CDM-700

High-Speed Satellite Modem
Installation and Operation Manual

Part Number MN/CDM700.IOM
Revision 5
December 12, 2008

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.

Copyright © 2008 Comtech EF Data. All rights reserved. Printed in the USA.
Comtech EF Data, 2114 West 7th Street, Tempe, Arizona 85281 USA, 480.333.2200, FAX: 480.333.2161

Table of Contents

PREFACE ..... **XV**

Customer Support ..... **xv**

About this Manual ..... **xvi**
Reporting Comments or Suggestions Concerning this Manual xvi

Conventions and References ..... **xvi**
Metric Conversion xvi
Cautions and Warnings xvi
Recommended Standard Designations xvi

Electrical Safety ..... **xvii**
Fuses xvii
Environmental xvii
Installation xvii

Telecommunications Terminal Equipment Directive ..... **xviii**

CE Mark ..... **xviii**

RoHS Compliancy ..... **xviii**

EMC (Electromagnetic Compatibility) ..... **xviii**

Warranty Policy ..... **xx**
Limitations of Warranty xx
Exclusive Remedies xxi

CHAPTER 1. INTRODUCTION **1–1**

1.1 Overview **1–1**

1.2 Standard Features **1–2**
1.2.1 Software – Flash Upgrading 1–2
1.2.2 Turbo Product Coding (TPC) 1–3

1.3 Major Assemblies **1–3**

1.4 Allowable Data Interface Combinations **1–3**

1.5 FAST and Hardware Options **1–5**

1.6 New in This Release 1–6

CHAPTER 2. INSTALLATION 2–1

2.1 Unpacking and Inspection 2–1

2.2 Mounting 2–2
2.2.1 Method A: Optional Rear-Mounting Support Brackets 2–2
2.2.2 Method B: Optional Installation of Side-Railings 2–4

CHAPTER 3. FUNCTIONAL DESCRIPTION 3–1

3.1 Description 3–1

3.2 Interfaces Modules 3–3
3.2.1 Data Interfaces And Data Transfer Across The Link 3–4
3.2.2 Simplex and Asymmetric Operation 3–4

3.3 Allowable Data Interfaces In Slot 1 and Slot 2 3–5

CHAPTER 4. PHYSICAL DESCRIPTION 4–1

4.1 Introduction 4–1

4.2 Front Panel 4–2

4.3 Rear Panel 4–3
4.3.1 External Cables 4–3
4.3.2 IEC Line Input Connector 4–3
4.3.3 Rx and Tx IF Connectors (J1 and J3) 4–4
4.3.4 10/100 Ethernet Remote Port Connector (J4) 4–4
4.3.5 SerDes (Private Communications Link) (J6) 4–4
4.3.6 External Reference Connector (J7) 4–4
4.3.7 Alarm Form C Connector (P1) 4–4
4.3.8 Remote Control Connector (RS-232/RS-485), P2 4–4
4.3.9 Data Interface Connector 4–4

4.4 Dimensional Envelope 4–5

CHAPTER 5. CONNECTOR PINOUTS 5–1

5.1 External Connections 5–1
5.1.1 Tx / Rx Connector Pinout – J1 / J3 5–3
5.1.2 10/100 Ethernet Management Port Connector Pinout – J4 5–3
5.1.3 SerDes Port Connector – J6 (Earlier Chassis Only) 5–3
5.1.4 ASYNC Connector Pinout – J6 (Rev. A and Later Chassis) 5–4
5.1.5 External Reference Input (Main Chassis) – J7 5–4
5.1.6 Alarm Connector Pinout – P1 5–5

5.1.7 RS-232/485 Remote Port Connector Pinout – P2 5–7

5.2 Data Interfaces 5–7

CHAPTER 6. FRONT PANEL OPERATION 6–1

6.1 Introduction 6–1
6.1.1 Front Panel LED Indicators 6–2
6.1.2 Front Panel Keypad 6–3
6.1.3 Front Panel Vacuum Flourescent Display (VFD) 6–4
6.1.4 Menu Matrix 6–5

6.2 Opening Screen 6–6

6.3 SELECT: (Main) Menu 6–6
6.3.1 (SELECT:) CONFIG 6–7
6.3.1.1 (CONFIG:) Remote 6–8
Remote Control: → Local 6–8
Remote Control: → Serial 6–8
Remote Control: → Ethernet 6–9
6.3.1.2 (CONFIG:) Tx 6–12
Tx: → Mod 6–12
Tx: → Code 6–13
Tx: → Freq 6–14
Tx: → Data 6–14
Tx: → Sym 6–15
Tx: → Pwr 6–15
Tx: → Scram 6–16
6.3.1.3 (CONFIG:) Rx 6–17
Rx: → Dem (Demod) 6–17
Rx: → Code 6–19
Rx: → Freq 6–19
Rx: → Data 6–19
Rx: → Sym 6–20
Rx: → Descrm 6–20
Rx: → Eb/No 6–20
6.3.1.4 (CONFIG): Intfc1 6–22
Intfc1 (CDI-10 Dual G.703 Interface) 6–23
Intfc1: → Alarm 6–23
Intfc1: → Port1 6–23
Intfc1: → Port2 6–30
Intfc1: → Ext-Clk 6–30
6.3.1.4.1 (CONFIG:) Intfc2 (CDI-10 Dual G.703 Interface) 6–30
6.3.1.5 (CONFIG:) Intfc1 (CDI-50 OC-3 Interface) 6–31
Intfc1 OC-3: → Tx 6–31
Intfc1 OC-3: → Rx 6–32
6.3.1.6 (CONFIG:) Intfc1 (CDI-60 HSSI Interface) 6–34
Intfc1 HSSI: → Tx 6–34
Intfc1 HSSI: → Rx 6–35

Intfc1 HSSI: → CTS/RTS 6–37
Intfc1 HSSI: → Alarm 6–38
6.3.1.6.1 (CONFIG:) Intfc2 (CDI-60 HSSI Interface) 6–38
6.3.1.7 (CONFIG:) Intfc1 (CDI-70 Gigabit Ethernet Interface) 6–38
Intfc1 Gigabit Ethernet: → Tx 6–39
Intfc1 Gigabit Ethernet: → Rx 6–40
Intfc1 Gigabit Ethernet: → Man 6–41
Intfc1 Gigabit Ethernet: → Stats 6–41
Intfc1 Gigabit Ethernet: → SWOP (Switch Operation) 6–44
Intfc1 Gigabit Ethernet: → Negotiation 6–49
Manual Negotiation 6–49
Master/Slave Options 6–49
Speed Options 6–50
Duplex Options 6–50
Automatic Negotiation 6–50
View Negotiation 6–51
6.3.1.7.1 (CONFIG:) Intfc2 (CDI-70 Gigabit Ethernet Interface) 6–51
6.3.1.8 (CONFIG:) Ref 6–51
6.3.1.9 (CONFIG:) Aux 6–51
6.3.2 (SELECT:) Monitor 6–52
Monitor: → Alarms 6–52
Monitor: → Rx-Params 6–56
Monitor: → Event-Log 6–57
6.3.3 (SELECT:) Test 6–58
6.3.4 (SELECT:) Info 6–61
INFO: → Rem 6–61
INFO: → Tx 6–61
INFO: → Rx 6–62
INFO: → 1:1 6–62
INFO: → Intfc1 / Intfc2 6–63
6.3.5 (SELECT:) Save/Load 6–64
Save/Load Configuration: →Save 6–64
Save/Load Configuration: →Load 6–65
6.3.6 (SELECT:) Util 6–66
UTIL: → Rt-Clk 6–66
UTIL: → Ref 6–66
UTIL: → ID 6–66
UTIL: → Display 6–67
UTIL: → Firmware 6–67
UTIL: → FAST 6–69

CHAPTER 7. FORWARD ERROR CORRECTION OPTIONS 7–1

7.1 Introduction 7–1

7.2 Turbo Product Codec 7–1
7.2.1 Range of Data Rates 7–2
7.2.2 Eb/No, Spectral Efficiency and Occupied Bandwidth 7–2

7.3 End-to-End Processing Delay (Latency) 7–3

CHAPTER 8. CLOCK MODES 8–1

8.1 Introduction 8–1

8.2 CDI-10 Dual G.703 Interface 8–3
8.2.1 CDI-10 Dual G.703 Interface Transmit Clocking 8–3
8.2.2 CDI-10 Dual G.703 Interface Receive Clocking 8–3

8.3 CDI-50 OC-3 / STM-1 (Optical / Coaxial) 155.52 Mbps Interface 8–4
8.3.1 CDI-50 OC-3 / STM-1 Interface Transmit Clocking 8–4
8.3.2 CDI-50 OC-3 / STM-1 Interface Receive Clocking 8–4

8.4 CDI-60 HSSI Interface 8–5
8.4.1 CDI-60 HSSI Interface Transmit Clocking 8–5
8.4.2 CDI-60 HSSI Interface Receive Clocking 8–5

8.5 CDI-70 10/100/1000 Gigabit Ethernet Interface 8–6

CHAPTER 9. FLASH UPGRADING 9–1

9.1 Introduction 9–1

9.2 Base Modem FTP upload procedure: 9–2

CHAPTER 10. SUMMARY OF SPECIFICATIONS 10–1

10.1 Summary of Specifications 10–1

10.2 Data Rate Range 10–3

10.3 70/ 140 MHz Modulator 10–4

10.4 L-Band Modulator 10–4

10.5 70 / 140 MHz Demodulator 10–5

10.6 L-Band Demodulator 10–5

10.7 BER Performance 10–7
10.7.1 Adjacent Channel 10–7

10.8 Data Interface (Optional) 10–8

10.9 Environmental and Physical 10–8

CHAPTER 11. REMOTE CONTROL 11–1

11.1 Introduction 11–1

11.2 RS-485 11–1

11.3 RS-232 11–2

11.4 Basic Protocol 11–2

11.5 Packet Structure 11–3
11.5.1 Start Of Packet 11–3
11.5.2 Address 11–3
11.5.3 Instruction Code 11–4
11.5.4 Instruction Code Qualifier 11–4
11.5.5 Message Arguments 11–5
11.5.6 End Of Packet 11–5

11.6 Remote Commands and Queries 11–6

CHAPTER 12. SNMP INTERFACE 12–1

12.1 SNMP Interface 12–1

12.2 CDM-700 Management Information Base (MIB) Files 12–2

12.3 SNMP Community Strings 12–3

12.4 CDM-700 Common Private MIB 12–3

12.5 System Information Group 12–3
12.5.1 Remote Ethernet Group 12–3
12.5.2 Ethernet SNMP Group 12–3
12.5.3 Interface FAST OPTIONS Group 12–3
12.5.4 Modem Reference Group 12–4
12.5.5 Monitor Group 12–4
12.5.6 Test Group 12–4
12.5.7 Save/Load Group 12–4
12.5.8 Firmware Group 12–4
12.5.9 System Log Group 12–4

12.6 Modulator Group 12–4

12.7 Demodulator Modulator Group 12–4

12.8 Interface Group 12–4
12.8.1 E3T3STS1 Group 12–5
12.8.2 OC3 Group 12–5
12.8.3 HSSI Group 12–5
12.8.4 Gigabit Ethernet Group 12–5

12.9 CDM Monitor Objects 12–5

12.10 CDM Redundancy Objects 12–5

12.11 SNMP Traps 12–5

12.12 MIB-II 12–6

CHAPTER 13. TELNET INTERFACE 13–1

13.1 Telnet Interface 13–1

13.2 Caution Using Windows Telnet Client 13–3

13.3 Using Telnet 13–4
13.3.1 Telnet Example 13–4

CHAPTER 14. ETHERNET NETWORK CONFIGURATIONS 14–1

14.1 Introduction 14–1

14.2 Ethernet Routers and Switches 14–1

14.3 Ethernet Configuration Examples 14–2
14.3.1 Ethernet Network Overview 14–2
14.3.2 Ethernet Redundancy with CRS-300 14–3
14.3.2.1 Wired-thru Connection 14–3
14.3.2.2 Wired-around Connection 14–3
14.3.3 Hub-to-Hub with Standard Traffic using Switches 14–4
14.3.4 Hub-to-Hub with Standard Traffic using Routers 14–6
14.3.5 Hub-to-Remotes with Standard Traffic using Routers or Switches 14–8
14.3.6 Hub-to-Remotes, Split-path Traffic using Routers (Point-to-Multipoint) 14–10
14.3.7 Hub-to-Remotes, Split-path Traffic using Switches (Point-to-Multipoint) 14–12

CHAPTER 15. WEB SERVER PAGES 15–1

15.1 Overview 15–1

15.2 Web Server Usage 15–1
15.2.1 Web Server Menu Tree 15–2

15.3 Home Pages 15–3
15.3.1 Home Page 15–3
15.3.2 Home: Contact Page 15–4
15.3.3 Home: Support Page 15–5

15.4 Admin Pages 15–6
15.4.1 Admin: Access Page 15–6
15.4.2 Admin: Remote Page 15–7

15.5 Config Mdm (Modem Configuration) Pages 15–8

15.5.1 Config Mdm: Modem Page 15–8
15.5.2 Config Mdm: Modem Utilities Page 15–9
15.5.3 Config Mdm: INTF1 (Interface 1) Page 15–10
15.5.3.1 Config Mdm: INTF1 – E3/T3/STS1 Page 15–11
15.5.3.2 Config Mdm: INTF1 – OC3 (Optical) Page 15–12
15.5.3.3 Config Mdm: INTF1 – HSSI Page 15–13
15.5.4 Config Mdm: INTF2 (Interface 2) Page 15–14
15.5.4.1 Config Mdm: INTF2 – GBEI (Gigabit Ethernet) Main Page 15–15
15.5.4.1.1 GBEI: Statistics Page 15–16
15.5.4.1.2 GBEI: VLAN Feature Page 15–17

15.6 Stats (Statistics) Pages 15–18
15.6.1 Stats: Modem Status Page 15–18
15.6.2 Stats: Modem Logs Page 15–19

15.7 Maint (Maintenance) Page: Unit Information 15–20

APPENDIX A. FAST ACTIVATION PROCEDURE A–1

A.1 Introduction A–1

A.2 Activation Procedure A–2
A.2.1 Serial Number A–2
A.2.2 View currently installed features A–2
A.2.3 Enter Access Codes A–2

APPENDIX B. DUAL E3 / T3 / STS-1 INTERFACE (CDI-10) B–1

B.1 Introduction B–1

B.2 Summary of Specifications B–3

B.3 Connector Pinouts B–4

APPENDIX C. OC-3 / STM-1 INTERFACE (CDI-50) C–1

C.1 Introduction C–1

C.2 General Specifications C–3

C.3 Connector Pinout C–4

APPENDIX D. HSSI INTERFACE (CDI-60) D–1

D.1 Introduction D–1

D.2 Physical Description D–3

D.3 General Specifications D–4

D.4 Environmental And Physical D–5

D.5 Connector Pinout D–6

APPENDIX E. 10/100/1000 BASE-T INTERFACE (GBEI) (CDI-70) E–1

E.1 Introduction E–1

E.2 Physical Description E–2

E.3 General Specifications E–2

E.4 Connector Pinout E–3

E.5 GBEI Software Upload Procedure E–4
E.5.1 Upgrading the Gigabit Ethernet Interface Card Firmware E–5
1. Download the Files E–5
2. Connect the PC to the Interface E–5
3. Reflash the Unit E–5

E.6 GBEI Operational Setups E–7

APPENDIX F. E_B/N_0 MEASUREMENT F–1

Tables

Table 1-1. Major Assemblies 1–3
Table 1-2. FAST and Hardware Options 1–5
Table 6-1. Front Panel LED Indicators 6–2
Table 7-1. Eb/No, Spectral Efficiency and Occupied Bandwidth 7–3
Table 10-1. Summary of Specifications 10–1
Table 10-2. Definition of Points For Spectral Mask 10–2
Table 15-1 Web Server Menu Tree 15–2
Table D-1. Interface Specifications D–4
Table D-2. Connector Pinout D–6
Table E-1. Interface Specifications E–2
Table E-2. Connector Pinout E–3

Figures

Figure 1-1. CDM-700 High Speed Satellite Modem 1–1
Figure 2-1. Installation of Optional Rear-Mounting Support Brackets (Kit KT/6228-2) 2–3
Figure 2-2. Installation of Optional Side-Railings (FP/SL0006) 2–4
Figure 3-1. CDM-700 Modem Block Diagram 3–3
Figure 3-2. Rear Panel View 3–5
Figure 4-1. CDM-700 Satellite Modem 4–1
Figure 4-2. CDM-700 Rear Panel 4–3
Figure 4-3. CDM-700 Dimensional Envelope (70/140 MHz) 4–5
Figure 5-1. CDM-700 Chassis – Rear Panel 5–1
Figure 6-1. Front Panel View 6–1
Figure 6-2. Keypad 6–3
Figure 6-3. Traffic Flow Loopback Block Diagrams 6–59
Figure 7-1. CDM-700 Gigabit Ethernet Latency with Modem in IF Loopback 7–4
Figure 7-2. CDM-700 HSSI Latency with Modem in IF Loopback 7–4
Figure 7-3. Rate 3/4 TPC QPSK, 8-PSK, 16-QAM, 64-QAM 7–5
Figure 7-4. Rate 7/8 TPC QPSK, 8-PSK, 16-QAM, 64-QAM 7–6
Figure 8-1. Typical Data Interface (Features Vary By Interface) 8–2
Figure 8-2. CDI-10 G.703 Dual G.703 Interface 8–3
Figure 8-3. CDI-50 OC-3 / STM-1 Interface 8–4
Figure 8-4. CDI-60 HSSI Data Interface 8–5
Figure 9-1. Flash Update via Internet 9–1
Figure 10-1. Spectral Mask 10–2
Figure 10-2. 70/140 MHz and L-Band Carrier Input Level versus Symbol Rate 10–6
Figure 14-1. Networking Loop with Switches 14–2
Figure 14-2. Networking Loop Example 14–4
Figure 14-3. Networking Loop Example (Simplified) 14–4
Figure 14-4. Hub-to-Hub with Standard Traffic using Routers 14–6
Figure 14-5. Wired-thru for Hub-to-Hub with Standard Traffic using Routers 14–7
Figure 14-6. Wired-around for Hub-to-Hub with Standard Traffic using Routers 14–7
Figure 14-7. Hub-to-Remotes with Standard Traffic using Routers or Switches 14–8
Figure 14-8. Wired-thru for Hub-to-Remotes with Standard Traffic using Routers or Switches 14–9
Figure 14-9. Wired-around for Hub-to-Remotes with Standard Traffic using Routers or Switches 14–9
Figure 14-10. Point-to-Multipoint using Routers 14–10
Figure 14-11. Wired-thru for Point-to-Multipoint with Routers 14–11
Figure 14-12. Wired-around for Point-to-Multipoint with Routers 14–11
Figure 14-13. Point-to-Multipoint using Switches 14–12
Figure 14-14. Wired-thru, Hub-to-Remotes, Split-path Traffic using Switches (Point-to-Multipoint) 14–13
Figure 14-15. Wired-around, Hub-to-Remotes, Split-path Traffic using Switches (Point-to-Multipoint) 14–13
Figure 15-1. CDM-700 Home Page 15–3
Figure 15-2. Home: Contact Information Page 15–4
Figure 15-3. Home: Customer Support Page 15–5
Figure 15-4. Admin: Access Page 15–6
Figure 15-5. Admin: Remote Page 15–7
Figure 15-6. Config Mdm: Modem Page 15–8
Figure 15-7. Config Mdm: Modem Utilities Page 15–9
Figure 15-8. Config Mdm: INTF1 Page (*Default – no module installed*) 15–10
Figure 15-9. Config Mdm: INTF1 – E3/T3/STS1 (Dual G.703) Page 15–11
Figure 15-10. Config Mdm: INTF1 – OC3 Page 15–12
Figure 15-11. Config Mdm: INTF1 – HSSI Page 15–13
Figure 15-12. Config Mdm: INTF2 page (*Default – no module installed*) 15–14
Figure 15-13. Config Mdm: INTF2 – GBEI Main Page 15–15

Figure 15-14. Config Mdm: INTF2 → GBEI Statistics Page 15–16
Figure 15-15. Config Mdm: INTF2 → GBEI VLAN Feature Page 15–17
Figure 15-16. Statistics: (Main) Modem Status Page 15–18
Figure 15-17. Statistics: Modem Logs Page 15–19
Figure 15-18. Maintenance: (Main) Unit Information Page 15–20
Figure B-1. Block Diagram of Dual E3/T3/STS-1 Data Interface Module B–2
Figure B-2. Dual E3/T3/STS-1 Data Interface Module (CDI-10) B–2
Figure C-1. Optical / Coaxial Interface Block Diagram C–2
Figure C-2. CDI-50 Rear Panel C–2
Figure D-1. HSSI Interface Block Diagram D–2
Figure D-2. HSSI Interface D–2
Figure D-3. Continuous and Gap Clock at TT D–4
Figure E-1. CDI-70 1000 Base-T Gigabit Ethernet Interface (GBEI) E–1
Figure E-2. GBEI Interface Option Board – Phase 1 ..... E–3
Figure E-4. Example of GBEI Interface Bridging a Remote Host on a Common LAN over the Satellite E–8
Figure E-5. Example of M&C Port Assigned an IP Address NOT on a Common LAN E–8

Notes:

Preface

Customer Support

Contact the Comtech EF Data Customer Support Department for:

- Product support or training
- Reporting comments or suggestions concerning manuals
- Information on upgrading or returning a product

A Customer Support representative may be reached at:

Comtech EF Data
Attention: Customer Support Department
2114 West 7th Street
Tempe, Arizona 85281 USA

480.333.2200 (Main Comtech EF Data number)
480.333.4357 (Customer Support Desk)
480.333.2161 FAX

To return a Comtech EF Data product (in-warranty and out-of-warranty) for repair or replacement:

- **Contact** the Comtech EF Data Customer Support Department. Be prepared to supply the Customer Support representative with the model number, serial number, and a description of the problem.
- **Request** a Return Material Authorization (RMA) number from the Comtech EF Data Customer Support representative.
- **Pack** the product in its original shipping carton/packaging to ensure that the product is not damaged during shipping.
- **Ship** the product back to Comtech EF Data. (Shipping charges should be prepaid.)

For Online Customer Support:

An RMA number request can be requested electronically by contacting the Customer Support Department through the online support page at **www.comtechefdata.com/support.asp**:

- **Click** on "Return Material Authorization" for detailed instructions on our return procedures.
- **Click** on the "RMA Request Form" hyperlink, then fill out the form completely before sending.
- **Send e-mail** to the Customer Support Department at **service@comtechefdata.com**.

For information regarding this product's warranty policy, refer to the Warranty Policy, p. xx.

About this Manual

This manual provides installation and operation information for the Comtech EF Data CDM-700 High Speed 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.

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: TechnicalPublications@comtechefdata.com.

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 non-metric to metric conversions.

Cautions and Warnings

CAUTION 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.

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

Indicates information critical for proper equipment function.

Recommended Standard Designations

Recommended Standard (RS) Designations have been superseded by the new designation of the Electronic Industries Association (EIA). References to the old designations are shown only when depicting actual text displayed on the screen of the unit (RS-232, RS-485, etc.). All other references in the manual will be shown with the EIA designations.

Electrical Safety

The CDM-700 Modem has been shown to comply with the **EN 60950 Safety of Information Technology Equipment, including electrical business machines** safety standard.

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.

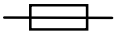
Installation

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

To ensure that the Modem continues to comply with these standards, observe the following instructions:

- Connections to the transmit and receive IF ports (‘N’ type female connectors) should be made using a good quality coaxial cable - for example, RG213/U.

- 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 back-shell.

- 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

Comtech EF Data products are 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 owner is responsible for freight to Comtech EF Data and all related customs, taxes, tariffs, insurance, etc. Comtech EF Data is responsible for the freight charges only for return of the equipment from the factory to the owner. 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.

All equipment returned for warranty repair must have a valid RMA number issued prior to return and be marked clearly on the return packaging. Comtech EF Data strongly recommends all equipment be returned in its original packaging.

Comtech EF Data Corporation's obligations under this warranty are limited to repair or replacement of failed parts, and the return shipment to the buyer of the repaired or replaced parts.

Limitations of Warranty

The warranty does not apply to any part of a product that has been installed, altered, repaired, or misused in any way that, in the opinion of Comtech EF Data Corporation, would affect the reliability or detracts from the performance of any part of the product, or is damaged as the result of use in a way or with equipment that had not been previously approved by Comtech EF Data Corporation.

The warranty does not apply to any product or parts thereof where the serial number or the serial number of any of its parts has been altered, defaced, or removed.

The warranty does not cover damage or loss incurred in transportation of the product.

The warranty does not cover replacement or repair necessitated by loss or damage from any cause beyond the control of Comtech EF Data Corporation, such as lightning or other natural and weather related events or wartime environments.

The warranty does not cover any labor involved in the removal and or reinstallation of warranted equipment or parts on site, or any labor required to diagnose the necessity for repair or replacement.

The warranty excludes any responsibility by Comtech EF Data Corporation for incidental or consequential damages arising from the use of the equipment or products, or for any inability to use them either separate from or in combination with any other equipment or products.

A fixed charge established for each product will be imposed for all equipment returned for warranty repair where Comtech EF Data Corporation cannot identify the cause of the reported failure.

Exclusive Remedies

Comtech EF Data Corporation's warranty, as stated is in lieu of all other warranties, expressed, implied, or statutory, including those of merchantability and fitness for a particular purpose. The buyer shall pass on to any purchaser, lessee, or other user of Comtech EF Data Corporation's products, the aforementioned warranty, and shall indemnify and hold harmless Comtech EF Data Corporation from any claims or liability of such purchaser, lessee, or user based upon allegations that the buyer, its agents, or employees have made additional warranties or representations as to product preference or use.

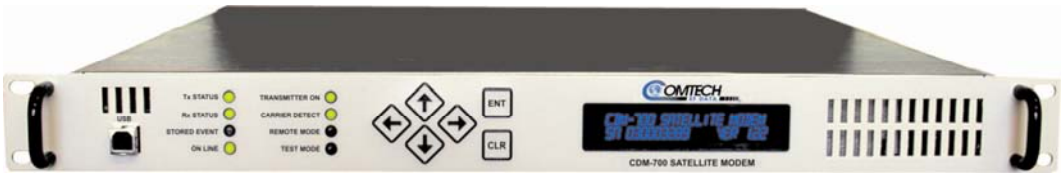
The remedies provided herein are the buyer's sole and exclusive remedies. Comtech EF Data shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Notes:

Chapter 1. INTRODUCTION

1.1 Overview

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



Chassis – Initially released version

Chassis –Rev. A or later version

Item	Rev A or Later Version	Initially released Version
1:1 and 1:N Redundancy	Supports 1:1 and 1:N Redundancy	Single Thread Only. Not Field Upgradable.
Front Panel	Protruding Round Button + Arrow Keys	Diamond Shape Flat Membrane Keys

Figure 1-1. CDM-700 High Speed Satellite Modem

1.2 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
    - VLAN supported in one of Slot 1 or Slot 2
- 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. Rev. A or later chassis is required for support of 1:1 or 1:N operation.
2. Initially released (prior to Rev. A) chassis are not field upgradeable to support 1:1 or 1:N operation.

1.2.1 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

1.2.2 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

1.3 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 Module
PL/11043-1	CDI-50-1 – Single Mode OC-3 (Optical) / STM-1 (Copper) Interface Module
PL/11043-2 (Note 2)	CDI-50-2 – Multiple Mode OC-3 (Optical) / STM-1 (Copper) Interface Module
PL/11582-1 (Note 3)	CDI-60 – HSSI Interface Module
PL/11509-1 (Initially released units)	CDI-70 – Gigabit Ethernet Interface Module with RJ-45 female connector
PL/11509-3 (Rev. A and later units)	CDI-70 – Gigabit Ethernet Interface Module with RJ-45 female connector
KT/12139-1	Blank Interface Panel

Notes:

1. Rev. A and later units required for 1:1 and 1:N Redundancy. Initially released 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 module via the Gigabit Ethernet port.)

1.4 Allowable Data Interface Combinations

Data interfaces are plugged into Slot 1 and Slot 2 of the CDM-700. The allowable combination of data interfaces and the data interfaces that are supported for redundancy are listed below. The

CRS-170A and CRS-180 support 1:1 redundancy for the L-Band and 70/140 MHz, respectively. the CRS-300 provides support for 1:N redundancy:

1:1 Redundancy with the CRS-170A (70/140 MHz) and CRS-180 (L-Band): The Allowable CDM-700 Modem Configuration column of the table below shows the data interface combinations of the CDM-700 that are supported by the CRS-170A and CRS-180. First, the 1:1 switch is selected depending upon the operating frequency, and then a data interface kit for Slot 1 and Slot 2 is chosen. More information on these kits is provided in the datasheet and manual for CRS-170A or CRS-180 1:1 Redundancy Switches.

1:N Redundancy with the CRS-300: The CRS-300 was originally designed for operation with the CDM-600 and subsequently adapted to a number of other modems. It is capable of supporting interfaces up to the point where there are no more paths left to route traffic. This is the reason why the CRS-300 supports a limited set of the interface combinations supported by the CDM-700.

Allowable CDM-700 Combinations		1:N CRS-300 Configurations	
Slot 1	**Slot 2**	**TMI Module** Notes 1,3	**RMI Module** Notes 2,4
Dual G.703 (CDI-10)	None	CRS-345	CRS-306
	Dual G.703 (CDI-10)	CRS-345	CRS-306
	HSSI (CDI-60)	Not Supported	Not Supported
	GigE (CDI-70)	CRS-345, Wired-Around Only	CRS-306, Wired-Around Only
OC3 Optical (CDI-50-1) Single Mode	None	Not Supported	Not Supported
OC3 Copper (CDI-50-1)	None	CRS-325	CRS-306
	GigE (CDI-70) (Allowed in Standby unit only)	CRS-325	CRS-306
HSSI (CDI-60)	None	CRS-336	CRS-306
	HSSI (CDI-60	Not Supported	Not Supported
	GigE (CDI-70)	CRS-336, CDI-70 is Wired-Around Only	CRS-306, CDI-70 is Wired-Around Only
GigE (CDI-70)	None	CRS-336	CRS-306
	GigE (CDI-70) Note 5	CRS-336, One CDI-70 is Wired-Through and the other is Wired-Around	CRS-306, One CDI-70 is Wired-Through and the other is Wired-Around
None	Dual G.703 (CDI-10)	CRS-345	CRS-306
	HSSI (CDI-60)	CRS-336	CRS-306
	GigE (CDI-70)	CRS-336	CRS-306

Refer to the *CRS-300 1:10 Redundancy Switch Installation and Operation Manual* for additional details and operational information.

Notes:

1. A TMI (Traffic Modem Interface) Module is used with each Primary Traffic Modem.
2. An RMI (Redundant Modem Interface) Module is used with the Standby Modem.
3. As of April 2007, GigE or HSSI TMI requires a CRS-336. The CRS-336 fully replaces or spares a CRS-335.
4. As of April 2007, the CRS-306 supersedes the CRS-305.
5. One Slot with a CDI-70 will support the maximum data rate. The 2nd slot is needed only for the Standby Modem

1.5 FAST and Hardware Options

The CDM-700 is extremely flexible and powerful, and incorporates a large number of optional features. Comtech EF Data provides **F**ully **A**ccessible **S**ystem **T**opology (**FAST**), which permits the purchase and installation of options through special authorization codes, entered remotely, or through the front panel. A customer can order features today and upgrade later to meet needs.

Table 1-2 lists the standard, hardware and FAST (software) options that 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)
	Tier 3, Turbo Coding, QPSK, 8-PSK to 30 Msymbol/s (76.352 Mbps @ 7/8)
	Tier 4, Turbo Coding, QPSK, 8-PSK to 37.5 Msymbol/s (95.440 Mbps @ 7/8)
	Tier 5, Turbo Coding, QPSK, 8-PSK to 45 Msymbol/s (114.528 Mbps @ 7/8) (Fits in 54 MHz Transponder)
	Tier 6, Turbo Coding, QPSK, 8-PSK to 64 Msymbol/s (155.520 Mbps @ 7/8) (Fits in 72 MHz Transponder)
	Tier 7, Turbo Coding, 16-QAM with Equalizer to 15 Msymbol/s (50.901 Mbps @ 7/8)
	Tier 8, Turbo Coding, 16-QAM with Equalizer to 22.5 Msymbol/s (76.352 Mbps @ 7/8)
	Tier 9, Turbo Coding, 16-QAM with Equalizer to 30 Msymbol/s (101.803 Mbps @ 7/8) (Fits in 36 MHz Transponder)
	Tier 10, Turbo Coding, 16-QAM with Equalizer to 37.5 Msymbol/s (127.253 Mbps @ 7/8)
	Tier 11, Turbo Coding, 16-QAM with Equalizer to 45 Msymbol/s (152.704 Mbps @ 7/8)
	Tier 12, Turbo Coding, 16-QAM with Equalizer to 64 Msymbol/s (155.52 Mbps @ 7/8), (Fits in 54 MHz Transponder)
	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
	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 Module
	CDI-50 Single Mode OC-3 (Optical) and STM-1 (Copper) Interface Module
	CDI-60 HSSI Interface Module
	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.

1.6 New in This Release

Revision 5:

- Chapter 6: Incorporated GBEI Statistics Summary, **Intfc1 GBEI Negotiation** added, **Monitor Rx-Params** updated with GBEI Frame Rate (FER1 or 2)
- Chapter 10: Incorporated **Power Consumption** specification change
- Chapter 11: Added **Frame Error Rate** (FER) and **Gigabit Interface Negotiation** (GNG) commands
- Chapter 15: Updated **GBEI Web Server** pages
- Appendix E: Incorporated **GBEI Statistics Summary** and **Upgrading the Gigabit Ethernet Interface Card Firmware**

Chapter 2. INSTALLATION

2.1 Unpacking and Inspection

The CDM-700 modem and its Installation and Operation Manual are packaged and shipped in a pre-formed, reusable cardboard carton containing foam spacing for maximum shipping protection.

Do not use any cutting tool that will extend more than 1" into the container and cause damage to the unit.

Be sure to keep all shipping materials for the carrier's inspection.

Unpack and inspect the CDM-700 as follows:

Step	Procedure
1	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.
2	Remove the packing list from the outside of the shipping carton.
3	Open the carton by cutting the tape at the top of the carton (indicated by OPEN THIS END).
4	Remove the cardboard/foam space covering the modem. Remove the modem, manual and power cord from the carton.
5	Check the contents against the packing list to verify completeness of the shipment.
6	Inspect the equipment for any possible damage incurred during shipment. If damage is evident, contact the carrier and Comtech EF Data immediately and submit a damage report.
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 Support Brackets

Install the optional rear-mounting support 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 follows:

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.

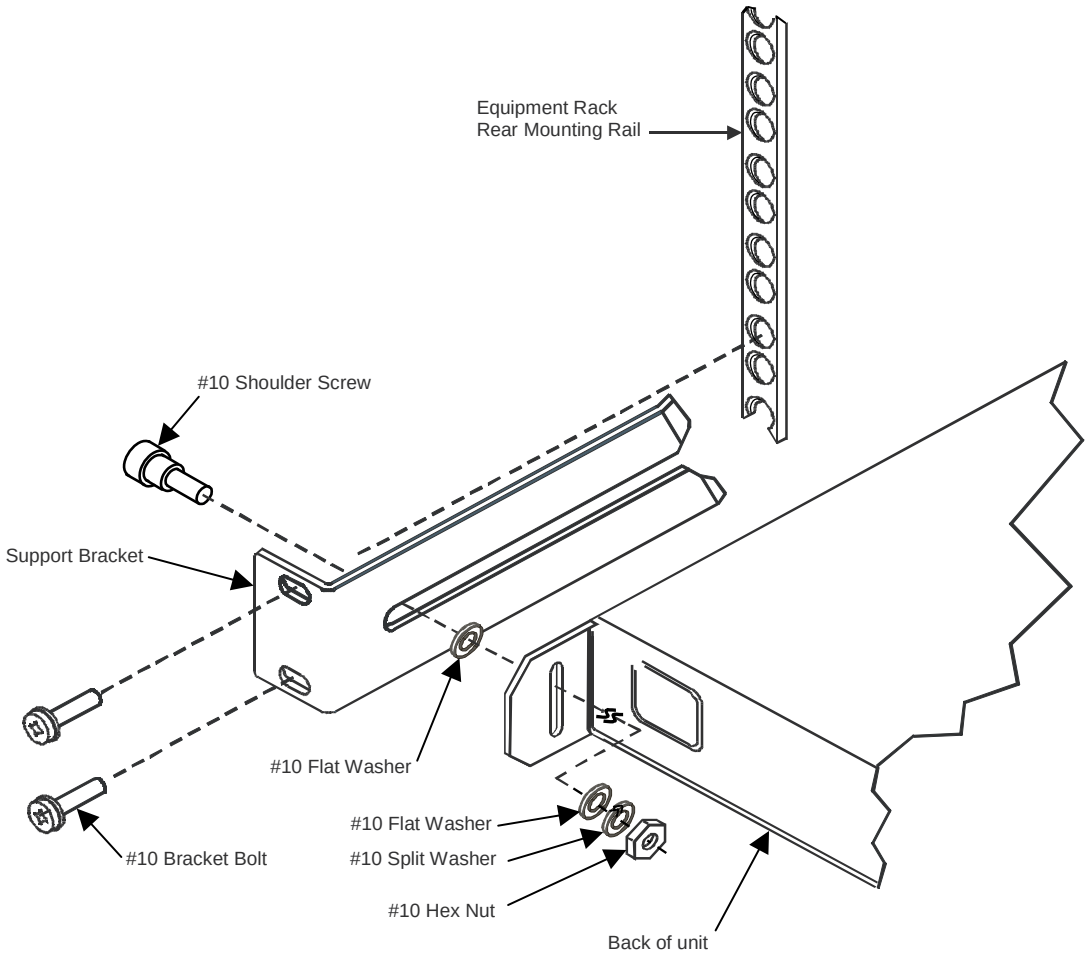


Figure 2-1. Installation of Optional Rear-Mounting Support Brackets (Kit KT/6228-2)

2.2.2 Method B: Optional Installation of Side-Railings

Figure 2-2 depicts installation , of the optional side-railings (FP/SL0006), using standard shop tooling and customer-furnished standard shop hardware:

Side-railings FP/SL0006 (Optional)		
Quantity	**Part Number**	**Description**
2	FP/SL0006	Side-Railings

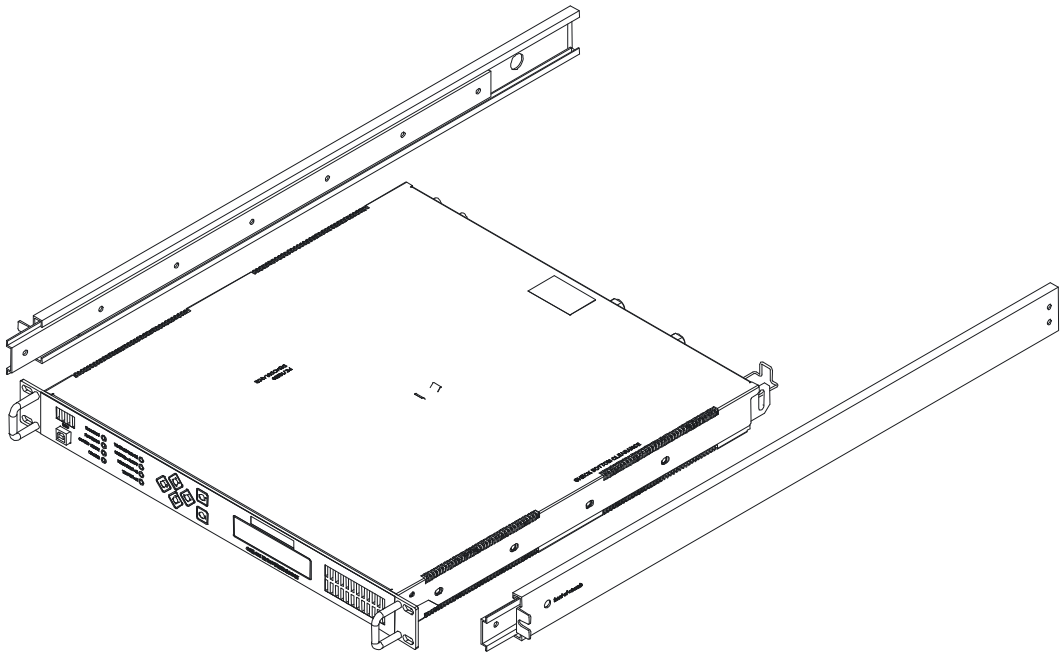


Figure 2-2. Installation of Optional Side-Railings (FP/SL0006)

Chapter 3. FUNCTIONAL DESCRIPTION

3.1 Description

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

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

- 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.**)

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 in-phase (I) and quadrature (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.

The Rx IF signal is digitally IF sampled, converted, demodulated and split into an I and a Q component. An **A**utomatic **G**ain **C**ontrol (AGC) circuit maintains the desired signal level constant over a broad range.

[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.

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 Modules

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.

