=Normal, 1=Tx Spectrum Inverted Example: TSI=0 (which is normal)	TSI= TSI? TSI* TSI#	TSI?	TSI=x (see description of arguments)
Tx Scrambler	TSC=	1 byte	Command or Query. Tx Scrambler state, where: 0=Off 1=On Example: TSC=1 (Scrambler On)	TSC= TSC? TSC* TSC#	TSC?	TSC=x (see description of arguments)
Tx Power Level	TPL=	5 bytes	Command or Query. Tx Output power level, where: s=sign (+ / -) xx.x = Tx Output power level, L-Band unit: +00.0 and –20.0 dBm. 70/140 MHz unit: +00.0 to –20.0 dBm Note: Beyond –20 dBm is beyond the specification. Example: TPL = -13.4	TPL= TPL? TPL* TPL#	TPL?	TPL=sxx.x (see description of arguments)
Tx Output Impendance	IMP=	1 byte	Command or Query. Tx output impedance, where: 0=50 Ohm 1=75 Ohm (Valid for 70/140 MHz units only) Example: IMP=1 (Set impedance to 75 Ohms)	IMP= IMP? IMP* IMP#	IMP?	IMP=x (see description of arguments)
Tx Interface Enable	TIE=	3 bytes	Command or Query. Interface Channel Enable/Disable, where: s=Defines which interface slot (1 or 2) c=Defines which channel (1 to 2) x=Tx Interface Status, where: 0=Disabled 1=Enabled Ex: TIE = 111 (Enables transmit on interface slot 1, channel 1)	TIE= TIE? TIE* TIE#	TIE?sc	TIE=scx (see description of arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Tx Clock Source	TCK=	3 bytes	Command or Query. Tx Clock Source, where: s=Defines which interface slot (1 or 2) c=Defines which channel (1 to 2) x=Tx Clock Source, where: 0=Internal 1=Tx Terrestrial 2=Rx Loop-Timed 3=External Reference Example: TCK=110 (selects Internal on interface 1 channel 1) *HSSI card not supported.	TCK= TCK? TCK* TCK#	TCK?sc	TCK=scx (see description of arguments)
Tx Data Invert	TDI=	3 bytes	Command or Query. Invert Transmit Data, where: s=Defines which interface slot (1 or 2) c=Defines which channel (1 to 2) x=Invert Transmit Data, where: 0=Normal 1=Inverted (Note: Command valid Only with CDI-10 Dual G.703 and CDI-60 HSSI interface. For HSSI the ‘c’ parameter is always ‘1’) Example: TDI = 111 (selects Inverted TX Data)	TDI = TDI? TDI * TDI #	TDI?sc	TDI =scx (see description of arguments)
Tx Clock Invert	TCI=	2 bytes	Command or Query. Invert Transmit Clock, where: s=Defines which interface slot (1 or 2) x=Invert Transmit Clock, where: 0=Normal 1=Inverted (Note: Command valid Only with CDI-60 HSSI interface) Example: TCI = 11 (selects Inverted TX Clock, Slot 1)	TCI = TCI? TCI * TCI #	TCI?s	TCI =sx (see description of arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Tx Line Code	TLC=	3 bytes	Command or Query. (G.703 Parameters) Tx Line Code, where: s=Defines which interface slot (1 or 2) c=Defines which channel (1 to 2) x=Defines Tx Line Code, where: 0=None (Valid for E3, T3, and STS-1) 1=HDB3 (Valid for E3) 2=B3ZS (Valid for T3 and STS-1) (Note: Command valid Only with CDI-10 Dual G.703 interface) Example: TLC=111 (sets Line Code to HDB3 for interface 1 channel 1)	TLC= TLC? TLC* TLC#	TLC?sc	TLC=scx (see description of arguments)
Tx Carrier State	TXO=	1 byte	Command or Query. Tx Carrier State, where: 0=OFF due to front panel or remote control command 1=ON 2=RTI (receive/transmit inhibit) 3=OFF due to ext H/W Tx Carrier Off command (not a valid argument when used as a command) Example: TXO=1 (Tx Carrier ON)	TXO= TXO? TXO* TXO#	TXO?	TXO=x (see description of arguments)
Interface Rx Data Rate	**IRR=**	**1 bytes**	**Command or Query.** **Interface Rx Data rate, in Mbps:** **s=Defines which interface slot (1 or 2)** **c=Defines which channel (1 to 2)** **xxx.xxxxxx=Defines the transmit data rate in Mbps.** **Resolution=1 bps.** **Example: IRR=11002.047999 (which is 2.047999 Mbps) on slot 1 channel 1.** ***Note: Interface types G.703 and GbEI cannot vary in datarate.**	**IRR=** **IRR?** **IRR*** **IRR#**	**IRR?sc**	**IRR= xxx.xxxxxx (see description of arguments)**

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Rx Frequency	RFQ=	9 bytes	Command or Query. Rx Frequency: - IF: 52-88 MHz and 104-176 MHz. - L-Band: 950-1950 MHz. Resolution=100 Hz Example: RFQ=0140.9872	RFQ= RFQ? RFQ* RFQ#	RFQ?	RFQ=xxxx.xxxx (see description of arguments)

Priority System = ITF (Highest priority) , TFT, TMD, , and TCR (Lowest Priority), indicated by **shading**. Any change to a higher priority parameter can override any of the parameters of lower priority.

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Rx FEC Type	**N/A**	**1 byte**	**Query Only.** **Rx FEC Type, where:** **0=Turbo** **Example: RFT=0 (which is Turbo coding)**	**N/A**	**RFT?**	**RFT=x** **(same format as command argument)**
Rx Demod type	**RMD=**	**1 byte**	**Command or Query.** **Rx Demodulation, where:** **0=QPSK** **1=8PSK** **2=16QAM** **3=Reserved** **4=64QAM** **Depending on FEC type, not all of these selections will be valid.** **Example: RMD=2 (selects 16QAM)**	**RMD=** **RMD?** **RMD*** **RMD#**	**RMD?**	**RMD=x** **(see description of arguments)**
Rx FEC Code Rate	**RCR=**	**1 byte**	**Command or Query.** **Rx FEC Code Rate, where:** **0 = Rate 3/4** **1 = Rate 7/8** **Depending on FEC type, not all of these selections will be valid.** **Example: RCR=0 (selects Rate 3/4)**	**RCR=** **RCR?** **RCR*** **RCR#**	**RCR?**	**RCR=x** **(see description of arguments)**
Rx Data Rate	RDR=	10 bytes	Query Only. Composite Rx Data Rate, in Mbps. Resolution=1 bps Example: RDR=002.047999 (which is 2.047999 Mbps)	N/A	RDR?	RDR=xxx.xxxxxx (see description of arguments)
Rx Alpha Rolloff	RAR=	1 byte	Command or Query Rx Alpha Rolloff, where: 1 = 25% 2 = 35% Example: RAR=1 (which is a Rx Alpha Rolloff of 25%)	RAR= RAR? RAR* RAR#	RAR?	RAR=x (see description of arguments)

Priority System = ITF (Highest priority) ,RFT, RMD, and RCR (Lowest Priority), indicated by shading. Any change to a higher priority parameter can override any of the parameters of lower priority.

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Rx Spectrum Invert	RSI=	1 byte	Command or Query. Rx Spectrum Invert, where: 0=Normal 1=Rx Spectrum Invert Example: RSI=0 (selects Normal)	RSI= RSI? RSI* RSI#	RSI?	RSI=x (see description of arguments)
Rx Descrambler	RDS=	1 byte	Command or Query. Rx Descrambler state, where: 0=Off 1=On Example: RDS=1 (Scrambler On)	RDS= RDS? RDS* RDS#	RDS?	RDS=x (see description of arguments)
Rx Data Invert	RDI=	3 bytes	Command or Query. Invert Receive Data, where: s=Defines which interface slot (1 or 2) c=Defines which channel (1 to 2) x=Invert Receive Data, where: 0=Normal 1=Inverted (Note: Command valid Only with CDI-10 Dual G.703 and CDI-60 HSSI interface. For HSSI the 'c' parameter is always '1') Example: RDI = 111 (selects Inverted RX Data)	RDI= RDI? RDI* RDI#	RDI?sc	RDI=scx (see description of arguments)
Rx Clock Invert	RCI=	2 bytes	Command or Query. Invert Receive Clock, where: s=Defines which interface slot (1 or 2) x=Invert Receive Clock, where: 0=Normal 1=Inverted (Note: Command valid Only with CDI-60 HSSI interface) Example: RCI = 11 (selects Inverted RX Clock, Slot 1)	RCI = RCI? RCI * RCI #	RCI?s	RCI =sx (see description of arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Rx Demod Acquisition Sweep Width	RSW=	3 bytes	Command or Query. Rx ± acquisition sweep range of demodulator, in kHz, ranging from ± 1 to ± 100 kHz. Example: RSW=009 (selects ± 9 kHz)	RSW= RSW? RSW* RSW#	RSW?	RSW=xxx (see description of arguments)
Rx Interface Enable	RIE=	3 bytes	Command or Query. Interface Channel Enable/Disable, where: s=Defines which interface slot (1 or 2) c=Defines which channel (1 to 2) x=Rx Interface Status, where: 0=Disabled 1=Enabled Ex: RIE = 111 (Enables receive on interface slot 1, channel 1)	RIE= RIE? RIE* RIE#	RIE?sc	RIE=scx (see description of arguments)
Rx Clock Source	RCK=	3 bytes	Command or Query. Rx Clock Source (For Data Rate Accuracy), where: s=Defines which interface slot (1 or 2) c=Defines which channel (1 to 2) x=Rx Clock Source, where: 0=Rx Satellite 1=Tx-Terrestrial 2=External Reference Clock (CDI-10 Only) 3=Internal (CDI-50 OC-3 and CDI-60 HSSI Only) Example: RCK=111 (selects Tx-Terrestrial)	RCK= RCK? RCK* RCK#	RCK?sc	RCK=scx (see description of arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Interface Reference Clock	EFI=	2 bytes	Command or Query. s=Defines which interface slot (1 or 2) x=EXT CLK (Data Rate Accuracy), where: 0 = 1 MHz 1 = 2 MHz 2 = 2.048 MHz 3 = 5 MHz 4 = 10 MHz 5 = 20 MHz 6 = 34.368 MHz 7 = 44.736 MHz 8 = 51.840 MHz (Note: Command valid Only with CDI-10 Dual G.703 interface) Example: EFI=14 (Selects 10MHz on slot 1)	EFI= EFI? EFI* EFI#	EFI?s	EFI=sx (see description of arguments)
Eb/No Alarm Point	EBA=	4 bytes	Command or Query. Eb/No alarm point in dB, with a range between 0.1 and 16 dB. Resolution=0.1 dB Example: EBA=12.3	EBA= EBA? EBA* EBA#	EBA?	EBA=xx.x (see description of arguments)
Rx Buffer Size	RBS=	6 bytes	Command or Query. Rx Buffer Size (in milliseconds), where: s=Defines which interface slot (1 or 2) c=Defines which channel (1 to 2) xx.x=Rx Buffer Size, E3 mode = 0.5 to 61.0 ms, in 0.5 ms steps T3 mode = 0.5 to 44.0 ms, in 0.5 ms steps STS1 mode = 0.5 to 40.0 ms, in 0.5 ms steps HSSI interface = 5.0 to 32.0 ms, in 0.1 ms steps OC-3 interface = 2.0 to 26.0 ms, in 0.1 ms steps GBEI interface = N/A Example: RBS=1130.0 (selects 30.0 ms on interface 1, channel 1)	RBS= RBS? RBS* RBS#	RBS?sc	RBS=scxx.x (see description of arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Rx Buffer Frame	RFM=	3 bytes	Command or Query. (G.703 Parameters) Rx Buffer Frame, where: s=Defines which interface slot (1 or 2) c=Defines which channel (1 to 2) x=Rx Ternary Code, where: 0=None (Valid for E3, T3, and STS-1) 1=G.751 (Valid for E3) 2=G.752 (Valid for T3) 3=G.753 (Valid for E3) 4=STS-1 (Valid for STS-1) (Note: Command valid Only with CDI-10 Dual G.703 interface) Example: RFM=111 (selects G.751 for slot #1, channel #1)	RFM= RFM? RFM* RFM#	RFM?sc	RFM=scx (see description of arguments)
External Reference Frequency (Modem Reference Clock)	ERF=	1 byte	Command or Query. External Reference Frequency (For Frequency Accuracy), where: 0=Internal 10 MHz 1=External 1 MHz 2=External 2 MHz 3=External 5 MHz 4=External 10 MHz 5=External 20 MHz Example: ERF=5 (selects External Reference Frequency to be 20 Mhz)	ERF= ERF? ERF* ERF#	ERF?	ERF=x
IP Address	IPA=	18 bytes	Command or Query. Used to set the IP address and network prefix for the 10/100 BaseTx Ethernet management port, in the format: xxx.xxx.xxx.xxx.yy, where: xxx.xxx.xxx.xxx is the IP address, and yy is the network prefix (0-31) Example: 010.006.030.001.24	IPA= IPA? IPA* IPA#	IPA?	IPA= xxx.xxx.xxx.xxx.yy

