CDD-562L/564

Demodulator with IP Module
Installation and Operation Manual

(Includes data for the CDD-562L, CDD-564, and CDD-564L Configurations)

For Firmware Version 1.6.10 or higher

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

Part Number MN/CDD564L.IOM Revision 2

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Revision 2

Comtech EF Data, 2114 West 7th Street, Tempe, Arizona 85281 USA, 480.333.2200, FAX: 480.333.2161

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PREFACE

About this Manual

This manual provides installation and operation information for the Comtech EF Data CDD-562L (L-Band) Dual, CDD-564 (70/140 MHz) Quad, and CDD-564L (L-Band) Quad Demodulator with IP Module. The demodulators include support for externally connected Low-Noise Block Downconverters (LNBs).

This is document is intended for the persons responsible for the operation and maintenance of the demodulator.

Reporting Comments or Suggestions Concerning this Manual

Comments and suggestions regarding the content and design of this manual are appreciated. To submit comments, contact the Comtech EF Data Technical Publications Department:

TechnicalPublications@comtechefdata.com

Conventions and References

Warnings, Cautions, and Notes

A <u>WARNING</u> gives information about a possible hazard that MAY CAUSE DEATH or SERIOUS INJURY.

A <u>CAUTION</u> gives information about a possible hazard that MAY CAUSE INJURY or PROPERTY DAMAGE.

A <u>NOTE</u> gives important information about a task or the equipment.

A <u>REFERENCE</u> directs the user to additional information about a task or the equipment.

Patents and Trademarks

See all of Comtech EF Data's Patents and Patents Pending at http://patents.comtechefdata.com.

Comtech EF Data acknowledges that all trademarks are the property of the trademark owners.

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.

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Recommended Standard (RS) Designations have been superseded by the new designation of the Electronic Industries Association (EIA).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.

The user should carefully review the following information.

Safety and Compliance

Electrical Safety and Compliance

The unit complies with the **EN 60950 Safety of Information Technology Equipment (Including Electrical Business Machines)** safety standard.

IF THE UNIT IS OPERATED IN A VEHICLE OR MOVABLE INSTALLATION, MAKE SURE THE UNIT IS STABLE. OTHERWISE, EN 60950 SAFETY IS NOT GUARANTEED.

Grounding

PROPER GROUNDING PROTECTION IS REQUIRED: The installation instructions require that the integrity of the protective earth must be ensured and that the equipment shall be connected to the protective earth connection at all times.

The CDD-562L/564 is designed for connection to a power system that has separate ground, line and neutral conductors. The equipment is not designed for connection to a power system that has no direct connection to ground. It is therefore imperative during installation, configuration, and operation for the user to ensure that the unit has been properly grounded using the ground stud provided on the rear panel of the unit.

Electrical Installation

The equipment is rated for operation over the range 100 - 240 volts AC. It has a maximum power consumption of 140 Watts (when all inputs are supplying DC to LNBs), and draws a maximum of 1.5 Amps.

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

The CDD-562L/564 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.

Operating Environment

DO NOT OPERATE THE UNIT IN ANY OF THESE EXTREME OPERATING CONDITIONS:

- ***AMBIENT TEMPERATURES LESS THAN 0°C (32°F) OR MORE THAN 50°C (122°F). (MAXIMUM STORAGE TEMPERATURE ALLOWED IS -25°C (-13°F) TO 85°C (185°F)).***
- ***PRECIPITATION, CONDENSATION, OR HUMID ATMOSPHERES OF MORE THAN 95% RELATIVE HUMIDITY.***
- ***UNPRESSURIZED ALTITUDES OF MORE THAN 2000 METRES (6561.7 FEET).***
- ***EXCESSIVE DUST.***
- ***FLAMMABLE GASES.***
- ***CORROSIVE OR EXPLOSIVE ATMOSPHERES.***

European Union Radio Equipment and Telecommunications Terminal Equipment (R&TTE) Directive (1999/5/EC) and EN 301 489-1

Independent testing verifies that the unit complies with the European Union R&TTE Directive, its reference to EN 301 489-1 (***E****lectromagnetic compatibility and* ***R****adio spectrum* ***M****atters [ERM];* ***E****lectro****M****agnetic* ***C****ompatibility [EMC] standard for radio equipment and services, Part 1: Common technical requirements)*, and the Declarations of Conformity for the applicable directives, standards, and practices that follow:

European Union Electromagnetic Compatibility (EMC) Directive (2004/108/EC)

- **EN 55022 Class B –** *Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment.*

- **EN 55024 –** *Information Technology Equipment: Immunity Characteristics, Limits, and Methods of Measurement.*
- **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*
- **Federal Communications Commission Federal Code of Regulation FCC Part 15, Subpart B.**

TO ENSURE THAT THE UNIT COMPLIES WITH THESE STANDARDS, OBEY THESE INSTRUCTIONS:

- Use coaxial cable that is of good quality (e.g., RG58/U (50Ω) or RG59/U (75Ω)) for connections to the IF Tx and Rx (transmit and receive) BNC female connectors.
- Use Type 'D' connectors that have back-shells with continuous metallic shielding.

  Type ‘D’ cabling must have a continuous outer shield (either foil or braid, or both). The shield must be bonded to the back-shell.
- Operate the unit with its cover on at all times.

European Union Low Voltage Directive (LVD) (2006/95/EC)

Symbol	Description
<HAR>	Type of power cord required for use in the European Community.
	CAUTION: **Double-pole/Neutral Fusing** ACHTUNG: **Zweipolige bzw. Neutralleiter-Sicherung**

International Symbols			
Symbol	**Definition**	**Symbol**	**Definition**
~	Alternating Current	⏚	Protective Earth
⏛	Fuse	⏚	Chassis Ground

For additional symbols, refer to Warnings, Cautions and Notes listed earlier in this Preface.

European Union RoHS Directive (2002/95/EC)

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

European Union Telecommunications Terminal Equipment Directive (91/263/EEC)

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

CE Mark

Comtech EF Data declares that the unit meets the necessary requirements for the CE Mark.

Warranty Policy

Comtech EF Data products are warranted against defects in material and workmanship for a specific period from the date of shipment, and this period varies by product. In most cases, the warranty period is two years. During the warranty period, Comtech EF Data will, at its option, repair or replace products that prove to be defective. Repairs are warranted for the remainder of the original warranty or a 90 day extended warranty, whichever is longer. Contact Comtech EF Data for the warranty period specific to the product purchased.

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.

Getting Help

Review the Warranty Policy before contacting Comtech EF Data Technical Support or Customer Service.

Contacting Comtech EF Data

Contact Comtech EF Data for:

- ***Technical Support –*** Product support or training.
- ***Customer Service –*** Information on returning an in-warranty or out-of-warranty product for upgrade or repair. **Be prepared to provide the product model number and its serial number.**

Contact Comtech EF Data Customer & Technical Support during normal business hours (Monday through Friday, 8 A.M. to 5 P.M Mountain Standard Time (MST)):

For:		Contact:
CDM-625 Technical Support and Service	Telephone	+1.480.333.4357
	Email	cdmipsupport@comtechefdata.com
	Fax	+1.480.333.2500
Comtech EF Data Web Site	Main Page	http://www.comtechefdata.com
	Customer and Technical Support	http://www.comtechefdata.com/support.asp
	RMA (Return Material Authorization)	http://www.comtechefdata.com/rmaform.asp
Comtech EF Data Main Number		+1.480.333.2200
Mailing Address		2114 West 7th Street Tempe, Arizona 85281 USA

Returning a Product for Upgrade or Repair

Step	Task
1	Go to the Comtech EF Data **Service** page (*http://www.comtechefdata.com/service.asp*) and read the **Return Material Authorization** section in its entirety.
2	Request a Return Material Authorization Number: • *On the Comtech EF Data **Service** page:* Select the **Return Material Authorization** hyperlink. • *On the Comtech EF Data **Support** page (http://www.comtechefdata.com/support.asp):* Click **[Send RMA Request]** (http://www.comtechefdata.com/rmaform.asp); • Fill out the RMA form completely; • Click **[Send Email]**. • ***Alternately:*** o Send an e-mail providing this same detailed information to Comtech EF Data Customer Service (service@comtechefdata.com). o Contact Comtech EF Data Customer & Technical Support by phone or fax.
3	Pack the product in its original shipping carton and protective packaging.
4	Ship the product back to Comtech EF Data. **Shipping charges should be prepaid.**

Notes:

Chapter 1. INTRODUCTION

1.1 Overview

The CDD-562L (**Figure 1-1**) is a dual (2-channel) L-Band satellite demodulator. The CDD-564L (**Figure 1-2**) is a quad (4-channel) L-Band satellite demodulator; the CDD-564 is the 70/140 MHz IF version of the same demodulator; apart from the IF frequency band, these two demodulators are essentially identical.

Equipped with IP router, these demodulators are intended for closed network applications.

Figure 1-1. CDD-562L L-Band Satellite Dual Demodulator

Figure 1-2. CDD-564/564L 70/140 MHz / L-Band Satellite Quad Demodulators

To simplify reading, the product is referred to hereafter as either "*the demodulator*" or "the *CDD-56X*". If there is a need to distinguish between the units, the specific model number will be identified.

The CDD-56X provides many standard and optional features:

- Fast acquisition demodulator:
  - *CDD-562L:* Two independent demodulators
  - *CDD-564/564L:* Four independent demodulators
- *CDD-564:* Demodulator programmed from 50–90, 100–180 MHz IF range (70./140 MHz)
- *CDD-562L/CDD-564L:* Demodulators programmed from 950–1950 MHz (L-Band)
- **Optional:** Variable data rates from 16 kbps to 9.98 Mbps
- **Optional:** Rates above 512 kbps
- 2nd Generation Turbo Product Coding (TPC) Forward Error Correction (FEC)
- QPSK modulation
- **Optional:** 8-PSK and 16-QAM
- SNMP, HTTP (Web Server), and Telnet Remote Product Management
- LNB Support: 10 MHz reference and LNB power

1.2 Functional Description

The CDD-562L has two Rx channels. The CDD-564/564L have four Rx channels.

The demodulators have two fundamentally different types of interface: **Ethernet** and **IF**.

The Ethernet interface is a bidirectional path, which connects with the customer's equipment through an Ethernet Switch. The Ethernet interface is a 10/100 BaseT Ethernet port where data flow is the combined output of the demodulator channels. Control and status information also uses this port.

The IF interfaces provides independent unidirectional links (Rx only) with the satellite via the downlink equipment.

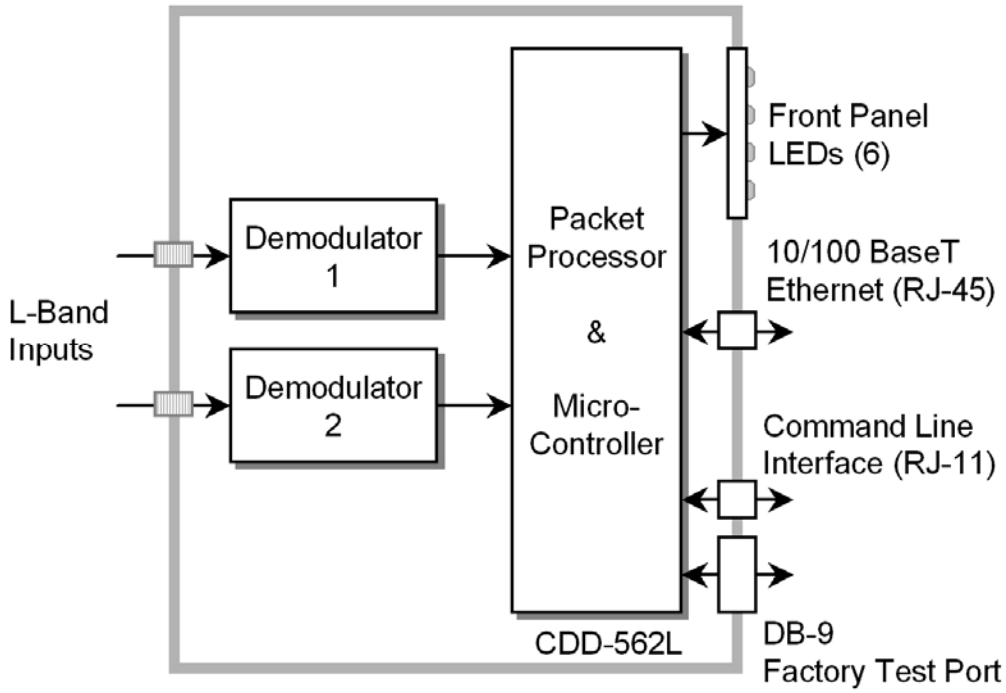
In the demodulator, the Rx IF signal in the range (*50–90 or 100–180 MHz for 70/140 MH z units, and 950–1950 MHz for L-Band units*) is translated to an intermediate frequency **(**approx. 465 MHz for L-Band), and then further translated to baseband using the carrier recovery VCO. This is a complex mix, resulting in the signal once more being split into an in-phase (I) and a quadrature (Q) component.

An AGC circuit maintains the desired signal level constant over a broad range. Following this, the I and Q signals are sampled by high-speed (flash) A/D converters. All processing beyond this conversion is purely digital, performing the functions of Nyquist filtering, carrier recovery, and symbol timing recovery. The resultant demodulated signal is fed, in soft decision form, to the selected FEC decoder (Turbo).

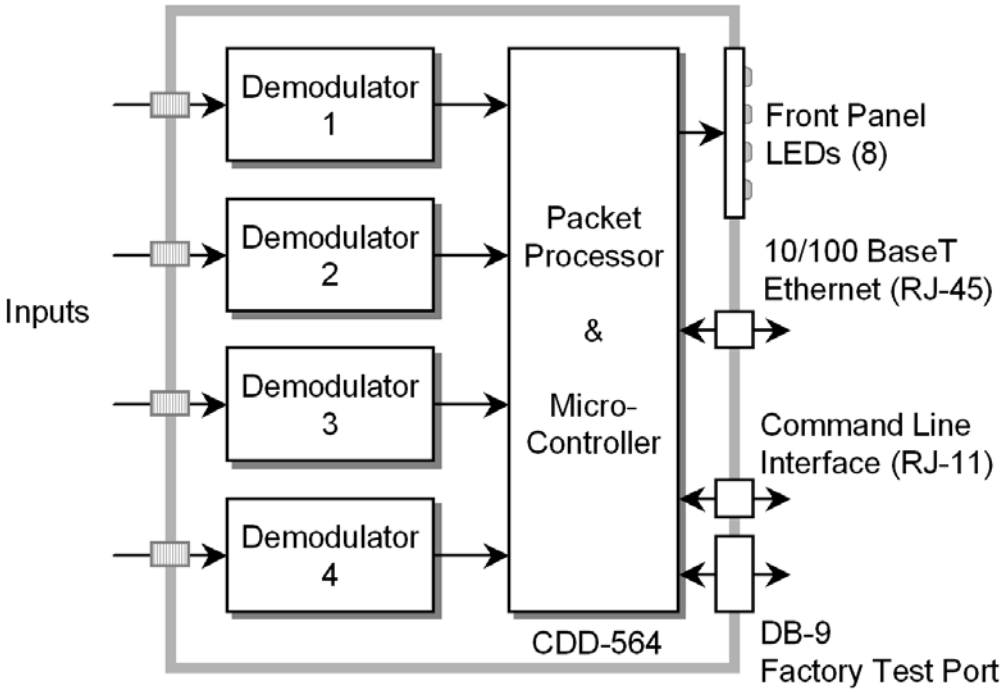
After decoding, the recovered clock and data pass to the IP Module where traffic is examined and processed for four channels before it is delivered to the Ethernet port.

The demodulator signal processing functions are performed in two, large **F**ield-**P**rogrammable **G**ate **A**rray (FPGA), which permits rapid implementation of changes, additions and enhancements in the field. These signal-processing functions are controlled and monitored by a 32-bit RISC microprocessor, which also controls all front panel indicators, serial and Ethernet interfaces.

As shown in the block diagrams depicted in **Figure 1-3**, the demodulator is physically comprised of a single printed circuit board assembly, with integral Turbo FEC and IP router.



CDD-562L Block Diagram



CDD-564/564L Block Diagram

Figure 1-3. CDD-5xx Block Diagrams

1.3 Features

1.3.1 Physical Description

The demodulators are 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.

1.3.2 Major Assemblies

Model	Assembly	Description
CDD-562L/564L	PL/10915-1	AC Chassis
	PL/10915-2	DC Chassis
CDD-564	PL/11548-1	AC Chassis
	PL/11548-2	DC Chassis
CDD-562L	PL/10735-2	Demodulator Card
CDD-564L	PL/10735-1	Demodulator Card

1.3.3 Interoperability/Compatibility

The demodulator is interoperable with the Comtech EF Data CDM-570 and CDM-570L Satellite Modems populated with the optional IP Module/router, as well as other Comtech EF Data IP-enabled products (including modems and Performance Enhancement Proxies). The demodulator supports the functions associated with receive side of the equipment.

1.3.4 Dimensional Envelopes

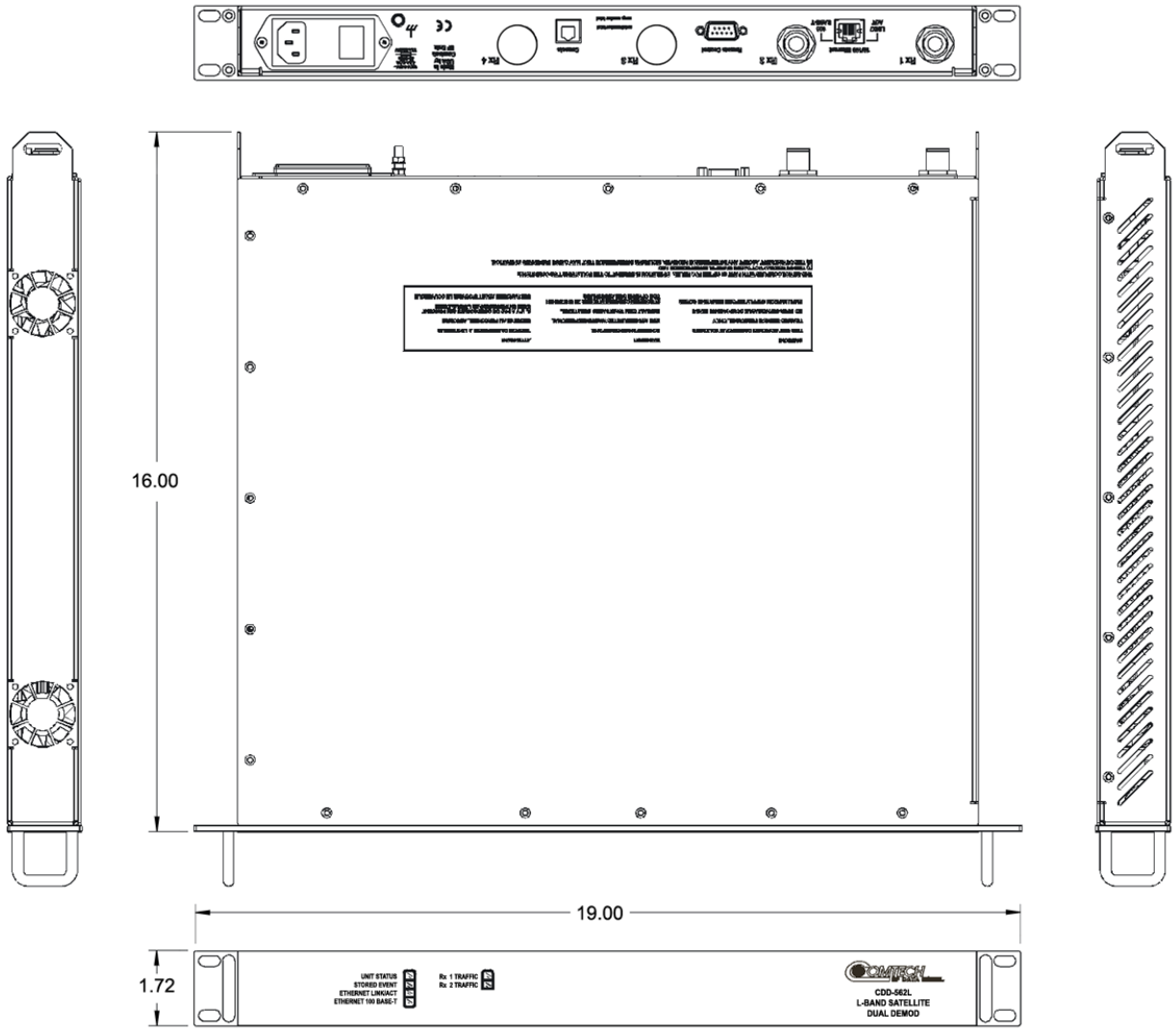


Figure 1-4. CDD-562L Dimensional Envelope

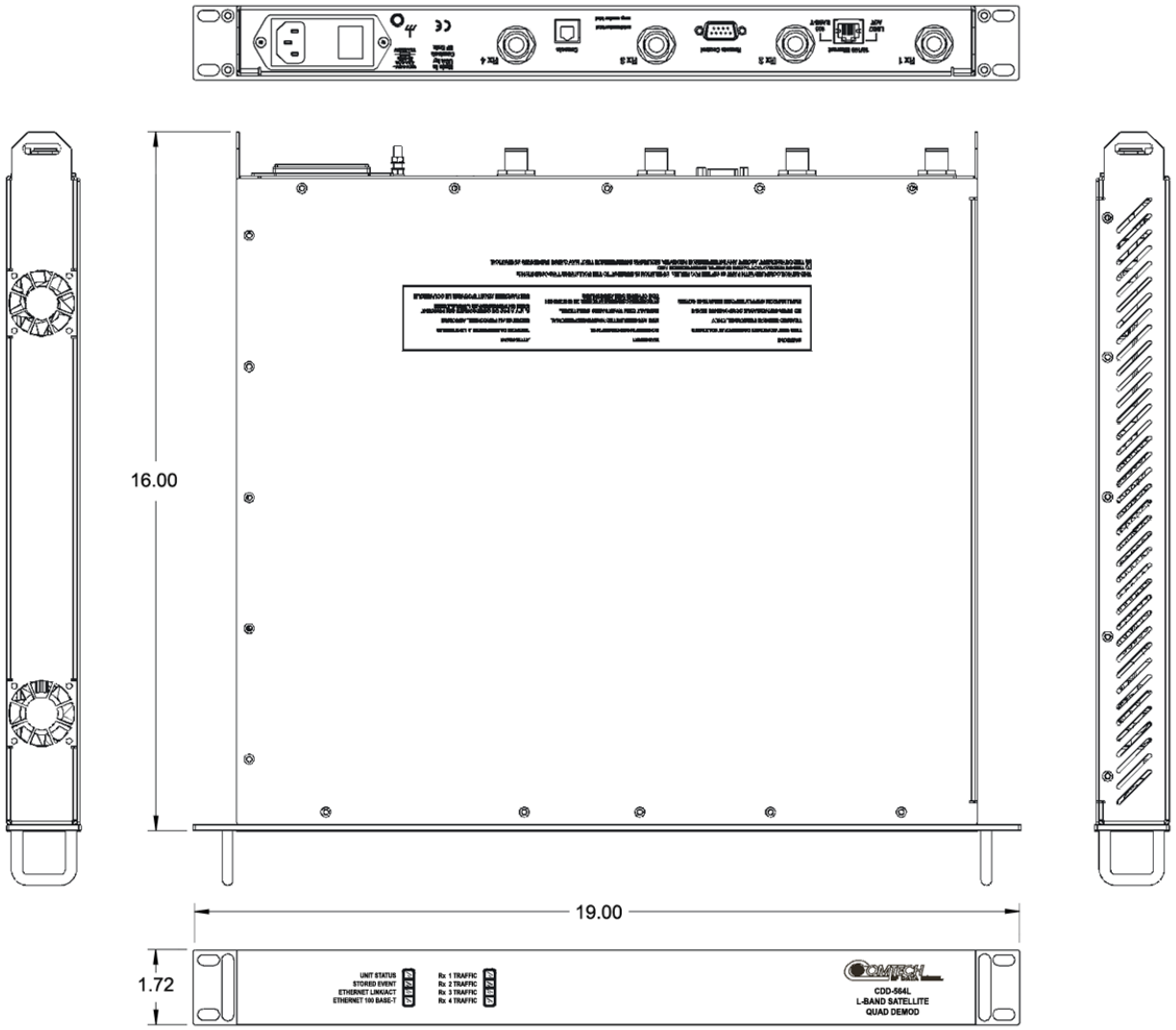
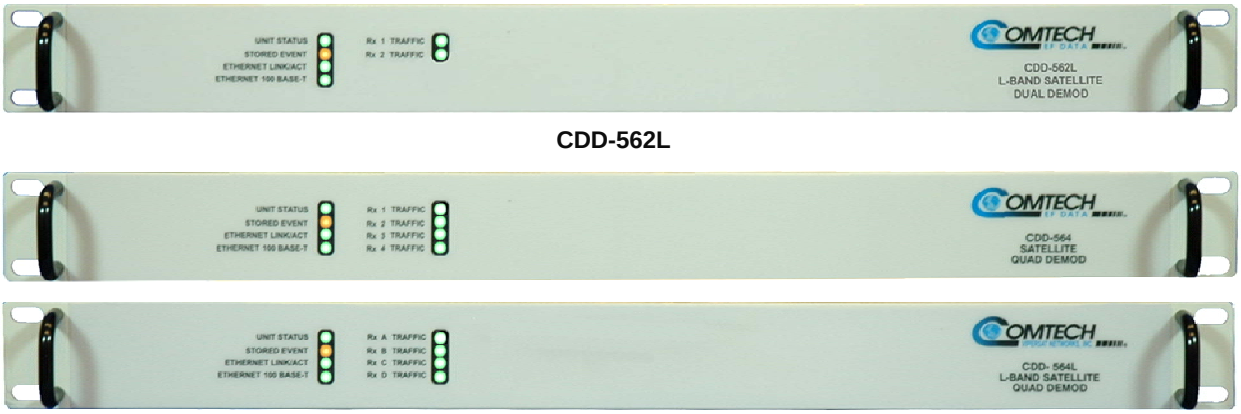


Figure 1-5. CDD-564/564L Dimensional Envelope

1.3.5 Physical Features

1.3.5.1 Front Panel



CDD-562L

CDD-564/564L

Figure 1-6. Front Panel Views

Figure 1-6 shows the front panel of the demodulators. Depending on the unit, the front panel features six (CDD-562L) or eight (CDD-564/564L) **L**ight-**E**mitting-**D**iode (LED) indicators.

The LEDs indicate, in a summary fashion, the status of the unit:

- Overall Unit Status
- Stored Event
- Ethernet Link Activity
- 10BaseT or 100BaseT Ethernet Activity
- Traffic Status for each of the two (CDD-562L) or four (CDD-564/564L) Rx Traffic (receive) channels

1.3.5.2 Rear Panel

Chapter 3. REAR PANEL CONNECTORS AND PINOUTS

Figure 1-7. Rear Panel Views

Figure 1-7 shows the rear panels of the demodulators. External cables are attached to connectors on the rear panel of the unit, comprised as follows:

Connector Group (Chapter 3 Sect. Ref.)	Name	Connector Type			Function
		CDD-562L (L-Band)	CDD-564 (70/140 MHz)	CDD-564L (L-Band)	
IF (Sect. 3.2)	Rx 1 *(Rx A on CDD-564L)*	Type 'N' female	BNC female	Type 'N' female	IF Input
	Rx 2 *(Rx B on CDD-564L)*	Type 'N' female	BNC female	Type 'N' female	
	Rx 3 *(Rx C on CDD-564L)*	N/A	BNC female	Type 'N' female	
	Rx 4 *(Rx D on CDD-564L)*	N/A	BNC female	Type 'N' female	
Terrestrial Data (Sect. 3.3)	10/100 Ethernet	RJ-45 female			Ethernet Traffic
	Console	RJ-11 female			Async Serial Console Port
Utility (Sect. 3.4)	Remote Control	9-pin Type 'D' male			Remote Interface (EIA-232) for Factory Test
Power/Ground (Sect 3.5)	AC	See Sect. 3.5.1			Chassis power
	DC (Optional)	See Sect. 3.5.2			
	Ground	#10-32 stud			Common Chassis Ground

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

1.3.6 Data Interfaces

The demodulators include, as standard, a 10/100 BaseT Ethernet port that serves as both a terrestrial data (i.e., IP traffic) interface and a management and control interface (i.e., the HTTP Web Server Interface).

1.3.7 Updating Demodulator Firmware

Chapter 5. UPDATING FIRMWARE

The demodulators store theirs firmware internally in flash memory, which simplifies the firmware updating process. If a firmware update is needed, it can be acquired by download from Comtech EF Data's Web site or from Comtech EF Data Customer Support during normal business hours via e-mail or on CD by standard mail delivery.

The firmware update, once acquired, can be transferred from an external user PC that is connected to the unit 10/100BaseT Ethernet port. Once connectivity has been established with the demodulator, the upgrade can be performed by "FTPing" the download from the PC.

1.3.8 Fully Accessible System Topology (FAST)

Appendix A. FAST ACTIVATION PROCEDURE

The demodulators incorporate a large number of optional features. In order to permit a lower initial cost, a demodulator may be purchased with only the desired features enabled. If, at a later date, the user wishes to upgrade the functionality of a unit, Comtech EF Data provides **F**ully **A**ccessible **S**ystem **T**opology (**FAST**), a technology which permits the purchase and installation of options through special authorization codes. These unique Fast Access Codes may be purchased from Comtech EF Data during normal business hours, and then loaded into the unit using either the serial/Telnet CLI (connected to the rear panel "Remote control" port) or the unit's Web Server (HTTP) Interface.

FAST System Theory

FAST allows an operator to order a unit precisely tailored for the initial application. When service requirements change, **FAST** allows the operator to upgrade the topology of the unit on-location, within minutes, and without having to remove the unit from the setup. This accelerated upgrade is possible due to **FAST**'s extensive use of the programmable logic devices incorporated into Comtech EF Data products.

FAST Implementation

Hardware options can be ordered and installed either at the factory or in the field. In the field, the operator can select options that can be easily activated, depending on the current hardware

configuration of the unit. The unique, register-specific FAST Access Code that is purchased from Comtech EF Data enables configuration of the available hardware.

FAST Accessible Options

Hardware options for basic demodulators can be ordered and installed either at the factory or in the field. The operator can select options that can be activated easily in the field, depending on the current hardware configuration of the demodulator. A unique access code enables configuration of the available hardware.

As standard features, the demodulator is configured with an Integrated IP router compatible with the optional IP Module/router available in the CDM-570/570L Satellite Modem, and Integrated 2nd Generation Turbo FEC compatible with the CDM-570/570L.

The following table shows the available FAST and FAST-accessible hardware options:

Option	Description and Comments	Installation Method
Low-Rate Variable	Data rate 16 kbps to 512 kbps	Base Unit
QPSK	Modulation Type	Standard
TPC Codec	Turbo Product Codec (IESS-315 compliant)	Standard
IP Router	10/100 Base-T Interface	Standard
-48 VDC	-48 VDC Prime Power Supply	Hardware
Mid-Rate Variable	Data rate 16 kbps to 2.048 Mbps	FAST
Full-Rate Variable	Data rate 16 kbps to 5.0 Mbps	FAST
High-Rate Variable	Data rate 16 kbps to 9.98 Mbps	FAST
3xDES Data Encryption	Uses NIST certified 3x core Software Version 1.5.1 and later	FAST
IP Header Compression	Uses proprietary IP Header Compressions Software Version 1.5.1 and later	FAST
Payload Compression	Uses proprietary Payload Compressions Software Version 1.5.1 and later	FAST
8-PSK	8-PSK Modulation	FAST
16-QAM	16-QAM Modulation	FAST

1.4 Summary of Specifications

1.4.1 Demodulator

1.4.1.1 70/140 MHz (CDD-564 only)

System Specification		
Frequency Range		50 to 90 or 100 to 180 MHz, 100 Hz resolution
Symbol Rate Range		16 ksps to 3.0 Msps
Data Rate Range		Each demodulator independently in 1 bps increments
Rate 3/4 QPSK TPC		16 kbps to 4.5 Mbps
Rate 7/8 QPSK TPC		16 kbps to 5.25 Mbps
Rate 0.95 QPSK TPC		16 kbps to 5.666Mbps
Rate 3/4 8-PSK TPC		16 kbps to 6.75 Mbps
Rate 7/8 8-PSK TPC		16 kbps to 8.5 Mbps
Rate 0.95 8-PSK TPC		16 kbps to 7.875 Mbps
Rate 3/4 16-QAM TPC		16 kbps to 9.0 Mbps
Rate 7/8 16-QAM TPC		16 kbps to 9.98 Mbps
Descrambling		Comtech to IESS-315
FEC Turbo Product		Rate 3/4, 0.95 QPSK
		Rate 3/4, 0.95 8-PSK
		Rate 3/4, 16-QAM
		Rate 7/8, QPSK, 8-PSK, 16-QAM
Inputs		(4X) Type 'BNC' female
Input Impedance		50 or 75Ω user selection
Return Loss		17 dB min
Traffic and Management Interface		10/100 BaseT Ethernet RJ-45
Command Line Interface (CLI)		EIA-232, RJ-11
Factory Test Connector		DB-9 male
Frequency Reference	Internal	± 0.06 ppm, 32 to 122°F (0 to 50°C)
	External	None

Demodulator	
Input Power Range	-30 to –60 dBm
Max Composite Level	+35 dBc, up to –5 dBm
Acquisition Range	± 1 to ± 32 kHz (1 kHz steps) < 625 ksps
Monitor Functions	Eb/No Frequency Offset, BER LNB current and voltage Rx signal level

1.4.1.2 L-Band (CDD-562L, CDD-564L)

System Specification		
Frequency Range		950 to 1950 MHz
Symbol Rate Range		16 ksps to 3.0 Msps
Data Rate Range		Each demodulator independently in 1 bps increments
Rate 3/4 QPSK TPC		16 kbps to 4.5 Mbps
Rate 7/8 QPSK TPC		16 kbps to 5.25 Mbps
Rate 0.95 QPSK TPC		16 kbps to 5.666Mbps
Rate 3/4 8-PSK TPC		16 kbps to 6.75 Mbps
Rate 7/8 8-PSK TPC		16 kbps to 7.875 Mbps
Rate 0.95 8-PSK TPC		16 kbps to 8.5 Mbps
Rate 3/4 16-QAM TPC		16 kbps to 9.0 Mbps
Rate 7/8 16-QAM TPC		16 kbps to 9.98 Mbps
Descrambling		Comtech to IESS-315
FEC Turbo Product		Rate 3/4, 0.95 QPSK
		Rate 3/4, 0.95 8-PSK
		Rate 3/4, 16-QAM
		Rate 7/8, QPSK, 8-PSK, 16-QAM
Inputs		CDD-562L: (2X) Type 'N' female CDD-564L: (4X) Type 'N' female
Input Impedance		50Ω, 17 dB minimum return loss
Traffic and Management Interface		10/100 BaseT Ethernet RJ-45
Command Line Interface (CLI)		EIA-232, RJ-11
Factory Test Connector		DB-9 male
Frequency Reference	Internal	± 0.06 ppm, 32 to 122°F (0 to 50°C)
	External	None

Demodulator	
Input Power Range	-130 + 10 log (Symbol Rate) to –90 +10 Log (Symbol Rate)
Max Composite Level	+40 dBc, up to –5 dBm
Acquisition Range	± 1 to ± 32 kHz (1 kHz steps) < 625 ksps ± 1 to ± 200 kHz ≥ 625 ksps
Monitor Functions	Eb/No Frequency Offset, BER LNB current and voltage Rx signal level

1.4.2 Low Noise Block Converter (LNB) Support (CDD-564L only)

Parameters	Specifications
LNB Voltage	+13 volts, +18 volts, and +24 volts DC or OFF at 500 mA max per Rx input
10 MHz Reference	-3 dBm ± 3 dB via Rx center conductor
Power Level	Selectable ON or OFF per Rx input

1.4.3 Environmental and Physical

Parameters		Specifications
Temperature	Operating	32 to 122°F (0 to 50°C)
	Storage	-13 to 185°F (-25 to 85°C)
Power Supply		100 to 240 volts AC, 50/60 Hz Optional: 48 VDC input (38 to 60)
Power Consumption		75 W typical (140 W max – powering 4 LNBs)
Fuse		120/230 VAC: T3, 15A, slow-blow 20 mm 48VDC (38 to 60 VDC): T8.0A, slow-blow 20 mm
Physical Dimensions		1RU high x 19 inches wide x 16 inches deep (43.8 mm h x 482.6 mm w x 406 mm d)
Weight		7 lbs (3.2 kg)
Agency Approvals		CE Mark FCC Part 15, Class B

1.4.4 Network Protocols

Protocols	
RFC 768 - UDP	RFC 2045 - MIME
RFC 791-IP	RFC 2236 – IGMP v2
RFC 792 – ICMP	RFC 2474 – DS Field
RFC 793 – TCP	RFC 2475 - ADS
RFC 826 - ARP	RFC 2578 - SMI
RFC 856 - Telnet	RFC 2597 – PHB Group
RFC 862 – Ping	RFC 2598 - PHB
RFC 894 – IP	RFC 2616 - HTTP
RFC 959 – FTP	RFC 2821 - SMTP
RFC 1112 – IP Multicast	RFC 3412 - SNMP
RFC 1213 –SNMP MIB II	RFC 3416 – SNMPv2
RFC 1812 – IPv4 Routers	RFC 3418 – SNMP MIB

1.4.5 BER (Bit Error Rate)

IMPORTANT NOTE: Starting with Release 1.4.1 of the CDM-570/570L firmware, the maximum symbol rate has been increased from 2.5 to 3.0 Symbol/sec. This has been done without modification to the hardware and as a consequence there may be a small degradation in BER versus Eb/No performance for rates above 2.5 Msymbols/sec.

The degradation is as follows:
Rates from 2.5 to 2.65 Msps: degradation < 0.1 dB
Rates from 2.65 to 2.80 Msps: degradation < 0.2 dB
Rates from 2.80 to 3.00 Msps: degradation < 0.3 dB

TURBO PRODUCT CODEC Rate 3/4 QPSK Rate 3/4 8-PSK Rate 3/4 16-QAM (With two adjacent carriers, each 7 dB higher than the desired carrier)	For: BER=10^{-6} BER=10^{-7} BER=10^{-8}	Rate 3/4 (Q) Guaranteed Eb/No: (typical value in parentheses) 3.8dB (3.4dB) 4.1dB (3.7dB) 4.4dB (4.0dB)	Rate 3/4 (8-PSK) Guaranteed Eb/No: (typical value in parentheses) 6.2dB (5.8dB) 6.4dB (6.0dB) 6.8dB (6.3dB)	Rate 3/4 (16-QAM) Guaranteed Eb/No: (typical value in parentheses) 7.4dB (7.0dB) 7.8dB (7.3dB) 8.2dB (7.7dB)
TURBO PRODUCT CODEC Rate 7/8 QPSK Rate 7/8 8-PSK Rate 7/8 16-QAM BER (With two adjacent carriers, each 7 dB higher than the desired carrier)	For: BER=10^{-6} BER=10^{-7} BER=10^{-8}	Rate 7/8 (Q) Guaranteed Eb/No: (typical value in parentheses) 4.3dB (4.0 dB) 4.4dB (4.1 dB) 4.5dB (4.2 dB)	Rate 7/8 (8-PSK) Guaranteed Eb/No: (typical value in parentheses) 7.0dB (6.6dB) 7.1dB (6.7dB) 7.2dB (6.8dB)	Rate 7/8 (16-QAM) Guaranteed Eb/No: (typical value in parentheses) 8.1dB (7.7dB) 8.2dB (7.8dB) 8.3dB (7.9dB)
TURBO PRODUCT CODEC Rate 0.95 QPSK Rate 0.95 (8-PSK) (With two adjacent carriers, each 7 dB higher than the desired carrier)	For: BER=10^{-6} BER=10^{-7} BER=10^{-8}	Rate 0.95 (Q) Guaranteed Eb/No: (typical value in parentheses) 6.4dB (6.0dB) 6.7dB (6.3dB) 6.9dB (6.5dB)	Rate 0.95 (8-PSK) Guaranteed Eb/No: (typical value in parentheses) 9.3dB (8.9dB) 9.8dB (9.4dB) 10.3dB (9.9dB)	
Monitor Functions	Eb/No estimate: 2 to 16 dB (± 0.25 dB accuracy) Corrected Bit Error Rate: 1E-3 to 1E-9 Frequency offset: ± 200 kHz range 100 Hz resolution) Buffer fill state (in percent) Receive signal level: -20 to -90 dBm (± 5.0 dB accuracy)			

Notes:

Chapter 2. INSTALLATION and STARTUP

2.1 Unpacking and Inspecting the Shipment

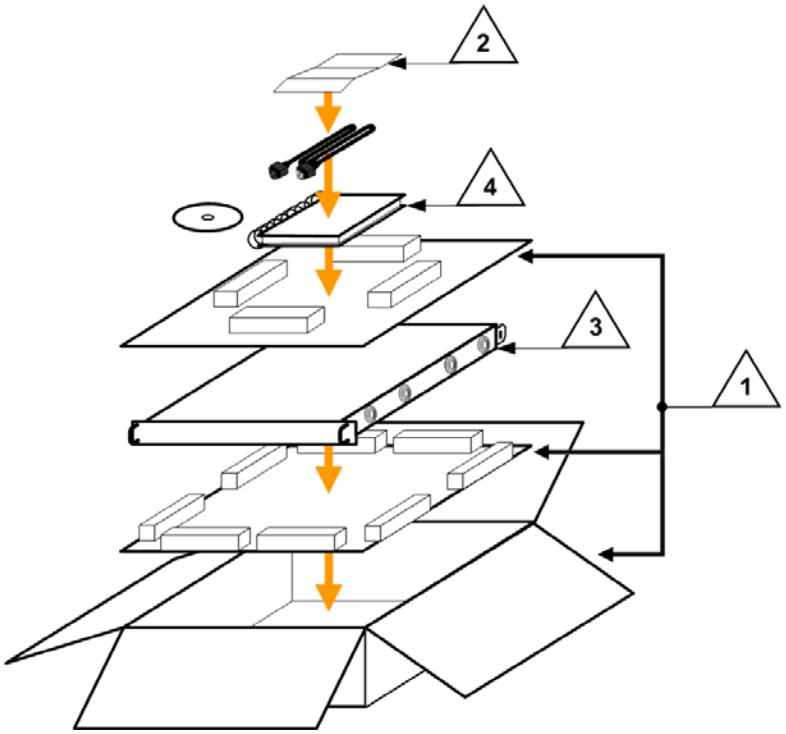


Figure 2-1. Unpacking and Inspecting the Shipment

The CDD-56X Satellite Demodulator with IP Module, its Installation and Operation Manual, and its power cord were packaged and shipped in a reusable cardboard carton containing protective foam spacing.

This equipment contains parts and assemblies sensitive to damage by Electrostatic Discharge (ESD). Use ESD precautionary procedures when handling the equipment.

Once opened, inspect the shipment:

Step	Task
1	Keep all shipping materials for storage or reshipment.
2	Check the packing list to ensure the shipment is complete.
3	Inspect the equipment for any possible damage incurred during shipment. Contact the carrier and Comtech EF Data immediately to submit a damage report if damage is evident.
4	Review the Installation and Operation Manual carefully to become familiar with operation.
5	Proceed to Section 2.2 Rack-mounting the CDD-56X.

2.2 Rack-mounting the CDD-56X

When mounting the CDD-56X into a rack enclosure:

- ***PROPER GROUNDING PROTECTION IS REQUIRED. The equipment must be connected to the protective earth connection at all times. It is therefore imperative that the unit is properly grounded, using the ground stud provided on the unit rear panel, during installation, configuration, and operation.***

- ***PROPER AIR VENTILATION IS REQUIRED. In a rack system where there is high heat discharge, provide forced-air cooling with top- or bottom-mounted fans or blowers.***

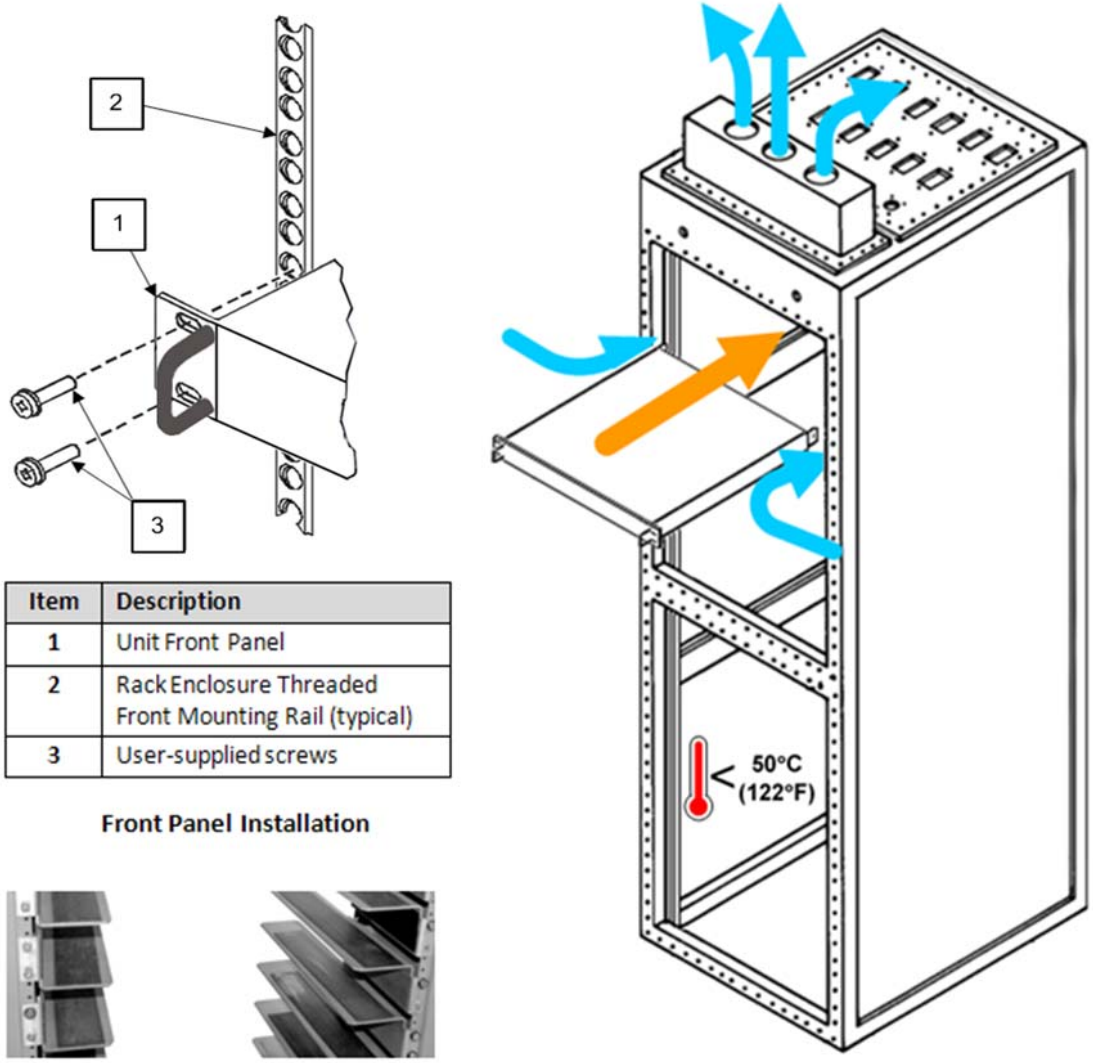
  - ***Make sure there is adequate clearance inside the enclosure, especially at the side for air ventilation.***

  - ***Air temperature inside the rack enclosure should never exceed 50°C (122°F).***

    For information about custom rack enclosures, contact Comtech EF Data Customer Support during normal business hours or visit Comtech EF Data's Web site (www.comtechefdata.com/support.asp).

  The CDD-56X CANNOT have rack slides mounted to the sides of the chassis. Cooling fans and exhaust vents are provided here – air flow must not be impeded.

Comtech EF Data recommends that an alternate method of support is provided within the rack, such as standard rack shelves (Figure 2-2) or the optional Rear-Mounting Support Brackets Kit (Figure 2-3). If there is any doubt, contact Comtech EF Data Customer Support during normal business hours.



Item	Description
1	Unit Front Panel
2	Rack Enclosure Threaded Front Mounting Rail (typical)
3	User-supplied screws

Front Panel Installation

Standard Rack Shelving

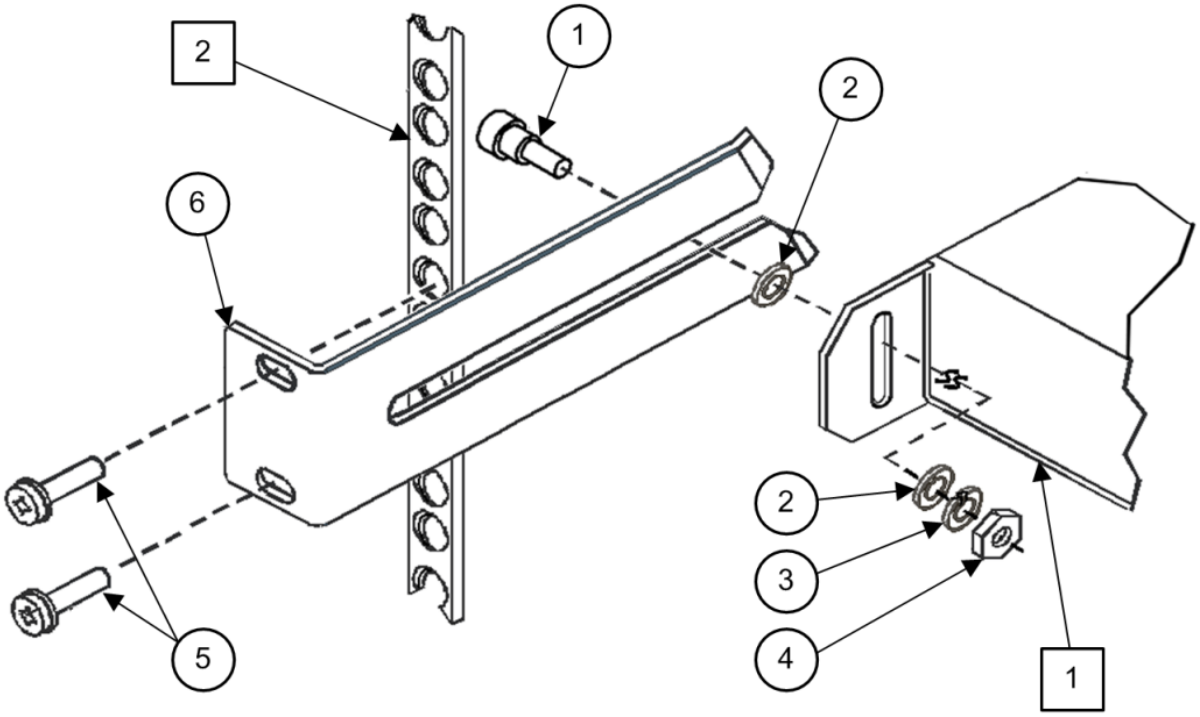
Custom Rack Enclosure

Figure 2-2. Installation into a Rack Enclosure

Mount the CDD-56X in its assigned position in the rack enclosure. Use, as required:

- A standard rack-mounted shelf;
- User-supplied screws to secure the front panel to the rack enclosure threaded front mounting rails;
- Comtech EF Data's optional KT/6228-2 (4") or KT/6228-3 (10") Rear-Mounting Support Brackets Kit.