Module Description	Mbps
CDI-10 Dual E3 / T3 / STS-1 G.703 Data Interface	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	1.5 to 70
CDI-70 1000 Base-T Gigabit Ethernet Interface (GbEI)	1.5 to 155.52

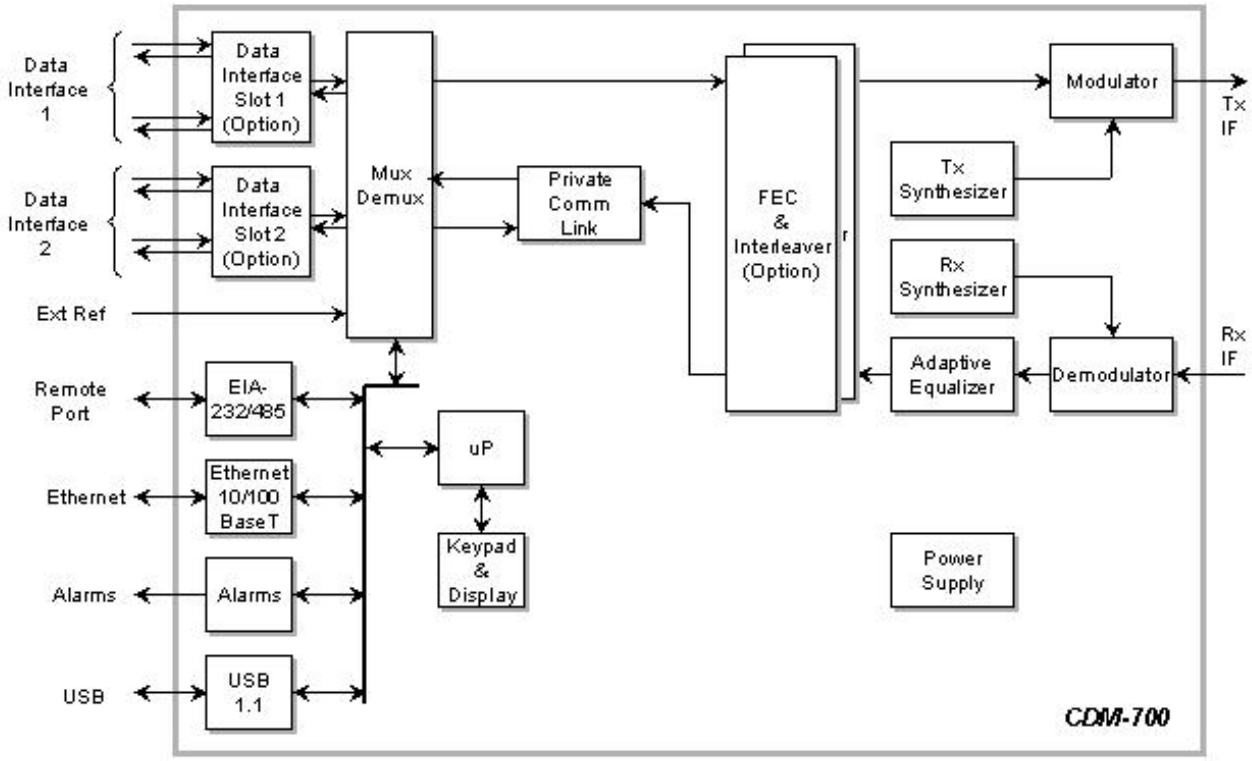


Figure 3-1. CDM-700 Modem Block Diagram

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 module is plugged into Slot 1 at the other end of the link for proper data transfer. Transfer of data between the Gigabit Ethernet module in Slot 1at the near end to the HSSI module 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)

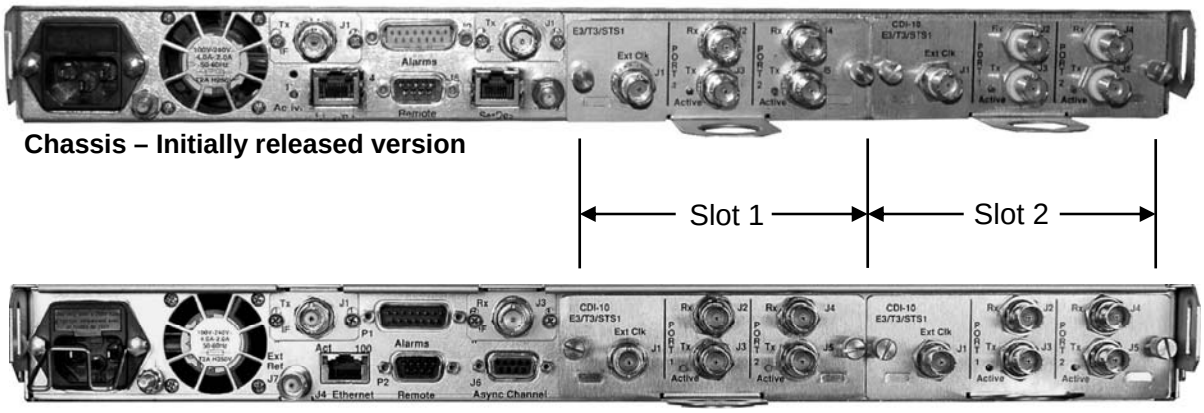


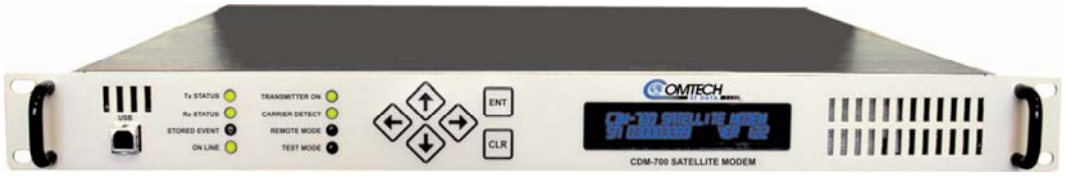
Figure 3-2. Rear Panel View

Notes:

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.



Chassis – Initially released version

Chassis –Rev. A and later versions

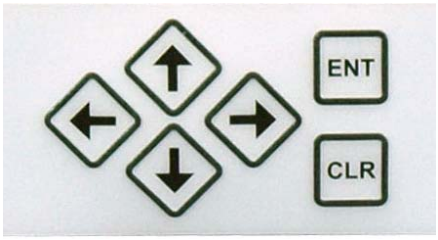
Figure 4-1. CDM-700 Satellite Modem

4.2 Front Panel

The CDM-700 front panel features a **V**acuum **F**luorescent **D**isplay (VFD), a keypad, eight **L**ight-**E**mitting **D**iode (LED) indicators, and a **U**niversal **S**erial **B**us (USB) port. 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.

Vacuum **F**luorescent **D**isplay **(VFD)**

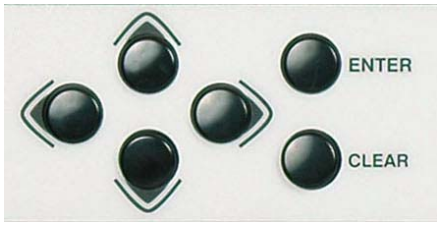
The VFD is an active display showing two lines with 24 characters per line. It produces a blue light, the brightness of which can be controlled by the user. It has greatly superior viewing characteristics compared to a **L**iquid **C**rystal **D**isplay (LCD), and does not suffer problems of viewing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



Initially Released Chassis Keypad

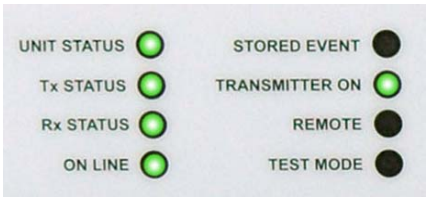
The keypad for the initially released chassis features six individual keyswitches mounted directly behind a fully sealed membrane overlay. They have a positive'click' action that provide the user with tactile feedback.

These six switches are identified as [↑], [↓], [→], [←] arrows, **ENT** (Enter) and **CLR** (Clear). The functions of these keys are described in **Chapter 6. FRONT PANEL OPERATION**.



Rev. A and Later Chassis Keypad

The keypad for the Rev. A and later chassis features six individual protruding black buttons. They have a positive'click' action that provide the user with tactile feedback.The later keypad function is the same as the earlier keypad.



LED Indicators

There are eight LEDs on the front panel. The behavior of these LEDs is described in **Chapter 6. FRONT PANEL OPERATION**.

4.3 Rear Panel

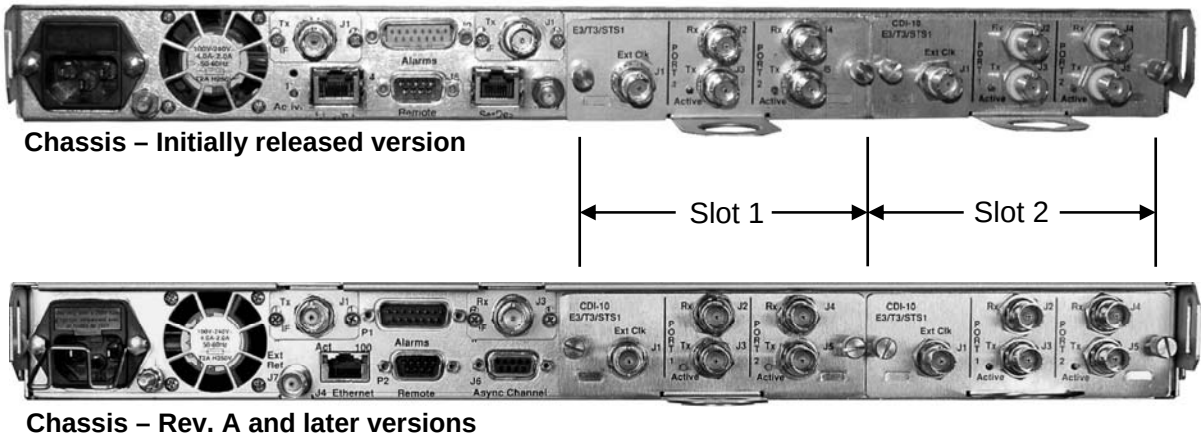


Figure 4-2. CDM-700 Rear Panel

4.3.1 External Cables

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

4.3.2 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.

IMPORTANT

For continued operator safety, always replace the fuses with the correct type and rating. Use T1.75A (slow-blow) 20mm fuses.

4.3.3 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**.

4.3.4 10/100 Ethernet Remote Port Connector (J4)

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

4.3.5 SerDes (Private Communications Link) (J6)

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

4.3.6 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.

4.3.7 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 is also 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.

4.3.8 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.

4.3.9 Data Interface Connector

Refer to **Chapter 5** and the Appendicies for applicable interfaces.

4.4 Dimensional Envelope

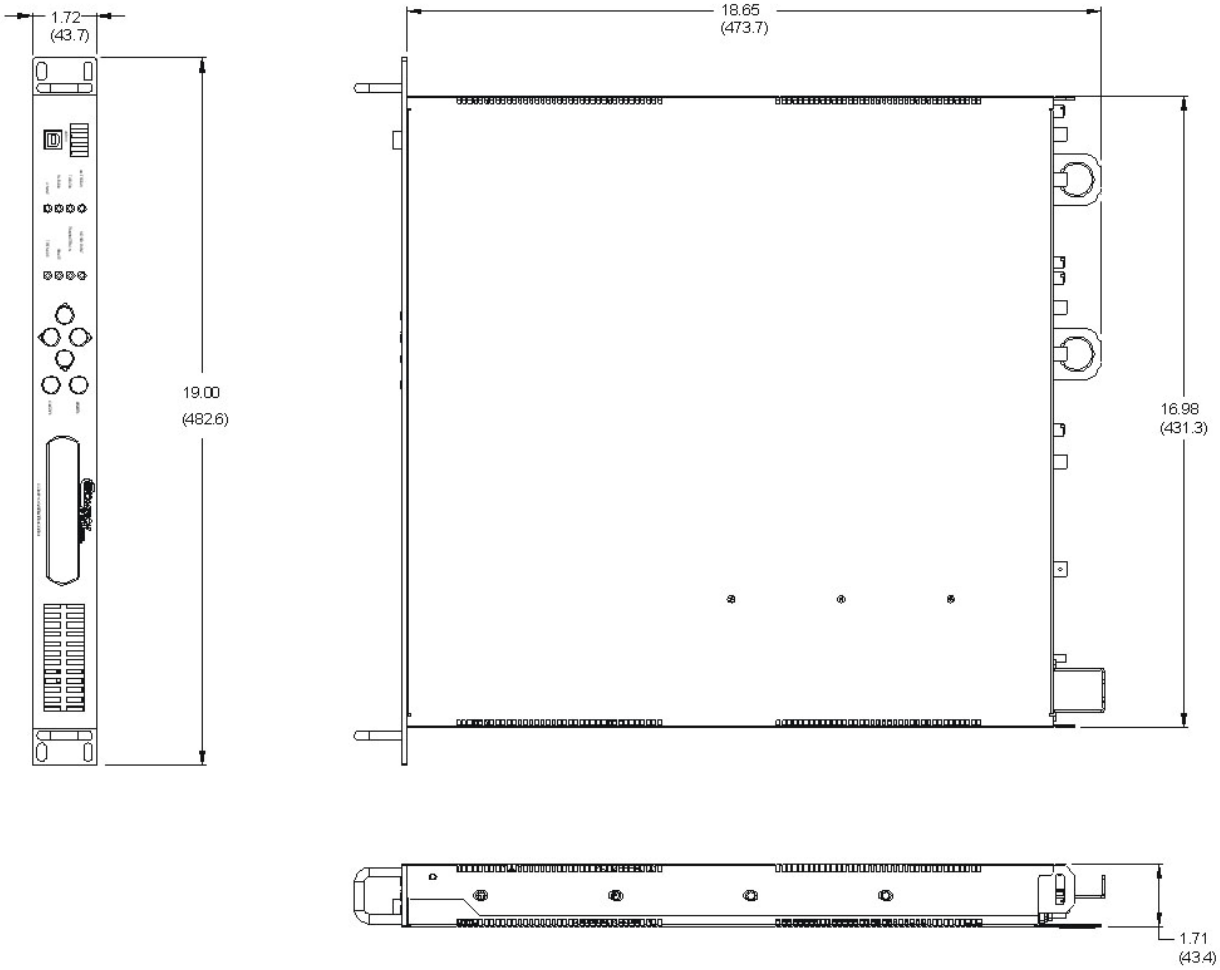


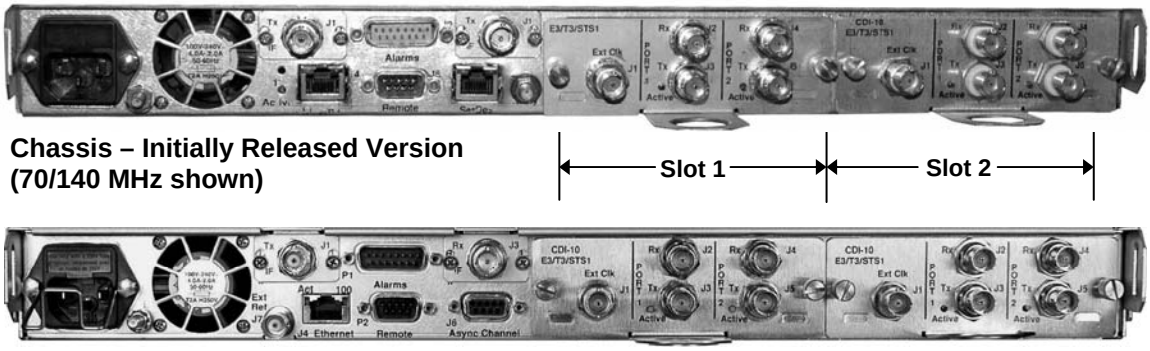
Figure 4-3. CDM-700 Dimensional Envelope (70/140 MHz)

Notes:

Chapter 5. CONNECTOR PINOUTS

5.1 External Connections

External cables are attached to connectors on the rear panel of the CDM-700. Figure 5-1 shows the CDM-700 rear panel – both current and original chassis configurations – with typical data interfaces installed in Slot 1 and Slot 2.



Chassis – Initially Released Version (70/140 MHz shown)

Chassis – Rev. A or Later Versions (70/140 MHz shown)

Figure 5-1. CDM-700 Chassis – Rear Panel

Refer to the applicable appendix in this manual for specific Data Interface pinout information.

The initially released chassis differs from the Rev. A chassis as follows:

Chassis – Initially Released Version	Chassis – Rev. A and Later Production Version
J6: RJ-45, SerDes	**J6:** 9 Pin D-F, Async Channel
J7: SMA-F, External Input	**J7:** BNC-F, External Input

For support of 1:1 and 1:N operation, a Rev. A or later chassis is required.

Modem Rear Panel Connectors Table for Initially Released Chassis Version:

Name	Ref. Des.	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	RJ-45 Female	Ethernet Management
SerDes	J6	RJ-45 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 initially-released chassis does not support 1:1 or 1:N operation and is not upgradeable.

Modem Rear Panel Connectors Table for L-Band, Rev. A and Later Chassis Versions:

Name	Ref. Des.	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	RJ-45 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

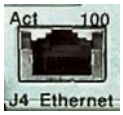
The European EMC Directive (EN55022, EN50082-1) requires using properly shielded cables for DATA I/O. These cables are double-shielded from end-to-end, ensuring a continuous ground shield.

5.1.1 Tx / Rx Connector Pinout – J1 / J3

The J1 (Tx) and J3 (Rx) IF interfaces are as follows:

Ref. Des.	Description	70/140 MHz Connector Type	L-Band Connector Type
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 J4 Ethernet management port interface is a RJ-45 female connector.

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 (Earlier Chassis Only)

The J6 private communications link is a type RJ-45 female connector – *it is not available for customer use.*

5.1.4 ASYNC Connector Pinout – J6 (Rev. A and Later Chassis)

The J6 ASYNC Channel interface is a 9-pin, Type D female connector.

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 J7 Ext Ref (External Reference) input 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:

- Female SMA connector (on the initially released chassis)
- BNC female connector (on the Rev A or later chassis)

Some data interfaces have an Ext-Clk input for synchronizing the data sources. Refer to the individual data interface card on the Data Interfaces appendix for details.

5.1.6 Alarm Connector Pinout – P1

The P1 Alarm interface is a 15-Pin type 'D' male connector with threaded jack nuts. The pinout depends upon whether the unit is in Normal mode, or in Redundancy mode for use with the CRS-170A (L-Band), CRS-180 (70/140 MHz), CRS-300, or CRS-700 redundancy switches.

The unit is put into 1:1 mode (available only in the Rev. A or later chassis) under the **Config: AUX → 1:1 Mask → Ena/Dis** menu by selecting **Enable**.

Initially released modems (chassis versions prior to Rev. A) do not support 1:1 redundancy. There is no upgrade program to support redundancy for these chassis.

Alarm Connector Pinout P1 – 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

The pinout table for the P1 connector in Redundancy mode is as follows:

Alarm Connector Pinout P1 – Redundancy Mode [1:1 (CRS-170A, CRS-180) and 1:N (CRS-300/700)]			
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

Note : For both the Normal Mode and the CRS-170A/180 and CRS300/700 and Redundancy Modes of operation:

- Prior to October 2007, the relays have low voltage contacts with transient suppressors across each pin to ground. The maximum working voltage = 18VDC or 13VAC. The maximum current rating is 1 Amp DC or 0.5 Amp AC. The Summary Relay combines Tx, Rx, and Unit Faults into a single relay.

- The suppressors were removed, as of October 2007, with Framer Card S/N 071539628. The Summary Relay combines Tx, Rx, and Unit Faults into a single relay.

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

The P2 Remote interface is a 9-Pin type 'D' male connector 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

IMPORTANT

RS-232/485 Remote Port P2 is used for 2-wire RS-485 operation.

5.2 Data Interfaces

Refer to the applicable appendix in this manual for specific Data Interface pinout information:

- Appendix B. Dual E3/T3/STS-1 (G.703) Interface (CDI-10)
- Appendix C. OC3 Interface (CDI-50)
- Appendix D. HSSI Interface (CDI-60)
- Appendix E. Gigabit Ethernet Interface (GbEI) (CDI-70)

Notes:

Chapter 6. FRONT PANEL OPERATION

6.1 Introduction

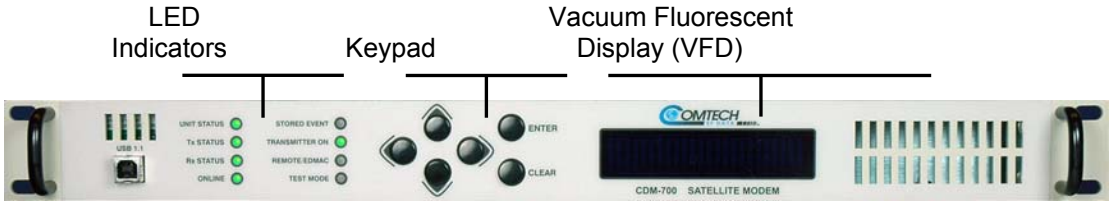
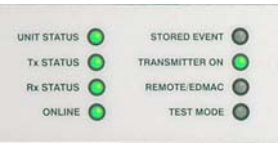


Figure 6-1. Front Panel View

Operators can fully control and monitor the operation of the CDM-700 from the front panel using the keypad and display. Nested menus display all available options, prompting operators to carry out a required action.

Figure 6-1 identifies the key features of the front panel, which are explained in greater detail in this section.

6.1.1 Front Panel LED Indicators



The behavior of the eight front panel LEDs adjacent to the keypad indicate the operational status of the CDM-700, and are described below in Table 6-1.

Table 6-1. Front Panel LED Indicators

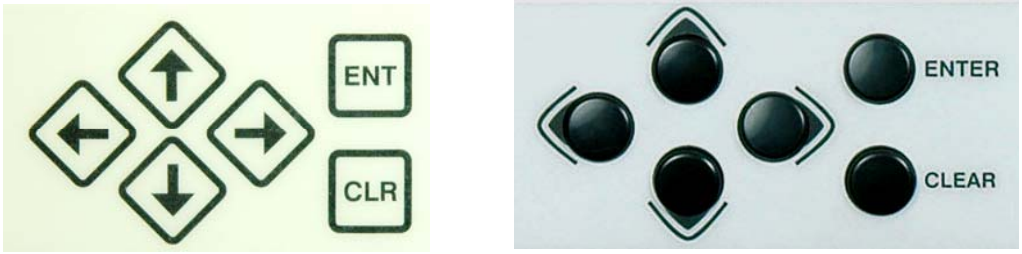
LED	Color	Condition
Unit Status	Green	No Unit Faults or Alarms exists
	Orange	No Unit Faults, but a Traffic fault exists
	Red	A Unit Fault exists
Tx Status	Green	No Tx Traffic Faults or Alarms exists
	Orange	A Tx Traffic Alarm exists
	Red	A Traffic Fault exists
	Off	Unit not configured for Modulator or Interface Tx is not enabled.
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/EDMAC	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.

6.1.2 Front Panel Keypad

The front panel keypad, with its physical variations, is shown in **Figure 6-2**:



Diamond Keypad:
Initially Released Chassis

Button Keypad:
Rev. A or Later Chassis

Figure 6-2. Keypad

The keypad features six individual key switches with a positive 'click' action – this provides tactile feedback. The function of these keys are as follows:

ENTER [ENT]	This key is used to select a displayed function or to execute a modem configuration change.
CLEAR [CLR]	This key is used to back out of a selection or to cancel a configuration change, which has not been executed using ENTER [ENT]. Pressing CLEAR [CLR] 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.

6.1.3 Front Panel Vacuum Flourescent Display (VFD)

The CDM-700 features a **V**acuum **F**luorescent **D**isplay (VFD). The VFD is an active display showing two lines of 24 characters each. It produces a blue light, the brightness of which can be adjusted. Compared to a **L**iquid **C**rystal **D**isplay (LCD), it has greatly superior viewing characteristics and does not suffer problems of viewing angle or contrast.

As shown above, the 'welcome screen' is displayed whenever power is first applied to the unit. The top line identifies the unit model (i.e., CDM-700); the bottom line displays the CDM-700's installed Firmware Version (version number varies).

Pressing any key navigates to the top-level Select menu. On most menu screens, a flashing, solid-block cursor blinks at a once-per-second rate. This cursor indicates the currently selected item, digit, or field:

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

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:

```
Tx IF Freq: 0140.0000 MHz
            (◄ ► ▲ ▼ ENT)
```

To prevent the display from becoming burnt by a constant image, the unit employs a screen saver feature, which activates after one hour and constantly scrolls and wraps a message across the screen. 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**…' as shown:

```
Circuit ID: -------------
not locked. Press any key..
```

Press any key to restore the previously active screen.

6.1.4 Menu Matrix

Para	Title	Selectable Params
6.2	**Opening Screen**	
6.3	**SELECT: (Main) Menu**	**Config; Monitor; Test; Info, Save/Load; Util**
6.3.1	**(SELECT:) Config [Configuration]**	**Remote; Tx; Rx; Intfc1; Intfc2; Ref, AUX**
6.3.1.1	CONFIG: Remote [Control]	Local; Serial; Ethernet
6.3.1.2	CONFIG: Tx	Mod; Code; Freq: Data; Sym; Pwr; Scram
6.3.1.3	CONFIG: Rx	Dem; Code; Freq: Data; Sym; Descram; EbNo; Mask
6.3.1.4	CONFIG: Intfc1 (CDI-10 Dual G.703)	Alarm, Port 1, Port 2, Ext-Clk
6.3.1.4.1	CONFIG: Intfc2 (CDI-10 Dual G.703)	
6.3.1.5	CONFIG: Intfc1 (CDI-50 OC-3)	Tx, Rx, Mode
6.3.1.6	CONFIG: Intfc1 (CDI-60 HSSI)	Tx, Rx, CTS/RTS
6.3.1.6.1	CONFIG: Intfc2 (CDI-60 HSSI)	
6.3.1.7	CONFIG: Intfc1 (CDI-70 Gigabit Ethernet)	Tx, Rx, Man, Stats, SWOP, NEG
6.3.1.7.1	CONFIG: Intfc2 (CDI-70 Gigabit Ethernet)	
6.3.1.9	CONFIG: Ref	Frequency Reference
6.3.1.10	CONFIG: Aux	Ena/Dis Force (1:1)
6.3.2	**(SELECT:) Monitor**	**Alarms; Rx-Params; Event-Log**
6.3.3	**(SELECT:) Test**	**Norm; IF; Dig; I/O; RF; Tx-Cw; Tx-1,0**
6.3.4	**(SELECT:) Info [Information]**	**Rem; Tx; Rx; 1:1; Intfc1; Intfc2**
6.3.5	**(SELECT:) Save/Load**	**Save; Load**
6.3.6	**(SELECT:) Util [Utility]**	**RT-CLK; Ref; ID; Display; Firmware; FAST**

6.2 Opening Screen

The opening 'welcome screen' shown here is representative of what displays whenever power is first applied to the unit (the Firmware Version may differ). Pressing any key displays the top-level **Select** menu.

6.3 SELECT: (Main) Menu

IMPORTANT

The following menus are presented using CDI-10 G.703, CDI-60 HSSI, and CDI-70 GbE Interfaces. The CDI-10 G.703 Interface is used to present all menus. The difference is noted in (SELECT:) Config → Intfc1***, where each interface is specifically referenced.***

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

Move the cursor to the desired choice using the ◄ ► arrow keys, then press **ENTER**. The following table describes the function of each menu branch:

Selection	Menu Branch Description
Config	**[Configuration]** Provides selections for the desired Interface, Transmit, and Receive operations
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, example: CW and Loopback
Info	**[Information]** Provides a summary/display of the Interface, Transmit, Receive, and M&C configurations.
Save/Load	Permits the user to save and retrieve up to 10 different modem configurations.
Util	**[Utility]** Permits the user to perform miscellaneous functions, such as setting the Real-Time Clock, adjusting the display brightness, etc.

6.3.1 (SELECT:) CONFIG

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

The submenus available are:

Selection	Submenu Description
Remote	**[Remote Control]** - used to define whether the unit is controlled locally or remotely. (See Important Note.)
Tx	**[Transmit]** - used to define, on a parameter-by-parameter basis, the Tx configuration of the unit. These submenu branches would be used to change, for example, just the Tx Frequency.
Rx	**[Receive]** - used to define, on a parameter-by-parameter basis, the Rx configuration of the unit. These submenu branches would be used to change, for example, just the Rx Frequency.
Intfc1 *or* **Intfc2**	**[Interface]** - used to configure Interfaces plugged into Slot 1 or Slot 2 on the back of the unit. The menus change depending on the type of interface – as of this manual revision, Dual E3/T3/STS-1, Dual G.703, OC3, HSSI, and Gigabit Ethernet (GbE) are available.
Ref	**[Reference]** - used to configure the source of the modem reference frequency.
Aux	**[Auxiliary]** - used to enable Redundancy. In 1:1 operation, allows the online unit to force switchover.

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.

6.3.1.1 (CONFIG:) Remote

```
Remote Control:
Local  Serial  Ethernet
```

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

Selection	Action
Local	Remote control is disabled. Remote monitoring is still possible.
Serial	RS232, RS485-2W, and RS485-4W menus are accessed.
Ethernet	Additional submenus will be displayed.

Remote Control: → Local

When* Local *is selected, remote control is disabled and local control enabled once* ENTER *is pressed; the* CONFIG: *menu returns. When* Remote *is selected, menu operations associated with local control are disabled, and the following message appears when menu or command access associated with Local control is attempted:

```
THIS UNIT IS CURRENTLY
IN REMOTE MODE!!
```

Remote Control: → Serial

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

Select **Interface** or **Baudrate** using the ◄ ► arrow keys, then press **ENTER**.

If **Serial Config: → Interface** is selected:

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

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

Note: At this point, a prompt requests entry of the bus address.

If **M&C Bus Interface → RS232** is selected:

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

If **M&C Bus Interface → RS485-2W** or **RS485-4W** is selected, further prompting occurs:

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

Edit the RS485 bus address of the modem by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. The valid range of addresses is from **1** to **9999**. Press **ENTER**.

If **Serial Config: → Baudrate** is selected:

```
Local M&C Bus Baud Rate:
9600 Baud   (▲ ▼  E )
```

Edit the Baud rate of the remote control bus, connected locally to the M&C computer. Values of **1200**, **2400**, **4800**, **9600**, **19200**, **38400**, and **57600** baud are possible. The value is changed using the ◄ ► arrow keys. Press **ENTER**.

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

Remote Control: → Ethernet

```
Ethernet Config: Gateway
Address  MAC SNMP   (◄ ►  E)
```

Select **Gateway**, **Address**, **MAC**, or **SNMP** using the ◄ ► arrow keys, then press **ENTER**.

If **Ethernet Config: → Gateway** is selected:

```
Ethernet IP Gateway:
063.168.001.127 (◄ ► ▲ ▼  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.

Edit the IP Gateway address by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. Press **ENTER**.

If **Ethernet Config: → Address** is selected:

```
Ethernet IP Address/Range:
010.006.030.139/16 (◄ ►▲▼)
```

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.

Edit the IP Address/Range address by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. Press **ENTER**.

If **Ethernet Config: → MAC** is selected:

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

This is a 'read only' status window that displays the factory program MAC address for the Ethernet management interface. Press **ENTER** or **CLEAR** to return to the previous menu.

Note: The preceding address is representative of a typical MAC address.

If **Ethernet Config: → SNMP** is selected:

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

This is a 'read only' status window . Submenus enable setting of the destination IP address for SNMP traps. Select **Community** or **Traps** using the ◄ ► arrow keys, then press **ENTER**.

If **SNMP → Community** is selected:

```
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,** then press **ENTER** to drop into the next level menu.

If **Community →Read** is selected:

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

Edit the **Read** Community string using the ◄ ► ▲ ▼ arrow keys. Only the bottom line (0 to 20 characters) is available. Select the cursor position on the bottom line using the ◄ ► arrow keys, then edit the selected character using the ▲ ▼ arrow keys.

The following characters are available:

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

If **Community →Write** is selected:

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

Edit the **Write** Community string using the ◄ ► ▲ ▼ arrow keys. Only the bottom line (0 to 20 characters) is available. Select the cursor position on the bottom line using the ◄ ► arrow keys, then edit the selected character using the ▲ ▼ arrow keys.

The following characters are available:

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

If **SNMP → Traps** is selected:

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

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

If **SNMP Trap IP Address: → 1** or **2** is selected:

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

Edit the SNMP Trip IP#1 or IP#2 Address by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. Press **ENTER**.

6.3.1.2 (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.

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.

Tx: → Mod

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

Select **Type**, **Inv**, or α using the ◄ ► arrow keys. Press **ENTER**.

If **Tx Modulation → Type** is selected:

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

Select the Transmit Modulation Type by using the ◄ ► arrow keys. Press **ENTER**. The choices are as follows:

Modulation Type (Symbol Rate) Selection	Description
Q (QPSK)	Valid for all FEC types
8P (8-PSK)	Valid for all FEC types
16Q (16-QAM)	Valid for all FEC types
64Q (64-QAM)	Valid for all FEC types

If **Tx Modulation → Inv** is selected:

```
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.

Select **Normal** or **Invert** using the ◄ ► arrow keys. Press **ENTER**.

If **Tx Modulation → α** is selected:

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

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

Select the **Rolloff (α)** setting using the ◄ ► arrow keys. Whenever the Mode is changed, **(α)** reverts to **25%**, but **(α)** can be modified to **35%** from this menu. Press **ENTER**.

Tx: → Code

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

Refer to data rate menu for valid code rates.

IMPORTANT

- ***All possible choices are presented at all times.***
- ***If an option is not installed (either Hardware or FAST) or is not valid, or if a code rate is not available for the Mode selected, the ◄ ► arrow keys will force the cursor to skip past the unavailable choice.***

Select the code rate by using the ◄ ► arrow keys. Press **ENTER**.

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

Tx: → Freq

```
Tx Freq: 0140.0000 MHz
          (◄ ► ▲ ▼ E)
```

Edit the **Tx IF Frequency** by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. 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 range of frequency is from 950 to 1950 MHz with 100 Hz resolution.

Tx: → Data

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

This is a 'read only' status window that displays the **Composite Data Rate**, the sum of data rates for all enabled Tx ports on Intfc1 and Intfc2 as measured at the data input connector (customer interface). Referring to the next menu, the **Symbol Rate** 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 = ∑ Port-Data Rates, where:

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),

and
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.

Press **ENTER** or **CLEAR** to return to the previous menu.

Tx: → Sym

```
Tx Sym Rate:
34.368000 Msps          (E)
```

This is a 'read only' status window that displays the **Symbol Rate**. Refer to the detailed explanation provided under **(CONFIG:) Tx → Data.**

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.

Press **ENTER** or **CLEAR** to return to the previous menu.

Tx: → Pwr

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

Select **Level**, **On/Off**, or **Imped** using the ◄ ► arrow keys. Press **ENTER**.

IMPORTANT

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

If **Tx Power → Level** is selected:

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

Edit the **TX Power Level** by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. Press **ENTER**. The valid ranges are as follows:

70/140 MHz	0 to -20 dBm
L-Band	-5 to -25 dBm

If **Tx Power → On/Off** is selected:

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

Select **Off**, **On**, or **Rx-Tx_Inhibit** using the ◄ ► arrow keys. Press **ENTER**.

If **Tx Output State → Rx-Tx_Inhibit** is selected:

Rx–Tx Inhibit (RTI)	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.

With this feature enabled it will not affect the internal IF Loopback feature. HOWEVER – 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.

If **Tx Power → Imped** is selected:

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

```
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. Press **ENTER**.
L-Band	Not Applicable.

Tx: → Scram

```
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. Press **ENTER**.

6.3.1.3 (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.

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.

Rx: → Dem (Demod)

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

Select **Type**, **Inv**, **Acq**, α, or **Adap-Eq** using the ◄ ► arrow keys. Press **ENTER**.

If **Rx Dem: → Type** is selected:

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

Select the Receive Demodulation Type by using the ◄ ► arrow keys. Press **ENTER**. The choices are as follows:

Demodulation Type (Symbol Rate) Selection	Description
Q (QPSK)	Valid for all FEC types
8P (8-PSK)	Valid for all FEC types
16Q (16-QAM)	Valid for all FEC types
64Q (64-QAM)	Valid for all FEC types

If **Rx Dem:** → **Inv** is selected:

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

Select **Normal** or **Inverted** using the ◄ ► arrow keys. Press **ENTER**.

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. Selecting **Inverted** also can correct for spectral inversion in the uplink or downlink.

If **Rx Dem:** → **Acq** is selected:

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

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.

Edit the demodulator acquisition search range value by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. The range varies from ±**001** kHz to ±**100** kHz. Press **ENTER**.

If **Rx Demod:** → **α** is selected:

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

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

Select the **Rolloff (α)** setting using the ◄ ► arrow keys. Whenever the Mode is changed, **(α)** reverts to **25%**, but **(α)** can be modified to **35%** from this menu. Press **ENTER**.

If **Rx Demod:** → **Adap-Eq** is selected:

```
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.

Select **Off** or **On** using the ◄ ► arrow keys. Press **ENTER**.

Rx: → Code

```
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 is not valid, or if a code rate is not available for the Mode selected, the ◄ ► arrow keys will force the cursor to skip past the unavailable choice.***

Select the code rate by using the ◄ ► arrow keys. Press **ENTER**.

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

Rx: → Freq

```
Rx IF Freq: 0140.0000 MHz
            (◄ ►▲▼E)
```

Edit the **Rx IF Frequency** by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. 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 range of frequency is from 950 to 1950 MHz with 100 Hz resolution.

Rx: → Data

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

This is a 'read only' status window that displays the **Composite Data Rate**, the sum of data rates for all enabled Tx ports on **Intfc1** and **Intfc2** as measured at the data input connector (customer interface). Referring to the next menu, the **Symbol Rate** 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 = ∑ Port-Data Rates, where:

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),

and
CR = Code Rate (3/4, etc)

Press **ENTER** or **CLEAR** to return to the previous menu.

Rx: → Sym

```
Rx Sym Rate:
34.368000 Msps        (E)
```

This is a 'read only' status window that displays the **Symbol Rate**. Refer to the detailed explanation provided under **(CONFIG:) Rx → Data.**

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.

Press **ENTER** or **CLEAR** to return to the previous menu.

Rx: → Descrm

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

Options are:

Default-On	The proprietary descrambler is selected.
Off	No Descrambling.

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

Rx: → Eb/No

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

Select **Threshold** or **Alarm/Fault** using the ◄ ► arrow keys. Press **ENTER**.

If **Eb/No Alarm: → Threshold** is selected:

```
Eb/No Alarm Threshold:
2.0 dB          (◄ ►▲ ▼ E)
```

Select a value here, and if the Eb/No falls below this value, a receive traffic fault will be generated.

Edit the Eb/No alarm point by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. The range of values is from **0.1** to **16.0** dB. Press **ENTER**.

If **Eb/No Alarm: → Alarm/Fault** is selected:

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

Select **Alarm, Fault**, or **Mask** using the ◄ ► arrow keys. The available choices define the Eb/No Alarm as an **Alarm**, as a **Fault**, or to completely **Mask** the alarm. This choice affects operation in 1:1 redundancy only. Press **ENTER**.

If **Eb/No Alarm: → Alarm/Fault → Mask** is selected:

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

Select **AGC**, **BER**, or **All-Rx-Flts** using the ◄ ► arrow keys. Press **ENTER**.

If **Rx Alarm Mask: → AGC** is selected:

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

This choice effects operation in 1:1 redundancy only. Select **Active** to activate the AGC Alarm or **Mask** to mask the AGC Alarm using the ◄ ► arrow keys. Press **ENTER**.

If **Rx Alarm Mask: → BER** is selected:

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

This choice effects operation in 1:1 redundancy only. Select **Active** to activate the BER Alarm or **Mask** to mask the BER Alarm using the ◄ ► arrow keys. Press **ENTER**.

If **Rx Alarm Mask: → All-Rx-Flts** is selected:

```
Mask All Rx Faults?
No  Yes              (◄ ►E)
```

The default value is **No**. If **Yes** is selected, all Rx Faults will be masked, and the Rx Status LED on the front panel will be *off*.

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

Note: All-Rx-Flts is used when operating the modem in a Tx only mode.

6.3.1.4 (CONFIG): Intfc1

IMPORTANT

1. INFORMATION RE: ALLOWABLE INTERFACE COMBINATIONS/CONFIGURATIONS:

The combination of installed data interfaces in CDM-700 Chassis Slot 1 (**Intfc1**) and Slot 2 (**Intfc2**) drive the appearance/selection of the **CONFIG: Intfc1** and **CONFIG: Intfc2** menus. Refer to **Chapter 3.3 Allowable Data Interfaces In Slot 1 and Slot 2** for a table of the available data interface combinations.

2. INFORMATION RE: MENU DOCUMENTATION FOR INTFC1/INTFC2:

The **Config: Intfc1** menu content depicted in this section is dependent on the installed data interface. While the **Config: Intfc2** menu content is very similar to that of **CONFIG: Intfc1**, the data interface menus in this manual are presented in an order that may or may not be representative of the actual configured 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.

3. INFORMATION RE: AVAILABLE DATA RATE RANGES:

(a) The composite data rate range depends on the FAST option ordered with the CDM-700. The options are arranged in ascending tiers by symbol rate and modulation type along with the corresponding data rate range.

(b) The Data Rate Range Table in the **Chapter 10. SUMMARY OF SPECIFICATIONS** summarizes the composite data range by tiers. It also shows how the composite data rate is constructed from the individual data ports on the data interface modules.

(c) The data rate of each individual data port depends on the particular CDI-xx data interface installed in the CDM-700. Additional information about the data rate range for each individual port is provided in the menus below and in the chapter for each data interface module.

Intfc1 (CDI-10 Dual G.703 Interface)

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  Port2  Ext-Clk
```

Select **Alarm, Port1, Port2** or **Ext-Clk** using the ◄ ► arrow keys. 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.

Intfc1: → Alarm

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

To configure the loss of External Clock as either an Alarm or a Fault, Press **ENTER**.

If **Intfc1 Alarm/Fault: → Ext-Clk** is selected:

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

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.

Select **Alarm, Fault,** or **Mask** using the ◄ ► arrow keys. Press **ENTER**.

Intfc1: → Port1

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

Select **Type**, **Line-Code**, **Tx**, or **Rx** using the ◄ ► arrow keys. Press **ENTER**.

If **Intfc1 Port1 E3/T3/STS1: → Type** is selected:

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

This menu allows port type selection for the interface. Select **E3**, **T3**, or **STS1** using the ◄ ► arrow keys. Press **ENTER**.

Upon entering the menu, the cursor blinks below the currently active interface and its data rate is shown:

Port Type Selection	Data Rate
E3	34.368 Mbps
T3	44. 768 Mbps
STS1	51.85 Mbps

If **Intfc1 Port1 E3/T3/STS1: → Line-Code** is selected:

```
Intfc1 Port1 E3CODE
(HDB3S):  On  Off   (◀ ▶E)
```

This display indicates which port type was selected for Port 1 under **Intfc1 Port1 E3/T3/STS1: → Type** and allows enabling or disabling of the line code specific to that selected port type.

The appearance of the **Line-Code** menu display depends upon the selected port type. For each display, the port type is shown first; the applicable line code appears in parentheses; and the **On** or **Off** selections that follow enable or disable line coding.

Selected Port Type (as displayed)	Line Code (as displayed)
E3 CODE	**(HDB3)**
T3 CODE	**(B3ZS)**
STS1 CODE	**(B3ZS)**

By selecting **Off**, the modem treats the data stream as alternate-mark-inversion (AMI) – that is, no line coding. Press **ENTER**.

If **Intfc1 Port1 E3/T3/STS1: → Tx** is selected:

```
Intfc1 Port1 Tx: Alarms
Inv Data Ena/Dia    (◀ ▶E)
```

Select **Alarms, Inv, Data** or **Ena/Dis**, using the ◀ ▶ arrow keys. Press **ENTER**.