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Gigabit Interface Management IP Address	GIP=	19 bytes	Command or Query. Used to set the management IP address and network prefix for an GBEI interface card, in the format: sxxx.xxx.xxx.xxx.yy, where: s is the slot number of interface card, xxx.xxx.xxx.xxx is the IP address, and yy is the network prefix (0-31) Example: 1010.006.030.001.24 (set IP address on Interface slot 1 to 10.6.30.1/24)	GIP = GIP? GIP* GIP#	GIP?s	GIP= sxxx.xxx.xxx.xxx.yy
Unit Test Mode	TST=	1 byte	Command or Query. CDM-700 Test Mode, where: 0=Normal Mode (no test) 1=IF Loopback 2=Digital Loopback 3=I/O Loopback 4=RF Loopback 5=Tx CW 6=Tx Alternating 1,0 Example: TST=3 (I/O Loopback)	TST= TST? TST* TST#	TST?	TST=x
Unit Alarm Mask	MSK=	3 bytes	Command or Query. Alarm mask conditions, in form abc, where: a=Rx AGC Alarm (0 = active, 1 = masked) b=Eb/No Alarm (0 = active, 1 = masked) c=BER Alarm (0 = active, 1 = masked) Example: MSK=010	MSK= MSK? MSK* MSK#	MSK?	MSK=abc

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Interface Alarm Mask	IAM=	7 bytes	Command or Query. Alarm mask conditions, in form spabcdef, where: s=slot number p=port number a=Tx Cable (0 = masked as Alarm,1 = masked as Fault,2 =Masked) b=Tx AIS (0 = masked as Alarm,1 = masked as Fault,2 =Masked) c=Rx AIS (0 = masked as Alarm,1 = masked as Fault,2 =Masked) d=Bufferslip Alarm (0 = masked as Alarm,1 = masked as Fault, 2 =Masked) e=External Clock Alarm (0 = masked as Alarm,1 = masked as Fault,2 =Masked) (Note: Command valid Only with CDI-10 Dual G.703 interface) Example: IAM=1101011 (alarm masks for interface slot 1, port 1)	IAM= IAM? IAM* IAM#	IAM?sp	IAM=spabcde
Active Bulk Image	IMG=	1 byte	Comand or Query. Sets or queries the active bulk image. n=Bulk Image Number (1, 2)	IMG= IMG? IMG* IMG#	IMG?	IMG=n
Circuit ID String	CID=	24 bytes	Command or Query. Sets or queries the user-defined Circuit ID string, which is a fixed length of 24 characters. Valid characters include: Space ( ) * + – , . / 0 9 and A thru Z	CID= CID? CID* CID#	CID?	CID=xxxxxxxxxxxxxxxxxxxxxxxx
Configuration Save	CST=	1 byte	Command only. Command causes the CDM700L to store the current modem configuration in Configuration Memory location defined by the one-byte argument (0 to 9). Example: CST=4 (store the current configuration in location 4)	CST= CST? CST* CST#	N/A	N/A

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Configuration Load	CLD=	1 byte	Command only. Causes the CDM700L to retrieve a previously stored modem configuration from Configuration Memory location defined by the one-byte argument (0 to 9). Example: CLD=4 (retrieve modem configuration from location 4)	CLD= CLD? CLD* CLD#	N/A	N/A
ReCenter Buffer	RCB=	2 bytes	Command only. Forces the software to recenter the receive Plesiochronous/Doppler buffer. s=Defines which interface slot (1 or 2) c=Defines which channel (1 to 2) Example: RCB=11 (ReCenter buffer on interface 1 channel 1)	RCB= RCB? RCB* RCB#	N/A	N/A
RTC Date	DAY=	8 bytes	Command or Query. A date in the form ddmmyy, where dd = day of the month (01 to 31), mm = month (01 to 12) yy = year (00 to 99) Example: DAY=24-04-57 (April 24, 2057)	DAY= DAY? DAY* DAY#	DAY?	DAY=dd-mm-yy
RTC Time	TIM=	8 bytes	Command or Query. A time in the form hhmmss, indicating the time from midnight, where: hh = hours (00 to 23) mm = minutes (00 to 59) ss = seconds (00 to 59) Example: TIM=23:12:59 (23 hours:12 minutes:59 seconds)	TIM= TIM? TIM* TIM#	TIM?	TIM=hh:mm:ss
Number of Unread stored Events	N/A	3 bytes	Query only. Unit returns the Number of stored Events, which remain Unread, in the form xxx. Note: This means unread over the remote control. Example: NUE=126	N/A	NUE?	NUE=xxx

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Retrieve next 5 unread Stored Events	N/A	80 bytes	Query only. Unit returns the oldest 5 Stored Events which have not yet been read over the remote control. Reply format: {CR}Sub-body{CR}Sub-body{CR}Sub-body{CR}Sub-body{CR}Sub-body, where Sub-body= ABCddmmyyhhmmss, A being the fault/clear indicator. F=Fault C=Clear I=Info B being the fault type where: 1=Unit 2=Rx Traffic 3=Tx Traffic 4=Power on/off, or log cleared C **is Fault Code numbers, as in FLT?** or Info Code, which is: 00=Power Off 01=Power On 02=Log Cleared 03=Global Config Change 04=Redundancy Config Change If there are less than 5 events to be retrieved, the remaining positions are padded with zeros. If there are no new events, the response is RNE*.	N/A	RNE?	RNE={CR}ABCCddmmyyhhmmss{CR}ABCCddmmyyhhmmss{CR}ABCCddmmyyhhmmss{CR}ABCCddmmyyhhmmss{CR}ABCCddmmyyhhmmss
Clear All Stored Events	CAE=	None	Command only. Forces the software to clear the software events log. Example: CAE= Note: This command takes no arguments	CAE= CAE? CAE* CAE#	N/A	N/A
Initialize Events Pointer	IEP=	None	Command only. Resets internal pointer to allow RNE? queries to start at the beginning of the stored events log.	IEP= IEP#	N/A	N/A
Rx Eb/No	N/A	4 bytes	Query only. Unit returns the value of Eb/No, between 0 and 16 dB, resolution 0.1 dB. Returns 99.9 if demod is unlocked. Example EBN=12.3 (which is Eb/No = 12.3 dB) For values greater than 16.0 dB, the reply will be: EBN=+016	N/A	EBN?	EBN=xxxx

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Rx Signal Level	N/A	3 bytes	Query Only. Unit returns the value of the Rx signal level, in dBm, between +3.0 and –99.0 dBm, where; xxx is the Rx signal level. Examples: RSL=+03 RSL=-41	N/A	RSL?	RSL=xxx
Rx Frequency Offset	N/A	5 bytes	Query only. Unit returns the value of the measured frequency offset of the carrier being demodulated. Values range from ± 0 to ± 30 kHz, 100 Hz resolution. Returns 99999 if the demodulator is unlocked. Example: RFO=+02.3 (which is + 2.3 kHz)	N/A	RFO?	RFO=sxx.x
Buffer Fill State	N/A	3 bytes	Query only. s=Defines which interface slot (1 or 2) c=Defines which channel (1 to 2) xx = value of the buffer fill state, between 1 to 99%. Returns 00 if demodulator is unlocked. Note: Command not valid for GbEI. Example: BFS=1133 (which is 33%, on interface slot 1 channel 1)	N/A	BFS?sc	BFS=scxx
Rx BER	N/A	8 bytes	Query only. Units returns the value of the estimated corrected BER in the form a.b x 10^{-c} . First three bytes are the value. Last two bytes are the exponent. Returns 0.0E+00 if the demodulator is unlocked. Example: BER=4.8E-03 (which is BER = 4.8 x 10^{-3})	N/A	BER?	BER=a.bEscc
Local/Remote Status	LRS=	1 byte	Command or Query. Local/Remote status, where: 0=Local 1=Serial 2=Reserved 3=Ethernet Example: LRS=1 (which is Serial Remote)	LRS= LRS? LRS* LRS#	LRS?	LRS=x

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Software Revision	N/A	34 bytes	Query only. Unit returns the value of the internal software revision installed in the unit, in the form of x.x.x Example: SWR=Boot:1.0.1 Bulk1:1.0.1 Bulk2:1.0.1	N/A	SWR?	SWR=Boot:x.x.x Bulk1:x.x.x Bulk2:x.x.x
Serial Number	N/A	9 bytes	Query only. Used to query the unit 9-digit serial number. Unit returns its S/N in the form xxxxxxxxx. Example: SNO=176500143	N/A	SNO?	SNO=xxxxxxxxx
Temperature	N/A	3 bytes	Query only. Unit returns the value of the internal temperature, in the form of sxxx (ºC). Example: TMP=+026	N/A	TMP?	TMP=sxxx
Reboot	RBT=	1 byte	Command only. Reboot. Where n is: 1=System reboot Example: RBT=1	RBT= RBT? RBT* RBT#	N/A	RBT=n
Firmware Revision Details	N/A	1 bytes	Command or Query Firmware Revision Details i=Bulk Image (1 or 2) a=Firmware Image b=Firmware Revision c=Firmware Date Example: FRW?1 (Firmware revision details for bulk image 1)	FRW= FRW? FRW* FRW#	FRW?i	FRW={CR}Boot:{CR}a,b,c{CR}Bulki:{CR}a,b,c{CR}a,b,c…

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
E3/T3/STS1 Mode Select	ETS=	3 bytes	Command or Query Sets the E3/T3/STS1 interface card mode. s=Interface Slot (1 or 2) p=Interface Port (1 or 2) m=Mode 0=E3 1=T3 2=STS1 (Note: Command valid Only with CDI-10 Dual G.703 interface) Example: ETS=111 (sets Interface 1, Port 1 to T3 mode)	ETS= ETS? ETS# ETS*	ETS?sp	ETS=spm
Modem Global Configuration	MGC=	69 bytes	Command or Query. a=Tx Frequency *TFQ b=Tx Datarate (Read-Only) *TDR c=Tx FEC Type *TFT d=Tx FEC Code Rate *TCR e=Tx Modulation Type *TMD f=Tx Spectrum Invert *TSI g=Tx Scrambler Enable *TSC h=Tx Power Level *TPL i=Tx Carrier State *TXO j=Tx Alpha Rolloff *TAR k=Rx Frequency *RFQ l=Rx Datarate (Read-Only) *RDR m=Rx FEC Type *RFT n=Rx FEC Code Rate *RCR o=Rx Demodulation Type *RMD p=Rx Spectrum Invert *RSI q=Rx Scrambler State *RDS r=Rx Sweep Width *RSW s=Rx Eb/No Alarm Point *EBA t=Rx Alpha Rolloff *RAR u=Rx Adaptive Equalization *AEQ v=External/Internal Reference *ERF w=Test Mode (Read-Only) *TST x=Unit Alarm Mask *MSK	MGC= MGC? MGC# MGC*	MGC?	MGC=aaaa.aaaabbb. bbbbbbcdefghhh.hijkk kk.kkkklll.llllllmnopqrrr ss.stuvwxxx
Gigabit Global Configuration	GGC=	23 bytes	Command or Query. a=Interface Slot 1 or 2 b=Tx Enable (0=Disabled, 1=Enabled) *TIE c=Tx Datarate (in megabits per second) *ITR d=Rx Enable (0=Disabled, 1=Enabled) *RIE e=Rx Datarate (in megabits per second) *IRR	GGC= GGC? GGC# GGC*	GGC?a	GGC=abccc.ccccccdeee. eeeeee

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
OC3 Global Configuration	OGC=	9 bytes	Command or Query. a=Interface Slot 1 or 2 b=Interface Mode (0 = Optical, 1 = Coax) c=Tx Enable (0=Disabled, 1=Enabled) *TIE d=Rx Enable (0=Disabled, 1=Enabled) *RIE e=Rx Clock Source *RCK f=Receive Buffer Size (in milliseconds.) *RBS	OGC= OGC? OGC# OGC*	OGC?a	OGC=abcdeff.f
HSSI Global Configuration	HGC=	33 bytes	Command or Query. a=Interface Slot (1 or 2) b=Tx Enable (0=Disabled, 1=Enabled) *TIE c=Tx Clock Invert (0=Non-Inverted, 1=Inverted) d=Tx Data Invert (0=Non-Inverted, 1=Inverted) *TDI e=Tx Clock Source (Read-only) *TCK f=Tx Datarate (in megabits per second) *ITR g=Rx Enable (0=Disabled, 1=Enabled) *RIE h=Rx Clock Invert (0=Non-Inverted, 1=Inverted) i=Rx Data Invert (0=Non-Inverted, 1=Inverted) *RDI j=Rx Clock Source *RCK k=Rx Datarate (in megabits per second) *IRR l=Receive Buffer Size (in milliseconds) *RBS	HGC= HGC? HGC# HGC*	HGC?a	HGC=abcdefff.ffffffghij kkk.kkkkkkll.l
Interface Type And Configuartion in SlOT 1	IFA?	N/A	Command or Query. IFA=* Turn OFF All ports on Slot 1	IFA=	IFA?	BGC =DGC port 1,DGC port 2 for Slot1 HGC=HGC for Slot 1 GGC=GGC for Slot 1 OGC=OGC for Slot1 IFA=*(No Card Installed)
Interface Type And Configuartion in SlOT 2	IFB?	NA	Command or Query. IFB=* Turn OFF All ports on Slot 2	IFB=	IFB?	BGC =DGC port 1,DGC port 2 for Slot2 HGC=HGC for Slot 2 GGC=GGC for Slot 2 OGC=OGC for Slot2 IFB=*(No Card Installed)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Dual G.703 Port Configuration	BGC=DGC port1,DGC port 2	28 Bytes	Command or Query. a=Interface Slot (1or 2) b=Interface Port (1) c=Interface Mode (E3/T3/STS1) *ETS d=Line Coding Enabled(0=None, 1 =Enabled) *TLC Enabled : E3 - HDB3 T3,STS1 –B3ZS e=Framing Type (0=None, 1=G.751, 2=G.752, 3=G.753, 4=STS-1) *RFM f=Tx Enable (0=Disabled, 1=Enabled) *TIE g=Tx Data Invert (0=Non-Inverted, 1=Inverted) *TDI h=Rx Enable (0=Disabled, 1=Enabled) *RIE i=Rx Data Invert (0=Non-Inverted, 1=Inverted) *RDI j=Rx Clock Source (0=Reserved, 1=External, 2=Rx, 3=Tx) *RCK k=Receive Buffer Size (in milliseconds) *RBS *IAM m1=Alarm Masking for TxData m2=Alarm Masking for TxAIS m3=Alarm Masking for RxAIS m4=AlarmMasking for Buffer Slip m5=Alarm Masking for External Clock a=Interface Slot (1 or 2) b=Interface Port (2) same as port 1	BGC=	Response Only To IFA? or IFB? with Dual G.703	N/A
Dual G.703 Global Configuration	DGC=	14 bytes	Command or Query. a=Interface Slot (1 or 2) b=Interface Port (1 or 2) c=Interface Mode (E3/T3/STS1) *ETS d=Line Coding Enabled(0=None, 1 =Enabled) *TLC Enabled : E3 - HDB3 T3,STS1 –B3ZS e=Framing Type (0=None, 1=G.751, 2=G.752, 3=G.753, 4=STS-1) *RFM f=Tx Enable (0=Disabled, 1=Enabled) *TIE g=Tx Data Invert (0=Non-Inverted, 1=Inverted) *TDI h=Rx Enable (0=Disabled, 1=Enabled) *RIE i=Rx Data Invert (0=Non-Inverted, 1=Inverted) *RDI j=Rx Clock Source (0=Reserved, 1=External, 2=Rx, 3=Tx) *RCK k=Receive Buffer Size (in milliseconds) *RBS	DGC= DGC? DGC# DGC*	DGC?ab	DGC=abcdefghijkk.k