2.2.1 Installing the Optional Rear-Mounting Support Brackets Kit



Detail	Description
1	Back of Unit
2	Rack Enclosure Threaded Rear Mounting Rail (typical)

Item	Kit / Quantity		Part Number	Description
	KT/6228-2	KT/6228-3		
1	2	2	HW/10-32SHLDR	Shoulder Screw, #10
2	4	4	HW/10-32FLT	Flat Washer, #10
3	2	2	HW/10-32SPLIT	Lock Washer, #10
4	2	2	HW/10-32HEXNUT	Hex Nut, #10
5	4	4	HW/10-32x1/2RK	Bolt, #10, Rear Support Bracket
6	2	–	FP/6138-2	Bracket, Rear Support – 4”
	–	2	FP/6138-3	Bracket, Rear Support – 10”

Figure 2-3. Optional Rear-Mounting Support Brackets Kit Installation

The tools needed to install the KT/6228-2 (4") or KT/6228-3 (10") Rear-Mounting Support Brackets Kit are as follows:

- A medium Phillips™ screwdriver
- A 5/32-inch SAE Allen™ Wrench
- An adjustable Crescent™ wrench.

To install the kit (**Figure 2-3**)**:**

Step	Task
1	Use the #10 flat washers, #10 split washers, and #10 hex nuts to secure the #10 shoulder screws to the unit chassis through the rear right and left side mounting slots.
2	Use the #10 rack bracket bolts to install the rear support brackets onto the rack enclosure threaded rear mounting rails.
3	Mount the unit into the rack enclosure. Ensure that the shoulders of the #10 shoulder screws properly engage into the rear support bracket slots.

2.3 Initial Configuration

There are no internal jumpers to configure, no interface cards to install, and no other options to install—*all configurations are carried out entirely via firmware.*

The unit will ship with a default 64 kbps, QPSK, Rate 3/4 configuration; the unit should first be further configured locally, using the EIA-232 Console Interface.

Note: The auto-sensing AC power supply does not require any adjustments. Simply plug in the supplied line cord, and turn on the switch on the rear panel.

2.4 Connecting External Cables

Once the desired configuration settings have been made, proceed to connect all external cables to the connectors outlined in the next chapter (**Chapter 3. REAR PANEL CONNECTORS AND PINOUTS**). Should difficulties occur, call Comtech EF Data Customer Support for assistance.

Notes:

Chapter 3. REAR PANEL CONNECTOR PINOUTS

3.1 CDD-56X Rear Panel Overview

(Top) CDD-562L Dual Demodulator with IP Module (L-Band)
(Center) CDD-564 Quad Demodulator with IP Module (70/140 MHz)
(Bottom) CDD-564L Quad Demodulator with IP Modulator (L-Band)

Figure 3-1. CDD-56X Rear Panel View

The CDD-56X Satellite Demodulator rear panel connectors, shown here in **Figure 3-1**, provide all necessary external connections between the modem and other equipment:

- **Section 3.2** summarizes the cabling connections provided on the rear panel interface, grouped according to service function.
- **Section 3.3** summarizes the grounding and power features for the unit.

3.2 CDD-56X Cable Connections

Table 3-1. Rear Panel External Cable Connections

Sect.	Service Type	Connector Name	Connector Type			Connector Function
			CDD-562L (L-Band)	CDD-564 (70/140 MHz)	CDD-564L (L-Band)	
3.2.1	Rx IF	Rx 1 *(Rx A on CDD-564L)*	Type 'N' female	BNC female	Type 'N' female	RF Input
		Rx 2 *(Rx B on CDD-564L)*	Type 'N' female	BNC female	Type 'N' female	
		Rx 3 *(Rx C on CDD-564L)*	N/A	BNC female	Type 'N' female	
		Rx 4 *(Rx D on CDD-564L)*	N/A	BNC female	Type 'N' female	
3.2.2	Terrestrial Data	10/100 Ethernet	RJ-45 female			Ethernet Traffic and M&C
3.2.3	Utility	Remote Control	9-pin Type 'D' male			NOT FOR CUSTOMER USE Remote Interface for Factory Test
		Console	RJ-11 female			Async Serial Console Port

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

3.2.1 Rx IF Connections

3.2.1.1 CDD-562L and CDD-564L L-Band Chassis Rx Input

There may be DC voltages present on the Type 'N' Rx IF connectors, up to a maximum of 48 volts.

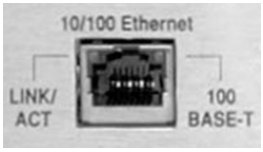
The Rx IF input port connectors on the L-Band demodulators are 50Ω 'N' female types. Two connectors, labeled **Rx1** and **Rx2**, are provided on the CDD-562L (shown at left), while four connectors labeled **Rx A** through **Rx D** are available on the CDD-564L (shown to the right).

The return loss on these ports is typically better than 17 dB, and if the user wishes to connect to a 75Ω system, an inexpensive 'N' to 'F' type adapter can be used and is available as an optional accessory. While there will be a reduction in return loss when doing this, the effect in most systems will be imperceptible.

3.2.1.2 CDD-564 70/140 MHz Chassis Rx Input

The Rx IF Input port connectors are BNC female types, with a programmable impedance of 50Ω or 75Ω. Four connectors, labeled **Rx 1** through **Rx 4**, are provided on the CDD-564.

3.2.2 Terrestrial Data Connection – 10/100 Ethernet (RJ-45 Traffic/M&C Port)



The 10/100 BaseT Ethernet port is a standard 8-pin RJ-45 modular jack, It is used for Ethernet traffic, management of CDD-562L/564/564L IP Module functions via Telnet/HTTP/SNMP, and for updating of the demodulator's IP Module firmware.

Note the following:

Pin #	Function
1	Tx+
2	Tx-
3	Rx+
4	N/C
5	N/C
6	Rx-
7	N/C
8	N/C

3.2.3 Utility Connections

3.2.3.1 Remote Control (DB-9M)

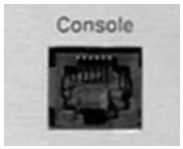
THIS CONNECTOR IS NOT A STANDARD EIA-232 INTERFACE. IT IS NOT INTENDED FOR CUSTOMER USE. IT IS INTENDED FOR FACTORY TEST USE ONLY. CONTACT CEFD CUSTOMER SUPPORT PRIOR TO CONNECTING ANY EQUIPMENT TO THIS INTERFACE.

The Remote Control interface is a 9-pin Type 'D' male (DB-9M) connector, reserved for use in in-factory test applications.

Note the following:

Pin #	Description	Direction
1	Ground	--
6	Selected Demod RS-422 Rx Data +	In
2	EIA-232 Transmit Data (38.4k, 8N1 fixed)	Out
7	Selected Demod RS-422 Rx Data -	In
3	EIA-232 Receive Data (38.4k, 8N1 fixed)	In
8	Selected Demod RS-422 Tx Clock +	Out
4	Selected Demod I-Channel monitor	Out
9	Selected Demod RS-422 Tx Clock -	Out
5	Selected Demod Q-Channel monitor	Out

3.2.3.2 Console (RJ-11 Async-Serial Port)



The Console port is a standard 6-pin RJ-11 modular jack. The Async-Serial EIA-232 DCE Console services the IP Module Command Line Interface (CLI). The supplied adapter cable connects the user PC to the Console port. A user-supplied terminal emulator program such as HyperTerminal or Tera Term is used for management of demodulator and IP Module functions.

Note the following:

Pin #	Function
1	Ground
2	Rx
3	Tx
4	Ground
5	Not used
6	Not used

3.3 CDD-56X Ground and Power Connections

3.3.1 Chassis Ground Interface

PROPER GROUNDING PROTECTION IS REQUIRED. The equipment must be connected to the protective earth connection at all times. It is therefore imperative that the unit is properly grounded, using the ground stud provided on the unit rear panel, during installation, configuration, and operation.

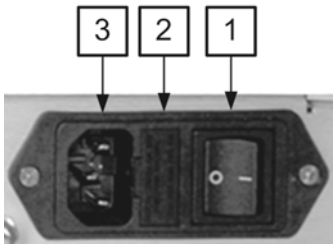
(Top) Standard AC Unit
(Bottom) Optional 48V DC Unit

Figure 3-2. CDD-56X Typical Chassis Ground Interface

Use the #10-32 stud, located adjacent to the power interface, for connecting a common chassis ground among equipment.

The AC power interface provides the safety ground.

3.3.2 100V/240V Alternating Current (AC) Power Interface (Standard)



Feature	Description
1	On / Off Switch
2	Press-fit Fuse Holder
3	IEC Three-prong Connector

AC Power Specifications	
Input Power	40W maximum, 20W typical
Input Voltage	100V to 240V AC, +6%/-10%, autosensing (total absolute max. range is 90V to 254V AC)
Connector Type	IEC
Fuse Protection	Line and neutral fusing (2X) 5mm x 20mm Slow-blow type fuses: T3.15A (100V or 240V AC operation)

Figure 3-3. CDD-56X AC Power Interface

3.3.2.1 AC Operation – Applying Power

Figure 3-4. Applying AC Power to the CDD-56X

To apply AC power to the CDD-56X (Figure 3-4):

- **First, plug the provided AC power cord female end into the unit.**
- **Then, plug the AC power cord male end into the user-supplied power source.**
- **Finally, switch the unit ON.**

3.3.2.2 AC Operation – Replacing Fuses

The CDD-56X uses two 5mm x 20mm Slow-blow fuses – one each for line and neutral connections. The fuses are contained within a fuse holder that is press-fit into the body of the IEC power module (located on the rear panel, **Figure 3-5**).

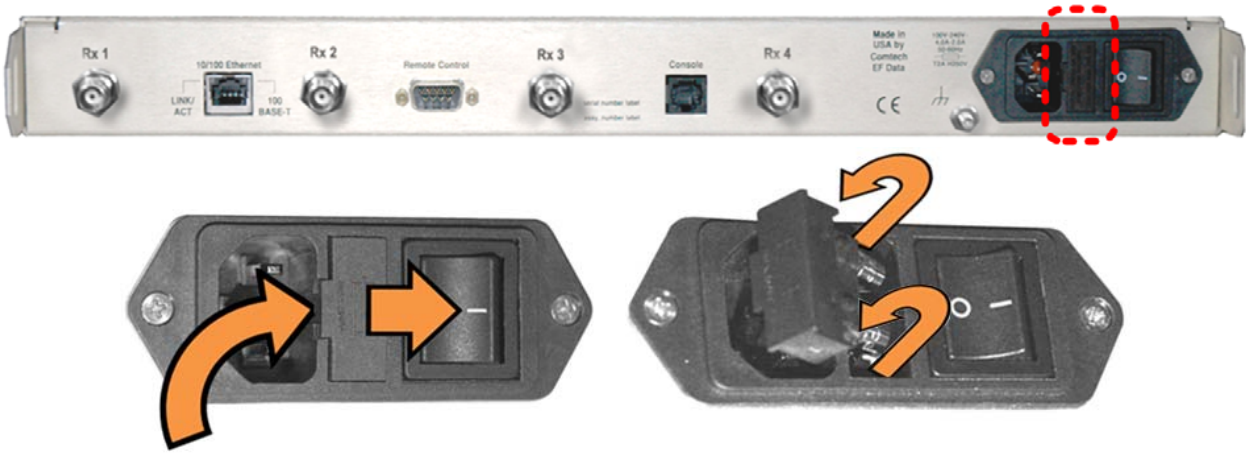


Figure 3-5. Replacing CDD-56X AC Fuses

To replace the fuse(s):

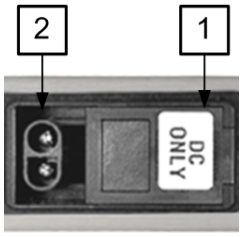
DISCONNECT THE POWER SUPPLY BEFORE PROCEEDING!

- **First, unseat the fuse holder from the IEC power module.**
  - Use the slot to pry the holder outward from the IEC power module.
  - Pull the holder straight out, and then swing the holder away from the module.
- **Then, remove and replace the T3.15A (3.15 Amp) fuses as needed.**

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

- **Finally, re-seat the fuse holder in the IEC power module.**

3.3.3 48V Direct Current (DC) Power Interface (Optional)



Feature	Description
1	On / Off Switch
2	Plug-in Power Receptacle

DC Power Specifications	
Input Power	48 watts (typical) 55 watts (maximum)
Input Voltage	48 volts DC nominal (36 volts to 60 volts)
Connector Type	Corcom PS series
Mating Connector	Corcom GA210 or Molex 03-12-1026
Fuse Protection	Line and Neutral Fusing (2X) 5mm x 20mm Slow-blow type fuses: T8A (8 Amp)

Figure 3-6. CDD-56X DC Power Interface

3.3.3.1 DC Operation – Applying Power

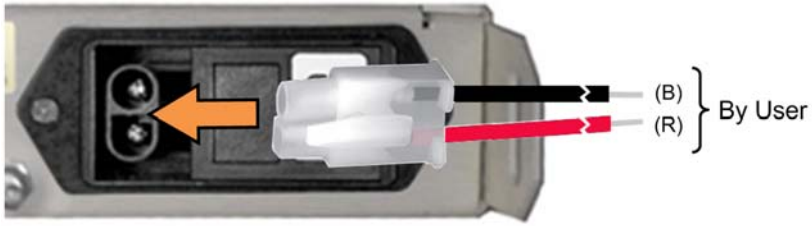


Figure 3-7. Applying DC Power to the CDD-56X

To apply DC power to the CDD-56X:

- **First, assemble the user-supplied red (+) and black (–) DC power leads and their crimped terminals into the shell of the module mating connector. *Number 18 AWG minimum wires are recommended.* Note the keyed orientation for the wires.**
- **Then, connect the user-supplied DC power leads to the power source.**
- **Finally, plug the connector into the keyed module socket as shown.**

3.3.3.2 DC Operation – Replacing Fuses

The CDD-56X uses two 5mm x 20mm Slow-blow fuses – one each for line and neutral connections. The fuses are contained within a fuse holder that is press-fit into the body of the DC power module (located on the rear panel, **Figure 3-8**).

Feature	Description
1	Hinged Flap
2	Press-fit Fuse Holder
3	Fuse (2X)

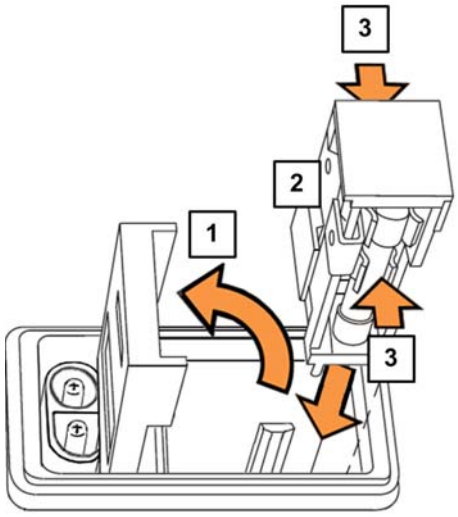


Figure 3-8. Replacing CDD-56X DC Fuses

To replace the fuse(s):

DISCONNECT THE POWER SUPPLY BEFORE PROCEEDING!

- **First, using a flat-bladed screwdriver, use the slot to pry open and swing back the hinged flap.**
- **Next, extract the press-fit fuse holder:**
  - Using the screwdriver, disengage the fuse holder outward from the DC power module.
  - Using your fingers, pull the holder straight out of the module.
- **Then, remove and replace the T8A (8 Amp) fuses as needed.**

  FOR CONTINUED OPERATOR SAFETY, ALWAYS REPLACE THE FUSES WITH THE CORRECT TYPE AND RATING.
- **Finally, re-seat the fuse holder into the DC power module, and close the protective flap.**

Chapter 4. IP MODULE ETHERNET INTERFACE

4.1 Introduction

For information specific to CDD-56X IP Module operation when deployed in a Vipersat system, please consult adjunct Comtech EF Data publication MN/22137 – Vipersat CDD-56X Series Satellite Network Demodulator Router User Guide.

The CDD-562X Satellite Demodulator's integral IP Module Ethernet Interface is intended for closed network **S**ingle **C**hannel **P**er **C**arrier (SCPC) links. It concentrates traffic from two or four independent demodulators into a single Ethernet port, making it ideal for networked VSAT applications. The CDD-56X can also be utilized in a Vipersat satellite bandwidth management system.

4.1.1 Standard Features

- 10/100BaseT Ethernet Interface (RJ-45)
- Powerful network management:
  - SNMP with public and private MIB
  - Telnet interface for remote product M & C
  - Web Server interface for complete product management
  - Console Port interface for local network management
- Remote software/firmware upgrade via FTP
- Configuration backup and restore via FTP
- Event Logging to capture all IP Module activity
- Detailed Statistics of IP traffic

- IGMP support for Multicast
- Static IP routing for unicast and multicast
- Symmetric and/or asymmetric operation for maximum bandwidth efficiency
- Point-to-Point or Point-to-Multipoint configuration
- Interoperable with the CDM-570/570L with IP Module, CDM-IP550, and CDM-IP 300L

4.1.2 10/100 BaseT Ethernet Interface

In Router Mode operation, the 10/100BaseT Ethernet Interface is used for routing IP traffic received over the satellite to another device on the local LAN, and for monitor and control purposes.

4.1.3 Powerful Network Management

Local or remote management of all demodulator and IP Module functions is available via SNMP, Telnet, or HTTP. The demodulator may be configured, operated and monitored using any of the following methods:

User Interface	Connection	Demod Functions	IP MODULE Functions	Manual Reference
SNMP	Local or remote – Ethernet via 10/100 BaseT Traffic interface	ALL	ALL	Chapter 6
Telnet	Local or remote – Ethernet via 10/100 BaseT Traffic interface	ALL	ALL	Chapter 6
Serial Command Line Interface (CLI)	Local – Serial RS-232 via Console Port	ALL	ALL	Chapter 8
Web Server	Local or remote – Ethernet via 10/100 BaseT Traffic interface	ALL	ALL	Chapter 9

4.1.4 Remote Firmware Update via FTP

Chapter 5. UPDATING FIRMWARE

The CDD-56X Satellite Demodulator with IP Module uses flash memory technology internally. Firmware update archive files may be downloaded from the Internet to a user PC (from Comtech EF Data's website), or obtained through Comtech EF Data Customer Support via e-mail or on CD by standard mail delivery.

Once acquired from Comtech EF Data, new firmware can be uploaded from the user PC by File Transfer Protocol (FTP) without opening the unit or having to be in the same physical location.

4.1.5 Configuration Backup and Restore via FTP

All demodulator configuration parameters are stored in a simple text file. The parameter file can easily be retrieved locally or remotely by FTP. The file can then be used to quickly configure a replacement unit if needed.

4.1.6 Event Logging to Capture All Demodulator Activity

All activity can be stored into an easy-to-read Event Log. This file also can be retrieved locally or remotely by FTP.

4.1.7 Detailed Statistics of IP Traffic

IP traffic statistics are continuously updated and allow detailed performance analysis or can be used to identify traffic problems. The statistics are available through the Serial Console locally, or can be gathered remotely by SNMP, Telnet, or HTTP.

4.1.8 IGMP Support for Multicast

IGMP is a standard feature in the demodulator. If enabled as an IGMP client, it responds to IGMP queries for the configured multicast routes. If enabled as an IGMP server, it generates IGMP queries and transmits multicast traffic per IGMP clients' request. If there are no active IGMP clients on the LAN, it will stop forwarding the multicast traffic (received from the satellite) to the LAN.

4.1.9 Static IP Routing for Unicast and Multicast

Up to 256 static routes can be entered into the demodulator to direct IP traffic to another device on the local LAN.

4.2 Demodulator Features

Appendix A. FAST ACTIVATION PROCEDURE

Additional features can be added quickly on site to the CDD-56X by entering FAST Access Codes purchased from Comtech EF Data. FAST-accessible options include:

- 3xDES Data Encryption
- IP Header Compression
- Payload Compression

4.2.1 3xDES Encryption with Ability to Change Keys

The demodulator optionally supports 3xDES-128 (using NIST certified 3x core) decryption for the highest-level security. For link encryption, each unit supports eight decryption keys.

4.2.2 IP Header Compression

Header Compression also is an optional feature of the demodulator. The demodulator supports Header Compression for the following Ethernet and Layer 3 & 4 Headers:

Supported Ethernet Headers
Ethernet 2.0
Ethernet 2.0 + VLAN-tag
Ethernet 2.0 + MPLS
802.3-raw
802.3-raw + VLAN-tag
802.3 + 802.2
802.3 + 802.2 + VLAN-tag
802.3 + 802.2 + SNAP
802.3 + 802.2 + SNAP + VLAN-tag
802.3 + 802.2 + SNAP + MPLS
Supported Layer 3&4 Headers
IP
TCP
UDP
RTP (Codec Independent)

Header Compression reduces the required VoIP bandwidth by 60 percent. Example: A G.729a voice codec, operating at 8 kbps, will occupy 32 kbps once encapsulated into IP framing on a LAN. Using IP/UDP/RTP Header Compression, the same traffic only needs 10.8 kbps total WAN satellite bandwidth to cross the link. A total maximum of 64 simultaneous VoIP calls can be compressed. Normal Web/HTTP traffic can be reduced an additional 10% via IP/TCP header compression.

Header Compression Configuration – Header Compression is completely independent from QoS, and there is no configuration required except enabling the Header Compression feature on both the sending and receiving Comtech EF Data IP modem/demod. Packets with a Header Compression supported header will automatically be identified for compression. The only configuration consideration is the Header Compression Refresh Rate. This is how many compressed header packets will be sent before a single full header packet is sent. Sometimes compressed header traffic could be lost during deteriorated satellite link conditions. Sending a full header packet will allow the return of the traffic stream. The Refresh Rate can be increased for poor satellite link conditions or decreased to further reduce overhead.

4.2.3 Payload Compression

Traffic optimization through Payload Compression is another optional feature of the demodulator.

- FAST feature to upgrade
- Uses AHA© chip
- Compression algorithm applied to all data (HDLC header excluded).
- Compression statistics are fed back to QoS in order to maximize WAN utilization while maintaining priority, jitter and latency.
- 1024 simultaneous compression sessions to maximize compression across multiple distinct traffic flows.
- Compression algorithm not applied to RTP streams because this traffic is already compressed and would only INCREASE the satellite bandwidth if compressed again.
- Additional statistics have been added to the compression statistics menu in order to provide feedback on the compression efficiency that has been achieved.
- Payload Compression is selectable on a per route basis.

4.2.3.1 ADLC vs LZS Compression Comparison

These numbers have been generated using an internally created test program. This program takes the target benchmark files and splits the files into payload size chunks and compresses each chunk in a separate invocation of the compression algorithm. This is important to note because most compression algorithms are applied to the entire file data set as a single invocation of the compression algorithm, which is easier for other types of compression algorithms (LZS, GZIP in specific). This, of course, does not apply to streamed packet data across an IP network (e.g., FTP transfer).

Algorithm	Payload size	File Set	Ratio
ADLC	1472	Calgary	1.76
ADLC	1000	Calgary	1.76
ADLC	500	Calgary	1.77
ADLC	100	Calgary	2.09
ADLC	1472	Canterbury	1.71
ADLC	1000	Canterbury	1.72
ADLC	500	Canterbury	1.74
ADLC	100	Canterbury	2.04

Algorithm	Payload size	File Set	Ratio
LZS	1472	Calgary	1.66
LZS	1000	Calgary	1.66
LZS	500	Calgary	1.68
LZS	100	Calgary	1.97
LZS	1472	Canterbury	1.61
LZS	1000	Canterbury	1.62
LZS	500	Canterbury	1.63
LZS	100	Canterbury	1.91

4.3 IP Module Specifications

4.3.1 Supported RFCs and Protocols

RFC	Protocol
RFC 768 User Datagram Protocol	RFC 791 Internet Protocol
RFC 792 Internet Control Message Protocol	RFC 793 Transmission Control Protocol
RFC 826 An Ethernet Address Resolution Protocol	RFC 856 Telnet Binary Transmission
RFC 862 Echo Protocol	RFC 894 A Standard for the Transmission of IP Datagrams over Ethernet Networks
RFC 959 File Transfer Protocol	RFC 1112 Host Extensions for IP Multicasting
RFC 1213 Management Information Base for Network Management of TCP/IP-based internet: MIB-II	RFC 1812 Requirements for IP Version 4 Routers
RFC 2045 Multipurpose Internet Mail Extensions (MIME)	RFC 2236 Internet Group Management Protocol, Version 2
RFC 2474 Definition of the Differentiated Services Field (DS Field) in the Ipv4 and Ipv6 Headers	RFC 2475 An Architecture for Differentiated Services
RFC 2578 Structure of Management Information Version 2 (SMIv2)	RFC 2597 Assured Forwarding PHB Group
RFC 2598 An Expedited Forwarding PHB	RFC 2616 Hypertext Transfer Protocol – HTTP/1.1
RFC 2821 Simple Mail Transfer Protocol	RFC 3412 Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)
RFC 3416 Version 2 of the Protocol Operations for the Simple Network Management Protocol (SNMP)	RFC 3418 Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)

4.3.2 CDD562L/564/564L Compatibility

The CDD-56X is compatible with other Comtech EF Data IP modems (referred to hereafter as CDM-IP), provided the modems have similar operating modes and IP options.

The following is a list of compatible CDM-IP modems:

CDD-564L IP FW Version	Comtech EF Data IP Modem / IP FW Version	Comments
Version 1.1.0 or later	CDM-IP 550 Version 1.3.0 or later	Must have Framer II Module (PL/9956-1) to support Data Compression IP option
Version 1.1.0 or later	CDM-IP 300L Version 1.3.0 or later	Must have Framer II Module (PL/9956-1) to support Data Compression IP option
Version 1.1.0 or later	CDM-570/570L Version 1.4.0 or later	

4.4 Typical IP Module Operational Setups

The CDD-56X has several modes of operation. The typical setup examples that follow serve as a means to determine the best mode of operation for the appropriate network topology and Ethernet traffic environment.

4.4.1 IP Module Working Modes

Typical CDM-IP modems support two Working Modes: Managed Switch Mode (formerly easyConnect™) and Router Mode; **however, the demodulator only supports Router Mode, so the CDM-IP modem that is transmitting to demodulator must be in Router Mode.** Non-IP traffic is not supported in Router Mode.

Router Mode supports three HDLC Addressing Modes: Point-to-Point, Small Network, and Large Network. Separate HDLC Modes allow the user to minimize the HDLC overhead transmitted over the satellite based on the size of their network.

In Router/Point-to-Point Mode, no HDLC address is transmitted, Router/Small Network transmits 1 byte, and Router/Large Network transmits 2 bytes as part of HDLC header for each packet.

In the sections that follow, the functionality of these modes is described in further detail, in order to optimize the Comtech EF Data IP modems in the network, based upon Network Topology and Ethernet Traffic requirements.

1. ***The demodulator only supports Router Mode, so the CDM-IP modem that is transmitting to demodulator must be in Router Mode.***
2. ***The HDLC Address Mode of the Comtech EF Data IP modems must be identical to pass traffic between the TX modems and the demodulator.***
3. ***Changing the HDLC Address Mode of the demodulator requires the IP Module to be rebooted. Before the user can select a different mode, the demodulator will notify the user that changing the mode will require a reboot.***

Working Mode HDLC Address Mode	Network Topology	Ethernet Traffic
Router Mode Point-to-Point	Point-to-Point only Both sites on different LAN subnet	IP v4 only
Router Mode Small Network	Point-to-Point or Point-to-Multipoint (up to 254 sites) All sites on different LAN subnet	IP v4 only
Router Mode Large Network	Point-to-Point or Point-to-Multipoint (up to 32766 sites) All sites on different LAN subnet	IP v4 only

Feature Support - The demodulator also has several standard and optional features to further optimize security, performance and efficiency.

The following table defines how these features are supported:

Standard Features	Additional Notes
HDLC Address Mode	Point-to-Point, Small Network, or Large Network
Access Lists	4 Clients by IP or IP Subnet
Multicast	RX all or specific Multicast streams
IGMP	IGMPv1, IGMPv2
Upgrade by FTP	By local LAN or remotely through satellite (requires a two way connection to demodulator)
* Quality of Service	Min/Max, Max/Priority, or DiffServ
Optional Features	**Additional Notes**
Header Compression	Must be enabled if any TX modem stream has Header Compression enabled.
Payload Compression	Must be enabled if any TX modem stream has Payload Compression enabled.
3xDES Encryption	Must be enabled if any TX modem stream has 3xDES Encryption enabled. Up to 8 Decrypt Keys or random

* Quality of Service (QoS) processing is performed by the transmit end of the link and passed through the IP Module in the demodulator. Support for QoS is a standard feature in the demodulator.

4.4.1.1 Router Working Mode – Point-to-Point

Figure 4-1 shows an example setup using the CDD-562L L-Band Satellite Dual Demodulator at a Hub site to receive two separate DVB return channels.

Note the following:

- The CDD-562L and all CDM-IP modems are in **Point-to-Point Mode**.
- Each remote site has a CDM-IP modem with a default static route.
- The CDD-562L has a default static route directing traffic to the hub router.
- The hub router would have routes defined for each remote network that would be directed to the DVB Encapsulator.

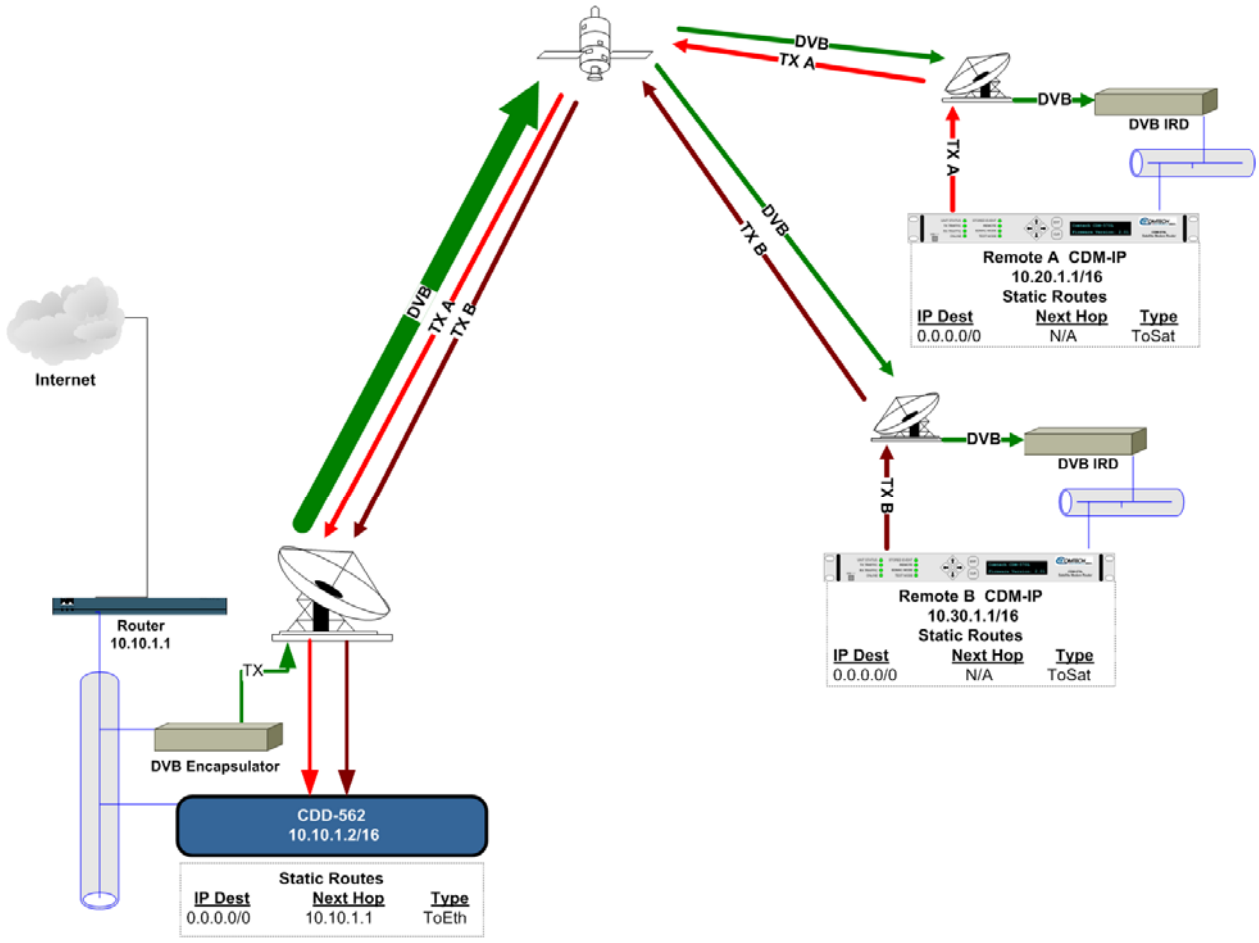


Figure 4-1. (CDD-562L) Router Mode Point-to-Point Diagram

Figure 4-2 shows an example setup using the CDD-564 (70/140 MHz) or CDD-564L (L-Band) Satellite Quad Demodulator at a Hub site to receive three separate DVB return channels.

Note the following:

- The demodulator and all CDM-IP modems are in **Point-to-Point Mode**.
- Each remote site has a CDM-IP modem with a default static route.
- The demodulator has a default static route directing traffic to the hub router.
- The hub router would have routes defined for each remote network that would be directed to the DVB Encapsulator.

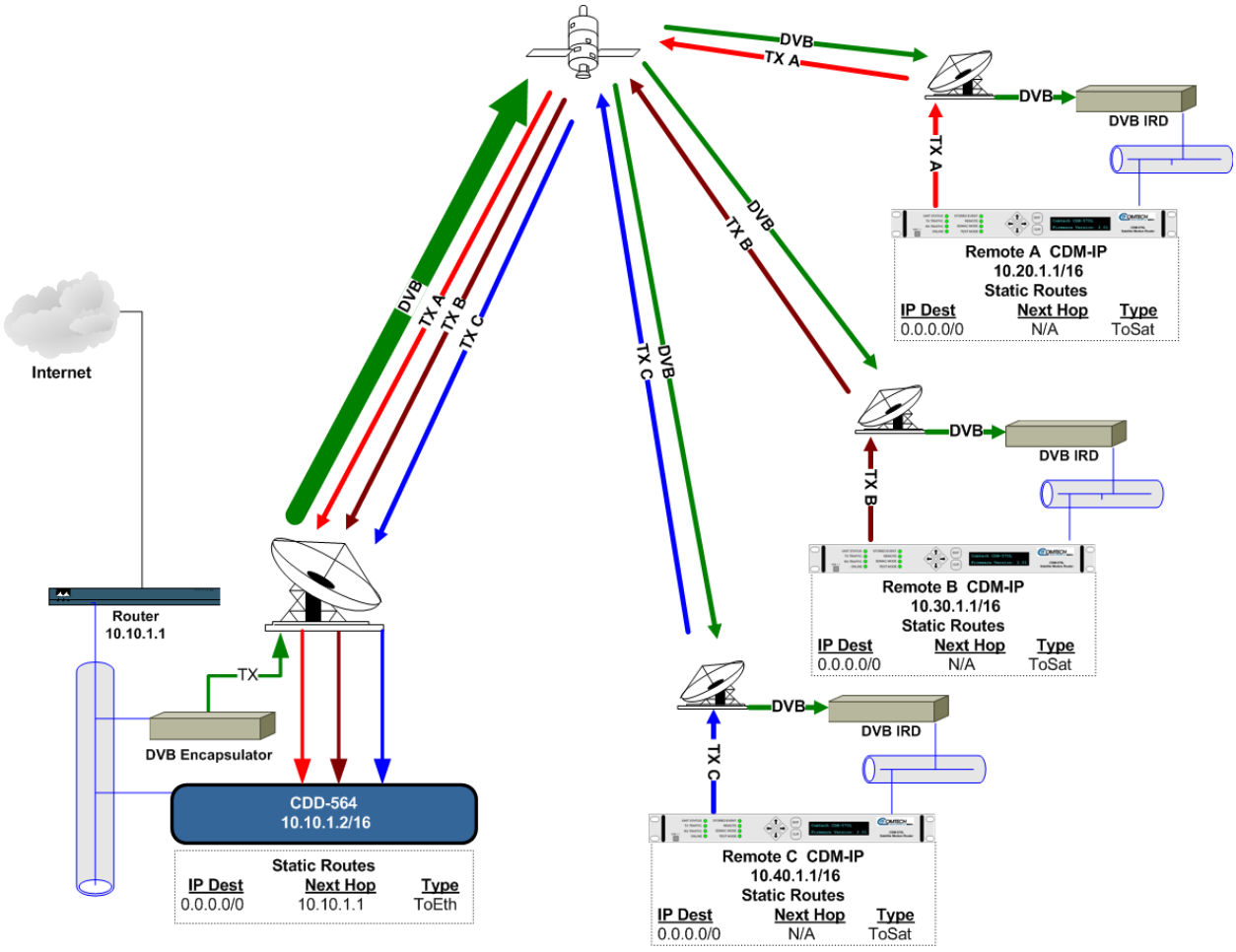


Figure 4-2. (CDD-564/564L) Point-to-Point Router Working Mode Diagram

4.4.1.2 Router Working Mode – Point-to-Multipoint

Figure 4-3 shows a **"Star Network" Point-to-Multipoint Configuration**, where the Hub CDM-IP modem is transmitting a common STDMA carrier to two remote sites with CDM-IP modems. In turn, the Remote CDM-IP is transmitting a link back to the Hub that is received by the CDD-562L L-Band Satellite Dual Demodulator.

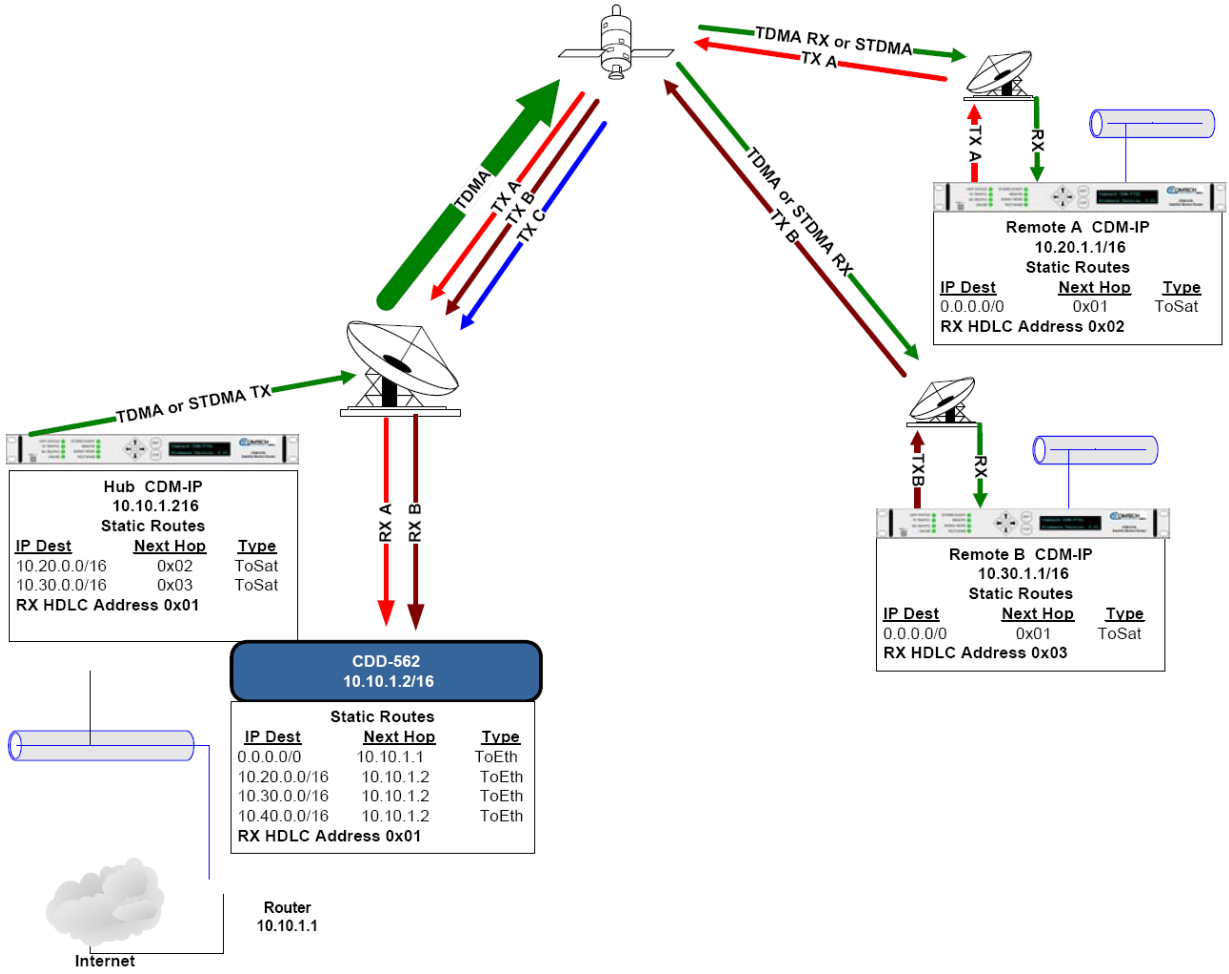


Figure 4-3. (CDD-562L) Point-to-Multipoint Router Working Mode Diagram

Figure 4-4 shows a **"Star Network" Point-to-Multipoint Configuration** where the Hub CDM-IP modem is transmitting a common STDMA carrier to three remote sites with CDM-IP modems. In turn, the Remote CDM-IP is transmitting a link back to the Hub that is received by the CDD-564 (70/140 MHz) or CDD-564L (L-Band) Satellite Quad Demodulator.

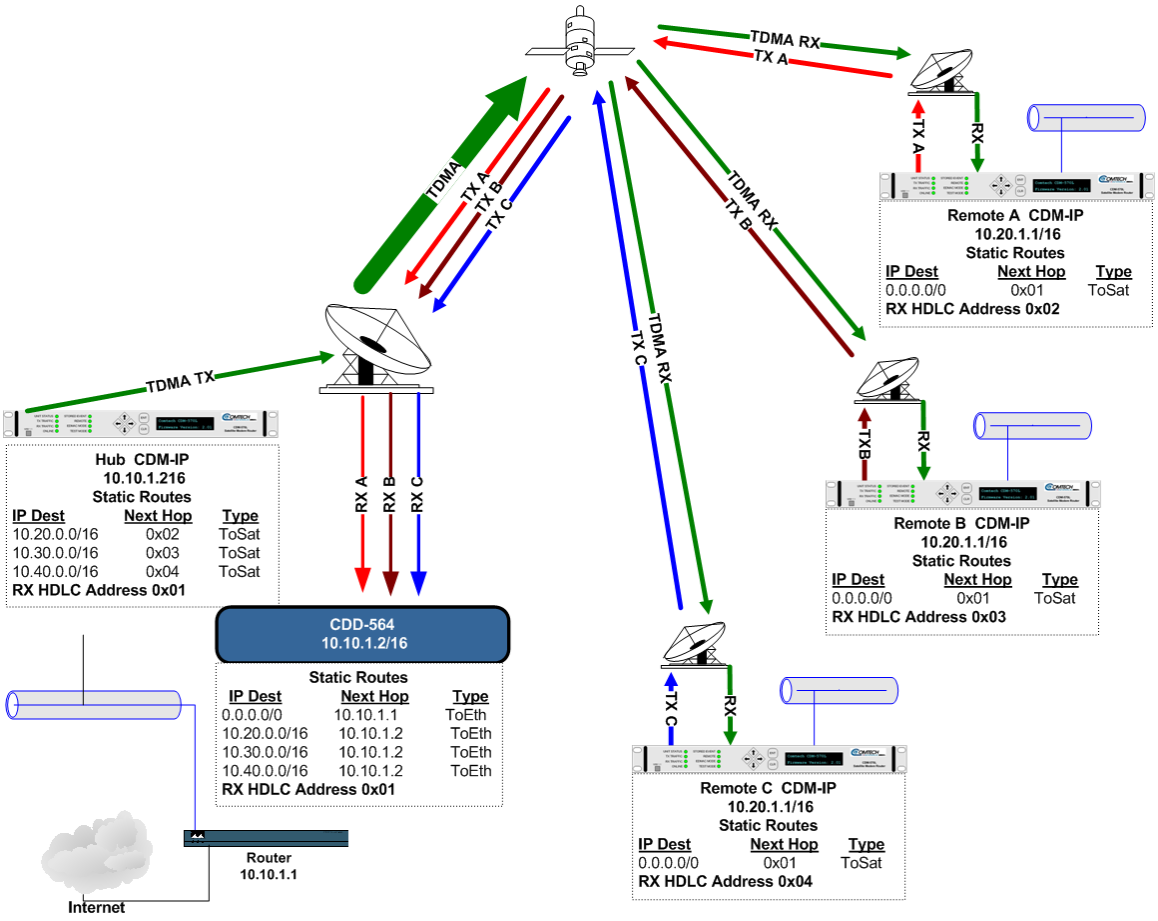


Figure 4-4. (CDD-564/564L) Point-to-Multipoint Router Working Mode Diagram

Since this is a Point-to-Multipoint configuration, HDLC addressing is used so that the traffic not intended for a particular destination can be filtered (Small or Large HDLC Mode). For unicast traffic, it is best to associate a unique HDLC address for each site in the network. In this case:

- The Hub Site is HDLC 0x01
- CDM-IP Remote 'A' is HDLC 0x02
- CDM-IP Remote 'B' is 0x03
- CDM-IP Remote 'C' is 0x04.

Each CDM-IP modem would select the HDLC address associated with its site as an Rx HDLC Address. Therefore:

- Both the Hub CDM-IP modem and CDD-564L would have 0x01 as the first RX HDLC Address
- CDM-IP Remote ‘A’ would have 0x02
- CDM-IP Remote ‘B’ would have 0x03
- CDM-IP Remote ‘C’ would have 0x04.

The remote CDM-IP modems only need a single default route to is directed to the Hub HDLC, 0x01. All of the traffic is managed by the static route entries in the hub CDM-IP and demodulator. The demodulator has a default route to the router for Internet access. It also has specific routes for the remote networks which are directed to the Hub CDM-IP. The Hub CDM-IP also has specific routes for the remote networks with the HDLC address associated with each site.

Notes:

Chapter 5. UPDATING FIRMWARE

5.1 Updating Firmware via the Internet

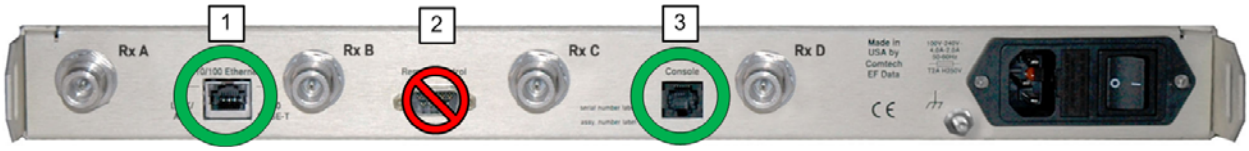
TO ENSURE OPTIMAL PERFORMANCE, IT IS IMPORTANT TO OPERATE THE CDD-56X WITH ITS LATEST AVAILABLE FIRMWARE.

The CDD-56X Satellite Demodulator with IP Module eliminates the need for updating firmware by physically replacing EPROMs. Instead, the demodulator uses 'Flash memory' technology internally. This makes the firmware update process very simple. Firmware update archive files may be downloaded from the Internet (from Comtech EF Data's website), or obtained through Comtech EF Data Customer Support via e-mail or on CD by standard mail delivery.

The complete firmware update process is as follows:

- New firmware can be downloaded from Comtech EF Data's website to a user-supplied PC.
- Transfer the firmware update file, via File Transfer Protocol (FTP) upload, from the user PC to the CDD-56X.
- Perform the update, without opening the CDD-56X, using the rear panel interface M&C connections:
    - The 10/100 BaseT **Ethernet** port connects to the Ethernet port of the user PC for user access to SNMP/Telnet/HTTP operations.
    - The **Console** port connects to an available serial port for user access to the IP Module Command Line Interface (CLI) operations.

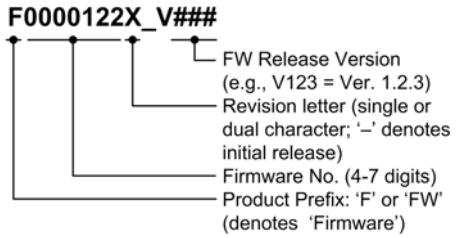
(**Figure 5-1** on the next page summarizes the rear panel data interfaces used – or *not* used – with the CDD-56X firmware update process.)



Feature	Name (Specification)	Connection to User PC	Used for:
1	10/100 Ethernet (BaseT Ethernet port – RJ-45 8-pin modular jack)	CABLING: CAT5, user-supplied to an available Ethernet port, via hub or switch or direct connection	• Ethernet traffic • Management of IP Module functions via SNMP/Telnet/ HTTP • Updating IP Module firmware
2	Remote Control *(NOTE: This DB-9M (Type 'D' 9-pin male) connector is NOT a standard EIA-232 interface)*	*DO NOT USE.* *Contact CEFD Customer Support prior to connecting any equipment to this interface.*	*Factory Test use ONLY – NOT intended for customer use*
3	Console (Async-Serial EIA-232 DCE port – RJ-11 6-pin modular jack)	CABLING: Use the provided adapter cable to connect to an available 9-pin serial port. SOFTWARE: A user-supplied terminal emulator program such as HyperTerminal or Tera Term is used for management of demodulator and IP Module functions.	IP Module Command Line Interface (CLI)

Figure 5-1. CDD-56X Rear Panel Connections to User PC

5.2 About Firmware Files, Naming, Versions and Formats



All CEFD products are shipped configured with the current version firmware release. Comtech EF Data's website catalogues its firmware update files by product type (e.g., modem, converter, etc.) and specific model/optional configuration. The example naming schematic at right shows the demodulator firmware download hyperlink **F0000122X_V###**, where 'X' denotes the revision letter, and ### represents the release version, of the firmware. (The linked file applies to Version 1.6.3 and earlier operation *without* the 3xDES Encryption option.)

The CDD-56X is optionally available with 3xDES Encryption. The desired firmware updates are available from Comtech EF Data per the following table:

Web Hyperlink	EXE/ZIP Filename	Contains Image File (* denotes revision letter)
F0000122X_V###	FW0000122X	FW-0000122*.bin – Ver. 1.6.3 (and earlier) with HDLC Encapsulation, *without* 3xDES Encryption option
N/A	Contact CEFD	FW11669*.bin – Ver. 1.6.3 (and earlier) with HDLC Encapsulation, *with* 3xDES Encryption option
F0000364X_V###	FW0000364X	FW-0000364*.bin – Ver. 1.7.0 (and later) with Streamline Encapsulation, *without* 3xDES Encryption option
F0000362X_V###	Contact CEFD	FW-0000362*.bin – Ver. 1.7.0 (and later) with Streamline Encapsulation, *with* 3xDES Encryption option

Ver. 1.7.0 firmware (featuring Streamline Encapsulation) is not compatible with Ver. 1.6.x firmware (featuring HDLC Encapsulation).

Only firmware for the CDD-562L/564 without the 3xDES Encryption option is available for download from the CEFD Web site. To obtain the firmware upgrade for the CDD-562L/564 with the 3xDES Encryption option, the user must Contact Network Product Customer Support:

Phone – 480.333.2433
E-mail – cdmipsupport@comtechefdata.com.

The firmware download files are available from Comtech EF Data in two archive file formats: ***.exe** (self extracting) and ***.zip** (compressed). Some firewalls will not allow downloading of *.exe files; in this case, download the *.zip file instead. If applicable, one version prior to the current release is also available for download.

For additional help with "zipped" file types, refer to the help files provided with the "PKZIP for Windows", "WinZip", or "ZipCentral" file archiving programs. "PKZIP for DOS" is not supported due to file naming conventions.