If **Intfc1 Port1 Tx: → Alarms** is selected:

```
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. Press **ENTER**.

If **Intfc1 Port1 Tx Alarms: → Tx-Data** is selected:

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

This selection affects the event reporting status upon detection of loss of Tx Cable, and subsequently the switching logic, when the modem is in a 1:1 redundancy configuration.

Select **Alarm**, **Fault**, or **Mask** using the ◄ ► arrow keys. Press **ENTER**.
If **Intfc1 Port1 Tx Alarms: → Tx-AIS** is selected:

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

This selection affects the event reporting status upon detection of a Tx AIS condition, and subsequently the switching logic, when the modem is in a 1:1 redundancy configuration.

Select **Alarm**, **Fault**, or **Mask** using the ◄ ► arrow keys. Press **ENTER**.

If **Intfc1 Port1 Tx: → Inv** is selected:

```
Intfc1 Port 1 Tx Data:
Normal  Inverted   (◄ ►E)
```

This feature has been added for compatibility with certain older equipment. Select **Normal** or **Inverted** using the ◄ ► arrow keys. Press **ENTER**.

If **Intfc1 Port1 Tx: → Data** is selected:

```
Intfc1 Port 1 Data Rate
Tx: 34.368000          (E)
```

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

This is a 'read only' status window to display the data selected via the **Intfc1 Port1: → Type** menu. When Port1 Tx is enabled or disabled via **Intfc1 Port1 Tx: → Ena/Dis** (see next section), that status is reflected in this display:

- When Port1 Tx is *enabled*, the data rate associated with Port 1 is displayed, as shown in the top example.
- When Port1 Tx is *disabled*, that status is reflected in this display, as shown in the bottom example.

Press **ENTER** to reveal the the following status menu:

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

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.

Press **ENTER** or **CLEAR** to return to the previous menu.
If **Intfc1 Port1 Tx: → Ena/Dis** is selected:

```
Intfc1 Port1 Status
Enable Disable      (◀ ▶E)
```

This selection activates or deactivates the transmit (Tx) side of Port1. *Disabling* the Tx port deactivates the port and changes the data rate to 0.

Select **Enable** or **Disable** using the ◀ ▶ arrow keys. Press **ENTER**.

If **Intfc1 Port1 E3/T3/STS1: → Rx** is selected:

```
Intfc1 Port 1 Rx: Alarms     Inv Data
Buf Clk Ena/Dis (◀ ▶E)
```

Select **Alarms, Inv, Data, Buf, Clk** or **Ena/Dis** using the ◀ ▶ arrow keys. Press **ENTER**.

If **Intfc1 Port1 Rx: → Alarms** is selected:

```
Intfc1 Port1 Rx Alarms:
Rx-AIS  Buffer-Slip   (◀ ▶E)
```

Select **Rx-AIS** or **Buffer-Slip,** using the ◀ ▶ arrow keys, to configure either as an Alarm or Fault condition. Press **ENTER**.

If **Intfc1 Port1 Rx Alarms: → Rx-AIS** is selected:

```
Rx-AIS Alarm:
Alarm   Fault   Mask  (◀ ▶E)
```

This selection will affect the event reporting status upon detection of a Rx AIS condition, and subsequently the switching logic, when the modem is in a 1:1 redundancy configuration.

Select **Alarm, Fault,** or **Mask** using the ◀ ▶ arrow keys. Press **ENTER**.

If **Intfc1 Port1 Rx Alarms: → Buffer-Slip** is selected:

```
Buffer Slip Alarm:
Alarm   Fault   Mask  (◀ ▶E)
```

This selection will affect the event reporting status upon detection of a Buffer Slip condition, and subsequently the switching logic, when the modem is in a 1:1 redundancy configuration.

Select **Alarm, Fault,** or **Mask** using the ◀ ▶ arrow keys. Press **ENTER**.
If **Intfc1 Port1 Rx: → Inv** is selected:

```
Intfc1 Port 1 Rx Data:
Normal  Inverted   (◀ ▶E)
```

This feature has been added for compatibility with certain older equipment. Select **Normal** or **Inverted,** using the ◀ ▶ arrow keys, to control data inversion. Press **ENTER**.

If **Intfc1 Port1 Rx: → Data** is selected:

```
Intfc1 Port 1 Data Rate
Rx: 34.368000          (E)
```

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

This is a 'read only' status window to display the data selected via the **Intfc1 Port1: → Type** menu. When Port1 Rx is enabled or disabled via **Intfc1 Port1 Rx: → Ena/Dis** (see next section), that status is reflected in this display:

- When Port1 Rx is *enabled*, the data rate associated with Port 1 is displayed, as shown in the top example.
- When Port1 Rx is *disabled*, that status is reflected in this display, as shown in the bottom example.

Press **ENTER** to reveal the the following status menu:

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

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.

Press **ENTER** or **CLEAR** to return to the previous menu.

If **Intfc1 Port1 Rx: → Buf** is selected:

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

Select **Frame-Type, Size**, or **Recenter** using the ◄ ► arrow keys. Press **ENTER**.

If **Intfc1 Port1 Rx Buffer: → Frame-Type** is selected:

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

Select **Frame-Type, Size**, or **Recenter** using the ◄ ► arrow keys. Press **ENTER**.

The Frame Type and the number of bits in the frame displayed are dependent on the choice selected under **Intfc1 Port1: → Type**. In the above example, G.751 (1536 Bits) shows the frame when the Port Type is E3. The available Frame Type / (Bits) are as follows:

Selected Port Type (as displayed)	Frame Type (Frame Size, in bits, as displayed)
E3	None - default G.751 (1536 Bits) G.753 (2148 Bits)
T3	None - default G.752 (4760 Bits)
STS1	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.

If **Intfc1 Port1 Rx Buffer: → Size** is selected:

```
Intfc1 Port1 Rx Buffer:
10.0 mSec (0344.064 Bits)(▲▼ E)
```

Edit the Rx Buffer Size by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. 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.

If **Intfc1 Port1 Rx Buffer: → ReCenter** is selected:

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

The percentage (65%) indicates the current buffer fill status. Select **Re-Center,** using the ◄ ► arrow keys, to reset the buffer to the midpoint (50%). Press **ENTER**.

If **Intfc1 Port1 Rx Buffer: → Clk** is selected:

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

This selection determines which source clocks the output of the Rx Buffer for delivering data to the Rx port at the user interface.

Select **Rx-Sat, Tx-Terr** or **Ext-Clk** using the ◄ ► arrow keys. Press **ENTER**. The selections are as follows:

Selection	Description
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.

If **Intfc1 Port1 Rx: → Ena/Dis** is selected:

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

This selection activates or deactivates the receive side of Port1. *Disabling* the Rx port deactivates the port and changes the data rate to 0.

Select **Enable** or **Disable** using the ◄ ► arrow keys. Press **ENTER**.

Intfc1: → Port2

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

Functionality for all submenus under **(CONFIG:) Intfc1 → Port2** is identical to what has been outlined previously under **(CONFIG:) Intfc1 → Port1**. For a full explanation of all submenus under **(CONFIG:) Intfc1 → Port2**, refer to these previous sections.

Intfc1: → Ext-Clk

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

Set the input frequency for the Ext-Clk connector on the E3/T3/STS-1 Interface Card by using the ▲ ▼ arrow keys. 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.

Once the Ext-Clk input frequency has been edited, Press **ENTER**.

6.3.1.4.1 (CONFIG:) Intfc2 (CDI-10 Dual G.703 Interface)

The CDM-700 can be configured with a second CDI-10 Dual G.703 Interface board plugged into interface Slot2 (**Intfc2**). The menus are identical to what is presented in **6.3.1.4 (CONFIG:) Intfc1 (CDI-10 Dual G.703 Interface)** except that **Intfc2,** rather than **Intfc1**, is displayed in all menus.

6.3.1.5 (CONFIG:) Intfc1 (CDI-50 OC-3 Interface)

The menus depicted in this section pertain to the CDI-50 OC-3 Optical and STM-1 Copper Interface.

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

Select **Tx, Rx** or **Mode** using the ◄ ► arrow keys. Press **ENTER**.

Intfc1 OC-3: → Tx

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

Select **Data** or **Ena/Dis** using the ◄ ► arrow keys. Press **ENTER**.

If **Intfc1 OC-3 Tx: → Data** is selected:

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

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

This is a 'read only' status window to display the data rate of the interface. When the Tx side of this interface is enabled or disabled via **Intfc1 OC-3 Tx: → Ena/Dis** (see next section), that status is reflected in this display:

- When Tx is *enabled*, the data rate of the interface is displayed, as shown in the top example.
- When Tx is *disabled*, that status is reflected in this display, as shown in the bottom example.

Press **ENTER** or **CLEAR** to return to the previous menu.

If **Intfc1 OC-3 Tx: → Ena/Dis** is selected:

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

This selection activates or deactivates the transmit (Tx) side of this interface. *Disabling* the Tx side deactivates it and changes the data rate to 0.

Select **Enable** or **Disable** using the ◄ ► arrow keys. Press **ENTER**.
Note: Disabling the Tx side will also turn off the output power.

Intfc1 OC-3: → Rx

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

Select **Data, Buf, Clk,** or **Ena/Dis** using the ◄ ► arrow keys. Press **ENTER**.

If **Intfc1 OC-3 Rx: → Data** is selected:

```
Intfc1 Rx Data Rate:
155.520000 Mbps     (E)
```

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

This is a 'read only' status window to display the data rate of the interface. When the Rx side of this interface is enabled or disabled via **Intfc1 OC-3 Rx: → Ena/Dis** (see section on pg. 6-3x), that status is reflected in this display:

- When Rx is *enabled*, the data rate of the interface is displayed, as shown in the top example.
- When Rx is *disabled*, that status is reflected in this display, as shown in the bottom example.

Press **ENTER** or **CLEAR** to return to the previous menu.

If **Intfc1 OC-3 Rx: → Buf** is selected:

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

Select **Size** or **ReCenter** using the ◄ ► arrow keys. Press **ENTER**.

If **Intfc1 Rx Buffer: → Size** is selected:

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

Edit the Rx Buffer Size by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. The range of values is from **00.0** to **26.0** mSec. Press **ENTER**.

If **Intfc1 Rx Buffer: → ReCenter** is selected:

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

The percentage (046%) indicates the current buffer fill status. Select **Re-Center,** using the ◄ ► arrow keys, to reset the buffer to the midpoint (50%). Press **ENTER**.

If **Intfc1 OC-3 Rx: → Clk** is selected:

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

This selection determines which source clocks the output of the Rx Buffer for delivering data to the Rx port at the user interface.

Select **Rx-Sat, Tx-Terr** or **Internal** using the ◄ ► arrow keys. Press **ENTER**. The selections are as follows:

Selection	Description
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.

If **Intfc1 OC-3 Rx: → Ena/Dis** is selected:

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

This selection activates or deactivates the receive (Rx) side of this interface. *Disabling* the Rx side deactivates it and changes the data rate to 0.

Select **Enable** or **Disable** using the ◄ ► arrow keys. Press **ENTER**.

If **Intfc1 OC-3 Rx: → Mode** is selected:

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

Select **Optical** or **Coax** using the ◄ ► arrow keys. Press **ENTER**.

6.3.1.6 (CONFIG:) Intfc1 (CDI-60 HSSI Interface)

The menus depicted in this section pertain to theCDI-60 HSSI Interface installed in Slot1. The CDM-700 supports either a single HSSI Interface (**Intfc1**) or Dual HSSI interfaces (**Intfc1** and **Intfc2**). The menus for **Intfc2** are identical to what is presented in this section, except that **Intfc2,** rather than **Intfc1**, is displayed in all menus.

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

There is a single port on an CDI-60 HSSI Interface. Select **Tx, Rx, CTS/RTS,** or **Alarm** using the ◄ ► arrow keys. Press **ENTER**.

Intfc1 HSSI: → Tx

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

Select **Data, Clock,** or **Enable** using the ◄ ► arrow keys. Press **ENTER**.

If **Intfc1 Tx: → Data** is selected:

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

Select **Datarate** or **Invert** using the ◄ ► arrow keys. Press **ENTER**.

If **Intfc1 Tx Data: → Datarate** is selected:

```
Intfc1 Data Rate:
Tx:032.000000 Mbps (◄ ►▲ ▼ E)
```

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

If **Intfc1 Tx Data: → Invert** is selected:

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

This feature has been added for compatibility with certain older equipment. Select **Normal** or **Inverted,** using the ◄ ► arrow keys, to control data inversion. Press **ENTER**.

If **Intfc1 Tx: → Clock** is selected:

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

This feature has been added for compatibility with certain older equipment. Select **Normal** or **Inverted,** using the ◄ ► arrow keys, to control clock inversion. Press **ENTER**.

If **Intfc1 Tx: → Enable** is selected:

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

This selection activates or deactivates the transmit (Tx) side of this interface. *Disabling* the Tx side deactivates it and changes the data rate to 0.

Select **Enable** or **Disable** using the ◄ ► arrow keys. Press **ENTER**.

Intfc1 HSSI: → Rx

```
Intfc1 Rx:
Data Buffer Clock Enable
```

Select **Data, Buffer, Clock,** or **Enable** using the ◄ ► arrow keys. Press **ENTER**.

If **Intfc1 Rx: → Data** is selected:

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

Select **Datarate** or **Invert** using the ◄ ► arrow keys. Press **ENTER**.

If **Intfc1 Rx Data: → Datarate** is selected:

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

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

Once the Rx Data Rate is edited, Press **ENTER**.

If **Intfc1 Rx Data: → Invert** is selected:

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

This feature has been added for compatibility with certain older equipment. Select **Normal** or **Inverted,** using the ◄ ► arrow keys, to control data inversion. Press **ENTER**.

If **Intfc1 Rx: → Buffer** is selected:

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

Select **Size** or **ReCenter** using the ◄ ► arrow keys. Press **ENTER**.

If **Intfc1 Rx Buffer: → Size** is selected:

```
Intfc1 Rx Buffer Size:
10.0 mSec (0343.680 Bits)
```

Edit the Rx Buffer Size by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys. The range of values is from **5.0** to **32.0 mSecs** in **0.1 mSec** increments. Press **ENTER**.

If **Intfc1 Rx Buffer: → ReCenter** is selected:

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

The percentage (046%) indicates the current buffer fill status. Select **ReCenter,** using the ◄ ► arrow keys, to reset the buffer to the midpoint (50%). Press **ENTER**.

If **Intfc1 Rx: → Clock** is selected:

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

Select **Source or Invert** using the ◄ ► arrow keys. Press **ENTER**. The selections are as follows:

If **Intfc1 Rx Clock: → Source** is selected:

```
Intfc1 Rx Clock:
Rx-Sat  Tx-Terr Internal
```

This selection determines which source clocks the output of the Rx Buffer for delivering data to the Rx port at the user interface.

Select **Rx-Sat, Tx-Terr** or **Internal** using the ◄ ► arrow keys. Press **ENTER**. The selections are as follows:

Selection	Description
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.

If **Intfc1 Rx Clock: → Invert** is selected:

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

This feature has been added for compatibility with certain older equipment. Select **Normal** or **Inverted,** using the ◄ ► arrow keys, to control clock inversion. Press **ENTER**.

If **Intfc1 Rx: → Enable** is selected:

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

This selection activates or deactivates the receive (Rx) side of this interface. *Disabling* the Rx side deactivates it and changes the data rate to 0.

Select **Enable** or **Disable** using the ◄ ► arrow keys. Press **ENTER**.

Intfc1 HSSI: → CTS/RTS

```
Intfc1 CTS/RTS:
Normal  Fault     (◄ ►E)
```

Select **Normal** or **Fault** using the ◄ ► arrow keys. Press **ENTER**.

RTS is the same as TA, and CTS is the same as CA. The selections operate as follows:

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

Intfc1 HSSI: → Alarm

```
Intfc1 Ext-Clock Alarm:
Alarm Fault Mask  (◄ ► E)
```

Ext-Clock Alarm is the alarm generated for the HSSI Tx Clock .Alarm when the HSSI Cable is disconnected or faulty.

Select **Alarm, Fault, or Mask** using the ◄ ► arrow keys. Press **ENTER**.

6.3.1.6.1 (CONFIG:) Intfc2 (CDI-60 HSSI Interface)

The CDM-700 can be configured with a second CDI-60 HSSI interface board plugged into interface Slot2 (**Intfc2**). The menus are identical to what is presented in **6.3.1.6 (CONFIG:) Intfc1 (CDI-60 HSSI Interface)** except that **Intfc2,** rather than **Intfc1**, is displayed in all menus.

6.3.1.7 (CONFIG:) Intfc1 (CDI-70 Gigabit Ethernet Interface)

There is a single RJ-45 port on the CDI-70 Gigabit Ethernet Interface.

The menus depicted in this section pertain to the CDI-70 Gigabit Ethernet Interface installed in Slot1. The CDM-700 supports either a single Gigabit Ethernet Interface (**Intfc1**) or Dual Gigabit Ethernet interfaces (**Intfc1** and **Intfc2**). The menus for **Intfc2** are identical to what is presented in this section except that **Intfc2,** rather than **Intfc1**, is displayed in all menus.

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

Select **Tx, Rx, Man**, **Stats**, **SWOP** (**Sw**ith **Op**eration), or **NEG** (Negotiation) using the ◄ ► arrow keys. Press **ENTER**.

Intfc1 Gigabit Ethernet: → Tx

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

Select **Data**, **Enable**, or **Alarm** using the ◄ ► arrow keys. Press **ENTER**.

If **Intfc1 Tx: → Data** is selected:

```
Intfc1 Data Rate:
Tx:075.000000 Mbps    (E)
```

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

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

If **Tx: Disabled** is displayed, the port is turned **Off** (0 Mbps).

If **Intfc1 Tx: → Enable** is selected:

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

This selection activates or deactivates the transmit (Tx) side of this interface. *Disabling* the Tx side deactivates it and changes the data rate to 0.

Select **Enable** or **Disable** using the ◄ ► arrow keys. Press **ENTER**.

If **Intfc1 Tx: → Alarm** is selected:

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

This selection will affect the event reporting status upon detection of loss of GBEI Cable.

Select **Alarm**, **Fault**, or **Mask** using the ◄ ► arrow keys. Press **ENTER**.

Intfc1 Gigabit Ethernet: → Rx

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

Select **Data** or **Enable** using the ◄ ► arrow keys. Press **ENTER**.

If **Intfc1 Rx: → Data** is selected:

```
Intfc1 Data Rate:
Rx:075.000000 Mbps    (E)
```

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

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

If **Rx: Disabled** is displayed, the port is turned **Off** (0 Mbps).

If **Intfc1 Rx: → Enable** is selected:

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

This selection activates or deactivates the receive (Rx) side of this interface. *Disabling* the Rx side deactivates it and changes the data rate to 0.

Select **Enable** or **Disable** using the ◄ ► arrow keys. Press **ENTER**.

Intfc1 Gigabit Ethernet: → Man

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

Edit the Gigabit Ethernet Interface Management IP Address and Mask Range by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys.

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.

Once the Gigabit Ethernet Interface Management IP Address and Mask Range are edited, Press **ENTER**.

Intfc1 Gigabit Ethernet: → Stats

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

Select **View** or **Clear** using the ◄ ► arrow keys. Press **ENTER**.

If **Intfc1 Statistics: → View** is selected:

```
FPGA Link Errors
0000000000000000000 (▲ ▼ E)
```

Use the ▲ ▼ arrow keys to scroll through the available statistics and counters.

The statistics for the Gigabit Ethernet Interface are shown in the following table:

GBEI Statistics Summary		
Category	**Message**	**Description**
1000Base-T Link Statistics **FPGA Statistics**	FPGA Link Errors	Indicates the number of HDLC link errors that have occurred on the Rx WAN interface. This error would most likely occur if there are errors in the received signal from the satellite resulting in corrupted frames.
	FPGA Overrun Errors	Indicates the number of times that a GBEI buffer overrun has occurred in the Rx direction (WAN to the LAN). This error would most likely occur if there are errors in the received signal from the satellite resulting in a corrupted framing structure.
	FPGA Rx Packet Count	Indicates the number of Ethernet packets received from the WAN
	FPGA Overflow Errors v3.1.0 and earlier	Indicates the number of times this error is likely to occur if the LAN traffic to the modem exceeds that which can be HDLC encapsulated per the configured modem data rate.
	FPGA Overflow Errors v3.1.1 and later	For debug only
	FPGA Tx Packet Count	Indicates the number of Ethernet frames transmitted to the WAN
1000Base-T Link Statistics (cont) **LAN Statistics**	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 Collisions (In)	The sum of collisions detected on the LAN
	LAN Undersize (In)	Removed, V1.3.1 and later
	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 Discards (In)	A count of the number of incoming packets from the LAN to GBEI card that are overflowing the Tx Buffer and discarded
	LAN Jabber (In)	Removed, V1.3.1 and later
	LAN Rx Err (In)	Total frames received from the LAN for which an error was detected at the PHY
	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

GBEI Statistics Summary		
Category	**Message**	**Description**
1000Base-T Link Statistics (cont) **WAN Port Statistics**	WAN Good Octets (In)	The sum of lengths of all good Ethernet received from the WAN
	WAN Bad Octets (In)	The sum of lengths of all bad Ethernet received from the WAN
	WAN Unicast (In)	The sum of good frames received from the WAN that have a unicast destination MAC address
	WAN Broadcast (In)	The sum of good frames received from the WAN that have a broadcast destination MAC address
	WAN Multicast (In)	The sum of good frames received from the WAN that have a multicast destination MAC address
	WAN Pause (In)	The number of good flow control frames received from the WAN
	WAN Undersize (In)	Removed, V1.3.1 and later
	WAN Collisions (In)	The sum of collisions detected on the WAN
	WAN Fragments (In)	Total frames received from the WAN with a length of less than 64 octets and an invalid FCS
	WAN Oversize (In)	Total frames received form the WAN with a length greater than the maximum size of octets but with a valid FCS
	WAN Discards (In)	The number of packets from the WAN that have been discarded due to GBEI switch congestion
	WAN Jabber (In)	Removed, V1.3.1 and later
	WAN Rx Error (In)	Total frames received from the WAN for which an error was detected at the PHY
	WAN FCS Error (In)	Total frames received from the WAN with a CRC error which was not counted in the Fragments or Rx Err totals
	WAN Octets (Out)	The sum of the lengths of all Ethernet frames which are forwarded for transmission to the WAN
	WAN Unicast (Out)	The number of good frames with unicast destination MAC addresses which are for transmission to the WAN
	WAN Broadcast (Out)	The number of good frames with broadcast destination MAC addresses which are forwarded for transmission to the WAN
	WAN Multicast (Out)	The number of good frames with multicast destination MAC addresses which are forwarded for transmission to the WAN
	WAN Good Octets (IN)	The sum of lengths of all good Ethernet received from the WAN
	WAN Unicast (IN)	The sum of good frames received from the WAN that have a unicast destination MAC address
	WAN Broadcast (IN)	The sum of good frames received from the WAN that have a broadcast destination MAC address
	WAN Multicast (IN)	The sum of good frames received from the WAN that have a multicast destination MAC address
1000Base-T Link Statistics (cont) **Mng (Management) 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

GBEI Statistics Summary		
Category	**Message**	**Description**
	Mng Undersize (In)	Removed, V1.3.1 and later
	Mng Collisions (In)	The sum of collisions detected on the WAN
	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)	Removed, V1.3.1 and later
	Mng Discards (In)	The number of management processor packets that have been discarded due to GBEI switch congestion
	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

Intfc1 Gigabit Ethernet: → SWOP (Switch Operation)

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

This section describes the menu selections for setting up VLAN operation when **SWOP** (**Sw**itch **Op**eration) is selected from the **(CONFIG:) Intfc1 Gigabit Ethernet:** menu.

Select **AutoCx**, **Learning**, or **Mode** using the ◄ ► arrow keys. Press **ENTER**.

If **Intfc1 SWOP**: → **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 as *straight-through* (MDI) or *crossover* (MDIX).

If *disabled*, the Gigabit Ethernet port is configured as *straight-through* (MDI).

Select **Enable** or **Disable** using the ◄ ► arrow keys. Press **ENTER**.

If **Intfc1 SWOP: → Learning** is selected:

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

Unit power must be cycled whenever Learning mode is enabled or disabled.

Learning is an Ethernet switch function that allows the LAN (user) side of the Gigabit Ethernet port to learn the MAC addresses of the equipment connected to the Gigabit port.

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. 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.

If *disabled,* the GBEI passes all packets from the LAN to the WAN.

Select **Enable** or **Disable** using the ◄ ► arrow keys. Press **ENTER, *then cycle the unit power***.

If **Intfc1 SWOP: → Mode** is selected:

```
Intfc1 Switch Mode:
Normal    VLAN      (◄ ►E)
```

The unit supports two mode of operation: **Normal** and **VLAN**. Select **Normal** or **VLAN** using the ◄ ► arrow keys. Press **ENTER.**

If **Normal** is selected, all packets pass unchanged, including **VLAN** tagged packets [Simple Bridge]. Once **ENTER** is pressed, the previous menu returns.

If **Intfc1 Switch Mode:→ VLAN** is selected:

```
VLANID Attribute
0001   NATIVE   Add
```

VLANs can be configured on the unit. The user may add 32 **VLANs** with IDs from 1 to 4094.

The following attributes are supported for association 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.

To scroll active **VLANs** on the front panel, use the ▼▲ arrow keys. Information is displayed per the following table:

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

To Edit the **VLAN ID** of **NATIVE VLANs:**

```
VLANID Attribute
0001   NATIVE   Add
```

- Use the ▼▲ arrow keys to toggle between **MNGMENT** and **NATIVE;**
- Press **ENTER;**
- Use the ▼▲ arrow keys to change the **NATIVE VLAN ID** (on the bottom left of the display).

The following issues must be taken into consideration when editing **VLAN IDs**:

- The **NATIVE VLAN** cannot be deleted from the table and the attribute cannot be edited.
- All untagged/tagged packets arriving at the LAN port will be tagged (four byte **VLAN** "frame" will be added) with the configured **VLAN ID**.
- 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.
- 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.
- If the port is set to **TAGGED** mode, then the **VLAN** table is referenced to determine if the packet should pass.

To change the **MNGMENT VLAN ID:**

```
VLANID Attribute
0001   MNGMENT   Add
```

- Use the ▼▲ arrow keys to switch from **NATIVE** to **MNGMENT**
- Press **ENTER**
- Use the ▼▲ arrow keys to change the **MANAGEMENT VLAN ID** (on the bottom left of the display).

The following issues must be taken into consideration:

- The **Management VLAN** cannot be deleted from the table and the attribute cannot be edited.
- Prompting occurs when editing or deleting an existing VLAN:

```
Delete VLAN? No  Yes
0003   UNTAGGED
```

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

The **Add** menu is accessible from either the **VLANID Attribute (NATIVE)** or **VLANID Attribute (MNGMENT)** menus by pressing **ENTER**, then using the ◄ ► arrow keys. Once **Add** is selected, Press **ENTER** once again.

If **VLANID Attribute → Add** is selected:

```
VLANID Attribute
0000   TAGGED
```

Adjust the **VLAN ID Number** by selecting the digit to be edited, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲ ▼ arrow keys.

If the VLAN PVID exists in the table, the prompt appears:

```
Edit Existing Vlan?
0001  MNGMENT  ? Yes  No
```

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

If **Yes** is selected the PVID will be edited and updated in the table.

To toggle between **TAGGED** and **UNTAGGED**, use the ◄ ► arrow keys to scroll to the attribute, then select the desired attribute using the ▼▲ arrow keys. Press **ENTER.**

```
VLAN Attribute
0003   UNTAGGED
```

The **VLAN ID** will be **Added,** and the VLAN Table updated .

To edit the VLAN, select the VLAN using the ▼▲arrow keys to scroll the **VLAN** selections. Press **ENTER.**

```
VLAN Attribute
0002   TAGGED   Del
```

Edit the **VLAN ID** and the Attribute by using the ◄ ► and ▼▲ arrow keys. Press **ENTER** at the VLAN ID or 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.

To edit the Attribute, scroll to the VLAN in the table using the ▼▲ arrow keys. Press **ENTER.** Select the Attribute by using the ◄ ► arrow keys, then use the ▼▲ arrow keys to edit the Attribute as **TAGGED** or **UNTAGGED**.

Press **ENTER**. The following prompt occurs:

```
Edit Existing Vlan?
0001  MNGMENT  ? No  Yes
```

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

If **Yes** is selected, the VLAN and its Attribute will be edited and updated in the table.

If **VLANID Attribute → Del** is selected:

```
VLANID Attribute
0003   TAGGED   Del
```

Scroll to the VLAN in the table by using the ▲ ▼ arrow keys. Press **ENTER.**

The prompt occurs:

```
Delete VLAN? No  Yes
0003   TAGGED
```

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

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

Intfc1 Gigabit Ethernet: → Negotiation

```
Intfc1 GBEI Negotiation  Manual   Auto
View (◄ ►E)
```

The unit supports **Auto** or **Manual** negotiation options. **Auto** is the recommended setting.

Manual options include:

- 100 Mbps Half Duplex
- 100 Mbps Full Duplex
- 1000 Mbps Full Duplex Slave (Not Recommended For Normal Usage)
- 1000 Mbps Full Duplex Master (Not Recommended For Normal Usage)

Manual Negotiation

The unit supports three Manual Negotiation selections, Master/Slave, Speed and Duplex: **Mst/Slv, Speed** and **Dplx**.

```
Intfc1 GBEI Negotiation
Mst/Slv  Speed  Dplx  (◄ ►E)
```

Select **Mst/Slv**, **Speed** or **Dplx** using the ◄ ► arrow keys. Press **ENTER.**

Master/Slave Options

Master/Slave applies to 1000 Mbps setting only. The Master and Slave settings are a link debug feature only and are not intended for normal use.

If **Mst/Slv** is selected, select **Slave** or **Master** using the ◄ ► arrow keys. Press **ENTER.**

```
Intfc1 GBEI Negotiation   Slave
Master       (◀ ▶E)
```

If **Slave** is selected, 1000 Mbps Full Duplex is supported and the CDM-700 GBEI is set as the timing slave.

If **Master** is selected, 1000 Mbps Full Duplex is supported and the CDM-700 GBEI is set as the timing master.

Speed Options

If **Speed** is selected, Select **100** or **1000** using the ◄ ► arrow keys. Press **ENTER.**

```
Intfc1 GBEI Speed Mbps
100  1000            (◀ ▶E)
```

If **100** is selected, 100 Mbps is supported in the current Duplex setting (Full or Half).

If **1000** is selected, 1000 Mbps is supported in the current Duplex setting (Full or Half).

Note: Manual 1000 Mbps operation is not intended for normal use.

Duplex Options

If **Dplx** is selected, Select **Half** or **Full** using the ◄ ► arrow keys. Press **ENTER.**

```
Intfc1 GBEI Duplex
Half   Full          (◀ ▶E)
```

If **Half** is selected, Half Duplex is configured for 100 Mbps only.

If **Full** is selected, Full Duplex is configured for 100 Mbps only.

Note: If the Manual settings are ***not compatible*** with the counterpart unit, the following screen indicates the negotiation is not resolved:

```
Intfc1 GBEI Negotiation
      NOT  RES
```

Automatic Negotiation

If **Negotiation → Auto** is selected, the unit will automatically negotiate appropriate settings with the counterpart unit. All Manual selections previously made will not be overwritten.

Note: **Automatic Negotiation** is the recommended setting.

View Negotiation

If **Negotiation → View** is selected, the current negotiation is displayed. See the following sample screens:

```
Intfc1 GBEI Negotiation
    100 HDPX
```

```
Intfc1 GBEI Negotiation
    100 FDPX
```

```
Intfc1 GBEI Negotiation
    1000 FDPX
```

6.3.1.7.1 (CONFIG:) Intfc2 (CDI-70 Gigabit Ethernet Interface)

The CDM-700 can be configured with a second CDI-70 Gigabit Ethernet interface board plugged into interface Slot2 (**Intfc2**). The menus are identical to what is presented in **6.3.1.7 (CONFIG:) Intfc1 (CDI-70 Gigabit Ethernet Interface)** except that **Intfc2,** rather than **Intfc1**, is displayed in all menus.

6.3.1.8 (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.

6.3.1.9 (CONFIG:) Aux

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

Ena/Dis (Enable/Disable) is used to configure the modem for 1:1 or 1:N operation. The **Force (1:1)** selection is only available for use with a 1:1 switch to force switchover.

Note: In VLAN Redundancy, **OFFLINE** Modem is **VLAN UNAWARE**.

Select **Ena/Dis** or **Force (1:1)** using the ◄ ► arrow keys. Press **ENTER.**

If **Redundancy Mode: → Ena/Dis** is selected:

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

Select **Enable** or **Disable** using the ◄ ► arrow keys. Press **ENTER.**

Selecting **Enable** configures the modem for 1:1 or 1:N operation.

If **Redundancy Mode:** → **Force 1:1** is selected:

```
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. Press **ENTER** to execute switchover.
Note: In VLAN Redundancy, **OFFLINE** Modem is VLAN UNWARE.

6.3.2 (SELECT:) Monitor

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

Select **Alarms, RX_Params,** or **Event-Log** using the ◄ ► arrow keys. Press **ENTER.**

Monitor: → Alarms

IMPORTANT

The CDM-700 uses a system of* Fault Prioritization*. In each category of fault, only the highest priority fault is displayed. For example: 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.

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

Select **Transmit**, **Receive**, or **Unit** using the ◄ ► arrow keys. Press **ENTER**.

If **Live Alarms:** → **Transmit** is selected:

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

The display indicates if there are any Transmit Traffic Faults. If not, **None** is displayed. Press **ENTER** to return to the previous menu.

If **Live Alarms: → Receive** is selected:

```
Rx Traffic:  Rx Synth
Demod Unlocked          (E)
```

The display indicates if there are any Receive Traffic Faults. If not, **None** is displayed. Press **ENTER** to return to the previous menu.

If **Live Alarms: → Unit** is selected:

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

The display indicates if there are any Unit Faults. If not, **None** is displayed. Press **ENTER** to return 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) Reserved
20) Reserved
21) Reserved
22) Reserved.
23) Reserved
24) Reserved
25) Reserved
26) Reserved
27) Reserved
28) Reserved
29) SerDes Par Intfc1->Framer
30) SerDes Par Intfc2->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 Ca
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->Intfc1
19) SerDes Par Framer->Intfc2
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

Monitor: → Rx-Params

Screen 1 (Use the ▲ ▼ arrow keys to scroll):

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

Screen 2 (Use the ▲ ▼ arrow keys to scroll):

```
ΔF= +0.0k  Buf=48  RSL=-39 ▲
FER1 7.1E-05               ▼
```

Screen 3 (Use the ▲ ▼ arrow keys to scroll):

```
FER1 7.1E-05
FER2 N/A                ▲
```

If the demodulator is locked, information as indicated in the preceding example is displayed:

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	This is 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)** This shows 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
FER1 or FER2	**(GBEI Frame Error Rate)** This shows a value indicating the input LINK ERRORS Per Total Frames Received. FER is meaningful until one of the counters (usually Total Frames) overflows. Reset statistics to re-start FER. Good for 32 hours at 155 Mbps or 64 hours at 75Mbps.

If the demodulator is not locked, the message **'Demod: Not Locked'** appears, but the receive signal level continues to display:

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

Press **ENTER** or **CLEAR** to return to the previous menu.

Monitor: → Event-Log

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

Select **View** or **Clear-All** using the ◄ ► arrow keys. Press **ENTER**.

If **View** is selected:

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

Scroll backwards or forwards through the entries in the event log, using the ▲ ▼ arrow keys.

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.

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

Press **ENTER** or **CLEAR** to return to the previous menu.

If **Clear-All** is selected, the prompt occurs:

```
Clear All Stored Events:
No  Yes              (◄ ► E)
```

If **Yes** is selected, the event log is cleared, and the previous menu returns. 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.

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

6.3.3 (SELECT:) Test

```
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 the ◄ ► arrow keys. Press **ENTER**.

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):

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 6-3). 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 6-3), 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 6-3). 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 6-3) 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.

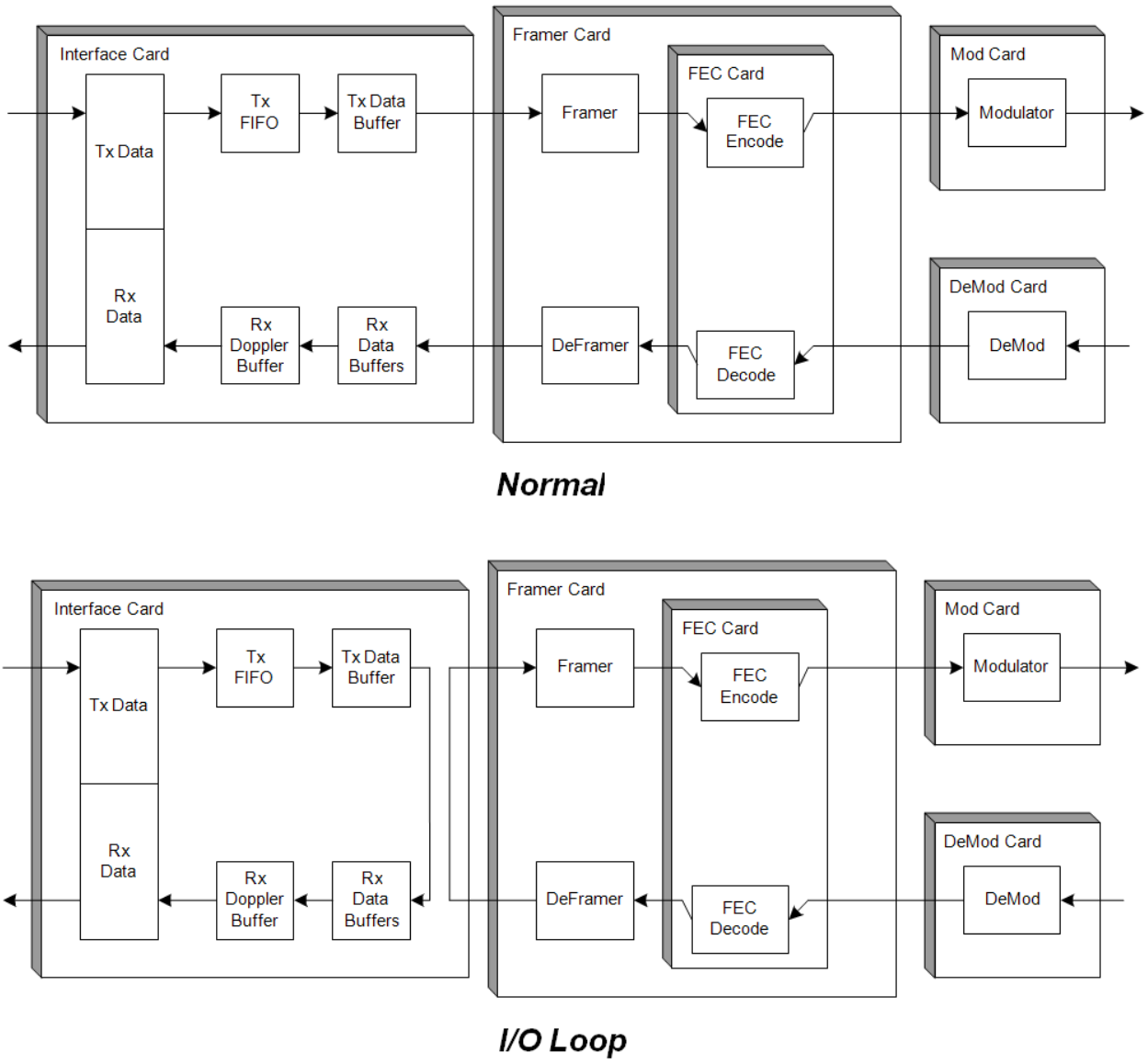


Figure 6-3. Traffic Flow Loopback Block Diagrams

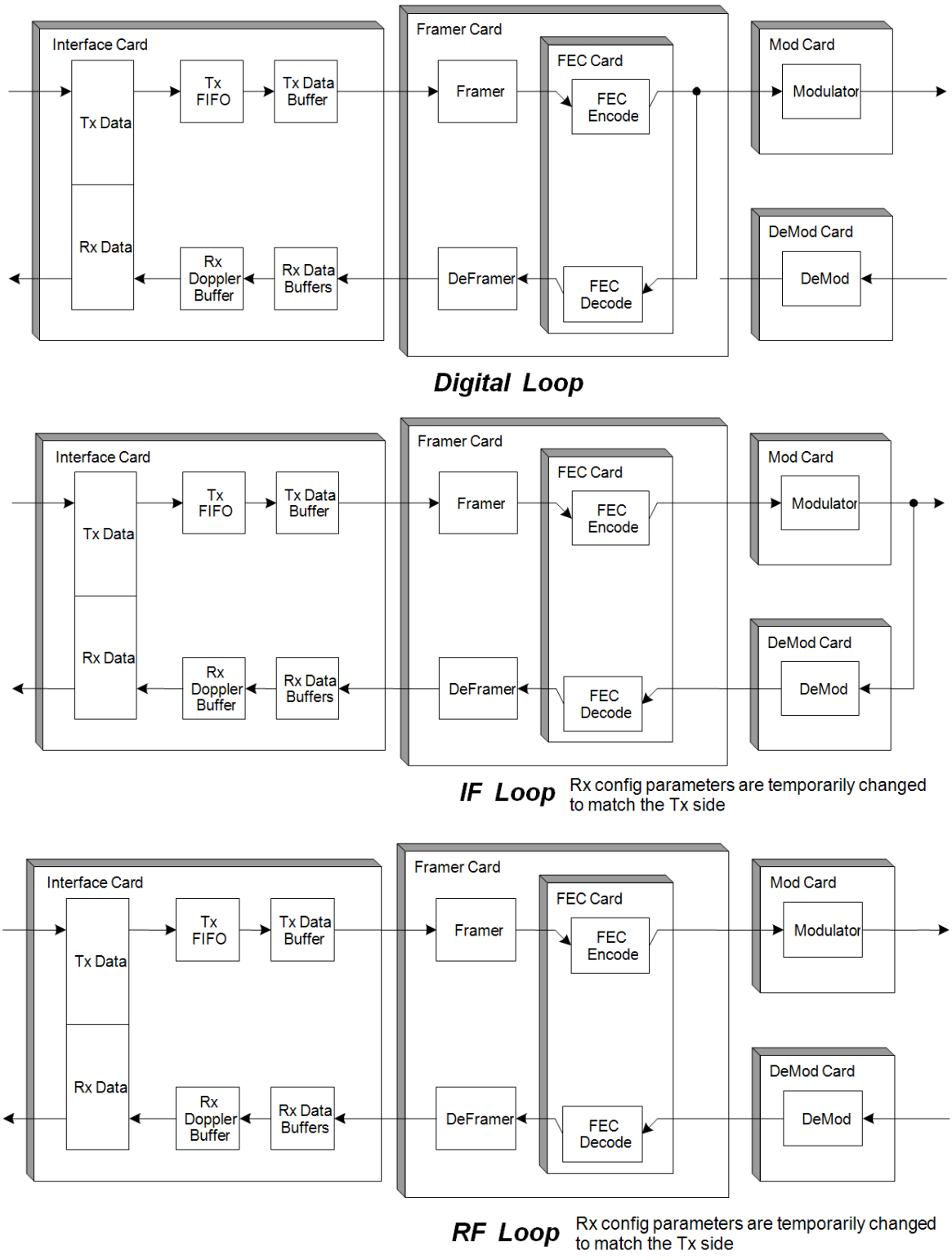


Figure 6-3. Traffic Flow Loopback Block Diagrams (continued)

6.3.4 (SELECT:) Info

```
INFO: Rem   Tx   Rx
1:1   Intfc1   Intfc2
```

(SELECT:) Info provides the 'read only' status windows that display information on the current modem configurations without risking inadvertent changes. Select **Rem**, **Tx**, **Rx**, **1:1**, **Intfc1**, or **Intfc2** using the ◄ ► arrow keys. Press **ENTER**.

INFO: → Rem

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

This display provides the status, as applicable, of the Remote Monitor & Control configuration.

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 follows:

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

If the modem is in Ethernet Remote Mode, the display will similar to what follows:

```
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
```

This display provides **Tx** information, similar to what is shown above. The following information is provided:

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

INFO: → Rx

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

This display provides **Rx** information, similar to what is shown above. The following information is provided:

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

INFO: → 1:1

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

```
Redundancy State:
Serial 1:1 Link: Stby 1:N
```

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

```
Redundancy State:
Serial 1:1 Link: Stby 1:1
```

This display indicates if the modem Redundancy configuration is *Enabled*,*1:1*,*1:N*, *Online*, or *Offline (Standby).* It echoes the Online LED indication on the front panel.

If the unit is not configured for redundancy, the following message is displayed:.