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Equipment ID	N/A	12 bytes	Query only. Unit returns information concerning the equipment identification, and the option field, in the form abbbcdefghij; where: aaa=defines the model number (700 in this case) b=Turbo H/W option: 0=None, 1=Turbo, 2=TPC/LDPC c= Tx Symbol Rate S/W option: 0=Base (15.0 Msps), 1=Up to 22.5 Msps, 2=Up to 30.0 Msps, 3=Up to 37.5 Msps, 4=Up to 45.0 Msps, 5=Up to 64 Msps d=Rx Symbol Rate S/W option: 0=Base (15.0 Msps), 1=Up to 22.5 Msps, 2=Up to 30.0 Msps, 3=Up to 37.5 Msps, 4=Up to 45.0 Msps, 5=Up to 64 Msps e=Tx Higher-order modulation: 0=None, 1=8PSK, 2=16-QAM, 3=64-QAM, 4=8PSK and 16-QAM, 5=8PSK, 16-QAM and 64QAM f=Rx Higher-order modulation: 0=None, 1=8PSK, 2=16-QAM, 3=64-QAM, 4=8PSK and 16-QAM, 5=8PSK, 16-QAM and 64QAM g=Mod configuration: 0=Not installed, 1=70/140, 2=L-Band h=Demod configuration: 0=Not installed, 1=70/140, 2=L-Band i=Interface #1 status: 0=E3/T3/STS-1 Card Installed, 1-2=Reserved, 3=OC3 Card Installed, 4=Gigabit Ethernet Card Installed, 5=HSSI Card Installed, 6-E=Reserved, F=Not Installed j=Interface #2 status: 0=E3/T3/STS-1 Card Installed, 1-2=Reserved, 3=OC3 Card Installed, 4=Gigabit Ethernet Card Installed, 5=HSSI Card Installed, 6-E=Reserved, F=Not Installed Example: EID=700155111100 is a CDM-700 modem with Turbo installed, capable of transmitting and receiving up to 64.0 Msps using QPSK or 8PSK with both interface slots filled with E3/T3/STS-1 cards.	N/A	EID?	EID=aaabcdefghij (see description of arguments)
VLAN Mode	SVM=	2 Bytes	Command or Query. a=Interface Slot (1 or 2) b=Normal or VLAN(0=Normal, 1=VLAN)	SVM= SVM? SVM#	SVM?a	SVM=ab

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
VLAN Configuration	SVC=	8Bytes	Command Only a=Interface Slot (1 or 2)";" Deleminator bbbb=VLAN PVID(0002 to 4094) ":" Deleminator c VLAN ATTRIBUTE 1=NATIVE 2=TAGGED 3=UNTAGGED 4=MANAGEMENT Notes: Create PVID if PVID does't exist and make room for it PVID entry table. 1. If No Room in Table returns " * " 2. If Trying to add more than one Native or Management returns * 3. If Trying to change the attribute of a VLAN ID which is Native or Management with different attribute.	SVC= SVC# SVC*	N?A	N/A
VLAN Table	SVT=	1 Byte	Query Only. Returns all VLAN ID's and attributes in the table. a=Interface Slot (1 or 2) Example: SVT=1;0001:0002:4 The current VLAN's in the table are PVID 1 with and attribute of NATIVE and PVID 2 with a management attribute.	N/A	SVT?a	SVT=abbbb…bbbb Returns all VLAN ID's in table.
VLAN Delete	SVD=	5Bytes	Command or Query. a=Interface Slot (1 or 2) bbbb=VLAN PVID(0001 to 4094) returns * if deleting Native or Management returns * if Vlan does not exist.	SVD= SVD? SVD# SVD*	SVD?a;	SVD=abbbb…bbbb Returns last five VLAN Deleted.
Set AutoCrossover	SCX=	2bytes	Command or Query. A=Interface Slot (1 or 2) b=0(Set AutoCrossover to NO) = 1(Set AutoCrossover to YES)	SCX= SCX? SCX# SCX*	SCX?a	SCX=ab
Set Learning LAN to WAN	SLM=	2bytes	Command or Query. A=Interface Slot (1 or 2) b=0 (Set Learning to NO) = 1 (Set Learning to YES)	SLM= SLM? SLM# SLM*	SLM?a	SVA=ab

Note: Once the Learning mode is changed cycle power to store.

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Faults and Status	N/A	8 bytes	Query only. Unit returns the current fault and status codes for the Unit (hardware), Modulator, Demodulator, and Interfaces, where: **a = Unit Faults:** 0 = No Faults 1 = Framer FPGA Not Loaded 2 = 1.5 Volt Supply 3 = 1.5 Volt Supply (Intfc 1) 4 = 1.5 Volt Supply (Intfc 2) 5 = 3.3 Volt Supply 6 = 5.0 Volt Supply 7 = 12.0 Volt Supply 8 = -12.0 Volt Supply 9 = 18.0 Volt Supply A = Flash Load B = FPGA Load (FEC 1) C = FPGA Load (FEC 2) D = FPGA Load (Interface 1) E = FPGA Load (Interface 2) F = 192MHz PLL Fault G = Ext Reference PLL Fault H = Framer FPGA Temperature I = Framer Temperature J = Cooling Fans K = Interface 1 L = Interface 2 M = 1:1 Redundancy Switch **bb = Tx Faults:** 00 = No Faults 01 = Modulator 1.5 Volt Supply 02 = Modulator FPGA Not Loaded 03 = Symbol Rate PLL 04 = Synthesizer Lock 05 = Digital Clock Mgmt Lock 06 = I & Q Activity 07 = Modulator Temperature 08 = Modulator Filters 09 = Cable Slot 1 Port 1 0A = Cable Slot 1 Port 2 0B = Cable Slot 2 Port 1 0C = Cable Slot 2 Port 2 0D = AIS Slot 1 Port 1 0E = AIS Slot 1 Port 2 0F = AIS Slot 2 Port 1 0G = AIS Slot 2 Port 2 0H = ASI Slot 1 Clock 0I = ASI Slot 2 Clock 0J = PECL Slot 1 FIFO 0K = PECL Slot 2 FIFO 0L = ASI Slot 1 FIFO Empty 0M = ASI Slot 2 FIFO Empty 0N = ASI Slot 1 FIFO Full 0O = ASI Slot 2 FIFO Full 0P = ASI Slot 1 Data 0Q = ASI Slot 2 Data 0R = PECL Slot 1 Frame Lock 0S = PECL Slot 2 Frame Lock 0T = ASI Slot 1 No Sync 0U = ASI Slot 2 No Sync 0V = Serdes Slot 1 to Framer 0W = Serdes Slot 2 to Framer 0X = Serdes Modulator to FEC 1 0Y = Serdes Modulator to FEC 2 0Z = Serdes FEC 1 to Framer 10 = Serdes FEC 2 to Framer 11 = Serdes Framer to Modulator 13 = GBEI CABLE SLOT 1 14 = GBEI CABLE SLOT 1	N/A	FLT?	FLT=aabbccde (see description for details of arguments d=0 NO Change in fault status since last poll. D=1 Change in fault status since last poll. E=0 NO Change in configuration since last poll. E=1 Change in configuration since last poll. (see description of arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
			cc = Rx Faults: 00 = No Faults 01 = Demod 1.5 Volt Supply 02 = Demod FGPA Not Loaded 03 = Demod Unlocked 04 = Demod FEC 1 Unlocked 05 = Demod FEC 2 Unlocked 06 = Framer Unlocked 07 = Tributaries Unlocked 08 = Demod Temperature 09 = BER Threshold 0A = AGC Level 0B = Eb/No Threshold 0C = Tributary Packet 0D = Serdes Demod to Framer 0E = Serdes FEC 1 to Demod 0F = Serdes FEC 2 to Demod 0G = Serdes Framer to FEC 1 0H = Serdes Framer to FEC 2 0I = Serdes Framer to Intfc 1 0J = Serdes Framer to Intfc 2 0K = Buffer Slot 1 Port 1 0L = Buffer Slot 1 Port 2 0M = Buffer Slot 2 Port 1 0N = Buffer Slot 2 Port 2 0O = Buffer Under Slot 1 Port 1 0P = Buffer Under Slot 1 Port 2 0Q = Buffer Under Slot 2 Port 1 0R = Buffer Under Slot 2 Port 2 0S = Buffer Over Slot 1 Port 1 0T = Buffer Over Slot 1 Port 2 0U = Buffer Over Slot 2 Port 1 0V = Buffer Over Slot 2 Port 2 0W = AIS Slot 1 Port 1 0X = AIS Slot 1 Port 2 0Y = AIS Slot 2 Port 1 0Z = AIS Slot 2 Port 2 10 = Ext Clock Slot 1 Port 1 11 = Ext Clock Slot 1 Port 2 12 = Ext Clock Slot 2 Port 1 13 = Ext Clock Slot 2 Port 2 14 = Demod Synth 1 Unlocked 15 = Demod Synth 2 Unlocked			
Gigabit Interface Alarm Mask	GAM=	3 bytes	Command or Query. Alarm mask conditions, in form spa, where: s=slot number p=port number a=Tx Cable (0=masked as Alarm, 1=masked as Fault, 2=Masked) Note: Command valid only with Gigabit interface. Example: GAM=110 (alarm masks for interface slot 1, port 1.	GAM= GAM? GAM* GAM#	GAM?sp	

Note: The following codes are used in the 'Response to Command' column:

= Message ok
? Received ok, but invalid arguments found
* Message ok, but not permitted in current mode, (**Note:** IFA,IFB =*,Response No Interface Card Installed,Command Turn Off All Ports On Interface Card)
# Message ok, but unit is not in **Remote** mode
~ Time out of an EDMAC pass-through message

Chapter 12. SNMP INTERFACE

12.1 SNMP Interface

The *Simple Network Management Protocol* (SNMP) is an application-layer protocol designed to facilitate the exchange of management information between network devices. The CDM-700 SNMP agent supports both SNMPv1 and v2c.

For proper SNMP operation, the CDM-700 MIB files must be used with the associated version of the CDM-700 modem M&C Software. Please refer to the CDM-700 SW Release Notes for information on the required FW/SW compatibility.

12.2 CDM-700 Management Information Base (MIB) Files

MIB files are used for SNMP remote management and consist of Object Identifiers (OIDs). Each OID is a node that provides remote management of a particular function. A MIB file is a tree of nodes that is unique to a particular device. There are two MIB files associated with the CDM-700:

MIB File/Name	Description
Fw12051-2-.mib **ComtechEFData MIB file**	**ComtechEFData MIB file gives the root tree for ALL Comtech EF Data products and consists of only the following OID:** **Name: comtechEFData** **Type: MODULE-IDENTITY** **OID: 1.3.6.1.4.1.6247** **Full path: iso(1).org(3).dod(6).internet(1).private(4).enterprises(1).comtechEFData(6247)** **Module: ComtechEFData** **Product ID 32(CDM 700)**
Fw12635-1 **CDM-700 Trap** **MIB File**	**CDM-700 Traps to Support SNMP v1.2**
Fw10874-2-.mib **CDM-700 MIB file.**	**CDM-700 OBJECTS** **CDM-700 –SYSTEM OBJECTS** **CDM-700 MODULATOR OBJECTS** **CDM-700 DEMODULATOR OBJECTS** **CDM-700 INTERFACE OBJECTS** • **E3T3STS1 INTERFACE** • **OC3 INTERFACE** • **GIGABIT INTERFACE** • **HSSI INTERFACE**

These MIB files should be compiled in a MIB Browser or SNMP Network Monitoring System server.

Note: The CDM-700 SNMP agent supports both SNMPv1 and v2c.

12.3 SNMP Community Strings

The CDM-700 uses community strings as a password scheme that provides authentication before gaining access to the CDM-700 agent's MIBs.

In SNMP v1/v2c, the community string is sent unencrypted in the SNMP packets. Caution must be taken by the network administrator to ensure that SNMP packets travel only over a secure and private network if security is a concern. A packet sniffer can easily obtain the community string by viewing the SNMP traffic on the network.

The community string is entered into the MIB Browser or Network Node Management software and is used to authenticate users and determine access privileges to the SNMP agent.

The user defines three Community Strings for SNMP access:

Read Community	default = public
Write Community	default = private
Trap Community	default = comtech

12.4 CDM-700 Common Private MIB

The CDM-700 SNMP agent also implements 1 private MIB. The CDM-700 Common MIB holds all unit parameters not associated with Modulator, Demodulator, System Configuration ,System Monitoring ,System Configuration and Interface boards. For detailed OID information please refer to the actual MIB file.