To verify the correct firmware number, see **Step 2** in the next section of this guide, **Sect. 4.3.1 Getting Started: Preparing for the Firmware Download.**

5.3 Ethernet FTP Upload Procedure

5.3.1 Getting Started: Preparing for the Firmware Download

Step	Task
1	Connect the user PC to the CDD-56X **10/100 Ethernet** port either via a hub or a switch or with a direct Ethernet cable connection, and connect the CDD-56X **Console** port (do ***NOT*** use the **Remote Control** port) to a serial port on the user PC using an adapter cable. **See Figure 4-1.**
2	Identify the product in use, its firmware number for download, and its version number. The current product M&C version and/or firmware number can be viewed as follows: • *Using the 10/100 Ethernet port, via HTTP and the IP Module Web Server Interface* – first click the **Maint** (Maintenance) tab, and then select the **Unit Info** hyperlink. For more information, see **Chapter 6. WEB SERVER (HTTP) INTERFACE.** • *Using the 10/100 Ethernet port, via Telnet and the IP Module Command Line Interface (CLI)* – first type '**0**' (for Operations and Maintenance) on the main page, and then type'**I**' (for Unit Information). For more information, see **Chapter 7. IP MODULE – CLI AND TELNET OPERATION**.
3	Create a temporary folder (subdirectory) on the user PC for the firmware archive download. • ***Drive letter "c:" is used in these examples. Any valid, writable drive letter can be used.*** • ***Typical for all tasks: Type the command without quotes, and then press* Enter *to execute.*** There are several ways the user may create a temporary folder on a Windows-based PC: **A.** Use the Windows Desktop to create and rename the temporary folder. • Right-click anywhere on the Windows Desktop to open the popup submenu, and then select **New > Folder** to create the temporary folder. The "**New Folder**" will be created on the desktop. • Right-click on the "**New Folder**" and then select '**Rename**' from the popup submenu. Rename this folder to "**temp**" or some other convenient, unused name. **B.** Use Windows Explorer to create and rename the temporary folder. • Select **File > New > Folder** to create the temporary folder. The new folder will be created in the active folder. • Right-click the "**New Folder"** folder name, and then rename this folder to "**temp**" or some other convenient, unused name.

Step	Task
3 (cont)	**C.** Use Windows Command-line to create the temporary folder: • First, click **[Start]** on the Windows taskbar, and then click the **Run...** icon (or, depending on Windows OS versions *prior* to Windows 95, click the **MS-DOS Prompt** icon from the Main Menu). • Next, open a Command-line window… o For Windows 95 or Windows 98, type "**command**". o For any Windows OS versions later than Windows 98, type "**cmd**" or "**command**". o Alternately, from **[Start]**, select **All Programs > Accessories > Command Prompt**. o Finally, from the Command-line prompt (**c:\>**), type "**mkdir temp**" or "**md temp**" (***mkdir*** and ***md*** stand for ***make directory***), and then click **[OK]**. **D.** Use the '**Run**' and '**Browse**' windows to create and rename the temporary folder. • Select **[Start]** on the Windows taskbar, and then click the **Run...** icon. The '**Run**' window will open. • Click **[Browse]** in the '**Run**' window. The '**Browse**' window will open. • Click the **Create New Folder** icon in the '**Browse**' window. The new folder will be created. Right-click the "**New Folder**" folder name, and then rename this folder to "**temp**" or some other convenient, unused name.

There should now be a "temp" folder created and available for placement of the firmware file download.

5.3.2 Downloading and Extracting the Firmware Update

Step	Task
1	Download the correct firmware archive file to the user PC temporary folder. **A.** Go online to www.comtechefdata.com. **B.** On the *Main* page – under Support Information or the Support tab, select the Software Downloads hyperlink. **C.** On the *Software Downloads* page – click *Download Flash and Software Update Files*. **D.** On the *Flash & Software Update Files* page – select the *(Select a Product Line) Modems* hyperlink. **E.** On the *Modems* product page – select the ***CDD-564/L*** *or* ***CDD-562L*** product hyperlink. **F.** Select the appropriate firmware EXE or ZIP download hyperlink (i.e., ***without*** 3xDES) or contact CEFD Network Product Customer Support to obtain the download ***with*** 3xDES). Refer to the table in **Sect. 4.2 About Firmware Numbers, File Versions, and Formats** in this chapter for the naming and availability of the firmware download hyperlinks, archive files, and downloaded image files. **G.** Download the archive file to the temporary folder. Once the EXE or ZIP hyperlink is selected, the '**File Download**' window opens and prompts selection of **[Open]** or **[Save]**: • Click [Open] to turn over file extraction to the user-supplied utility program. Be sure to extract the firmware files to the "temp" folder created earlier. • Click **[Save]** to open the '**Save As**' window. Be sure to select and **[Save]** the archive *.exe or *.zip file to the "**temp**" folder created earlier. • Otherwise, click **[Cancel]** to quit and exit the file download process.
2	Extract the firmware files from the archive file (if not already done with **File Download > [Open]**). Extract the firmware files from the downloaded *.exe or *.zip archive file with the user-supplied utility program: A minimum of three files should be extracted (note that '*' denotes the revision letter for the image file): • ***Without 3xDES*** FW-0000122*.bin (Ver. 1.6.3 and earlier) *–or–* FW-0000364*.bin (Ver. 1.7.0 or later). ***–or–*** • ***With 3xDES*** FW11669*.bin (Ver. 1.6.3 and earlier) *–or–* FW-0000362*.bin (Ver. 1.7.0 or later). • CDD 56x L X.X.X Release Notes.pdf (or a variation of this filename); • CDD 56x L X.X.X Upgrade (or a variation of this filename) – Installation notes.

Step	Task
3	Confirm availability of the firmware files in the temporary folder. There are a number of ways the user may view the contents of the temporary folder on a Windows-based PC: **A.** *From the Windows Desktop:* • Double-left-click the "**temp**" folder saved to the Windows Desktop. • Use Windows Explorer to locate, and then double-left-click the "**temp**" folder. • Use the 'Browse' window (**[Start] > ...Run > [Browse]**) to locate, and then double-click the "**c:\temp**" folder. **B.** *Using Command-line:* • Type "cd c:\temp" at the Command-line prompt to change to the temporary directory created earlier using Command-line. • Type "dir" to list the files extracted to the temporary directory from the downloaded archive file.

The firmware files have been successfully downloaded and are now available for transfer to the CDD-56X.

5.3.3 Bulk Firmware FTP Upload Procedure

Step	Task
1	Verify that: • The firmware update has been downloaded to the user PC and is available in the temporary folder, and • The user PC is connected to the CDD-56X **10/100 Ethernet** port either via a hub or a switch or with a direct Ethernet cable connection, and that the CDD-56X **Console** port (do **NOT** use the **Remote Control** port) is connected to a serial port on the user PC using an adapter cable.
2	Confirm that there is proper connection and communication between the user PC and the CDD-56X. *First*, determine the IP Address as follows: • *Using the front panel* – use the **SELECT: CONFIG → Remote → Remote → Ethernet** menu. • *Using serial remote control* – use the **<0/IPA?** query. *Then*, use Command-line to "ping" the modem: • From Windows, click **[Start]** on the Windows toolbar, and then select the **Run...** option (as an alternative, use the '**Command-line Prompt'** or '**Command Prompt'** icon in the **Start** menu): o *Using Win95 or Win98* – Type "**command**". o *Using WinNT, Win2K or WinXP* – Type "**cmd**". Type "**ping *xxx.xxx.xxx.xxx***" at the Command-line prompt (where "*xxx.xxx.xxx.xxx*" is the CDD-56X IP Address). The results should confirm whether or not the modem is connected and communicating.
3	Use Command-line to initiate an FTP session with the CDD-56X: **A.** Type "**ftp xxx.xxx.xxx.xxx**" (where 'xxx.xxx.xxx.xxx' denotes the unit IP Address). **B.** Enter the **Admin User Name** and **Password** to complete login. **C.** Type "**bin**" to set the binary transfer mode. **D.** Type "**prompt"**, and then type "**hash**" to facilitate the file transfers.
4	Upload the files from the temporary folder on the user PC: Type "**put FW-0000###*.bin**" (where '0000###' is the firmware number, and '*' is the firmware revision letter) to begin the file transfers. The process sequences through several blocks – this may take several minutes. When the firmware update image file has been uploaded, it will be written to flash memory.

Step	Task
5	Change the desired image to boot. By default, the demodulator will boot to the version with the *latest date* (**Boot to – Latest**). "**Boot to**" can also be set to force the demodulator to boot up using either **Image #1** or **Image #2**. The unit will then need to be reset (i.e., rebooted or power cycled) from the serial console, Web Server Interface, or CLI/Telnet for the firmware upgrade selection to become active: • *To reset from the Web Server Interface* – Select the **Maint | Reboot** page, and then click **[Yes, Reboot]**. • *To reset from the CLI/Telnet Main Menu* – Select **Operations and Maintenance [O]**, and then select **Reset [R]**.

The CDD-56X is now operating with its latest firmware. The firmware update process is now complete.

Notes:

Chapter 6. ETHERNET-BASED REMOTE PRODUCT MANAGEMENT

6.1 Introduction

Ethernet-based Remote Product Management of the CDD-56X Satellite Demodulator with IP Module is available using the rear panel RJ-45 10/100 BaseT Ethernet M&C port. This chapter summarizes the functionality of this interface and references other chapters for further details.

6.2 Ethernet Management Interface Protocols

A user-supplied PC facilitates access to Ethernet-based remote monitor and control (M&C) of the CDD-56X through three separately-operated protocols:

- **Simple Network Management Protocol (SNMP).** This requires a user-supplied Network Management System (NMS) and a user-supplied Management Information Base (MIB) File Browser.

- **The Telnet Interface.** This requires use of the CDM-625 Command-Line Interface (CLI), which is accessed via a user-supplied terminal emulation program, such as HyperTerminal, installed on the user PC.

- **The CDD-56X HTTP (Web Server) Interface.** This requires a compatible user-supplied web browser such as Internet Explorer.

6.3 SNMP Interface

The *Simple Network Management Protocol* (SNMP) is an Internet-standard protocol for managing devices on IP networks. An SNMP-managed network consists of three key components:

- **The managed device.** This includes the CDD-56X Demodulator with IP Module.

- **The SNMP Agent.** The software that runs on the CDD-56X. The CDD-56X SNMP Agent supports both **SNMPv1** and **SNMPv2c**.

- **The user-supplied Network Management System (NMS).** The software that runs on the manager.

6.3.1 Management Information Base (MIB) Files

MIB files are used for SNMP remote management of a unique device. A MIB file consists of a tree of nodes called Object Identifiers (OIDs). Each OID provides remote management of a particular function. These MIB files should be compiled in a user-supplied MIB Browser or SNMP Network Monitoring System server.

The following MIB files are associated with the CDD-56X:

MIB File/Name (where * is revision letter)	Description
FW11669-2*.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 OID: 1.3.6.1.4.1.6247 Path: iso(1).org(3).dod(6).internet(1).private(4).enterprises(1).comtechEFData(6247)
FW11669-3*.mib MIB file	CDD-564 MIB file consists of all of the OID's for management of the demodulators functions.
FW11669-4*.mib Traps MIB file	CDD-564 Traps MIB file is provided for SNMPv1 traps.

6.3.2 SNMP Community Strings

In SNMP v1/v2c, the SNMP 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.

The CDD-56X uses Community Strings as a password scheme that provides authentication before gaining access to the demodulator agent's MIBs. They are used to authenticate users and determine access privileges to the SNMP agent.

Type the SNMP Community String into the user-supplied MIB Browser or Network Node Management software.

The user defines three Community Strings for SNMP access:

- Read Community default = public

- Write Community default = private

- Trap Community default = comtech

1. ***For proper SNMP operation, the CDD-56X MIB files must be used with the associated version of the demodulator M&C. See the CDD-562L/ 564/564L FW Release Notes for information on the required FW/SW compatibility.***

2. ***Maximum number of characters for community strings shall not exceed 20. All printable ASCII characters, except '\' and '~' are allowed. No trailing spaces are permitted for community strings.***

3. ***Any changes made to the IP Parameters will be lost if the demodulator is reset or loses power unless the changes are saved to permanent storage. The IP Parameters can be saved by a SET of the* cdd564SaveParamToFlash *OID within the MIB.***

6.3.3 SNMP Traps

The CDD-56X supports both **SNMPv1** traps and **SNMPv2** notifications. The demodulator has the ability to send out SNMP traps when certain events occur in the demodulator. Which style of traps the demodulator sends can be configured by the user using the cdd564SNMPTrapVersion OID. These include unit faults, Rx faults, and LNB faults. A trap is sent both when a fault occurs and is cleared.

The following MIB-II v1traps/v2 notifications are supported by the CDD-56X:

MIB-II SNMPv1 traps:

Cold Start	1
Link Up	4
Authentication Failure	5

MIB-II SNMPv2 notifications:

Cold Start	1.3.6.1.6.3.1.1.5.1
Link Up	1.3.6.1.6.3.1.1.5.4
Authentication Failure	1.3.6.1.6.3.1.1.5.5

The following Alarms and Faults v1 traps / v2 notifications are supported by the CDD-56X:

Alarms and Faults SNMPv1 traps:

cdd564UnitAlarmTrap	6247251
cdd564RxAlarmTrap	6247252
cdd564LNBAlarmTrap	6247253

Alarms and Faults SNMPv2 notifications:

cdd564UnitAlarmNotification	1.3.6.1.4.1.6247.24.2.0.1
cdd564RxAlarmNotification	1.3.6.1.4.1.6247.24.2.0.2
cdd564LNBAlarmNotification	1.3.6.1.4.1.6247.24.2.0.3

6.3.4 MIB-II

The demodulator 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 please see the actual MIB file. The agent implements the following Groups:

Table 6-1. MIB-II Support

Group	Comments
System Group	Mandatory for RFC1213
Interface	Mandatory for RFC1213
IP	Mandatory for RFC1213
ICMP	Mandatory for RFC1213
TCP	Mandatory for RFC1213
UDP	Mandatory for RFC1213
SNMP	Mandatory for RFC1213
Address Translation Group	Implemented but depreciated in MIB-II
EGP	Not applicable

6.3.5 Private MIB

The Private MIB holds all the security, feature selection, IP related parameters and all the demodulator specific parameters. For detailed OID information please see the actual MIB file.

6.3.5.1 Administration Group

This group contains system security, administration, and feature configuration parameters.

6.3.5.1.1 Access Lists Subgroup

This subgroup allows the user to define which remote clients can connect to a demodulator when the Access List Enforcement is enabled. Each entry allows the user to specify an IP address and a subnet mask to define a unique class of clients that are allowed access to the unit.

6.3.5.1.2 Features Subgroup

This subgroup allows the user to enable/disable a Standard or FAST feature.

Standard features (ping reply, telnet, , IGMP, and multicast forwarding) can be enabled or disabled by sending a 1 (enable) or 0 (disable).

Header decompression can be enabled or disabled on a per demodulator basis via the FeaturesTable.

Changing the Working mode between Point-to-Point Mode, Small Network Mode, Large Network Mode, and Vipersat Mode forces the system to reboot. System configuration will be saved before re-booting. Please make sure you are setting the correct value.

6.3.5.1.3 3xDES Decryption Subgroup

This subgroup controls the parameters for the triple DES (3xDES) feature. Each Receive key is of 192-bit length. The Rx DES keys can be entered through the DESRxKeyTable.

6.3.5.1.4 SMTP Subgroup

This subgroup sets up the unit to use a SMTP mail server to send a problem report back to Comtech EF Data Modem Support. Along with the problem report, the unit sends the equipment serial number and configuration, which is attached to the e-mail message. By default, the problem report is sent to: cdmipsupport@comtechefdata.com.

In order for this to work, the user is required to enter the IP address of their outgoing SMTP mail server. Also the user should enter their e-mail username (text before the @ in an e-mail address) and e-mail domain name (text after the @ in an e-mail address).

6.3.5.1.5 SNMP Traps Subgroup

This subgroup controls where SNMP traps are sent and the community string used in sending traps. Either SNMPv1 or SNMPv2 traps can be sent.

6.3.5.2 Interface Group

This group controls the parameters of the unit's Ethernet and demodulator interfaces.

6.3.5.2.1 Ethernet Interface Subgroup

This subgroup defines the unit's Ethernet interface. These include parameters for setting the Ethernet speed, IP address, and IP address subnet prefix length.

6.3.5.2.2 Demodulator Interface Subgroup

This subgroup defines the Demodulator's interfaces each demodulator's HDLC addresses.

HDLC Address Mode has been changed to be read-only. This parameter is now settable through the Working Mode OID (cdd564WorkingMode) in the Features subgroup.

6.3.5.3 Route Table Group

This group allows the user to define how the packets that the unit receives are routed.

6.3.5.4 Protocols Group

These protocols groups allow the user to control networking protocols such as IGMP.

6.3.5.4.1 IGMP Subgroup

This subgroup controls the IGMP, Internet Group Management Protocol, which is the standard for IP multicasting in the Internet.

6.3.5.5 Maintenance Group

This group contains several miscellaneous operations for the demodulator, including the unit information, bulk database configuration (allows the user to define which image to boot from and into which image to save a new bulk file), and IP PARAM file configuration. Rebooting the unit is also possible from this group.

6.3.5.6 Statistics Group

This group collects various statistics on Ethernet interface, satellite interfaces, and IP routing.

6.3.5.6.1 IP Routing Statistics Subgroup

This subgroup reports statistics collected by the IP router mechanism.

6.3.5.6.2 Ethernet Statistics Subgroup

This subgroup collects statistics reported on the Ethernet network card.

6.3.5.6.3 Satellite Statistics Subgroup

This subgroup collects statistics reported on the WAN (satellite interface) FPGA.

6.3.5.7 Demodulator Configuration Group

Whenever modifying the demodulator parameters by SNMP, the user must be aware that the following variables must be executed in this order:

1. ***FEC (Forward Error Correction***
2. ***Demodulation***
3. ***Code Rate***
4. ***Data Rate***

This group allows the user to configure the demodulator parameters, alarm masks, and internal reference adjustment. LNB units attached to the demodulator can also be configured.

For detailed OID information please see the actual MIB file.

6.3.5.7.1 Rx Parameters

This section allows the user to configure the demodulators' parameters.

6.3.5.7.2 Alarm Mask Parameters

This section allows the user to mask the AGC, Eb/No, and LNB alarms.

6.3.5.7.3 Reference Parameters

This section allows the user to change the internal reference adjustment.

6.3.5.7.4 LNB Parameters

This section allows the user to configure LNB parameters when an LNB is attached to the demodulator.

6.3.5.8 Monitor Group

This group reports the demodulator's status, including alarms, receive parameters, event log entries, statistics entries, and LNB parameters.

6.3.5.8.1 Unit Monitor

This section reports serial number, software revision, model number, and temperature. Any alarms that have been raised for the unit are also available.

6.3.5.8.2 Rx Monitor

This section reports the demodulator's bit error rate (BER), buffer fill state, frequency offset, receive signal level, and Eb/No value. Alarms that have been raised on a specific demodulator are also reported.

6.3.5.8.3 LNB Monitor

This section reports LNB unit status, including LNB current, LNB voltage, and any alarms.

6.3.5.8.4 Stored Events Log

The event log is a table that informs the user of any faults that have occurred in the demodulators. Event entries may also include informational items, such as power on/off.

6.3.5.8.5 Stored Statistics

The statistics log is a table that gathers data concerning receive Eb/No. The user can decide to collect these statistics on intervals ranging from 10 minutes to 90 minutes.

6.3.5.9 Utilities Group

This group allows the user set the unit's time and date, and set the circuit ID string per demodulator.

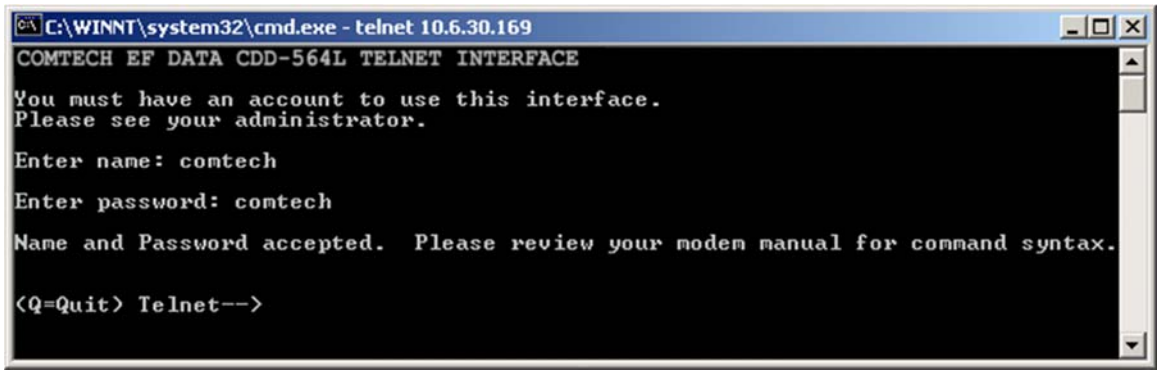
6.4 Telnet Interface

The CDD-56X provides a Telnet interface for two primary functions:

1. Equipment M&C via the Command Line Interface (CLI) application. For further details about using this application, see **Chapter 8. IP MODULE CLI AND TELNET OPERATION**.

2. Equipment M&C via Comtech EF Data's CDM/CDD NMCS application and associated Remote Control protocol. For further details about using this application, see **Appendix D. CDM/CDD NMCS PROTOCOL**.

The Telnet interface requires login at the ***Administrator*** and ***Read/Write*** User Access Levels. An example of the login process is shown here:



Once logged into the Telnet interface as the Administrator, the NCMS interface defined in **Appendix D. CDM/CDD NMCS PROTOCOL** is accessible, as shown here:

6.4.1 Telnet Operation via HyperTerminal

There is a disadvantage when using Windows Command-line as a Telnet client. Since Command-line cannot translate a '\r' (i.e., carriage return or "CR") to a '\r\n' (i.e., CR+line feed "LF") for the messages coming from Telnet Server, any multi-line Target-to-Controller response (e.g., the

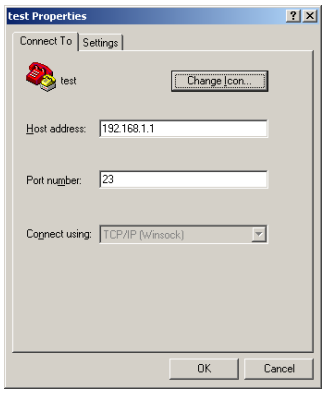
response to the FRW? query) will be displayed as one line, with the latter lines overwriting the previous lines.

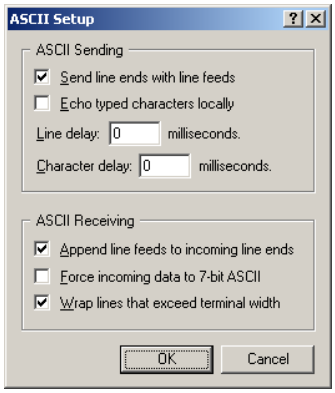
In order to view the full response messages, Comtech EF Data recommends use of the HyperTerminal terminal emulation program, configured as a Telnet client.

Configure HyperTerminal as follows:

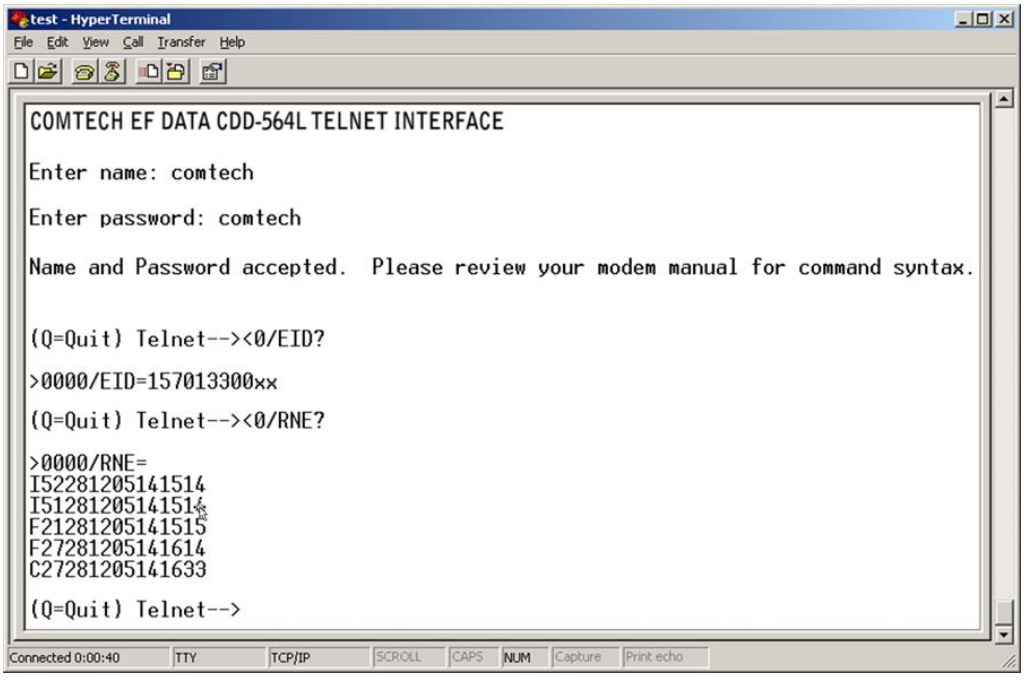
1. Ensure that the connection is made using **TCP/IP (Winsock)** instead of COM1 or COM2, as shown at the near right.

2. ASCII Setup (File → Properties → Settings → ASCII Setup): Check the "**Send line ends with line feeds**" option in the *ASCII Sending* section, and the "**Append line feeds to incoming line ends**" option in the *ASCII Receiving* section, as shown at the far right.





An example of login and remote command/query execution, when using HyperTerminal as the interface, appears as follows:



6.5 HTTP (Web Server) Interface

A user-supplied web browser allows the full monitor and control (M&C) of the CDD-56X from its HTTP Interface. The CDD-56X embedded web application is designed for, and works best with, Microsoft's Internet Explorer Version 6.0 or higher.

The parameters featured on the individual web pages are described in **Appendix D. CDM/CDD NMCS PROTOCOL**. For further details on using the HTTP Interface, see **Chapter 9. HTTP (WEB SERVER) INTERFACE**.

6.5.1 HTTP (Web Server) Interface – Typical Operational Features

6.5.1.1 Interface Access

Type the CDD-56X IP Address (shown here as *http://xxx.xxx.xxx.xxx*) into the **Address** area of the user-supplied web browser:

The Login window will appear, similar to the example shown here, and the user is prompted to type a **User name** and **Password**.

The Web Server Interface default user names and passwords are as follows:

- Admin comtech/comtech
- Read/Write opcenter/1234
- Read Only monitor/1234

Type the User Name and Password, and then click **[OK].**

Once the valid User Name and Password is accepted, the user will see the CDD-56X Web Server Interface "splash" page, as per the example shown to the right:

HTTP Login User Access Levels are further defined as follows:

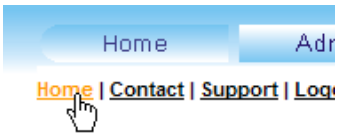
Admin User	Read/Write User	Read Only User
Full Access to all web pages.	No Access to Admin web pages.	No Access to Admin web pages.
	Full Access for all other web pages	*View Only Access* for all other web pages.

6.5.1.2 Navigation

This manual uses a naming format for all web pages to indicate the depth of navigation needed to view the referenced page: "**Top Level Tab | Page Hyperlink**"

For example: "**Home | Support**" is interpreted to mean "*first* click the top-level '**Home**' navigation tab; *then*, click the '**Support**' page hyperlink.

Roll the cursor over the navigation tabs located at the top of each page, and then select from the available page hyperlink. You can fully monitor and control operations of the CDD-56X from the HTTP Interface. Roll the cursor over the navigation tabs located at the top of each page (shown at right) to select from the available nested hyperlinks.



For further details on using the Web Server Interface, see **Chapter 9. HTTP (WEB SERVER) INTERFACE**.

6.5.1.3 Page Sections

Each web page is divided into operational content sections. Whether there is one section to a page, or there are multiple sections, the title at the upper-left corner of each page or page section provides a reference to its operational features.

This manual explains the purpose and operation for each web page on a ***per-page, per-section*** basis.

6.5.1.4 Execution Buttons

Configuration changes generally do not take effect until a selection has been saved to Flash memory. There may be anywhere from one execution button per page up to multiple execution buttons within a page section. The label for each of these buttons is generally self-explanatory, e.g., **[Submit]**, **[Refresh**], etc.

All execution buttons serve the same purpose – to save the configuration changes to Flash memory, or to execute an update of the active page display.

Always make sure to click the execution button before selecting another web page. Any changes made on that previous page will <u>not</u> be saved if the execution button for those functions is not clicked.

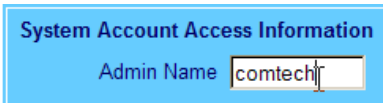
6.5.1.5 Feature Selection

Drop-down menus provide access to multiple setting selections, where available, for a specific function. Move the cursor to the drop-down tab, and then left-click the tab. The drop-down will open and list the available selections. Move the cursor to the desired choice and then left-click once again to select that choice.

6.5.1.6 Text or Data Entry

Text boxes are provided any time an alphanumeric entry is required for access or configuration.

Move the cursor to the text box, and then left-click anywhere inside the box. Then, use the keyboard to type in the desired alphanumeric string. Press **Enter** when done.



Chapter 7. QUICK START GUIDE

7.1 Introduction

This chapter assumes user familiarity with the configuration and the operation of both the CDM-IP modem and the CDD-56x demodulator.

Use this chapter to quickly configure a pair of Comtech EF Data IP-compatible modems (referred to hereafter as the **CDM-IP** modems) using a CDD-56X as the demodulator.

By following this Quick Start Guide, the user – beginning with the factory default settings – may be able to pass traffic within a matter of minutes.

7.2 Getting Started

7.2.1 Equipment List

Item	Description	Qty	Comments
1	CDM-IP modems (e.g., CDM-IP550, CDM-IP300L, CDM-570/570L w/IP Module, etc.)	2	Depending upon the modems used, the user may need to provide equipment to convert 70 MHz IF to L-Band for a duplex connection.
2	CDD564/564L/562L Demodulator	1	
3	10/100 BaseT Ethernet Hub	2	Provided by user. Note the following: 1. Only 10 BaseT operation is supported in Managed Switch Mode (formerly easyConnect™ Mode). 2. RJ-45 crossover Ethernet cables can be substituted to directly connect PC to CDM-IP modem without the use of a hub.
4	PC equipped with network interface card and terminal emulation program (e.g., HyperTerminal, Tera Term, etc.)	2	Provided by user.
5	Console cable (DB-9 to RJ-11)	1	Supplied by Comtech EF Data.
6	CAT5 Ethernet cables	4	Provided by user.
7	IF cables	2	Provided by user to interconnect Tx/Rx between both CDM-IP modems (Type BNC for 70/140 MHz operation or Type 'N' for L-Band operation).

7.2.2 Basic Equipment Setup

*See **Figure 7-2** in Sect. 7.3 of this chapter for the diagram of this basic equipment setup.*

Step	Task
1	Connect CDM-IP 1 and CDD-56X Demod 3 to PC 1 via the 10/100 BaseT Ethernet Hub 1; connect CDM-IP 2 to PC 2 via the 10/100 BaseT Ethernet Hub 2
2	Connect the TX IF on CDM-IP 1 to RX IF of CDM-IP 2; connect the Tx IF on CDM-IP 2 to the RX1 IF of CDD-56X Demod 3 [RX-1 First Demodulator].
3	Connect the DB-9 end of the Console cable to the COM1 or COM2 port of the PC, and the RJ-11 end to the Console port on the CDM-IP 1 rear panel.
4	Connect CDM-IP 1, CDM-IP 2, and CDD-56X Demod 3 to a suitable power supply and turn all units ON.

7.2.3 Transmit and Receive IF Configuration

Step	Task
1	Configure the transmit and receive IF parameters for CDM-IP 1, CDM-IP 2, and the CDD-56X Demod 3 via the modem front panel. *The IF parameters can also be set via Command Line Interface (CLI), Telnet, Web interface, or SNMP, but for this exercise it is recommended that the modem front panel be used.*
2	Set the TxPower to minimum level.
3	Before proceeding to next step, make sure that CDM-IP 1 is appropriately carrier-locked to CDM-IP 2, and that CDM-IP 2 is carrier-locked to CDD-56X Demod 3.

7.2.4 Serial Console Port Command Line Interface (CLI) Configuration

Step	Task
1	Launch the terminal emulation program (e.g., HyperTerminal, Tera Term, etc.) via Microsoft Windows.
2	Select the appropriate COM port (i.e., the port to which the DB-9 end of the console cable is connected) and configure it for: ▸ 38,400 bps ▸ 8 data bits ▸ No parity ▸ 1 stop bit ▸ No hardware flow control
3	Press Enter to first log onto, then bring up the CLI Main Menu as depicted in Figure 7-1 via either the Telnet or HyperTerminal interfaces. To use the CLI, select the appropriate submenu or command entry by typing the character indicated at the right. For either interface, enter [X] to return to the previous menu. *To save any CDM-IP configuration changes: From any menu screen, type* [S] *(Save Parameters to permanent storage), and then type* [y] *to confirm save.*

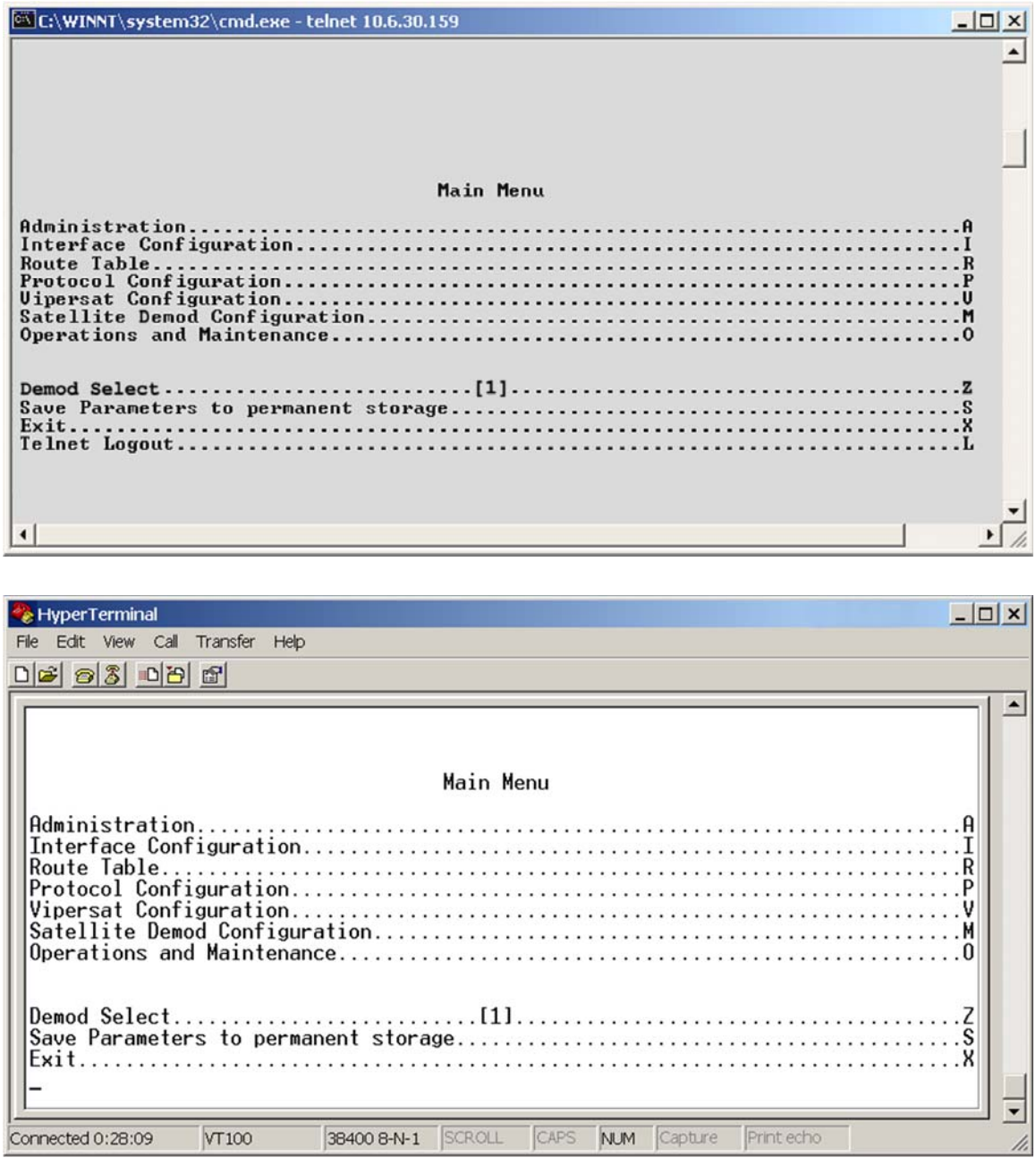


Figure 7-1. CLI Main Menu via Telnet or HyperTerminal (CDD-56X shown)

7.2.5 Restoring Factory Default Configuration

The remaining sections in this chapter assume that the CDM-IP is still in factory default configuration for IP. If this is not the case, the factory default configuration may be restored from the menu as follows:

Step	Task
1	From the Main Menu, select the Operations and Maintenance submenu [O].
2	From the Operations and Maintenance submenu, select Database Operations submenu [D].
3	From the Database Operations menu, select Restore Factory Default option [R].
4	When the following prompt is displayed: **Are you sure you want to restore factory default settings?** **WARNING: Choosing Yes will restore factory defaults and then reboot..** Type [Y] (yes) to confirm restore.

By completing the above procedure, this erases any user configurations made to date and restores the CDD-56X to its factory default configuration.

Proceed to **Section 7.3** to perform the Router Mode configuration.

7.3 Router Mode – Point-to-Point System Configuration

The steps in this section are used to establish a Router Mode Point-to-Point System Configuration. Note that all steps outlined in the subsections that follow refer back to **Figure 7-2**.

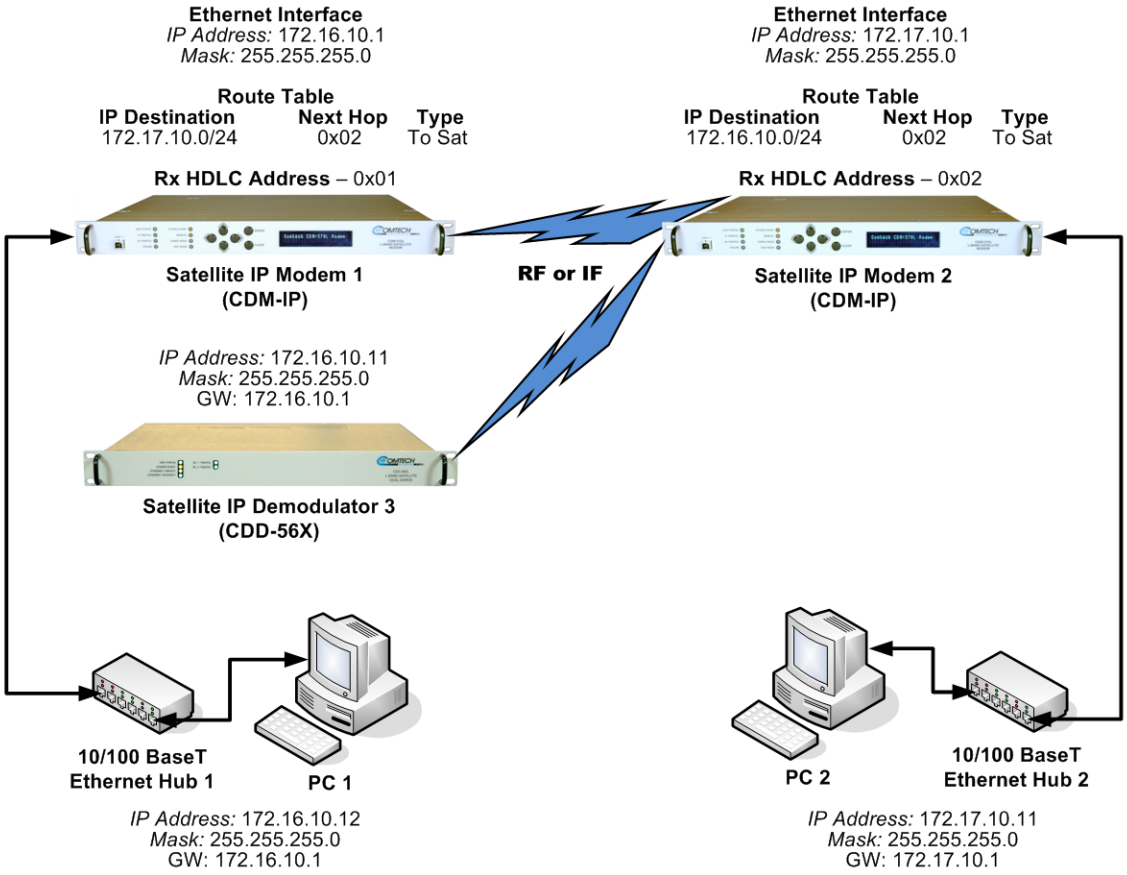


Figure 7-2. Router Mode Point-to-Point System Configuration

7.3.1 PC Configuration

Step	Task
1	Set the IP address on PC 1 to 172.16.10.11; Set Mask to 255.255.255.0; Set PC Gateway to 172.16.10.1.
2	Set the IP address on PC 2 to 172.17.10.11; Set Mask to 255.255.255.0; Set PC Gateway to 172.17.10.1.
3	Reboot the PCs (if required).

7.3.2 Set CDM-IP Modems to Router Mode Operation

Perform the following steps on **Satellite Modems (CDM-IP) 1 and (CDM-IP) 2**:

Step	Description
1	*Beginning with the CDM-IP 1 modem:* From the CLI Main Menu, select the Administration [A] submenu.
2	From the Administration submenu, select CDM-IP Working Mode [C].

3	Select [1] for Router Mode – Small Network Mode.
	
	When the following prompt is displayed:
	
	`Changing Modem working mode requires system Reboot.`
	`Do you want to continue(Y/N)[Enter :No]`
	
	Confirm, when prompted, by typing [y] (yes).

4	Allow CDM-IP to reboot then, from the CLI Main Menu select Interface Configuration [I].
5	From the Interface Configuration submenu, select Receive HDLC Channel Addresses [H].

6	From the Receive HDLC Channel Addresses submenu, select [1] for HDLC Addr 1.
	
	When the following prompt is displayed:
	
	`Please enter a value for the HDLC Addr 1`
	`Press ESC to abort`
	`HDLC address [SMALL NETWORK] in hex <0x1 - 0xFE, enter = 0001>:`
	
	Enter [1] to set HDLC Addr 1 to 0x01.
	
	HDLC Addr 1 will display as 0x0001, although only the last two digits are used in Small Network Mode, allowing up to 254 separate HDLC addresses.

7	*Continuing to the CDM-IP 2 modem:* For CDM-IP 2, repeat Steps 1-6 – except – for Step 6, set HDLC Addr 1 to 0x02.

7.3.3 Set CDD-56X Demodulator to Router Mode Operation

Perform the following steps on **Satellite Demodulator (CDD-56X) 3**:

Step	Description
1	From the CLI Main Menu, select the Administration [A] submenu.
2	From the Administration submenu, select Working Mode [C].

3	When the following prompt is displayed:
	`Changing working mode requires system Reboot.`
	`Do you want to continue(Y/N)[Enter :No]`
	Confirm, when prompted, by typing [y] (yes).
	Select [1] for Router Mode – Small Network Mode.

4	Allow the CDD-56X to reboot then, from the CLI Main Menu, select Interface Configuration [I].
5	From the Interface Configuration menu, select Receive HDLC Channel Addresses [H].
6	Set "Demod Select" to [1].

7	From the Receive HDLC Channel Addresses menu, select [1] for HDLC Addr 1. The following prompt will display:
	`Please enter a value for the HDLC Addr 1`
	`Press ESC to abort`
	`HDLC address [SMALL NETWORK] in hex <0x1 - 0xFE, enter = 0001>:`
	Enter [1] to set HDLC Addr 1 to 0x01.
	HDLC Addr 1 will display as 0x0001, although only the last two digits are used in Small Network Mode, allowing up to 254 separate HDLC addresses.

Both CDM-IP modems and the CDD56X demodulator are now in **Router/Small Network Mode**, meaning that **CDM-IP 1** & **CDD-56X DEMOD 3** are on **172.16.10.xxx** subnet, and **CDM-IP 2** is on **172.17.10.xxx subnet**. Modems will be on independent IP subnets and will require adding static routes to pass traffic between them.

The HDLC MAC address is user-configurable.

7.3.4 Set IP Address(es)

Step	Task
1	From the CLI Main Menu, select Network Interface Configuration submenu [I].
2	From the Interface Configuration Menu, select Ethernet Interface submenu [E].
3	Select Ethernet IP Addresses [I], then set the addresses as follows: • CDM-IP 1 to 172.16.10.1 • CDD-56X to 172.16.10.2 • CDM-IP 2 to 172.17.10.1
4	Set Ethernet Subnet MaskSubnet Prefix Length [M] to 24.

7.3.5 Set IP Stack DES Select Key to ClearRoute Table

First, perform the following steps on **Satellite Modem (CDM-IP) 1:**

Step	Task
1	From the CLI Main Menu, select the Route Table [R] submenu.
2	Enter '1' to configure the first route.
3	Enter a suitable name (e.g., 'test').
4	Set IP Address to '172.17.10.0'.
5	Set Number of Subnet Bits to '24'.
6	For Interface to which route is destined to <E-Ethernet S-Satellite Enter : S> select 'S'.
7	For HDLC address [SMALL NETWORK] in hex <0x1 - 0xFE, enter = 0000>: select '2'.

8	Per this example, the CDM-IP 1 Route Table should now display the following:
	`Route Name  Dest IP/SNet Bits Next Hop MultiCast State`
	`Route001...[test 172.17.10.0/24  0x2  N/A  toSat]..1`

9	Go to "Per Route" by pressing [E], then *disable* 'HdrCompression', 'PayloadCompression' and '3xDES' by selecting 'No' ('Clear' for 3xDES) for each of these choices.

Next, perform the following steps on **Satellite Modem (CDM-IP) 2:**

Step	Task
1	From the CLI Main Menu, select the Route Table [R] submenu.

2	Enter '1' to configure the first route.
3	Enter a suitable name (e.g., 'test')
4	Set IP Address to '172.16.10.0'
5	Set Number of Subnet Bits to '24'.
6	For Interface to which route is destined to <E-Ethernet S-Satellite Enter : S> select 'S'.
7	For HDLC address [SMALL NETWORK] in hex <0x1 - 0xFE, enter = 0000>: select '1'.

8	Per this example, the CDM-IP 2 Route Table should now display the following:
	`Route Name Dest IP/SNet Bits Next Hop MultiCast State`
	`Route001...[test 172.16.10.0/24 0x1 N/A toSat]..1`

9	Go to "Per Route" by pressing [E], then *disable* 'HdrCompression', 'PayloadCompression' and '3xDES' by selecting 'No' ('Clear' for 3xDES) for each of these choices.

Finally, perform the following steps on the **Satellite IP Demodulator (CDD-56X) 3:**

Step	Task
1	From the CLI Main Menu, select the Route Table [R] submenu.
2	Enter '1' to configure the first route.
3	Enter a suitable name (e.g., 'ToCDMIP2').
4	Set IP Address to '172.17.10.0'.
5	Set Number of Subnet Bits to '24'.
6	For Interface to which route is destined to <E-Ethernet S-Satellite Enter : S> select 'E'.
7	Set the Next-hop IP Address to '172.16.10.1'.

8	Per this example, the CDD-56X Demod 3 Route Table should now display the following:
	`Route Name Dest IP/SNet Bits Next Hop MultiCast State`
	`Route001...[ToCDMIP2 172.17.10.0/24 172.16.10.1 N/A toEth]..1`

9	If the Header Compression Feature is available on this demodulator, do the following: From the CLI Main Menu, select Administration [A] → Features Configuration [F] → RxHeaderCompression [H], then press '1' to *disable* the Header Compression on 'Demod 1'.

At this point the basic configuration is over and the user should be able to:

- Ping **PC 1** from **PC 2** and vice versa;

- Ping **CDM-IP 2** from **PC 1** and vice versa;
- Pass any other data between **PC 1** and **PC 2**:
  - ► *From PC 1:*
    - o Ping 172.16.10.1 (CDM-IP 1)
    - o Ping 172.16.10.2 (CDD-56X DEMOD 3)
    - o Ping 172.17.10.2 (CDM-IP 2)
    - o Ping 172.17.10.11 (PC 2)
  - ► *From PC 2:*
    - o Ping 172.17.10.1 (CDM-IP 2)
    - o Ping 172.16.10.1 (CDM-IP 1)
    - o Ping 172.16.10.2 (CDD-56X DEMOD 3)
    - o Ping 172.16.10.11 (PC 1)

7.4 Troubleshooting the IP Module

The CDM-IP & CDD-56X come with a variety of diagnostic tools to aid in identifying the traffic path going into and out of the modems. This section shows how to use some of these troubleshooting tools, and additionally identifies several common problems encountered when first setting up two CDM-IP modems.

If following these troubleshooting steps fails to resolve the problem, contact a User Support representative at:

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

480.333.2200 (Main Comtech EF Data Number)
480.333.4357 (User Support Desk)
480.333.2161 FAX

Alternately, E-mail can be sent to the User Support Department at:

cdmipsupport@comtechefdata.com

7.4.1 Router Mode Troubleshooting

Use the following troubleshooting steps if unable to successfully send traffic in Router Mode.

Router Mode Troubleshooting		
Step	Problem	Action

1	No ping response from the locally connected PC to the CDM-IP/CDD-56X Ethernet port. ICMP response is:
	`Request timed out.`
		a) Verify correct IP address/subnet on PC and CDM-IP/CDD-56X.
		b) Verify Ethernet connection – cables, hub, etc.
		c) The PC, hub, and CDM-IP/CDD-564L should have Ethernet activity LED lit.
		 
		A PC must be connected to the CDM-IP using a hub, switch or a RJ45 crossover cable. When the CDM-IP/CDD-56X Ethernet port senses an Ethernet connection, the CLI displays:
		`Ethernet Interface UP`
		If the connection is broken, the CLI displays:
		`Ethernet Interface DOWN`

2	No Ping response from PC 1 to PC 2 or vice versa. ICMP response is: `Reply from 172.XXX.10.1 -Destination net unreachable`	a) Verify CDM-IP, CDD-564L Route Tables are correct. b) Verify that both the *hdrcomp* and *decomp* are either enabled or disabled.  Go to the Route Table, then Options page to verify *hdrcomp* is enabled or disabled. On the remote modem, go the main menu, press 'A' Administration, and 'F' for Feature; *hdrdecomp* should be same as *hdrcomp* (i.e., both should either be enabled or disabled).

Chapter 8. CDD-56X CLI AND TELNET OPERATION

8.1 Overview

The CLI (Command Line Interface) is a user menu system that facilitates configuration, monitoring and control of the CDD-56X Satellite Demodulator with IP Module. This interface is accessible with a user-provided terminal emulator application such as HyperTerminal, or over the Ethernet interface using Telnet.

8.1.1 Interface Access

1. ***The demodulator does not allow concurrent access to the menu via Telnet and the Console port. If the user connects via Telnet, the demodulator automatically disables the Console port for the duration of the Telnet session.***

   All Telnet-based menu pages allow a Telnet Logout to end a Telnet session. Additionally, the demodulator automatically ends a Telnet session after a preconfigured period of inactivity (definable from 1 to 60 minutes).