```
Redundancy State:
NONE
```

INFO: → Intfc1 / Intfc2

```
Intfc1:
E3T3STS1 Interface
```

```
Intfc1:
OC3 Interface
```

```
Intfc1:
HSSI Interface
```

This 'read-only' status window identifies the interface module that is installed in the designated slot (Intfc1 → Slot1, Intfc2 → Slot2). The preceding examples indicate that either a CDI-10 Dual G.703, CDI-50 OC3, or CDI-60 HSSI interface card have been installed as the Intfc1 (Slot 1) or Intfc2 (Slot 2) interface, depending on which submenu is selected.

Press **ENTER** or **CLEAR** to return to the previous menu (typical for all).

If **Info: → Intfc2** is selected and no interface module is installed in Slot 2, the following message displays:

```
Intfc1:
GBEI Interface
```

This 'read-only' status window indicates if the modem is **Resolved**, **Duplex**, **Speed**, or **Not Resolved**.

Status	Description
Resolved *-or-* **Not Resolved**	Displays whether Duplex and Speed has been *Resolved* or *Not Resolved.* **Note:** If GBEI Tx or Rx is *Off*, this is always blank.
Duplex	This is only valid if *Resolved*.
Speed	This is only valid if *Resolved*. 10Mbps 100Mbps 1000 Mbps

6.3.5 (SELECT:) Save/Load

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

Note: When the unit is in **Remote** mode, any attempt to use this menu (i.e., by using the ◄ ► arrow keys), displays the following message:

```
THIS UNIT IS CURRENTLY
IN REMOTE MODE!!
```

When in **Local** mode: Select **Save** or **Load** using the ▲▼ arrow keys. Press **ENTER**. The **Save** and **Load** submenus permit storing or loading of up to 10 different modem configurations in the non-volatile memory of the modem.

Save/Load Configuration: →Save

```
Save Config to Loc: 9
Empty                  (▲▼ E)
```

Using **Loc 9:** as the example, if **Save** is selected and no configuration has been saved, the second line reads '**Empty'**, as shown in the preceding example.
However, if the selected **Loc: 9** already contains data, what displays is similar to the next example:

```
Save Config to Loc: 9
01:02:43  05/08/05  (▲▼ E)
```

The time and date stamp of the previously stored configuration is displayed for identification purposes.

Select the location to where the current configuration is to be stored, using the ▲▼ arrow keys, then press **ENTER**. Locations **1** through **10** are available.

If the selected location does not contain a previously stored configuration, the following screen is displayed:

```
New Config has been
Saved to Loc 9        (E)
```

However, if the selected location *does* contain a previously stored configuration, the following screen is displayed:

```
Loc 0 Contains Data !
Overwrite? NO YES (◄ ►E)
```

Select **No** or **Yes** using the ◄ ► arrow keys, then press **ENTER**. Selecting **Yes** overwrites the existing configuration at the selected location.

Save/Load Configuration: →Load

```
Load Config from Loc: 9
11:02:43  05/08/05  (▲▼ E)
```

Using **Loc: 9** as the example, if **Load** is selected and there is a configuration stored at the selected location, what displays is similar to the preceding example. Note that the stored configuration is identified with a date and time stamp.

If the selected location contains **no** data, what displays is similar to the next example:

```
Load Config from Loc: 9
Empty                 (▲▼ E)
```

Select the location from where the current configuration is to be loaded using the ▲▼ arrow keys, then press **ENTER**. Locations **1** through **10** are available.

If the selected location contains ***valid*** data, what displays is similar to the following example:

```
New Config has been
Loaded from Loc #       (E)
```

Press **ENTER** or **CLEAR** to return back to the previous menu.

If the selected location contains ***invalid*** data, what displays is similar to the next example:

```
Warning! Loc 9 Contains
No Data!                (E)
```

Press **ENTER** or **CLEAR** to return back to the previous menu.

6.3.6 (SELECT:) Util

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

Select **RT-Clk, Ref, ID, Display, Firmware,** or **FAST** using the ◄ ► arrow keys. Press **ENTER**.

UTIL: → Rt-Clk

```
Edit Real-Time Clock:
10:23:51 23/05/06 (◄ ► ▲ ▼ E)
```

Edit the time and date settings of the real-time clock by selecting the digit to be changed, using the ◄ ► arrow keys. The value of the digit is then changed using the ▲▼ arrow keys. Press **ENTER**.

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

UTIL: → Ref

```
Internal 10 MHz Ref Freq
Fine Adjust:+1911
```

This menu provides a fine adjustment for the internal 10 MHz reference. The range is +2000 counts to -2000 counts.

UTIL: → ID

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

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

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

Once the string has been composed, press **ENTER**.

UTIL: → Display

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

Brightness levels of **25%, 50%**, **75%** or **100%** are selectable. Edit the display brightness using the ▲▼ arrow keys. Once the desired brightness has been set, press **ENTER**.

UTIL: → Firmware

THESE MENUS ARE FOR DIAGNOSTIC PURPOSES ONLY. DO NOT CHANGE AN IMAGE UNLESS INSTRUCTED TO DO SO BY COMTECH EF DATA CUSTOMER SERVICE TECHNICIANS.

The submenus available under **UTIL: Firmware** permit viewing information about the CDM-700 internal firmware. The modem stores two complete firmware images, and the user can select which image will be loaded the next time the unit reboots.

```
Firmware Images:
Info  Select        (◄ ► E)
```

Select either **Info** or **Select** using the ◄ ► arrow keys, then press **ENTER**.

If **Firmware Images: Info** is selected:

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

The user can view information on the Bootrom and the two images. Select **Bootrom**, **Image#1**, or **Image#2** using the ◄ ► arrow keys, then press **ENTER**.

If **Firmware Info: → Bootrom** is selected:

```
Bootrom:              XX/XX/XX
CDM7XX_Boot              X.X.X
```

The information on the installed Bootrom firmware is provided; on the top display line, the release date is provided in DAY/MONTH/YEAR format. The bottom line provides the Firmware release number and its installed version number.

Press **ENTER** or **CLEAR** to return back to the previous menu.

If **Firmware Info: → Image#1** or **→ Image#2** are selected:

```
Image#X: Bulk   App   Framer
FEC  Mod  Demod  Interfaces
```

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

Util: Firmware Images: Info	
BootRom	Bootrom: 09/09/04 CDM7XX_Boot 1.0.1
Image#1	Image#1: Bulk App Framer FEC Mod Demod Interfaces
Util:Firmware: Info: Image#1	
Bulk	Bulk: 01/08/07 FW10236H
App	App: 02/08/07 FW10238F
Framer	Framer: 06/09/06 FW10240C 1.1.5
FEC	Image#1 FEC: Turbo
→ TURBO	TURBO Image: 03/31/06 FW10248A 1.0.1
Mod(ulator)	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
Demod(ulator)	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
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

If **Firmware Images: Select** is selected:

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

This menu is used to select the active software image. The top line shows the active image. On the second line, select the desired image using the ◄ ► arrow keys, then press **ENTER**. To make the selected image active, it is necessary to power cycle the modem to reboot the new software.

UTIL: → FAST

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

Comtech EF Data's **FAST** (**F**ully **A**ccessible **S**ystem **T**opology) system permits the purchase and installation of options through special authorization codes, entered remotely or through the front panel. FAST allows immediate implementation of different options through the user interface keypad. All FAST options are available through the basic platform unit.

In addition, the Hardware Revision Number, and the Main Board Serial Number are presented. 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.

Select either **Cnfg** or **View** using the ◄ ► arrow keys, then press **ENTER**.

If **(UTIL:) FAST: → Cnfg** is selected:

```
FAST Configuration
Edit Code  Demo Mode
```

Select **Edit Code** or **Demo Mode** using the ◄ ► arrow keys, then press **ENTER**.

If **FAST Configuration: → Edit Code** is selected:

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

Enter the code ***carefully*** on the bottom line by using the ◄ ► arrow keys to move to each character position, then editing the character in that position by using the ▲▼ arrow keys. Once the 20-digit FAST Code has been correctly edited into place, press **ENTER**. The CDM-700 will respond with "**Configured Successfully**" if the new FAST option has been accepted.

If **FAST Configuration: → Demo Mode** is selected:

```
FAST Demo Mode: Off On
 604669 seconds remain
```

The **Demo Mode** enables all FAST options for seven days (604800 seconds).

Select **Off** or **On** using the ◄ ► arrow keys, then press **ENTER**. The display indicates the time remaining on the demo counter. The demo time may be paused by either turning demo mode off, or unplugging the unit. However, whenever the unit is turned back on, the demo counter will resume.

When the Demo period expires, the following menu is displayed:

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

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.

If **(UTIL:) FAST: → View** is selected:

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

Scroll through the available option numbers by using the ▲▼ arrow keys. As the cursor highlights each option, the description of each option and its installation status (**Installed** or **Not Installed**) appears on the lower line of the display.

The available FAST 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

DATA RATE RANGE NOTES:

1. The composite data rate range depends on the FAST option ordered with the CDM-700. The options are arranged in ascending tiers by symbol rate and modulation type along with the corresponding data rate range.

2. The Data Rate Range Table in the Chapter 10. Summary of Specifications summarizes the composite data range by tiers. It also shows how the composite data rate is constructed from the individual data ports on the data interface modules.

3. The data rate of each individual data port depends on the particular CDI-xx data interface installed in the CDM-700. Additional information about the data rate range for each individual port is provided in the menus below and in the chapter for each data interface module.

Notes:

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. A Turbo Product Coding (TPC) codec card with encoder and decoder is currently 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, an FEC technique developed within the last few years, 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 an R-S Codec with a primary FEC codec, TPC is an entirely standalone method. It does not require the complex interleaving/de-interleaving of the R-S approach – 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.

With the CDM-700, Comtech EF Data 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

The composite data rate range depends on the FAST option ordered with the CDM-700. The options are arranged in ascending tiers by symbol rate and modulation type along with the corresponding data rate range.

The Data Rate Range Table in the **Chapter 10. Summary of Specifications** summarizes the composite data range by tiers. It also shows how the composite data rate is constructed from the individual data ports on the data interface modules.

The data rate of each individual data port depends on the particular CDI-xx data interface installed in the CDM-700. Additional information about the data rate range for each individual port can be found in the chapters for each data interface module.

NOTE

For additional information on composite data rate, refer to the next 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; 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 CDM-700 70/140 MHz; 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.

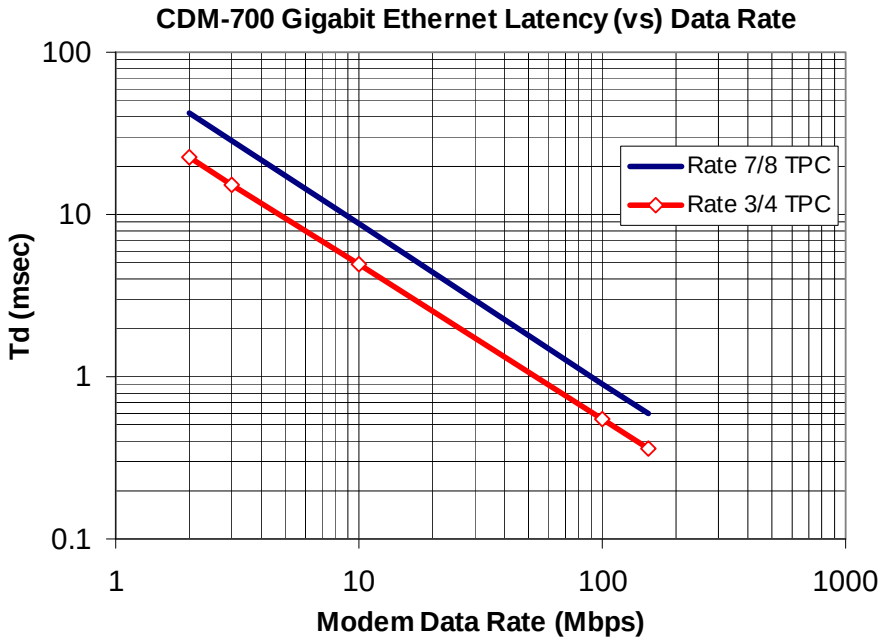


Figure 7-1. CDM-700 Gigabit Ethernet Latency with Modem in IF Loopback

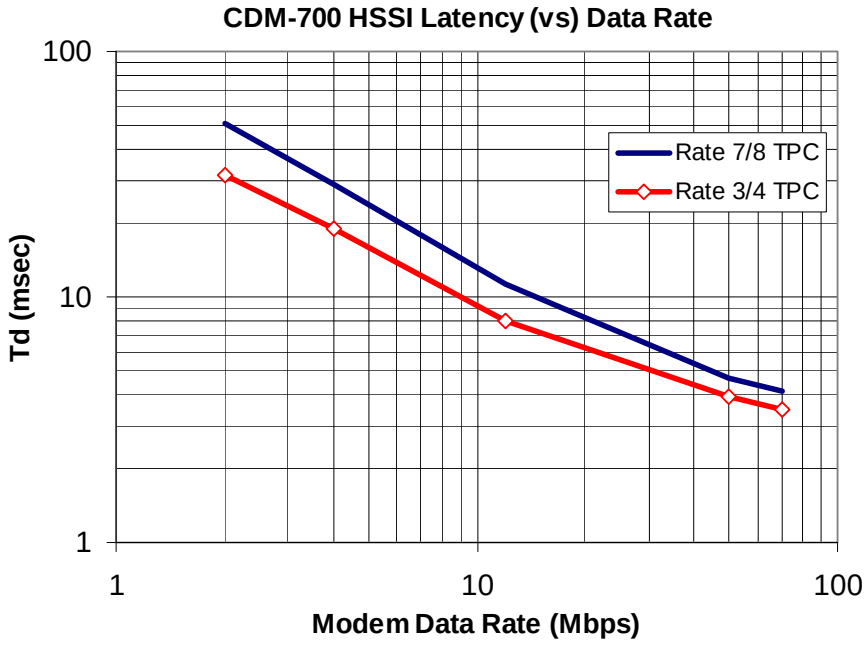


Figure 7-2. CDM-700 HSSI Latency with Modem in IF Loopback

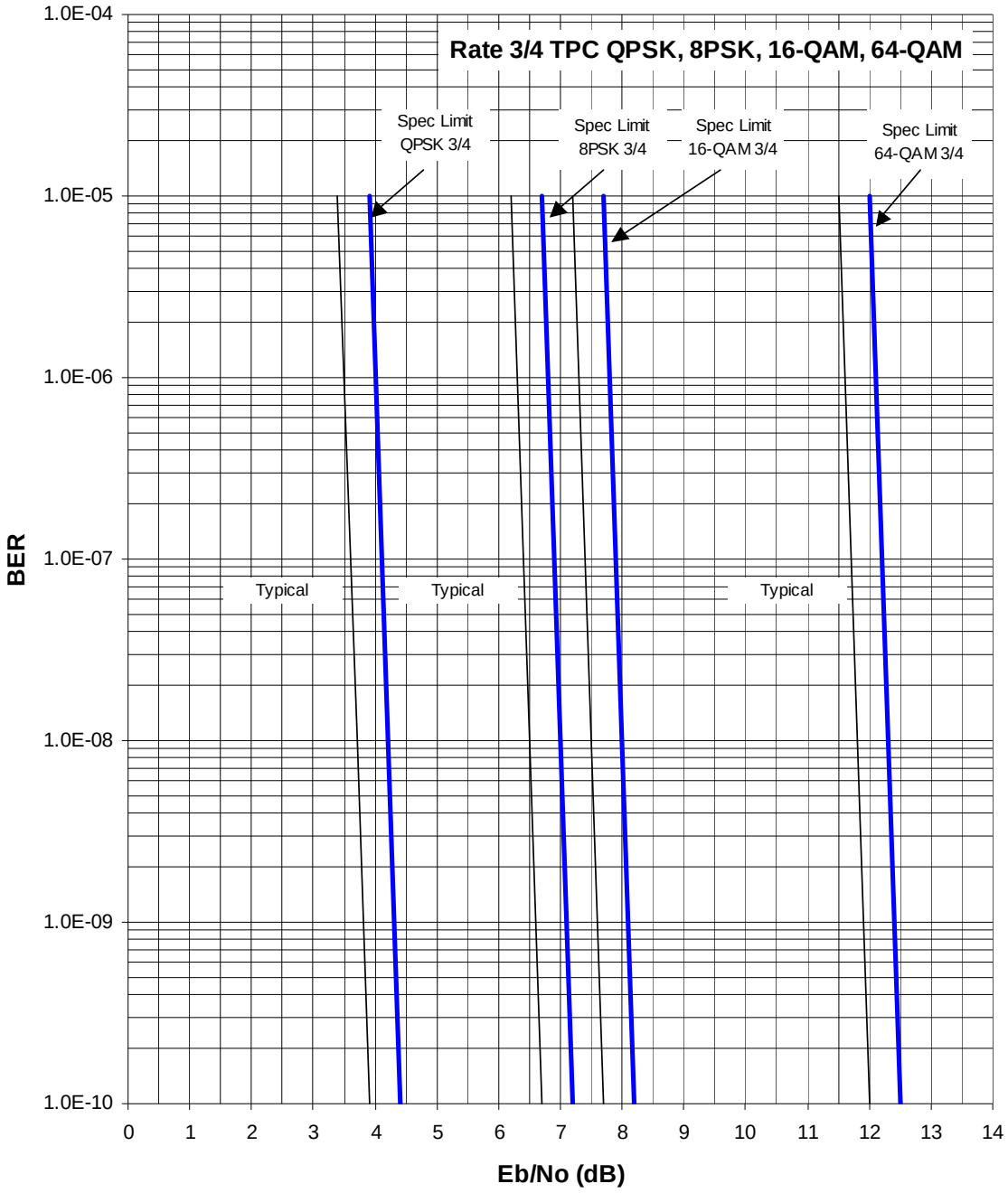


Figure 7-3. Rate 3/4 TPC QPSK, 8-PSK, 16-QAM, 64-QAM

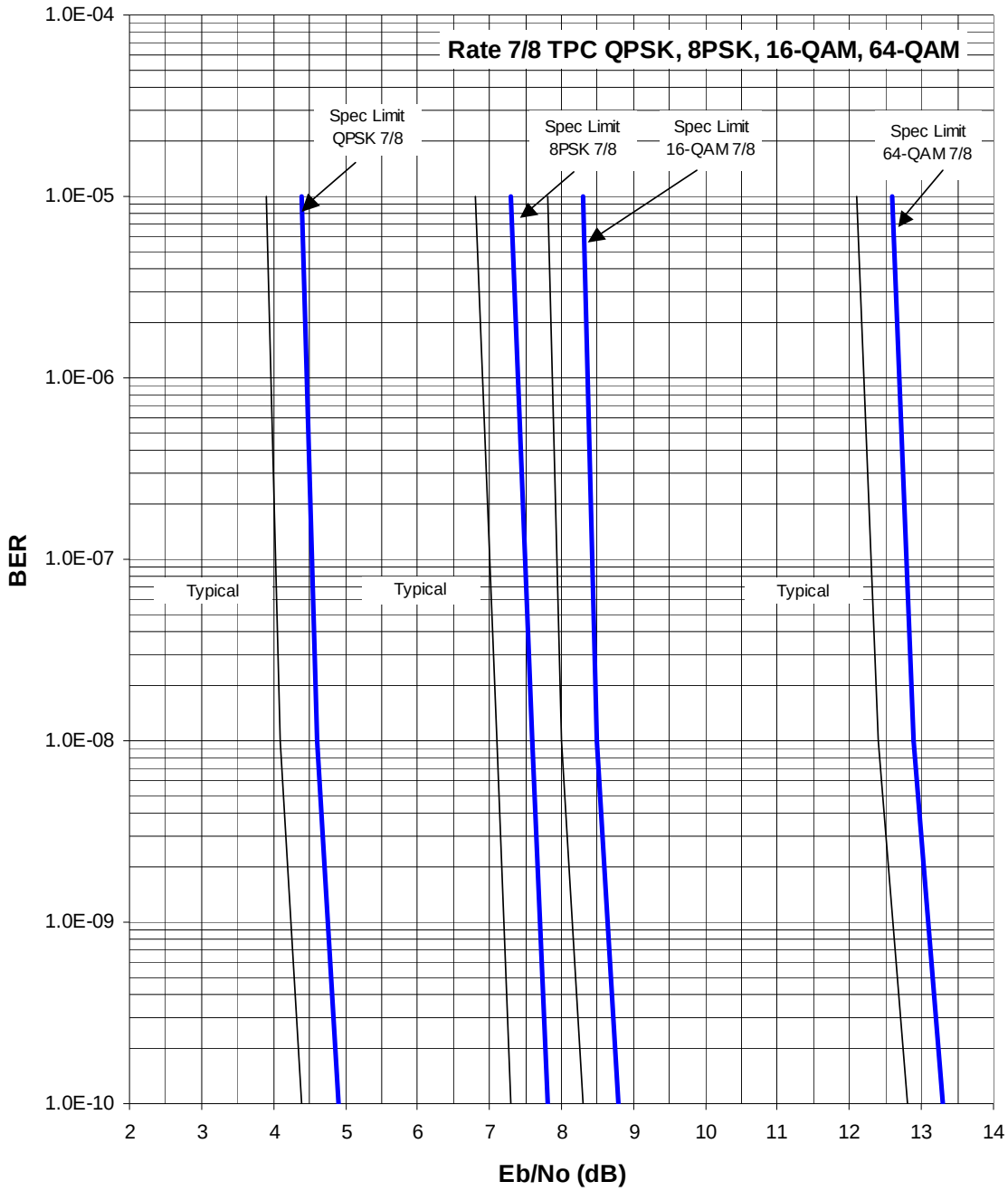


Figure 7-4. Rate 7/8 TPC QPSK, 8-PSK, 16-QAM, 64-QAM

Chapter 8. CLOCK MODES

8.1 Introduction

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).

Figure 8-1 presents a diagram of a typical interface; a general description of the clocking and clock modes is provided below. 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; it is located on the main part of the modem – not on a data interface module. 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 modules. It 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 module. 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	**Rx-Sat** is the clock derived from the signal received from the satellite. 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.

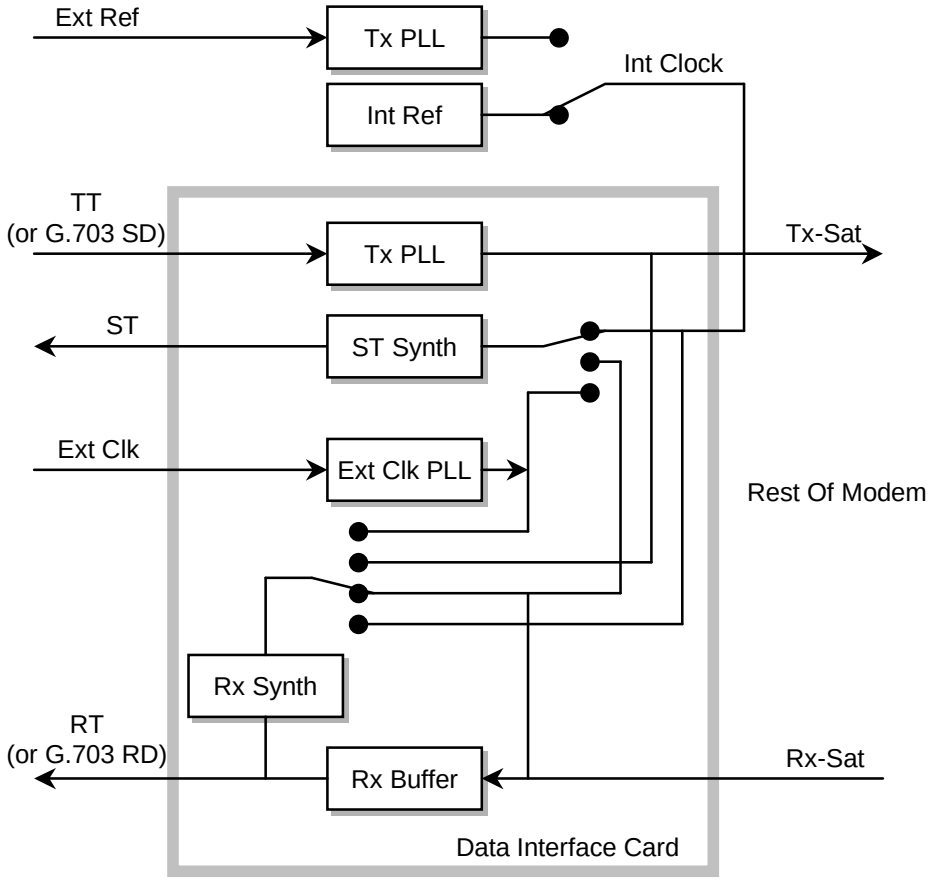


Figure 8-1. Typical Data Interface (Features Vary By Interface)

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

8.2 CDI-10 Dual G.703 Interface

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

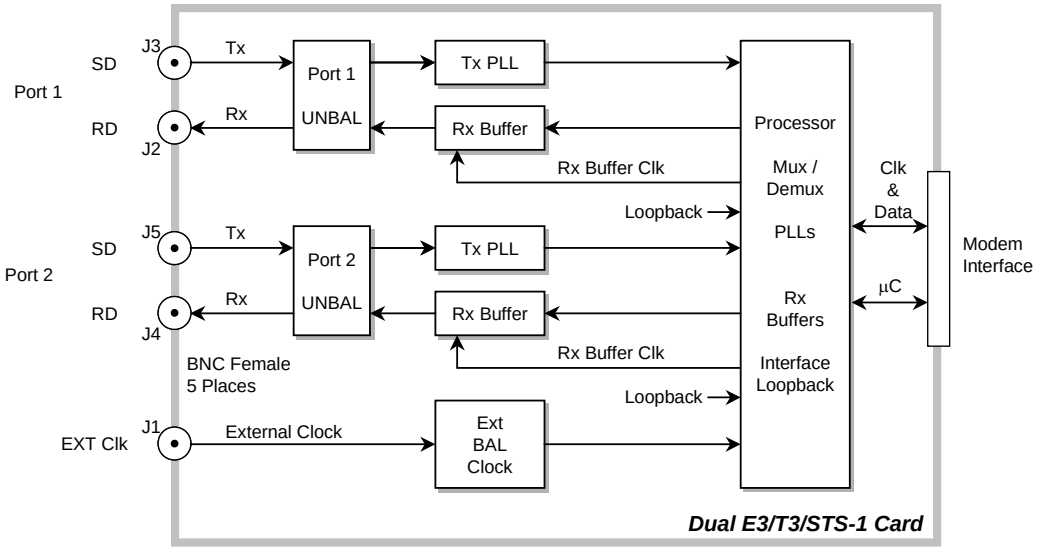


Figure 8-2. CDI-10 G.703 Dual G.703 Interface

8.2.1 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.

8.2.2 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 than Port 2.
Ext-Clk	Derives a clock from a signal input to the **Ext-Clk** connector on the E3/T3/STS-1 Interface Module, not J7 on the modem.

8.3 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.

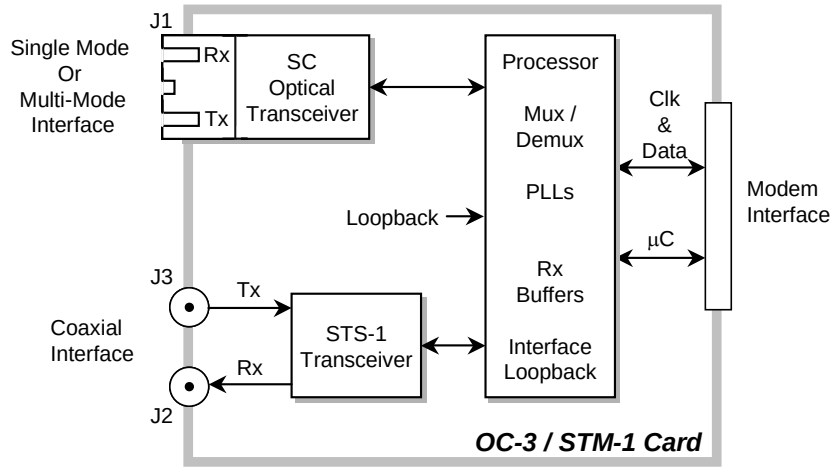


Figure 8-3. CDI-50 OC-3 / STM-1 Interface

8.3.1 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.

8.3.2 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, 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.

8.4 CDI-60 HSSI Interface

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

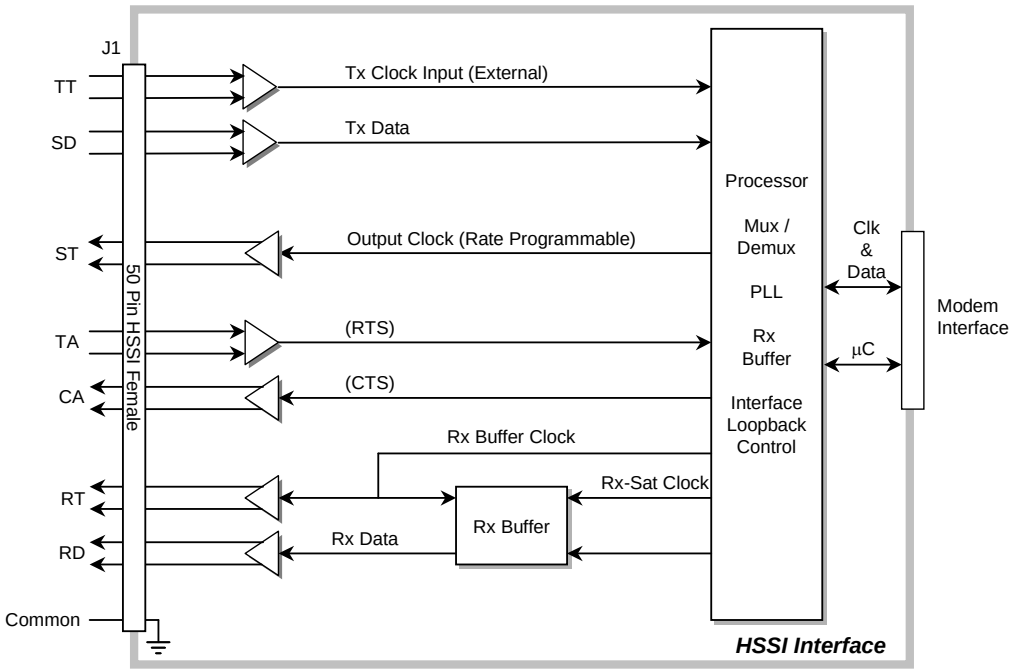


Figure 8-4. CDI-60 HSSI Data Interface

8.4.1 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 DCE (modem) to both RT and ST at the DTE.

8.4.2 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.

8.5 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 the established 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

9.1 Introduction

The CDM-700 eliminates the need for updating firmware by physically replacing EPROMs. Instead, the CDM-700 uses 'Flash memory' technology internally. This makes software upgrading very simple, and updates can now be sent via the Internet (**Figure 9-1**), via E-mail, or on CD.

This chapter outlines the complete upgrading process as follows:

- New firmware can be downloaded via the Internet to an external PC.
- The upgrade can be performed without opening the CDM-700 by simply connecting the unit to the serial port of a computer.
- The firmware update is transferred, via File Transfer Protocol (FTP), to the CDM-700.

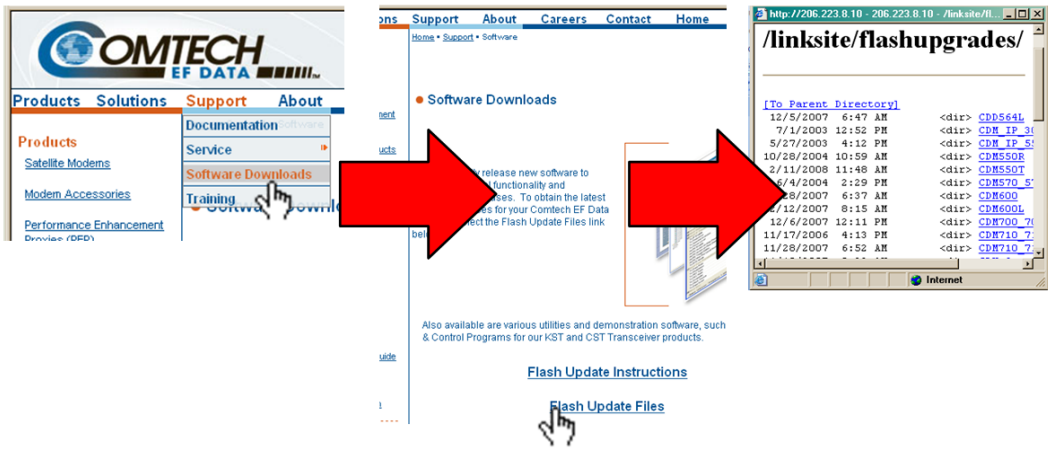


Figure 9-1. Flash Update via Internet

***The procedure for updating the CDI-70 (via J4 Ethernet) Gigabit Ethernet Interface firmware is outlined in* Appendix E. 10/100/1000 BASE-T INTERFACE (GbEI) (CDI-70).**

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.

   Alternative Method – 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/

   -or-

   a) **Go online to: www.comtechefdata.com**
   b) **Click on: Support**
   c) **Click on: Software Downloads**
   d) **Click on: Flash Update Files**
   e) **Click on:** <dir> **CDM700_700L**
   f) **Select: F10236K V123 111607***

   (***Note:** Choices shown are representative of upgrades available via the Web as of 4/2008. These selections are updated periodically. Contact Comtech EF Data Customer Support for questions regarding the availability of support files for your specific product.)

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 is:

FW10236*_*_* (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. Enter your admin user name and password to complete login.

      Factory Default user is: COMTECH
      Password is: COMTECH

   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 start reporting “PROGRAMMING FLASH SECTOR#xx – PLEASE WAIT”.

   Stopping the FTP before the “PROGRAMMING FLASH SECTOR#xx- PLEASE WAIT” screen has finished could lead to an incomplete download and a repeat of Step 8a.

   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 [←] (left arrow) or [→] (right arrow) to change to the other image), then cycle power to reboot the modem.

10. **Verify** the new software versions are booting by observing the following messages on the modem display (version number will vary):

```
Comtech CDM-700 Modem
Firmware Version: x.x.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 (see Chapter 7)
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

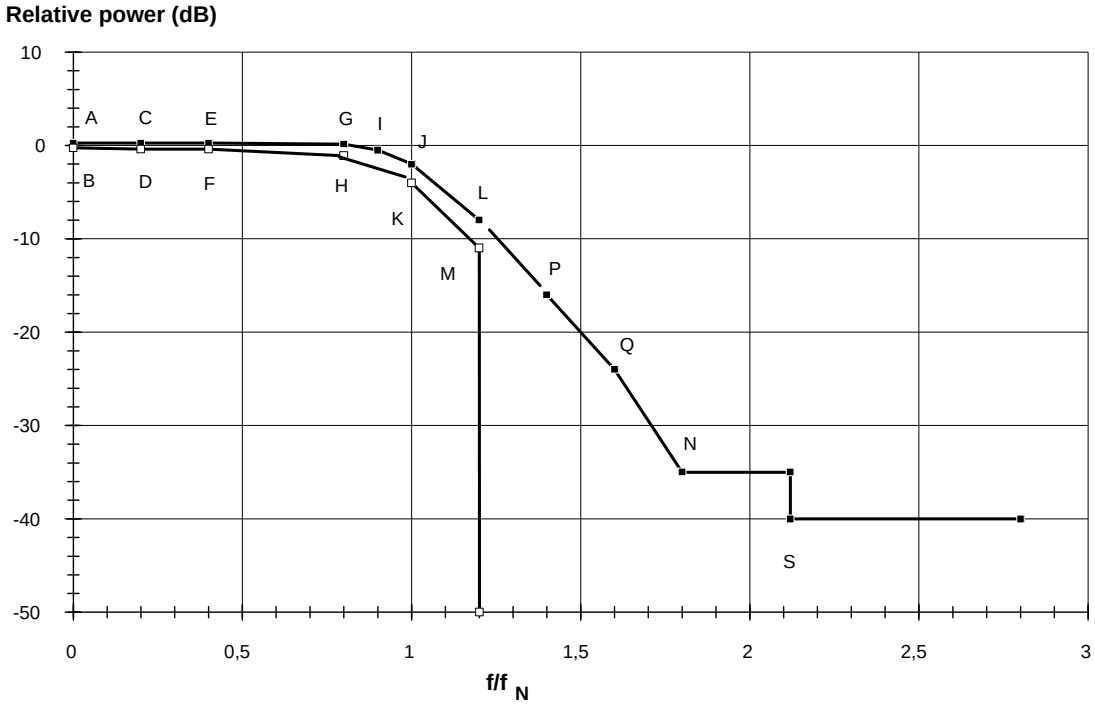


Figure 10-1. Spectral Mask

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)								
Tier		Min Symbol Rate (Msps)	Max Symbol Rate (Msps)	Modulation	Code Rate	FEC	Composite Data Rate (Mbps) (Rounded)	
							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
	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 or removing data connections.
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 or removing data connections.
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

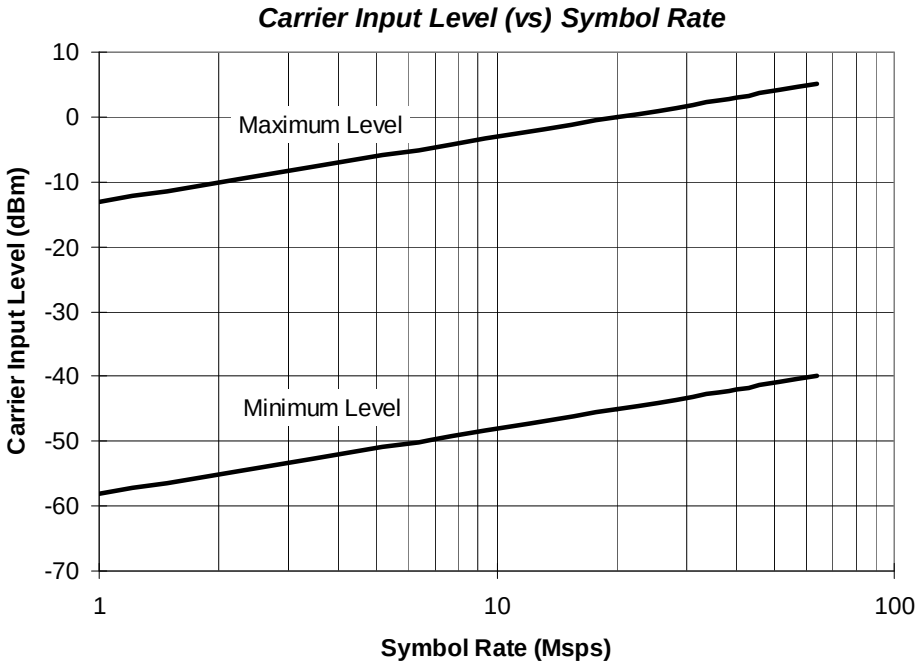


Figure 10-2. 70/140 MHz and L-Band Carrier Input Level versus Symbol Rate

10.7 BER Performance

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

Requirement				Information Only			
		Eb/No 3/4	Eb/No 7/8	3/4 Spectral Efficiency	7/8 Spectral Efficiency	Es/No = C/N 3/4	Es/No = C/N 7/8
QPSK	10-5 10-8 10-10	3.9 (3.4) 4.2 (3.7) 4.4 (3.9)	4.4 (3.9) 4.6 (4.1) 4.9 (4.4)	1.463415	1.696713	5.6 (5.1) 5.9 (5.4) 6,1 (5.6)	6.1 (5.6) 6.3 (5.8) 6.6 (6.1)
8-PSK	10-5 10-8 10-10	6.7 (6.2) 7.0 (6.5) 7.2 (6.7)	7.3 (6.8) 7.6 (7.1) 7.8 (7.3)	2.195122	2.545069	10.1 (9.6) 10.4 (9.9) 10.6 (10.1)	10.8 (10.2) 11.0 (10.5) 11.2 (10.7)
16-QAM	10-5 10-8 10-10	7.7 (7.2) 8.0 (7.5) 8.2 (7.7)	8.3 (7.8) 8.5 (8.0) 8.8 (8.3)	2.926829	3.393425	12.4 (11.9) 12.7 (12.2) 12.9 (12.4)	13.0 (12.5) 13.2 (12.7) 13.5 (13.0)
64-QAM	10-5 10-8 10-10	12.0 (11.5) 12.3 (11.8) 12.5 (12.0)	12.6 (12.1) 12.9 (12.4) 13.3 (12.8)	4.390244	5.090138	18.4 (17.1) 18.7 (18.2) 18.9 (18.6)	19.7 (17.7) 20.0 (18.0) 20.4 (18.4)

Notes:

1. 16-QAM 3/4, add 0.2 dB above 51 Mbps.
2. 16-QAM 3/4, add 0.4 dB above 103 Mbps.
3. 64-QAM 3/4 , operates to 32 Msps. 64-QAM 7/8, operates to 30.6 Msps.

Additional Information:
For comparison with DVB-S2 it is convenient to use Spectral Efficiency (bps/Hz) and Es/No (Es/No = C/N in the symbol rate bandwidth). Es/No is given by:

Es/No = C/N = Eb/No + 10 Log (Spectral Efficiency).

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 *x* 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, 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**	0 to 50°C (32 to 122°F)
	Storage	-25 to 85°C (-13 to 185°F)
Humidity		95% maximum, non-condensing
Power Supply Input	**AC**	100-240 VAC (50 to 60 Hz)
	DC	48 VDC
Power Consumption	**120 VAC @ 60 Hz**	80W, 81.5 VA maximum
	220 VAC @ 50 Hz	67W, 87 VA maximum
	48 VDC	1.6A, 77W maximum
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

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 in the following sections.