12.5 System Information Group

This group provides Serial Number and Model Number information as well as an interface table that defines the exact hardware configuration of the units ystem Entries provides access to the unit's Real-Time clock (Time and Date), Internal Reference Adjustment, Circuit ID, and System Reboot.

12.5.1 Remote Ethernet Group

This group provides the parameters of the modem's Ethernet interface. This includes the IP Address and Mask, IP Gateway, and MAC Address.

12.5.2 Ethernet SNMP Group

This group provides the parameters necessary to configure and operate the SNMP interface. This includes the System Name, Administrator and Location as well as the Community Strings.

12.5.3 Interface FAST OPTIONS Group

This group provides information regarding unit's FAST OPTIONS capabilities .

12.5.4 Modem Reference Group

This group provides the parameters for selection of the modem's frequency reference.

12.5.5 Monitor Group

This group provides access to the units current Alarm/Fault Status as well as a table to access the Stored Alarms/Events.

12.5.6 Test Group

This group provides access to the units test modes.

12.5.7 Save/Load Group

This group provides control of the unit's configuration Store and Load capabilities.

12.5.8 Firmware Group

This group provides a table of firmware numbers, Revision Numbers, and Release Dates for all the software/firmware within the unit.

12.5.9 System Log Group

This group provides information stored in the system log of the modem,including date an time the event occurred.

12.6 Modulator Group

The CDM-700 Modulator Group holds all unit parameters associated with the Modulator. For detailed OID information please refer to the actual MIB file.

12.7 Demodulator Modulator Group

The CDM-700 DeModulator Group holds all unit parameters associated with the Demodulator. For detailed OID information please refer to the actual MIB file.

12.8 Interface Group

The CDM-Interface Group holds all Grops associated with the Various Interface board. For detailed OID information please refer to the actual MIB file.

12.8.1 E3T3STS1 Group

The CDM-700 E3T3STST1 Group holds all unit parameters associated with the E3T3STS1 Interface. For detailed information, refer to the actual MIB file.

12.8.2 OC3 Group

The CDM-700 OC3 Group holds all unit parameters associated with the OC3 Interface. For detailed information, refer to the actual MIB file.

12.8.3 Gigabit Ethernet Group

The CDM-700 Gigabit Interface Group holds all unit parameters associated with the Gigabit Ethernet Interface. For detailed information, refer to the actual MIB file.

12.9 HSSI Group

The CDM-700 HSSI Group holds all unit parameters associated with the HSSI Interface. For detailed information, refer to the actual MIB file.

12.10 CDM Monitor Objects

The CDM-700 Monitor Objects holds all unit,transmit and receive alarms associated with the notifications for support Of SNMP v1.2 and SNMP v2.0 Traps.
For detailed information, refer to the actual MIB file.

12.11 CDM Redundancy Objects

The CDM-700 Redundancy Objects holds all the entries associated with monitoring of The Redundancy Modes of the modem. For detailed information, refer to the actual MIB file.

12.12 SNMP Traps

The CDM-700/700L has the ability to send out SNMP traps when certain events occur in the modem. For example, when the CDM-700/700L boots it sends out a coldstart trap and three linkup traps, one for each interface that is brought up. The CDM-700/700L also sends out traps when an alarm or a fault occurs in the modem. These include unit faults, TX faults, and RX faults. A trap is sent both when a fault occurs when the fault condition changes.The CDM-700/700L supports both SNMPv1 traps and SNMPv2 notifications. Which style of traps the CDM-700/700L sends can be configured by the user using the cdmipSnmpTrapVersion OID.

The following are the MIB2 v1traps/v2 notifications that the CDM-700/700L supports.
CDM-700 MIB2 SNMPv1 traps:
Cold Start 1
CDM-700 MIB2 SNMPv2 notifications:
Cold Start 1.3.6.1.6.3.1.1.5.1

The following tables are the Alarms and Faults v1 traps / v2 notifications that the CDM-700 supports.

CDM-700/700L Alarms and Faults SNMPv1 traps:
cdm700UnitAlarm 6247321
cdm700RxTrafficAlarm 6247322
cdm700TxTrafficAlarm 6247323
cdm700 GBEI Cable 6247324
cdm700Redundancy 6247325

CDM-700/700L Alarms and Faults SNMPv2 notifications:
cdm700 SystemUnitAlarms 1.3.6.1.4.1.6247.32.2.4.1
cdm700 TxTrafficAlarms 1.3.6.1.4.1.6247.32.2.3.1
cdm700 RxTrafficAlarms 1.3.6.1.4.1.6247.32.2.2.1
cdm700 Gigabit Cable Alarm 1.3.6.1.4.1.6247.32.2.1.2.1.0
cdm700 RedundancySwitchOver 1.3.6.1.4.1.6247.32.2.6.1

12.13 MIB-II

The CDM-700/700L agent implements RFC 1213, Management Information Base for Network Management of TCP/IP-based Internets. This is known as “MIB-II” or “Public MIB support.” For detailed OID information refer to the actual MIB file. The agent implements the following Groups:

Table 12.13.1. MIB-II Support Group Comments

System Group Mandatory for RFC1213
Interface Mandatory for RFC1213
IP Mandatory for RFC1213
ICMP Mandatory for RFC1213
TCP Mandatory for RFC1213
UDP Mandatory for RFC1213
SNMP Mandatory for RFC1213
1FXTables for RFC 2233

Notes:

Chapter 13. Telnet Interface

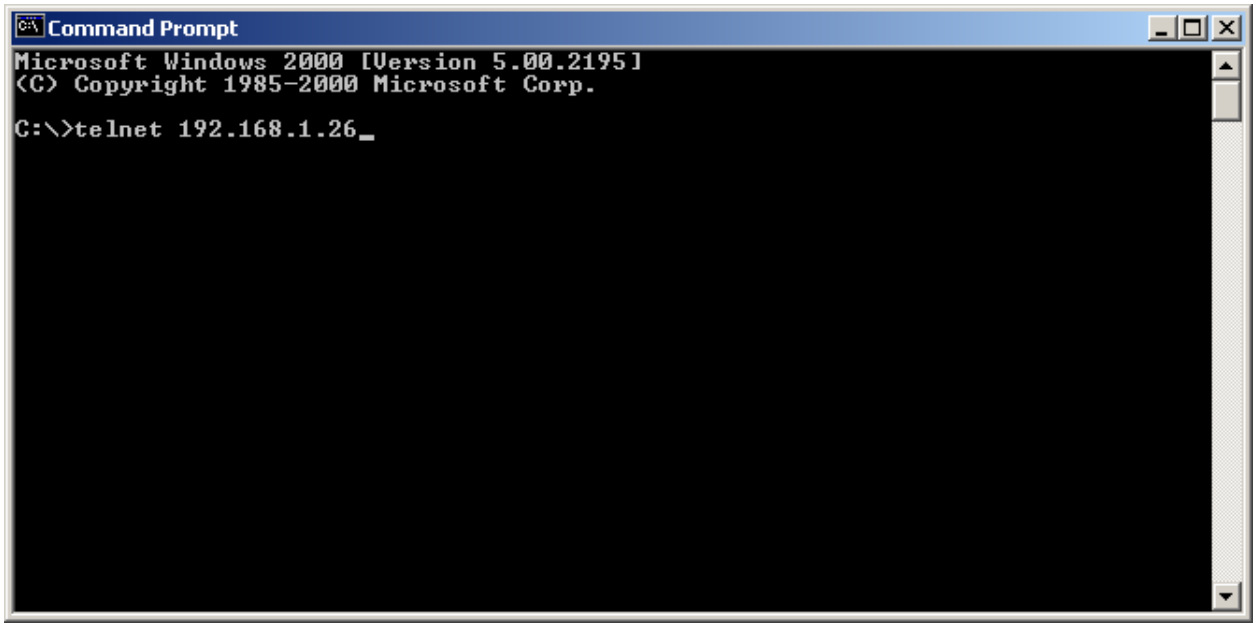
13.1 Telnet Interface

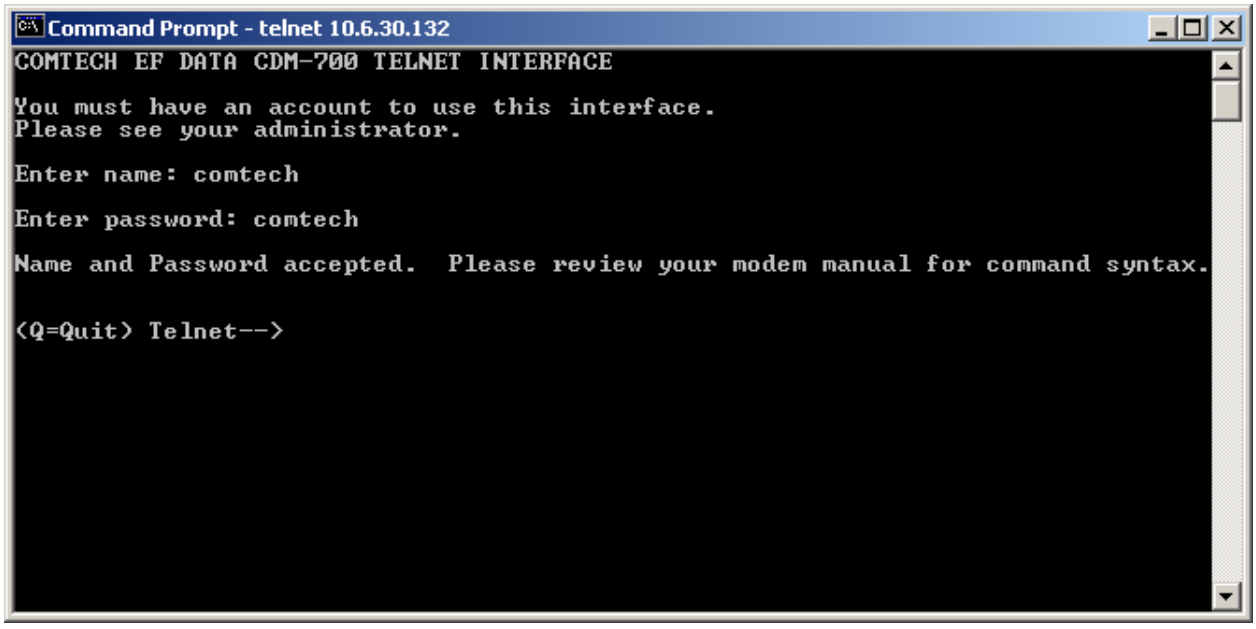
The modem provides a Telnet interface for two primary functions:

- Equipment M&C via the standard equipment Remote Control protocol.
- Equipment M&C via Comtech Monitor and Control System (CMCS) application.

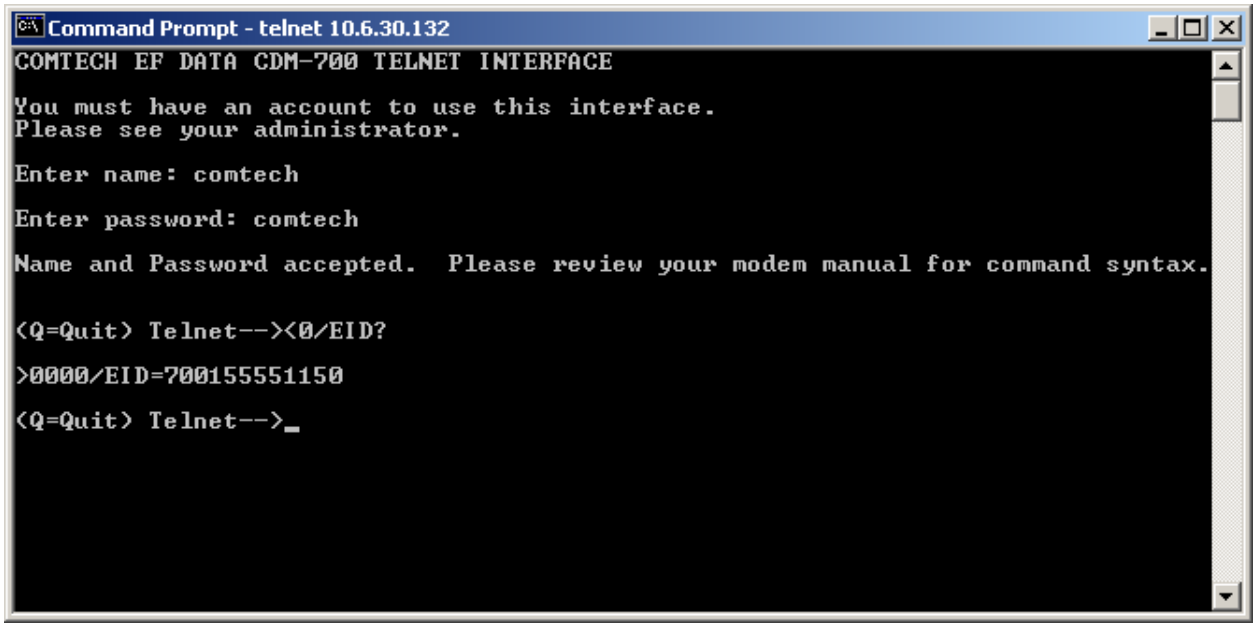
The Telnet interface requires user login at the **Administrator** level and **Read/Write** level.