2. ***Any changes made to the demodulator IP parameters will be lost if the demodulator is reset or loses power, unless the changes are first saved to permanent storage. This applies to all of the IP parameters. Type 'S' from any CLI/Telnet Menu page to save the actively set parameters.***

3. ***All demodulator parameters configured via the CLI or Ethernet interface will be automatically stored in the demodulator unit non-volatile RAM and will be retained if there is a power loss.***

For connection via a Terminal Emulator: The user PC should be physically attached to the Console port of the CDD-56X. The terminal emulator should be configured to match the Console port setting. The default Console port setting is **38,400 bps**, **8 data bits**, **no parity**, **1 stop bit** and **no flow control**.

For connection via Telnet: The user PC must have network connectivity to the 10/100 Ethernet port of the CDD-56X. This connectivity can be over a local LAN, a remote LAN, or by satellite link from another IP modem. The Ethernet Speed Mode is a configurable parameter of the demodulator and, accordingly, its exact setting can vary between specific installations.
The CLI and Telnet User Access Levels are defined as follows:

User Interface	User Login Access Level		
	Admin User	Read/Write User	Read Only User
CLI (direct to Console port)	Full Access – no Login	Full Access – no Login	Full Access – no Login
Telnet	Full Access, all Menus	No Access to Admin Menu Full Access all other Menus	No Access

The factory defaults for user names/passwords are as follows:

Admin	comtech/comtech
Read/Write	opcenter/1234
Read Only	monitor/1234

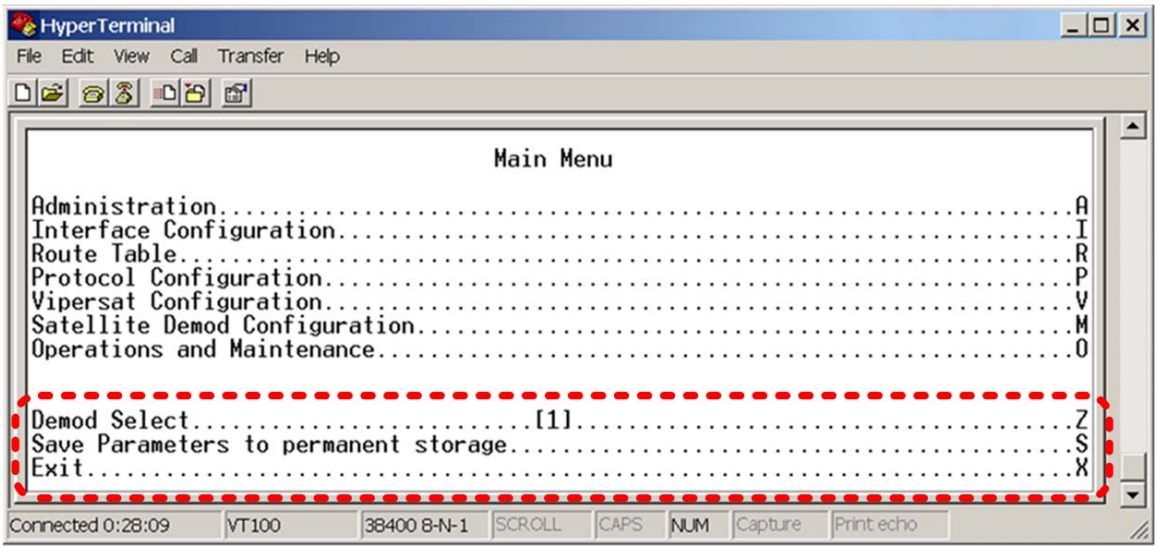
8.2 CLI Menu Pages

Interface Appearance – The remaining sections in this chapter show CLI pages as they appear with the user-supplied HyperTerminal terminal emulator application. The appearance of this interface may vary across individual user configurations. For this reason, a complete CLI window is shown for the Main Menu page only.

The remainder of this chapter shows the selectable CLI pages. Functionality is explained in tabulated format as follows:

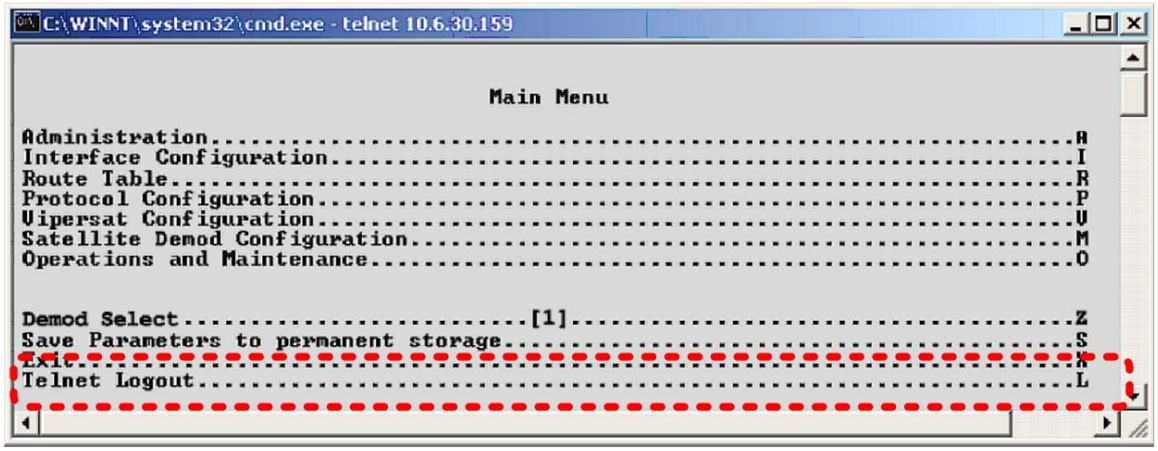
- **Selection:** This column lists the name of the function or command as it appears on the menu page.
- **Entry:** This column identifies the letter or number assigned as the keystroke/mnemonic for execution of that function or command. Type this letter to execute; otherwise, where the Entry column specifies ***[RO]***, this means that the pertinent menu selection is a *read-only* feature.
- **Description:** This column provides the detailed explanation for the selection. Where applicable, command modifiers required to execute a specific action are also specified.

Common Interface Selections/field – The menu functions indicated here are common for all primary and nested pages:



Selection	Entry	Description
Demod Select	Z	Selects the active receive channel to apply the configuration: • CDD 564/564L has 4 Rx Channels • CDD 562/562L has 2 Rx Channels.
Save Parameters to permanent storage	S	Allows user to permanently save the current configuration. This configuration is then stored to flash memory and recalled for subsequent operational sessions.
Exit	X	Allows user to exit the current menu and return to its parent menu.

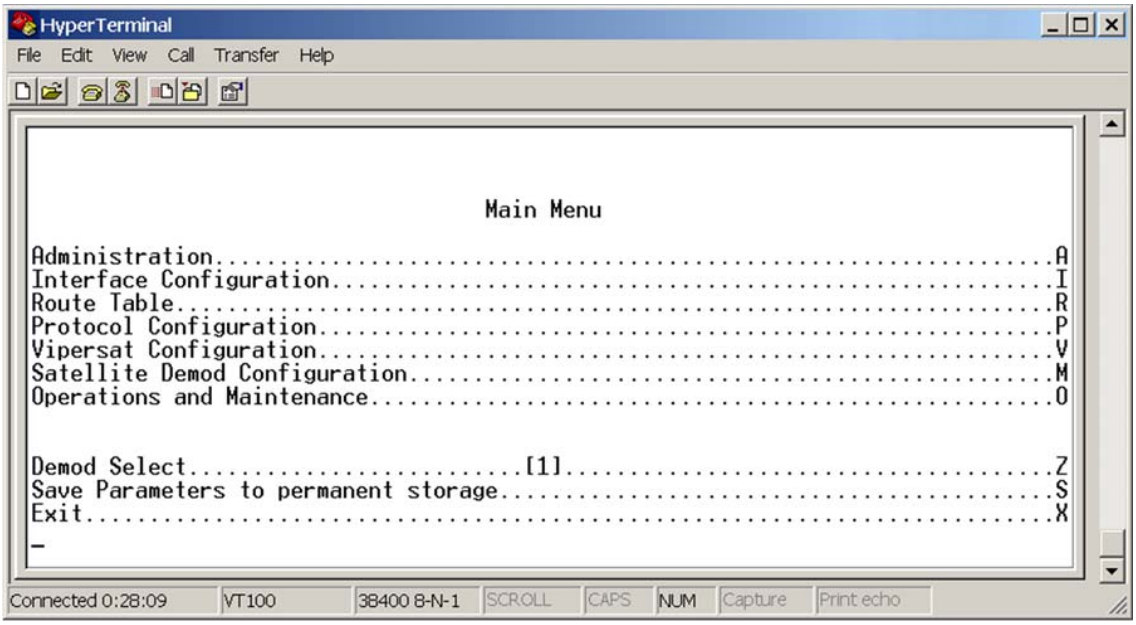
Telnet Logout Option – When operating the demodulator through a Telnet-based CLI session, an additional means of ending a session is available on all menu pages – the Telnet Logout option, executed by typing '**L**':



By typing this letter, the user logs out of the Telnet session and returns control of the CLI to the serial interface.

The IP Module does not allow concurrent access to the menu via Telnet and the Console port. If a user connects via Telnet, the demodulator automatically disables the console port for the duration of the Telnet session. All menu pages allow a Telnet logout to end a Telnet session. Also, the demodulator will automatically end a Telnet session after a configured period of inactivity (configurable from 1 to 60 minutes).

8.2.1 Main Menu page



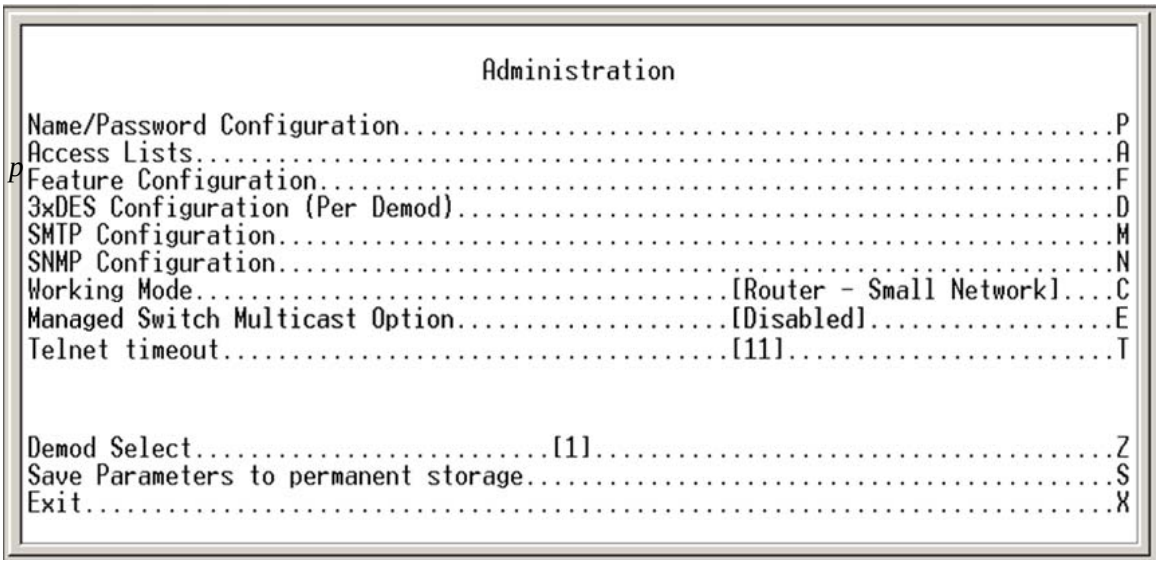
The *Main Menu* page provides access to the following submenus:

Selection	Entry	Description
Administration	A	Provides a basic set of standard administrative functions to the demodulator. When connected via Telnet, navigation to this menu is restricted to the Admin user.
Interface Configuration	I	Allows configuration of the Ethernet and Satellite interfaces.
Route Table	R	Defines how the demodulator routes packets that it receives on its Ethernet and Satellite interfaces.
Protocol Configuration	P	Allows configuration of various protocols used by the demodulator. These protocols currently include ARP and IGMP.
Vipersat Configuration	V	Viewable/selectable only when the demodulator is used in a Vipersat system. For details on configuration and use of the CDD-56X Vipersat feature, consult adjunct Comtech EF Data publication MN/22137 – *Vipersat CDD-56X Series Satellite Network Demodulator Router User Guide.*
Satellite Demod Configuration	M	Allows configuration and monitoring of the satellite base unit.
Operations and Maintenance	O	Allows configuration of various control and maintenance options for the system. Diagnostic/troubleshooting tools, and Statistics pages are also accessible.

8.2.2

Administration page

Access the *Administration* page from the *Main Menu* page.



Access to the Administration page is restricted to the Admin user when connecting via the Telnet, SNMP, or HTTP interface. The Administration page is available when connected via the Terminal Emulator (serial) connection because there is no login.

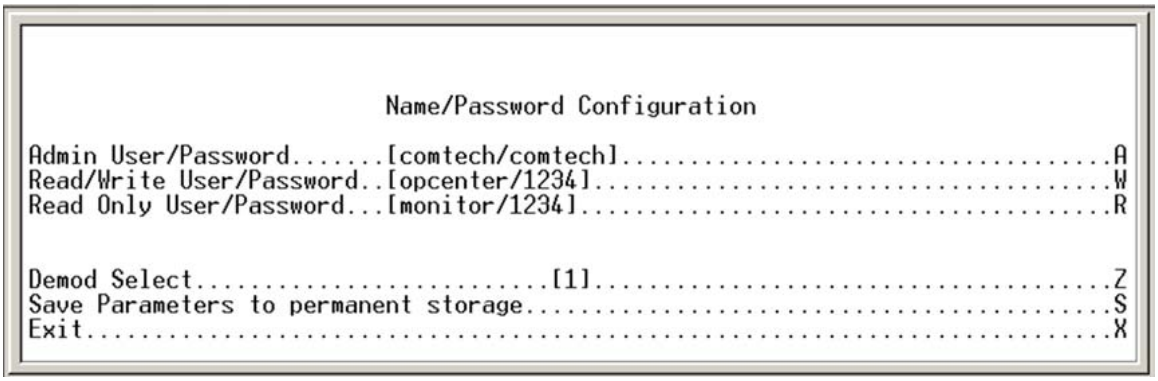
This page contains the following unique selections/fields:

Selection	Entry	Description
Name/Password Configuration	P	Allows definition of the user name and passwords that are required in order to access the management interfaces, like Telnet, SNMP, HTTP.
Access Lists	A	Sets access restrictions to the management interfaces based upon the requester's IP address.
Feature Configuration	F	Opens the *Feature Configuration* page.
3xDES Configuration (Per Demod)	D	Determines if 3xDES encryption is enabled on a device and, if so, the 3xDES keys that are used to decrypt traffic.
SMTP Configuration	M	Specifies appropriate settings for Simple Mail Transfer Protocol e-mail server.
SNMP Configuration	N	Specifies management parameters for Simple Network Management Protocol.
Working Mode	C	Selects the *IP Module Working Mode*. Note that only Router Mode is supported: 1 -- Router – Small Network 2 -- Router – Large Network 3 -- Router – Point to Point 4 -- Router – Vipersat 5 -- Managed Switch

Selection	Entry	Description
Managed Switch Multicast Option	E	Selectable only when Managed Switch is the selected Working Mode: Allows user to *enable* or *disable* the ability to route multicast IP traffic over the satellite or to another device on the local LAN.
Telnet timeout	T	Determines, in minutes (1-60), the period of Telnet inactivity before the Telnet session is automatically terminated.

8.2.2.1 Name/Password Configuration page

Access the *Name/Password Configuration* page from the *Administration* page.



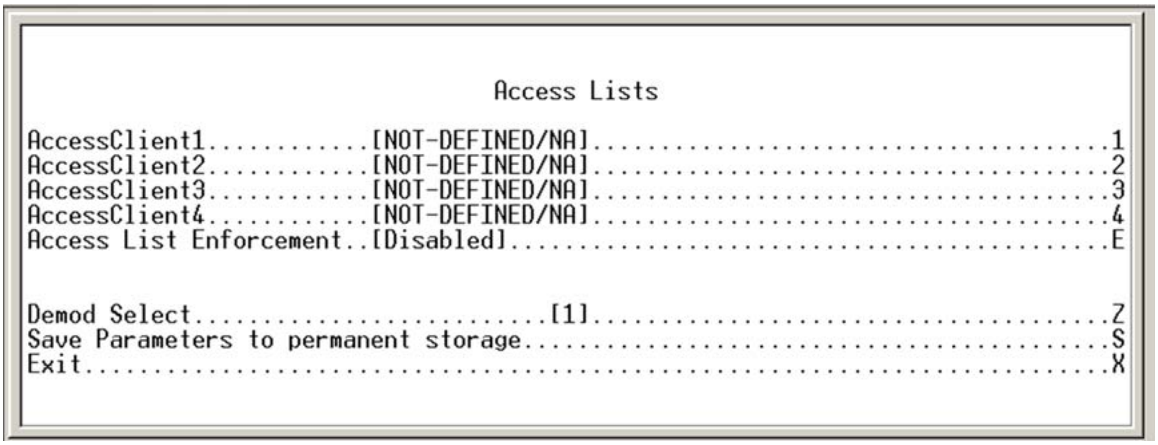
1. ***All Usernames and Passwords are case sensitive.***
2. ***There is a minimum of 1 and maximum of 11 characters.***
3. ***Any or all of the Usernames and Passwords can be removed by entering "NONE NONE" from the CLI or Telnet.***
4. ***Removing all Usernames and Passwords would only allow access to the IP functions when connected via the Terminal Emulator (serial) connection (because there is no log in).***
5. ***FTP access is restricted to Admin Username/Password only. FTP is only used to upgrade the IP SOFTWARE or to load or retrieve the IP Parameter file.***

Use this page to define the passwords required for access via HTTP, FTP, SNMP, and Telnet. This page contains the following unique selections/fields:

Selection	Entry	Description
Admin User/Password	A	Enter the user name and password with a space delimiter. Example: <user> <passwd> Type NONE NONE to erase
Read/Write User/Password	W	Enter the user name and password with a space delimiter. Example:<user> <passwd> Type NONE NONE to erase
Read Only User/Password	R	Enter the user name and password with a space delimiter. Example:<user> <passwd> Type NONE NONE to erase

8.2.2.2 Access Lists page

Access the *Access Lists* page from the *Administration* page.



If connecting to the IP modem (or demodulator) remotely, the IP address of the machine used to manage the IP modem should be included in the Access List.

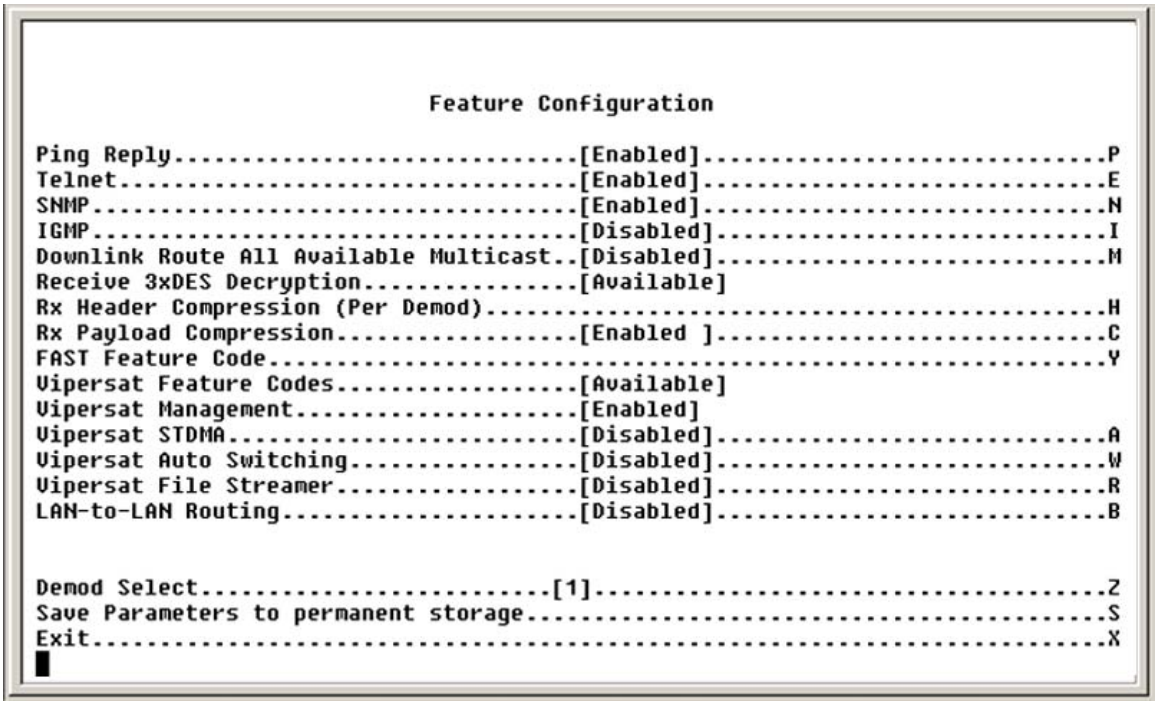
Use this page to limit monitor and control access to the unit from a specified list of authorized clients. This page contains the following unique selections/fields:

Selection	Entry	Description
AccessClient1 *through* AccessClient4	1 *through* 4	Allows definition of which remote clients can connect when the Access List Enforcement is enabled. Each entry Allows user to specify an IP Address or a subnet mask to define a unique class of machines that are allowed access. For example: If the user wanted to grant access to a PC with an IP Address of 10.10.10.1 and any PC on a subnet of 192.168.10.xxx, then the Access List would be defined as: AccessClient1 ...[10.10.10.1/32] AccessClient2.... [192.168.10.0/24]
Access List Enforcement	E	Allows access to be granted via ping, Telnet, HTTP, FTP, and SNMP to a well-defined list of client machines. Access List Enforcement toggles between [Enabled] and [Disabled]: • If *enabled*, then only those machines specified in the Access Client List will be allowed to connect via ping, Telnet, HTTP, and SNMP. • If *disabled*, then any client machine will be able to connect via ping, Telnet, HTTP, FTP, and SNMP.

8.2.2.3 Feature Configuration page

- ***Chapter 1. INTRODUCTION***
- ***Appendix A. FAST ACTIVATION PROCEDURE***

Access the *Feature Configuration* from the *Administration* page to display the current availability for each feature. Any feature marked "Unavailable" is a FAST feature that must be activated with a FAST Option Purchase Access Code.



This page contains the following unique selections/fields:

Selection	Entry	Description
Ping Reply	P	Toggles [Enabled] or [Disabled]: • *Enabled* tells the demodulator to respond to ping requests directed to the demodulator Ethernet Interface. • *Disabled* tells the demodulator not to respond to ping requests. This is used as a security feature to prevent unauthorized parities from determining if a device exists via the ping utility.
Telnet	E	Toggles [Enabled] or [Disabled]: • *Enabled* allows access via Telnet. • *Disabled* denies access via Telnet.
SNMP	N	Toggles [Enabled] or [Disabled]: • *Enabled* tells the demodulator to respond to SNMP requests against the private and public MIB. • *Disabled* tells the demodulator not to respond to SNMP requests against the private and public MIB.

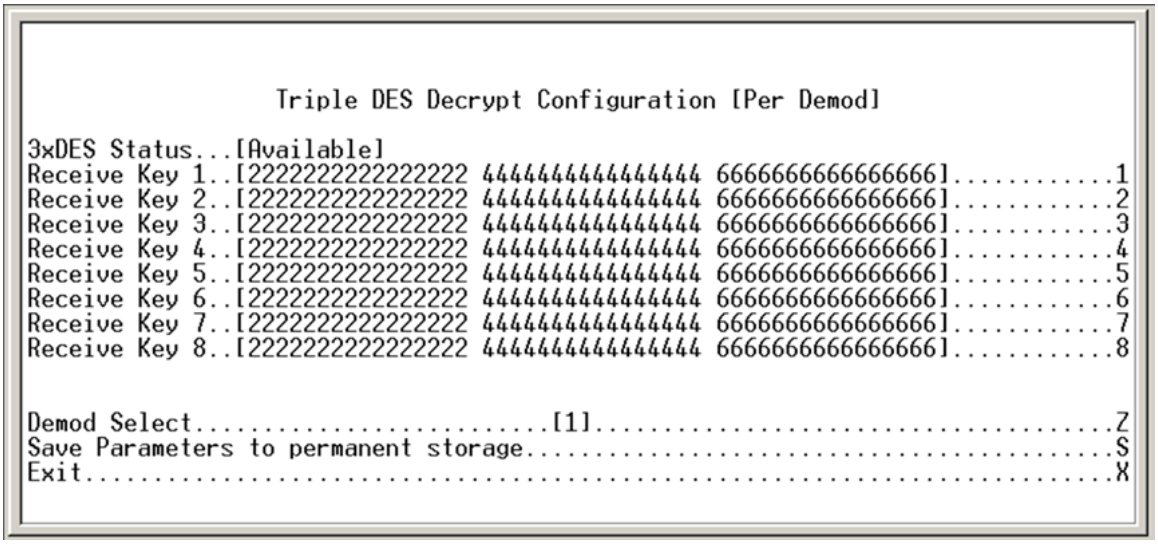
Selection	Entry	Description
IGMP	I	Toggles [Enabled] or [Disabled]. If *Enabled*: • The *receive* portion of a demodulator utilizes the demodulator as an IGMP server. • The *transmit* portion of a demodulator utilizes the demodulator as an IGMP client. • The *IGMP Information* page configures the demodulator to report an interest to join a Multicast group on an IGMP server. • The *IGMP protocol* regulates the Multicast traffic on a LAN segment to prevent information of no interest from consuming bandwidth on the LAN.
Downlink Route All Available Multicast	M	Toggles [Enabled] or [Disabled]: • When *Enabled*, the demodulator routes all Multicast packets coming from the Satellite interface to the Ethernet LAN regardless of the Route Table entries. • When *Disabled,* the demodulator does not automatically forward all Multicast packets. This demodulator will only forward multicast traffic received from the satellite to the Ethernet port if the multicast route exists in the Route Table.
Receive 3XDES Decryption	*[RO]*	This option is always available if purchased. • When *Available*, the demodulator decrypts packets being received from the Satellite Interface. • When *Unavailable*, the demodulator cannot decrypt packets received from the Satellite Interface. This option is auto-sensed by a bit carried in packet headers.
Rx Header Compression (Per Demod)	K	Toggles [Enabled] or [Disabled]. This option is set per Rx Channel. For each Rx Channel: • *Enabled* – Perform Header Decompression. • *Disabled* – Does not perform Header Decompression. When *Enabled*, the system expects received streams to be Header compressed. Note: A CDM-IP modem (or demodulator) must receive all streams as compressed or not compressed – the unit has no way to distinguish between the two.
Rx Payload Compression	*[RO]*	This option is always available if purchased. Allows a unit receiving a stream of data that has been payload compressed to be correctly uncompressed. This option is auto-sensed by a bit carried in packet headers.
FAST Feature Code	V	Allows the entry of a FAST Option Pruchase Access Code that has been provided by the Comtech EF Data Sales Representative upon purchase of a specific option/upgrade.
Vipersat Feature Codes	F	Allows user to enter a Vipersat features activation code that has been provided by Comtech Vipersat for modems (or demodulators) configured to operate under VMS control.
Vipersat Management	V	For details on configuration and use of the CDD-56X Vipersat feature, consult adjunct Comtech EF Data publication MN/22137 – *Vipersat CDD-56X Series Satellite Network Demodulator Router User Guide.*
Vipersat STDMA	A	
Vipersat Auto Switching	W	
Vipersat File Streamer	R	

Selection	Entry	Description
LAN-to-LAN Routing	B	When LAN-to-LAN Routing is enabled, packets ingress from LAN can be routed (egress) to the LAN port instead of sending the ICMP redirect message. If selected, the user is prompted with the following message: "Configuring LAN-to-LAN Routing disables the ICMP redirect Messages. Do you want to continue(Y/N)[Enter :No]" Type 'Y' for "Yes" or 'N' for NO to proceed.

8.2.2.4 Triple DES Decrypt Configuration (Per Demod) page

This menu is accessible only when the 3xDES FAST Feature has been purchased and activated.

Access the *Triple DES Decrypt Configuration (Per Demod)* page from the *Administration* page.



Use this page to determine if 3xDES encryption is enabled on a device and, if so, define the 3xDES keys that are used to decrypt traffic. This page contains the following unique selections/fields:

Selection	Entry	Description
3xDES Status	*[RO]*	Displays status as [Available] or [Unavailable]: • Status displays as *Available* when the 3xDES feature is installed. • Status displays as *Unavailable* when the 3xDES feature is *not* installed.

Selection	Entry	Description
Receive Key 1 *through* Receive Key 8	1 *through* 8	These 3xDES keys are used to decrypt traffic being received from the Satellite Interface. The key is entered in HEX format (48 digits max). The keys specified for one receive channel are completely independent for the 3xDES keys specified for other receive channels. Note: The "Demod Select" appearing on the bottom of each CLI Menu specifies the active receive channel for which configuration is being done.

A 24 Byte [192-bit] 3xDES key is actually a combination of 3 single DES keys of 8 Bytes [64-bits]. The CLI will display the Key with a space separating the Key into 3 sections. In the screen capture above, Transmit Key 1 is displayed as:

2222222222222222 4444444444444444 6666666666666666

Consider the first section as Key1A, the second as Key1B, and the third as Key1C.

Data is first encrypted with Key1A and then decrypted with Key1B and again encrypted with Key1C. So if the user specifies all the three Keys the same, (like 48 '1's OR all the characters in DES key the same) the cumulative effect of 3xDES is just a single DES. When data is first encrypted with Key1A and decrypted with Key1B we get back the original data and then when encrypted with Key1C results in a total effect of single DES key.

Because of this, the user is required to enter unique 64-bit keys. If any 2 sections of the Key match, the demodulator will respond `Invalid Key - Please Re-enter`

Also, The Least Significant bit of each byte in a 24 Byte [192-bit] 3xDES key is reserved for the DES Algorithm for parity. Entries of 1, 3, 5, 7, 9, B, D, or F will have all the corresponding bit positions masked. So a Key entry of:

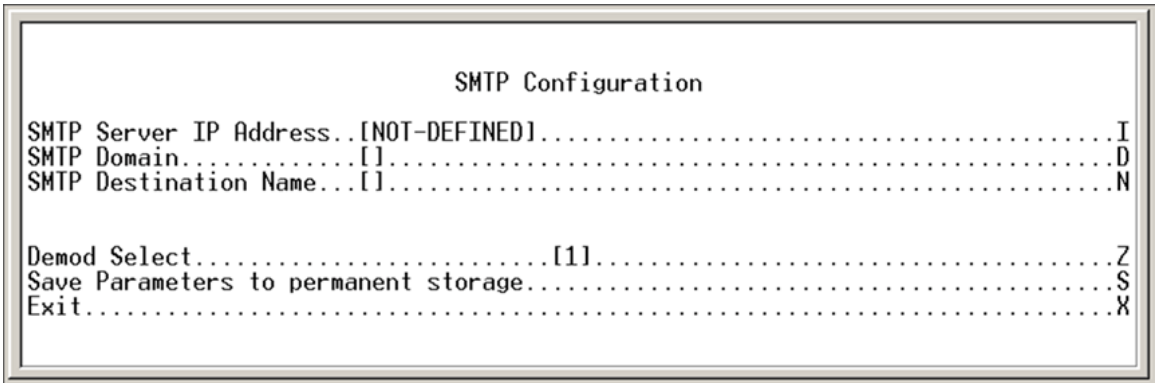
1111111133333333 5555555577777777 99999999BBBBBBBB

becomes

1010101032323232 5454545476767676 98989898BABABABA

8.2.2.5 SMTP Configuration page

Access the *SMTP Configuration* page from the *Administration* page.



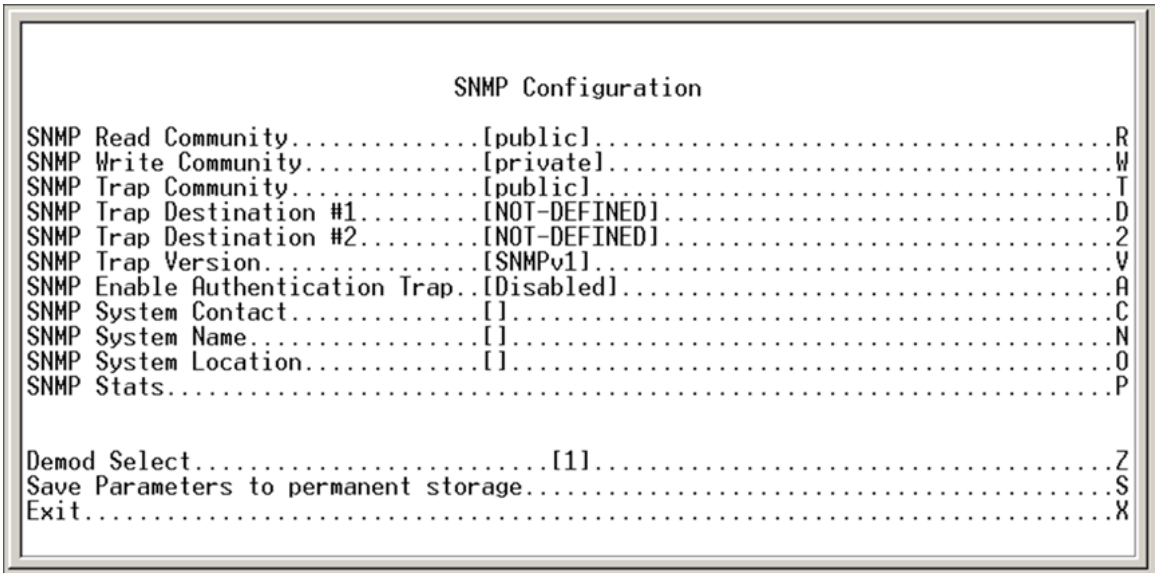
Use this page to specify appropriate settings for Simple Mail Transfer Protocol e-mail server. This page contains the following unique selections/fields:

Selection	Entry	Description
SMTP Server IP Address	I	Defines the mail server address from where e-mail should be sent.
SMTP Domain	D	Sets the domain of the e-mail server (usually found to the right of the @ symbol in an e-mail address).
SMTP Destination Name	N	Sets the e-mail recipient names (usually found to the left of the @ symbol in an e-mail address).

If there are any questions about or problems with the CDD-56X, SMTP is used to send e-mail to CEFD IP Modem Support cdmipsupport@comtechefdata.com using the Home \| Support Web page (once Ethernet connectivity has been established between the User PC's Web browser and the demodulator). The user can also select to automatically attach the demodulator parameter file in order to facilitate troubleshooting or to resolve configuration issues.

8.2.2.6 SNMP Configuration page

Access the *SNMP Configuration* page from the *Administration* page.



Use this page to specify management parameters for Simple Network Management Protocol. This page contains the following unique selections/fields:

Selection	Entry	Description
SNMP Read Community	R	(GET community) Allows GET operations to all portions of the demodulator Controller and Quad Demodulator MIBs.
SNMP Write Community	W	(SET community string) Allows SET operations to all portions of the demodulator Controller and Quad Demodulator MIBs.
SNMP Trap Community	T	Defines Community String that will be set in the Community field of all outgoing traps. This field on the trap PDU may be checked by the network manager application to determine if the trap came from a "trusted" agent.
SNMP Trap Destination #1	D	IP address where all traps/notifications will be sent. If a network management application is running in the network, it should be configured to receive traps and its IP address should be entered here. Supports 2 – Trap Destinations.
SNMP Trap Destination #2	2	IP address where all traps/notifications will be sent. If a network management application is running in the network, it should be configured to receive traps and its IP address should be entered here. Supports 2 – Trap Destinations.
SNMP Trap Version	V	Determines whether an SNMPv1 trap or SNMPv2 notification is sent.
SNMP Enable Authentication Trap	A	Determines whether a MIB2 authentication trap will be sent when a PDU with an invalid community string is encountered. A community string is invalid when it does not match the Admin, the Read Write, or the Read Only community strings.
SNMP System Contact	C	User-defined SNMP Contact information.
SNMP System Name	N	User-defined SNMP Name information.

Selection	Entry	Description
SNMP System Location	O	User-defined SNMP Location information.
SNMP Stats	P	Displays statistics concerning the operation of the SNMP agent (number of IN SNMP packets, number of OUT SNMP packets, number of OUT Traps, etc.)

8.2.2.7 Working Mode

The CDD-56X demodulator only supports Router Mode.

Access the *Working Mode* page from the *Administration* page.

```
Demod Select.........................[1].....................................Z
Save Parameters to permanent storage.....................................S
Exit.....................................................................X

C


Please enter a value for the Working Mode
Press ESC to abort


      Changing Modem working mode requires system Reboot.

Do you want to continue(Y/N)[Enter :No] y

Press ESC to abort. Select
   1 -- Router - Small Network
   2 -- Router - Large Network
   3 -- Router - Point to Point
   4 -- Router - Vipersat
   5 -- Managed Switch
```

Note that selecting a Working Mode other than the currently active mode will cause the unit to reboot. At the prompt, type '**Y**' to proceed, then select the desired Working Mode; otherwise, press the **[ESC]** or [**Enter]** keys to abort the command and return back to the *Administration* page.

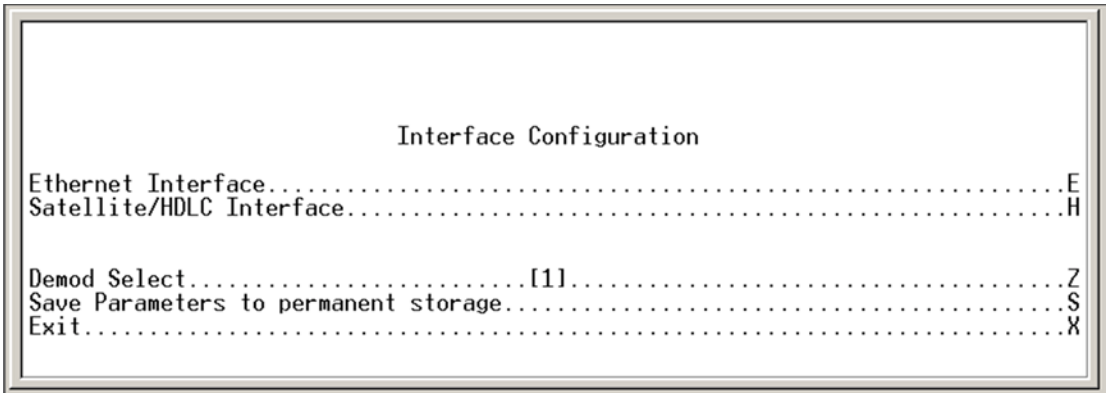
8.2.2.8 Telnet Timeout

Telnet timeout, as accessed from the *Administration* page, defines the number of minutes (1-60) of Telnet inactivity before the Telnet session is automatically terminated by the demodulator.

The demodulator does not allow concurrent access to the menu via Telnet and the console port. If the user connects via Telnet, demodulator automatically disables the console port for the duration of the Telnet session. All menu pages allow a Telnet logout to end a Telnet session. Also, the demodulator will automatically end a Telnet session after a period of inactivity (configurable from 1 to 60 minutes).

8.2.3 Interface Configuration page

Access the *Interface Configuration* page from the *Main Menu* page.

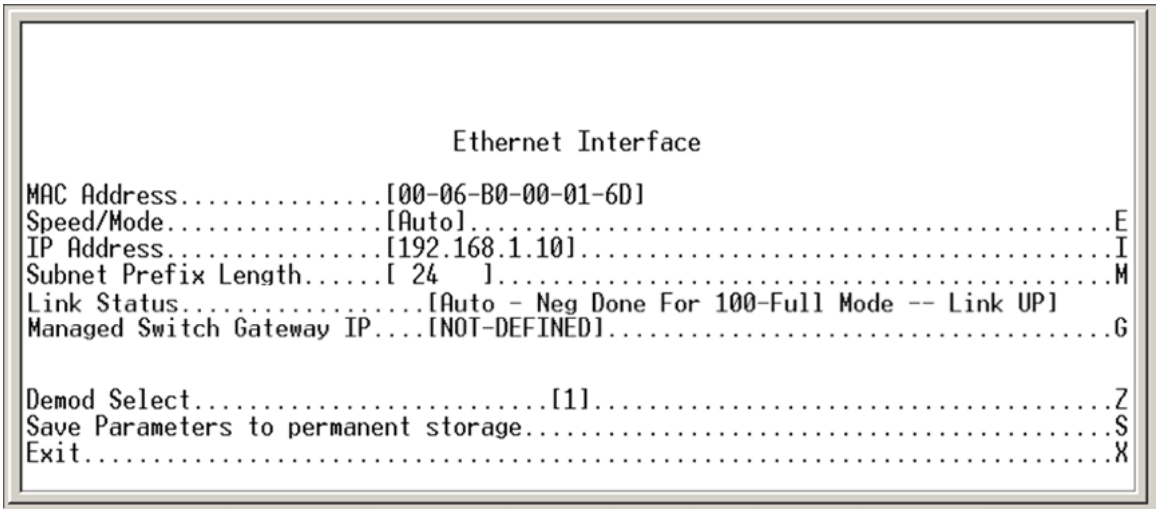


This page contains the following unique selections/fields:

Selection	Entry	Description
Ethernet Interface	E	Opens *Ethernet Interface* page.
Satellite/HDLC Interface	H	Opens *Satellite/HDLC Interface* page.

8.2.3.1 Ethernet Interface page

Access the *Ethernet Interface* page from the *Interface Configuration* page.

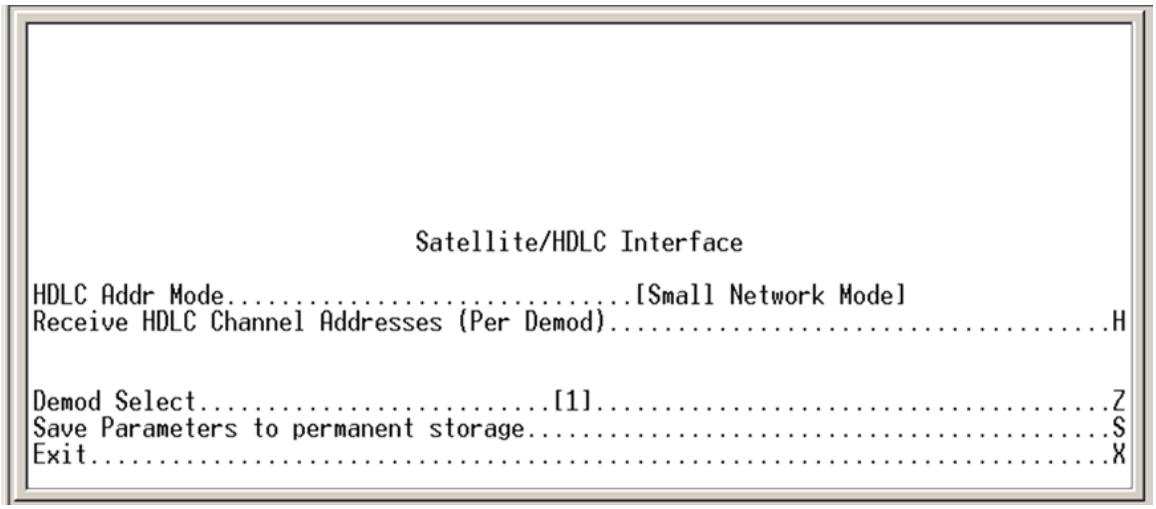


This page contains the following unique selections/fields:

Selection	Entry	Description
MAC Address	*[RO]*	The MAC Address defines the hardware destination MAC Address that is used when an Ethernet packet is destined for the demodulator Traffic Ethernet Interface. This address is unique and has been assigned permanently at the factory.
Speed/Mode	E	The Ethernet Speed Mode is a configurable parameter and thus its exact setting can vary between specific installations. The default setting allows the Ethernet port to auto negotiate its link speed on power-up. Selections are: 1 -- Auto 2 -- 10 MB/sec Half Duplex 3 -- 100 MB/sec Half Duplex 4 -- 10 MB/sec Full Duplex 5 -- 100 MB/sec Full Duplex
IP Address	I	This is the IP Address assigned to the Ethernet Traffic Interface. Enter the IP address in aaa.bbb.ccc.ddd format
Subnet Prefix Length	M	Specifies the Subnet Mask assigned to the Ethernet Traffic Interface. Enter the subnet mask prefix length (valid range is from 8 to 30).
Link Status	*[RO]*	Displays the Ethernet Link status like the speed, duplex, and whether the link is 'UP' Or 'DOWN'.
Managed Switch Gateway IP	G	Selectable only when Managed Switch is the selected Working Mode: This is the IP Address assigned to the Managed Switch Gateway. Enter the IP address in aaa.bbb.ccc.ddd format

8.2.3.2 Satellite/HDLC Interface page

Access the *Satellite/HDLC Interface* page from the *Interface Configuration* page.

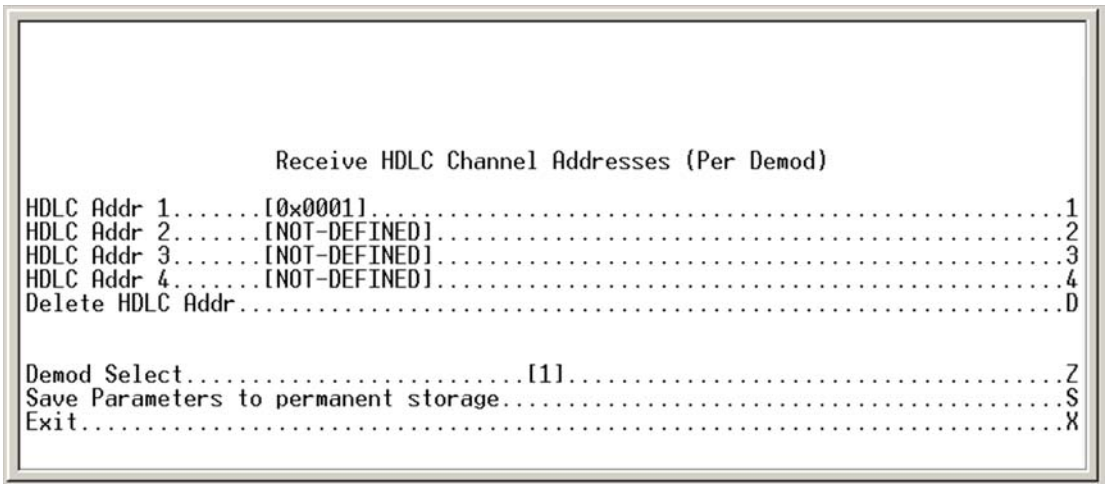


This page contains the following unique selections/fields:

Selection	Entry	Description
HDLC Addr Mode	*[RO]*	• Point-To-Point Mode – In this mode of operation, no HDLC address is used over the satellite link. The restrictions on using this mode are that it can only be used for pure Point-to-Point configurations. • Small Network Mode (up to 254 addresses) - In this mode of operation, demodulator expects a single byte HDLC address over the satellite link (0x1 – 0xFE). • Large Network Mode (up to 32766 addresses) - In this mode of operation, demodulator expects two byte HDLC address over the satellite link (0x1 – 0xFFFE).
Receive HDLC Channel Addresses (Per Demod)	H	Opens *Receiver HDLC Channel Addresses (Per Demod)* page.

8.2.3.2.1 Receive HDLC Addresses (Per Demod) page

Access the *Receive HDLC Addresses (Per Demod)* page from the *Satellite/HDLC Interface* page.



Use this page to define up to four HDLC addresses per receive channel that can carry user information on the Satellite Interface. Note the following:

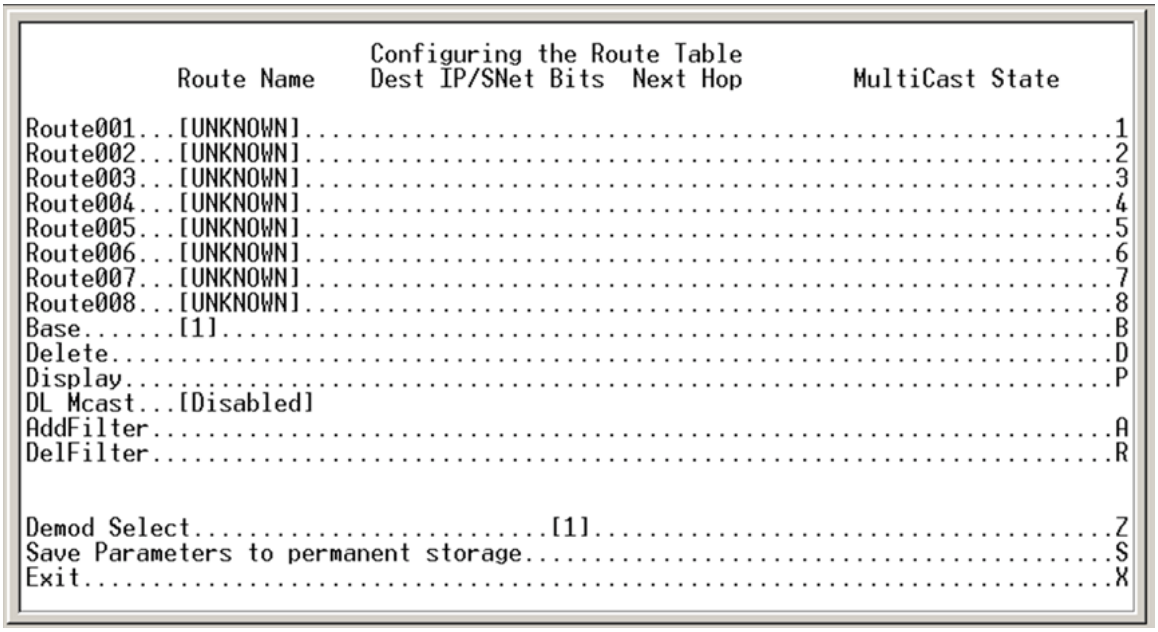
- The CDD 564/564L has **four** Receive channels;
- The CDD 562/562L has **two** Receive channels.

This page contains the following unique selections/fields:

Selection	Entry	Description
HDLC Addr 1 *through* HDLC Addr 4	1 *through* 4	Note: For HDLC addresses in hex <1 - 7FFE, enter = 0001> Note the following: • Point-To-Point Mode: HDLC addresses are not used in this mode. • Small Network Mode (up to 254 addresses) - The user is limited to valid addresses between the values of 0x01 and 0xFE. • Large Network Mode (up to 32766 addresses) - The user is limited to valid addresses between the values of 0x0001 and 0x7FFE.
Delete HDLC Addr	D	Specifies the HDLC entry to delete (1,2,3 or 4)

8.2.4 Route Table Configuration page

Access the *Route Table Configuration* page from the *Main Menu* page.



Do* not *operate a CDM-IP modem satellite link where both IP modems have a Default Route to the satellite. For example, if both IP modems had this Route Table entry:

IP Dest	***Next Hop***	***Type***
0.0.0.0/0	***Point-to-Point***	***ToSat***

In this setup, any traffic forwarded by an IP modem that did not have a valid IP host at the remote LAN would then be resent by the remote IP modem. This traffic would continue to be forwarded until the TTL expired. This "routing loop" will limit the performance of the IP modem by wasting satellite bandwidth.