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 – ***for example***, with **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 – ***for example,*** **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 and Queries

Where Column 'C' = Command; Column 'Q' = Query: Columns marked (**X**) indicate Command only, Query only, or Command/Query for Instruction Code.

Instr Code	C	Q	Page
BER		X	11-22
BFS		X	11-22
BGC	X	X	11-26
BTH		X	11-22
CAE	X		11-21
CID	X	X	11-19
CLD	X		11-20
CST	X		11-19
DAY	X	X	11-20
DGC	X	X	11-26
EBA	X	X	11-15
EBN		X	11-21
EDI	X	X	11-15
EFI	X	X	11-15
EID		X	11-27
ERF	X	X	11-16
ETS	X	X	11-24
FER		X	11-23
FLT		X	11-29, -30
FRW	X	X	11-23
GAM	X	X	11-19
GGC	X	X	11-25
GIP	X	X	11-17
GMC		X	11-24
GNG	X	X	11-31
GSW		X	11-25
HAM	X	X	11-18
HGC	X	X	11-25
IAM	X	X	11-18
IEP	X		11-21
IFA	X	X	11-25
IFB	X	X	11-25
IMG	X	X	11-19

Inst Code	C	Q	Page
IMP	X	X	11-9
IPA	X	X	11-17
IRR	X	X	11-12
ITF		X	11-7
ITR	X	X	11-7
LRS	X	X	11-23
MGC	X	X	11-24
MRF	X	X	11-17
MSK	X	X	11-17
NUE		X	11-20
OAM	X	X	11-19
OGC	X	X	11-25
RAR	X	X	11-13
RBS	X	X	11-16
RBT	X		11-23
RCB	X		11-20
RCI	X	X	11-14
RCK	X	X	11-15
RCR	X	X	11-13
RDI	X	X	11-14
RDR		X	11-13
RDS	X	X	11-14
RED		X	11-30
RFM	X	X	11-16
RFO		X	11-22
RFQ	X	X	11-12
RFT		X	11-13
RIE	X	X	11-15
RMD	X	X	11-13
RNE		X	11-21
RSI	X	X	11-14
RSL		X	11-22
RSW	X	X	11-14

Instr Code	C	Q	Page
SCX	X	X	11-28
SLM	X	X	11-28
SNO		X	11-23
SVC	X		11-28
SVD	X	X	11-28
SVM	X	X	11-27
SVT		X	11-28
SWR		X	11-23
TAR	X	X	11-9
TCI	X	X	11-11
TCK	X	X	11-10
TCR	X	X	11-8
TDI	X	X	11-10
TDR		X	11-8
TFQ	X	X	11-8
TFT		X	11-8
TIE	X	X	11-10
TIM	X	X	11-20
TLC	X	X	11-11
TMD	X	X	11-8
TMP		X	11-23
TPL	X	X	11-9
TSC	X	X	11-9
TSI	X	X	11-9
TST	X	X	11-17
TXO	X	X	11-11

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
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)**

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 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)
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)

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 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)
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)

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 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 Example: TIE = 111 (Enables transmit on interface slot 1, channel 1)	TIE= TIE? TIE* TIE#	TIE?sc	TIE=scx (see description of arguments)
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)

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 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)
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)

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 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.** ***Note: Interface types G.703 and GbEI cannot vary in datarate.** **Example: IRR=11002.047999 (which is 2.047999 Mbps) on slot 1 channel 1.**	**IRR=** **IRR?** **IRR*** **IRR#**	**IRR?sc**	**IRR= xxx.xxxxxx (see description of arguments)**
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), 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 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)

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)
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)

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 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 Example: 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)
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)

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 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)
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

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
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
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
Demodulator Mask All Faults	MRF=	1 byte	Command or Query 0=Unmask All Demodulator Faults(Normal Fault Reporting). 1=Mask All Demodulator Faults(All Faults Ignored). Example.:MRF =1;	MRF= MRF? MRF#	MRF?	MRF=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
HSSI Interface Alarm Mask	HAM=	7 bytes	Command or Query. Alarm mask conditions, in form spa, where: s=slot number p=port number 21 a=x reserved b=x reserved c=x reserved d=x reserved e=Ext Clock Alarm (0 = masked as Alarm,1 = masked as Fault,2 =Masked) (Note: Command valid Only with Gigabit Interface) Example: HAM= 21xxxx0 (alarm masks for interface slot 2, port 1)	HAM= HAM? HAM* HAM#	HAM?sp	HAM=spxxxxe

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 Interface Alarm Mask	OAM=	7 bytes	Command or Query. Alarm mask conditions, in form spa, where: s=slot number p=port number 21 a=Tx Cable (0 = masked as Alarm,1 = masked as Fault,2 =Masked) b=x reserved c=x reserved d=Bufferslip Alarm (0 = masked as Alarm,1 = masked as Fault, 2 =Masked e= x reserved Example: OAM= 110xx0x(alarm masks for interface slot 1, port 1)	OAM= OAM? OAM* OAM#	OAM?sp	OAM=spaxxdx
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	GAM=spa
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=xxxxxxxxxxxxxxxx xxxxxxxx
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. Note: This command takes no arguments Example: CAE=	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

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
Frame Error Rate	N/A	9bytes	Query only. s=Defines which interface slot (1 or 2) Units returns the value of the calculated estimated Frame Error Rate(LINK ERRORS/RX PACKETS RECEIVED) in the form a.b x 10^{-c} . First three bytes are the value. Last two bytes are the exponent. Returns 0.0E+00 0r 1.0E+00 if the Gigabit Traffic is RX PACKETS Received 0.. Example: FER=17.8E-03 (which is Slot One FER= 7.8 x 10^{-3}) Valid for Gigbait Interface Only. Value is reset to 0.00E+00 if GBEI Statistics Cleared.	N/A	*F*ER?s	FER=sa.bExcc
Rx BER Alarm Threshold	BTH	1bytes	Command or Query. Sets and Returns BerThreshold a=Ber Threshold 0= NONE 3= 1E10-3 4 =1E10-4 5= 1E10-5 6= 1E10-6 7= 1E10-7 8 =1E10-8 Example BTH=3(Sets Ber Alarm Threshold to 1E10-3)	BTH= BTH? BTH#	BTH?	BTH =1E10-3 Returns string of BER Alarm Threshold
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
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

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
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…
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

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
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.hijkkkk.kkkklll.lllllmnopqrrrss.stuvwxxx
Gigabit Interface Management MAC Address	GMC?	N/A	**Query Only.** **s=Defines which interface slot (1 or 2)** **Example get MAC address for Gigabit in Slot One** **GSW?1** **GSW=**1 s0006B0004717	GMC? GMC* GMC#	GMC?s	Gigabit Interface Management MAC Address
Gigabit Interface Software Revision	GSW?	N/A	**Query Only.** **s=Defines which interface slot (1 or 2)** **Example get Software Revision for Gigabit in Slot One** **GSW?1** GSW=1 FW/12738-,1.1.8,02/16/07	GSW? GSW* GSW#	GSW?s	Gigabit Interface Software Revision
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.ffffffghijk kk.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	SLM=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 = Reserved 0M = Rserved 0N = Reserved 0O = Reserved 0P = Reserved 0Q = Reserved 0R = Reserved 0S = Reserved 0T = Reserved 0U = Reserved. 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 22	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
Faults and Status (cont)			**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 2 Port 1 0Y = AIS Slot 2 Port 2 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			
Redundancy	RED=	1	Query or Command a=Redundancy Status 0=Redundancy not enabled. 1=Redundancy Enabled(Command Only) 1=Online 1:1 2=Offline 1:1 3=Online 1:N 4=OffLine 1:N Example RED=1 Enables Redundancy. RED=0 Disables Redunddancy	RED= RED? RED# RED*	RED?	RED=a
Gigabit Interface Negotiation	GNG=	5Bytes	Command or Query a=Interface Slot (1 or 2) b=0 (Auto to NO) = 1 (Auto to YES) c=0 (Slave) = 1 (Master) d=4 Speed (100Mbps) = 8 Speed(1000 Mbps) e=0 Duplex (Half) = 1Duplex(Full)	GNG=abcde	GNG?a	GNG=abcde

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 Negotiation	N/A	NEG	Query Only a=Interface Slot (1 or 2) b=4 (Speed=100Mbps), or b=8 (Speed=1000Mbps) c=0 (Duplex=Half), or c=1 (Duplex=Full) Note: If not returned, Negotiation is not resolved. Examples: NEG=140 (Slot 1 Negotiation is 100 Half Duplex) NEG=10 (Slot 1 Negotiation is NOT RESOLVED)	N/A	NEG?a	NEG=abc

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.

The following MIB files are 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**
Fw10236-4-.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** • **HSSI INTERFACE** • **GIGABIT INTERFACE** **CDM-700 MONITOR OBJECTS** **CDM-700 REDUNDANCY OBJECTS**

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 one 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, 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 unit system. Entries provide 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 the modem'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 and 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, 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, refer to the actual MIB file.

12.8 Interface Group

The CDM-700 Interface Group holds all groups associated with the various Interface boards. For detailed OID information, refer to the actual MIB file.

12.8.1 E3T3STS1 Group

The CDM-700 E3T3STST1 Group holds all unit parameters associated with the E3/T3/STS1 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 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.

12.8.4 Gigabit Ethernet Group

The CDM-700 Gigabit Ethernet Group holds all unit parameters associated with the Gigabit Ethernet Interface. For detailed information, refer to the actual MIB file.

12.9 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.

12.10 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.

12.11 SNMP Traps

The CDM-700 has the ability to send out SNMP traps when certain events occur in the modem. **For example**: When the CDM-700 boots, it sends out a coldstart trap and three linkup traps – one for each interface that is brought up.

The CDM-700 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 for both when a fault occurs and when the fault condition changes.

The CDM-700 supports both SNMPv1 traps and SNMPv2 notifications. Which style of traps the CDM-700 sends can be configured by the user using the cdmipSnmpTrapVersion OID.

The following are the MIB2 v1traps/v2 notifications that the CDM-700 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 Alarms and Faults SNMPv1 traps:
cdm700UnitAlarm 6247321
cdm700RxTrafficAlarm 6247322
cdm700TxTrafficAlarm 6247323
cdm700 GBEI Cable 6247324
cdm700Redundancy 6247325
cdm700 GBEITraffic 6247326

CDM-700 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
cdm700GigabitTraffic 1.3.6.1.4.1.6247.32.2.1.2.2.0
cdm700 RedundancySwitchOver 1.3.6.1.4.1.6247.32.2.6.1

12.12 MIB-II

The CDM-700 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:

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 RFC2233

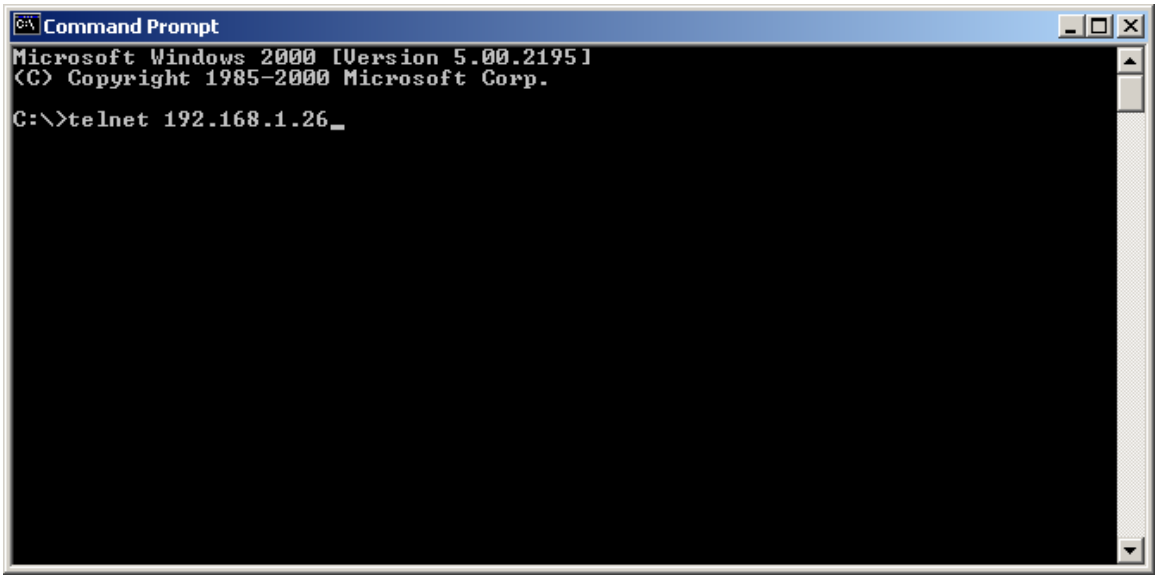
Chapter 13. TELNET INTERFACE

13.1 Telnet Interface

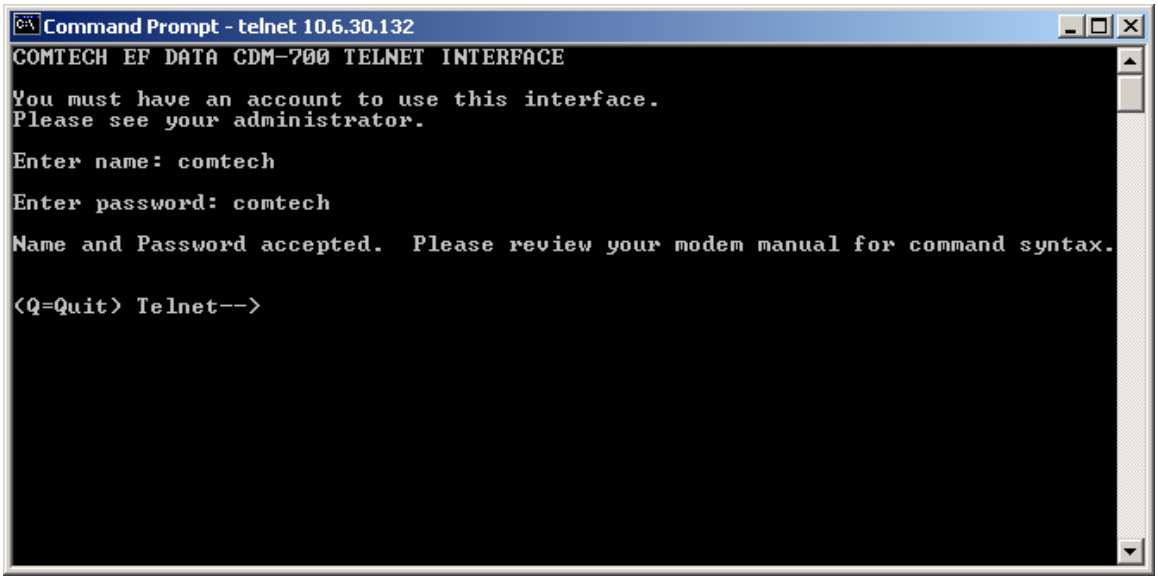
The modem provides a Telnet interface for two primary functions:

- Equipment M&C via the standard equipment Remote Control protocol.
- Equipment M&C via Comtech Monitor and Control System (CMCS) application.

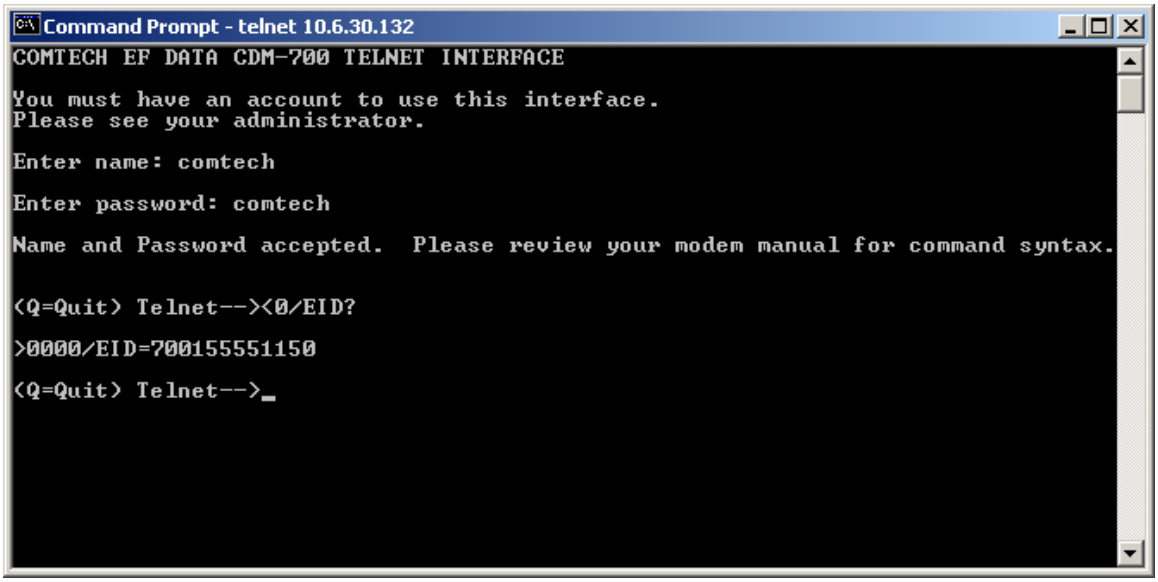
The login process is shown in the following screen captures:



The Telnet interface requires user login at the **Administrator** level and **Read/Write** level.



Once logged into the Telnet interface as the Administrator, the User can access the standard remote control interface, defined in Chapter 11 as shown in the following example:



13.2 Caution Using Windows Telnet Client

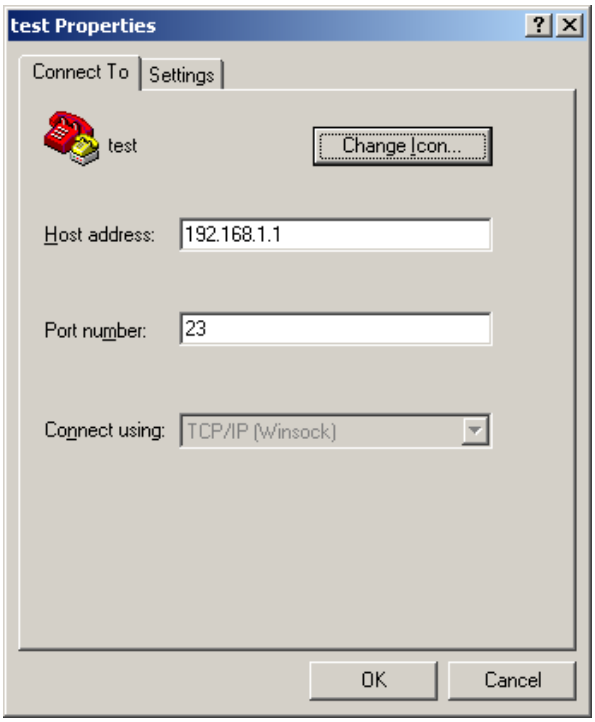
There is a disadvantage when using Windows DOS as Telnet Client. Since Windows DOS cannot translate a '\r' to a '\r\n' for the messages coming from Telnet Server, the multi-line command response (for example, FRW? response) will be displayed as one line, with the latter lines overwriting the previous lines.

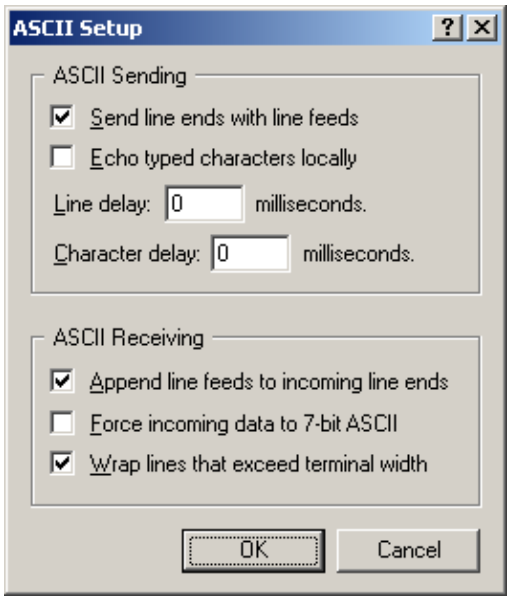
In order to view the full response messages, CEFD recommends using HyperTerminal configured as Telnet Client. To do so, configure the HyperTerminal as following:

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:





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 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}

Chapter 14. ETHERNET NETWORK CONFIGURATIONS

14.1 Introduction

The intent of this chapter is to outline the differing methods for Ethernet-based data handling with the CDM-700.

For operations requiring Ethernet-based terrestrial data handling, it is important to emphasize the need for Users to avoid Ethernet looping connection problems – with or without use of the CDM-700 in redundancy. These issues are specifically addressed with a CDM-700 redundancy configuration that uses Comtech EF Data's CRS-300 1:10 Redundancy Switch.

14.2 Ethernet Routers and Switches

Routers and switches allow connection of one or more computers or networked devices to other computers or network devices. Each has two or more connectors, called ports, in which cables connect to other network devices.

An **Ethernet switch** examines the traffic that comes across it, and learns where particular MAC addresses are. An Ethernet switch maintains what is known as a **C**ontent **A**ddressable **M**emory (**CAM**) table, listing the MAC addresses for each switch port. The Ethernet switch uses the CAM table to determine where to forward Ethernet frames. By default, Ethernet switches will update the CAM table automatically; for example, if an Ethernet switch sees traffic from 'Machine A' coming in on 'Port 2', it now knows that 'Machine A' is connected to that port, and that traffic destined for 'Machine A' needs to only be sent to that port and not any of the others.

An **Ethernet router** determines where to forward IP traffic based upon the destination IP address and the Route table entries in the router. An Ethernet router can be programmed to understand and route the data it is directed to handle; for example, broadband routers include the ability to "hide" computers behind a type of firewall, which involves slightly modifying the packets of network traffic as they traverse the device. All routers include some kind of user interface for configuring how the router will treat traffic: larger routers include the equivalent of a full-blown programming language to describe how they should operate, as well as the ability to communicate with other routers to describe or determine the best way to direct network traffic from 'Point A' to 'Point B'.

14.3 Ethernet Configuration Examples

This section explains the problems with **Ethernet Networking Loops**, and how to properly design applications architecture for handling **Standard traffic** and **Split-path traffic.** *Standard traffic* is defined as Rx and Tx Ethernet traffic using the same port on the same router or switch, whereas *split-path traffic* is Rx and Tx Ethernet traffic using different ports of the same router or switch.

The following sections in this chapter provide examples of applications architecture designed to handle near-to-far end Ethernet network configurations:

- **Chapter 14.3.3** Hub-to-Hub with Standard Traffic using Switches
- **Chapter 14.3.4** Hub-to-Hub with Standard Traffic using Routers
- **Chapter 14.3.5** Hub-to-Remotes with Standard Traffic using Routers or Switches
- **Chapter 14.3.6** Hub-to-Remotes, Split-path Traffic using Routers (Point-to-Multipoint)
- **Chapter 14.3.7** Hub-to-Remotes, Split-path Traffic using Switches (Point-to-Multipoint)

14.3.1 Ethernet Network Overview

When placing modems in a network, there are a number of issues that must be addressed – first and foremost on the list of concerns is whether implementation of the switches in the network will cause a **Networking Loop**. This is problematic because a Networking Loop will cause a **Broadcast Storm**, which shuts down the network and causes harm to devices in that network.

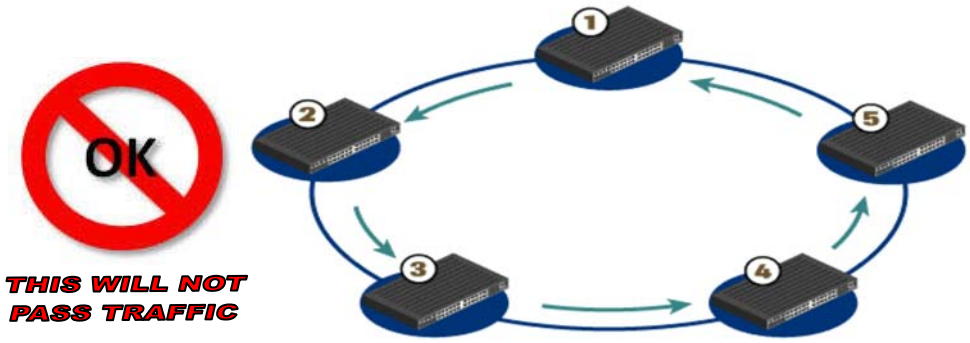


Figure 14-1. Networking Loop with Switches

Figure 14-1 illustrates a Networking Loop with switches. The problem with this configuration is that **'Switch 1'** will send out an ARP request looking for a particular MAC, then each subsequent switch passes along that request until **'Switch 1'** receives it again. At this point, two things could happen:

1. The switch could continue to forward all requests out all ports, creating more and more traffic on the network until there is no bandwidth available and the switch either reboots or locks up.
2. The switch could sense that the ARP request came back to the switch on a different port. The switch could then stop forwarding traffic out the proper port.

Other factors will affect the network: e.g., if the switch is running Spanning Tree Protocol, VLANs, etc.

14.3.2 Ethernet Redundancy with CRS-300

After the customer has determined the best configuration for near-to-far end Ethernet networks, the CRS-300 1:10 Redundancy Switch may now be added to one or both ends of the link(s). Ethernet redundancy using the CRS-300 can be accomplished using a **wired-thru** or **wired-around** configuration.

14.3.2.1 Wired-thru Connection

This redundancy approach is the recommended ***and*** preferred ***connection method.***

The wired-thru Ethernet connection on the CRS-300 is the easiest and simplest choice for Ethernet redundancy. This connection method – the same as used on the standard serial data interface – provides a single connection for the User Data Interface and provides simple form-C relays that route the Ethernet connection from the User connection to either the Traffic or Redundant Modem.

14.3.2.2 Wired-around Connection

This redundancy approach is not ***recommended.***

The wired-around Ethernet connection is used with the CDM-700 modem and CRS-300 1:10 Redundancy Switch, where both modem data interface slots are needed; e.g., where one slot is HSSI or G.703 and the other slot is GigE. With the Ethernet slot configured for the wired-around method, this gives full redundancy capability to both data slots. However, care must be taken to ensure there are no Ethernet network loops or connection problems – *this method should* **only** *be used if both modem data slots are used.* In general, the wired-around approach can be used in a hub-to-remotes configuration with standard traffic.

14.3.3 Hub-to-Hub with Standard Traffic using Switches

When connecting two or more "hub-sites" where there are multi-paths between each site, care must be taken to ensure no network loops occur. **Figure 14-2** depicts two hub-sites connected with two or more modems where all the traffic being transmitted and received is on the same LAN/VLAN.

Figure 14-3 shows a simplified version of the Networking Loop. Since there is no router in the network and all the traffic is destined to the same network, routing loops have been created.

As illustrated, two switches have been connected, each with two or more separate connections. This is not how the Ethernet switches were designed to be used, and this configuration will cause a network outage.

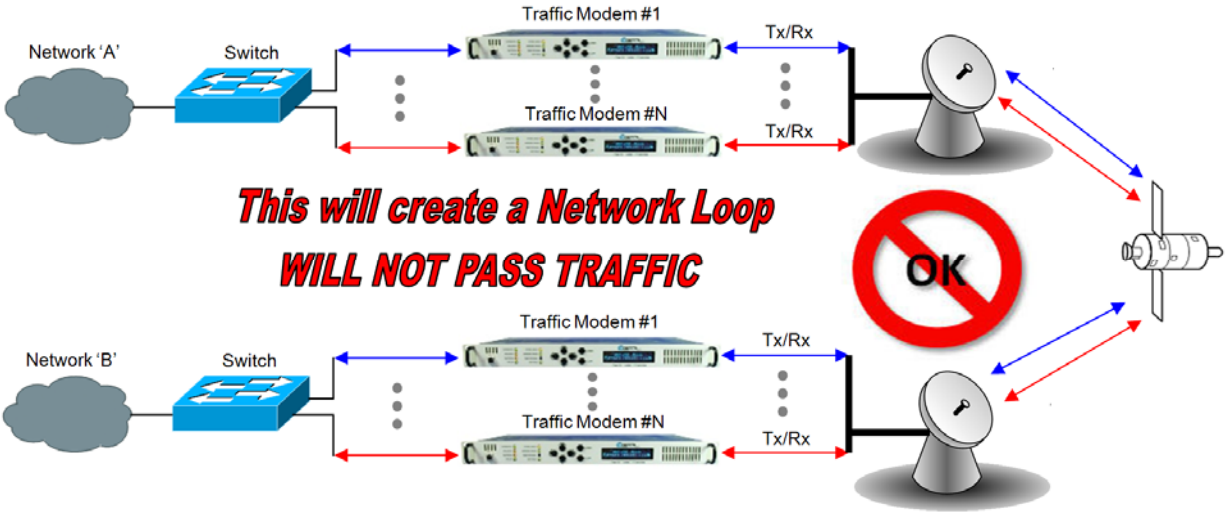


Figure 14-2. Networking Loop Example

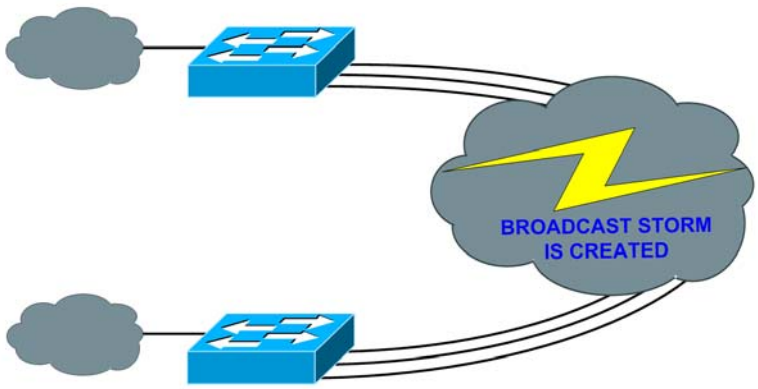


Figure 14-3. Networking Loop Example (Simplified)

This page is intentionally blank.

14.3.4 Hub-to-Hub with Standard Traffic using Routers

Figure 14-4 shows two hub-sites connected with standard Ethernet traffic, using routers instead of switches for Ethernet connection. The routers will block the broadcasts coming from the remote network. Therefore, no broadcast storm can be created or the possibility of having a remote MAC on the Hub networks.

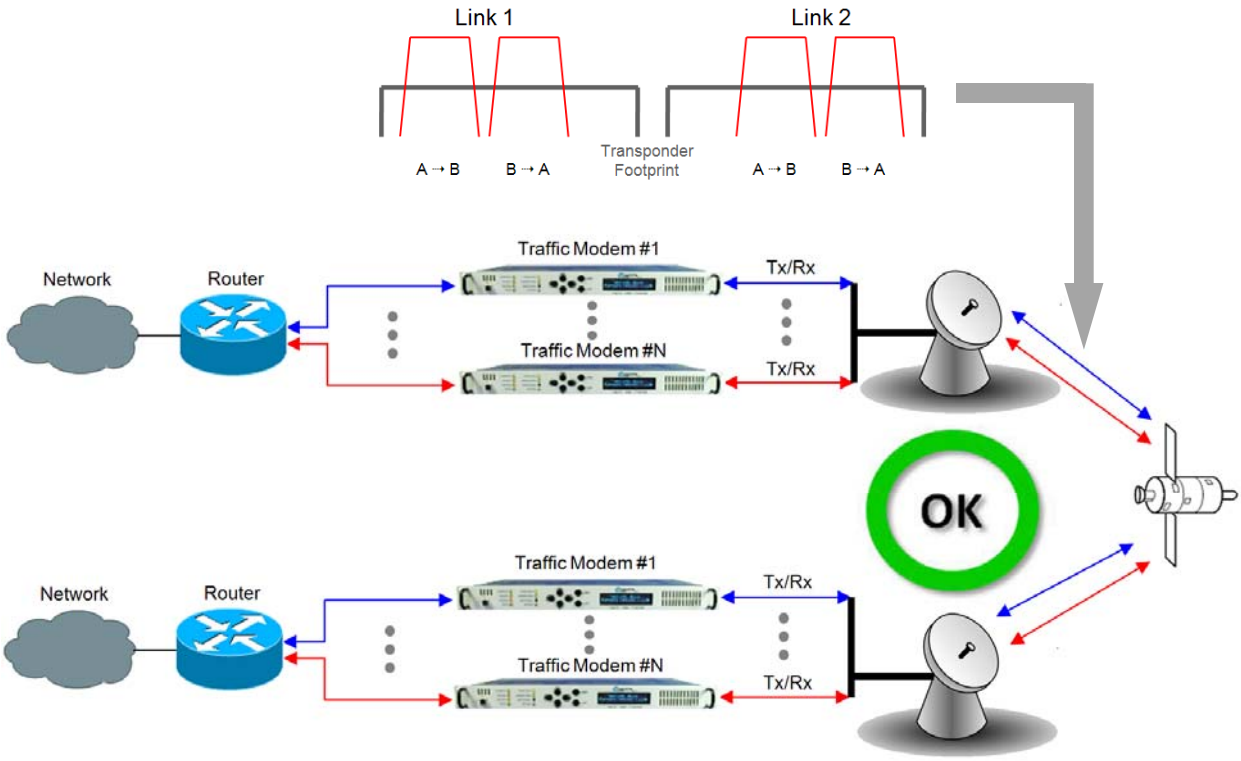


Figure 14-4. Hub-to-Hub with Standard Traffic using Routers

A wired-thru Ethernet redundancy example is shown in **Figure 14-5**. When the CRS-300 1:10 Redundancy Switch "backs-up" a faulted Traffic Modem, the physical port on the router does not change, because the Ethernet connection is properly rerouted within the CRS-300 from the Traffic Modem to the Redundant Modem.

A wired-around Ethernet redundancy example is shown for the CDM-700 User in **Figure 14-6**. When the CRS-300 1:10 Redundancy Switch backs-up a faulted Traffic Modem, the physical port on the router needs to change from the Traffic Modem port to the Redundant Modem port. Because of this, special router configuration is required for successful operation – the User may need to consult with the router manufacturer.

IMPORTANT

The wired-around redundancy approach is not ***recommended.***

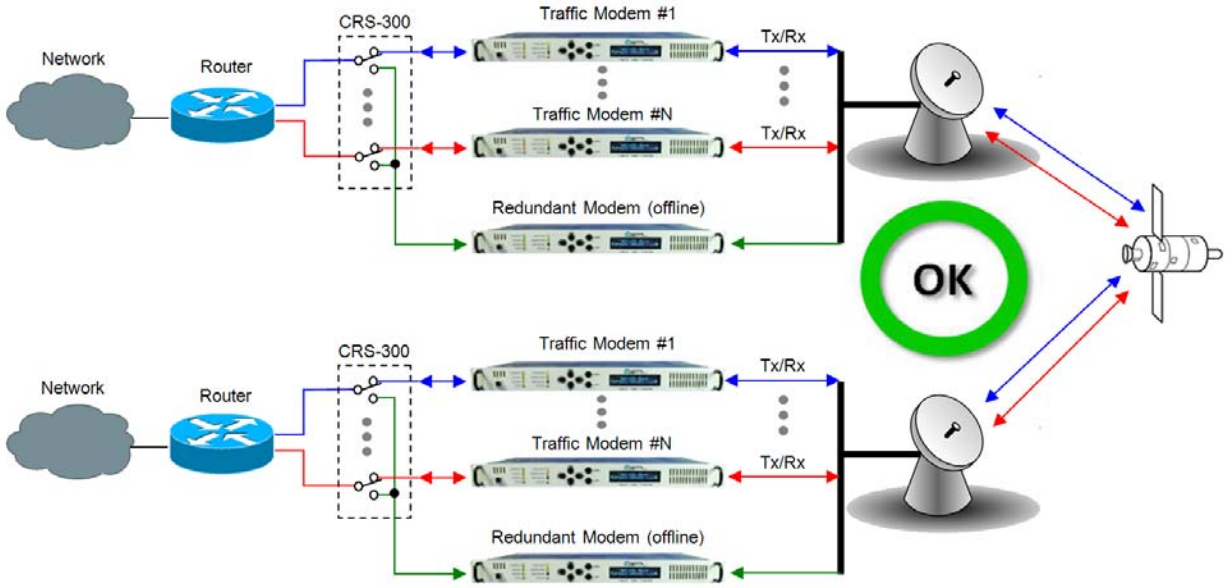


Figure 14-5. Wired-thru for Hub-to-Hub with Standard Traffic using Routers

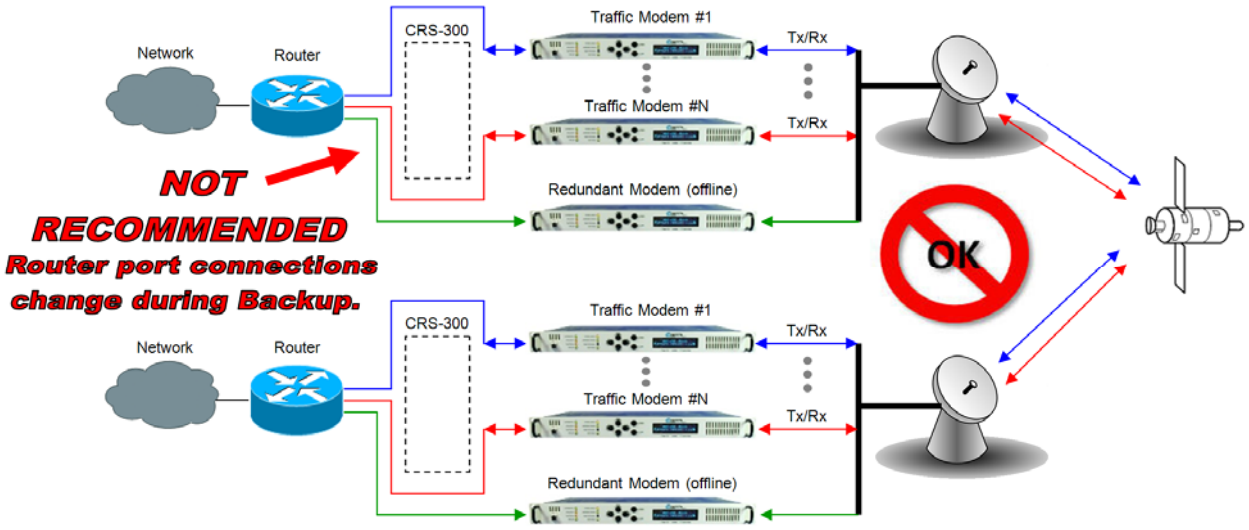


Figure 14-6. Wired-around for Hub-to-Hub with Standard Traffic using Routers

14.3.5 Hub-to-Remotes with Standard Traffic using Routers or Switches

Figure 14-7 shows hub-to-remotes configuration with standard Ethernet traffic using routers or switches. The routers/switches will block broadcasts coming from the hub and remote networks. Therefore, no broadcast storm can be created or the possibility of having a remote MAC on the Hub networks.

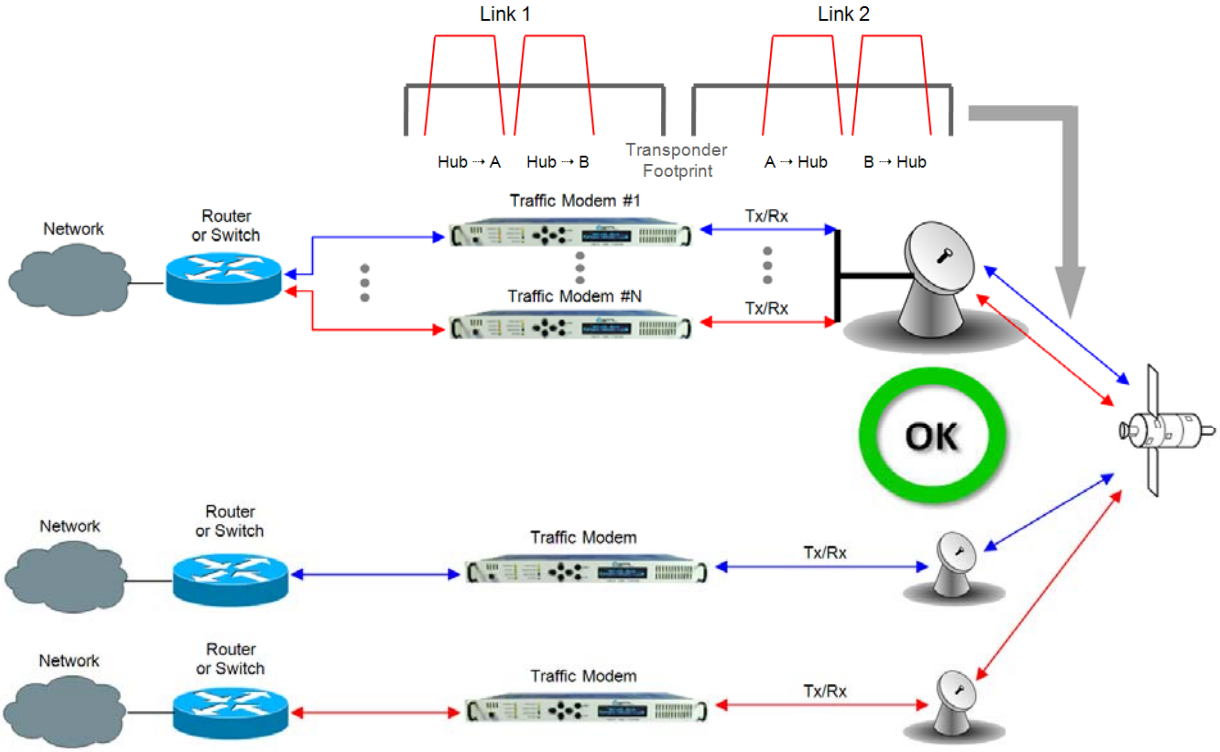


Figure 14-7. Hub-to-Remotes with Standard Traffic using Routers or Switches

A wired-thru Ethernet redundancy example is shown in **Figure 14-8**. When the CRS-300 1:10 Redundancy Switch backs-up a faulted Traffic Modem, the physical port, (on the router) does not change because the Ethernet connection is properly rerouted within the CRS-300 from the Traffic Modem to the Redundant Modem.

A wired-around Ethernet redundancy example for the CDM-700 User is shown **Figure 14-9**. When the CRS-300 1:10 Redundancy Switch backs-up a faulted Traffic Modem, the Dwitch will learn the new MAC address of the redundant unit and traffic will be passed again. This type of architecture will slow down the switching time, because the Switch will need to re-learn the correct port connection.