The screen capture below shows the login process :





Once logged into the Telnet interface as the Administrator, the user can access the standard remote control interface defined in Chapter 11as shown in the example below:



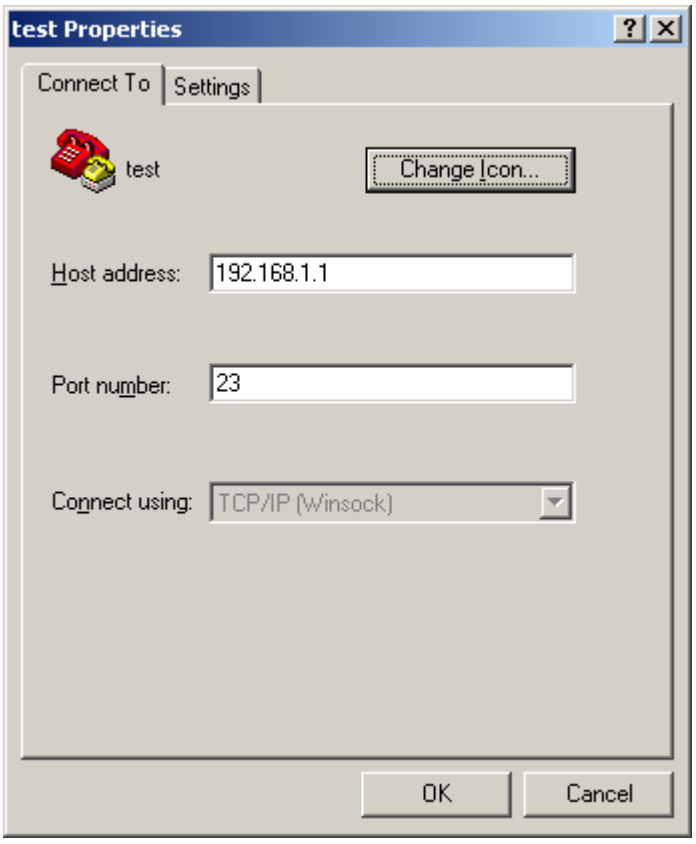
13.2 Caution Using Windows Telnet Client

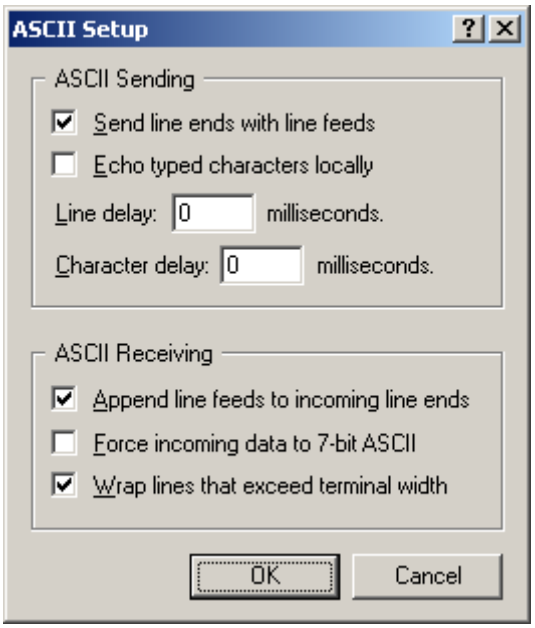
There is a disadvantage when using Windows DOS as Telnet Client. Since Windows DOS cannot translate a '\r' to a '\r\n' for the messages coming from Telnet Server, the multi-line command response (for example, FRW? response) will be displayed as one line, with the latter lines overwriting the previous lines.

In order to view the full response messages, CEFD recommends using HyperTerminal configured as Telnet Client. To do so, configure the HyperTerminal as following:

1. Connect using TCP/IP instead of COM1 or COM2;
2. ASCII setup: check both the "Send line ends with line feeds" and "Append line feeds to incoming line ends" options.

See the following screen captures for examples.


test Properties
Connect To
Settings
test
Change Icon...
Host address:
192.168.1.1
Port number:
23
Connect using:
TCP/IP (Winsock)
OK
Cancel


ASCII Setup
ASCII Sending
Send line ends with line feeds
Echo typed characters locally
Line delay:
0
milliseconds.
Character delay:
0
milliseconds.
ASCII Receiving
Append line feeds to incoming line ends
Force incoming data to 7-bit ASCII
Wrap lines that exceed terminal width
OK
Cancel

13.3 Using Telnet

Please refer to the Remote Control section of the manual for the syntax and list of commands and status for the modem.

Telnet is implemented in the modem Ethernet M&C in a "Telnet wrapper". When the user Telnets to the modem, it emulates a local RS-232 (RS-485) serial connection to the modem. The user can then type the same command syntax that he would use from a serial remote terminal and the Ethernet M&C "unwraps" the Telnet packet and sends it on to the base modem processor which responds to it as if it was a serial remote command. Here is a brief summary:

- Start of Packet is either a '<' or a '>' where '<' is used to send a command/query to the modem and '>' is the modem response.
- Defines the address of the modem (always is 0 in RS-0232).
- The 3 digit instruction code of the specific command/query.
- Instruction Code Qualifier. When sending, = will set a parameter, ? is used to query.
- The modem response will be either =, ?, !, *, #, or ~
  (see the specific definitions in the the Remote Control Section).
- Optional argument.
- End of packet (CR).

13.3.1 Telnet Example

A controller sends the following command to the modem to program its Tx frequency:

<0135/TFQ=0070.2345 {CR}

And the modem returns:

>0654/TFQ=

The message below requests status Tx frequency status:

<0135/TFQ?

The modem response is:

>0654/TFQ= 0070.2345 {CR}{LF}

Notes:

Appendix A. FAST Activation Procedure

A.1 Introduction

FAST is an enhancement feature available in Comtech EF Data products, enabling on-location upgrade of the operating feature set—in the rack—without removing a modem from the setup. This accelerated upgrade can be accomplished only because of FAST's extensive use of programmable devices incorporating Comtech EF Data-proprietary signal processing techniques. These techniques allow the use of a unique access code to enable configuration of the available hardware. The access code can be purchased at any time from Comtech EF Data. Once obtained, the access code is loaded into the unit through the front panel keyboard.

A.2 Activation Procedure

A.2.1 Serial Number

Obtain the Modem serial number as follows:

a. From the main menu, select **FAST**, then [ENTER].
b. The Modem motherboard Serial Number is displayed on the bottom line, to the left.
c. Record serial number: _____

A.2.2 View currently installed features

To view the currently installed features, proceed as follows:

a. From the main menu, select **FAST**, then [ENTER].
b. From the **FAST OPTIONS** menu, select **VIEW**, then [ENTER].
c. Scroll through the Modem Options and note, which are 'Installed' or 'Not Installed'. Any that are 'Not Installed' may be purchased as a FAST upgrade.

Contact a Comtech EF Data sales representative to order features. You will be asked to provide the Modem Serial Number. Comtech EF Data Customer Support personnel will verify the order and provide an invoice and instructions, including a 20-character configuration code.

A.2.3 Enter Access Codes

Enter the access codes as follows:

a. Press [CLEAR] to return to the **FAST OPTIONS** menu.
b. Select **SET**.
c. Press [ENTER].
d. Use [←][→] and [↑][↓] arrow keys to enter the 20-character config code.
e. Press [ENTER].

If everything has been entered correctly, the display will show "CONFIGURED CORRECTLY" and the modem resets to its default configuration.

Appendix B. Dual E3/T3/STS-1 Interface, CDI-10

B.1 Introduction

This data interface is a plug-in module that inserts into the rear of the CDM-700 series modem chassis. It provides physical and electrical connection between the external terrestrial device and the internal circuitry of the modulator or demodulator. By convention, a modem is **D**ata **C**ommunications **E**quipment (DCE) where Tx data enters the data interface and Rx data exits it. The plug-in interface has full duplex capability.

In addition, the module is automatically configured for simplex-transmit or simplex-receive operation when the module is plugged into a simplex chassis configured for modulator only or demodulator only operation. Slot 1 of the modem is filled with a data interface card first, and Slot 2 is assigned a blank panel or another interface depending upon configurations allowed at time of order. (Slot 1 is located near the center of the rear panel, and Slot 2 is next to the outside edge.) Initially, the modem is available in Duplex and Rx only configurations.

The Dual E3/T3/STS-1 card (CDI-10) provides two independent interfaces (ports) that are operable T3/E3/STS-1. The card is a data interface module that plugs into the CDM-700 Satellite Modem. It features two primary data interfaces used in the satellite applications. The T3/E3/STS-1 interface provides:

- 2 independent G.703 Interfaces
  - E3, T3, STS-1or OFF
  - Each separately programmed
- External Clock Input

Figure B-1 is a block diagram of the interface and Figure B-2 shows a typical view of the rear panel of the module.

A port is defined as a Tx / Rx pair, and there are two independent ports. Assigning each port to a different data rate is allowed. However assigning the Tx side of Port 1 to a different data rate than the Rx side of Port 1 is not allowed.

When a Dual E3/T3/STS-1 card is installed in Slot 1, Slot 2 is either a blank panel or another Dual E3/T3/STS-1 card.

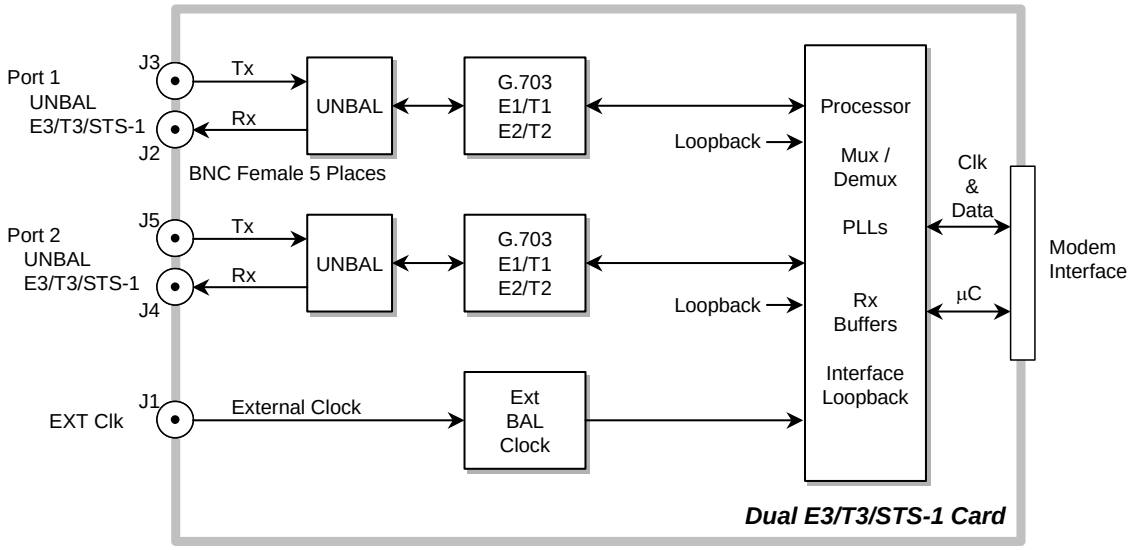


Figure B-1. Block Diagram of Dual E3/T3/STS-1 Data Interface Card

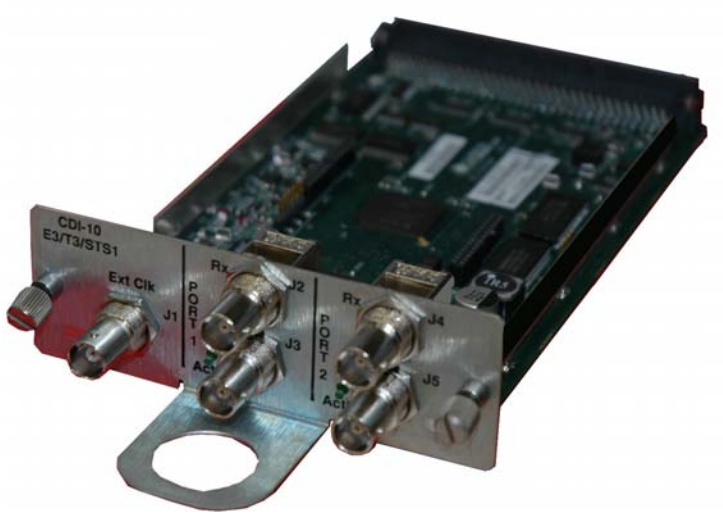


Figure B-2. Typical View of Dual E3/T3/STS-1 Data Interface Card

B.2 Summary of Specifications

Item	Requirements		
General			
Interfaces	2 each Independent G.703 ports, E3, T3, and STS-1 **Note:** Selection of a port requires TX and RX having the same data rate.		
External Clock Input	1 input		
Interfaces Operating Simultaneously	None, one or both of the interfaces		
Interface Selection	Each of the interfaces is individually enabled		
Rx Buffer: G.703 Frame Types	Type G.751 G.752 G.753 STS-1	Bits 1536 4760 2148 6480	Bytes 192 595 268.5 810
	Note: Programmable in 0.5 ms increments.		
Minimum Buffer Size for any rate	0.5 ms		
Maximum Buffer Size	G.751 61 ms G.752 44 ms G.753 61 ms STS-1 40 ms		
Clock Options	Tx Clock = Tx, Rx (satellite) or External Rx Clock = Tx, Rx, External or Internal **Note:** Asymmetric operation is not supported		
Acquisition Range	Programmed Tx data rate ± 100 ppm		
Test	Baseband Loopback (at interface) Interface Loopback (through interface card) 2047 test pattern generator		
Hot Swap Capability	None		
Interfaces			
G.703 Unbalanced: Connector Type Signals Supported Data Rate Tx and Rx Data Rates Line Coding Pulse Mask Jitter Impedance	2 independent channels supporting G.703 E3, T3, and STS-1. BNC, female ITU-T-G.703 SD, RD 34.368, 44.736 and 51.84 Mbps Tx and Rx data rates are programmed the same HDB3 (for E3), B3ZS (for DS3 STS-1), AMI (Common) ITU-T-G.703 Bellcore GR-499 core For T3 and STS-1, G.823 for E3 75 Ω Per ITU-T-G.703		
External Clock Input: Connector Impedance Input Amplitude Input Frequency Signal Characteristics	 BNC, female 75 Ω ± 5% 0.5 to 5.0 V peak to peak 1, 2, 5, 10, 2.048, 34.368, 44.736, and 51.84 Sine wave or square with duty cycle of 50 ± 10%		
Alarms	Loss of Signal All 1's		

Physical and Environmental	
Environmental: Temperature Humidity	 0 to 50 °C (32 to 122°F) 0 to 95% non-condensing
Physical	3.95 W x 8.14 D x 1.5 H inches (10.03 W x 20.67 D x 3.81H cm)

B.2.1 Connector Pinouts

Port	Ref	Description	Direction	Connector
1	J3	Tx-Data	In	BNC, Female
	J2	Rx-Data	Out	BNC, Female
2	J5	Tx-Data	In	BNC, Female
	J4	Rx-Data	Out	BNC, Female
	J1	Ext-Clk	In	BNC, Female

Appendix C. OC-3 / STM-1 Interface, CDI-50

C.1 Introduction

This data interface is a plug-in module that inserts into the rear of the CDM-700 series modem chassis. It provides physical and electrical connection between the external terrestrial device and the internal circuitry of the modulator or demodulator. By convention, a modem is **D**ata **C**ommunications **E**quipment (DCE) where Tx data enters the data interface and Rx data exits it. The plug-in interface has full duplex capability.