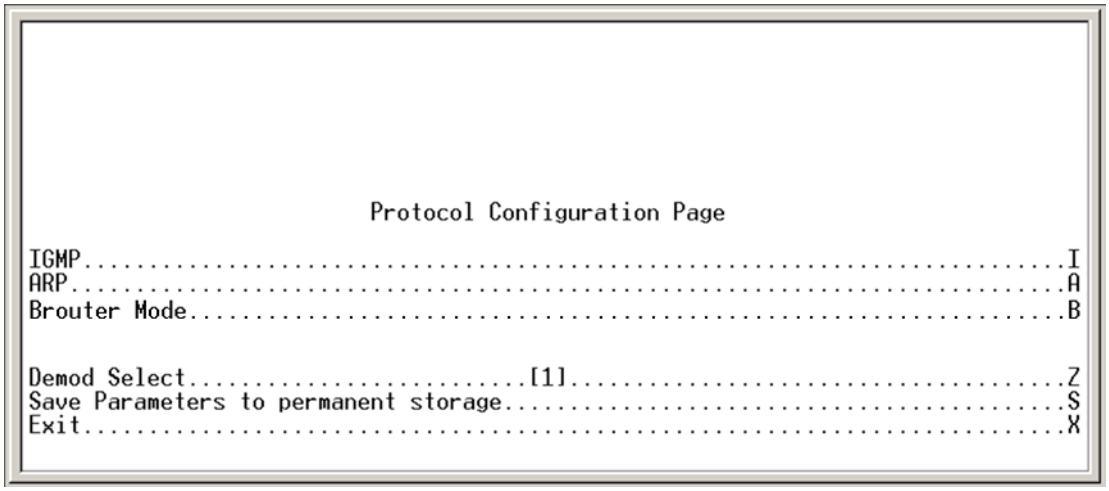
This page contains the following unique selections/fields:

Selection	Entry	Description
Route001 *through* Route008(256) (The menu page displays eight routes at a time. System can be configured up to 256 routes.)	1-8	Allows user to define how packets the IP Module receives are routed. Defining an entry in this table is similar to using 'route add' command of machines that support that command. For each route, the user must define: • A name assigned by the user to reference the route. The assigned name cannot contain any whitespace and must be unique. • The destination address of an IP packet of interest. • The number of network addresses that are governed by the selected destination entry, i.e., subnet mask. • The Next Hop IP address. This is the IP address where the packet will be routed for further processing, on the same subnet as the Ethernet interface.

Selection	Entry	Description
		Optionally: If entering a multicast address (224.0.0.0-239.255.255.255) as the destination IP address, then the following parameters will be requested: Route Multicast packets from Satellite to Ethernet? [y/n] The option Allows user to specify if multicast packets that match the provided IP address will be routed from the Satellite to Ethernet. "No" means that the packets will be discarded. Multicast Routes always have a subnet length of 32 and the next hop is 0.0.0.0 because it is not applicable. Note: The IP Module does allow the specification of one and only one default route. Destination IP = 0.0.0.0 Subnet Length = 0. The default route can be defined to send traffic to an IP Address on the same subnet as the Ethernet interface. This will cause all packets that do not match any other route to be sent to the destination you have defined for further processing.
Base	B	Allows user to view up to 8 different routes per screen. To allow editing on any of the 256 entries that can be defined, the user can select a base address to control which 8 routes are displayed. For example, if the user wants to edit Routes 32-40, then a Base value of 32 should be defined.
Delete Route	D	Specifies Route Name to delete.
Display	P	Displays all of the routes that are currently defined in the system. This will include automatically generated routes that are provided to simplify provisioning of the system. The information displayed is: • Route Name • DestIP/SnetBits • Next Hop • HDLC Flags.
Downlink Mcast	*[RO]*	Shows *Read Only* status of Downlink Multicast as [Enabled] or [Disabled]. This feature is enabled or disabled on the *Administration Feature Configuration* page.

8.2.5 Protocol Configuration page

Access the *Protocol Configuration* page from the *Main Menu* page.

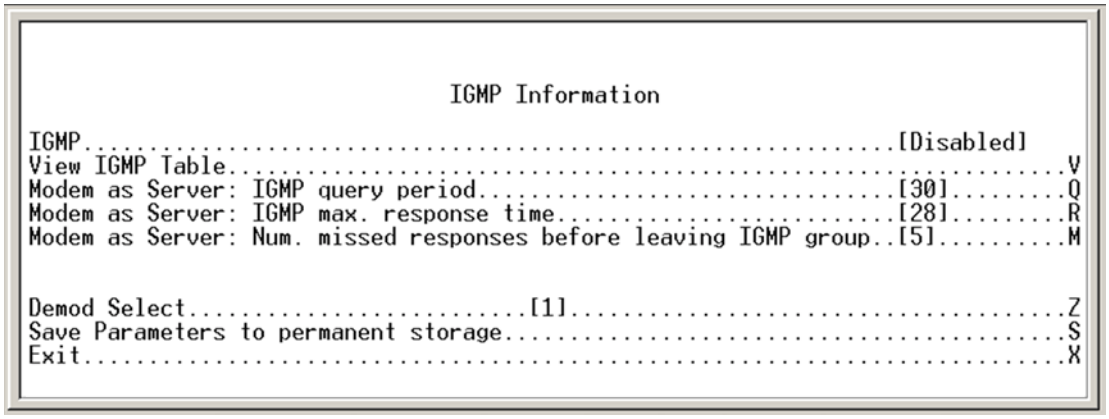


This page contains the following unique selections/fields:

Selection	Entry	Description
IGMP	I	Opens *IGMP Information* page.
ARP	A	Opens *ARP Table Utilities* page.
Brouter Mode	B	Opens the (VLAN) *Brouter Configuration* page.

8.2.5.1 IGMP Information page

Access the *IGMP information* page from the *Protocol Configuration* page.

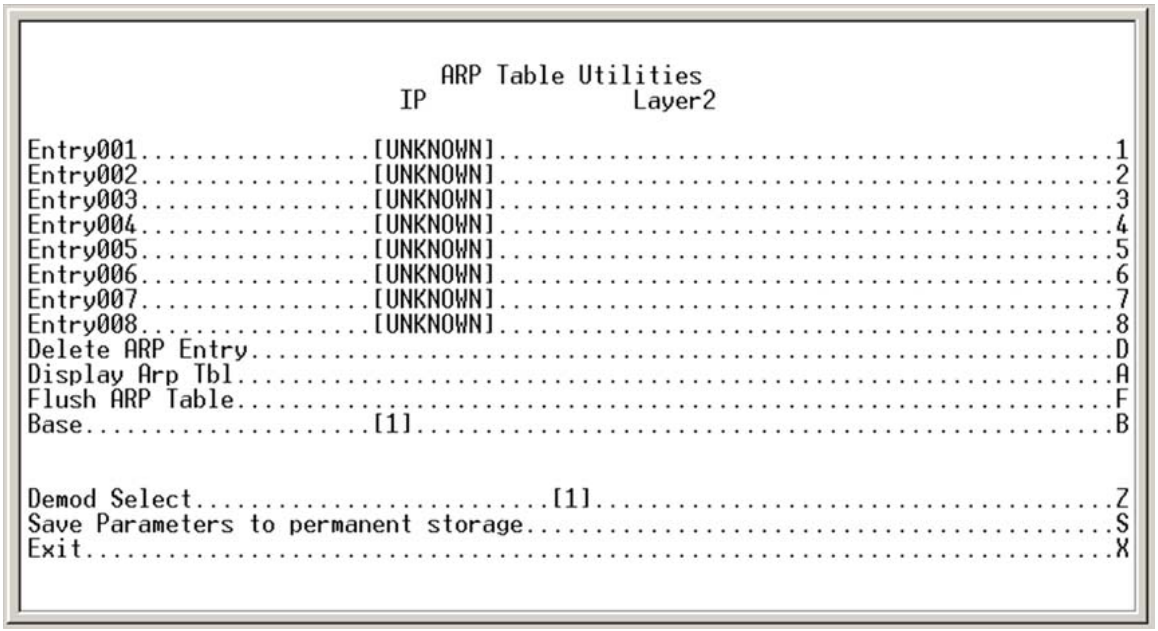


Use this page to view the IGMP clients that are actively listening to content being provided by the demodulator. This page also helps to determine how the Ethernet Interface is configured, either to receive requests to join IGMP groups or to announce groups for others to join. This page contains the following unique selections/fields:

Selection	Entry	Description
IGMP	*[RO]*	Shows IGMP status as [Enabled] or [Disabled].
View IGMP Table	V	Reports the content that clients have subscribed to the demodulator using the IGMP protocol. This Allows user to determine which services are being used and the minimum time before a service will be terminated.
CDM-IP as Server: IGMP query period	Q	Requests that a server periodically publish to users on the LAN the Multicast IP Addresses that it can service. The IGMP query period defines the time interval (in seconds) between each of these queries for membership.
CDM-IP as Server: IGMP max. response time	R	Defines the time interval (in seconds) that the demodulator should wait before it assumes that no parties are interested in the content published via an IGMP query. This option is expressed in seconds, and the max response time that is accepted by the demodulator is 25 seconds.
CDM-IP as Server: Number of missed responses before leaving IGMP group	M	Defines the number of membership queries that go unanswered from LAN clients before the Ethernet Interface will no longer forward data for that IGMP group. For example, consider a demodulator that has the IGMP query period set to 60 seconds, and the number of missed responses set to 3. If a client joins an IGMP group, then the service to that group will not be discontinued until no clients respond to a query from the demodulator for a period of 60*3 = 180 seconds.

8.2.5.2 ARP Table Utilities page

Access the *ARP Table Utilities* page from the *Protocol Configuration* page.



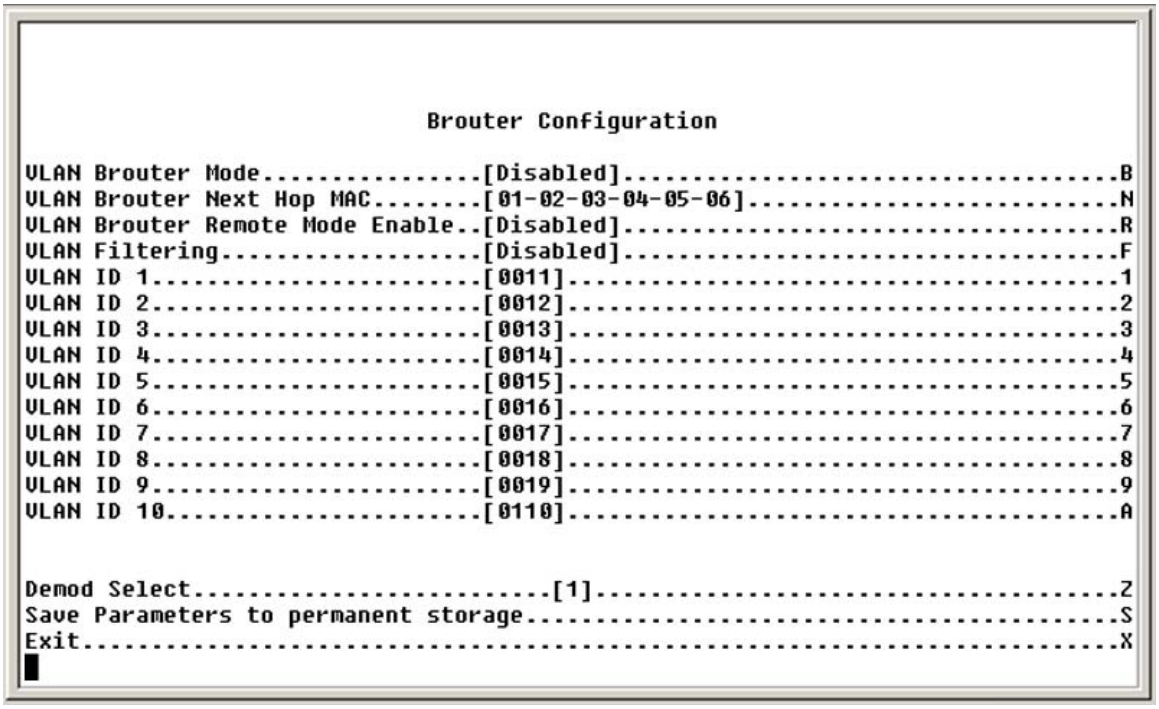
Use this page to view and edit the ARP table defined by the demodulator. It allows up to 256 static IP→MAC ARP entries. This page contains the following unique selections/fields:

Selection	Entry	Description
Entry001 *through* Entry008 (256) (The menu page displays 8 ARP definitions at a time on the demodulator. User can define up to 256 ARP definitions.)	1 *through* 8	Define up to 256 static ARP definitions on the demodulator. A static ARP definition is defined as: • Unicast IP Address – This IP Address is used as a lookup into the ARP table when the demodulator needs to resolve a MAC or HDLC Address. Restrictions: o IP Address must be on the same subnet as the Ethernet Interface. o IP Address must be a valid Unicast address (Not Multicast, broadcast, etc.) • MAC Address – The MAC Address defines the hardware destination MAC Address that is used when an Ethernet packet is destined for an IP machine from the demodulator.
Delete ARP Entry	D	Allows deletion of a Static ARP entry. Queries the user for the IP address of the ARP entry to delete.
Display ARP Tbl	A	Displays the entire IP to MAC ARP table, in blocks of 10 ARP entries, including the static as well as dynamic ARP entries. Hit 'Enter' key to display next 10 entries, or 'ESC' key to return to ARP Table Utilities page.

Selection	Entry	Description
Flush ARP Table	F	Allows the entire ARP table [Dynamic Entries] to be removed. This is equivalent to performing the standard UNIX command "arp –d" on each address reported in an "arp –a" command. The command only flushes the dynamic ARP entries. The static ARP entries will not be removed.
Base	B	Allows user to view up to 8 different Static ARP definitions per screen. To allow editing on any of the 256 entries that can be defined, the user can select a base address to control which 8 ARP entries are displayed. For example, if the user wants to edit static ARP Entries 32-40, then a Base value of 32 should be defined.

8.2.5.3 (VLAN) Brouter page

Access the *Brouter Configuration* page from the *Protocol Configuration* page.



This page contains the following unique selections/fields:

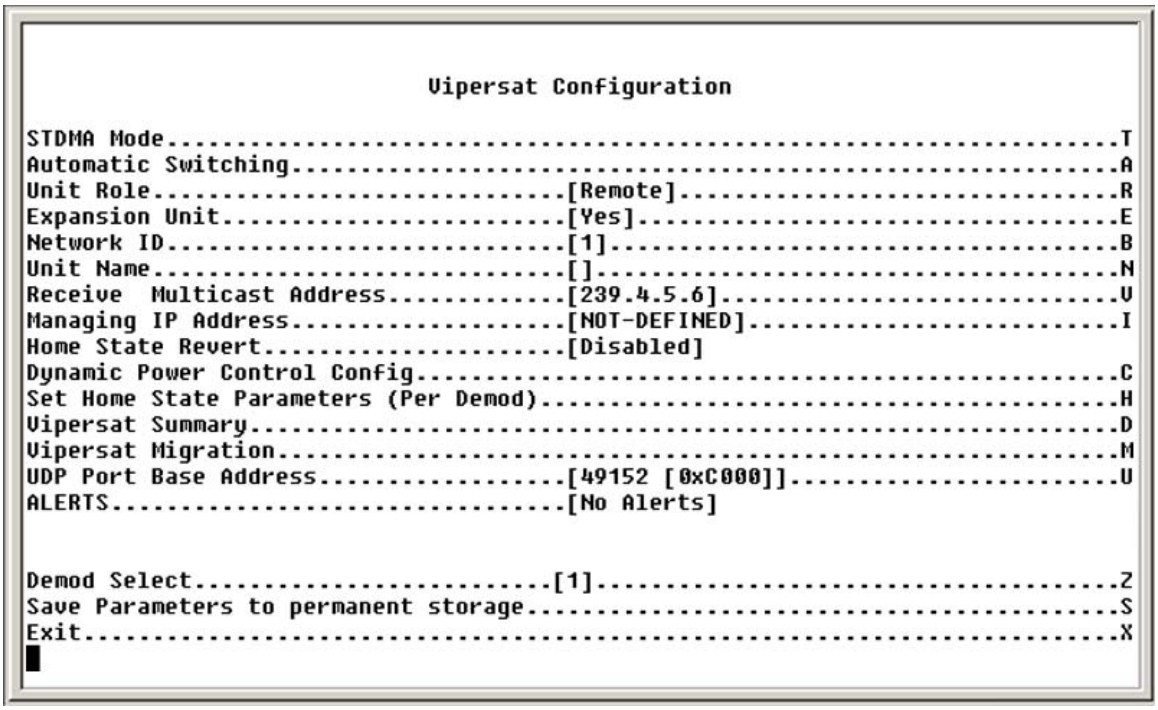
Selection	Entry	Description
VLAN Brouter Mode	B	Toggle VLAN Brouter Mode as [Enabled] or [Disabled]. This feature allows VLAN tagged packets to be forwarded when in Router mode. Notes: 1. This feature is automatically disabled when Managed Switch Mode is selected. 2. Header Compression must be purchased and available for this feature to work.
VLAN Brouter Next Hop MAC	N	Allows user to enter a Next Hop MAC address in 01-02-03-04-05-06 format.
VLAN Brouter Remote Mode Enable	R	Toggle VLAN Brouter Remote Mode as [Enabled] or [Disabled]. In this mode, IP traffic received from the WAN interface will not be forwarded back to the WAN interface even though the route table matches.
VLAN Filtering	F	Toggle Filtering Mode as [Enabled] or [Disabled]. This feature, when Enabled, allows the filtering of "Brouted" Packets – i.e., this will permit the *bridging* of VLAN destination packets and the *routing* of non-VLAN traffic using static route table information.
VLAN ID 1 through VLAN ID 10	1-9, A (for 10)	Enter a valid ID in the range of 0000 to 4095.

8.2.6 Vipersat Configuration page

Comtech EF Data publication MN/22137 – Vipersat CDD-56X Series Satellite Network Demodulator Router User Guide.

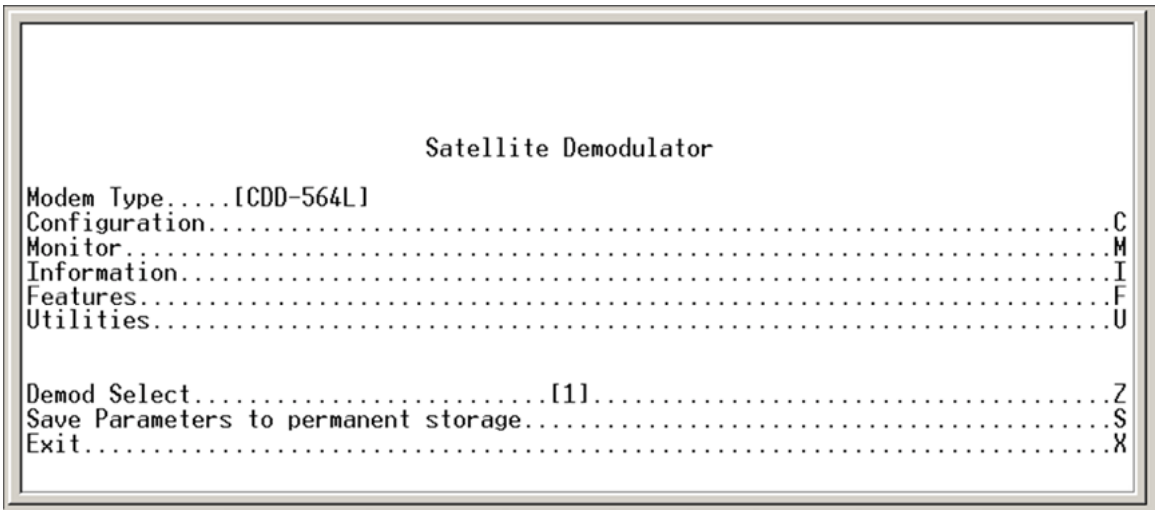
This page and its operations are functional only when the demodulator is used in a Vipersat Management System (VMS).

Access the *Vipersat Configuration* page from the *Main Menu* page.



8.2.7 Satellite Demod Configuration page

Access the *Satellite Demodulator* page from the *Main Menu* page.

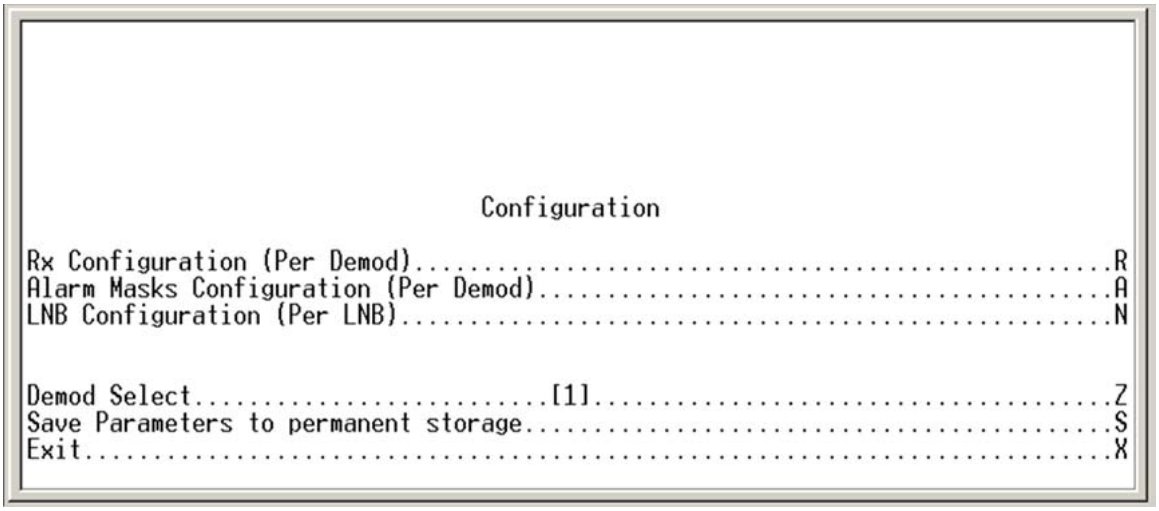


This page contains the following unique selections/fields:

Selection	Entry	Description
Modem Type	*[RO]*	Displays the unit type in use – i.e., CDD-562L, CDD-564L, etc.
Configuration	C	Opens *Receive Configuration* page.
Monitor	M	Opens *Monitor* page.
Features	F	Opens *Features* page.
Information	I	Opens *Information* page.
Utilities	U	Opens *Utilities* page.

8.2.7.1 Configuration page

Access the *Configuration* page from the *Satellite Demodulator* page.

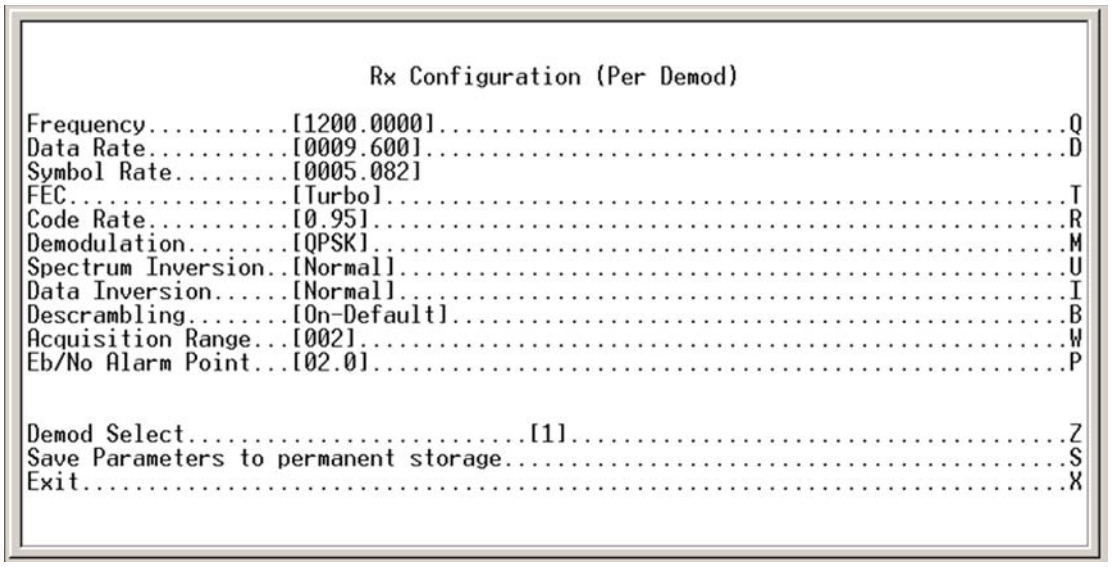


This page contains the following unique selections/fields:

Selection	Entry	Description
Rx Configuration (Per Demod)	R	Opens *Rx Configuration (Per Demod)* page.
Alarm Masks Configuration (Per Demod)	A	Opens *Alarm Masks Configuration (Per Demod)* page.
LNB Configuration (Per LNB)	N	Opens *LNB Configuration (Per Demod)* page, when the presence of an LNB is detected.

8.2.7.1.1 Rx Configuration (Per Demod) page

Access the *Rx Configuration* page from the *Configuration* page. Note that all parameters on this page are configurable on a *per-Demod* basis (as determined via **Demod Select**).



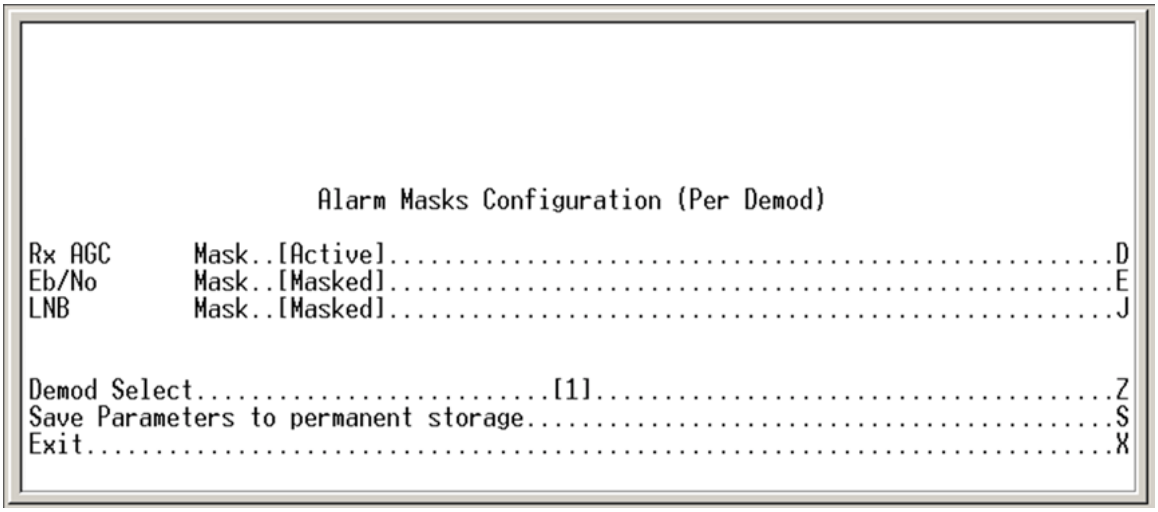
This page contains the following unique selections/fields:

Selection	Entry	Description
Frequency	Q	CDD-562L/CDD-564L (L-Band): Valid ranges for Rx Frequency are from 950 to 1950 MHz.
Data Rate	D	Valid range for Rx Data Rate is from 2.4 kbps to 9980 kbps. Note: High data rate [>5000Kbps] is a FAST Feature to be purchased from Comtech EF Data
FEC	T	Select one of the following for the Decoder Type: 1 – Uncoded 2 – TURBO Note: Selection 2 (TURBO) available only with the CDD-564L.
Code Rate	R	Select one of the following for the Decoder Rate: 1 – 3/4 2 – 7/8 3 – 0.95 4 – 1/1
Demodulation	M	Select one of the following for the Rx Demodulation type: 1 – QPSK 2 – 8-PSK 3 – 16QAM Note: Selections1, 2, 3 available only with the CDD-564L.
Spectrum Inversion	U	Select one of the following: 1 – NRM (Normal) 2 – INV (Inverted)
Data Inversion	I	Select one of the following: 1 – NRM (Normal) 2 – INV (Inverted)

Selection	Entry	Description
Descrambling	B	Select one of the following: 1 – Off 2 – On-Default 3 – On-IESS-315
Acquisition Range	W	Valid ranges are from 0 to 200 kHz: • 1 to 32HKz if symbol rate < 625Ksymbol on CDD-564L • 1 to 32HKz on CDD-564
Eb/No Alarm Point	P	Valid range is from 0.1 to 16.0.

8.2.7.1.2 Alarm Masks Configuration (Per Demod) page

Access the *Alarm Masks Configuration (Per Demod)* page from the *Configuration* page.

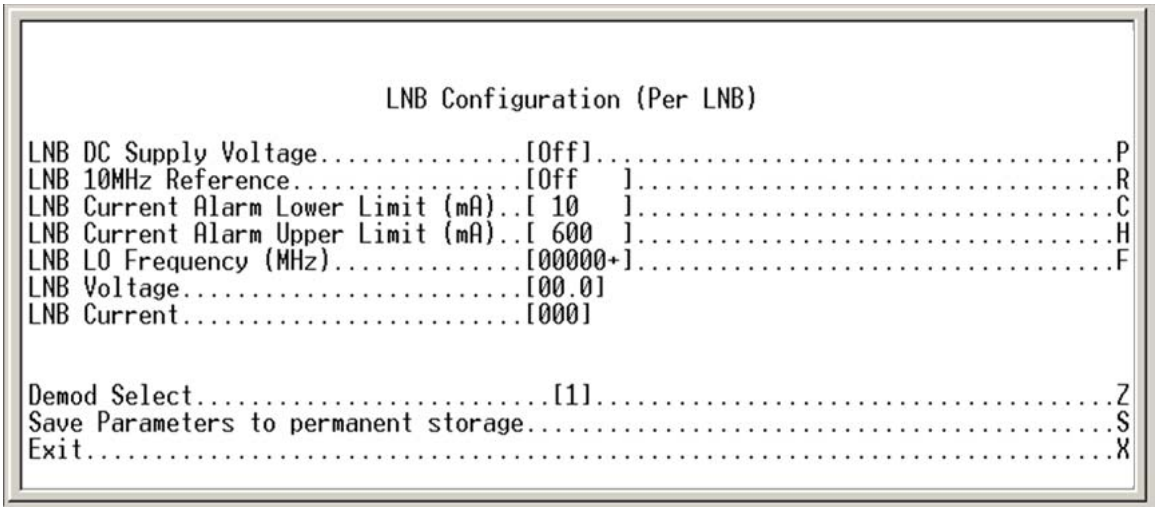


This page contains the following unique selections/fields:

Selection	Entry	Description
Rx AGC (Auto Gain Control) Mask	D	Select as [Active] or [Masked].
Eb/No Mask	E	Select as [Active] or [Masked].
LNB Mask	J	Select as [Active] or [Masked], when the presence of an LNB is detected.

8.2.7.1.3 LNB Configuration (Per LNB) page

Access the *LNB Configuration (Per Demod)* page from the *Configuration* page. Note that all parameters on this page are configurable on a *per-LNB* basis (as determined via **Demod Select**).

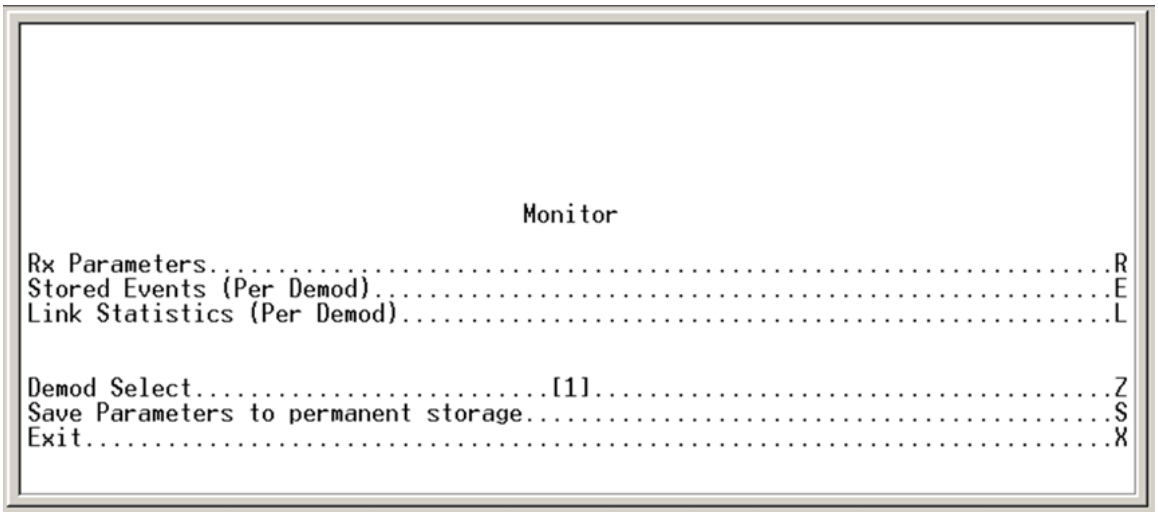


This page contains the following unique selections/fields:

Selection	Entry	Description
LNB DC Supply Voltage	P	Select as [On] or [Off].
LNB 10MHz Reference Enable	R	Select as [On] or [Off].
LNB Current Alarm Lower Limit (mA)	C	Valid range is from 10 to 400 mA.
LNB Current Alarm Upper Limit (mA)	H	Valid range is from 50 to 600 mA.
LNB LO Frequency (MHz)	L	Valid range is from 3000 MHz to 65000 MHz.
LNB Current	*[RO]*	Displays active LNB current values on a *per-LNB* basis, when the presence of an LNB is detected.
LNB Voltage	*[RO]*	Displays active LNB voltage values on a *per-LNB* basis, when the presence of an LNB is detected.

8.2.7.2 Monitor page

Access the *Monitor* page from the *Satellite Demodulator* page.

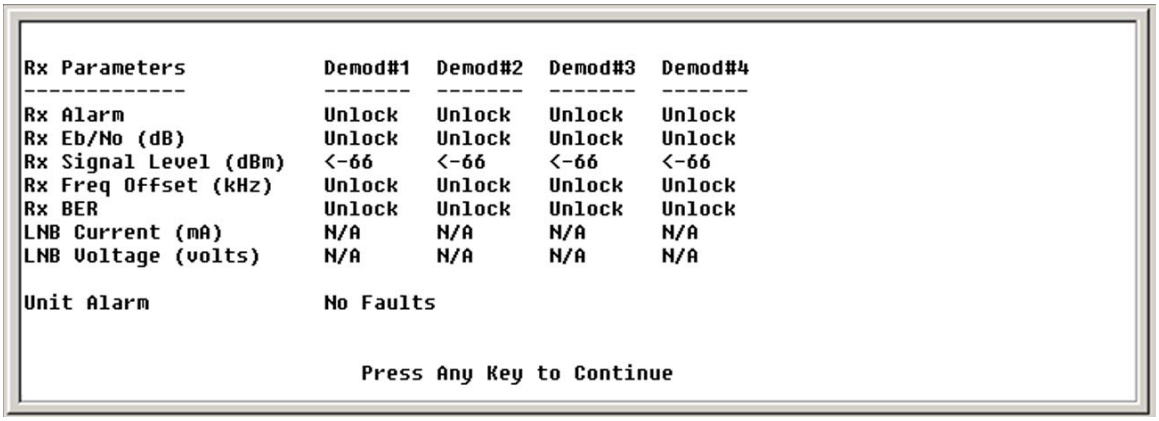


This page contains the following unique selections/fields:

Selection	Entry	Description
Rx Parameters	R	Opens *Receive Parameters (Per Demod)* page.
Stored Events (Per Demod)	E	Opens *Stored Events (Per Demod)* page.
Link Statistics (Per Demod)	L	Opens *Link Statistics (Per Demod)* page.

8.2.7.2.1 Rx Parameters page

Access the *Rx Parameters* page from the *Monitor* page.



This *read-only* page provides, in a summary fashion, the following functional status indicators or operating statistics on a per-Demod basis:

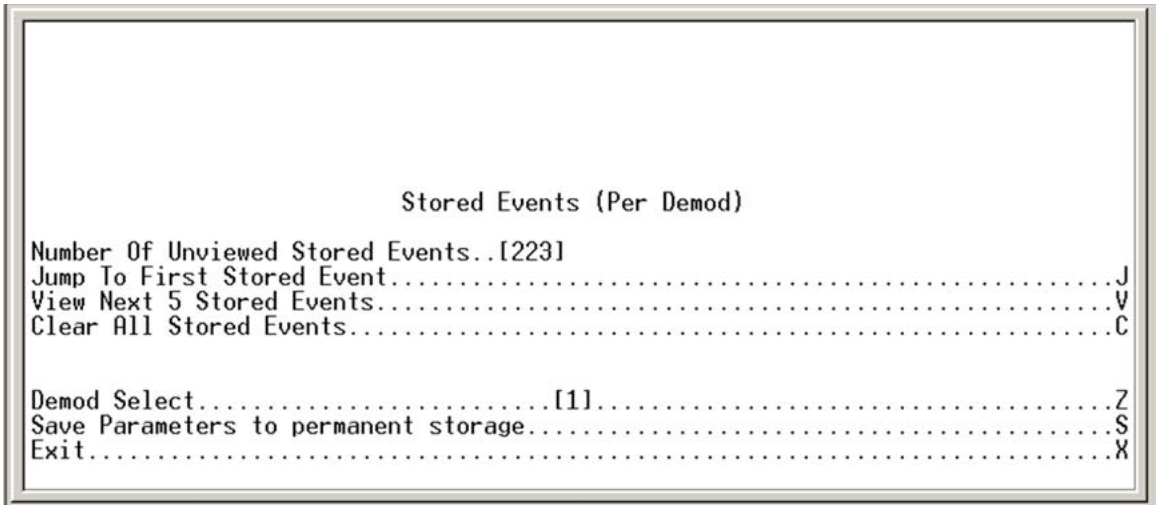
- Rx Alarm
- Rx Eb/No (dB)
- Rx Signal Level (dBm)
- Rx Freq Offset (kHz)
- Rx BER
- LNB Current (mA)
- LNB Voltage (volts)

Additionally, the presence of any Unit (system-level) alarms/faults is indicated.

Press any key to return to the previous CLI menu page.

8.2.7.2.2 Stored Events (Per Demod) page

Access the *Stored Events (Per Demod)* page from the *Monitor* page.

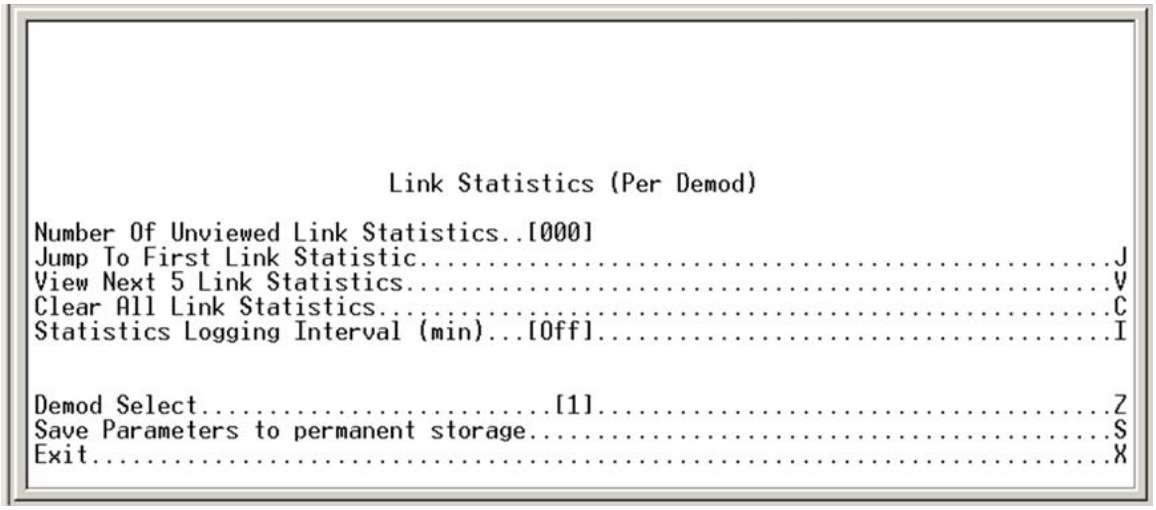


This page contains the following unique selections/fields:

Selection	Entry	Description
Number of Unviewed Stored Events	*[RO]*	Displays the number of events not yet viewed. Events are displayed five at a time [5X] and, once viewed this tally of unviewed events is adjusted/reduced accordingly.
Jump to First Stored Event	J	Resets the internal Event Index to 1, permitting the user to browse through those previously viewed events.
View Next 5 Stored Events	V	Displays the next five events, starting from the internal Event Index.
Clear All Stored Events	C	Clears all stored events from the NVRAM buffer.

8.2.7.2.3 Link Statistics (Per Demod) page

Access the *Link Statistics (Per Demod)* page from the *Monitor* page.

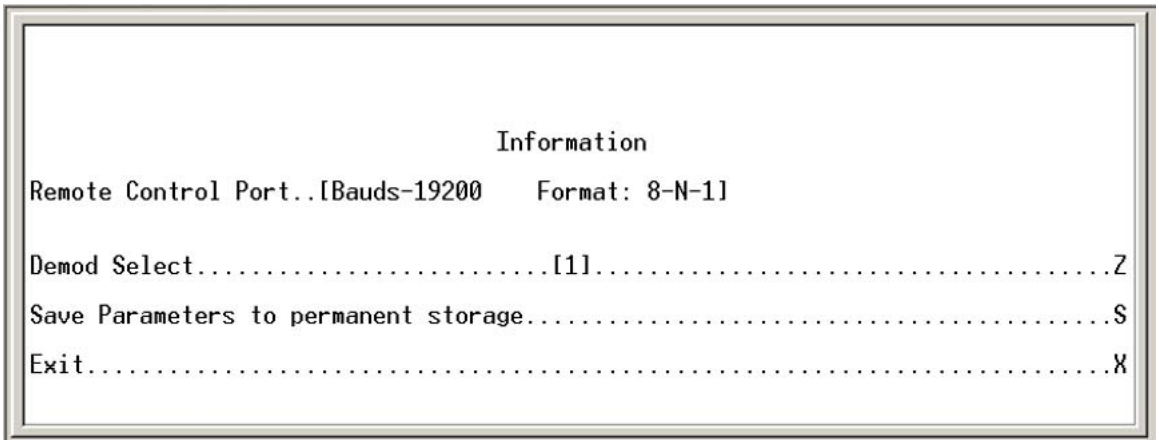


This page contains the following unique selections/fields:

Selection	Entry	Description
Number of Unviewed Link Statistics	*[RO]*	Displays the number of statistics not yet viewed. Statistics are displayed [5] at a time and, once viewed, this tally of unviewed statistics is adjusted/reduced accordingly.
Jump to First Link Statistics	J	Resets the internal Statistics index to 1, permitting the user to browse through those previously viewed statistics.
View Next 5 Link Statistics	V	Displays the next 5 statistics, starting from the internal Statistics index.
Clear All Link Statistics	C	Clears all Link Statistics from the NVRAM buffer.
Statistics Logging Interval (min)	I	Defines the period of time, in 10-minute increments, over which the statistics will be measured. The user can choose 10, 20, 30, 40, 50, 60, 70, 80, or 90 minutes, or OFF to disable the feature.

8.2.7.3 Information page

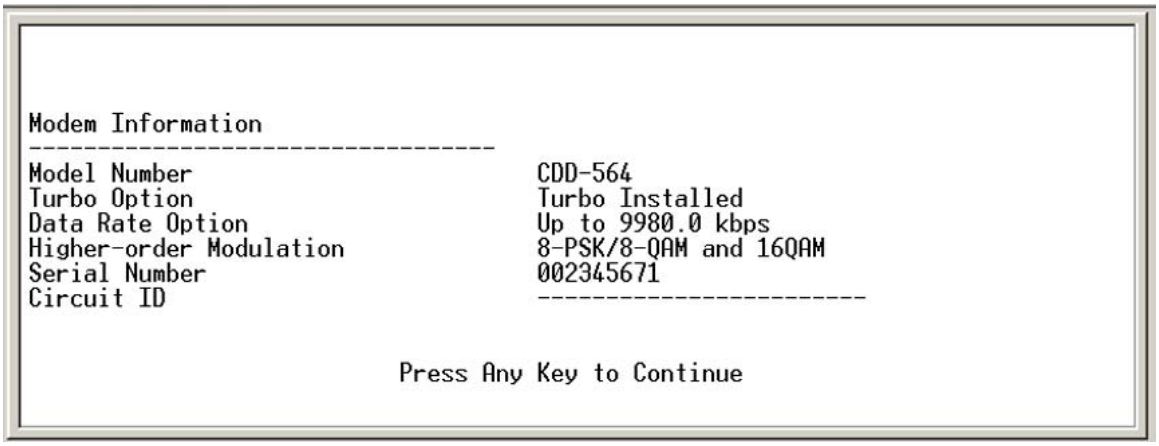
Access the *Information* page from the *Satellite Demodulator* page.



This *read-only* page displays the current operating parameters for the serial remote control port that is configured for use with the interface to the CLI.

8.2.7.4 Features page

Access the *Features* page from the *Satellite Demodulator* page.

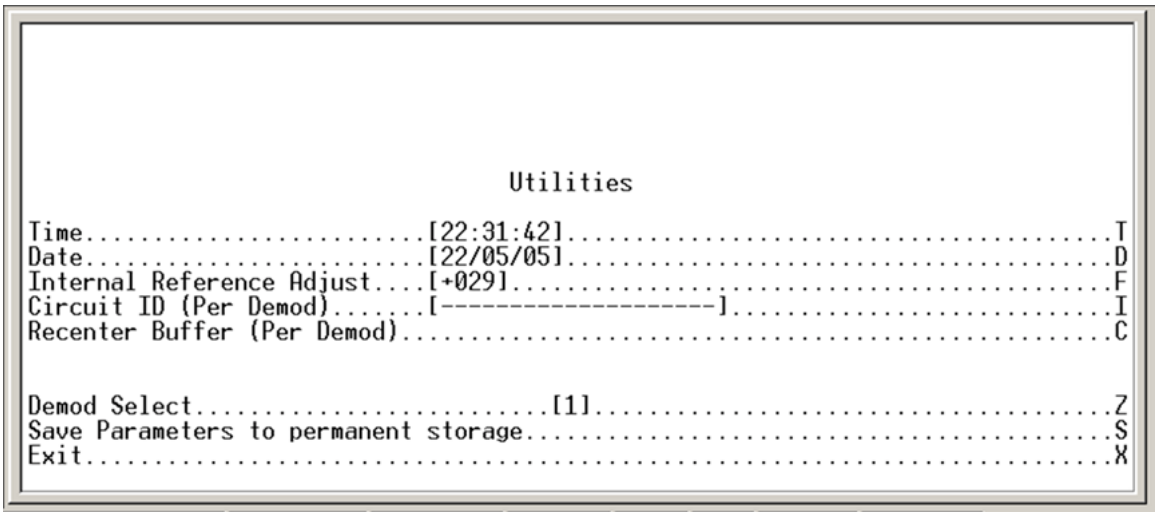


This *read-only* page displays the operational features and other information specific to the unit in use (the screen shot shown here is for example only).

Press any key to return to the *Satellite Demodulator* page.

8.2.7.5 Utilities page

Access the *Utilities* page from the *Satellite Demodulator* page.

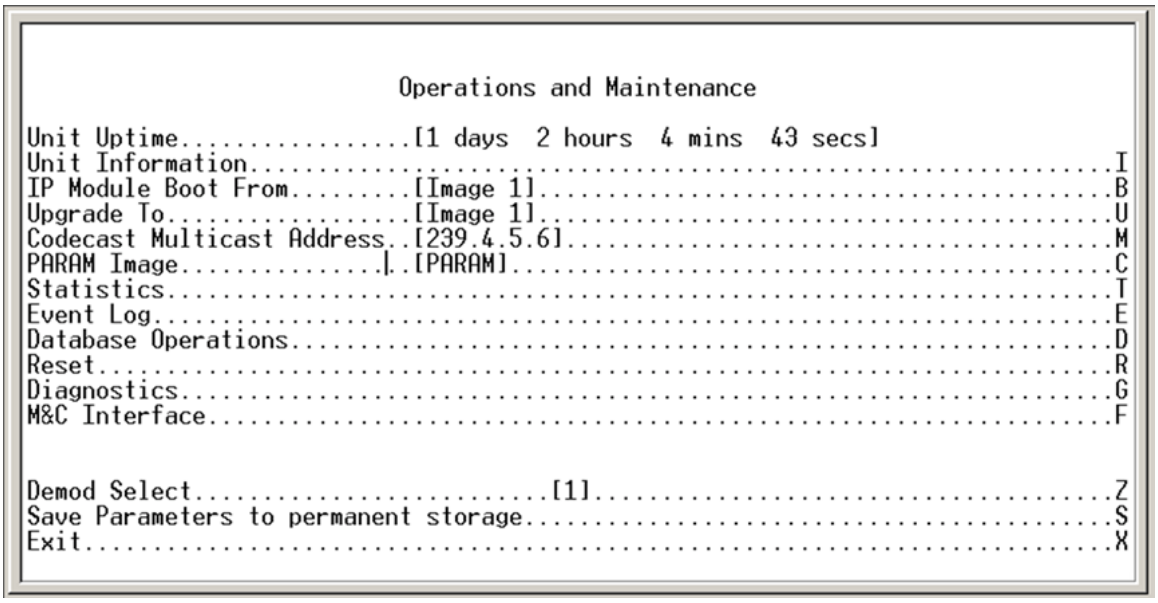


This page contains the following unique selections/fields:

Selection	Entry	Description
Time	T	Allows user to set the Time on the Unit, in 24-Hour Format, as HH:MM:SS
Date	D	Read/Set the Date in DD/MM/YY format, where: DD – Day MM – Month YY – Year.
Internal Reference Adjust	F	Adjust the Internal Reference Clock Frequency, in the range of –999 to +999.
Circuit ID (Per Demod)	I	Sets the Circuit Identifier per receive channel on a per-Demod basis. This can be any text up to 24 – Characters in length.
Recenter Buffer (Per Demod)	C	Recenter the internal receive data buffer on a per-Demod basis.

8.2.8 Operations and Maintenance page

Access the *Operations and Maintenance* page from the *Main Menu* page.



This page contains the following unique selections/fields:

Selection	Entry	Description
Unit Up Time	*[RO]*	Displays the elapsed time the unit has been running continuously since its last reboot.
Unit Information	I	Opens the *Unit Information* page, which provides details about the unit's current operational firmware.
Boot From	B	Determines which version of the IP Module firmware (including Application, FPGA, and FFPGA) will be loaded upon boot-up. The possible options are: 0 (Latest) – Boots the newest firmware package based upon date. 1 (Image1) – Boots the firmware package loaded into the first slot in permanent storage. 2 (Image2) – Boots the firmware package loaded into the second slot in permanent storage.
Upgrade To	U	Determines which installed firmware package (including Application, FPGA, and FFPGA) that the IP Module will overwrite when upgrading with a new firmware package. The possible options are: 0 (Oldest) – Overwrites the oldest firmware package based upon date. 1 (Image1) – Overwrites the firmware package loaded into the first slot in permanent storage. 2 (Image2) – Overwrites the firmware package loaded into the second slot in permanent storage.
Codecast Multicast Address	M	Configures the IP Multicast Address for the Codecast protocol. The IP Module has the ability to get the firmware updates installed on multiple units using the Codecast protocol, making unit upgrades easy in bigger networks.