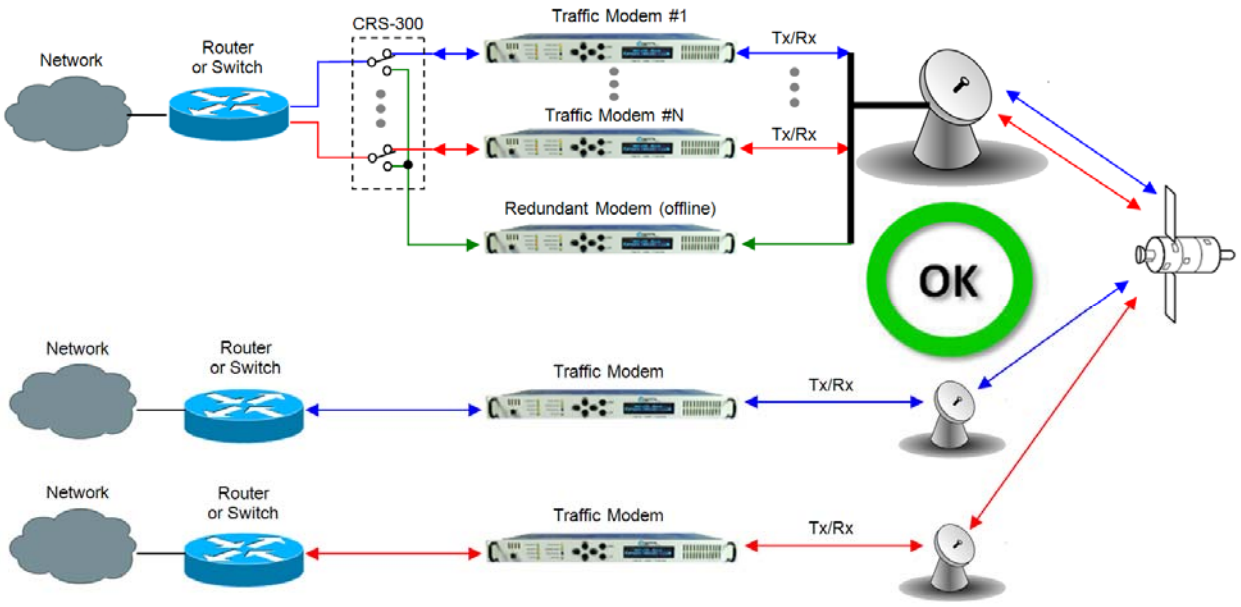


Figure 14-8. Wired-thru for Hub-to-Remotes with Standard Traffic using Routers or Switches

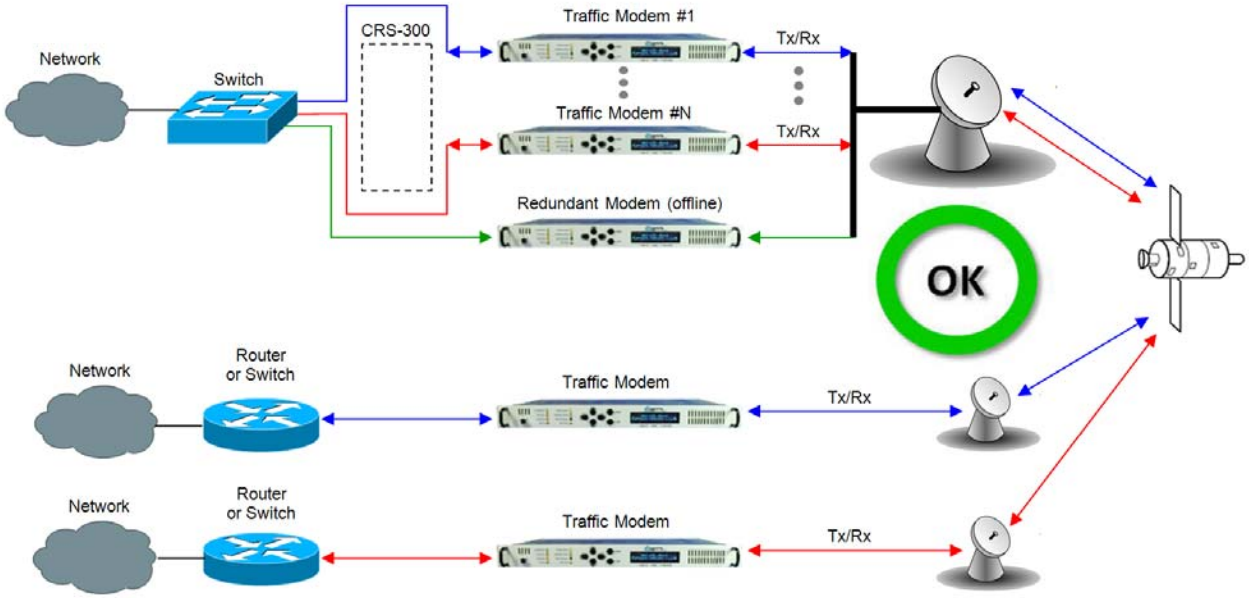


Figure 14-9. Wired-around for Hub-to-Remotes with Standard Traffic using Routers or Switches

14.3.6 Hub-to-Remotes, Split-path Traffic using Routers (Point-to-Multipoint)

Figure 14-10 shows hub-to-remotes configuration with standard and split-path Ethernet traffic, using routers. A Static ARP Entry is needed in the switch so that routing of the Tx side of the modems will be on the correct port of the router. For example, the Rx side of the Ethernet connection for **'Traffic Modem #N'** comes in the bottom port of the Router, but the Tx Ethernet connection must be connected through the same port as **'Traffic Modem #1'**, as shown in this figure.

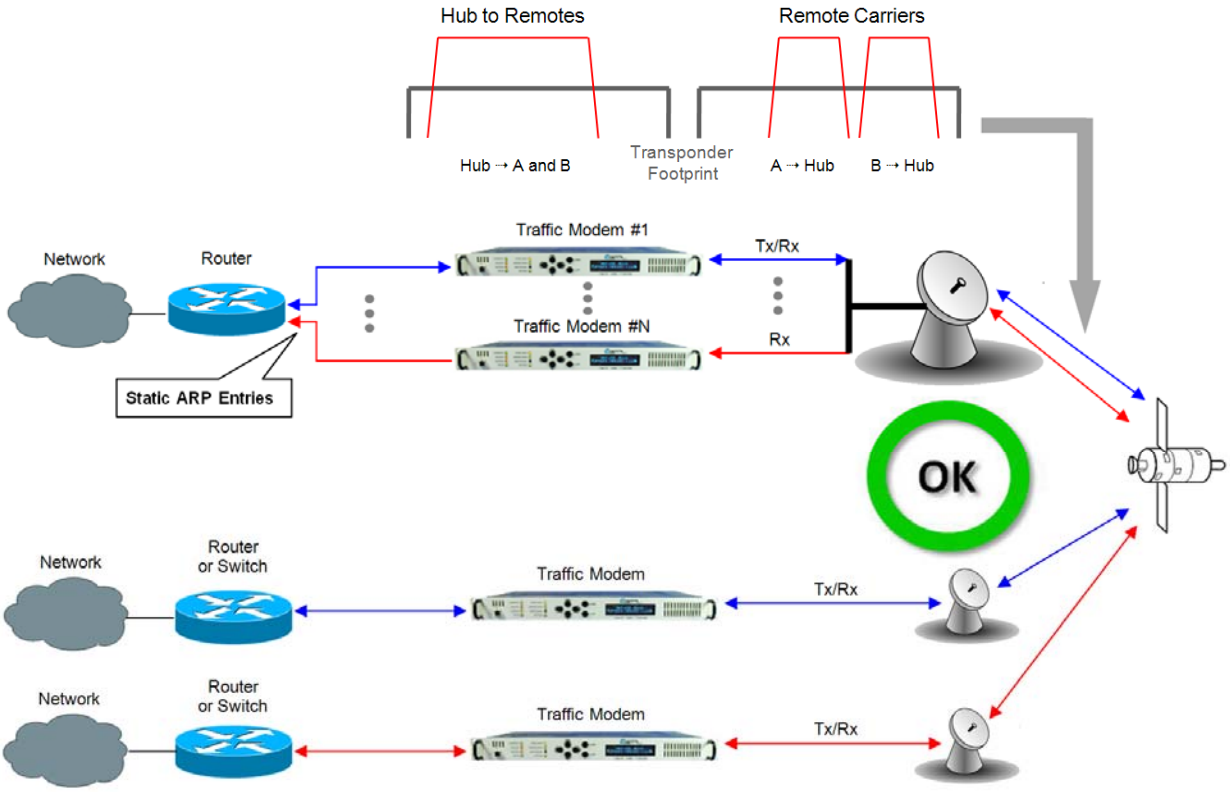


Figure 14-10. Point-to-Multipoint using Routers

A wired-thru Ethernet redundancy example is shown in **Figure 14-11.** When the CRS-300 1:10 Redundancy Switch backs-up a faulted Traffic Modem, the physical port on the router does not change, because the Ethernet connection is properly rerouted within the CRS-300 from the Traffic Modem to the Redundant Modem.

A wired-around Ethernet redundancy example is shown for the CDM-700 User in **Figure 14-12**. When the CRS-300 1:10 Redundancy Switch backs-up a faulted Traffic Modem, the physical port on the router needs to change from the Traffic Modem port to the Redundant Modem port. Because of this, special router configuration is required for successful operation – the User may need to consult with the router manufacturer.

IMPORTANT

The wired-around redundancy approach is not ***recommended.***

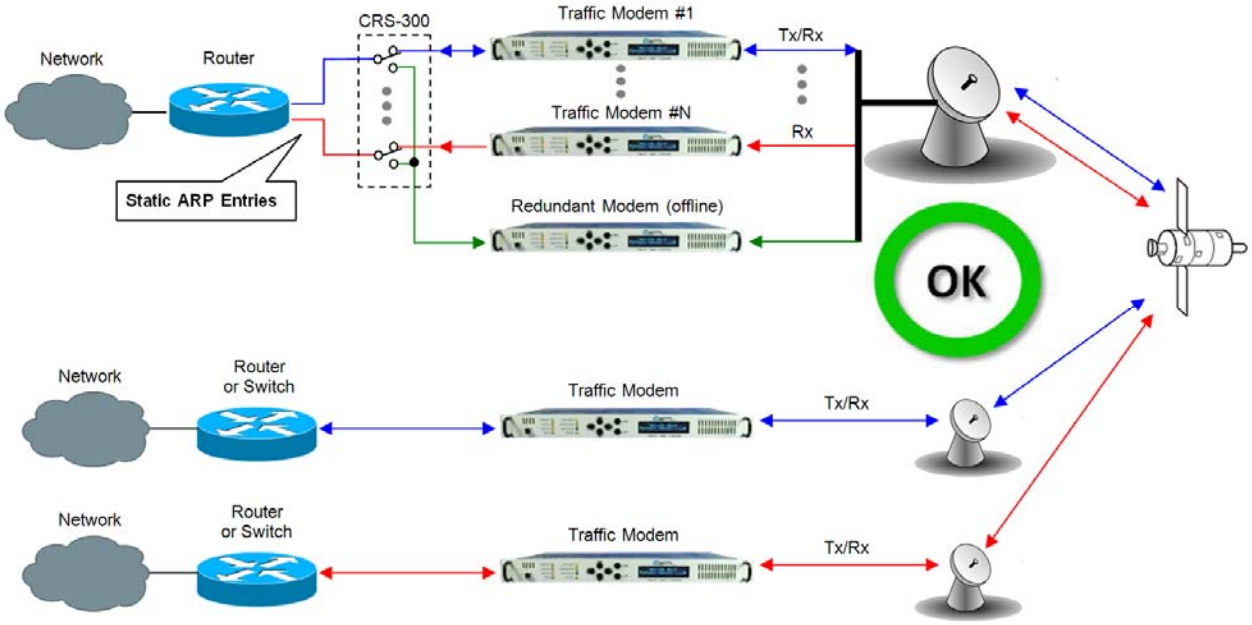


Figure 14-11. Wired-thru for Point-to-Multipoint with Routers

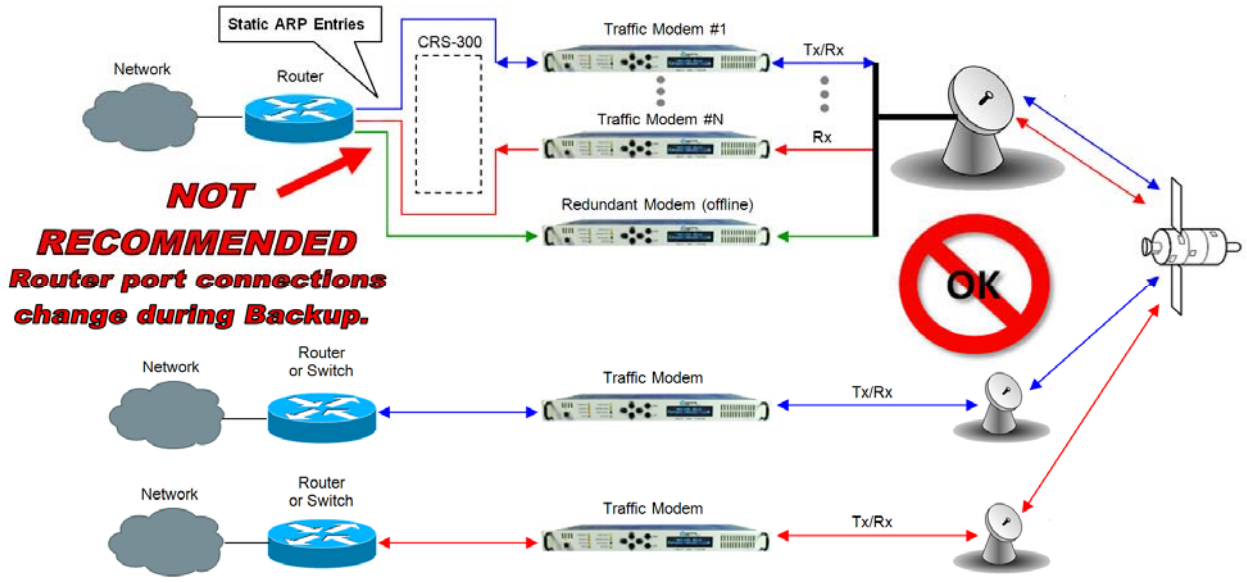


Figure 14-12. Wired-around for Point-to-Multipoint with Routers

14.3.7 Hub-to-Remotes, Split-path Traffic using Switches (Point-to-Multipoint)

With switches used, the hub and remote are on the same subnet as shown in **Figure 14-13**, meaning that broadcasts will be allowed to transverse the network. Learning Mode must be disabled on the Hub Tx/Rx modem, because if a computer on the remote sends a broadcast out to the Hub, the modem learns that MAC is local – when in fact it is not.

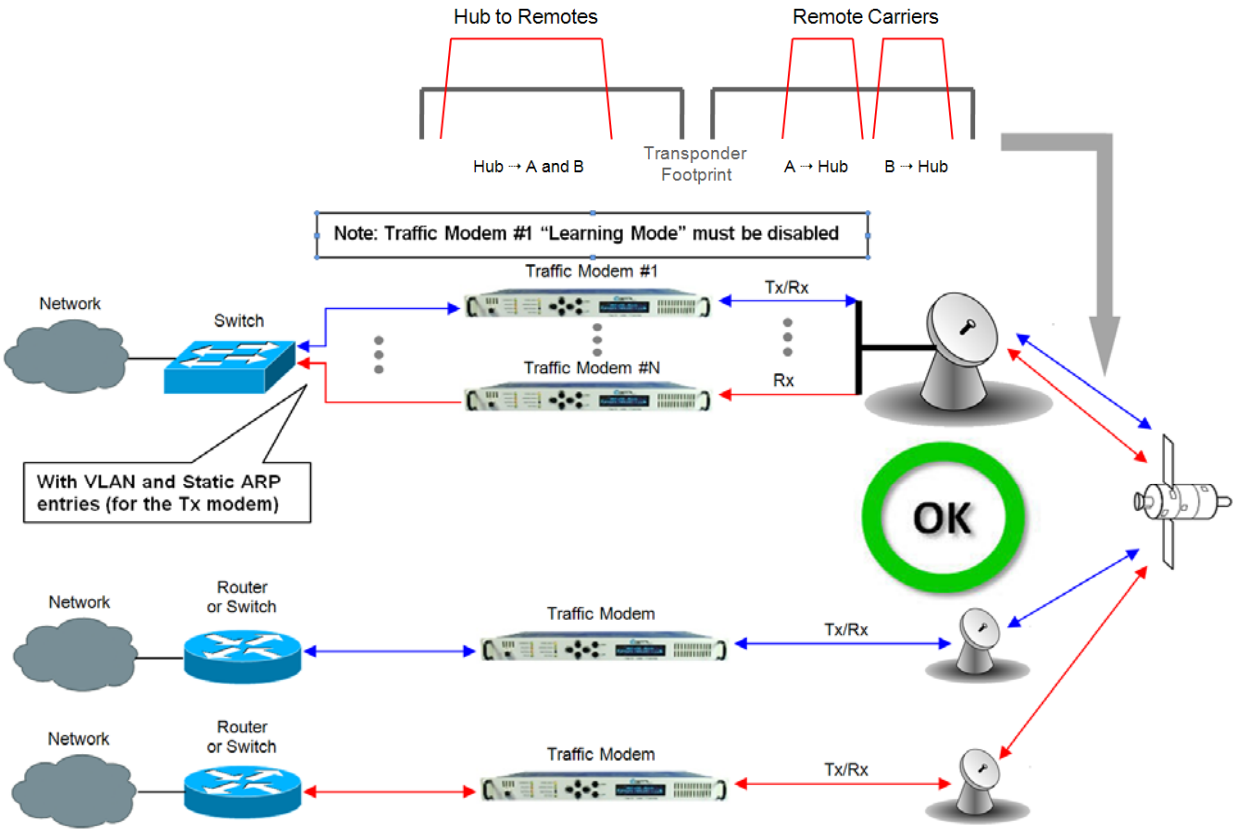


Figure 14-13. Point-to-Multipoint using Switches

A wired-thru Ethernet redundancy example is shown in **Figure 14-14**. When the CRS-300 1:10 Redundancy Switch backs-up a faulted Traffic Modem, the physical port on the Switch does not change, because the Ethernet connection is properly rerouted within the CRS-300 from the Traffic Modem to the Redundant Modem.

A wired-around Ethernet redundancy example is shown for the CDM-700 User in **Figure 14-15**. When the CRS-300 1:10 Redundancy Switch backs-up a faulted Traffic Modem, the Switch will learn the new MAC address of the redundant unit and traffic will be passed again. This type of architecture will slow down the switching time, because the Switch will need to re-learn the correct port connection.

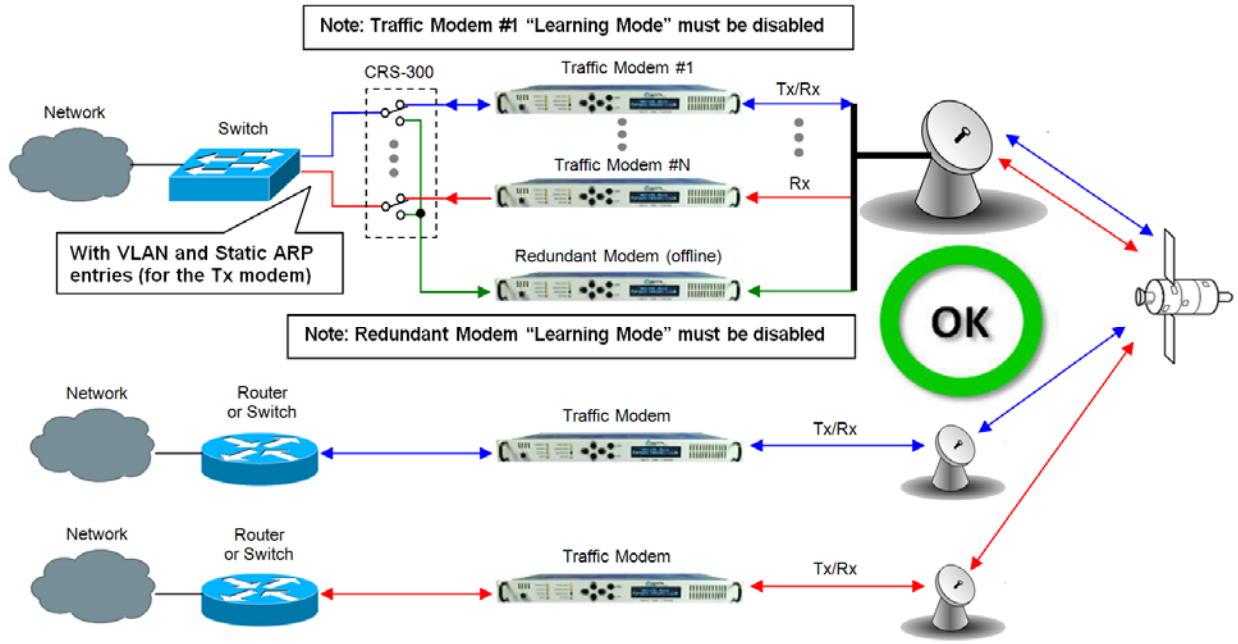


Figure 14-14. Wired-thru, Hub-to-Remotes, Split-path Traffic using Switches (Point-to-Multipoint)

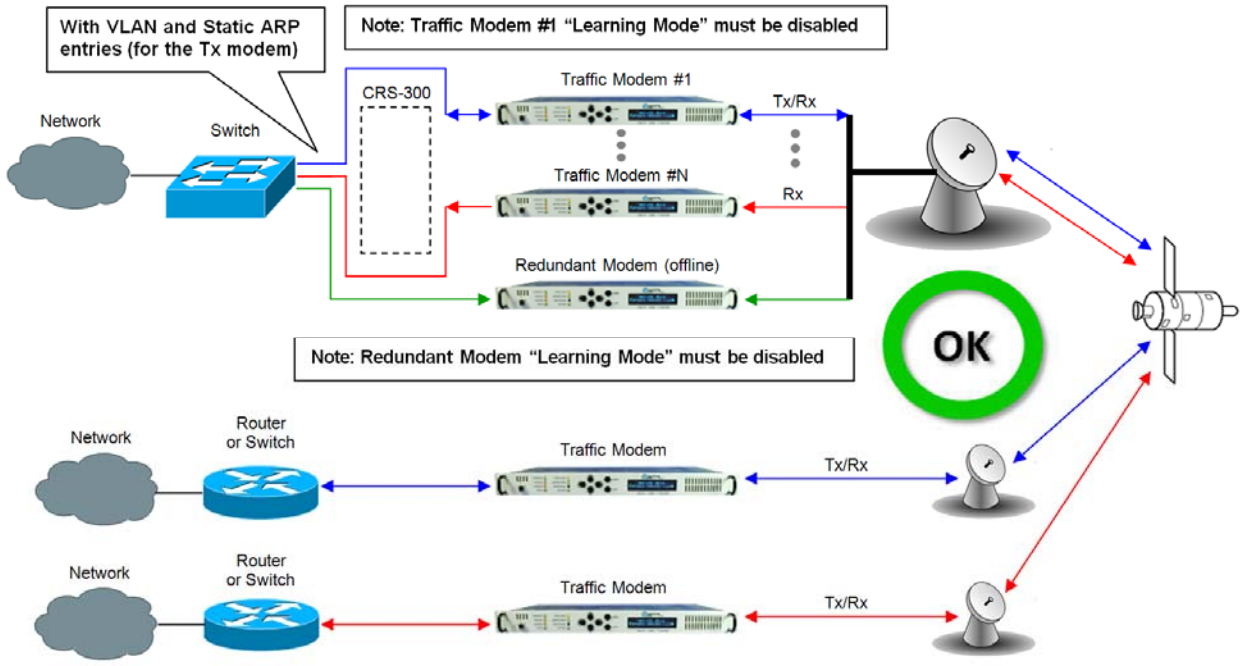


Figure 14-15. Wired-around, Hub-to-Remotes, Split-path Traffic using Switches (Point-to-Multipoint)

Notes:

Chapter 15. WEB SERVER PAGES

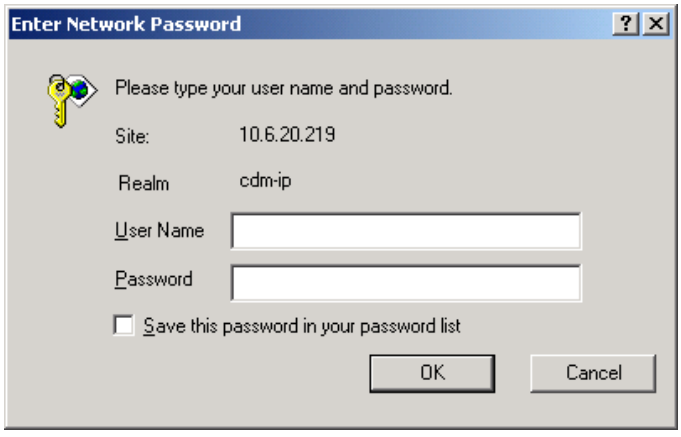
15.1 Overview

Welcome to the CDM-700 Web Interface. This chapter describes the functionality of the Web Interface. Please refer **Chapter 6. Front Panel Operation,** and the Remote Commands Specifications tables found in **Chapter 11. Remote Control,** for detailed descriptions of the configuration parameter featured on the individual Web pages featured in this chapter.

15.2 Web Server Usage

The embedded Web Server application provides the user with an easy to use interface to configure and monitor all aspects of the CDM-700. These Web pages have been designed for optimal performance when using Microsoft's Internet Explorer 5.5 or higher.

By typing http://xxx.xxx.xxx.xxx" (where xxx.xxx.xxx.xxx =IP Module IP address) on your browser, the Login prompt will appear:



HTTP Login Access Levels are defined as follows:

User Interface	User Login Access Level		
	Admin User	**Read/Write User**	**Read Only User**
Web	Full Access to all Web Pages	No Access to Admin or Encryption Web pages	No Access to Admin or Encryption Web pages
		Full Access for all other Web Pages	View Only Access for all other Web Pages, able to reset Statistics

IP Module Default Name/Passwords are:

- Admin comtech/comtech
- Read/Write opcenter/1234
- Read Only monitor/1234

15.2.1 Web Server Menu Tree

Table 15-1 Web Server Menu Tree

Level 1	Level 2
Home	Home
	Contact
	Support
Admin (Administrative functions)	Access
	Remote
Config Mdm (Modem Configuration)	Modem
	Modem Utilities
	INTF1 (Interface 1)
	INTF2 (Interface 2)
Stats (Statistics)	Modem Status
	Modem Logs
Maint (Maintenance)	Unit Info

15.3 Home Pages

15.3.1 Home Page

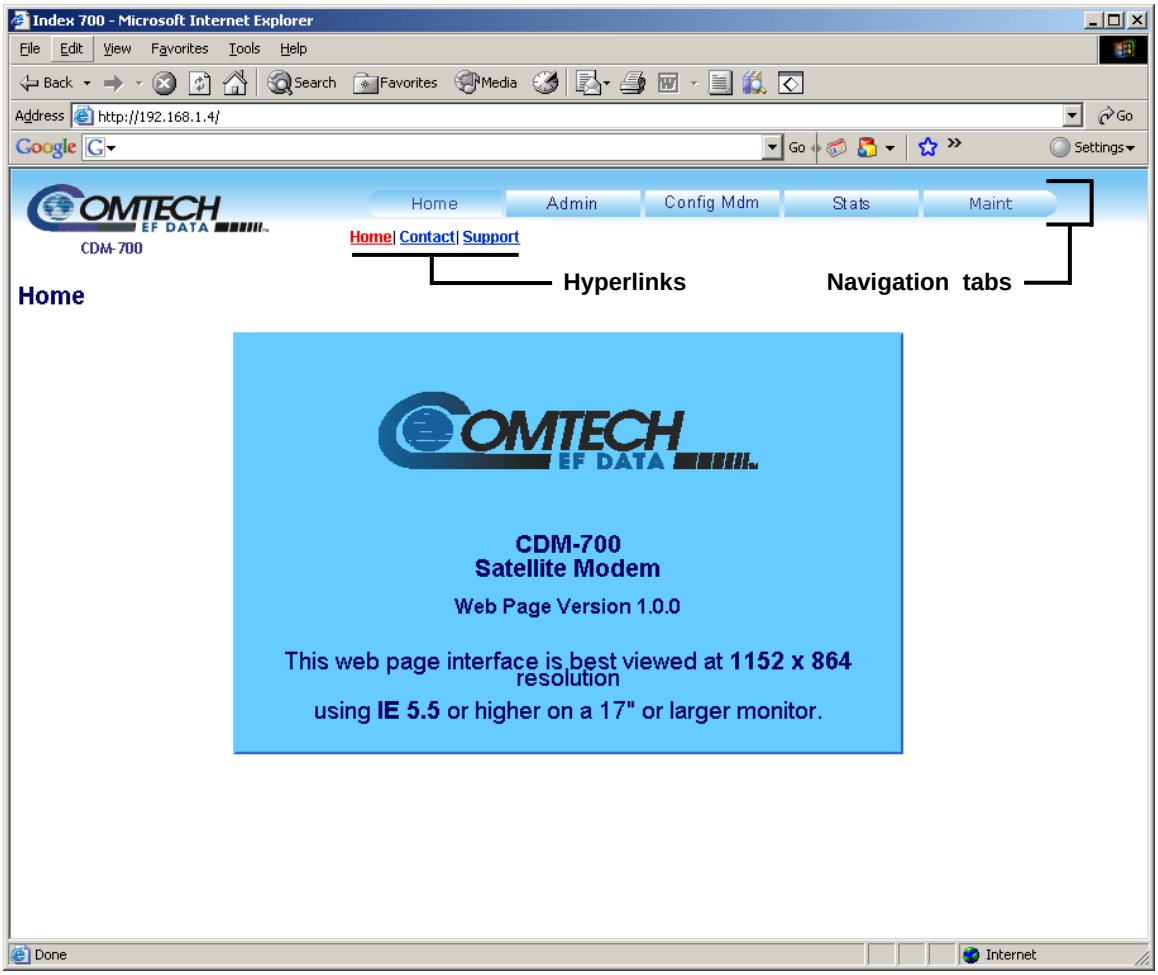


Figure 15-1. CDM-700 Home Page

The User is greeted with this top-level Web page upon entering the IP Module IP Address. This page serves to idenitify the modem for which this Web Interface is established, and the version number for this Web Interface.

From this top level menu, the User has access to four additional navigation tabs – **Admin** (Administration), **Config Mdm** (Configure Modem), **Stats** (Statistics), and **Maint** (Maintenance) – plus two additional Home Page hyperlinks: **Contact** and **Support**.

Click on a tab or hyperlink to continue.

15.3.2 Home: Contact Page

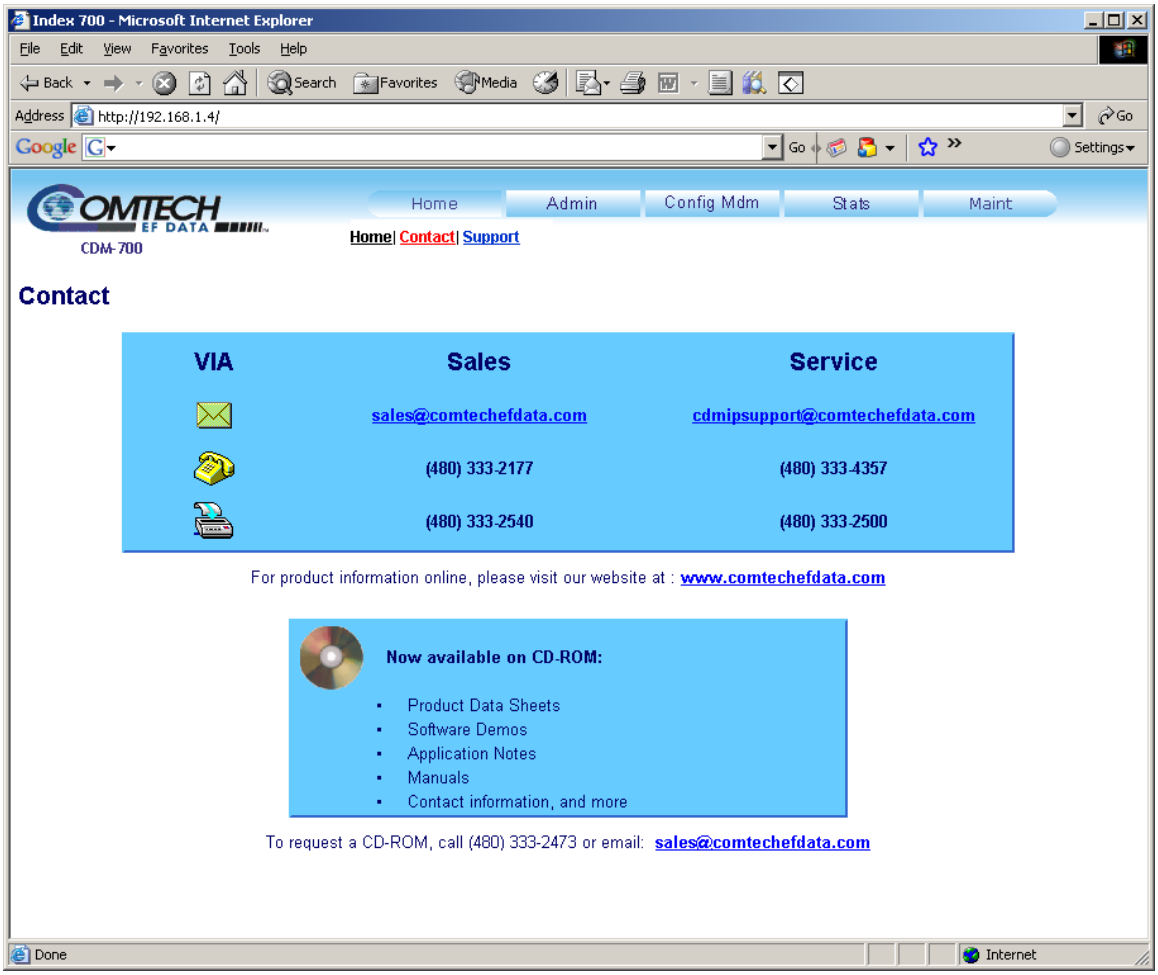


Figure 15-2. Home: Contact Information Page

As shown in **Figure 15-2**, this page provides basic contact information to reach Comtech EF Data Sales and Customer Support via phone or automated e-mail links.

15.3.3 Home: Support Page

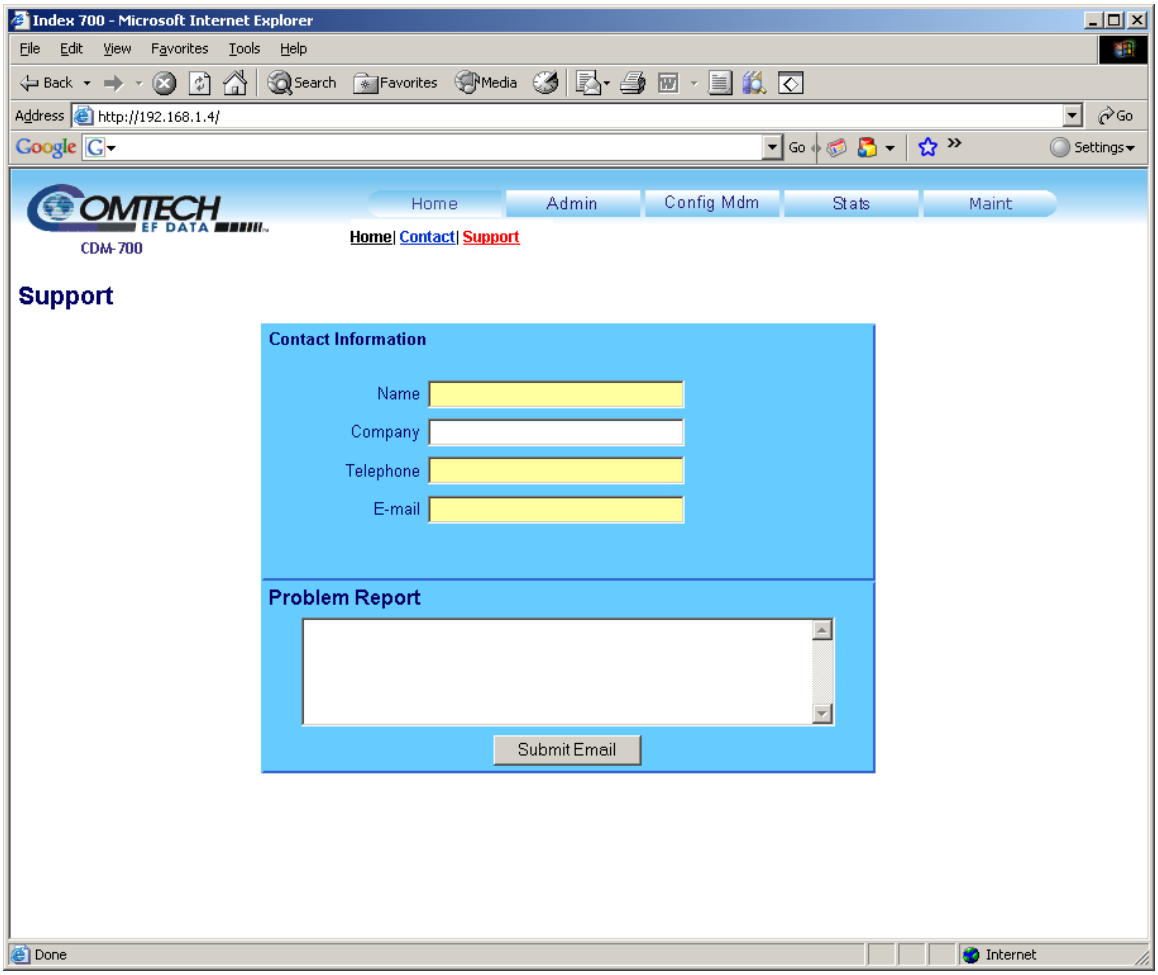


Figure 15-3. Home: Customer Support Page

The CDM-700 Support Web Page allows the User to compose an e-mail message for questions or problems with the modem.

The **Problem Report** area of the display allows up to 256 characters maximum.

Once the **Contact Information** is entered and a message composed in the **Problem Report** text window, click on **Submit Email** to send the message. The CDM-700 Support Web Page uses SMTP (Simple Mail Transport Protocol) to send e-mail to Comtech EF Data Modem Support (cdmipsupport@comtechefdata.com).

15.4 Admin Pages

The '**Admin'** pages provide the means to set up access parameters required to facilitate communication with the CDM-700 Web Server.

15.4.1 Admin: Access Page

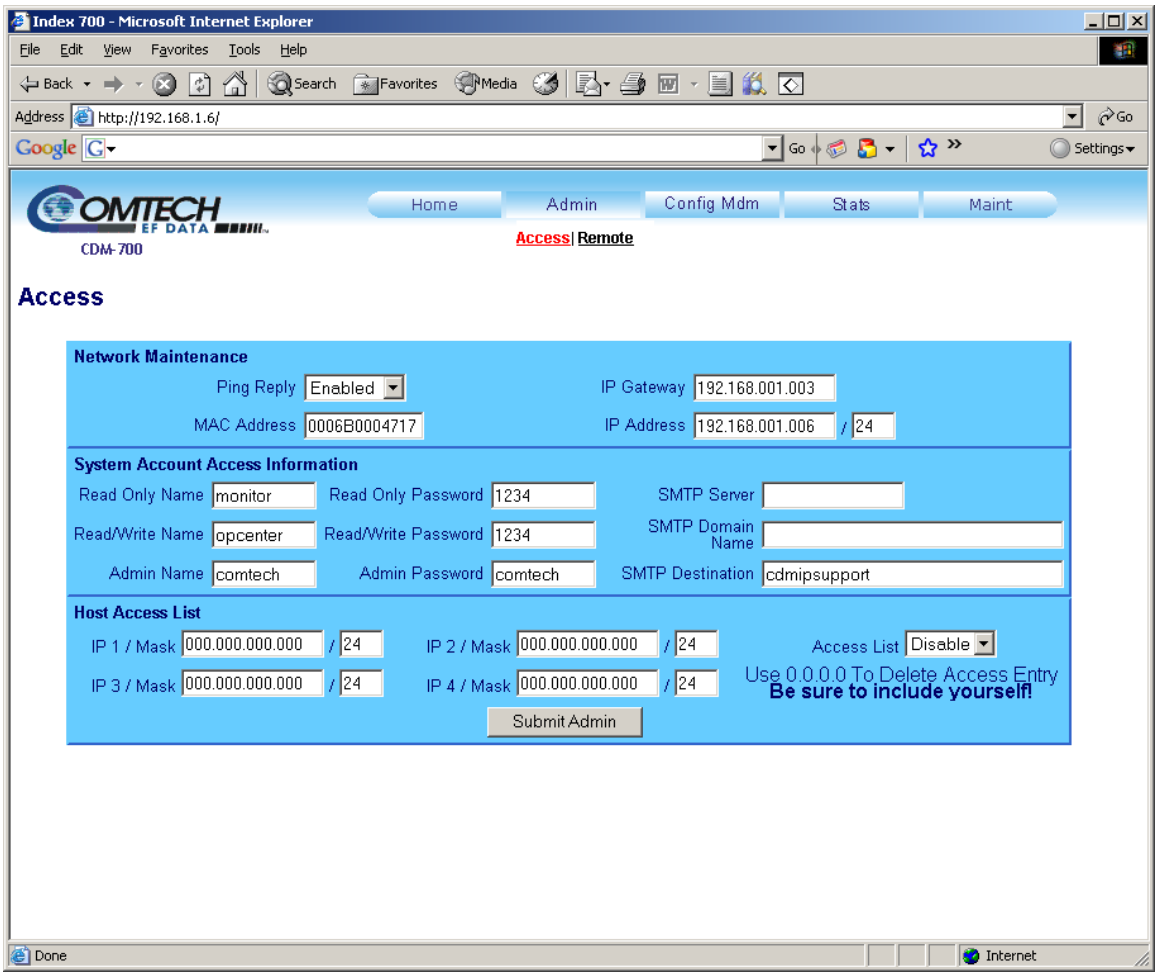


Figure 15-4. Admin: Access Page

The '**Admin: Access'** page, shown in **Figure 15-4**, provides the means to set up User names, passwords, the e-mail server, and the host IP addresses to facilitate communication with the CDM-700 Web Server.

For details pertaining to the configuration parameters available on this page, refer to **Chapter 6. FRONT PANEL OPERATION**.

Once the desired configuration settings have been made on this page, the User should then click on **Submit Admin** to save these changes.