In addition, the module is automatically configured for simplex-transmit or simplex-receive operation when the module is plugged into a simplex chassis configured for modulator only or demodulator only operation. The module will operate when plugged into Slot 1 modem. (Slot 1 is located near the center of the rear panel, and Slot 2 is next to the outside edge.) Initially, the modem is available in Duplex and Rx only configurations.

Two types of OC-3 / STM-1 modules area available and one is selected at the time of order. Each module has two interfaces, one optical and the other copper (coaxial), and the user programs the active one.

Interface	Optical	Coaxial	Data Rate
CDI-50-1	Single Mode Fiber OC-3 / STM-1	G.703	155.52 Mbps
CDI-50-2	Multi-Mode Fiber OC-3 / STM-1	G.703	155.52 Mbps

Figure C-1 is a block diagram of the interface. Figure C-2 shows a typical view of the rear panel of the interface.

When an OC-3 / STM-1 card is installed in Slot 1, Slot 2 is a blank panel.

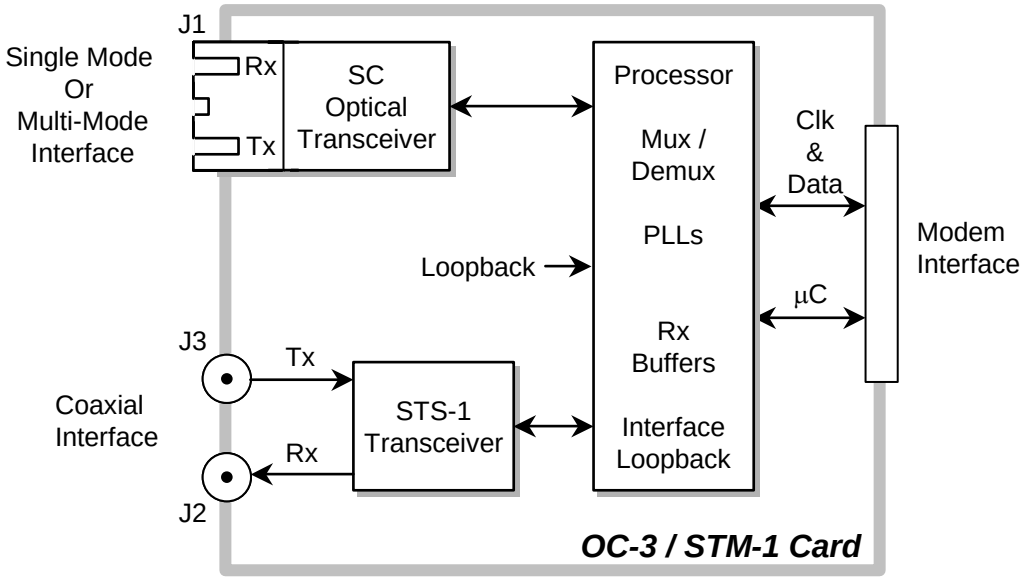


Figure C-1. Optical / Coaxial Interface Block Diagram

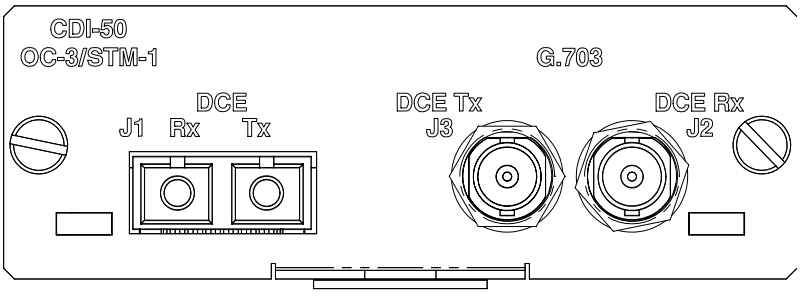


Figure C-2. Rear Panel Layout

C.2 General Specifications

The interface operates to the specifications described in Table C-1.

Table C-1. Interface Specifications

Item	Requirements
General – Optical Interface	
Data Rate	155.52 Mbps ± 20 ppm
Framing and Signaling	SONET OC-3 SDH STM-1
Direction	Full duplex, Allowing Tx/Rx only operation
Connectors	Duplex SC
Fiber	Single Mode, 1300 nm, spectral width 7.7 nm rms (CDI-50-1) Multi Mode, 1300 nm, 62.5 / 125 um, spectral width 58 nm rms (CDI-50-2)
Typical Distance	Single Mode, up to 15 km. Multi Mode not stated
Output Power, Single Mode	-12 dBm typical
Input Power, Single Mode	-7 dBm maximum to -31 dBm
Output Power, Multi Mode	-14 dBm typical
Input Power, Multi Mode	-30 dBm maximum to -35 dBm
Standard	G.957 / GR-253
Jitter	G.825
Diagnostics	Baseband Loopback (at interface) Interface Loopback (through interface card)
Hot Swap Capability	No
Rx Buffer	0.5 to 26 mS in 0.1 mS steps
General – Coaxial Interface	
Data Rate	155.52 Mbps ± 20 ppm
Framing and Signaling	G.703 / GR-253, CMI
Jitter	G.825
Direction	Full duplex, Allowing Tx/Rx only operation
Connectors	BNC-F, 75 Ohm
Output Level	1 Volt peak to peak typical
Input Level	1.1 Vpp maximum input. 0.5 Vpp minimum
Diagnostics	Baseband Loopback (at interface) Interface Loopback (through interface card)
Jitter	G.825
Hot Swap Capability	No
Rx Buffer	0.5 to 26 mS in 0.1 mS steps
Physical and Environmental	
Environmental: Temperature Humidity	 0 to 50 °C (32 to 122°F) 0 to 95% non-condensing
Physical	3.95 W x 8.14 D x 1.5 H inches (10.03 W x 20.67 D x 3.81H cm)

Monitor & Control	
Interface Select	Fiber or Coaxial
Controlled Functions	Interface I/O Loopback, Digital Loopback Loss of data. Mask as Fault or Alarm
Monitored Functions	Loss of Tx Data : The modulator indicates a loss of data and transmits

C.3 Connector Pinout

The interface is shown below:

J1	Optical SC Connector with Tx on the left and Rx on the right when viewed from the rear of the chassis
J2	Receive (Rx) Data Output, BNC female
J3	Transmit (Tx) Data Input, BNC female

Appendix D. HSSI Interface, CDI-60

D.1 Introduction

This data interface is a plug-in module that inserts into the rear of the CDM-700 series modem chassis. It provides physical and electrical connection between the external terrestrial device and the internal circuitry of the modulator or demodulator. By convention, a modem is **D**ata **C**ommunications **E**quipment (DCE) where Tx data enters the data interface and Rx data exits it. The plug-in interface has full duplex capability.

In addition, the module is automatically configured for simplex-transmit or simplex-receive operation when the module is plugged into a simplex chassis configured for modulator only or demodulator only operation. Slot 1 of the modem is filled with a data interface card first, and Slot 2 is assigned a blank panel or another interface depending upon configurations allowed at time of order. (Slot 1 is located near the center of the rear panel, and Slot 2 is next to the outside edge.) Initially, the modem is available in Duplex and Rx only configurations.

The CDI-60 is a HSSI Card data interface module that plugs into the rear of the modem. Figure D-1 is a block diagram of the interface. The HSSI interface provides:

- A single HSSI interface
- DCE Connection
  - ST clock is sourced to the terrestrial interface for use as reference by DTE
  - TT is treated as an incoming External Clock, and the interface phase locks to it
  - TA / CA is supported

Figure D-2 shows a picture of the CDI-60 HSSI interface and the SCSI-2 connector that serves as the data port. A summary of specifications for the interface is provided in Table D-1 and the connector pinout is shown in Table D-2.

When a HSSI card is installed in Slot 1, Slot 2 is either a blank panel or another HSSI card.

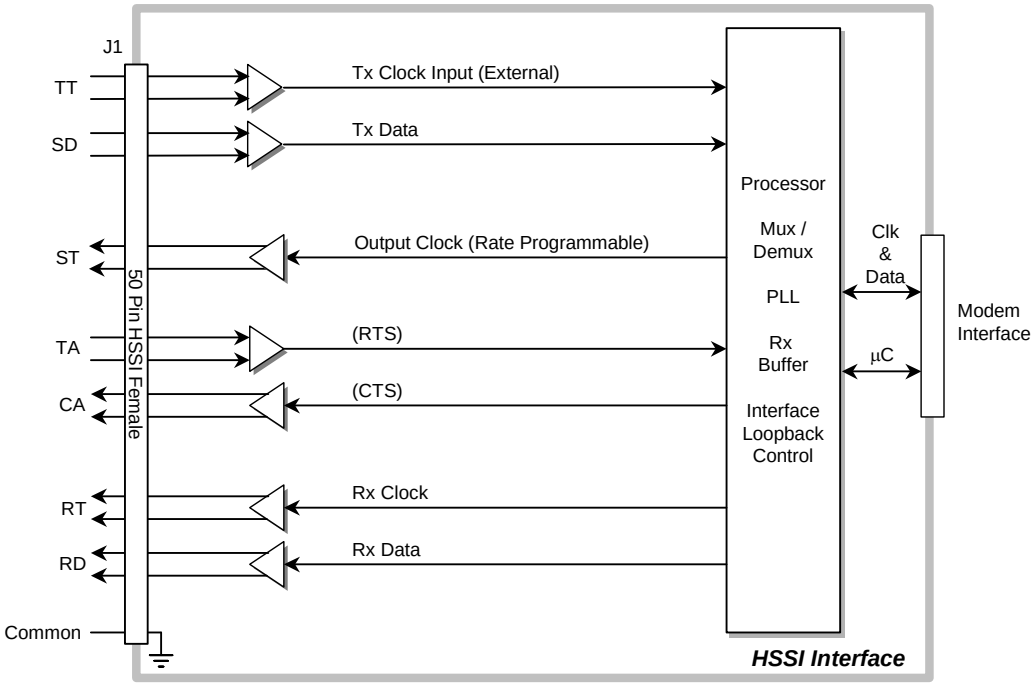


Figure D-1. HSSI Interface Block Diagram

Figure D-2. HSSI Interface

D.2 Physical Description

The HSSI Interface is implemented on a 3.95 x 7.022 inch (10.03 x 17.83 cm) PCB. Connection to the modem is provided when the 96-pin DIN connector is engaged into the modem slot. The HSSI interface consists of a 50-pin SCCI connector and an activity Light-Emitting Diode (LED) that is lit when the interface is enabled.

D.3 General Specifications

Table D-1. Interface Specifications

Item	Requirement
Data Rate Range	1 to 70 Mbps
Interfaces Per Card	One HSSI
Signals Supported	ST, TT (or external) , SD, TA, CA, RT, RD, SG
Connector	DCE, 50-pin mini-D female per EIA-613 (HSSI)
Electrical	Per EIA-612 (10KH ECL compatible).
Electrical Typical	Differential output voltage: ≥ 590 mV pp into 110Ω load Differential Input voltage: 150 to 1000 mV pp with 110Ω load
Minimum Buffer Size	5.0 mS smallest buffer setting, 0.1 mS step size, 32 mS maximum size
Impedance Tx: Rx:	110Ω for TT, SD, TA ST, CA, RT, RD will drive 110Ω and meet HSSI voltage levels
Signal Characteristics	The A terminal is negative with respect to the B terminal for a binary 0 (Space or OFF) state. The A terminal is positive with respect to the B Terminal for a binary 1 (Mark or ON) state.
Clock / Data Relationship	The data transitions occur during the OFF to ON transition of the clock. Data is stable during the ON to Off transition of the clock.
Tx Clock Modes	TT (Input clock) continuous. ST (output clock) is continuous output, programmable in 1 bps steps or phase locked to satellite clock
Rx Clock Modes	RT (output clock) is continuous from satellite, ST (internal clock), continuous from TT
Gap Clock (See Figure D-3)	Not allowed – Send ST to external equipment so it will return a continuous clock
Tx / Rx Clock	Asymmetrical clocking with Rx Doppler buffer disabled
Acquisition Range	Programmed Tx data rate ± 100 ppm
TA / CA Default: Selection:	CA looped to TA CA is asserted when there is no modem fault

Item	Requirement
Test	I/O Loopback per the Appendix Interface Loopback per the Appendix 2047 test pattern generator
Operation	Simplex (Tx only or Rx only) or full duplex
Signal Sense	Programmable Normal or Inverted for TT and TD, RT and RD
Cards Per Modem	The interface operates in Slot 1, Slot 2, or both slots.
Cable Length to 52 Mbps	2 m (6 ft) nominal, up to 15 m (49 ft) maximum – Note higher data rates usually require shorter cable lengths.
LED	Green LED's indicate channel is enabled

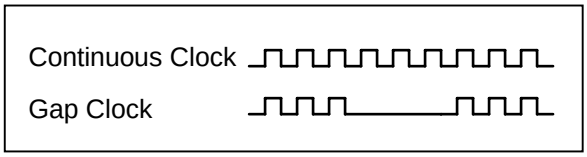


Figure D-3. Continuous and Gap Clock at TT

D.4 Environmental And Physical

Item	Requirement
Operating Temperature	0 to 50ºC (32 to 122ºF)
Storage Temperature	-40 to +70ºC (-40 to 158ºF)
Humidity	95% maximum, non-condensing
Mechanical	Compatible with CDM-700 / 800 slots
Agency Approval	CE in conjunction with the modem

D.5 Connector Pinout

The HSSI interface has a 50 pin female SCCI-2 connector (mini-D) with the pinout shown in Table D-2.