Selection	Entry	Description
PARAM Image	C	Identifies the PARAM file that will be loaded on bootup. The options are: 1. Factory – Uses the internal, hard-coded factory default parameters. 2. PARAM – Last saved Parameter file.
Statistics	T	Opens *Statistics Menu* page.
Event Log	E	Opens *Event Log* page.
Database Operations	D	Opens administrative *Database Operations* page.
Reset	R	Allows user to reboot the Unit. This has the same logical effect of power-cycling the unit.
Diagnostics	G	Opens *Diagnostics* page.
M&C Interface	F	Provides user access to the demodulator's available remote product management commands and queries. Once the M&C Interface is selected, at the '#' prompt a Controller-to-Target remote command or query takes the following form: • Start of Packet '<' • Address Delimiter '/' • Target Address (1-4 characters, 0001 – 0004) • 3-character Instruction Code (e.g., RFQ) • Instruction Code Qualifier – Command '=' or Query '?' Example: **M&C CLI INTERFACE** **(X=Exit) #<1/RFQ?** **>0001/RFQ=1200.0000** When finished, type 'X' to exit the M&C Interface and return to the *Operations and Maintenance* page.  Appendix D. CDM/CDD NMCS REMOTE PRODUCT MANAGEMENT PROTOCOL

8.2.8.1 Unit Information page

Access the *Unit Information* page from the *Operations and Maintenance* page.

```
System time is THU MAY 10 10:27:30 2012

Database Version is 6.10
Booted using Bulk #2.
Using configuration parameters from PARAM.


Type          |  Date      Time  | Name             | Rev      | Len
Boot          | 12/09/2005 11:39 | FW11669-7a       | 1.1.2    | 460600
IP Bulk #1    |  4/06/2012 14:57 | FW11669AC        | 1.6.10   | 1679476
IP Bulk #2    |  4/06/2012 15:11 | FW-0000122J      | 1.6.10   | 1629948
EVENTLOG      |  4/17/2012 16:28 | eventlog         | 1.5.3    | 430080
PARAM         |  4/06/2012 15:13 | console          | 1.6.10   | 8976


                          Press Any Key to Continue
```

The M&C (Monitor & Control) Interface (option 'F' on this page) is reserved for CEFD test & development and system test tools only. It is not intended for customer use.

If this interface is inadvertently selected, do not attempt to execute any commands on this page; rather, type 'X' to exit this page to return to the Main Menu.

Otherwise, this page provides the following *read-only* information:

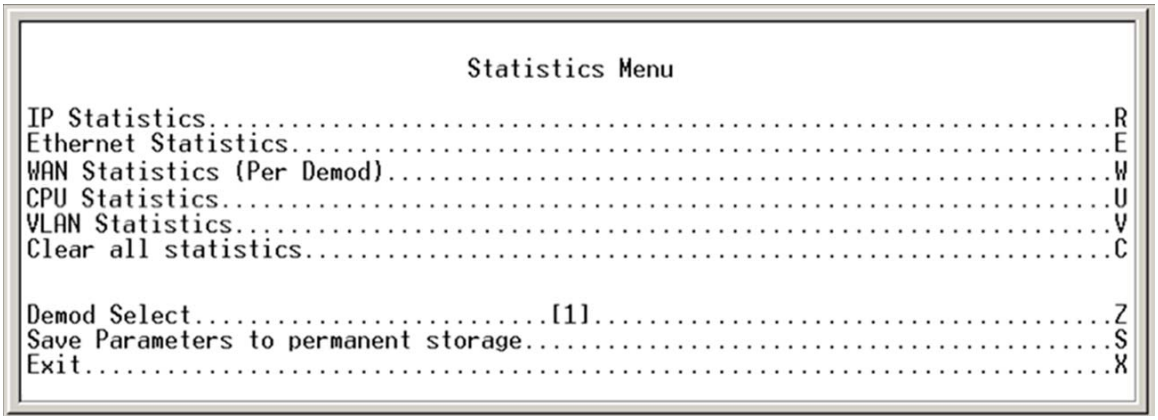
Information Displayed…	Description
System time is…	Displays the system time in "DAY MONTH DATE hh:mm:ss YEAR" format
Database Version is…	The Database Version, in combination with the Release Number, is used by the VMS and VLOAD to detemine which version of the Param Config Editor to use.
Booted using Bulk #X…	Displays Image # from which the unit currently boots. By default will be the Latest, unless "Boot From" is set to Image #1 or Image #2
Using configuration parameters from PARAM.	Displays PARAM file from which the unit is currently configured. By default, this file is the PARAM file from Flash memory, or Factory Default if no parameter file is found in Flash memory.
Type/Date – Time/Name/Rev/Len *Boot* *IP Bulk #1* *IP Bulk #2*	Currently Loaded demodulator boot firmware – displays Build Date, CEFD FW#, Revision #, and size of each FW file. Note the following: • There is a single Boot FW file. • The Bulk file contains all of the FW files for the unit; there are two slots available. • The FPGA files are subsets of the Bulk FW.
Type/Date – Time/Name/Rev/Len *EVENTLOG*	Displays the date/time that the EVENTLOG file was last updated.

Information Displayed…	Description
Type/Date – Time/Name/Rev/Len *PARAM*	Displays the date/time that the PARAM1 file was last updated/saved. This also shows what user interface was used to update/save the PARAM file last time. Note the following: • From CLI – displays 'console' • From Web – displays 'http' • From Telnet – displays Telnet user login name • From SNMP – displays 'snmp'

Press any key to return to the previous CLI menu page.

8.2.8.2 Statistics Menu page

Access the *Statistics Menu* page from the *Operations and Maintenance* page. Note that all statistics/information presented on this page automatically updates once every 6 seconds.

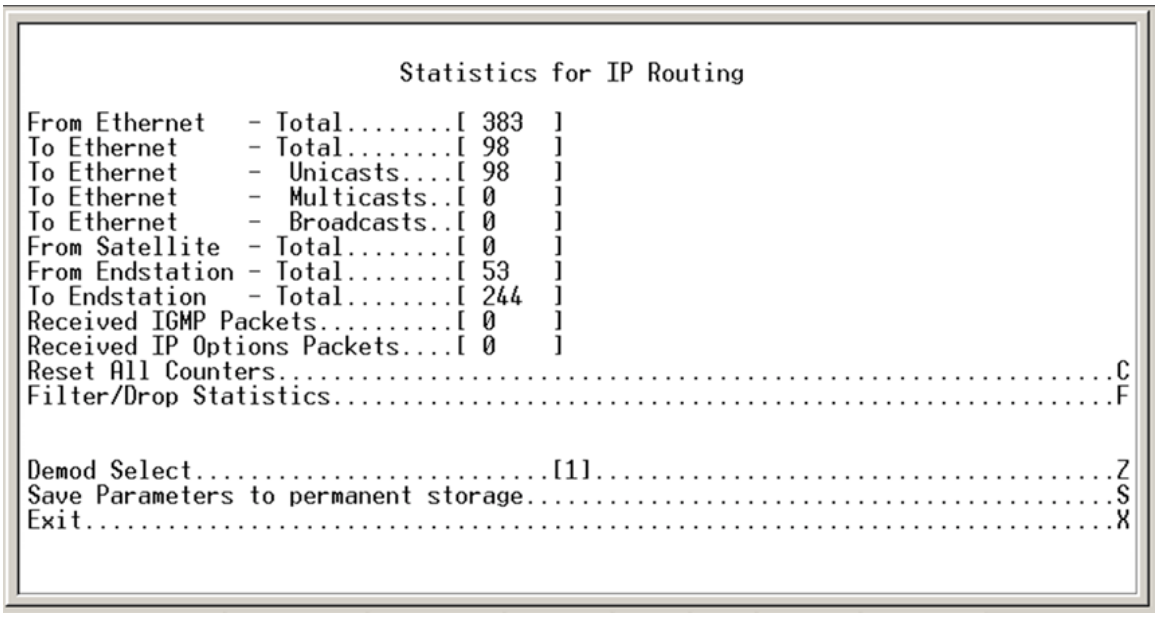


This page contains the following unique selections/fields:

Selection	Entry	Description
IP Statistics	R	Displays Statistics for IP Routing and allows counters to be reset.
Ethernet Statistics	E	Displays Statistics for the Ethernet Port and allows counters to be reset.
WAN Statistics (Per Demod)	W	Displays Statistics, on a *per-Demod* basis, for the WAN (HDLC) Port, and allows counters to be reset.
CPU Statistics	U	Displays, on a percentage basis, the CPU usage.
VLAN Statistics	V	Displays, in groups of 8, Statistics for the VLAN.
Clear all statistics	C	Globally resets all statistics counters.

8.2.8.2.1 IP Statistics page

Access the *IP Statistics* page from the *Statistics Menu* page.

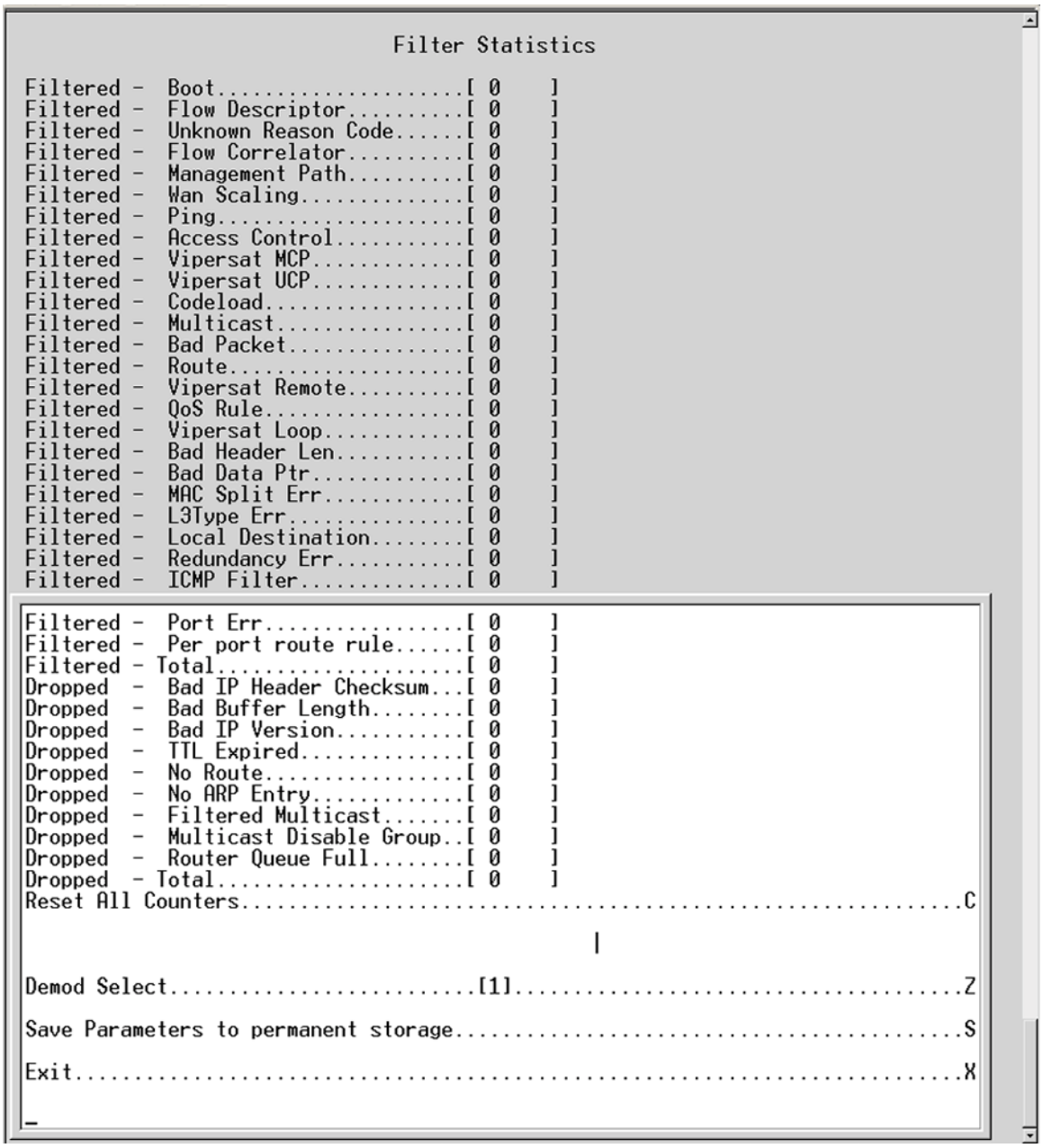


This page tallies the number of packets routed or dropped in the IP Module. This page contains the following unique selections/fields:

Selection	Entry	Description
From Ethernet - Total	*[RO]*	Displays Ethernet Statistics page, Rx Good Frames
To Ethernet - Total		Displays Ethernet Statistics page, Tx Good Frames
To Ethernet – Unicasts		Displays Unicast packets to LAN
To Ethernet – Multicasts		Displays Multicast packets to LAN
To Ethernet – Broadcasts		Displays Broadcast packets to LAN
From Satellite – Total		Displays WAN Statistics page, Rx HDLC Packet Count
From Endstation – Total		Displays Packets sent from demodulator
To Endstation – Total		Displays Packets directed to demodulator
Received IGMP Packets		Displays Internet Group Management Packets received (used for management of multicast traffic).
Received IP Options Packets		Displays number of IP Options packets received.
Reset All Counters	C	Resets all WAN, Ethernet and IP Routing statistics gathered to zero.
Filter/Drop Statistics	F	Opens *Filter Statistics* page.

8.2.8.2.1.1 Filter/Drop Statistics page

Access the *Filter/Drop Statistics* page from the *Statistics Menu* | *IP Statistics* page.



This *read-only* page tallies the number of packets filtered or dropped in the IP Module. This page provides the following unique information:

Packet Item	Description
Filtered – Boot	Packets are filtered while booting.
Filtered – Flow Descriptor	1. Packet are Filtered due to a Multicast packet classified as UNICAST packet. 2. Packets are filtered due to Off-line modem is receiving packet from WAN port.

Packet Item	Description
Filtered – Unknown Reason Code	Packets dropping due to reasons were not listed here.
Filtered – Flow Correlator	Packet are filtered due to improper establishing SAT-to-SAT traffic (This counter generally will be seen on out bounding Hub modem in point-to-multipoint setup)
Filtered – Management Path	Not used currently.
Filtered – WAN Scaling	Internal Error occurred during WAN scaling sub process in processing packet.
Filtered – Ping	Ping packets were received but PING feature was disabled.
Filtered – Access Control	Packets are received while "Access List" control is enabled but IP address does not match the access list database.
Filtered – Vipersat MCP	Internal Error occurred while processing Vipersat Multi command messages.
Filtered – Vipersat UCP	Internal Error occurred while processing Vipersat Uni-command messages.
Filtered – Codeload	Internal error occurred while processing Codeload messages.
Filtered – Multicast	A multicast packet is received but there is no application associated with it.
Filtered – Bad Packet	Malformed packet is received. This may be due to internal or external error.
Filtered – Route	Applies to Vipersat Remote only – when a packet is received from the WAN and the Route Table contains a route to transmit that packet to the WAN, the packet will be filtered to prevent a routing loop.
Filtered – Vipersat Remote	Packet filtered due to QoS Rule configured to filter.
Filtered – QoS Rule	Packet filtered due to QoS Rule configured to filter.
Filtered – Vipersat Loop	Packet filtered due to Vipersat loop (a modem configured as a Vipersat Remote Expansion unit and default route set to 0.0.0.0/0).
Filtered – Bad Header Len	Filtered due to packets received with less than 14 bytes of L2 header.
Filtered – Bad Data Ptr	Internal error occurred while accessing the packet data.
Filtered – MAC Split Err	Not currently used.
Filtered – L3Type Err	Not currently used.
Filtered – Local Destination	Packet received with destination MAC as modem MAC and destination IP is not modem IP while modem is operating in bridge mode (EasyConnect)
Filtered – Redundancy Err	Applies to Offline modem in 1:1 Redundancy Packets will be received on the WAN port by the both Offline unit and Online unit, only Online unit is allowed to forward the packets. Indicates packets received by Offline unit from WAN port that were filtered because unit is Offline.
Filtered – ICMP Filter	This is the same as "Filtered Ping", except this will update in easyConnect mode.
Filtered – Port Err	Non-IP or ARP packets are targeted to End-station. (End-station will not allow any non-IP packets.)
Filtered – Per port route rule	In 1:1 Redundancy Easy connect mode – a packet received with modem destination MAC, but the IP does not match the traffic IP or management IP. In Router mode - per port WAN filtered mode is ON.
Filtered – Total	Total Filtered Packets
Dropped – Bad IP Header Checksum	Total Dropped Packets due to incorrect IP Header Checksum.
Dropped – Bad Buffer Length	IP length (as specified in packet header) was greater than payload received in the Ethernet packet. This would indicate the packet was truncated before arriving).

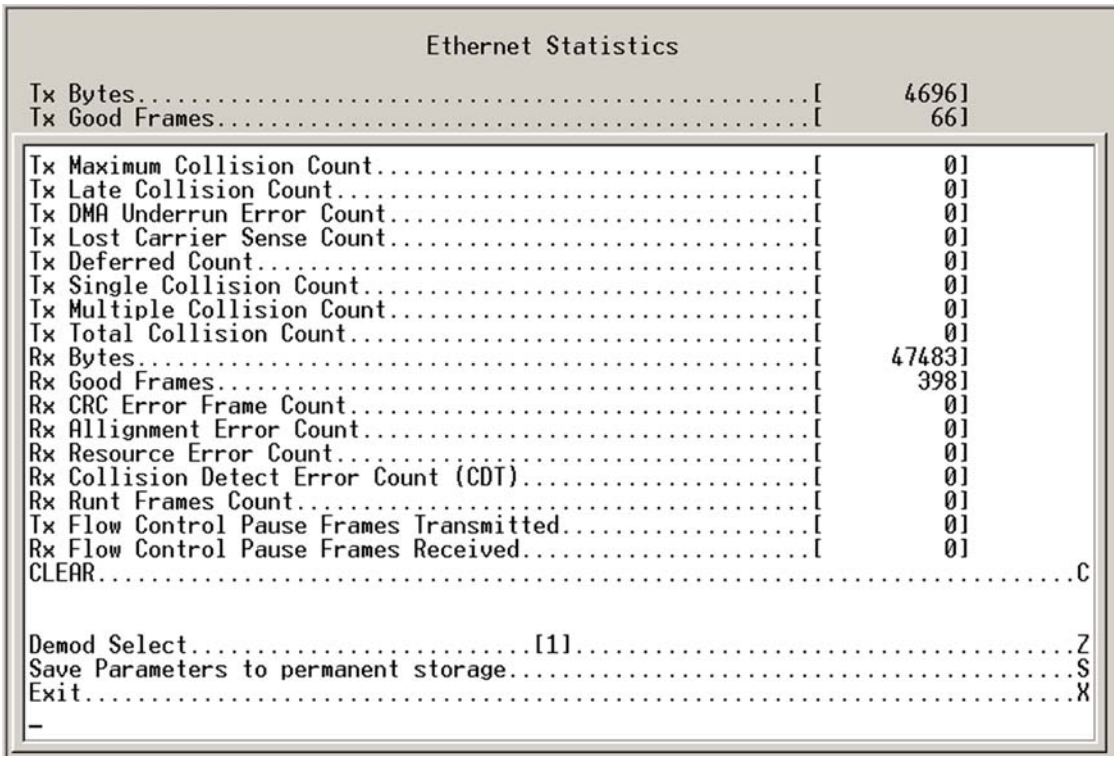
Packet Item	Description
Dropped – Bad IP Version	Total Dropped IP Version 6 Packets (IP Module only supports IP Version 4).
Dropped – TTL Expired	Total Dropped Packets due to Time To Live counter expired (TTL limits the number of hops, or seconds, before a packet reaches it's destination).
Dropped – No Route	Total Dropped Packets due to no Route for the destination in the IP Module Route Table. These are packets that are directed to the IP Module's MAC address and the IP Module will reply to the sender with a ICMP 'Destination net unreachable' message.
Dropped - No ARP Entry	Total Dropped Packets due to no ARP entry in IP Module ARP Table. For example, if a IP Module receives packets from the satellite for a host that is not in the ARP table, the IP Module will send an ARP request. If there is no response, the packets will be dropped.
Dropped – Filtered Multicast	Total Dropped Multicast Packets received from the satellite due to no SAT→LAN or
Dropped – Multicast Disable Group	Multicast packet was dropped because, although route existed, IGMP is being used, and there is no client requesting forwarding of this traffic or due to a IGMP "leave group" message.
Dropped – Router Queue Full	Indicates that the router task is dropping packets due to being full. Represents a graceful drop process when the processor performance is being overdriven.
Dropped – Total	Total Dropped Packets

Additionally, management of the information reported on this page is provided:

Selection	Entry	Description
Reset All Counters	C	Executing this menu option resets all gathered WAN, Ethernet and IP Routing statistics gathered to zero.

8.2.8.2.2 Ethernet Statistics page

Access the *Ethernet Statistics* page from the *Statistics Menu* page.



This *read-only* page tallies the number of IP packets received from and sent to the Ethernet interface. This page provides the following unique information:

Selection	Description
Tx Bytes	Displays number of bytes transmitted by this Ethernet interface.
Tx Good Frames	Displays number of good frames transmitted by this Ethernet interface.
Tx Maximum Collision Count	Displays number of frames that are not transmitted because they encountered configured max collisions.
Tx DMA Underrun Error Count	Displays number of frames not transmitted or re-transmitted due to transmit DMA underrun.
Tx Lost Carrier Sense Count	Displays number of frames transmitted by device despite the fact that it detected a de-assertion of carrier sense.
Tx Deferred Count	Displays number of frames deferred before transmission due to activity on link.
Tx Single Collision Count	Displays number of transmitted frames that encountered only one collision.
Tx Multiple Collision Count	Displays number of transmitted frames that encountered more than one collision.
Tx Total Collision Count	Displays total number of collisions encountered while attempting to transmit.
Rx Bytes	Displays number of bytes received by this Ethernet interface.
Rx Good Frames	Displays count of good frames received by the Ethernet device.
Rx CRC Error Frame Count	Displays number of aligned frames discarded due to a CRC error.
Rx Alignment Error Count	Displays number of frames that are both misaligned and contain a CRC error.

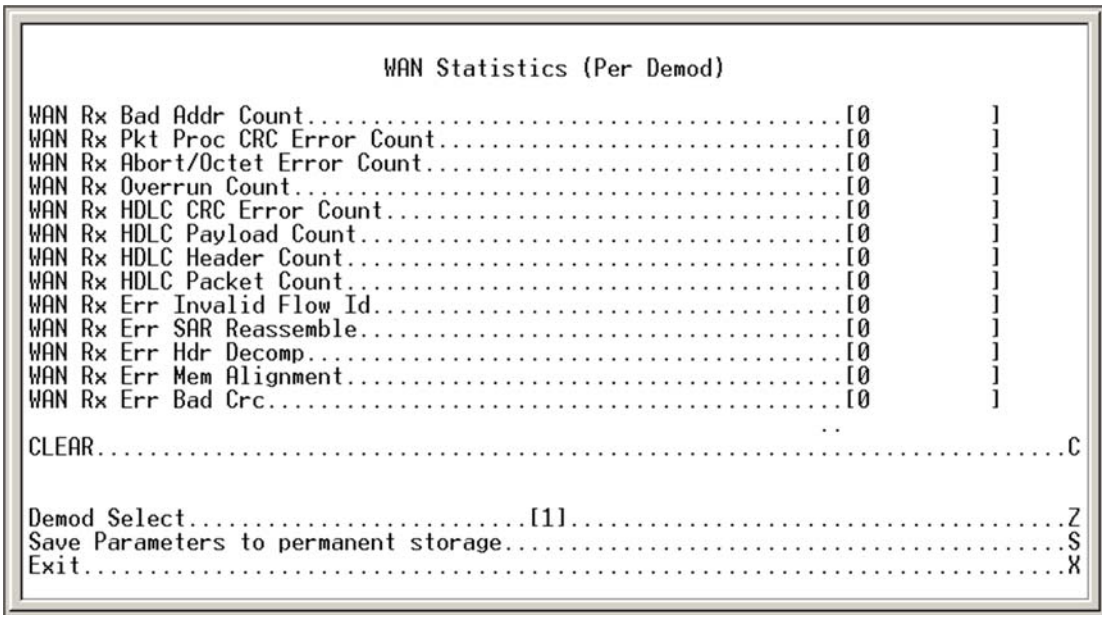
Selection	Description
Rx Resource Error Count	Displays count of good frames discarded due to unavailable resources.
Rx FIFO Overrun Error Count	Displays number of good frames discarded due to overflow of internal receive FIFO.
Rx Collision Detect Error Count (CDT)	Displays number of frames encountered collisions during frame reception.
Rx Runt Frames Count	Displays count of undersize frames received by the Ethernet device.
Tx Flow Control Pause Frames Transmitted	Displays number of Flow Control frames transmitted by the device.
Rx Flow Control Pause Frames Received	Displays number of Flow Control frames received by the device.

Additionally, management of the information reported on this page is provided:

Selection	Entry	Description
Clear	C	Resets all Ethernet Statistics

8.2.8.2.3 WAN Statistics page

Access the *WAN Statistics* page from the *Statistics Menu* page.



This *read-only* page tallies the number of IP packets received from and sent to the Ethernet Interface. Note that these statistics are provided on *per-Demod* [Receive Channel] basis, as determined via the "**Demod Select**" option used before viewing the statistics. This page provides the following unique information:

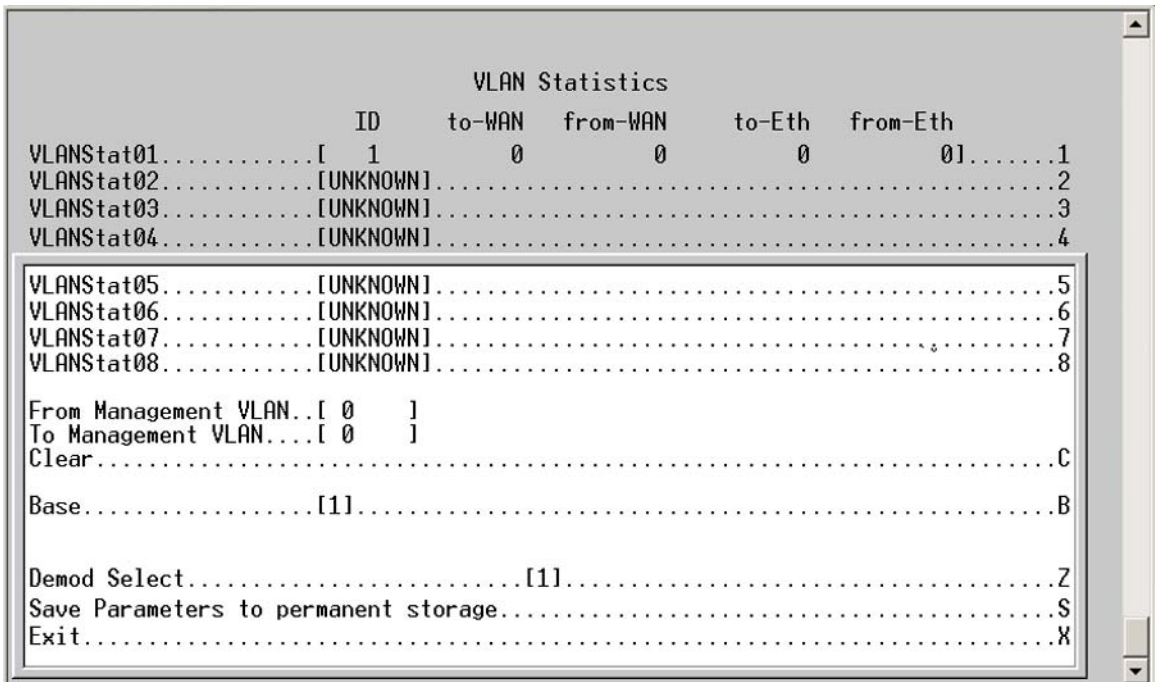
Selection	Description
WAN Rx Bad Addr Count	The count of received frames that did not match any of the 4 HDLC addresses or the broadcast address, configured for this Receive channel
WAN Rx Pkt Proc CRC Error Count	Count of received frames that failed packet processor CRC check.
WAN Rx Abort/Octet Error Count	Count of aborted frames and octet error frames.
WAN Rx Overrun Count	Count of received frames that exceeded max frame length of 2K bytes in length (Or) overflowed the HDLC buffer.
WAN HDLC CRC Error Count	Number of received frames that failed HDLC CRC check.
WAN Rx HDLC Payload Count	The count of payload bytes that were received over satellite link excluding any frame overhead.
WAN Rx HDLC Header Count	The count of HDLC header bytes received over satellite link including control, HDLC address, Flow ID, and CRC.
WAN Rx HDLC Packet Count	Number of packets received over satellite link.
WAN Rx Err Invalid Flow Id	Number of packets which the flow identifier has been corrupted, does not fall into the range of acceptable values.
WAN Rx Err SAR Reassemble	Number of packets unable to correctly reassemble a segmented packet.
WAN Rx Err Hdr Decomp	Number of packets unable to correctly decompress the header information.
WAN Rx Err Mem Alignment	Number of packets discarded (caused by memory corruption).
WAN Rx Err bad CRC	Number of corrupted packets indicated by CRC check.

Additionally, management of the information reported on this page is provided:

Selection	Entry	Description
CLEAR	C	Resets all WAN Statistics for this specific demodulator.

8.2.8.2.4 VLAN Statistics page

Access the *VLAN Statistics* page from the *Statistics Menu* page. Note that this page displays information only when the unit is in one of the router modes, and VLAN Brouter Mode is **enabled**.

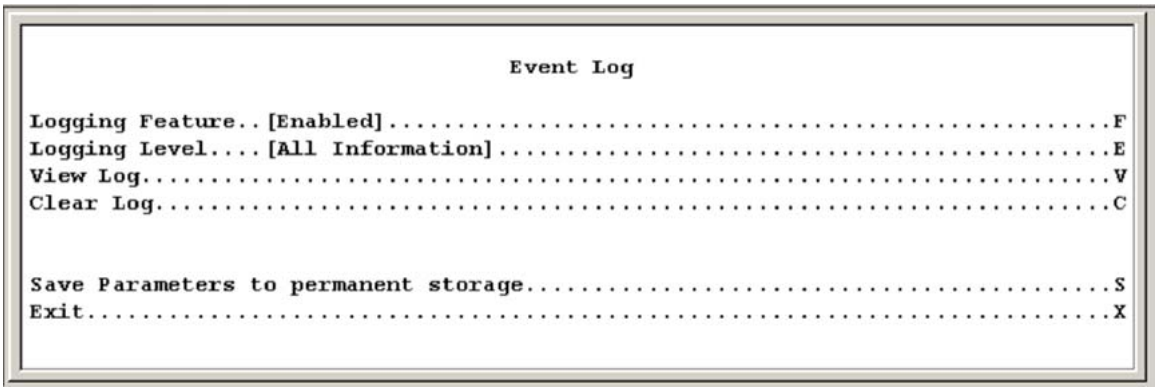


This page contains the following unique *read-only* information plus information display controls:

Selection	Entry	Description
VLANStatXX	*[RO]*	Displays, in groups of eight (8), the VLAN Statistics.
Clear	C	Resets all VLAN Statistics.
Base	B	Allows user to define which group of up to 8 consecutive stats per screen is displayed. The user can select a base address to control which group of 8 stats are displayed. For example: If the user wants to view VLANStat25 through VLANStat32, then a Base value of 25 should be entered.

8.2.8.2.5 Event Log page

Access the *Event Log* page from the *Operations and Maintenance* page.



Use this page to capture all IP Module events to a log. This page contains the following unique selections/fields:

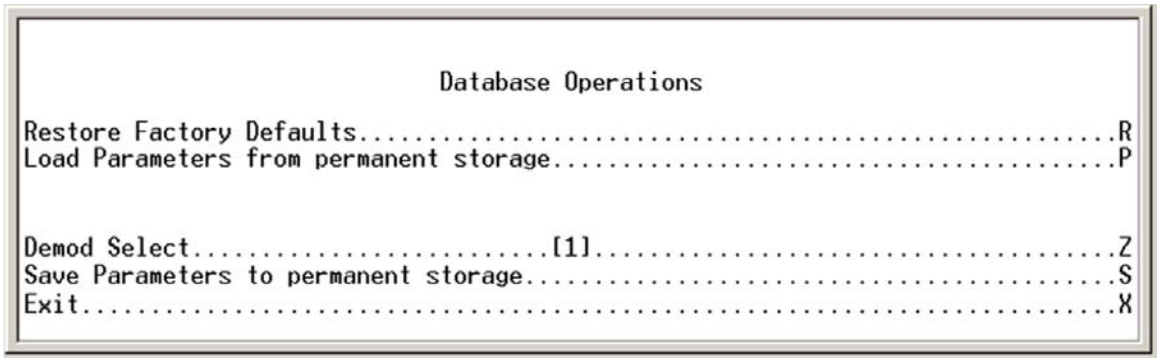
Selection	Entry	Description
Logging Feature	F	Select [Enable] or [Disable].
Logging Level	E	Select the logging level: 1 – Errors Only 2 – Errors and Warnings 3 – All Information
View log	V	Allows user to view log/most recent events. Press any key to scroll through events, or 'ESC' to exit. All events will display the following information: • Type – Error, Warning, or Information • Date/Time – Note: During Bootup, multiple Boot Events will be created, but a Date/Time will only be seen when the Bootup has completed. • Category – Boot, Database, FTP logins, upgrade file transfers, Ethernet Link status change. • Description – Event details
Clear log	C	Select to clear log contents.

The full Event log file can be retrieved by FTP. Using the Admin-level login, type the command '`get eventlog`'. The entire Event log can then be viewed with a text viewer, similar in appearance to the example shown here:

```
54        Information    05/21/2004 10:12:04 C:/Comtech/ftp/ftpCallbacks.c
1041      FTP                 FTP Connected - 'User: comtech' logged in

53        Information    05/21/2004 09:07:40 C:/Comtech/cimmib/cimMib.c
520       Database            Set system clock to FRI MAY 21 09:07:40 2004

52        Information    Unknown    Unknown  C:/Comtech/startup/usrAppInit.c
534       Boot                Configuring router using PARAM file

51        Information    Unknown    Unknown  C:/Comtech/startup/usrAppInit.c
364       Boot                Detected Framer Module II.

50        Information    05/21/2004 08:57:42 C:/Comtech/cimmib/cimMib.c
520       Database            Set system clock to FRI MAY 21 08:57:42 2004

49        Information    Unknown    Unknown  C:/Comtech/startup/usrAppInit.c
534       Boot                Configuring router using PARAM file

48        Information    Unknown    Unknown  C:/Comtech/startup/usrAppInit.c
364       Boot                Detected Framer Module II.

47        Information    05/21/2004 08:13:02 C:/Comtech/ftp/ftpCallbacks.c
180       FTP                 Disconnected FTP

46        Information    05/21/2004 07:58:06 C:/Comtech/ftp/ftpCallbacks.c
540       FTP                 FTP Transfer complete

45        Information    05/21/2004 07:58:04 C:/Comtech/ftp/ftpCallbacks.c
863       FTP                 Image has been saved to FLASH

44        Information    05/21/2004 07:57:40 C:/Comtech/ftp/ftpCallbacks.c
1041      FTP                 FTP Connected - 'User: comtech' logged in

43        Information    05/21/2004 06:55:14 C:/Comtech/telnetd/telnetd.c
421       Telnet              Telnet disconnected

42        Information    05/21/2004 06:54:26 C:/Comtech/telnetd/telnetd.c
385       Telnet              Connected host 10.6.6.94

41        Information    05/21/2004 06:38:02 C:/Comtech/ftp/ftpCallbacks.c
180       FTP                 Disconnected FTP

40        Information    05/21/2004 06:23:07 C:/Comtech/ftp/ftpCallbacks.c
540       FTP                 FTP Transfer complete

39        Information    05/21/2004 06:23:06 C:/Comtech/ftp/ftpCallbacks.c
863       FTP                 Image has been saved to FLASH

38        Information    05/21/2004 06:22:43 C:/Comtech/ftp/ftpCallbacks.c
1041      FTP                 FTP Connected - 'User: comtech' logged in
```

8.2.8.3 Database Operations page

Access the *Database Operations* page from the *Operations and Maintenance* page.



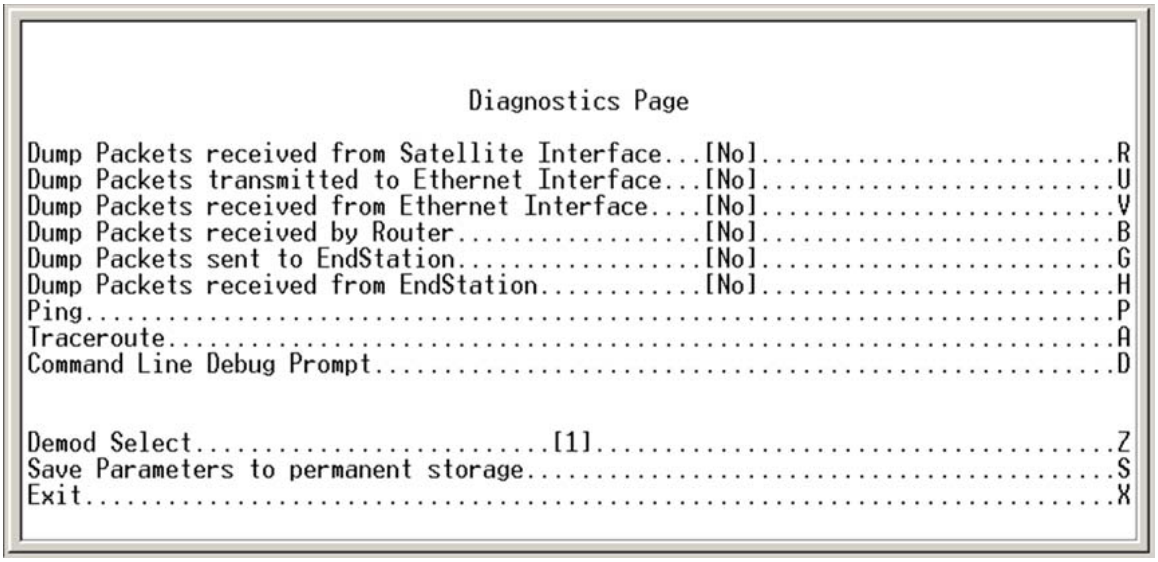
The User Configuration File allows overwrite of the values defined in the Factory Configuration File. The demodulator uses these files to initialize itself on power-up. The use of the User Configuration File allows full customization of a demodulator without erasing the factory-defined operating parameters. This file also can be retrieved or overwritten via FTP by specifying the filename '**`param1`**'.

Use this page to view, save, or erase an existing User Configuration File for the demodulator. This page contains the following unique selections/fields:

Selection	Entry	Description
Restore Factory Default	R	Restores the demodulator settings to "safe" values as defined by the factory.
Load Parameters from permanent storage	P	Overwrites the current configuration of the demodulator with the configuration last saved to permanent storage. Allows user to perform an "Undo" type operation if the demodulator is put into an undesirable state by the user [provided the undesired configuration is not saved.].

8.2.8.4 Diagnostics page

Access the *Diagnostics* page from the *Operations and Maintenance* page.



When using Dump Packets Diagnostics Utilities:

1. ***The Dump Packet Utilities will display a hexadecimal representation of each packet and <u>should</u> <u>not</u> be used when the demodulator is on a "live" network.***

2. ***Selecting the menu option a second time terminates the dump operation. Each selection toggles the value of the dump engine.***

This page contains the following unique selections/fields:

Selection	Entry	Description
Dump Packets received from Satellite Interface	R	Select [Yes] or [No]. Selecting [Yes] forces the IP Module to dump a hexadecimal representation of each packet that it receives from the Satellite Interface.
Dump Packets transmitted to Ethernet Interface	U	Select [Yes] or [No].Selecting [Yes] forces the IP Module to dump a hexadecimal representation of each packet that is transmitted to the Ethernet Interface.
Dump Packets received from Ethernet Interface	V	Select [Yes] or [No]. Selecting [Yes] forces the IP Module to dump a hexadecimal representation of each packet that it receives from the Ethernet Interface.
Dump Packets received by Router	B	Select [Yes] or [No]. Selecting [Yes] forces the IP Module to dump a hexadecimal representation of each packet that is received by the routing engine. (Note: Does not apply when in easyConnect™ mode.)

Selection	Entry	Description
Dump Packets sent to EndStation	G	Select [Yes] or [No]. Selecting [Yes] forces the IP Module to dump a hexadecimal representation of each packet that is received/destined for the demodulator only.
Dump Packets received from EndStation	H	Select [Yes] or [No]. Selecting [Yes] forces the IP Module to dump a hexadecimal representation of each packet that is sourced from this unit and destined for some other device. This Allows user to see what type of packets this unit is generating internally.
Ping	P	Enter the IP address in aaa.bbb.ccc.ddd format to ping, on the same subnet as CDD-56x unit.
Traceroute	A	Enter the IP address in aaa.bbb.ccc.ddd format
Command Line Debug Prompt	D	Enter the password to access the debug command line. *Note: This option is reserved for Customer Service and engineering use only.*

Notes:

Chapter 9. CDD-56X HTTP (WEB SERVER) INTERFACE

9.1 Overview

This chapter describes the functionality of the CDD-56X Satellite Demodulator with IP Module's HTTP (Web Server) Interface. This non-secure interface complements operation of the CDD-56X's use of the serial-based Command Line Interface (CLI) as well as remote control commands and queries via the Telnet-based network management interface.

- **Chapter 8. CDD-56X CLI AND TELNET OPERATION**
- **Appendix D. CDM/CDD NMCS PROTOCOL, REV 1.0**

9.2 HTTP Interface Introduction

A user-supplied web browser allows the full monitor and control (M&C) of the CDD-56X from its HTTP Interface. The CDD-56X's embedded web application is designed for, and works best with, Microsoft's Internet Explorer Version 6.0 or higher.

9.2.1 Interface Access

Type the CDD-56X IP Address (shown here as *http://xxx.xxx.xxx.xxx*) into the **Address** area of the user-supplied web browser:

The Login window appears, similar to the example shown here, and prompts you to type a **User name** and **Password**.

The HTTP Interface default user names and passwords are as follows:

- Admin comtech/comtech
- Read/Write opcenter/1234
- Read Only monitor/1234

User accessibility to the interface is further defined:

Admin User	Read/Write User	Read Only User
Full Access to all web pages.	No Access to Admin web pages.	No Access to Admin web pages.
	Full Access for all other web pages	*View Only Access* for all other web pages.

Once the valid IP address has been entered, the CDD-56X HTTP Interface "splash" page is displayed (**Figure 9-1**).

9.2.2 Interface Menu Tree and Splash Page

This menu tree illustrates the CDD-56X HTTP Interface. The interface provides six primary interface navigation tabs (represented in blue). Nested page hyperlinks are shown here in grey:

Home	Admin	Demod	IP	Stats	Maint
Home	**Summary**	*Demod*	**Ethernet**	**Ethernet**	**Unit Info**
Contact	**Mode**	*Utilities*	*HDLC*	**IP**	**Operations**
Support	**Access**	*Status*	**Routes**	*WAN*	**Save**
Logoff	**Features**	*Events*	**Multicast**		**Reboot**
	SNMP	*Statistics*	**ARP**		
	Decryption	*LNB**	*VLAN*		
			IGMP		

Web pages providing monitor and control over the individual demodulator channels – i.e., M&C on a *per-demod* basis – are shown in this menu tree as ***bold/italicized***. Otherwise, the remaining pages here impact operations on a *per-unit* (system level) basis.

**** The 'LNB' hyperlink is available only on the CDM-562L/564L HTTP Interfaces.***

Depending on the unit in use and the number of configured modulators on that unit, this page provides the means to control and monitor up to four Low-Noise Block Downconverters (LNBs), on a per-demod basis, when connected to the CDD-562L/564L.

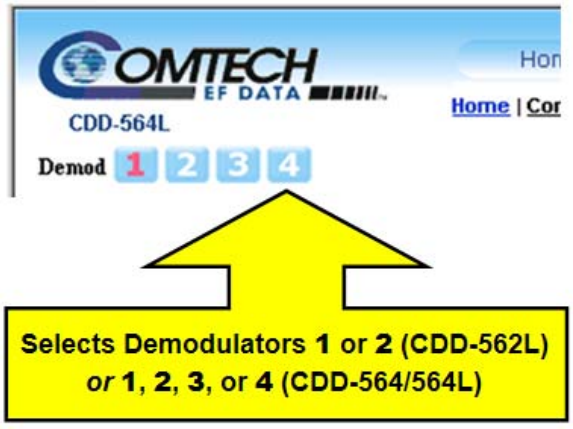
Click any tab or hyperlink to continue.

Figure 9-1. HTTP Interface "Splash" page

9.2.3 Selecting Demodulators

Two demodulator channels are available for selection on each page of the CDD-562L HTTP Interface. Four demodulator channels are available on the CDD-564/564L HTTP Interface pages.

Select the individual demodulator channel number, located in the upper left hand corner of every web page, to designate that demodulator as *active*. System-level web pages that do not impact *per-demod* parameters (i.e., routing, administrative pages, etc.) are not affected by any change to this demodulator selection.



9.3 HTTP Interface Page Descriptions

Refer to the chapter sections listed here for detailed information about the web pages that are accessble via nested hyperlink from the HTTP Interface top-level navigation tabs:

Navigation Tab	For nested pages, see Chapter Sect:
Home	9.3.1
Admin (Administration)	9.3.2
Demod (Configure Demodulator)	9.3.3
IP	9.3.4
Stats	9.3.5
Maint (Maintenance)	9.3.6

9.3.1 Home pages

Click the **Home**, **Contact**, **Support** or **Logoff** hyperlink to continue.

9.3.1.1 Home | Home

Click the **Home** tab or hyperlink from any location within the HTTP Interface to return back to this top-level page.

Figure 9-2. CDD-56X Home page

9.3.1.2 Home | Contact

Use this page to obtain contact information for Comtech EF Data Sales and Service via phone or fax, or by clicking on the available e-mail hyperlinks.

Figure 9-3. Home | Contact page

9.3.1.3 Home | Support

For this page to operate correctly, the demodulator's Administrator is required to specify the SMTP server, domain name, and destination on the* Admin | Access *page (see Sect. 9.3.2.3).

This page uses SMTP (Simple Mail Transport Protocol) to compose and send an e-mail message to Comtech EF Data Modem Support (cdmipsupport@comtechefdata.com).

Use this communications portal for questions about or problems with the unit.

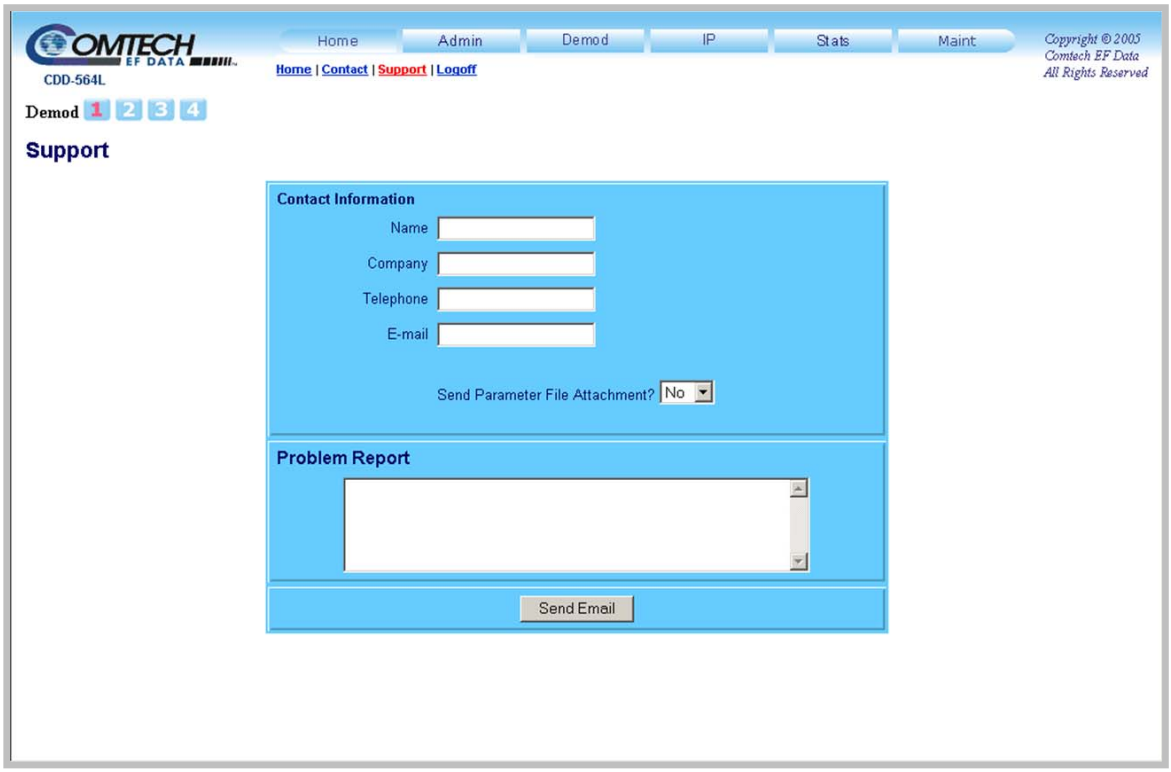


Figure 9-4. Home | Customer Support page

Contact Information

Use this section to provide Comtech EF Data with your contact information.

Problem Report

Use this section to compose the required message – up to 256 characters maximum are permitted.

Fill in the pertinent **Contact Information**, create the desired message, and then click **[Send Email]** to send the message.

9.3.1.4 Home | Logoff

Use this page to formally disconnect from the HTTP Interface.

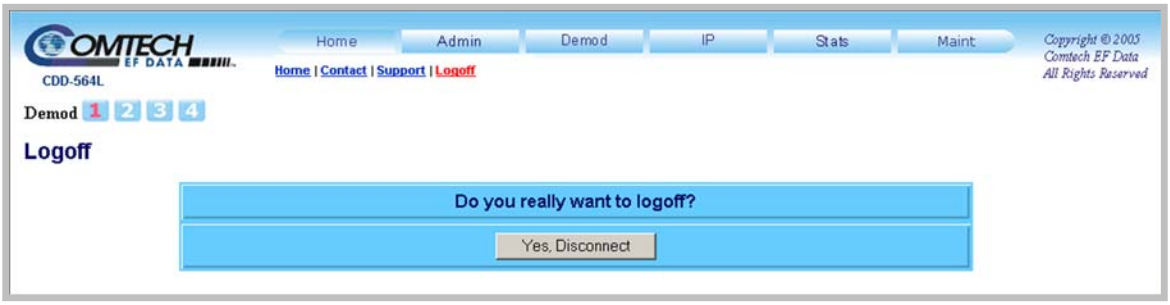


Figure 9-5. Home | Logoff page

At present, the demodulator only allows one connection to the CLI or the HTTP Interface. Click **[Yes, Disconnect]** when prompted to execute logoff from the session.

The web browser must be closed upon logoff in order to delete the demodulator security cookie.

9.3.2 Admin (Administrative) pages

The Admin pages are available only if you have logged in using the Administrator Name and Password.

The Administrator may use these pages to set up user names, passwords, the e-mail server, and the host IP Addresses as required to establish communication with the HTTP Interface.

Click the **Summary**, **Mode**, **Access**, **Features**, **SNMP**, or **Decryption** hyperlink to continue.

9.3.2.1 Admin | Summary

Use this *read-only* page to view the unit's configured Ethernet MAC and IP addresses, and to review the operational status of the FAST-accessible product features – **Available** (i.e., activated) or **Unavailable**.

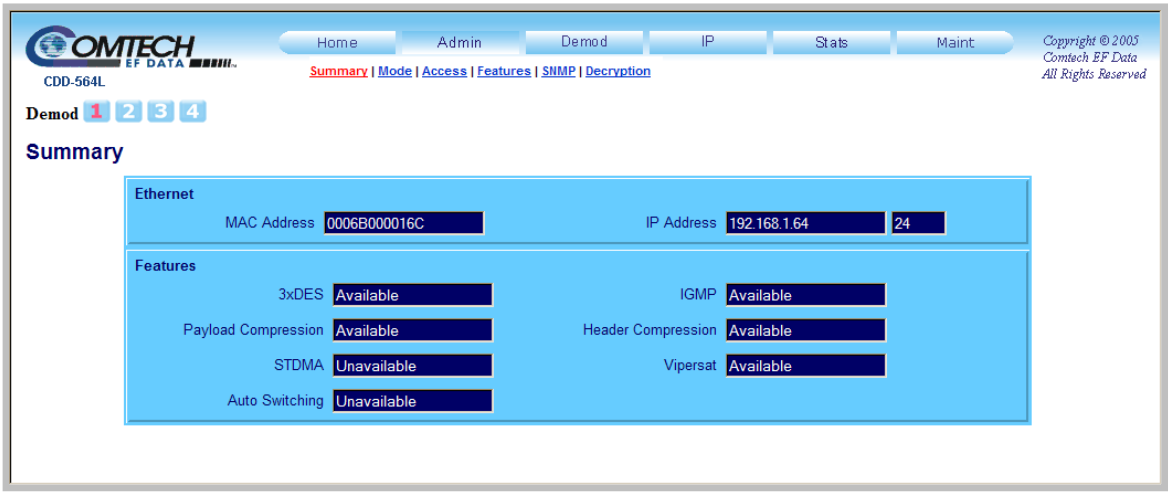


Figure 9-6. Admin | Summary page

9.3.2.2 Admin | Mode

Use this page to define how the active demodulator is to operate in Vipersat or non-Vipersat Working Mode. Once this unit's role in the network is determined, this single point of configuration simplifies deployment.