15.4.2 Admin: Remote Page

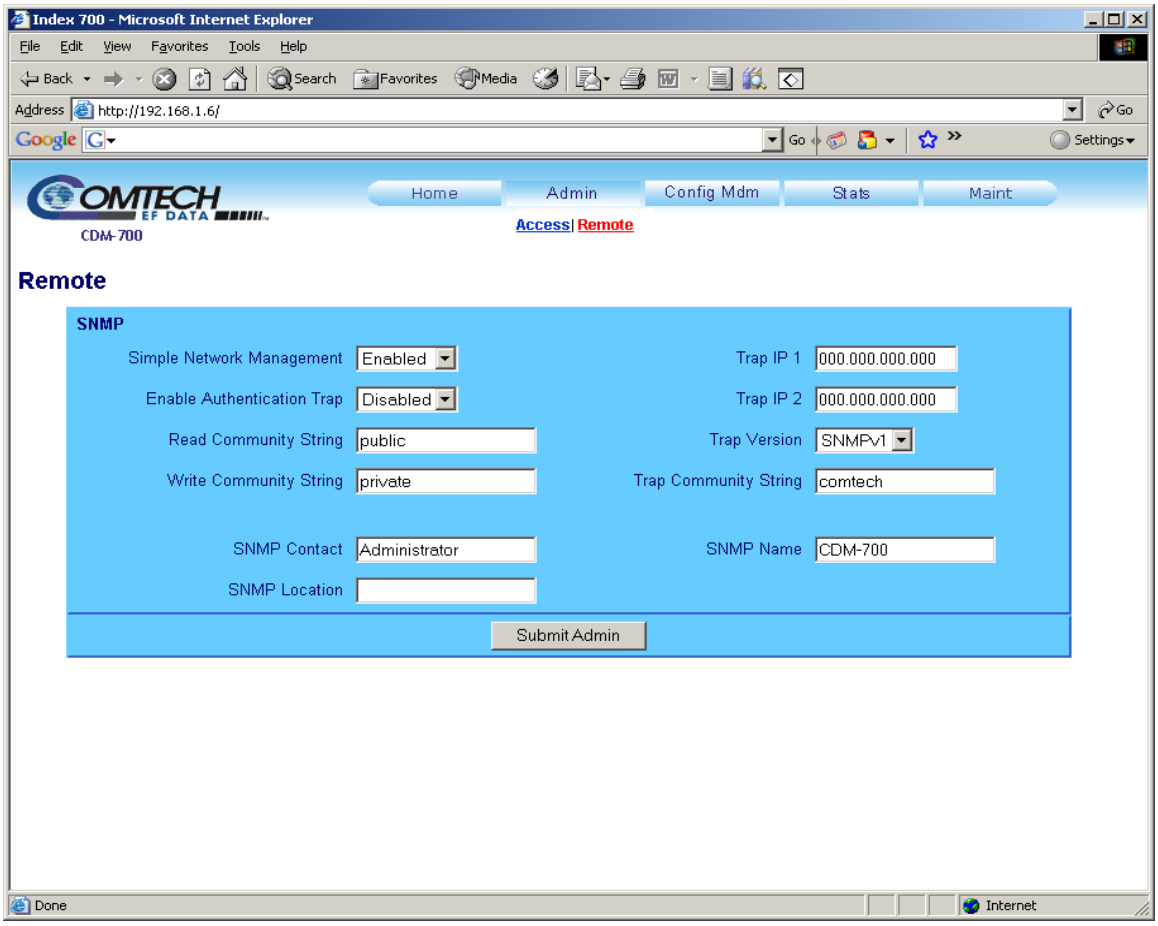


Figure 15-5. Admin: Remote Page

The '**Admin: Remote'** page, shown here in **Figure 15-5**, sets and returns administration information for the CDM-700 Simple Network Management Protocol (SNMP) feature.

For details pertaining to the configuration parameters available on this page, refer to **Chapter 6. FRONT PANEL OPERATION** and **Chapter 12. SNMP INTERFACE**.

Once the desired configuration settings have been made on this page, the User should then click on **Submit Admin** to save these changes.

15.5 Config Mdm (Modem Configuration) Pages

From this main page, the User may select from the **Modem**, **Modem Utilities**, **INTF1** and **INTF2** pages. As shown in **Figure 15-6**, the '**Config Mdm**' pages are used to configure the Modulator, Demolator, and installed Interfaces (including E3/T3/STS1, OC3, HSSI, and Gigabit Ethernet).

15.5.1 Config Mdm: Modem Page

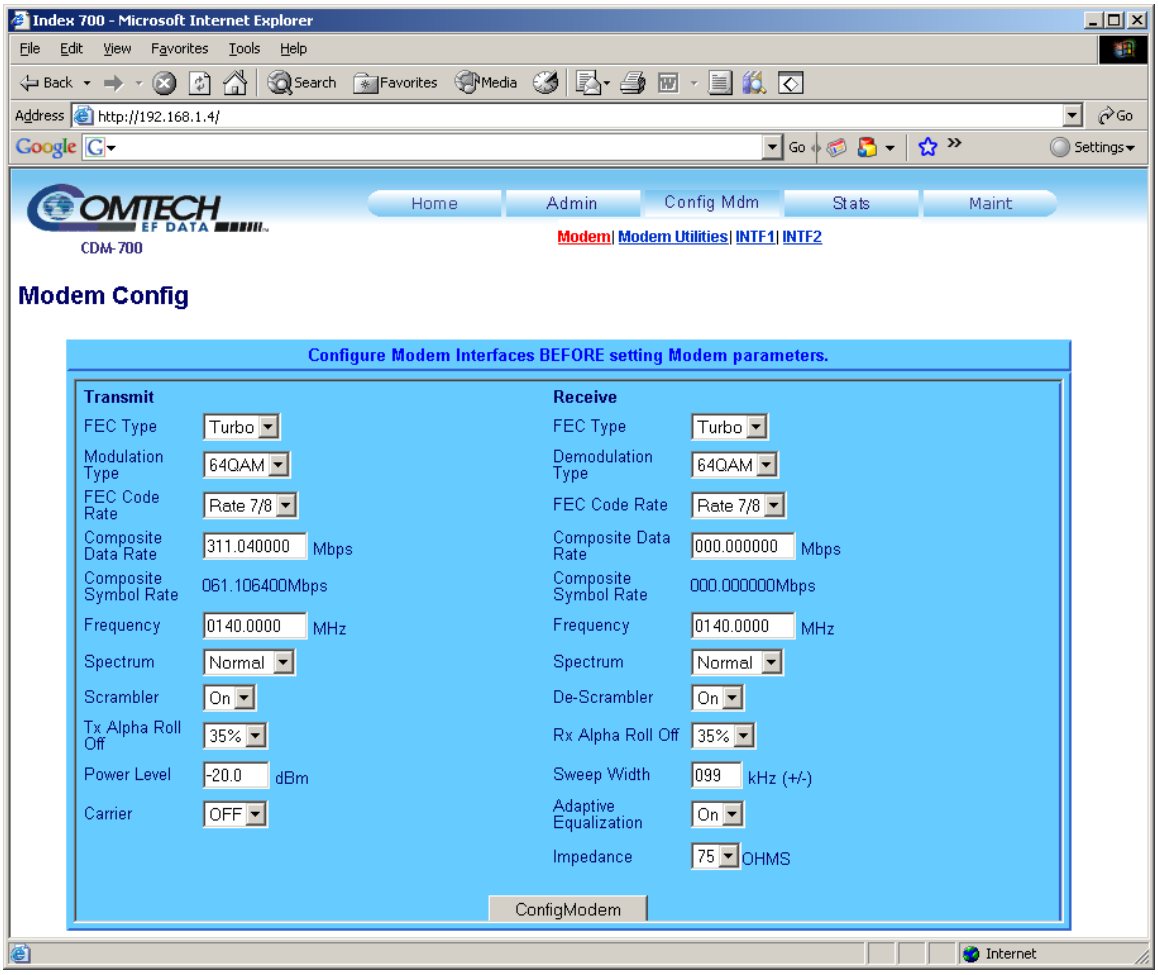


Figure 15-6. Config Mdm: Modem Page

For details pertaining to the configuration parameters available on this page, refer to **Chapter 6. FRONT PANEL OPERATION**.

Once the desired configuration settings have been made on this page, the User should then click on **ConfigModem** to save these changes.

15.5.2 Config Mdm: Modem Utilities Page

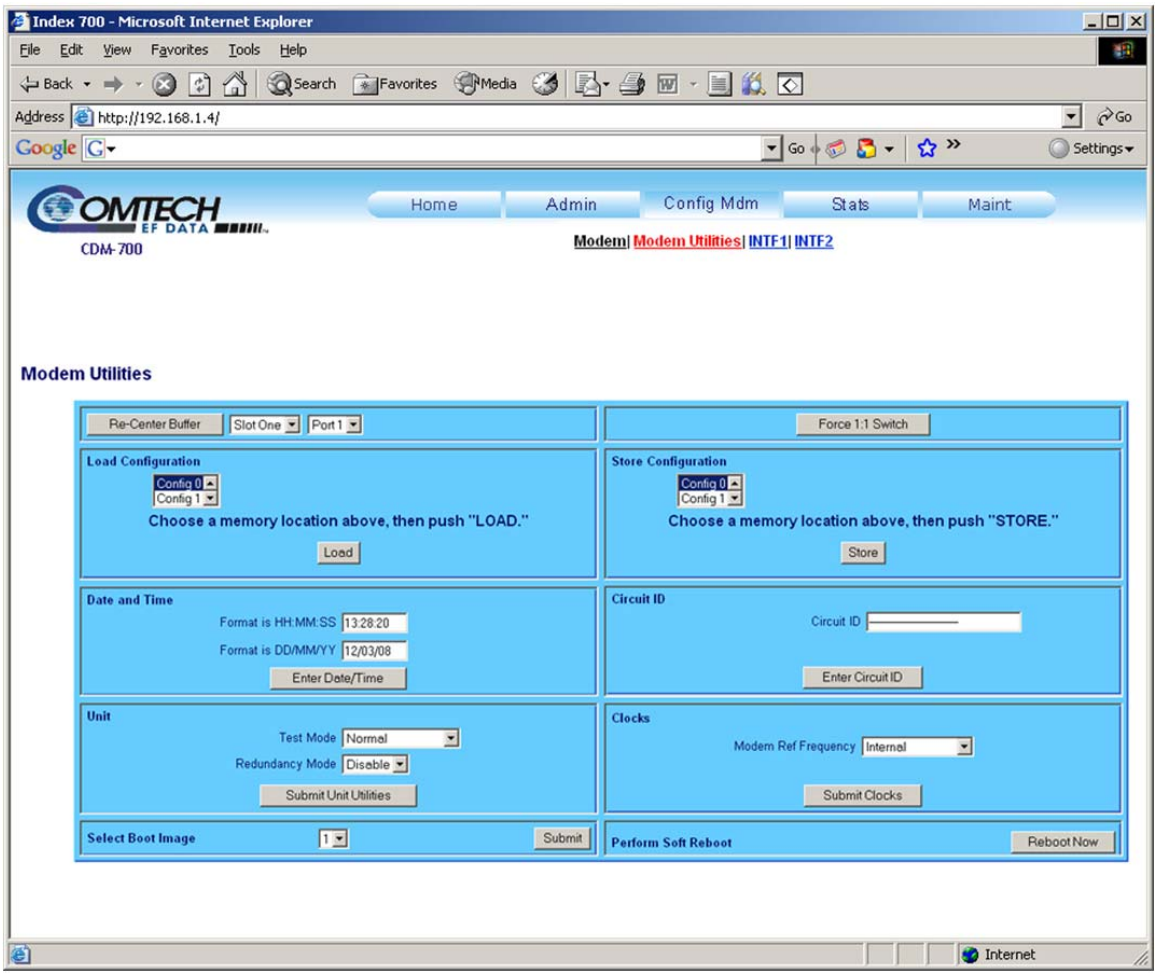


Figure 15-7. Config Mdm: Modem Utilities Page

The '**Config Mdm: Modem Utilities'** page is used to set Modem Utilities such as Date and Time; Redundancy; Test Mode; and Configurations.

For details pertaining to the configuration parameters available on this page, refer to **Chapter 6. FRONT PANEL OPERATION**.

15.5.3 Config Mdm: INTF1 (Interface 1) Page

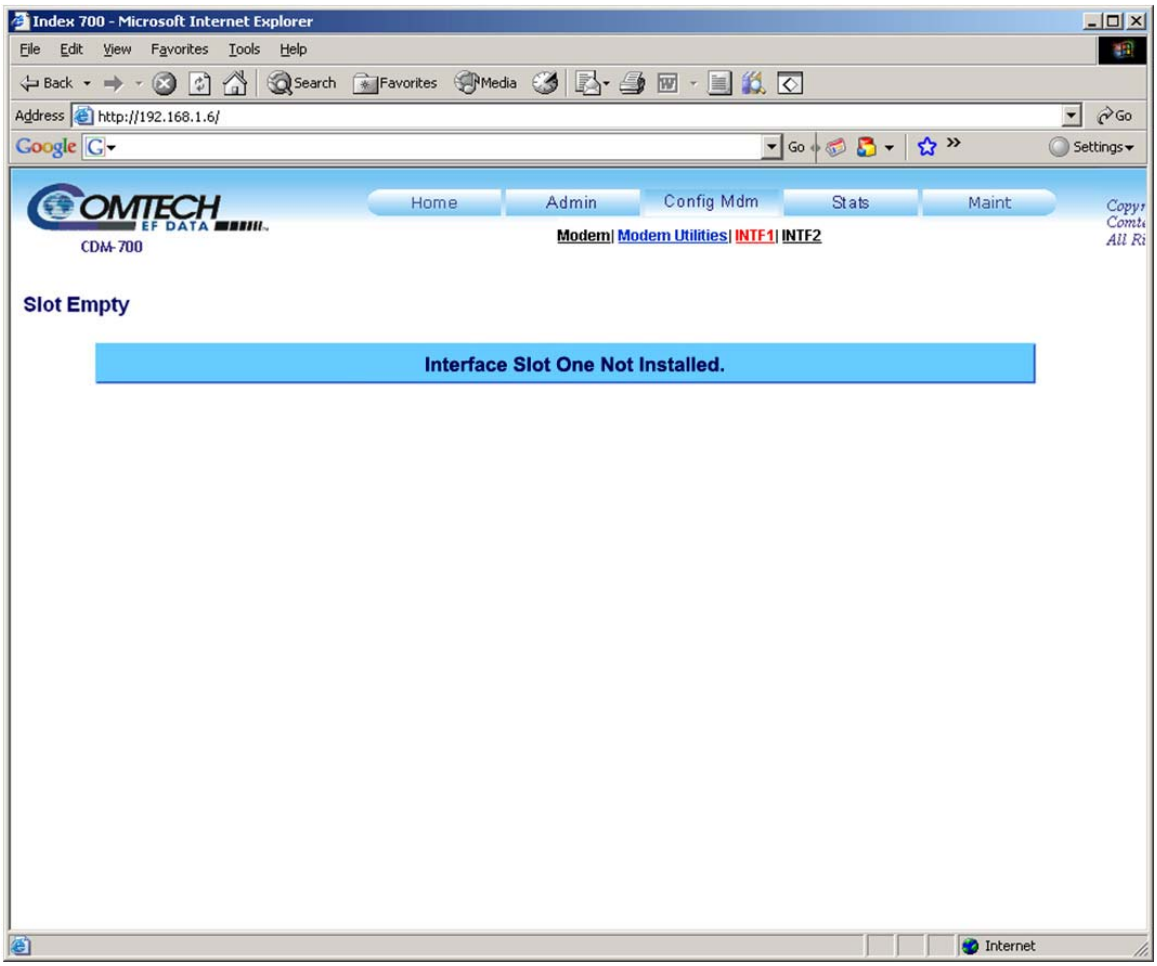


Figure 15-8. Config Mdm: INTF1 Page (*Default – no module installed*)

The '**Config Mdm: INTF1**' page displays the configuration parameters for the Interface module installed in Slot 1, located on the rear panel of the CDM-700 chassis.

If there is no interface module present, as shown in Figure 15-8 the page header reads "**Slot Empty**" and the message "**Interface Slot One Not Installed.**" is displayed in place of an operable configuration window.

The subsections that follow provide further information on this Web page on an interface-by-interface basis. For detailed information pertaining to the configuration parameters available for each of these interfaces, refer to **Chapter 6. FRONT PANEL OPERATION**, as well as to the appendix specific to the interface at the end of this manual.

15.5.3.1 Config Mdm: INTF1 – E3/T3/STS1 Page

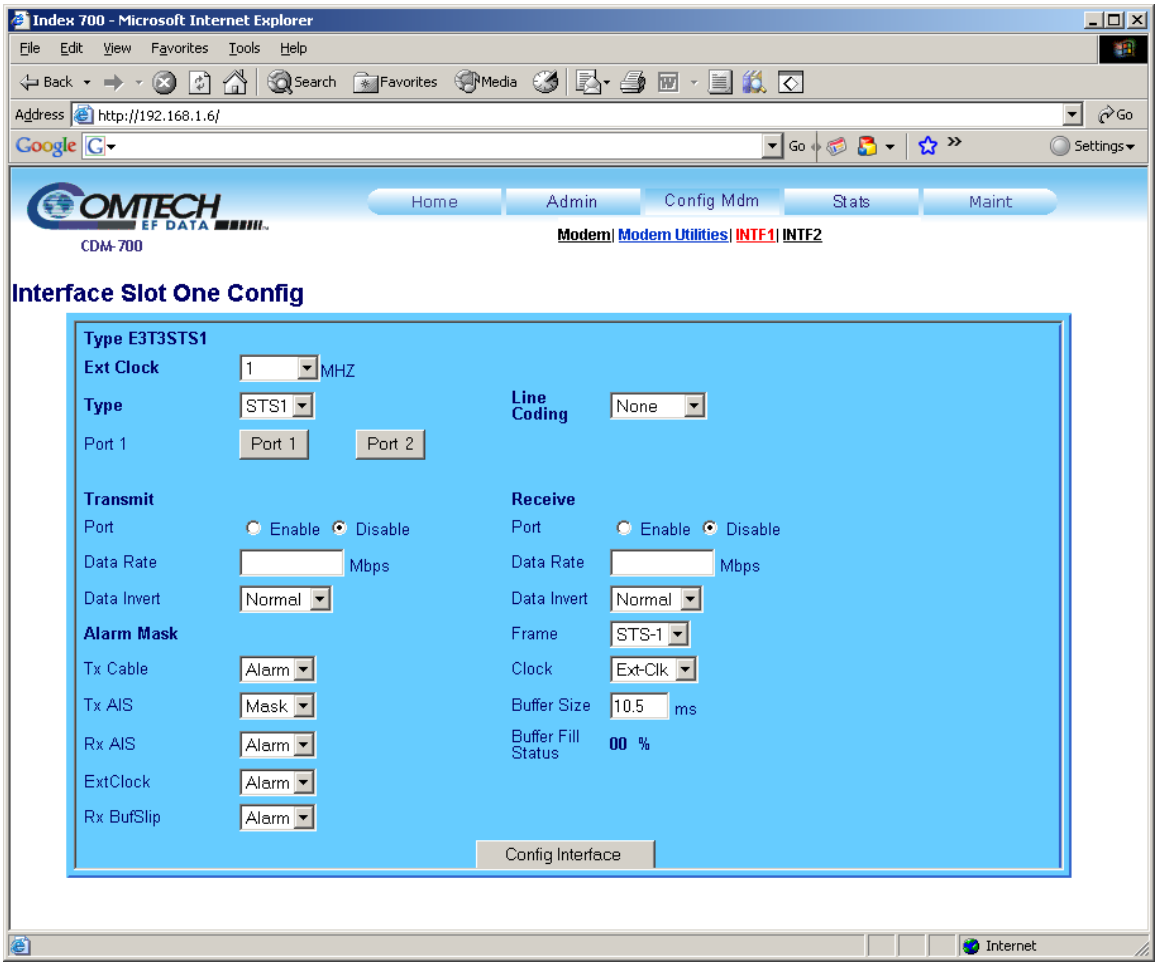


Figure 15-9. Config Mdm: INTF1 – E3/T3/STS1 (Dual G.703) Page

Typically, the configuration interface window on the '**Config Mdm: INTF1'** page identifies, in the upper lefthand corner, the interface module type installed into Slot 1.

As shown in **Figure 15-9**, the CDI-10 E3/T3/STS1 (Dual G.703) Interface Module is installed in the Slot 1 position in the CDM-700 chassis.

For details on the configuration parameters available for this interface, refer to **Chapter 6. FRONT PANEL OPERATION** and **Appendix B. DUAL E3/T3/STS-1 Interface (CDI-10).**

Once the desired configuration settings have been made on this page, the User should then click on **Config Interface** to save these changes.

15.5.3.2 Config Mdm: INTF1 – OC3 (Optical) Page

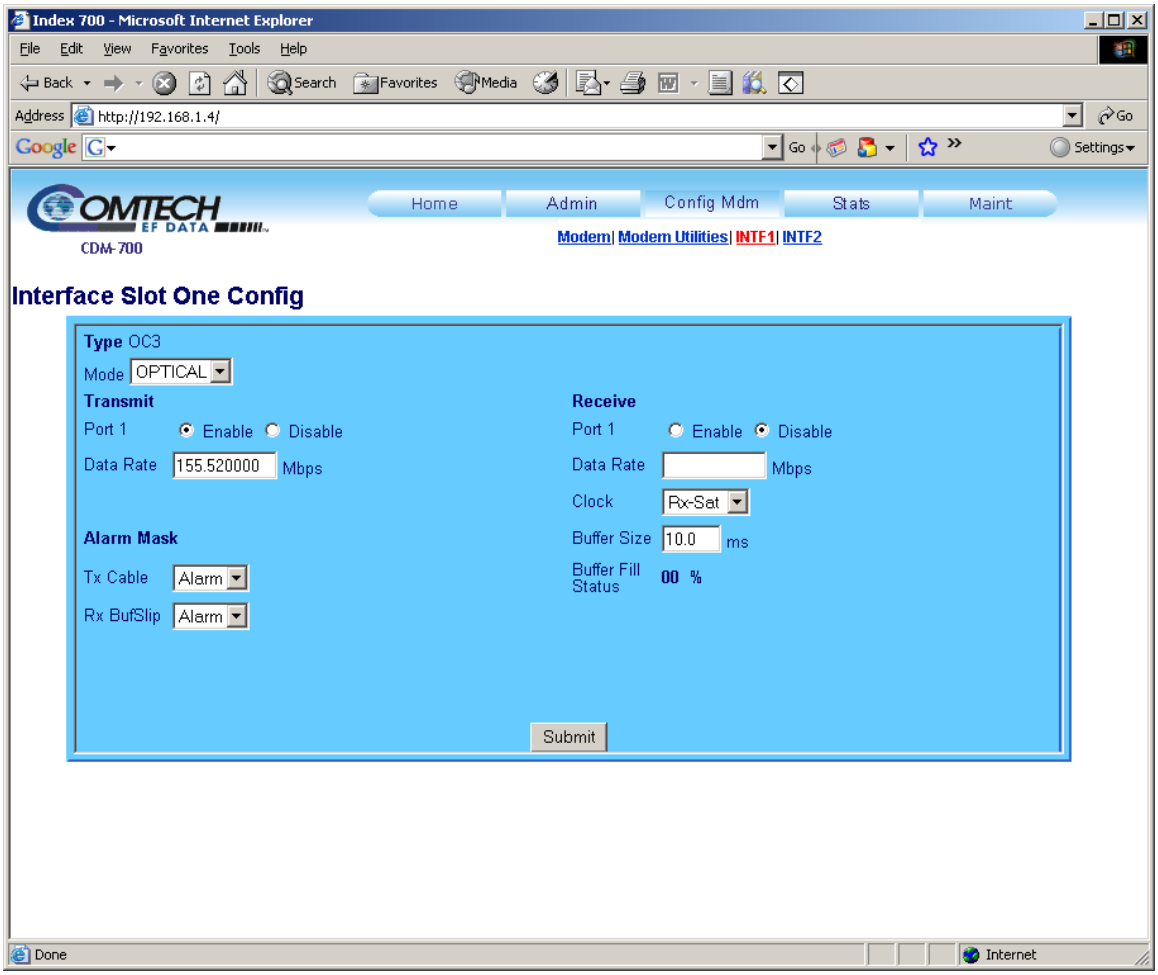


Figure 15-10. Config Mdm: INTF1 – OC3 Page

Typically, the configuration interface window on the '**Config Mdm: INTF1'** page identifies, in the upper lefthand corner, the interface module type installed into Slot 1.

As shown in **Figure 15-10**, the CDI-50 OC3 / STM-1 Interface Module is installed in the Slot 1 position in the CDM-700 chassis.

For details on the configuration parameters available for this interface, refer to **Chapter 6. FRONT PANEL OPERATION** and **Appendix C. OC3 / STM-1 Interface (CDI-50).**

Once the desired configuration settings have been made on this page, the User should then click on **Submit** to save these changes.

15.5.3.3 Config Mdm: INTF1 – HSSI Page

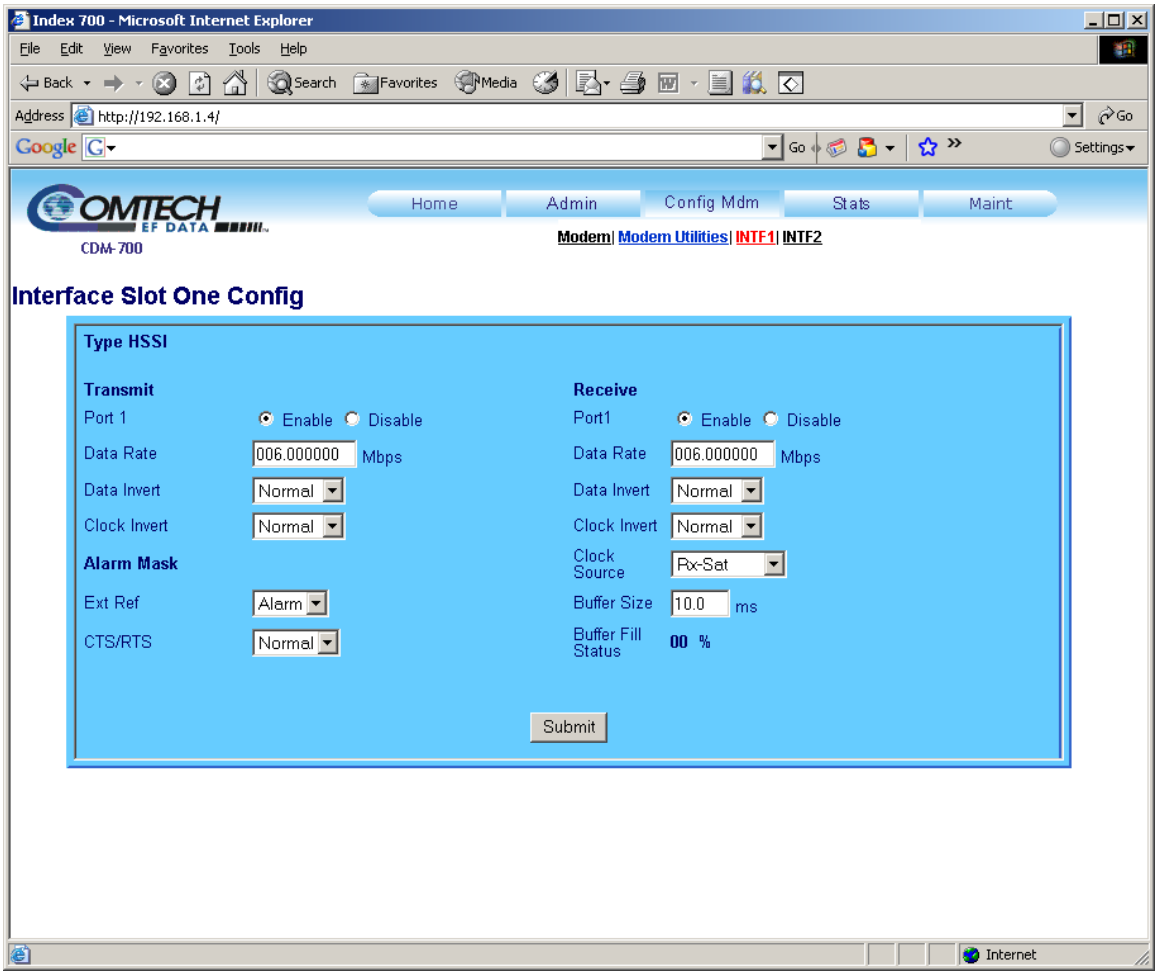


Figure 15-11. Config Mdm: INTF1 – HSSI Page

As shown in **Figure 15-11**, the CDI-60 HSSI Interface Module is installed in the Slot 1 position in the CDM-700 chassis.

For details on the configuration parameters available for this interface, refer to **Chapter 6. FRONT PANEL OPERATION** and **Appendix D. HSSI Interface (CDI-60).**

Once the desired configuration settings have been made on this page, the User should then click on **Submit** to save these change.

15.5.4 Config Mdm: INTF2 (Interface 2) Page

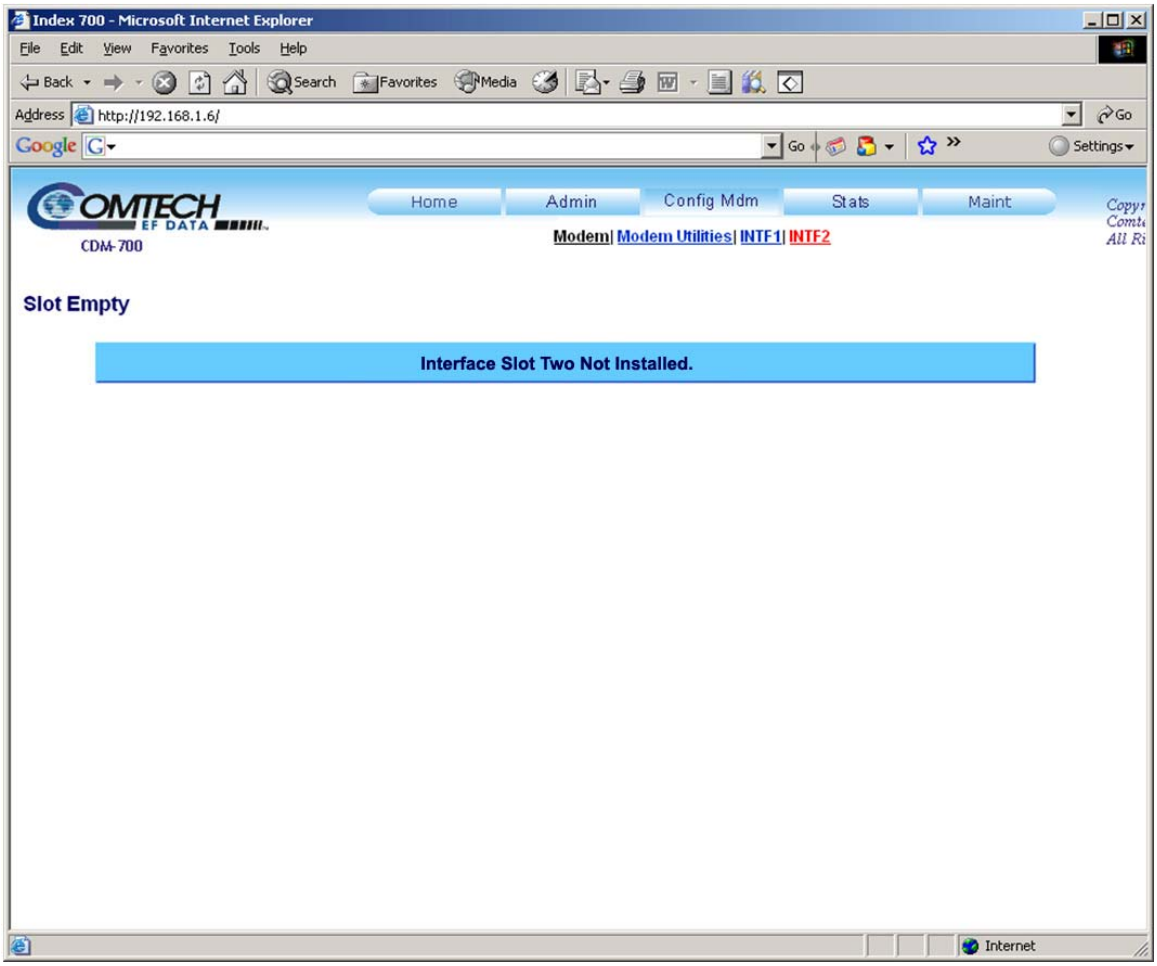


Figure 15-12. Config Mdm: INTF2 page (*Default – no module installed*)

As with the '**Config Mdm: INTF1'** page, the '**Config Mdm: INTF2**' page displays the configuration parameters for the Interface module installed in Slot 2, located on the rear panel of the CDM-700 chassis.

If there is no interface module present, as shown in **Figure 15-12** the page header reads "**Slot Empty**" and the message "**Interface Slot Two Not Installed.**" is displayed in place of a usable configuration window.

15.5.4.1 Config Mdm: INTF2 – GBEI (Gigabit Ethernet) Main Page

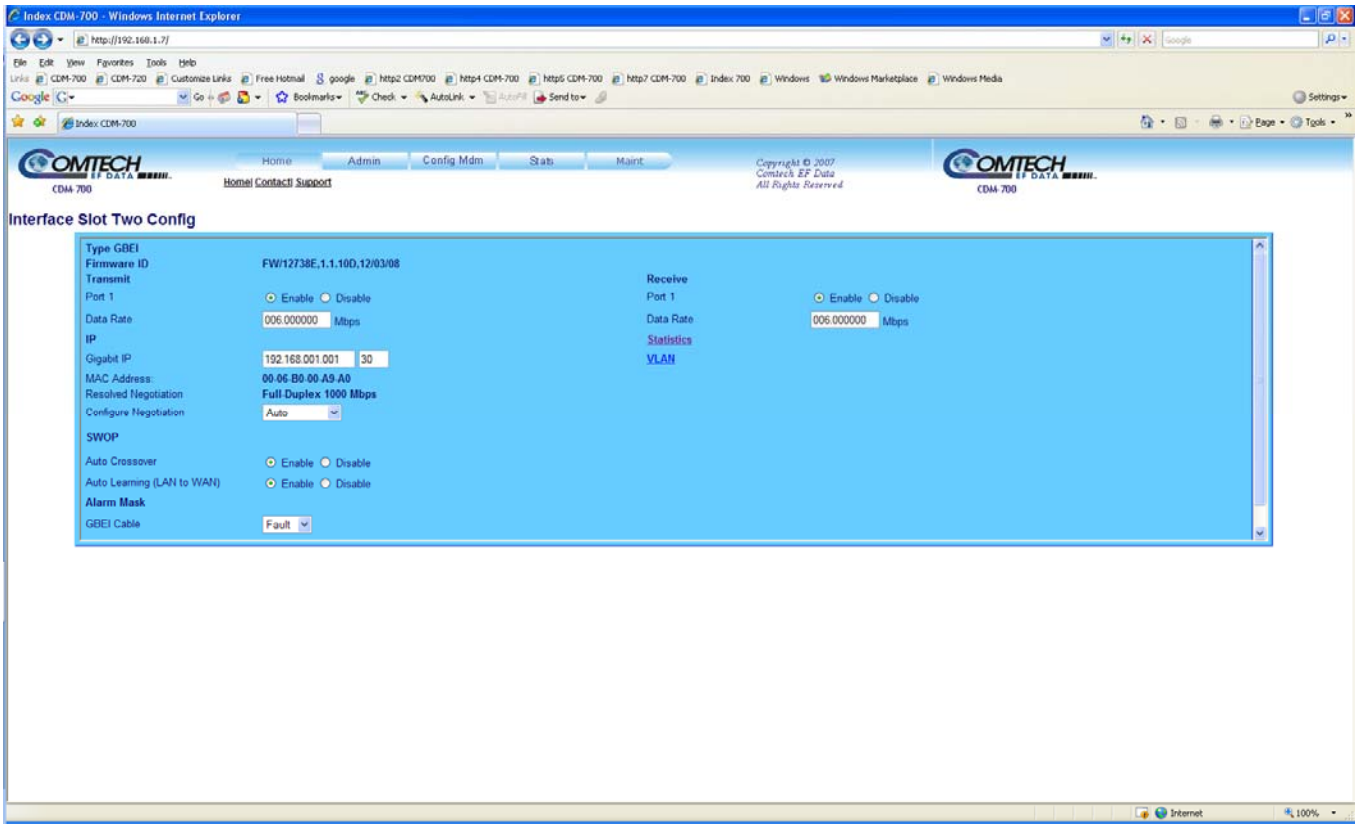


Figure 15-13. Config Mdm: INTF2 – GBEI Main Page

As shown in **Figure 15-13**, the CDI-70 Gigabit Ethernet Interface (GBEI) Module is installed in the Slot 2 position in the CDM-700 chassis.

Two nested pages are available for viewing GBEI statistics, or setting up VLAN operation when **SWOP** (**Sw**itch **Op**eration) is enabled. These pages may be accessed by clicking on **Statistics** or **Vlan**.

For details on the configuration parameters available for this interface, refer to **Chapter 6. FRONT PANEL OPERATION** and **Appendix E. 10/100/1000 Base-T (GbE) Interface (CDI-70).**

Once the desired configuration settings have been made on this page, the User should then click on **Config Interface** to save these change.

15.5.4.1.1 GBEI: Statistics Page

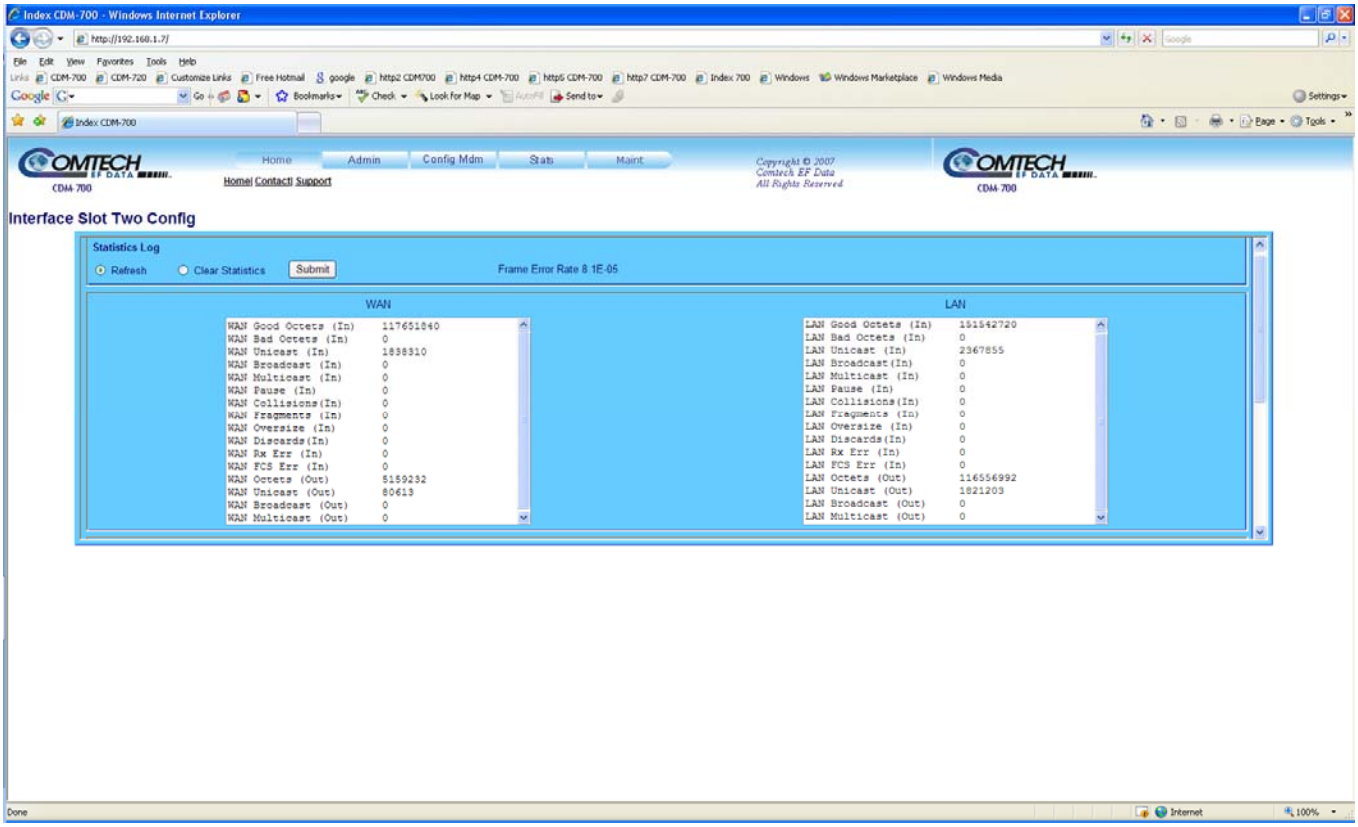


Figure 15-14. Config Mdm: INTF2 → GBEI Statistics Page

Clicking the **Statistics** button on the GBEI main Web page (**Figure 15-13**) allows the User to view the GBEI Statistics Log.

As shown in **Figure 15-14**, the User has the option of paging through the available statistics, or clearing the Statistics Log. Once the choice has been made on this page, the User should then click on **Submit** to execute the page update.

15.5.4.1.2 GBEI: VLAN Feature Page

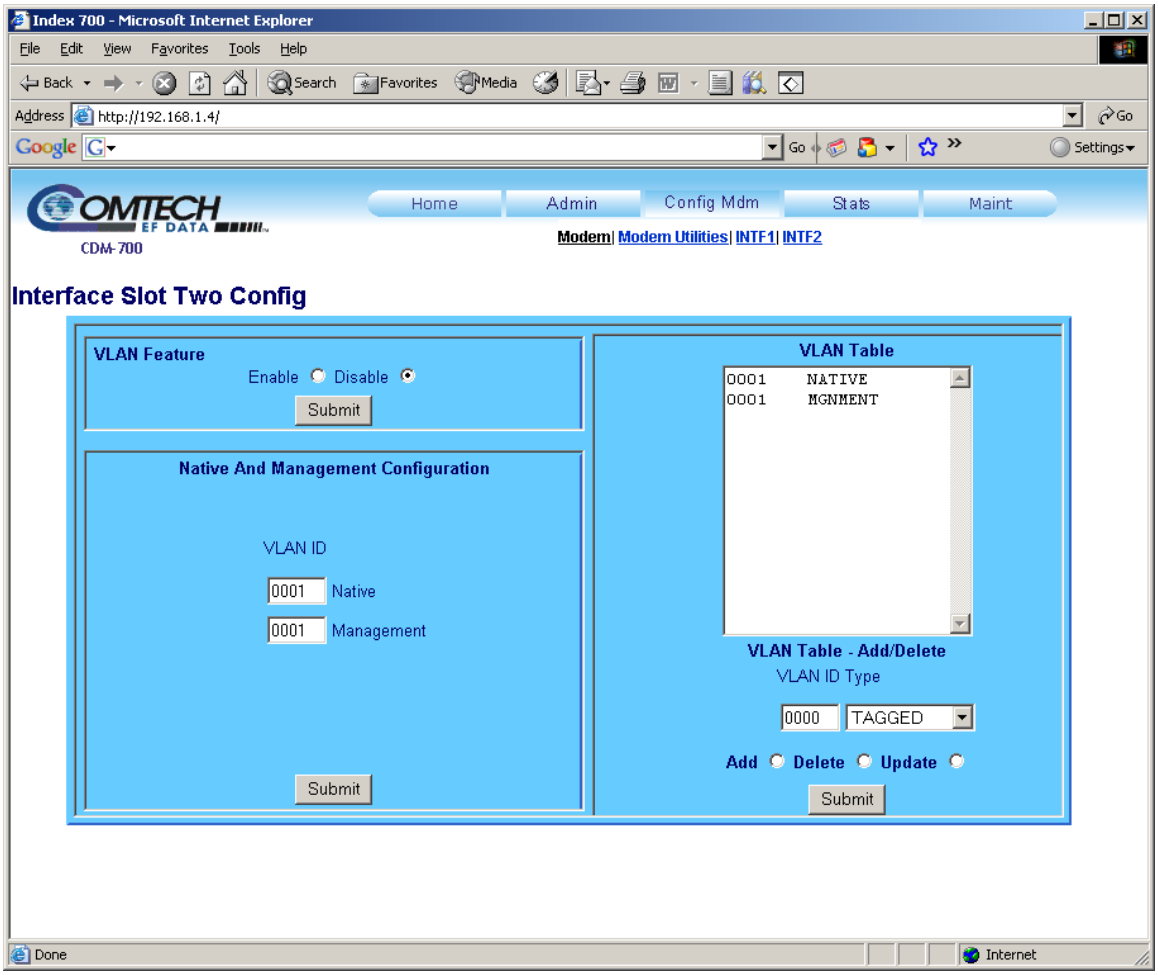


Figure 15-15. Config Mdm: INTF2 → GBEI VLAN Feature Page

Clicking the **VLAN** button on the GBEI Main Web page (**Figure 15-13)** allows the User to set up VLAN operation when **SWOP** (**Sw**itch **Op**eration) is enabled.. For details on the configuration parameters available for this page, refer to **Chapter 6. FRONT PANEL OPERATION.**

Once the desired settings have been made in any of the three configurations windows available on this page (as shown in **Figure 15-15**), the User should then click on **Submit** to save these change.