Table D-2. Connector Pinout

HSSI/EIA-613 Interface Connector Pinout					
Signal Function	**HSSI Signal**	**EIA-613 Circuit**	**Pin # (+,-)**	**Circuit Direction**	**Comment**
Signal Ground	SG	102	1, 26		Ground
Receive Timing	RT	115	2, 27	From DCE	
DCE Available	CA	107	3, 28	From DCE	
Receive Data	RD	104	4, 29	From DCE	
Loopback circuit C	LC	undefined	5, 30	From DCE	Not used
Send Timing	ST	114	6, 31	From DCE	
Signal Ground	SG	102	7, 32		Ground
DTE Available	TA	108/2	8, 33	to DCE	
Terminal Timing	TT	113	9, 34	to DCE	
Loopback circuit A	LA	143	10, 35	to DCE	Not used
Send Data	SD	103	11, 36	to DCE	
Loopback Circuit B	LB	144	12, 37	to DCE	Not used
Signal Ground	SG	102	13, 38		Ground
Not used		undefined	14, 39		Not used
TX DVALID		undefined	15, 40		Not used
reserved (to DCE)			16, 41		Not used
reserved (to DCE)			17, 42		Not used
reserved (to DCE)			18, 43		Not used
Signal Ground	SG	102	19, 44		Ground
		undefined	20		Not used
		undefined	45		Not used
		undefined	21		Not used
reserved (to DTE)			46		Not used
		undefined	22, 47	from DCE	Not used
		undefined	23, 48	from DCE	Not used
Test Mode	TM	142	24, 49	from DCE	Not used
Signal Ground	SG	102	25, 50		Ground

Notes:

Appendix E. 10/100/1000 Base-T (GbE) Interface, CDI-70

E.1 Introduction

The 1000 Base-T Ethernet Interface or GbE acts as an Ethernet bridge for data traffic and is designated the CDI-70. The GbE Interface is shown in Figure E-1. **M**onitor and **C**ontrol (M&C) information is not supported on the GbE Interface but available through the 10/100 Base-T remote port of the modem. The GbE Interface provides 10/100/1000 Base-T connectivity and supports data rates from 1 Mbps to 155 Mbps. IP traffic entering the GbE Interface is encapsulated in HDLC protocol for transmission over the satellite link. In normal mode, the packets are passed unaltered. For VLAN mode, native VLAN processing and/or VLAN tagging is supported. HDLC CRS-16 verification is performed on all received (from WAN) HDLC frames. The user interface to the GbE card is a single IEEE 802.3ab 1000 Base-T copper compliant female RJ-45 connector wired as described in Table E-1.

Figure E-1. 1000 Base-T Ethernet (GbE) Interface

E.2 Physical Description

The GbE is implemented on a 3.95 x 7.022 inch (10.03 x 17.83 cm) PCB. Connectivity to the CDM-700 will be implemented with a 96-pin DIN receptacle, and the LAN interface consists of an RJ-45 connector with link status and link activity Light-Emitting Diode (LED) indicators (at minimum).

E.3 General Specifications

Table E-1. Interface Specifications

General Specifications	
Data Framing	10/100/1000 Base-T Interface: RFC-894 “Ethernet”
Frame Size, Max	1632 bytes
Data Framing Format (WAN)	HDLC (Standard Single Channel)
Connectors	RJ-45 female, 100Ω
Electrical Properties	Per IEEE 802.3ab
Packet Types	Burst or distributed IPV4
Signal Types	Serial data
Voltage Level	Per IEEE- 802.3ab
Packet Latency	50 ms maximum
Flow Control	None
Cable Length, Maximum	100 meters CAT 5 cable, patch cords and connecting hardware, per ISO/IEC 11801:1995 and ANSI/EIA/TIA-568-A (1995)
Hot Pluggable (cable)	Yes
Hot Pluggable (card)	NO
LEDs	Link status, link activity

Monitor & Control	
Data Rate	1.5 to 155.52 Mbps
Packet Filtration Parameters (generic)	IP address match value configuration for management packets; Optional VLAN processing, VLAN configuration, enabled VLID’s.
1000Base-T Link Statistics	Ingress good octets Ingress bad octets Ingress unicast packets Ingress broadcast packets Ingress multicast packets Ingress pause packets Ingress undersize packets Ingress fragments Ingress oversize packets Ingress jabber

Monitor & Control	
	Ingress Rx errors Ingress Frame Check Sequence Errors Egress oclets Egress unicast packets Egress broadcast packets Egress multicast packets
WAN Port Statistics	Ingress good oclets Ingress bad oclets Ingress unicast packets Ingress broadcast packets Ingress multicast packets Ingress pause packets Ingress undersize packets Ingress fragments Ingress oversize packets Ingress jabber Ingress Rx errors Ingress Frame Check Sequence Errors Egress oclets Egress unicast packets Egress broadcast packets Egress multicast packets HDLC link errors Rx packet count Tx packet count
Management Port Statistics	Ingress good oclets Ingress bad oclets Ingress unicast packets Ingress broadcast packets Ingress multicast packets Ingress pause packets Ingress undersize packets Ingress fragments Ingress oversize packets Ingress jabber Ingress Rx errors Ingress Frame Check Sequence Errors Egress oclets Egress unicast packets Egress broadcast packets Egress multicast packets
Controlled Functions	TX data rate Rx data rate Tx enable/disable Rx enable/disable Management IP Address and Mask

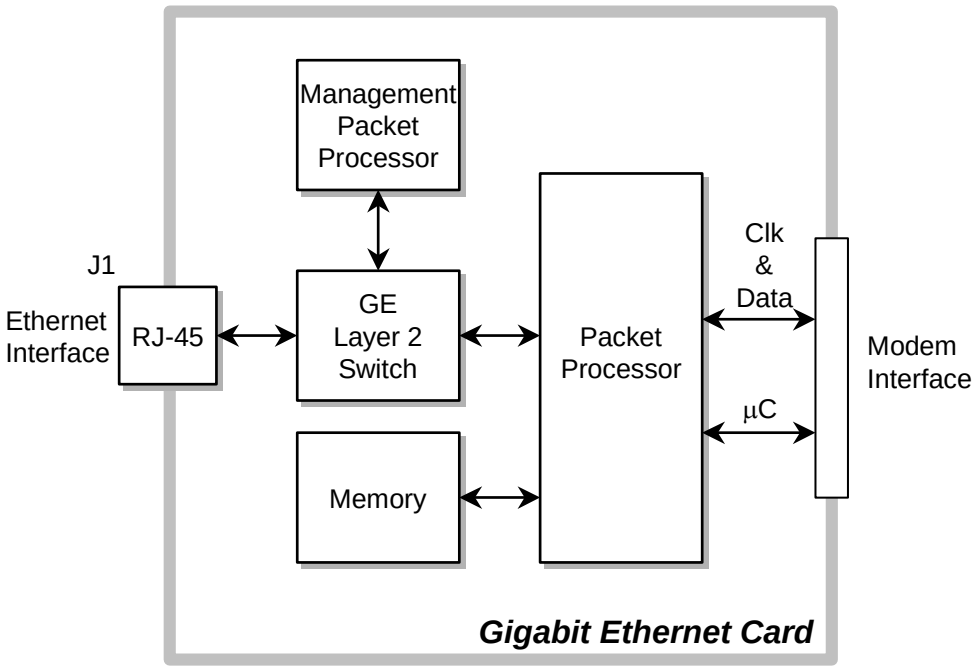


Figure E-2. GbE Interface Option Board – Phase 1

E.4 Connector Pinout

The LAN interface is comprised of one IEEE 802.3ab 1000Base-T copper interface via a single female RJ-45 connector wired:

Table E-2. Connector Pinout

Pin #	Description	Direction
1	BI_DA+	bidirectional
2	BI_DA-	bidirectional
3	BI_DB+	bidirectional
4	BI_DC+	bidirectional
5	BI_DC-	bidirectional
6	BI_DB-	bidirectional
7	BI_DD+	bidirectional
8	BI_DD-	bidirectional

E.5 GBEI Software Upload Procedure

The CDM-700 GBEI interface board contains its own processor and memory. On occasion CEFD may release new software to fix anomalies or add functionality to this interface board. This section will define how to perform this upgrade process. The CDM-700 CDI-70 GBEI interface board uses 'flash memory' technology internally, and new firmware can be uploaded to the unit from an external PC, as follows:

Go to: www.comtechefdata.com
Click on: downloads
Click on: flash upgrades

This makes software upgrading very simple, and updates can now be sent via the Internet, E-mail, or on disk. The upgrade can be performed without opening the unit, by simply connecting the GBEI 10/100/1000 Ethernet port to the Ethernet port of a computer.

1. Identify the reflashable product, firmware number, and version for download.

The current base GBEI version can be viewed at the top level menu of the front panel display (press "CLR" button several times to view). Also, you can find the firmware information within the **<Util > <Firmware > <Info> <Image#1, Image#2 >** <**Interfaces**> <**GBEI**> menu tree.

2. Create a temporary directory (folder) on your PC.

Windows: Select File **> New > Folder >** and rename the New Folder to "temp" or another convenient and unused name. Assuming "temp" works, you should now have a "c:\temp" folder created.
Note: The c: is the drive letter used in this example. Any valid writable drive letter can be used.

CMD Prompt: At the command prompt (c:\>) type "MD temp" without quotes (MD stands for make directory). This is the same as creating a new folder from Windows. You should now have a "c:\temp" subdirectory created where c: is the drive letter used in the example.

3. Download the correct firmware file to this temporary folder.

Access the download server with the flash firmware data files link,
http://206.223.8.10/linksite/flashupgrades/GBEI/

About Firmware Numbers, File Versions, and Formats:

The flashable files on the download server are organized by product first, then by firmware number, (make sure you know the correct firmware number; see step 1) version, if applicable, and release date. The base modem bulk firmware for the

CDM-700 will be **F11509***_*_* (where the asterisks show revision, version and date).

The current version firmware release is provided. If applicable, one version prior to the current release is also available. Be sure to identify and download the desired version.

The downloadable files are stored in two formats: *.exe (self extracting) and *.zip (compressed). Some firewalls will not allow the downloading of *.exe files. In this case, download the *.zip file instead.

For additional help with "zipped" file types, refer to "pkzip for windows", "winzip", or "zip central" help files. Pkzip for DOS is not supported due to file naming conventions.

4. Unzip the files in the temporary folder on your PC.

At least 3 files should be extracted:

a. **FW11509**x.bin, where "x" is the version (bulk image file).
b. **FW11509**x.txt, where "x" is the version (history notes).
c. README.TXT installation notes

5. Connect the client PC to the CDI-70 (GBEI) 10/100/1000 Ethernet connector via a hub or a switch, or directly to a PC with a crossover cable.

Verify the communication and connection by issuing a "ping" command to the modem. You can find the management IP address of the GBEI interface using the front panel with the **<Config> <Intfc1> <Gigabit Ethernet> <Man>** menus.

To PING and FTP from DOS, press the “Start” button on the Windows toolbar, and select the “Run...” option. From Win95 or Win98, type, “command”. From WinNT, Win2K or WinXP, type “cmd”. You can also use the “DOS Prompt” or “Command Prompt” icons in the Start Menu. Now change to the temporary directory you created earlier with “cd c:\temp”. A quick “dir” will show the downloaded files.

6. Initiate an FTP session with the modem. The example is with a DOS window.

a. From the PC, type "ftp xxx.xxx.xxx.xxx" where "xxx.xxx.xxx.xxx" is the management IP address of the CDI-70 (GBEI).

b. Press <Enter> twice to bypass the user name and password to complete login.

c. Verify your FTP transfer is binary by typing "bin".

d. Type "prompt" then type "hash" to facilitate the file transfers.

7. Transfer the files.

Type "put **FW11509***.bin bulk:" to begin the file transfers. The destination “bulk:” must be all lower-case. It will take approximately one minute to transfer the file.

8. Verify the file transfer.

a. The PC should report that the file transfer has occurred.

b. Terminate the FTP session by typing "bye" and closing the DOS window.

c. Verify that the new file loaded using the procedure in step 1.

9. After waiting at least 2 minutes you must cycle power on the modem for the new GBEI firmware to run.

E.6 GbE Operational Setups

The CDM-700 GbE operates as a bridge device and passes traffic between hosts at different geographic locations on a common **L**ocal **A**rea **N**etwork (LAN).

The GbE Interface operates like a network hub device which means it acts like a “direct wire” connection and passes all Ethernet traffic and broadcasts.
Figure E-3 is an example of using the GbE Interface to bridge a remote hosts on a common LAN over the satellite.

It also may be desirable to separate the M&C Ethernet port from the traffic on the GbE Interface port. Figure E-4 shows an example where the M&C Ethernet port has been assigned an IP address that is **NOT** on the common LAN. A router is in place at both locations to isolate access to the M&C port.