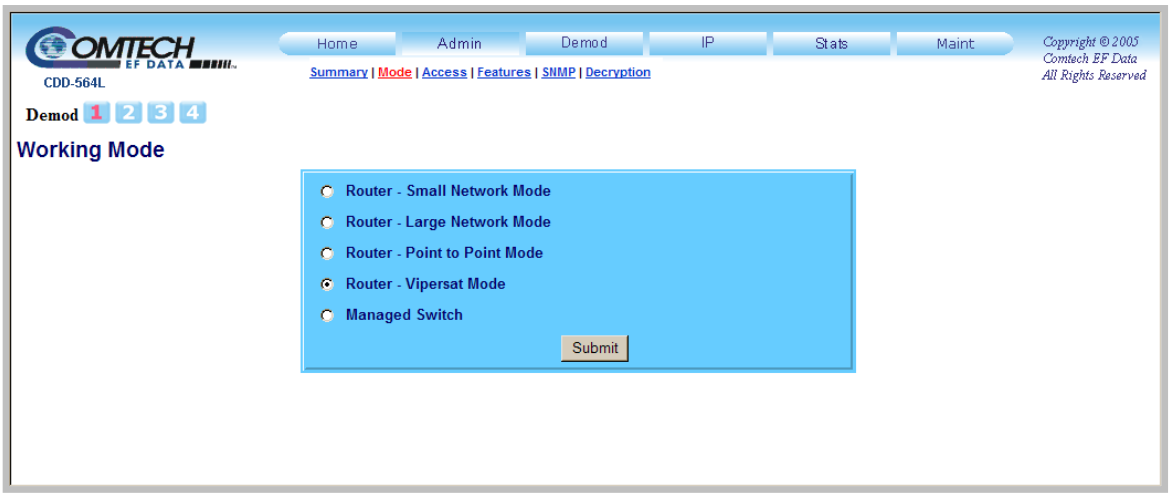


Figure 9-7. Admin | Mode page

Working Mode

Select an available working Mode, and then click [**Submit]** to execute the selection made on this page.

Router – Small Network Mode: Small Network Mode supports up to 255 remotes, as allowed using HDLC addressing. Select this mode to set the demodulator to be on independent IP subnets; this mode requires adding static routes to pass traffic between them.

Router – Large Network Mode: This mode is similar to Small Network Mode, the exception being that a maximum of 32,766 remotes are allowed on a single shared satellite outbound carrier.

Router – Point-to-Point Mode: Select for use in a Point-to-Point SCPC link where there are different IP subnets on either side of the link.

Router – Vipersat Mode

***For details on configuration and use of Vipersat operations via the HTTP Interface, consult adjunct Comtech EF Data publication* MN/22137 – Vipersat CDD-56X Series Satellite Network Demodulator Router User Guide**

Managed Switch: Managed Switch Mode functions as a learning bridge with VLAN support. Optional supported features include QoS, Header Comp, Payload Comp, and 3xDES. No routes are required in this mode.

9.3.2.3 Admin | Access

Use this page to set up and maintain the user names, passwords, e-mail server, and host IP addresses as needed to facilitate communication with the HTTP Interface.

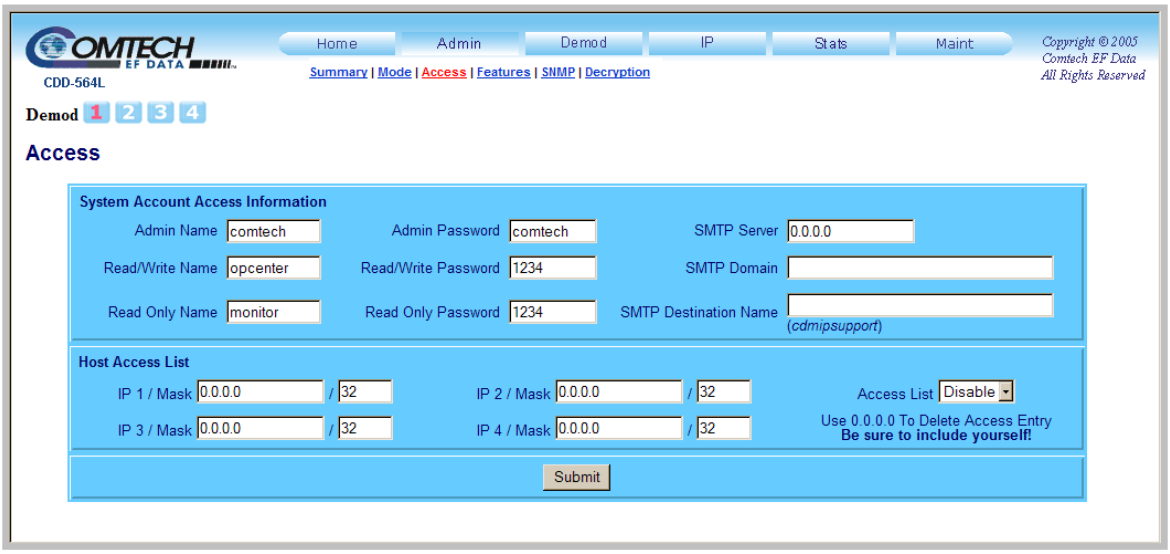


Figure 9-8. Admin | Access page

System Account Access Information

- **Admin, Read/Write, and Read Only Names and Passwords:** The factory defaults for these names/passwords are:

  - **Admin** comtech/comtech
  - **Read/Write** opcenter/1234
  - **Read Only** monitor/1234

  Note that the **Name** and **Password** fields can each accept any alphanumeric combination with a maximum length of 10 characters.

- **SMTP Server:** Specify the mail server IP address from where you want to send the e-mail.

- **SMTP Domain / Destination Name:** The Administrator can assign the SMTP Domain Name and Destination. This is required if the e-mail feature of the **'Home | Support'** Page (**Sect. 9.3.1.3** in this chapter) is to be used.

  - For **SMTP Domain Name**, specify the domain of the e-mail server (usually found to the right of the @ symbol in an e-mail address).
  - For **SMTP Domain Destination**,specify the e-mail recipient name (usually found to the left of the @ symbol in an e-mail address).

Host Access List

- **IP *(#)* / Mask:** The *Host Access List* is used to define which remote clients can connect when the *Access List* is **Enabled**. Each entry allows a user to specify an IP address and a subnet mask to define a unique class of machines that are allowed access.

  For example, if a user wanted to grant access to a PC with an IP Address of 10.10.10.1 and any PC on a subnet of 192.168.10.xxx, then the Access List would be defined as :

  IP 1 / Mask: 10.10.10.1/32
  IP 2 / Mask: 192.168.10.0/24

  For **IP 3 / Mask** and **IP 4 / Mask**, make sure they are not 0.0.0.0/0. An entry with 0.0.0.0/0 simply means any machine is allowed to access.

- **Access List:** Use the Access List to grant access via HTTP and SNMP to a defined list of client machines. From the drop-down list, select **Enable** or **Disable**. If **Disabled**, then any client machine will be able to connect via HTTP and SNMP.

Click [**Submit]** to execute the changes made on this page.

9.3.2.4 Admin | Features

Use this page to establish operating parameters for the demodulator's standard and optional features.

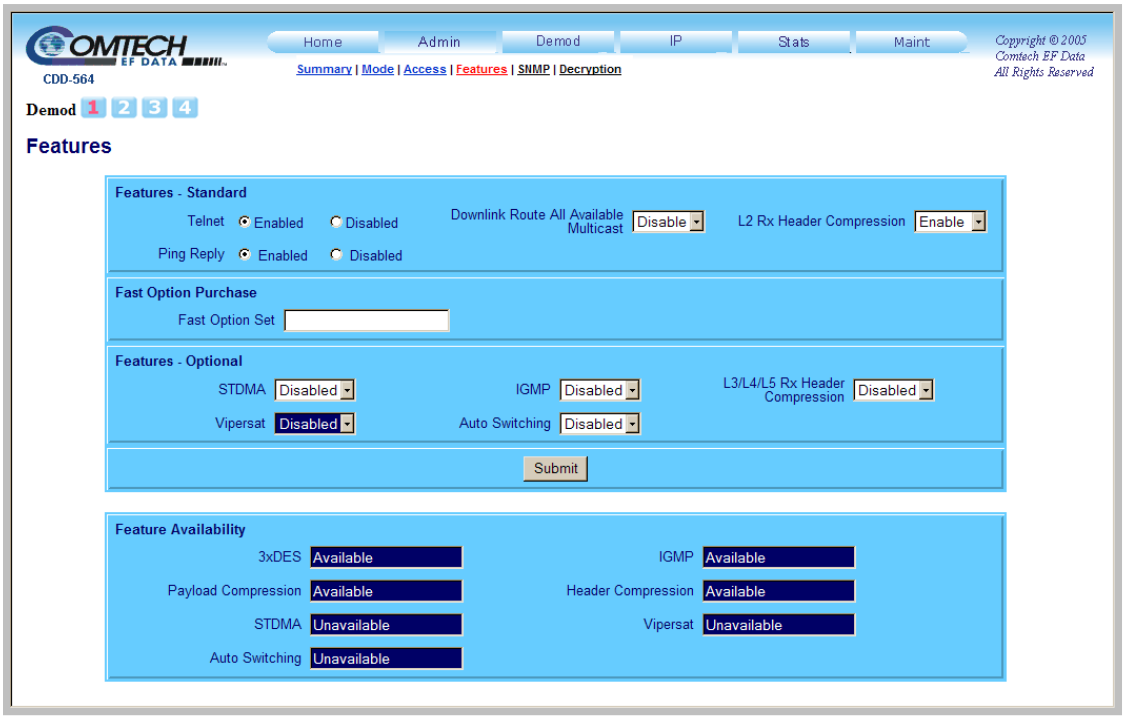


Figure 9-9. Admin | Features page

Features – Standard

- Click **Enabled** or **Disabled** to set either **Telnet** or **Ping Reply** functionality.
- Select **Enabled** or **Disabled** from either drop-down list to set operation for **Downlink Route All Available Multicast** or **L2 Rx Header Compression**.

Fast Option Purchase

Fast Option Set: Enter the FAST Access Code obtained from Comtech EF Data into this field

Appendix C. FAST ACTIVATION PROCEDURE

Features – Optional

Select **Enabled** or **Disabled** from the available drop-down lists to set operation for **STDMA**, **Vipersat**, **IGMP**, **Auto Switching**, or **L3/L4/L5 RX Header Compression.** Note that when a feature is unavailable, the drop-down list for that selection will be rendered *inoperable*.

Click [**Submit]** to execute the changes made in these sections.

Feature Availability

Appendix C. FAST ACTIVATION PROCEDURE

This *read-only* section displays the operational status of the listed FAST features:

- **Available** – The FAST feature is activated and operational.
- **Unavailable** – The FAST feature must be purchased. Contact Comtech EF Data to acquire the FAST Option Purchase Access Code required to activate the option.

9.3.2.5 Admin | SNMP

Sect. 5.3 SNMP Interface

Use this page to set and return administration information for the CDM-56X *Simple Network Management Protocol (SNMP)* and *Vipersat* features.

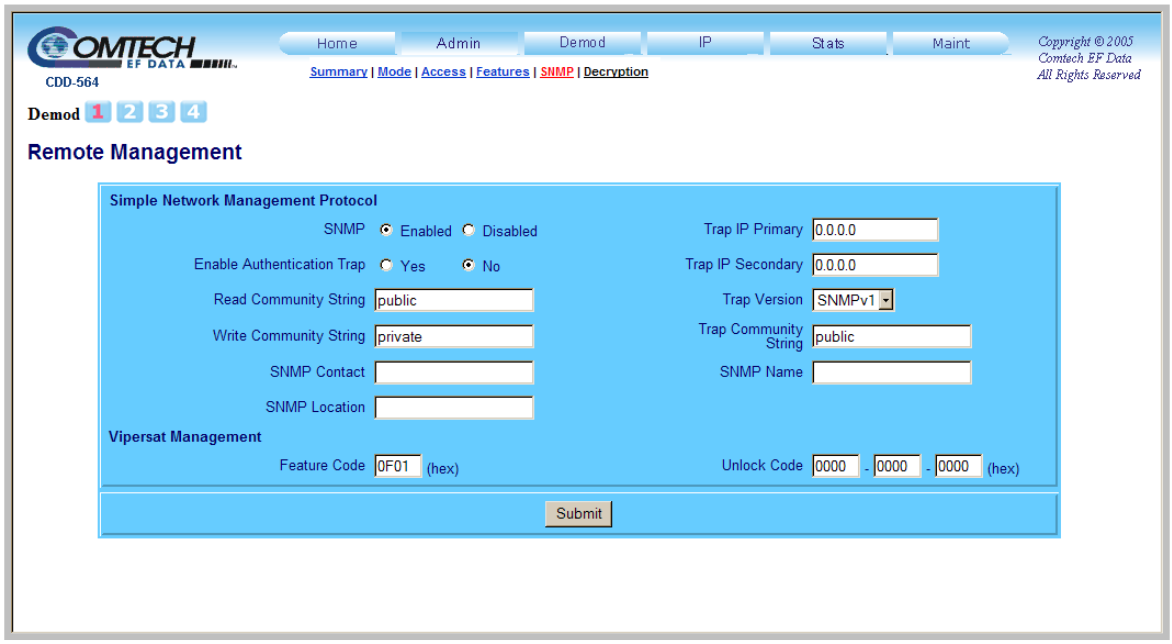


Figure 9-10. Admin | SNMP page

Simple Network Management Protocol

The Administator may:

- Click **Enabled** or **Disabled** to set operation for **Simple Network Management**.

- Click **Yes** or **No** to **Enable Authentication Trap**.
- Assign the SNMP **Trap IP Primary** and **Trap IP Secondary** addresses.
- Use the drop-down list to set the **Trap Version** as **SNMPv1** or **SNMPv2**.

  Assign the SNMP **Read**, **Write**, and **Trap Community Strings**. Each Community String may consist of a minimum of 0 to a maximum of 20 alphanumeric characters in length.

  The factory defaults for these parameters are as follows:

  - ***Read Community String*** public
  - ***Write Community String*** private
  - ***Trap Communty String*** comtech

- Assign the **SNMP Contact**, **SNMP Name**, and **SNMP Location**.

Vipersat Management

For details on configuration and use of Vipersat operations via the HTTP Interface, consult adjunct Comtech EF Data publication **MN/22137 – Vipersat CDD-56X Series Satellite Network Demodulator Router User Guide**

Click [**Submit]** to execute the changes made on this page.

9.3.2.6 Admin | Decryption

This page is accessible only when the 3xDES FAST feature has been purchased and its FAST Access Code has been entered.

Sect. 6.2.2.4 Triple DES Decrypt Configuration (Per Demod) page *in* Chapter 8. CDD-56X CLI AND TELNET OPERATION *for detailed information on using 3XDES Decryption.*

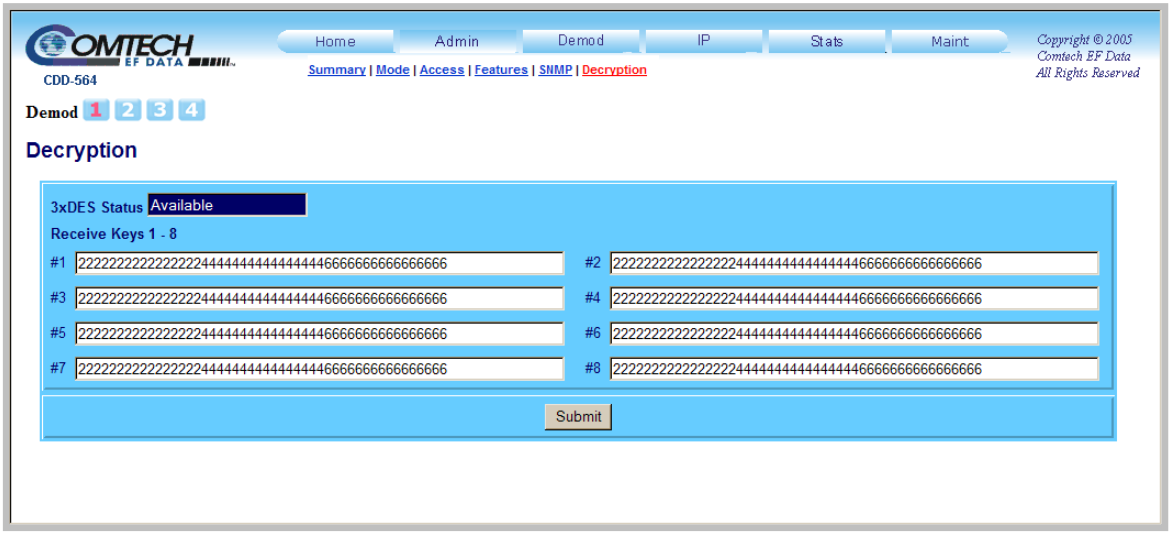


Figure 9-11. Admin | Decryption page

Decryption

3xDES Status: This *read-only* field notes this feature as **Available** or **Unavailable**.

Receive Keys 1 – 8: 3xDES keys are used to decrypt traffic being received from the Satellite Interface. Each key is entered in hexadecimal format (48 digits max).

Click [**Submit]** to execute the changes made on this page.

9.3.3 Demod (Configure Demodulator) pages

The 'LNB' hyperlink is available only on the CDM-562L/564L HTTP Interface.

Click the **Demod**, **Utilities**, **Status**, **Events**, **Statistics**, or **LNB** hyperlink to continue.

9.3.3.1 Demod | Demod

The Rx Interface Types have highest priority and should be configured before setting any other parameters.

Sect. 6.2.7.1 Configuration page *in* Chapter 8. CDD-56X CLI AND TELNET OPERATION *for detailed operational information*.

Use this page on a *per-demod* basis to configure or review demodulator operating (Rx) parameters.

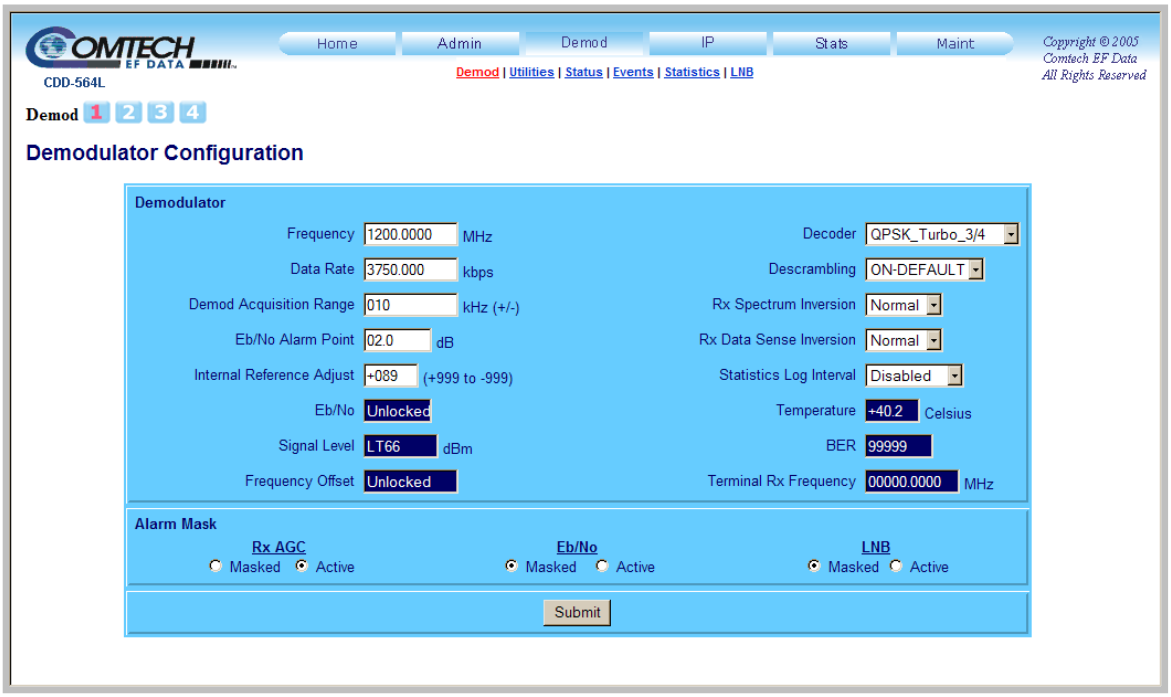


Figure 9-12. Demod | Demod page

Demodulator

Enter an operational value for each of the following parameters:

- Frequency
- Data Rate
- Demod Acqusition Range
- Eb/No Alarm Point
- Internal Reference Adjust

Use the provided drop-down list to set operation for each of the following parameters:

- Decoder
- Descrambling
- Rx Spectrum Inversion
- Rx Data Sense Inversion
- Statistics Log Interval

The following operational statistics are provided on a *read-only* basis and cannot be changed:

- Eb/No
- Signal Level
- Frequency Offset
- Temperature
- BER
- Terminal Rx Frequency

Alarm Mask

Set the **Rx AGC**, **Eb/No**, or **LNB** (when available) Alarm Mask by clicking **Masked** or **Active**.

Click [**Submit]** to execute the changes made on this page.

9.3.3.2 Demod | Utilities

Use this page to configure the specified CDD-56X utility functions.

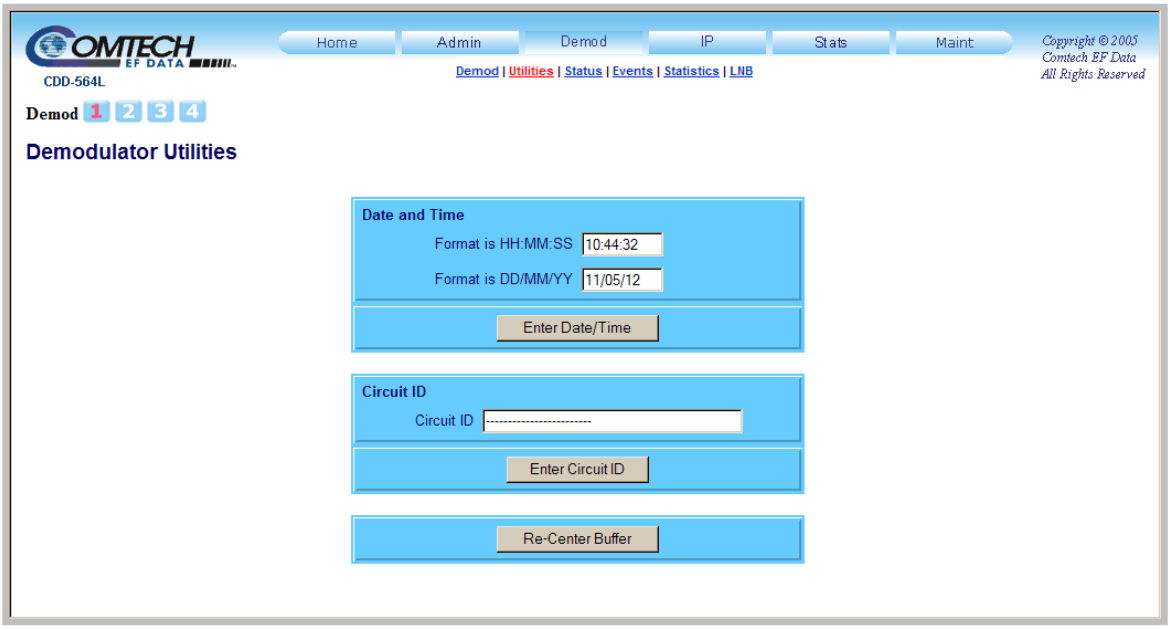


Figure 9-13. Demod | Utilities page

Date and Time

- Enter a **time** using HH:MM:SS format (where HH = hour [00 to 23], MM = minutes [00 to 59], and SS = seconds [00 to 59]).

- Enter a **date** using international format in the form DD/MM/YY (where DD = day [01 to 31], MM = month [01 to 12], and YY = year [00 to 99]).

Click **[Enter Date/Time]** to execute these entries.

Circuit ID

Enter a Circuit ID string of up to 24 characters. Click **[Enter Circuit ID]** to save this entry.

Re-Center Buffer

Click **[Re-Center Buffer]** to force re-centering of the Plesiochronous/Doppler buffer.

9.3.3.3 Demod | Status

Use this page to view *read-only* information on a *per-demod* basis.

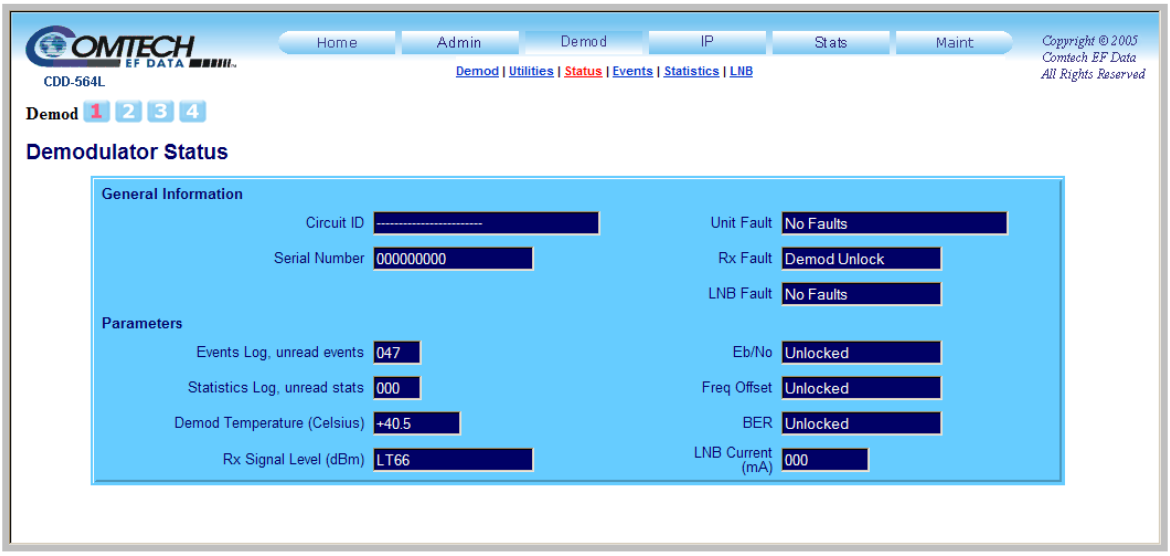


Figure 9-14. Demod | Status page

General Information

- Circuit ID
- Demodulator Serial Number
- Latest Unit Fault
- Latest Rx Fault

Parameters

- Number of unread events in Events Log
- Number of unread statistics in Statistics Log
- Demodulator Temperature (in °C)
- Rx Signal Level, in dBm
- Eb/No status
- Frequency Offset status
- BER Status
- LNB Current, in mA *(when installed)*

9.3.3.4 Demod | Events

Use this page to review *read-only* Faults or Alarms (Events) as logged by the unit on a *system-wide* basis during the course of normal operation.

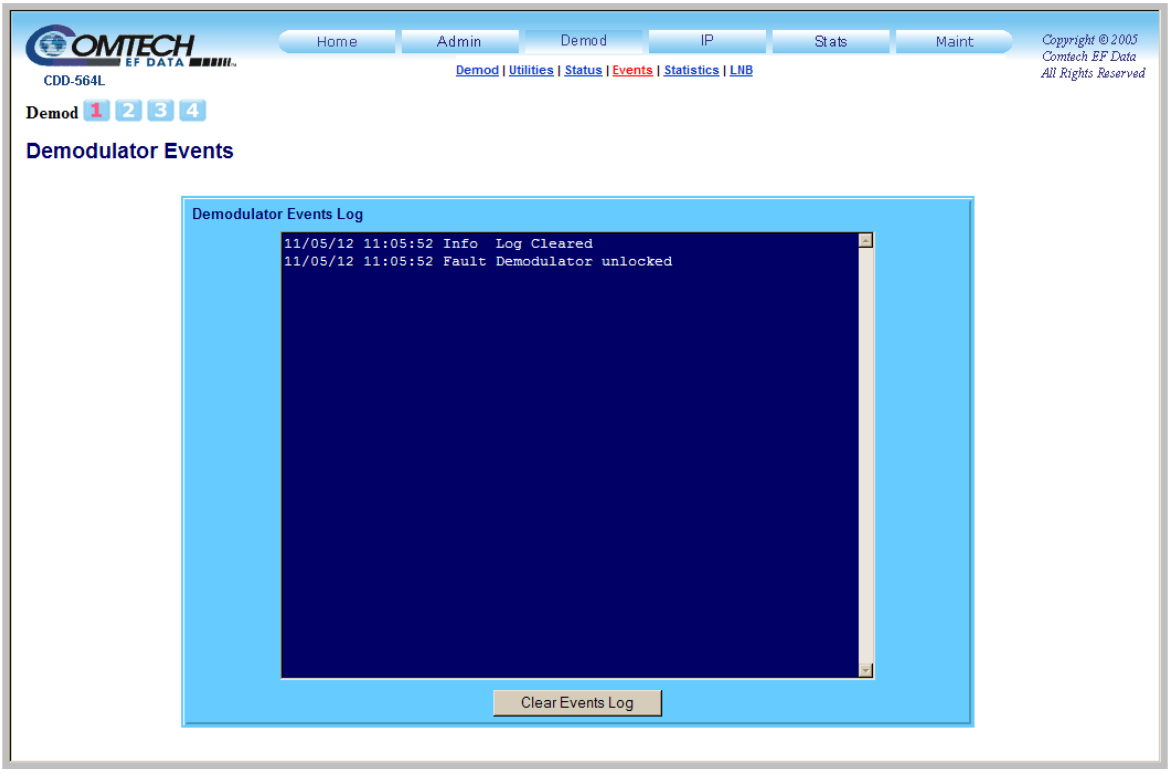


Figure 9-15. Demod | Events page

Demodulator Events Log: Click **[Clear Events Log]** to delete all existing log entries from the Demodulator Events Log. The log is then reset to one (1) entry: "**Info Log Cleared**".

9.3.3.5 Demod | Statistics

Use this page to review *read-only* operating Statistics as logged by the unit on a *per-demod* basis during the course of normal operation.

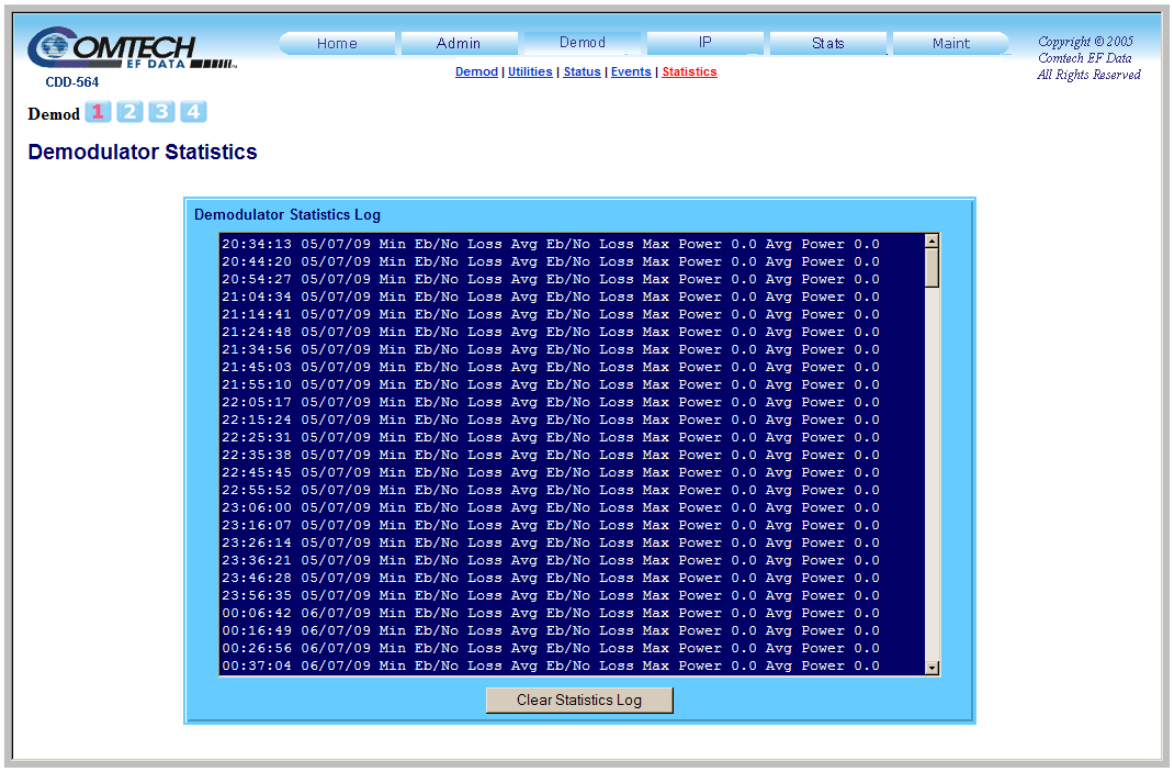


Figure 9-16. Demod | Statistics page

Demodulator Statistics Log: Click **[Clear Statistics Log]** to delete all existing entries from the Demodulator Statistics Log.

9.3.3.6 Demod | LNB

The 'LNB' hyperlink is available only on the CDM-562L/564L HTTP Interface. Depending on the unit in use and the number of configured modulators on that unit, the user with the means to control and monitor up to four Low-Noise Block Downconverters (LNBs), on a per-Demod basis, when connected to the CDD-562L/564L.

When a Low Noise Block Down Converter (LNB) is installed, use this page to configure its operating parameters and to view the LNB status for L-Band operation**.**

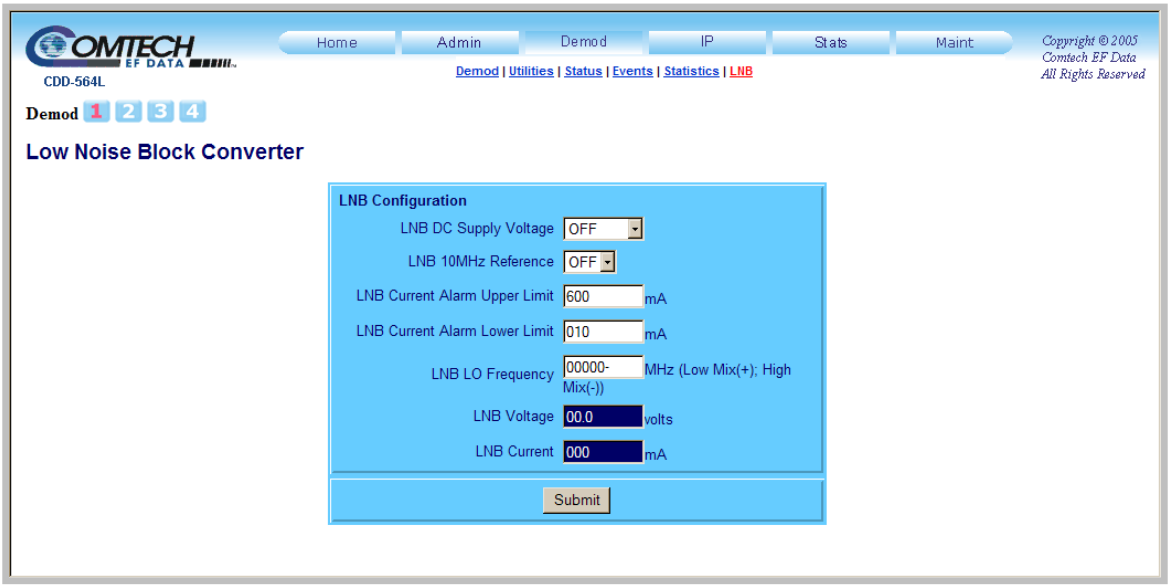


Figure 9-17. Demod | LNB page

LNB Configuration

- **LNB DC Supply Voltage** and **LNB 10MHz Reference:** Use the drop-down lists to turn either function **ON** or **OFF**.
- **LNB Current Alarm Upper Limit** and **LNB Current Alarm Lower Limit:** Assign a value (in mA) ranging from 0 to 500 for either function.
- **LNB LO (Low Oscillator) Frequency:** Assign a value (in MHz) to the LO Frequency, and designate the value as a "+" (HIGH) or "–" (LOW) limit.
- **LNB Voltage and LNB Current:** Theese status fields are ***read-only*** and cannot be changed.

Click **[Submit]** to execute the changes made on this page.

9.3.4 IP pages

The hyperlinks available under the '**IP**' tab provide the user access to all functionality associated with Ethernet operation.

Click the **Ethernet**, **HDLC**, **Routes, Multicast**, **ARP**, **VLAN**, or **IGMP** hyperlink to continue.

9.3.4.1 IP | Ethernet

Use this page to view the MAC address and Link Status, and set the IP address/mask, and mode/speed of the IP Module.

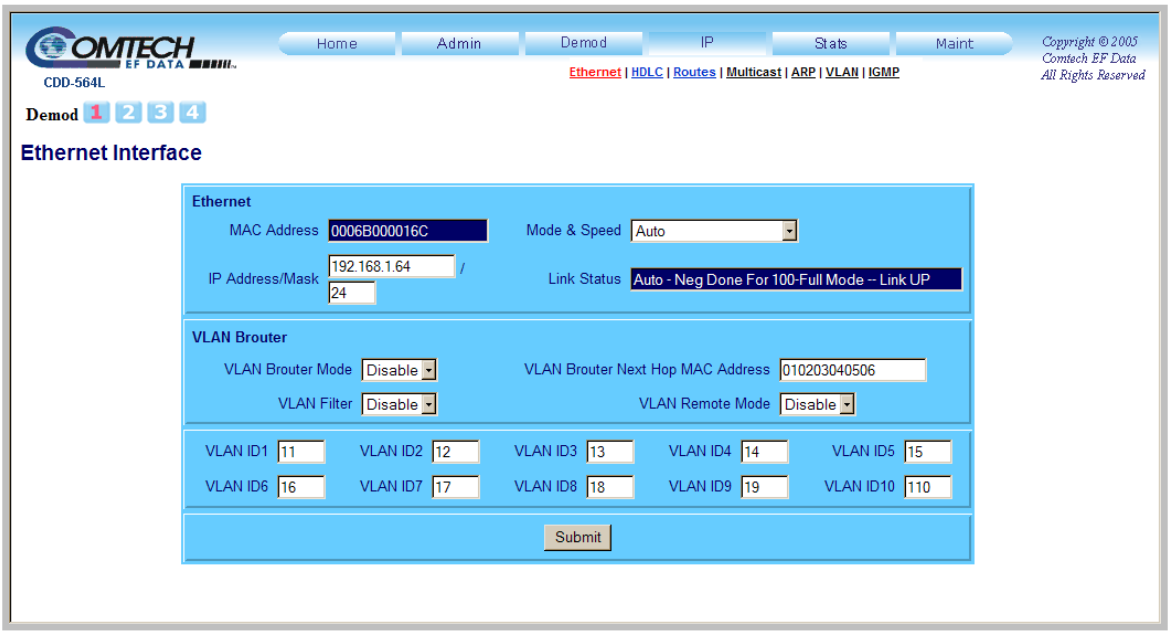


Figure 9-18. IP | Ethernet page

Ethernet

- **MAC Address (*read-only*):** This is set at the factory to a guaranteed unique address that cannot be modified by the user.
- **Mode & Speed:** Use the drop-down list to select **Auto**, **10 Mbps Half Duplex**, **100 Mbps Half Duplex**, **10 Mbps Full Duplex**, or **100 Mbps Full Duplex**.
- **IP Address/Mask:** The user may enter the IP Address/Mask for the IP Module Ethernet Interface.
- **Link Status (*read-only*)**: The is the actual negotiated Link Status of the Ethernet Port; this includes whether the link is **UP** or **DOWN**.

VLAN Brouter

In order for this feature to work, Header Compression must be purchased and available.

The VLAN Brouter feature allows VLAN tagged packets to be forwarded when in Brouter mode.

- **VLAN Brouter Mode:** Use the drop-down list to select this mode as **Enabled** or **Disabled**.

  Note the following:

  - This mode can be enabled only when one of the Router modes is **enabled**.
  - When Managed Switch Mode is enabled, this feature is automatically **disabled**.

- **VLAN Brouter Next Hop MAC Address:** When VLAN Brouter Mode is **enabled**, the user may enter the Next Hop MAC Address, to which VLAN tagged packets are to be directed, into this text field.

- **VLAN Filter**: Use the drop-down list to set this feature as **Enabled** or **Disabled**.

- **VLAN Remote Mode**: Use the drop-down list to select this mode as **Enabled** or **Disabled**.

- **VLAN ID1** through **VLAN ID10:** Enter a valid ID in the range of 0000 to 4095.

Click [**Submit]** to execute the changes made on this page.

9.3.4.2 IP | HDLC

Two IP Module Working Modes are available with Comtech EF Data IP-enabled products: **Managed Switch Mode** (formerly easyConnect™) and **Router Mode**.

For the CDD-56X Satellite Demodulator, three primary HDLC Addressing (Router) Modes are available – **Point-to-Point**, **Small Network**, and **Large Network**. Once the role of a particular CDM-IP Modem is determined in the network, this single point of configuration simplifies deployment.

Use this page to specify the Router Mode for the CDM-IP modem/CDD-56X pairing.

1. ***The demodulator only supports Router Mode, so the CDM-IP modem that is transmitting to the CDD-56X demodulator must be in Router Mode.***
2. ***The HDLC Address Mode of the Comtech EF Data IP modems must be identical to pass traffic between the TX modems and the demodulator.***

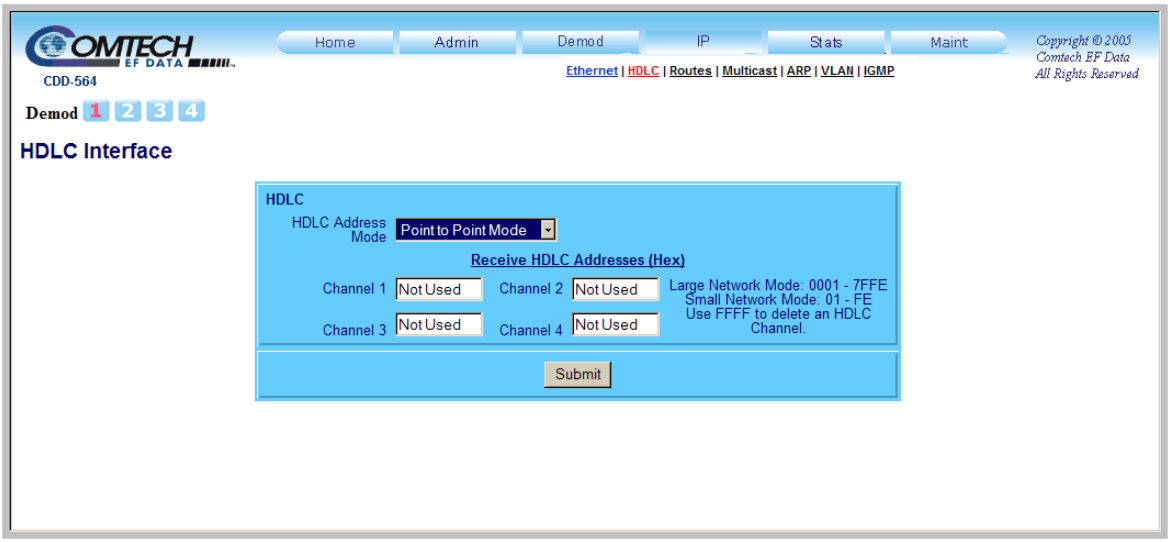


Figure 9-19. IP | HDLC page

HDLC

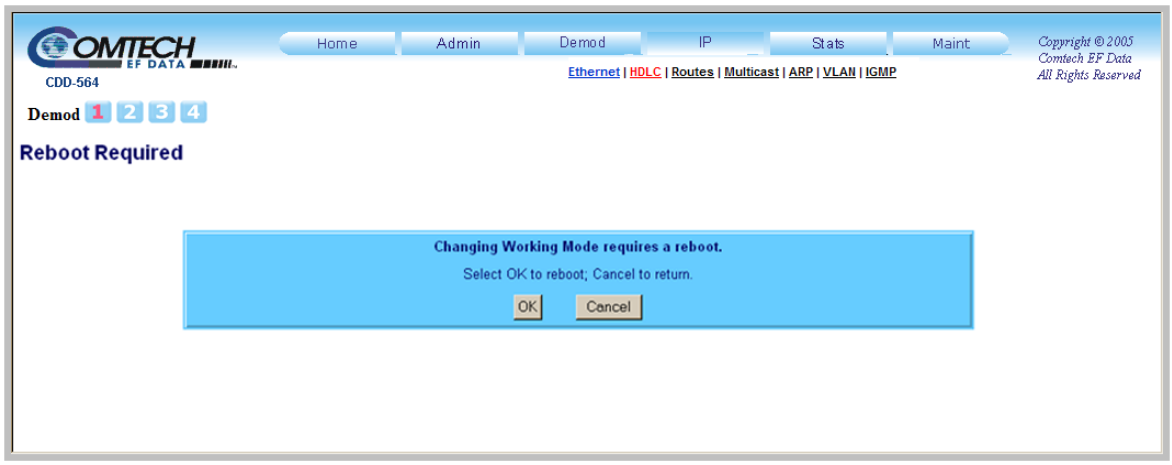
HDLC Address Mode: Use the drop-down list to select the active HDLC Address (Router) Mode:

- **Point-to-Point Mode –** Select for use in a Point-to-Point SCPC link where there are different IP subnets on either side of the link.
- **Small Network Mode –** The Small Network Mode supports up to 255 remotes, as allowed using HDLC addressing. Select to set the unit to be on independent IP subnets; requires adding static routes to pass traffic between them.
- **Large Network Mode –** This mode is similar to Small Network Mode, the exception being that a maximum of 32,766 remotes are allowed on a single shared satellite outbound carrier.

Receive HDLC Addresses (Hex): The address may be assigned on a *per-demod* basis within the following ranges:

- *Point-to-Point* – No HDLC address
- *Small Network* – 0x1 to 0xFE
- *Large Network* – 0x1 to 0xFFFE

If a selected working mode differs from the current mode, the user is prompted to reboot the CDD-56X:



Click **[OK]** to reboot the unit, or **[Cancel]** to return to the '**IP | HDLC'** page.

9.3.4.3 IP | Routes

Use this page to enter static routes into the IP Module on a *per-demod* basis, for the purpose of routing IP traffic over the satellite or to another device on the local LAN.

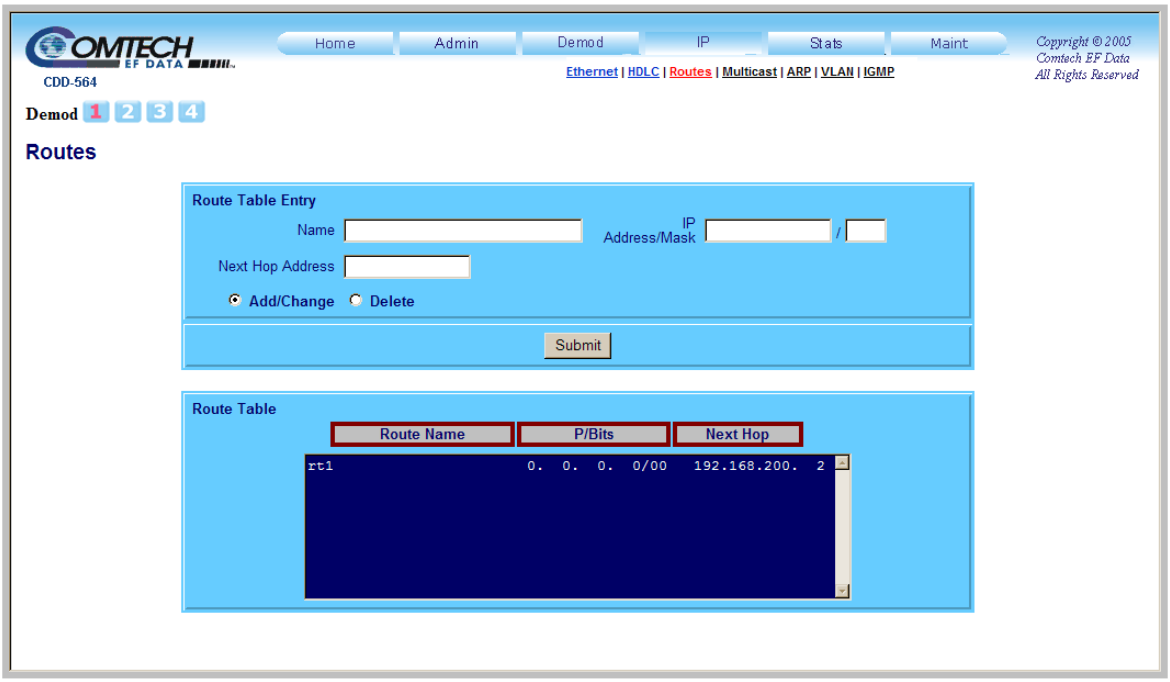


Figure 9-20. IP | Routes page

Route Table Entry

- **Name:** Assign a label for the Route Entry as a means to maintain the network. The assigned name cannot contain any whitespace and must be unique.

- **IP Address/Mask:** This address defines the route to the destination network.

- **Next Hop Address:** When the route is of type **Sat to Eth** (as per the **'IP | Multicast'** page), use the **Next Hop Address** to define the locally attached router's IP address that will be used to route to the destination network. This is the case when there is another subnet addressed to the modem on the LAN side. The address may be assigned, dependant on the selected Working Mode, within the following ranges:

    - *Point-to-Point* – No HDLC address
    - *Small Network* – 0x1 to 0xFE
    - *Large Network* – 0x1 to 0xFFFE

- **Add/Change:** Once a Route Entry is entered into the **Name** field, click **Add/Change** to to subsequently add to or to modify the Route Table.

- **Delete:** Once a Route Entry is entered into the **Name** field, click **Delete** to subsequently remove the entry from the Route Table.

Click [**Submit]** to execute the entries to this section.

Route Table

This *read-only* window displays the current Route Table entries.

9.3.4.4 IP | Multicast

Use this page to manage multicast IP traffic over the satellite or to another device on the local LAN.