15.6 Stats (Statistics) Pages

15.6.1 Stats: Modem Status Page

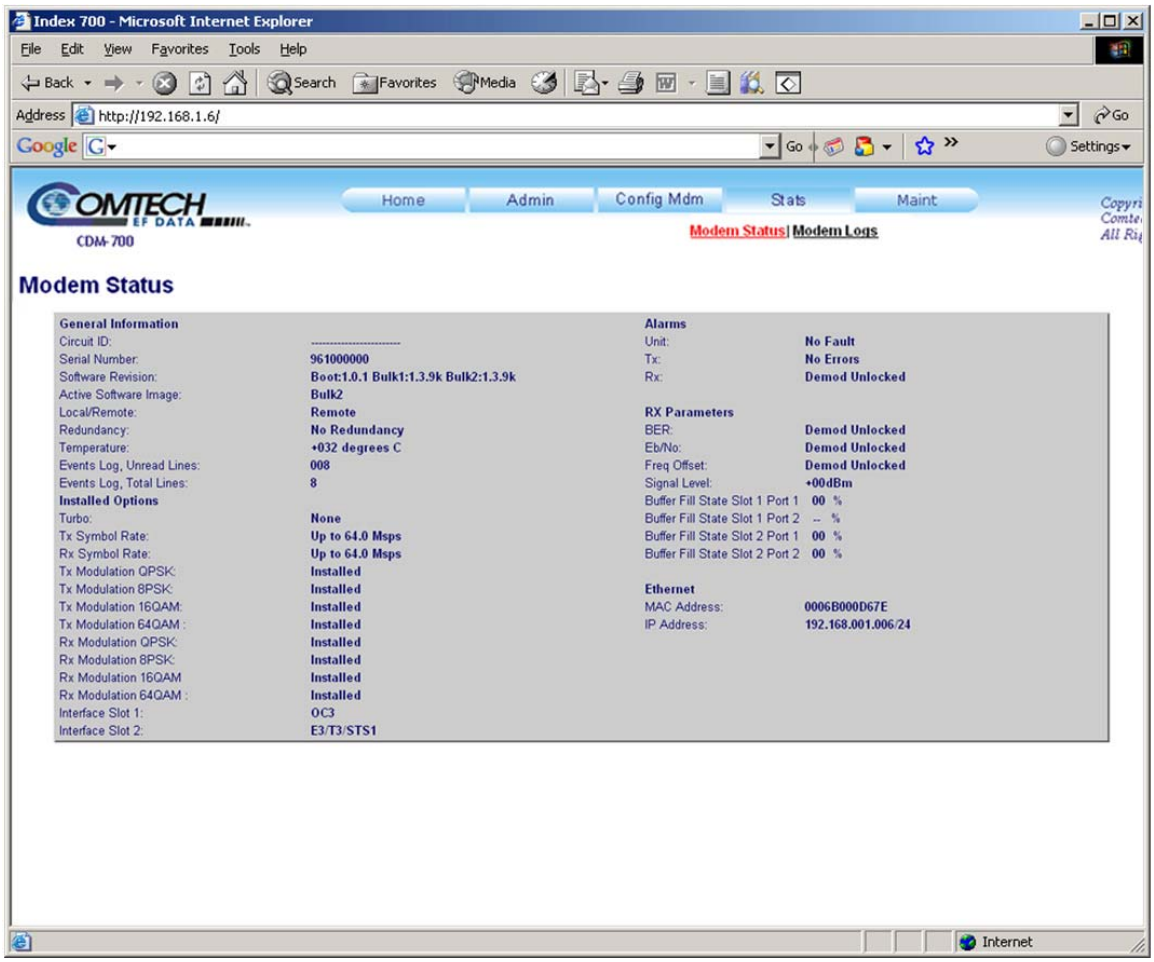


Figure 15-16. Statistics: (Main) Modem Status Page

The **Stats (Statistics)** pages provide the User with 'read only' status window: General operating and configuration information about the modem; Installed Options (FAST, Interface modules, etc.); Alarms; Tx and Rx Parameters; and Ethernet information.

The **Modem Status** page, shown here in **Figure 15-16**, is the default page displayed once the User clicks on the **Stats** tab.

15.6.2 Stats: Modem Logs Page

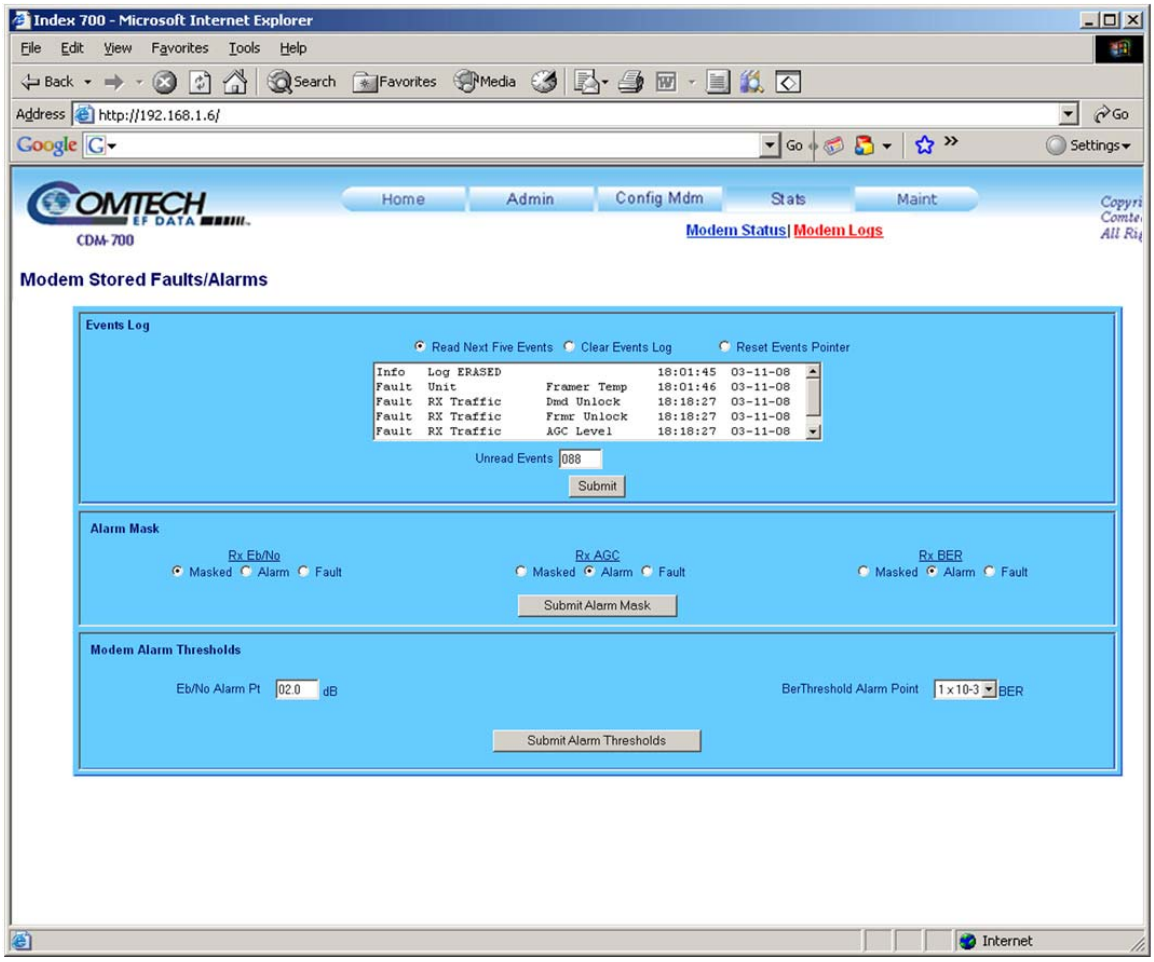


Figure 15-17. Statistics: Modem Logs Page

The **Stats: Modem Logs** page, shown in **Figure 15-17**, provides the User with contol over how Faults and Alarms are proceesed by the unit. For details on the configuration parameters available for this page, refer to **Chapter 6. FRONT PANEL OPERATION.**

15.7 Maint (Maintenance) Page: Unit Information

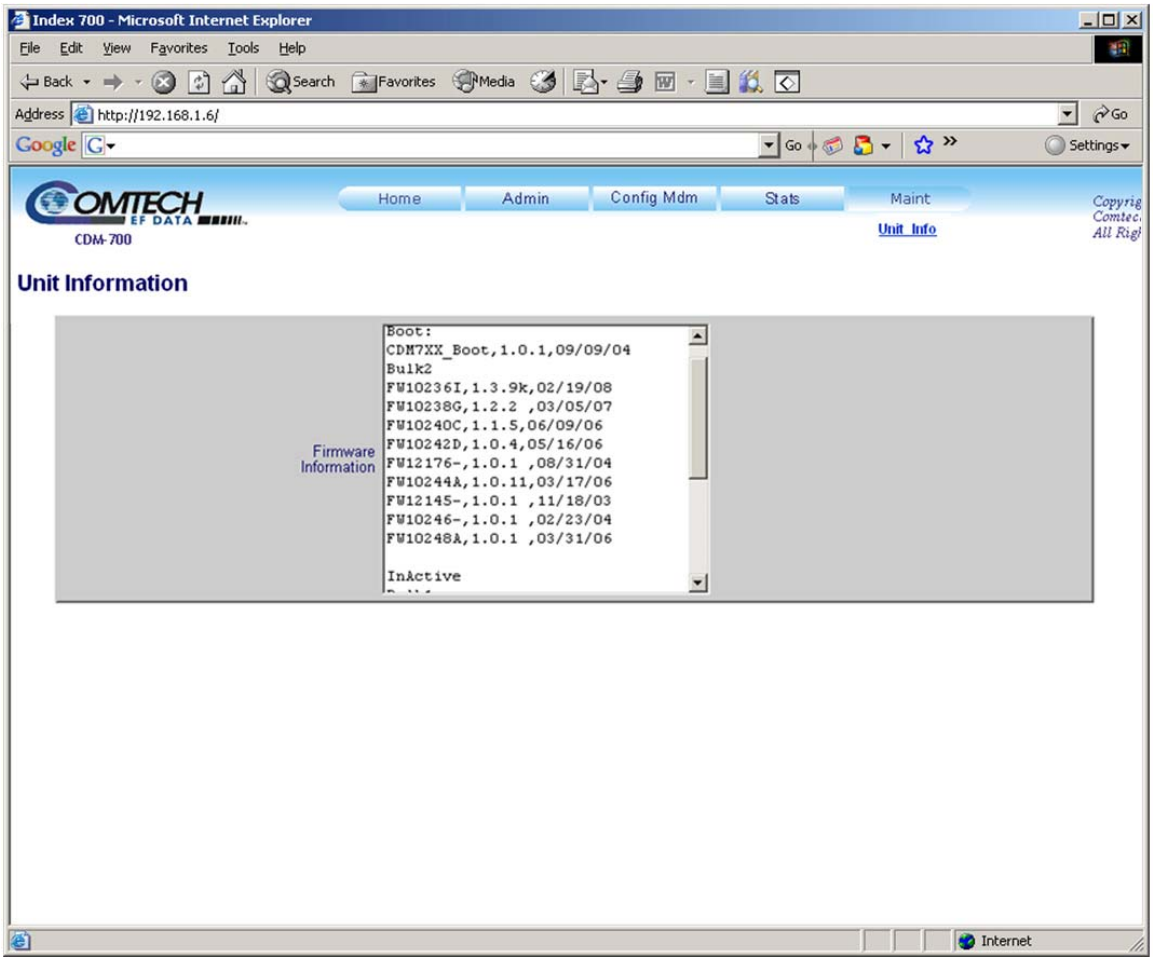


Figure 15-18. Maintenance: (Main) Unit Information Page

The **Maint: Unit Info** page, shown in **Figure 15-18**, provides the User a scrollable 'read-only' status window containing the unit's firmware information for Boot, Active and Inactive Bulks. For details on the information provided on this page, refer to **Chapter 6. FRONT PANEL OPERATION.**

Appendix A. FAST ACTIVATION PROCEDURE

A.1 Introduction

Fully Accessible System Topology (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.

d. Press **[ENTER].**

e. Use **[←][→]** and **[↑][↓]** arrow keys to enter the 20-character configuration code.

f. 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

The Dual E3/T3/STS-1 Interface (CDI-10) 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. 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 – located to the right center of the rear panel – is filled with a data interface module first; Slot 2 – located to the right side edge of the chassis – is assigned a blank panel or another interface depending upon configurations allowed at time of order.

Initially, the modem is available in Duplex and Rx only configurations.

The CDI-10 module provides two independent interfaces (ports) that are operable E3/T3/STS-1. Two primary data interfaces used in the satellite applications are featured:

- 2 independent G.703 Interfaces:
  - E3, T3, STS-1or OFF
  - Each separately programmed
- External Clock Input

Figure B-1 depicts the block diagram of the interface. **Figure B-2** shows the module looking at the rear panel.

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.

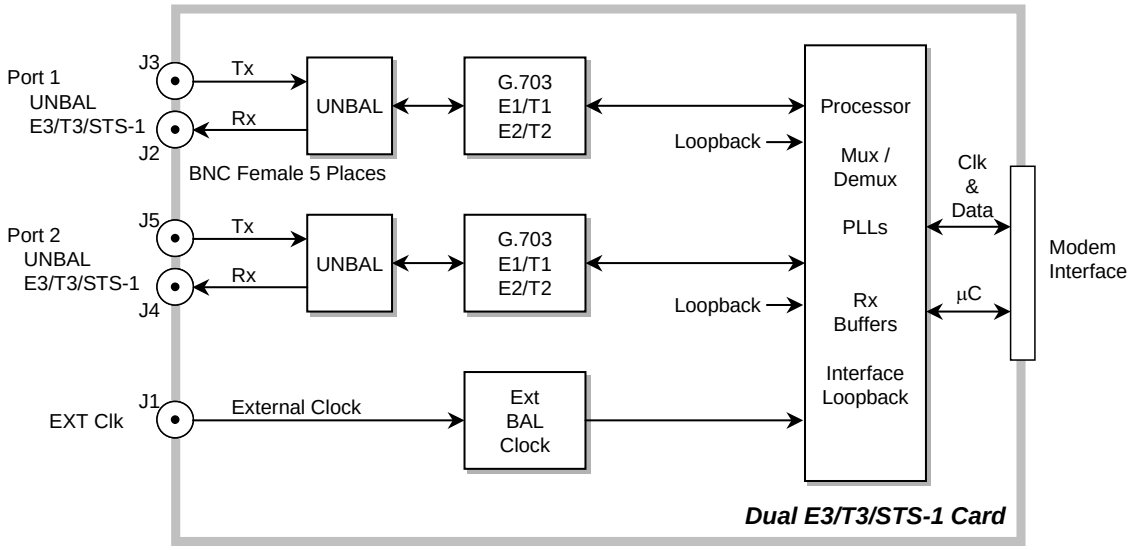


Figure B-1. Block Diagram of Dual E3/T3/STS-1 Data Interface Module

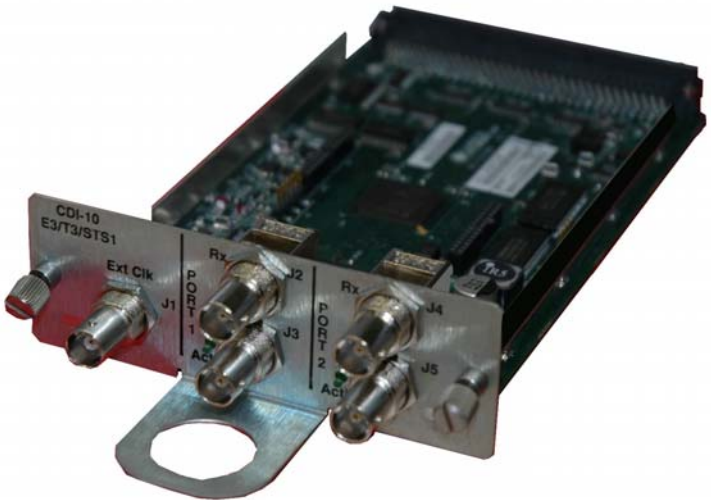


Figure B-2. Dual E3/T3/STS-1 Data Interface Module (CDI-10)

B.2 Summary of Specifications

<table>
<tr><th colspan="4">Item</th><th colspan="4">Requirements</th></tr>
<tr><td rowspan="11">General</td><td colspan="3">Interfaces</td><td colspan="4">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.</td></tr>
<tr><td colspan="3">External Clock Input</td><td colspan="4">1 input</td></tr>
<tr><td colspan="3">Interfaces Operating Simultaneously</td><td colspan="4">None, one or both of the interfaces</td></tr>
<tr><td colspan="3">Interface Selection</td><td colspan="4">Each of the interfaces is individually enabled</td></tr>
<tr><td colspan="3" rowspan="6">Rx Buffer:
G.703 Frame Types</td><td>Type</td><td>Bits</td><td>Bytes</td></tr>
<tr><td>G.751</td><td>1536</td><td>192</td></tr>
<tr><td>G.752</td><td>4760</td><td>595</td></tr>
<tr><td>G.753</td><td>2148</td><td>268.5</td></tr>
<tr><td>STS-1</td><td>6480</td><td>810</td></tr>
<tr><td colspan="4">Note: Programmable in 0.5 ms increments.</td></tr>
<tr><td colspan="3">Minimum Buffer Size for any rate</td><td colspan="4">0.5 ms</td></tr>
<tr><td colspan="3">Maximum Buffer Size</td><td colspan="4">G.751 61 ms
G.752 44 ms
G.753 61 ms
STS-1 40 ms</td></tr>
<tr><td colspan="3">Clock Options</td><td colspan="4">Tx Clock = Tx, Rx (satellite) or External
Rx Clock = Tx, Rx, External or Internal
Note: Asymmetric operation is not supported</td></tr>
<tr><td colspan="3">Acquisition Range</td><td colspan="4">Programmed Tx data rate ± 100 ppm</td></tr>
<tr><td colspan="3">Test</td><td colspan="4">Baseband Loopback (at interface)
Interface Loopback (through interface module)
2047 test pattern generator</td></tr>
<tr><td colspan="3">Hot Swap Capability</td><td colspan="4">None</td></tr>
<tr><td rowspan="4">Interfaces</td><td colspan="3">G.703 Unbalanced:
Connector Type
Signals Supported
Data Rate
Tx and Rx Data Rates
Line Coding
Pulse Mask
Jitter
Impedance</td><td colspan="4">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</td></tr>
<tr><td>External Clock Input</td><td colspan="2">Connector
Impedance
Input Amplitude
Input Frequency
Signal Characteristics</td><td colspan="4">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%</td></tr>
<tr><td colspan="3">Alarms</td><td colspan="4">Loss of Signal
All 1’s</td></tr>
<tr><td rowspan="3">Physical and Environmental</td><td colspan="2" rowspan="2">Environmental</td><td>Humidity</td><td colspan="4">0 to 50 °C (32 to 122°F)</td></tr>
<tr><td>Temperature</td><td colspan="4">0 to 95% non-condensing</td></tr>
<tr><td colspan="3">Dimensions</td><td colspan="4">3.95 W x 8.14 D x 1.5 H inches
(10.03 W x 20.67 D x 3.81H cm)</td></tr>
</table>

B.3 Connector Pinouts

Port	Ref	Description	Direction	Connector
1	J3	Tx-Data	In	BNC, Female
	J2	Rx-Data	Out	
2	J5	Tx-Data	In	
	J4	Rx-Data	Out	
	J1	Ext-Clk	In	

Appendix C. OC-3 / STM-1 INTERFACE (CDI-50)

C.1 Introduction

The CDI-50 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. 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 – located to the right center of the rear panel – is filled with a data interface module first; Slot 2 – located to the right side edge of the chassis – is assigned a blank panel or another interface depending upon configurations allowed at time of order (i.e., when an OC-3 / STM-1 module is installed in Slot 1, Slot 2 is a blank panel).

Initially, the modem is available in Duplex and Rx only configurations.

Two types of OC-3 / STM-1 modules area available; one is selected at the time of order. Each module has two interfaces: one optical, and the other copper (coaxial); the user programs the active interface.

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 depicts a block diagram of the interface. **Figure C-2** shows the module, looking at the rear panel of the interface.

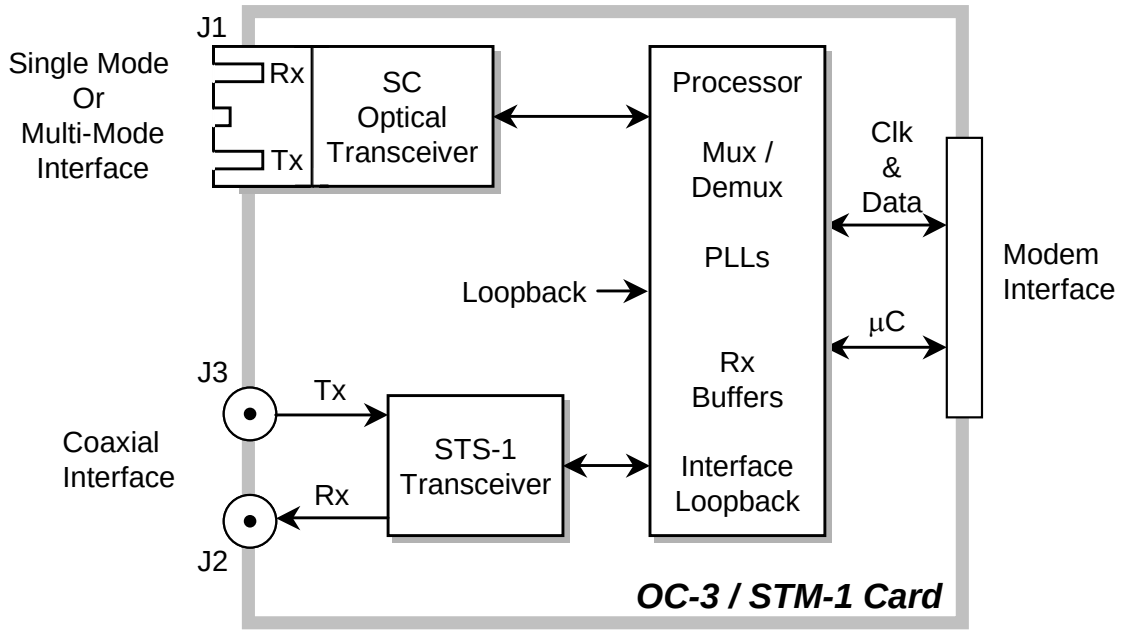


Figure C-1. Optical / Coaxial Interface Block Diagram

Figure C-2. CDI-50 Rear Panel

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 module)
	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 module)
	Jitter		G.825
	Hot Swap Capability		No
	Rx Buffer		0.5 to 26 mS in 0.1 mS steps
Physical and Environmental	Environmental	Humidity	0 to 95% non-condensing
		Temperature	0 to 50 °C (32 to 122°F)
	Physical		3.95 W x 8.14 D x 1.5 H inches (10.03 W x 20.67 D x 3.81H cm)
M&C (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 connector pinouts are as follows:

Interface		Description
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

The CDI-60 HSSI 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. 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 – located to the right center of the rear panel – is filled with a data interface module first; Slot 2 – located to the right side edge of the chassis – is assigned a blank panel or another interface depending upon configurations allowed at time of order (i.e., when a HSSI module is installed in Slot 1, Slot 2 is a blank panel).

Initially, the modem is available in Duplex and Rx only configurations.

The CDI-60 plugs into the rear of the modem. **Figure D-1** depicts the block diagram for the interface. The CDI-60 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 the CDI-60 HSSI interface, looking towards the real panel – the SCSI-2 connector serves as the data port. A summary of specifications for the interface is provided in **Table D-1**; the connector pinout is shown in **Table D-2**.

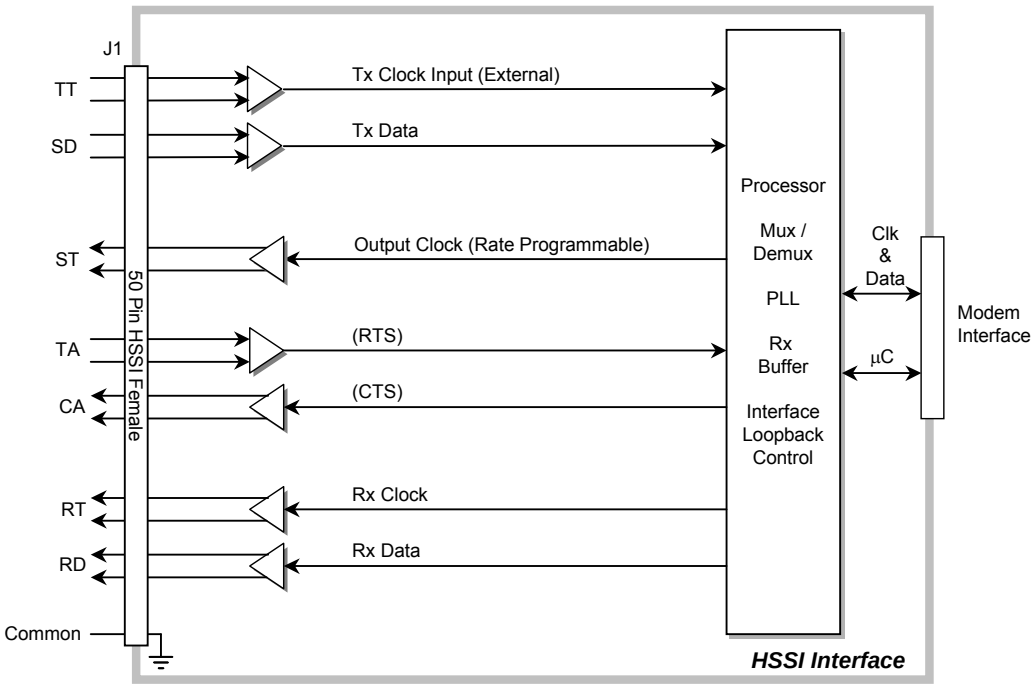


Figure D-1. HSSI Interface Block Diagram

Figure D-2. HSSI Interface

D.2 Physical Description

The HSSI data 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 SCSI 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 Module		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 110□ load Differential Input voltage: 150 to 1000 mV pp with 110□ load
Minimum Buffer Size		5.0 mS smallest buffer setting, 0.1 mS step size, 32 mS maximum size
Impedance	Rx	110□ for TT, SD, TA
	Tx	ST, CA, RT, RD will drive 110□ 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	CA looped to TA
	Selection:	CA is asserted when there is no modem fault
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
Modules 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 LEDs indicate channel is enabled

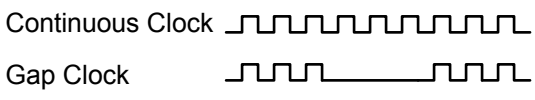


Figure D-3. Continuous and Gap Clock at TT

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 CDI-60 HSSI data interface has a 50-pin female SCSI-2 (mini-D) connector; the pinout is 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

Appendix E. 10/100/1000 BASE-T INTERFACE (GBEI) (CDI-70)

E.1 Introduction

The CDI-70 10/100/1000 Base-T Ethernet Interface, or GBEI, acts as an Ethernet bridge for data traffic. **M**onitor and **C**ontrol (M&C) information is not supported on the GBEI but available through the 10/100 Base-T remote port of the modem.

The GBEI provides 10/100/1000 Base-T connectivity and supports data rates from 1 Mbps to 155 Mbps. IP traffic entering the 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 GBEI is shown in **Figure E-1**. The user interface to the GBEI module 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. CDI-70 1000 Base-T Gigabit Ethernet Interface (GBEI)

E.2 Physical Description

The GBEI 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

Additional GBEI Statistics Summary specifications are provided in Chapter 6, in the Section describing the front panel commands for (CONFIG:) Intfc1 (CDI-70 Gigabit Ethernet Interface).

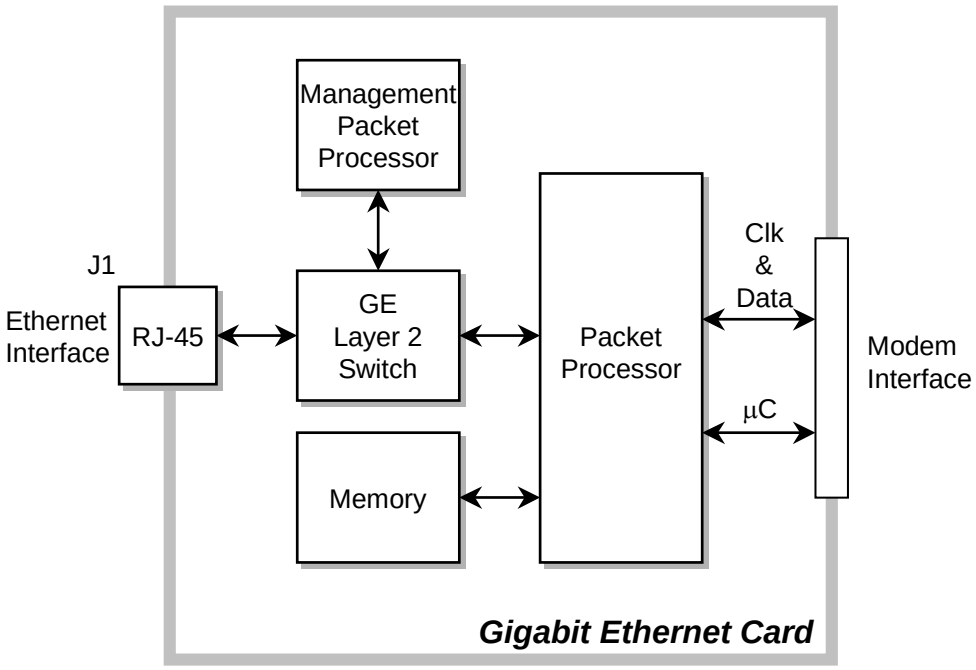


Figure E-2. GBEI Interface Option Board – Phase 1

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's CDI-70 GBEI module contains its own processor and memory. On occasion, CEFD may release new software to fix anomalies or add functionality to this interface board.

The GBEI board uses 'flash memory' technology internally. This makes software upgrading very simple, and updates can now be obtained via the Internet (**Figure E-3**), e-mail, or on CD.

This section outlines the complete upgrading process as follows:

- New firmware can be downloaded via the Internet to an external PC.
- 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.
- The firmware update is transferred, via File Transfer Protocol (FTP), to the unit.

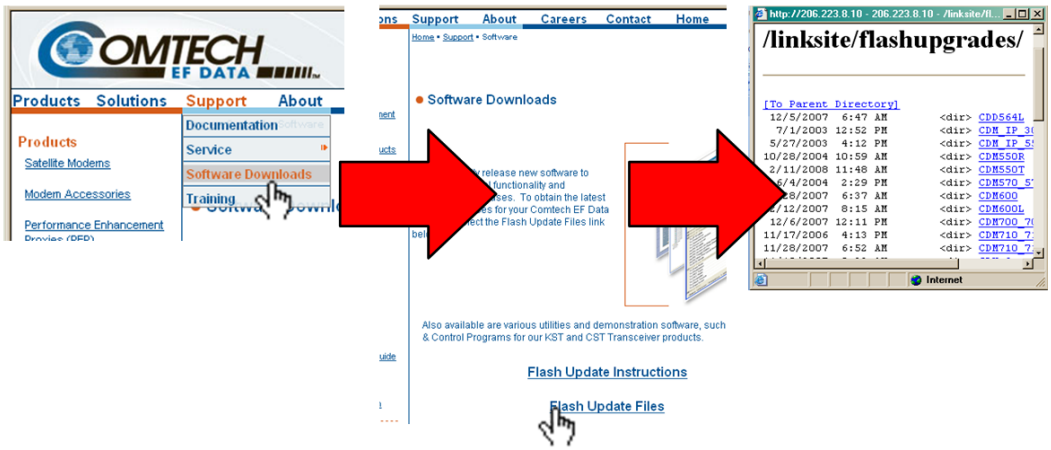


Figure E-3. Flash Update via Internet

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.

Continue upgrading the unit using the instructions in Section E.5.1.

E.5.1 Upgrading the Gigabit Ethernet Interface Card Firmware

1. Download the Files

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

b. From the web browser, access the download server using the following flash firmware data files URL:
http://206.223.8.10/linksite/flashupgrades/CDM700_700L/GBEI/

c. Download the correct firmware file to the folder created in Step 1. The bulk firmware for the Gigabit Ethernet Interface Card is: **FW12738-.bin**

d. On the PC, Unzip the files in the temporary folder. At least 4 files must be extracted:

i. **FW12738x.bin**, where "x" is the revision (bulk image file)

ii. **ReleaseNotes_FW12738_vxxx.pdf**, where "xxx" is the complete version

iii. **readme_vxxx_GBEI.TXT,** installation notes file

iv. **CReflash.exe**, use this executable to load the firmware onto the GBEI

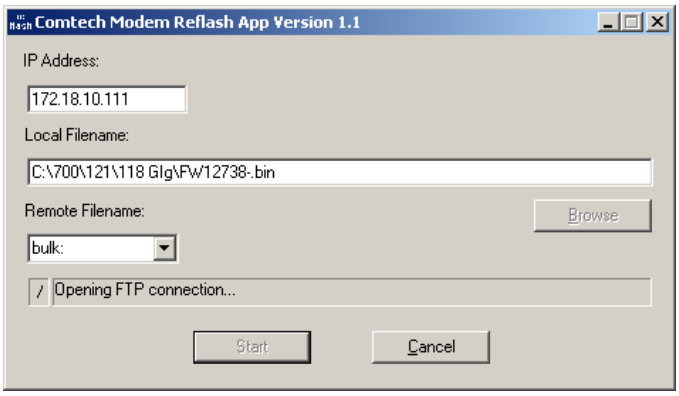
2. Connect the PC to the Interface

a. Connect the client PC to the Gigabit Ethernet Interface Card via an Ethernet hub or a switch, or directly to a PC with a crossover cable.

b. Enable the GBEI on the CDM-700/700L to enable the PHY interface on the GBEI.

3. Reflash the Unit

a. Double-click on **CReflash.exe** to start the Comtech Modem Reflash Application:



b. Type the IP Address on the GigE card in the **IP Address** field.

c. Select the **Local Filename** to load by either (1) typing the path and filename , or (2) using the **Browse** button to select the file.

d. Leave the selection for **Remote Filename** as **"bulk:"**.

e. Click **Start.**

f. The **CReflash.exe** executable will automatically FTP the filename to the IP address entered and display the progress of the update.

IMPORTANT: Once the CReflash.exe application has been started, the program will not respond to user input for approximately 5 minutes.
DO NOT CLOSE PROGRAM
DO NOT REBOOT MODEM.

g. When it is finished, you will see **'Successful!**' in the **/** status line.

h. Cycle power to the CDM-700/700L to have the new firmware loaded on the GBEI.

i. Verify the version update using the front panel menu.

E.6 GBEI Operational Setups

The CDM-700 GBEI 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 GBEI operates like a network hub device which means it acts like a “direct wire” connection and passes all Ethernet traffic and broadcasts. **Figure E-4** is an example of using the GBEI 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 GBEI port. **Figure E-5** 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-4. Example of GBEI Interface Bridging a Remote Host on a Common LAN over the Satellite

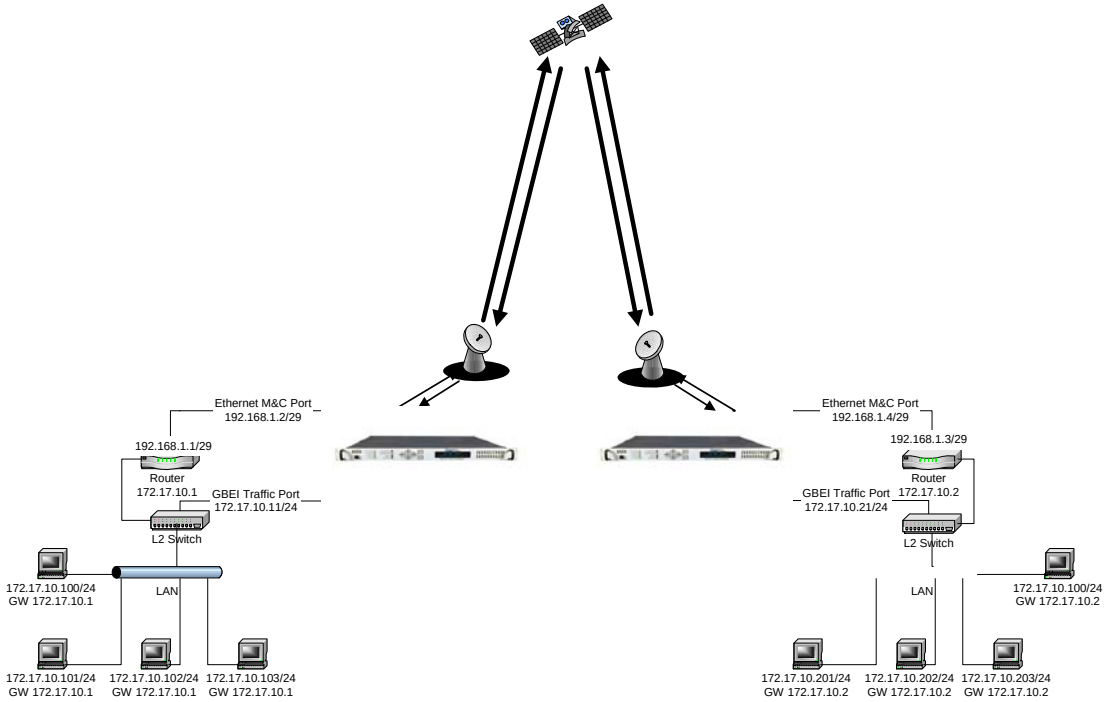
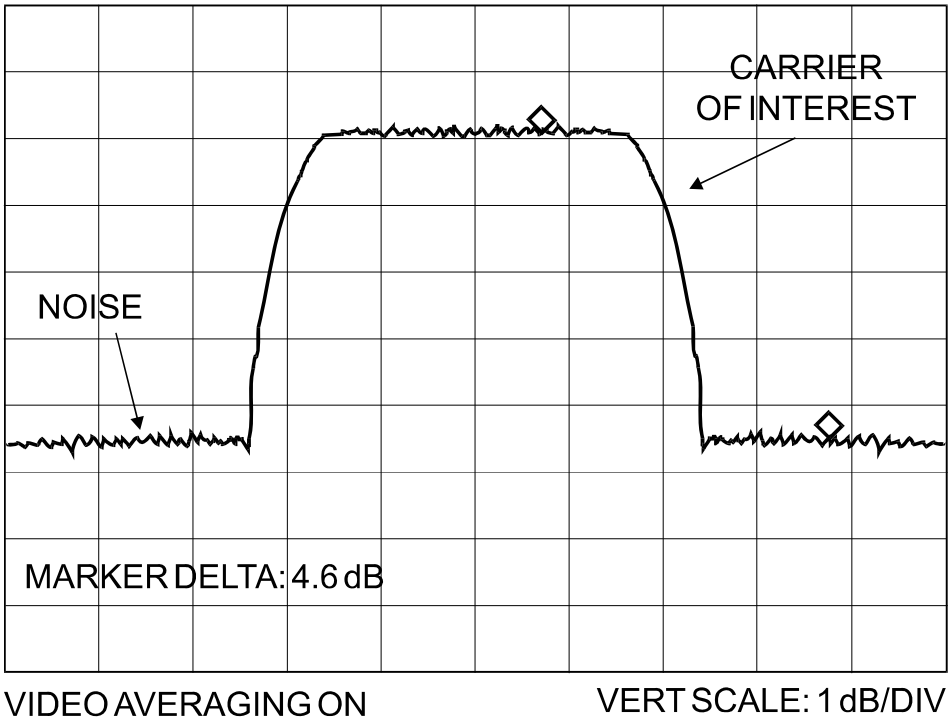


Figure E-5. Example of M&C Port Assigned an IP Address NOT on a Common LAN

Appendix F. E_b/N_0 MEASUREMENT

Although the CDM-700 calculates and displays the value of receive E_b/N_0 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 on the previous page, the (Co+No)/No measured is 4.6 dB. If Rate 3/4 QPSK is used, this corresponds to an E_b/N_0 of approximately 1.1 dB.

  The exact relationship used to derive the table values is as follows:

  $$E_b/N_0 = 10 \log_{10}(10^{(Co+No/No)/10} - 1) - 10 \log_{10}(\text{FEC Code Rate}) - 10 \log_{10}(\text{bits/symbol})$$

  and:

  - E_b/N_0 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	E_b/N_0	E_b/N_0	E_b/N_0	E_b/N_0	E_b/N_0	E_b/N_0	E_b/N_0	E_b/N_0
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.

This page is intentionally blank.

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	—

2114 WEST 7TH STREET TEMPE ARIZONA 85281 USA
480 • 333 • 2200 PHONE
480 • 333 • 2161 FAX