Figure E-3. Example of GbE Interface Bridging a Remote Host on a Common LAN over the Satellite.

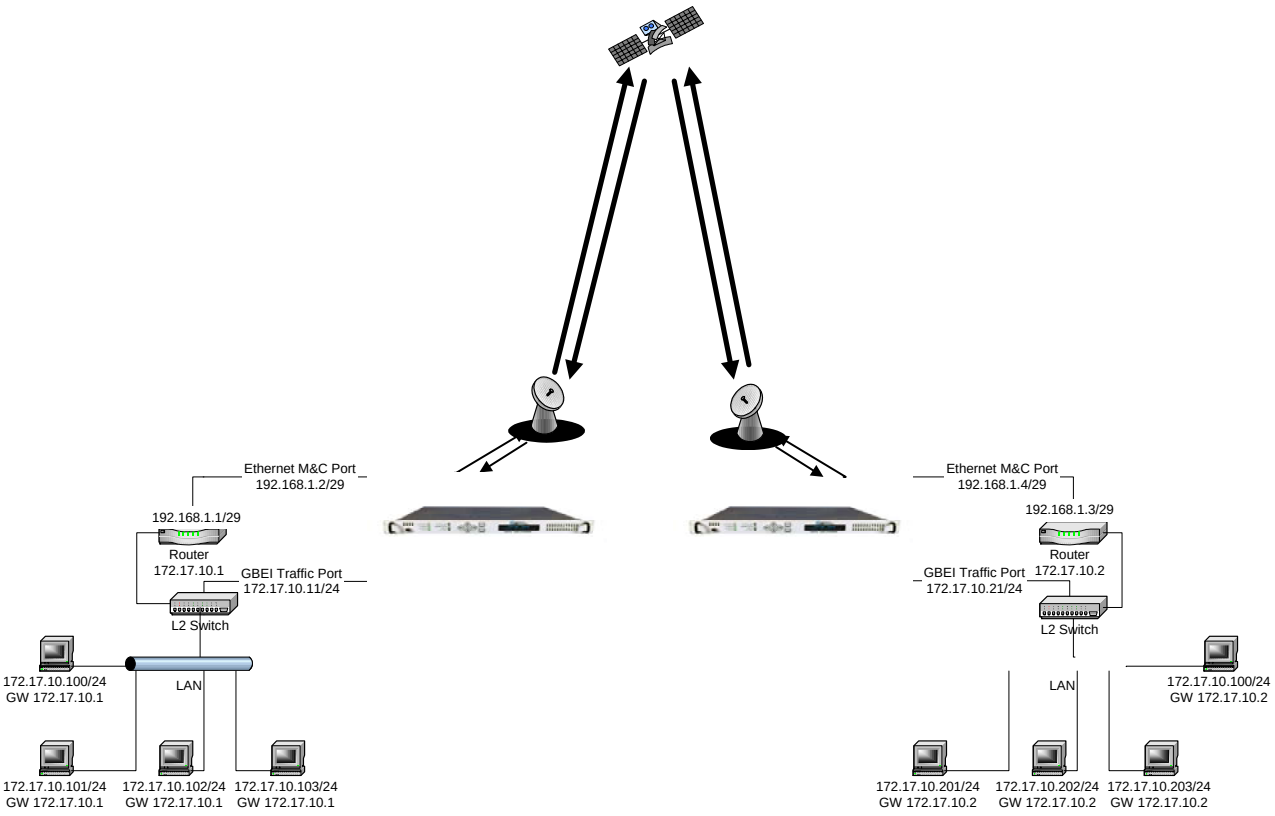
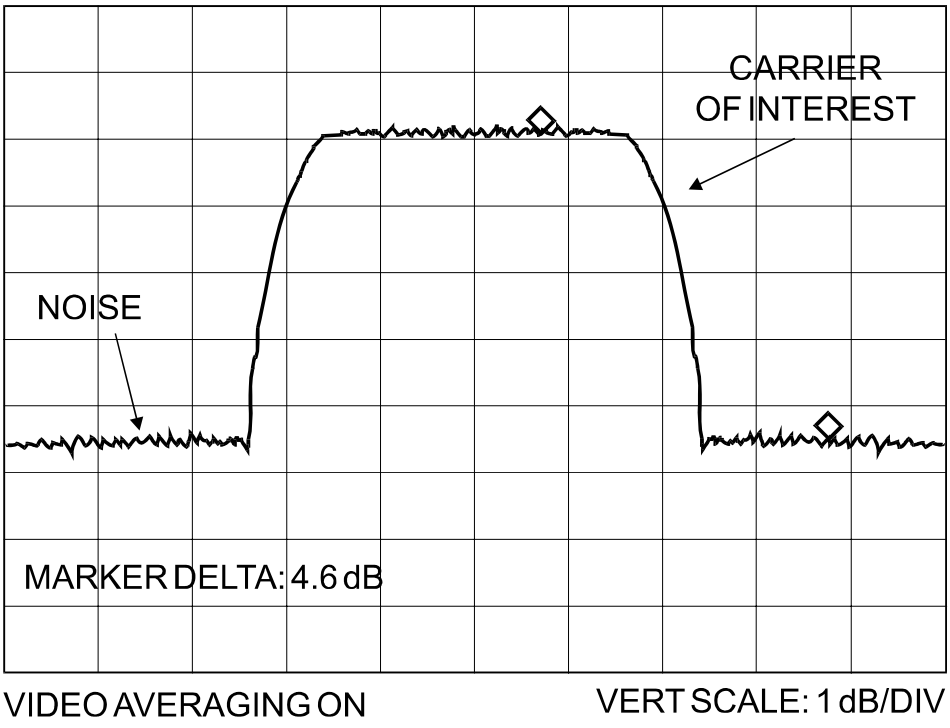


Figure E-4. Example of M&C Port Assigned an IP Address NOT on a Common LAN

Notes:

Appendix F. Eb/No MEASUREMENT

Although the CDM-700 calculates and displays the value of receive Eb/No on the front panel of the unit, it is sometimes useful to measure the value using a spectrum analyzer, if one is available.



The idea is to accurately measure the value of (Co+No)/No, (Carrier density + Noise density/Noise density). This is accomplished by tuning the center frequency of the Spectrum analyzer to the signal of interest, and measuring the difference between the peak spectral density of the signal (the flat part of the spectrum shown) and the noise density. To make this measurement:

- Use a vertical scale of 1 or 2 dB/division.
- Set the Resolution Bandwidth of the Spectrum Analyzer to < 20 % of the symbol rate.
- Use video filtering and/or video averaging to reduce the variance in the displayed trace to a low enough level that the difference can be measured to within 0.2dB.
- Place a marker on the flat part of the signal of interest, then use the MARKER DELTA function to put a second marker on the noise to the side of the carrier. This value is (Co+No)/No, in dB.
- Use this value of (Co+No)/No in the table on the following page to determine the Eb/No. You will need to know the operating mode to read from the appropriate column.
- If the (Co+No)/No value measured does not correspond to an exact table entry, interpolate using the two nearest values.

Note that the accuracy of this method degrades significantly at low values of (Co+No)/No (approximately less than 6 dB).

Example:
In the diagram above, the (Co+No)/No measured is 4.6 dB. If Rate 3/4 QPSK is used, this corresponds to an Eb/No of approximately 1.1 dB.

The exact relationship used to derive the table values is as follows:

$$\text{Eb/No} = 10\log_{10}(10^{(\text{Co+No/No})/10} - 1) - 10\log_{10}(\text{FEC Code Rate}) - 10\log_{10}(\text{bits/symbol})$$

and:

- Eb/No and (Co+No)/No are expressed in dB
- Bits/symbol = 2 for QPSK
- Bits/symbol = 3 for 8-PSK
- Bits/symbol = 4 for 16-QAM
- Bits/symbol = 6 for 64-QAM
- Pay close attention to the sign of the middle term

CDM-700 Co+No/No to C/N (Es/No) and Eb/No (dB)

		Code Rate							
		QPSK		8-PSK		16-QAM		64-QAM	
		3/4	7/8	3/4	7/8	3/4	7/8	3/4	7/8
(Co+No)/No	C/N = Es/No	Eb/No	Eb/No	Eb/No	Eb/No	Eb/No	Eb/No	Eb/No	Eb/No
4.5	2.6	0.9	0.3	-0.8	-1.5	-2.1	-2.7	-3.8	-4.5
5.0	3.3	1.7	1.1	-0.1	-0.7	-1.3	-2.0	-3.1	-3.7
5.5	4.1	2.4	1.8	0.6	0.0	-0.6	-1.2	-2.4	-3.0
6.0	4.7	3.1	2.4	1.3	0.7	0.1	-0.6	-1.7	-2.3
6.5	5.4	3.7	3.1	2.0	1.3	0.7	0.1	-1.0	-1.7
7.0	6.0	4.4	3.7	2.6	2.0	1.4	0.7	-0.4	-1.0
7.5	6.6	5.0	4.4	3.2	2.6	2.0	1.3	0.2	-0.4
8.0	7.3	5.6	5.0	3.8	3.2	2.6	1.9	0.8	0.2
8.5	7.8	6.2	5.5	4.4	3.8	3.2	2.5	1.4	0.8
9.0	8.4	6.8	6.1	5.0	4.4	3.8	3.1	2.0	1.3
9.5	9.0	7.3	6.7	5.6	4.9	4.3	3.7	2.6	1.9
10.0	9.5	7.9	7.2	6.1	5.5	4.9	4.2	3.1	2.5
10.5	10.1	8.4	7.8	6.7	6.0	5.4	4.8	3.7	3.0
11.0	10.6	9.0	8.3	7.2	6.6	6.0	5.3	4.2	3.6
11.5	11.2	9.5	8.9	7.8	7.1	6.5	5.9	4.8	4.1
12.0	11.7	10.1	9.4	8.3	7.7	7.1	6.4	5.3	4.6
12.5	12.2	10.6	10.0	8.8	8.2	7.6	6.9	5.8	5.2
13.0	12.8	11.1	10.5	9.4	8.7	8.1	7.5	6.4	5.7
13.5	13.3	11.6	11.0	9.9	9.2	8.6	8.0	6.9	6.2
14.0	13.8	12.2	11.5	10.4	9.8	9.2	8.5	7.4	6.8
14.5	14.3	12.7	12.0	10.9	10.3	9.7	9.0	7.9	7.3
15.0	14.9	13.2	12.6	11.4	10.8	10.2	9.6	8.4	7.8
15.5	15.4	13.7	13.1	12.0	11.3	10.7	10.1	9.0	8.3
16.0	15.9	14.2	13.6	12.5	11.8	11.2	10.6	9.5	8.8
16.5	16.4	14.7	14.1	13.0	12.3	11.7	11.1	10.0	9.3
17.0	16.9	15.3	14.6	13.5	12.9	12.2	11.6	10.5	9.8
17.5	17.4	15.8	15.1	14.0	13.4	12.8	12.1	11.0	10.4
18.0	17.9	16.3	15.6	14.5	13.9	13.3	12.6	11.5	10.9
18.5	18.4	16.8	16.1	15.0	14.4	13.8	13.1	12.0	11.4
19.0	18.9	17.3	16.6	15.5	14.9	14.3	13.6	12.5	11.9
19.5	19.5	17.8	17.2	16.0	15.4	14.8	14.1	13.0	12.4
20.0	20.0	18.3	17.7	16.5	15.9	15.3	14.6	13.5	12.9
20.5	20.5	18.8	18.2	17.0	16.4	15.8	15.2	14.0	13.4
21.0	21.0	19.3	18.7	17.6	16.9	16.3	15.7	14.5	13.9
21.5	21.5	19.8	19.2	18.1	17.4	16.8	16.2	15.0	14.4
22.0	22.0	20.3	19.7	18.6	17.9	17.3	16.7	15.5	14.9

Note:
1. Includes 2.5% Data Rate overhead (+0.107 db). Rate 7/8 is 20/23 actual (+0.03 dB).
2. Shaded are high error rate or unusable.

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METRIC CONVERSIONS

Units of Length

Unit	Centimeter	Inch	Foot	Yard	Mile	Meter	Kilometer	Millimeter
1 centimeter	—	0.3937	0.03281	0.01094	6.214×10^{-6}	0.01	—	—
1 inch	2.540	—	0.08333	0.2778	1.578×10^{-5}	0.254	—	25.4
1 foot	30.480	12.0	—	0.3333	1.893×10^{-4}	0.3048	—	—
1 yard	91.44	36.0	3.0	—	5.679×10^{-4}	0.9144	—	—
1 meter	100.0	39.37	3.281	1.094	6.214×10^{-4}	—	—	—
1 mile	1.609×10^{5}	6.336×10^{4}	5.280×10^{3}	1.760×10^{3}	—	1.609×10^{3}	1.609	—
1 mm	—	0.03937	—	—	—	—	—	—
1 kilometer	—	—	—	—	0.621	—	—	—

Temperature Conversions

Unit	° Fahrenheit	° Centigrade
32° Fahrenheit	—	0 (water freezes)
212° Fahrenheit	—	100 (water boils)
-459.6° Fahrenheit	—	273.1 (absolute 0)

Formulas
C = (F - 32) * 0.555
F = (C * 1.8) + 32

Units of Weight

Unit	Gram	Ounce Avoirdupois	Ounce Troy	Pound Avoir.	Pound Troy	Kilogram
1 gram	—	0.03527	0.03215	0.002205	0.002679	0.001
1 oz. avoir.	28.35	—	0.9115	0.0625	0.07595	0.02835
1 oz. troy	31.10	1.097	—	0.06857	0.08333	0.03110
1 lb. avoir.	453.6	16.0	14.58	—	1.215	0.4536
1 lb. Troy	373.2	13.17	12.0	0.8229	—	0.3732
1 kilogram	1.0×10^{3}	35.27	32.15	2.205	2.679	—

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