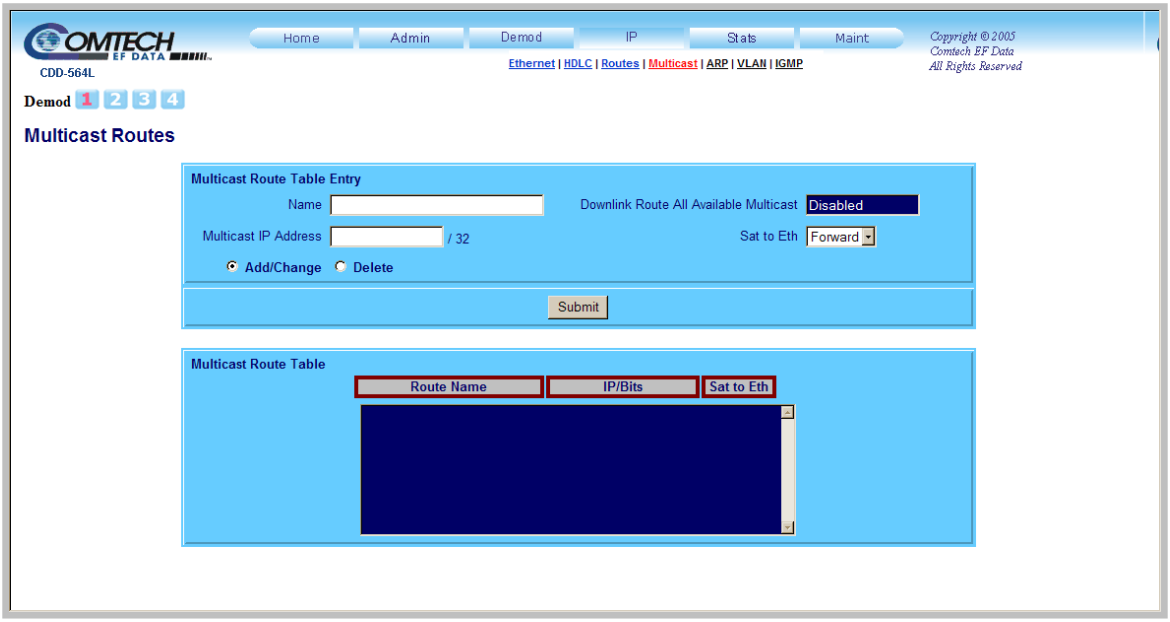


Figure 9-21. IP | Multicast page

Multicast Route Table Entry

- **Name**: Assign a label for the Multicast Route Entry as a means to maintain the network. The assigned name cannot contain any whitespace and must be unique.

- **Downlink Route All Available Multicast** (***read-only***): Displays the status of this feature as **Enabled** or **Disabled**.

- **Multicast IP Address**: This address defines the route to the destination network.

- **Next Hop HDLC (Eth to Sat Only) (*read-only*)**: Displays the desired Next Hop HDLC IP Address for traffic to be sent over the satellite, within the following ranges:

    - *Point-to-Point* – No HDLC address

- *Small Network* – 0x1 to 0xFE
- *Large Network* – 0x1 to 0xFFFE

- **Sat to Eth:** Select the valid packet handling value for routing to a destination network, using the drop-down list:
  - Forward – Multicast is only forwarded across link if both units have this feature enabled.
  - Filter – A multicast packet is received but there is no application associated with it.

- **Add/Change:** Once a Multicast Route Entry is entered into the **Name** field, click **Add/ Change** to subsequently add to or to modify the Multicast Route Table.

- **Delete:** Once a Multicast Route Entry is entered into the **Name** field, click **Delete** to subsequently remove the entry from the Multicast Route Table.

Click [**Submit]** to execute the entries to this section.

Multicast Route Table

This *read-only* window displays the current Multicast Route Table entries.

9.3.4.5 IP | ARP

Use this page to display or directly edit all current Static and Dynamic ARP (Address Resolution Protocol) entries.

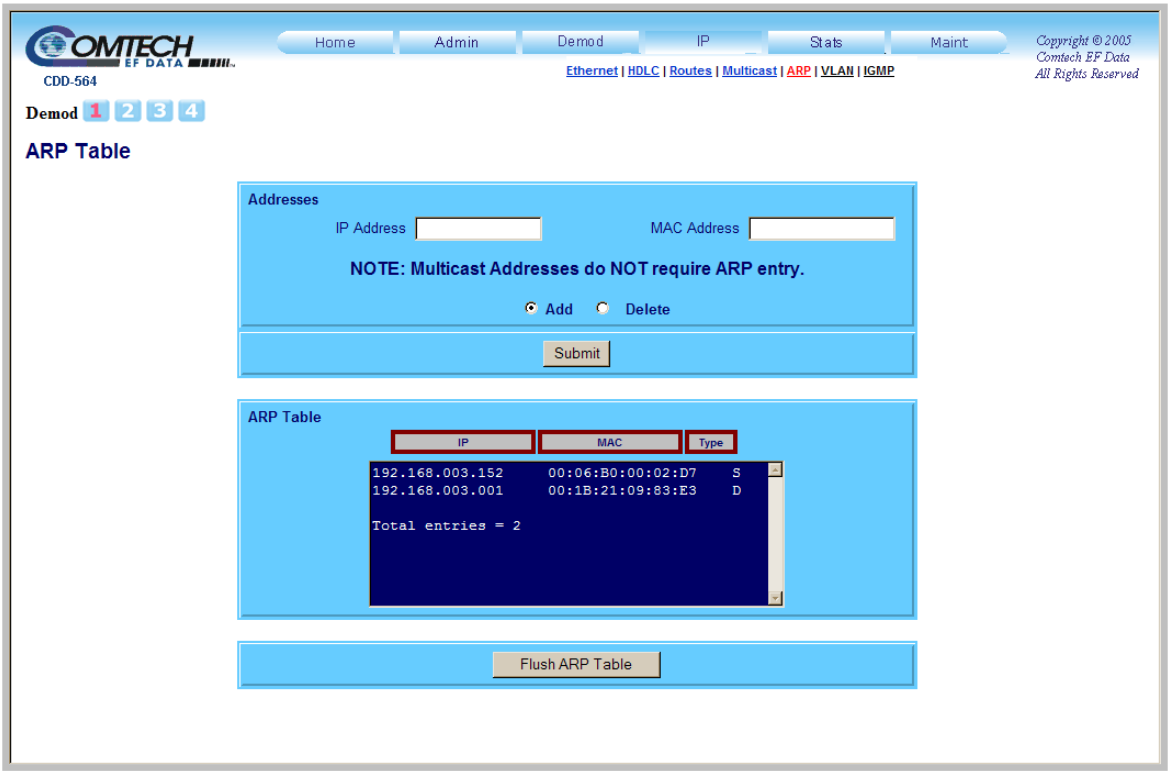


Figure 9-22. IP | ARP page

Addresses

- **IP Address:** Enter the IP Address in the form XXX.XXX.XXX.XXX.
- **MAC Address:** Enter the MAC Address in the form YY:YY:YY:YY:YY:YY.
- **Add:** Click to add a Static ARP Entry to the ARP Table for processing.
- **Delete:** Click to remove a Static ARP Entry from the ARP Table.

Once the desired ARP values have been entered, click [**Submit]** to execute the update.

ARP Table

This *read-only* table list the ARP entries by IP Address, MAC Address, and entry Type ('S' for *Static*, 'D' for *Dynamic*).

Click **[Flush ARP Table]** to update the table. Note that the index total will automatically increment to the next available number.

9.3.4.6 IP | VLAN

Use this page on a *per-demod* basis when *HDLC Address Mode* has been set to **Managed Switch** (see **Sect. 9.3.4.2 IP | HDLC**).

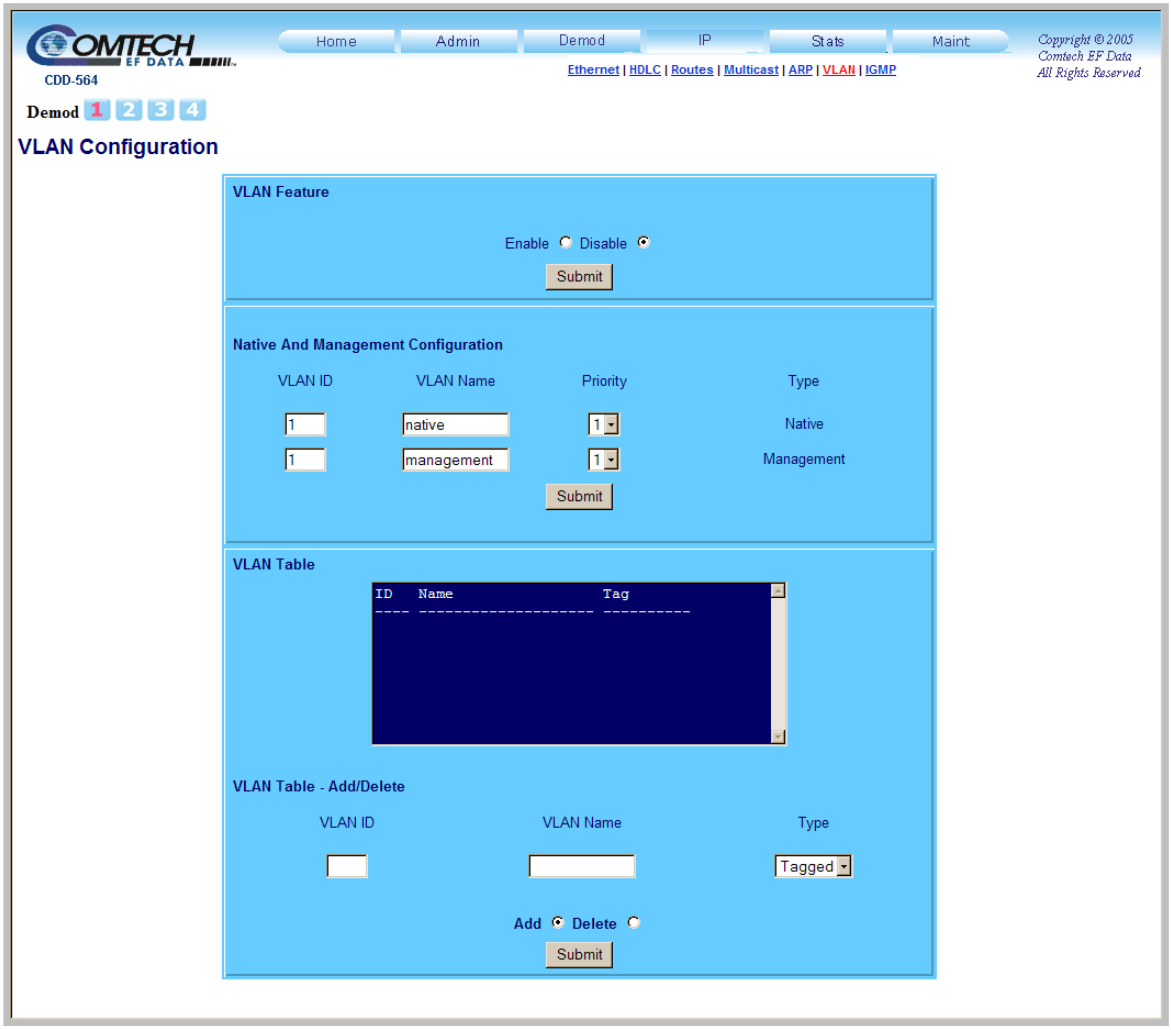


Figure 9-23. IP | VLAN page

VLAN Feature

Click **Enable** or **Disable** to set the VLAN operational state, and then click **[Submit]** to execute the selection.

Native and Management Configuration

This section is used to configure the *Native* and *Management* VLAN IDs:

- The *Native* VLAN ID is used to tag arriving packets that have no VLAN tag. Likewise, when packets arrive from the WAN with the same VLAN tag as the Native VLAN ID, then the VLAN header is removed and passed to the LAN interface.

- The *Management* VLAN ID us used to specify a dedicated management VLAN used to access and control the modems.

For either Native or Management VLAN ID configuration, enter the following information:

- **VLAN ID:** Specifiy a value from **1** to **4095**.
- **VLAN Name:** Assign a label to the VLAN ID as needed.
- **Priority:** Use the drop-down list to select prioritize rules from **0** to **7**.

Click [**Submit]** to execute the entries made in this section.

VLAN Table

This *read-only* table list the VLAN rules by ID, Name, and Tag.

VLAN Table – Add/Delete

- **VLAN ID:** Enter an ID for the rule. Specifiy a value from **1** to **4095**.
- **VLAN Name:** Enter a name for the rule, using a maximum of 20 characters.
- **Type:** ***Tagged*** is the only rule option available at this time.
- **Add:** Click to add a VLAN priority rule. The entry will be added to the VLAN Table for processing once the user clicks **[Submit]**.
- **Delete:** Click to flag a VLAN priority rule for removal from the VLAN Table. The VLAN rule will be deleted from the VLAN Table once the user clicks **[Submit]**.

Click [**Submit]** to execute the entries made in this section.

9.3.4.7 IP | IGMP

Use this page to facilitate the use of IGMP (Internet Group Management Protocol) with configured multicast routes.

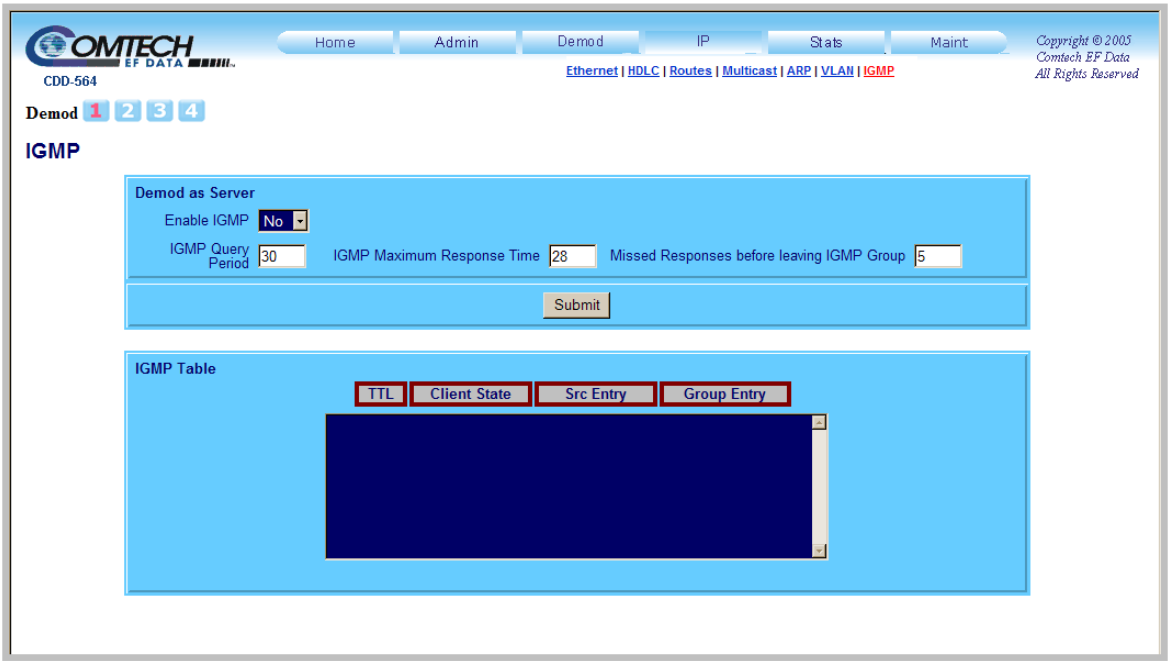


Figure 9-24. IP | IGMP page

Demod as Server

- **Enable IGMP:** Use the drop-down list to select **Yes** or **No**. If enabled, the IP Module responds to IGMP queries for the configured multicast routes on the transmit side and generates IGMP queries on the receive side.
- **IGMP Query Period:** Enter a query period value – from **1** to **600** seconds – into the text box.
- **IGMP Maximum Response Time:** Enter a response time value that is *less than the IGMP Query Period* ***minus one*** – from **1** to **598** seconds – into the text box.
- **Missed Responses before leaving IGMP Group:** Enter the number of desired missed responses – from **1** to **30** – into the text box.

Click [**Submit]** to execute the entries made in this section.

IGMP Table

This *read-only* table lists the IGMP Groups that are active on the demodulator. This includes the TTL (Time to Live) for the entry; the Client State (Idle, Active, or Closing); and the SRC and Group Entries.

9.3.5 Stats Pages

The hyperlinks available under the '**Stats**' tab provide the user access to ***read-only*** windows reflecting ongoing operational status, operational statistics, and event logging.

Click the **Ethernet**, **IP**, or **WAN** hyperlink to continue.

9.3.5.1 Stats | Ethernet

Use this page to review ***read-only*** status information pertaining current operating statistics for Ethernet Rx.

Figure 9-25. Stats | Ethernet page

Click **[Reset Stats]** to allow the most recent statistics to display; otherwise, this page automatically updates every 10 seconds.

9.3.5.2 Stats | IP

Use this page to review ***read-only*** status information pertaining to a variety of IP Routing Statistics – Sent/Received, Dropped, and Filtered.

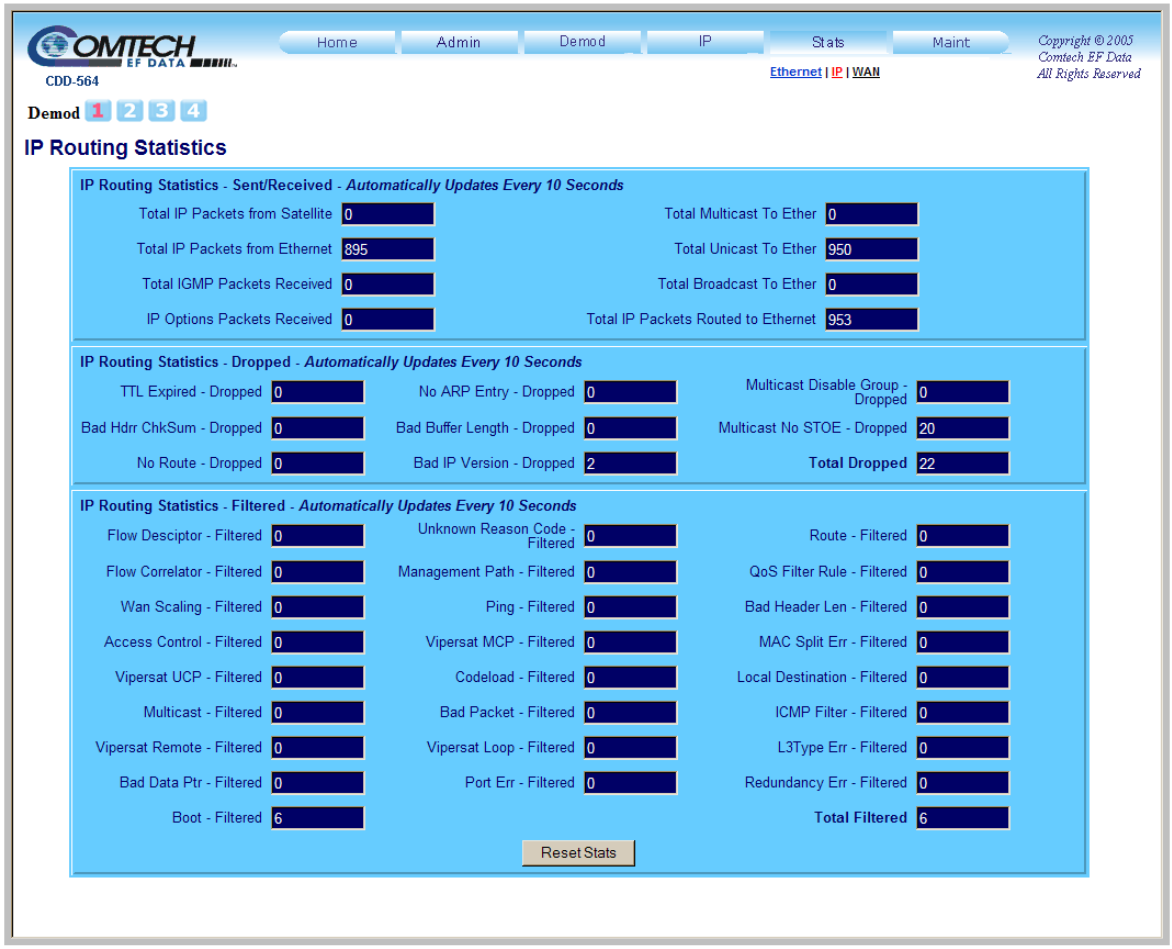


Figure 9-26. Stats | IP page

Click **[Reset Stats]** to allow the most recent statistics to display; otherwise, this page automatically updates every 10 seconds.

9.3.5.3 Stats | WAN

Use this page to review ***read-only*** status information pertaining to current operating statistics for the WAN FPGA Rx, as well as logged Rx Errors.

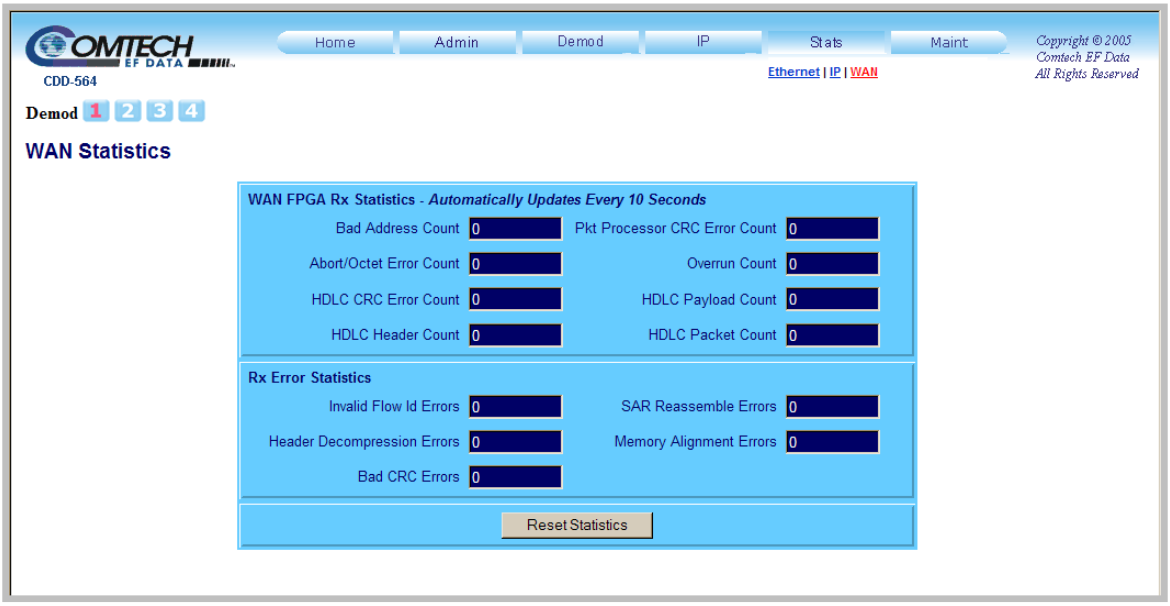


Figure 9-27. Stats | WAN page

Click **[Reset Statistics]** to allow the most recent statistics to display; otherwise, this page automatically updates every 10 seconds.

9.3.6 Maint (Maintenance) pages

Click the **Unit Info**, **Operations**, **Save**, or **Reboot** hyperlink to continue.

9.3.6.1 Maint | Unit Info

Use this page to review ***read-only*** status information pertaining to the base unit and IP Module's firmware information for Boot, Active and Inactive Bulks. The Unit Uptime, Demod Serial Number, and IP Module Software Revision information is also provided here.

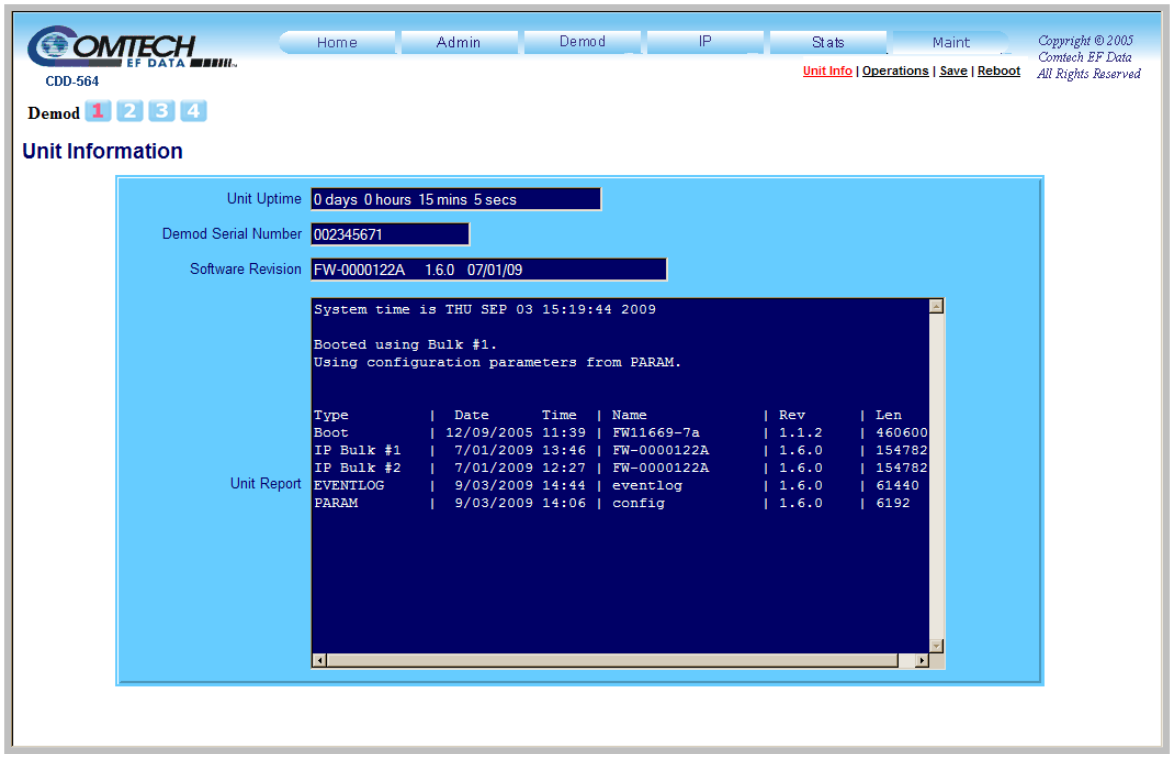


Figure 9-28. Maint | Unit Info page

9.3.6.2 Maint | Operations

Use this page to configure the unit's handling of firmware upon bootup.

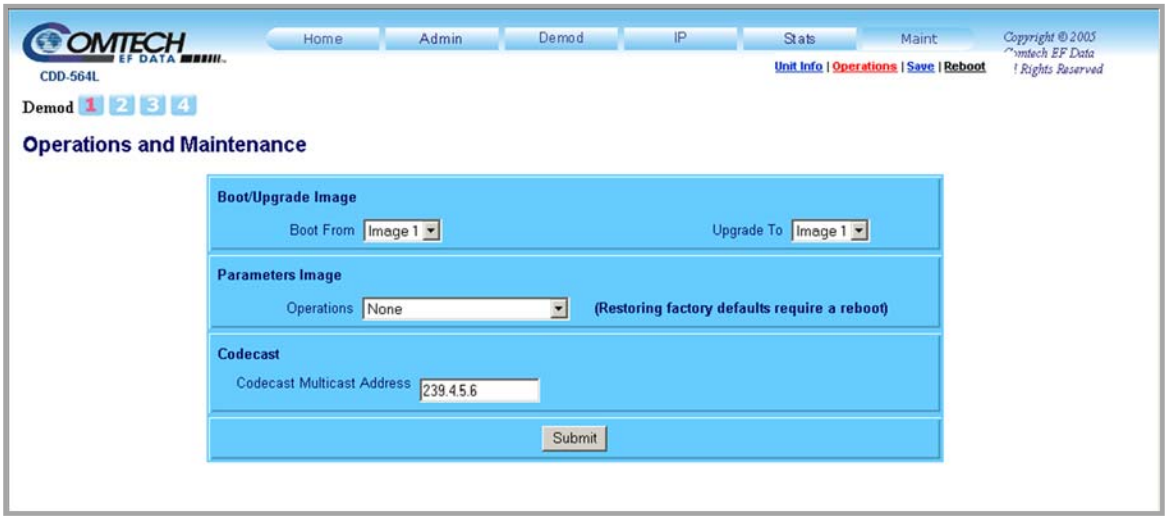


Figure 9-29. Maint | Operations page

Boot/Upgrade Image

- **Boot From:** Determines which firmware version (includes Application, FPGA, and FFPGA) will be loaded upon bootup.

  Use the drop-down list to select:

  - **Latest –** Boots the newest firmware load based upon date.
  - **Image1** – Boots the firmware loaded into the first slot in permanent storage.
  - **Image2 – B**oots the firmware loaded into the second slot in permanent storage.

- **Upgrade To:** Determines which installed firmware (includes Application, FPGA, and FFPGA) that the demodulator will overwrite when upgrading with a new firmware download.

  Use the drop-down list to select:

  - **Oldest –** Overwrites the oldest firmware based upon date.
  - **Image1 –** Overwrites the firmware loaded into the first slot in permanent storage.
  - **Image2 –** Overwrites the firmware loaded into the second slot in permanent storage.

Parameters Image

- **Operations:** Use the drop-down list to select one of the following:

  - **None** – No deviation from the parameter currently saved to Flash.

- **Save Parameters to Flash** – When changes are made to the demodulator's parameters, the **'Maint | Save'** page must be selected in order for these settings to be valid through a power cycle. Without using this option, settings will revert back to their previous state as indicated by the last time changes were saved to Flash memory.

- **Load Parameters from Flash** – Reloads the parameters from Flash memory. This may overwrite changes that have not yet been saved to Flash memory.

- **Restore Factory Defaults** – Uses the internal, hard-coded factory default parameters.

Restoring the factory default configuration requires a system reboot.

Codecast

Set the *Codecast Multicast Address* used to upgrade the Software Packages using Vload.

Click **[Submit]** to execute the updates made on this page.

9.3.6.3 Maint | Save

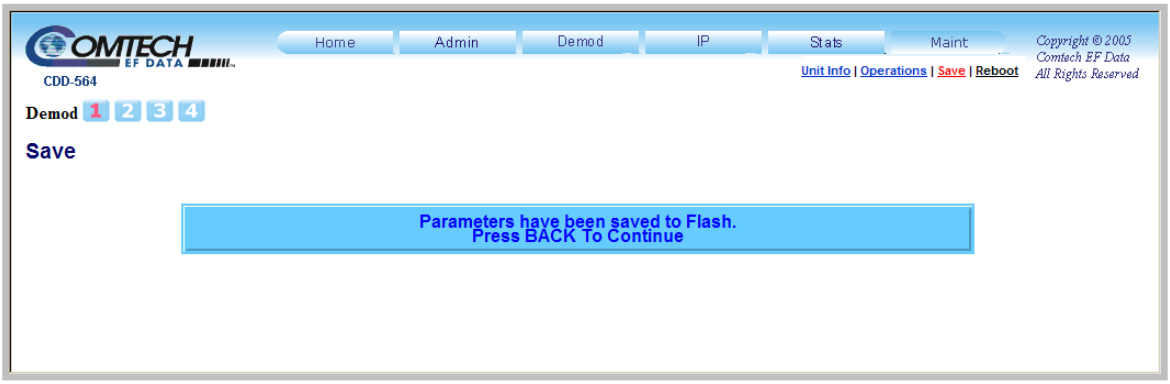


Figure 9-30. Maint | Save page

Clicking the '**Maint | Save'**hyperlink causes all configuration changes made during this operational session to the demodulator and IP parameters to be stored to Flash memory. These updates are permanent until the user either initiates and saves a new round of settings updates, or restores all settings to the original factory defaults via the **'Maint | Operations'** page.

Any changes made to the demodulators will be lost upon reset or power loss unless the changes are saved to permanent storage. This applies to all of the demodulator and IP parameters.

Press the Backspace key (**[Back ←]**) on the keyboard, or select any other page tab or hyperlink, to continue using the HTTP Interface.

9.3.6.4 Maint | Reboot

Use this page to force the demodulator to reboot.

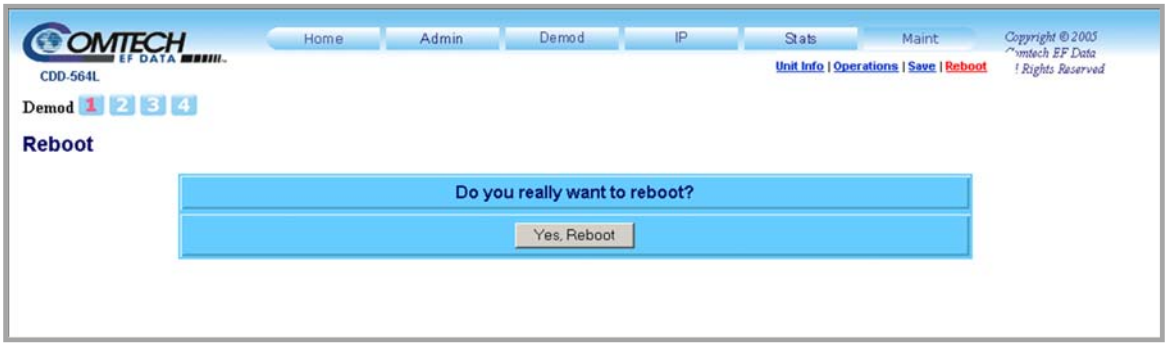


Figure 9-31. Maint | Reboot page

In response to the displayed prompt, click **[Yes, Reboot]** to execute reboot of the unit.

Rebooting the unit does not remove the web browser's name/password cookie. It is therefore recommended after clicking **[Yes, Reboot]** ***that the user close the web browser in order to delete the demodulator's security cookie.***

Appendix A. FAST ACTIVATION PROCEDURE

A.1 FAST System Overview

The CDD-56X Demodulator with IP Module incorporates a number of optional features. In order to permit a lower initial cost, the unit may be purchased with only the desired features enabled. If, at a later date, the user wishes to upgrade the functionality of a unit, Comtech EF Data provides **F**ully **A**ccessible **S**ystem **T**opology (**FAST**), a technology which permits the purchase and installation of options through special authorization codes.

FAST Access Codes are unique authorization codes that may be purchased from Comtech EF Data, and then activated in the unit using either the HTTP (Web Server) Interface or the Command Line Interface. Contact a Comtech EF Data sales representative during normal business hours, or via e-mail to sales@comtechefdata.com, to order the desired options.

FAST System Theory

FAST allows an operator to order a unit precisely tailored for the initial application. When service requirements change, **FAST** allows the operator to upgrade the topology of the unit on-location, within minutes, and without having to remove the unit from the setup. This accelerated upgrade is possible due to **FAST**'s extensive use of the programmable logic devices incorporated into Comtech EF Data products.

FAST Implementation

Comtech EF Data's **FAST** system is factory-implemented in the demodulator. All **FAST** options are available through the basic platform unit at the time of order. **FAST** allows immediate activation of available options – first, upon entry of the register-specific FAST Access Code, and then by setting the desired operational parameters using the HTTP Interface or the CLI.

FAST Accessible Options

Hardware options can be ordered and installed either at the factory or in the field. In the field, the operator can select options that can be easily activated, depending on the current hardware configuration of the unit. The unique, register-specific FAST Access Code that is purchased from Comtech EF Data enables configuration of the available hardware.

A.2 FAST Activation Procedure

A.2.1 FAST Activation via the Command Line Interface (CLI)

Chapter 8. CDD-56X CLI and TELNET OPERATION

Step	Task
1	Before contacting Comtech EF Data to order FAST feature upgrades, obtain and record the demodulator serial number: a) From the CLI *Main Menu*, first type 'M' to select the *Satellite Demodulator* page; then, type 'F' to select the *Features* page. b) The 9-digit Serial Number is displayed on the *Features* page. Record Serial Number: _____
2	View the currently installed features: a) From the CLI *Main Menu*, first type 'A' to select the *Administration* page; then, type 'F' to select the *Feature Configuration* page. b) Options are identified as 'Available' or 'Unavailable'. Any options that are 'Unavailable' may be purchased as a FAST upgrade.
3	Contact a Comtech EF Data sales representative during normal business hours to order features: • Provide the unit Serial Number to the representative. • Identify and purchase the desired FAST option(s). • Obtain the invoice, the 20-digit FAST Access Code(s), and the FAST option activation instructions.
4	Enter the FAST access code(s): a) From the CLI *Main Menu*, first type 'A' to select the *Administration* page; then, type 'F' to select the *Feature Configuration* page. b) Type 'Y' to select FAST Feature Code. At the prompt, *carefully* enter the 20-character FAST access code. The CLI responds with "`"Fast Feature Code is Accepted. Press Any Key to Continue."`
5	Reboot the unit. Select the *Operations and Maintainenance* page (type 'O' from the *Main Menu*) and then type 'R' to Reset (reboot) the unit.

6	Once the unit has rebooted, verify that the FAST Upgrade has been completed by reviewing the currently installed features. See Step 2 – the '**Available**' status of the list of features should now reflect the FAST upgrade just completed. If the feature is still listed as '**Unavailable**', repeat the FAST Access Code entry procedure. Should the code entry error persist, contact Comtech EF Data Customer Support for further assistance.

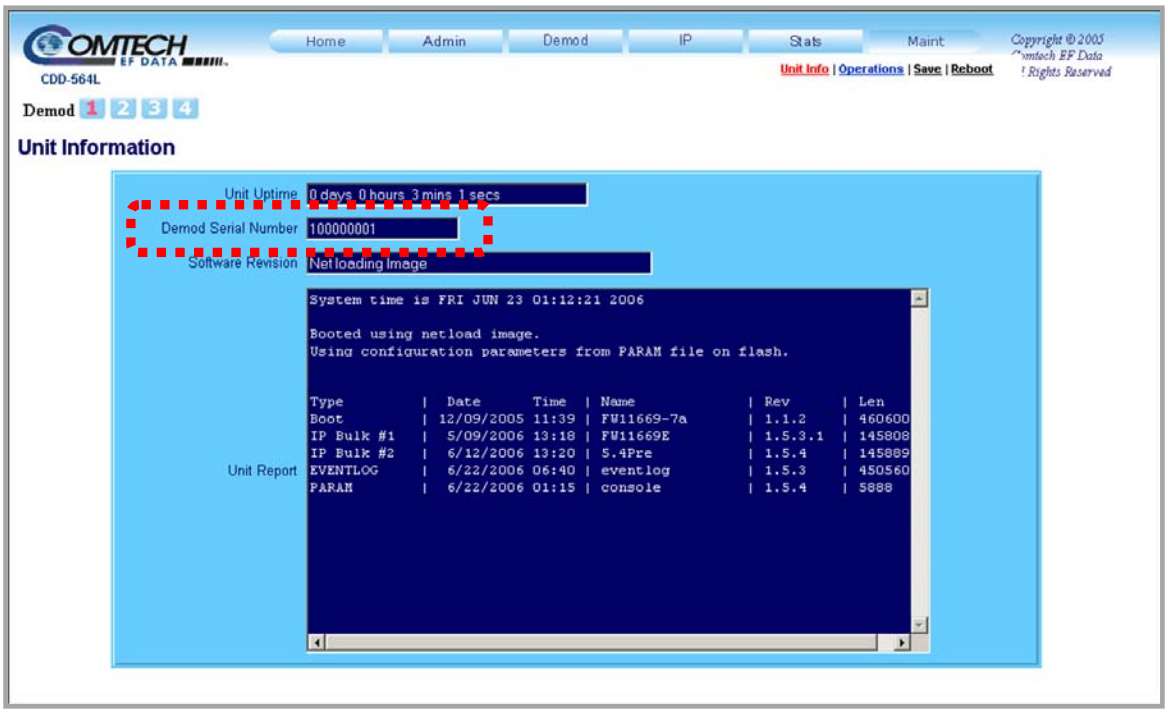
A.2.2 FAST Activation via the HTTP (Web Server) Interface

Chapter 9. CDD-56X HTTP INTERFACE

For the purpose of demonstration, this appendix depicts use of the HTTP Interface for the CDD-564L Satellite Demodulator with IP Module.

A.2.2.1 Record Serial Number

Use the **Maint | Unit Info** page to review the **Demod Serial Number**:

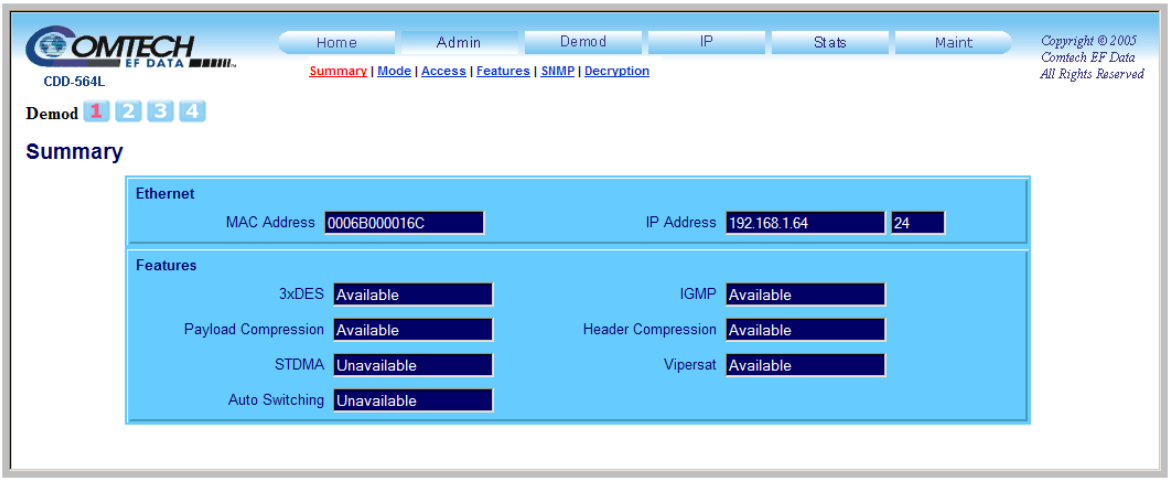


Carefully record the **Demod Serial Number** as displayed here:

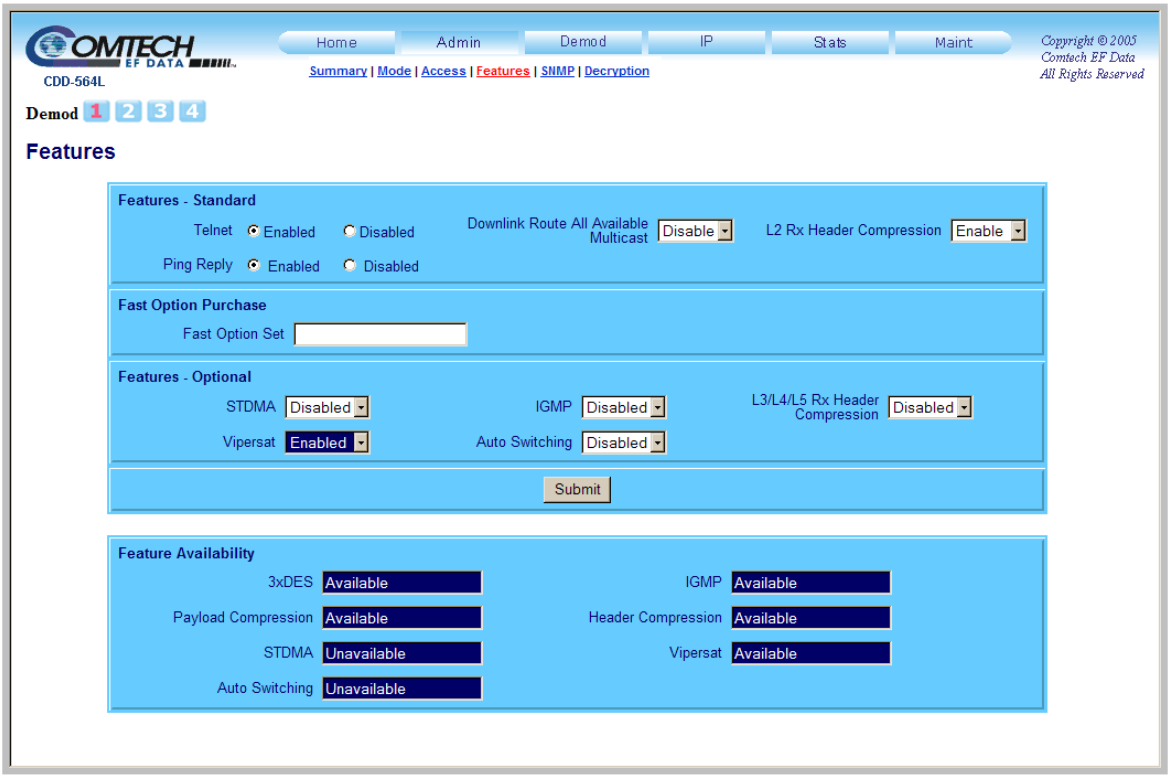
A.2.2.2 View Currently Installed Features

Use either of these HTTP Interface pages to view currently installed features:

*From the **Admin | Summary** page, **Features** section:*



*From the **Admin | Features** page, **Feature Availability** section:*

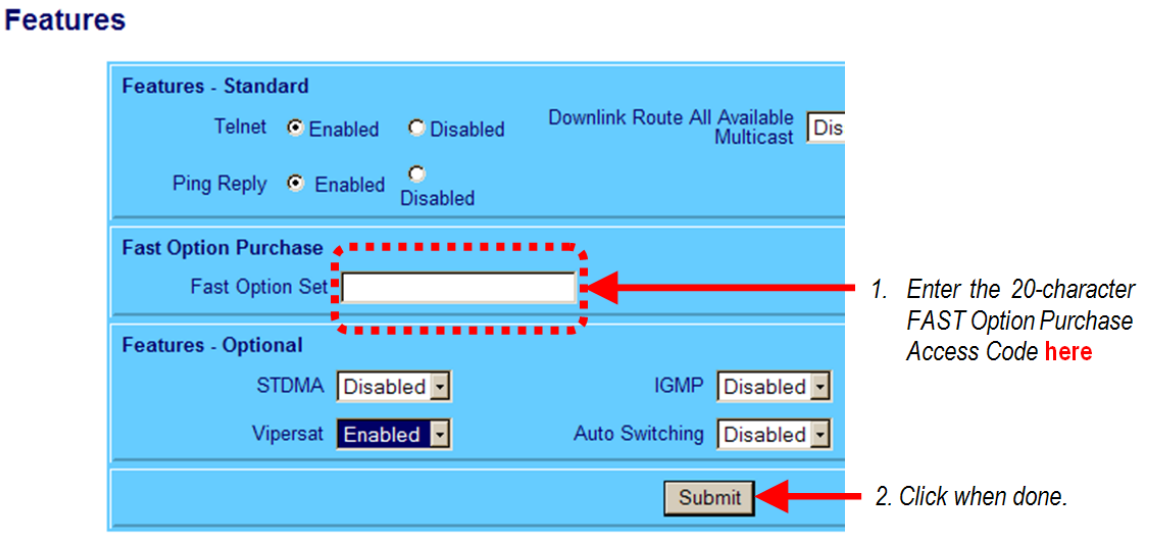


Note that, as shown in the **Features** and **Feature Availability** sections of these pages, any features installed and currently operational are noted as **Available**; conversely, any feature not available/operational (until purchased from Comtech EF Data) is noted as **Unavailable**.

A.2.2.3 Acquire/Enter FAST Option Purchase Access Code

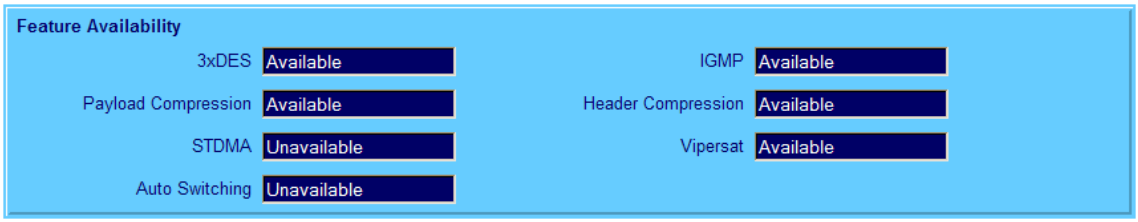
Contact a Comtech EF Data sales representative to order features, and provide the Serial Number, as obtained previously, when asked. The Comtech EF Data sales representative will verify the order, and Comtech EF Data Customer Support will provide an invoice and FAST option activation instructions (including a 20-character FAST Option Purchase Access Code).

From the **Admin | Features** page **Fast Option Purchase** section, ***carefully*** enter the FAST Option Purchase Access Code into the **FAST Option Set** field, and then click **[Submit]**:



A.2.2.4 Verify FAST Option Availability

If the FAST Option Purchase Access Code is accepted, the page refreshes once **[Submit]** is clicked. The **Feature Availability** section of the **Admin | Features** page, and the **Features** section of the **Admin | Summary** page, update accordingly as per the following example:



Notes:

Appendix B. FORWARD ERROR CORRECTION (FEC)

B.1 Introduction

Turbo Product Coding represents a significant development in the area of FEC. It provides best of class Forward Error Correction technology along with modulation types that optimize link performance under any conditions.

As standard, the CDD-56X Satellite Demodulator is equipped with an integral Turbo Product Codec. Comtech EF Data's Turbo Product Codec offers:

- Rate 3/4 and 0.95 for QPSK and 8-PSK
- Rate 3/4 for 16-QAM
- Rate 7/8 for QPSK, 8-PSK, and 16-QAM

B.2 Turbo Product Codec

B.2.1 Description

Two general classes of Turbo Codes are available: Turbo Convolutional Codes (TCC) and Turbo Product Codes (TPC, a block coding technique). Comtech EF Data has chosen to implement an FEC codec based on TPC.

A Turbo Product Code is a 2- or 3-dimensional array of block codes. Encoding is relatively straightforward, but decoding is a very complex process requiring multiple iterations of processing for maximum performance to be achieved.

Unlike the popular method of concatenating a Reed-Solomon codec with a primary FEC codec, Turbo Product Coding is an entirely standalone method. It does not require the complex interleaving/de-interleaving of the RS approach and, consequently, decoding delays are significantly reduced.

Furthermore, the traditional concatenated RS 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 demod and decoder remain synchronized down to the point where output error rate becomes unusable. This is considered to be an advantageous characteristic in fading environment.

Typically, in QPSK, TPC modes the demod and decoder can remain synchronized ***2 – 3 dB below*** the Viterbi/R-S or TCM cases.

B.2.2 End-to-End Processing Delay

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. **Table B-1** shows the processing delays for the three TPCs at 64 kbps based on the latency through a CDM-570/570L with IP Module and either a CDD-564/564L or CDD-562L.

Table B-1. Turbo Product Coding Processing Delay Comparison

FEC Mode (64 kbps data rate)	End-to-end delay, ms
Turbo Product Coding, Rate 3/4	47
Turbo Product Coding, Rate 7/8	249
Turbo Product Coding, Rate 0.95	69

Note that, in all cases, the delay is inversely proportional to data rate, so for 128 kbps the delay values would be half of those shown above.

B.2.3 Comparison of All TPC Modes (Contains Additional Information)

Mode	Eb/No at BER = 10^{-6} Guaranteed (Typical in parentheses)	Eb/No at BER = 10^{-8} Guaranteed (Typical in parentheses)	Spectral Efficiency	Symbol Rate	Occupied Bandwidth for 1 Mbps Carrier
QPSK Rate 3/4 Turbo	3.8 dB (3.4 dB)	4.4 dB (4.0 dB)	1.50 bits/Hz	0.67 x bit rate	793 kHz
QPSK Rate 0.95 Turbo	6.4 dB (6.0 dB)	6.9 dB (6.5 dB)	1.90 bits/Hz	0.53 x bit rate	626 kHz
8-PSK Rate 3/4 Turbo	6.2 dB (5.8 dB)	6.8 dB (6.3 dB)	2.25 bits/Hz	0.44 x bit rate	529 kHz
8-PSK Rate 0.95 Turbo	9.3 dB (8.9 dB)	10.3dB (9.9 dB)	2.85 bits/Hz	0.35 x bit rate	377 kHz
16-QAM Rate 3/4 Turbo	7.4 dB (7.0 dB)	8.2 dB (7.7 dB)	3.00 bits/Hz	0.33 x bit rate	396 kHz

The additional advantages of Turbo – lower delay, performance during fades, etc. – should also be considered.

Table B-2. Turbo Product Coding Summary

FOR	AGAINST
• Exceptionally good BER performance – significant improvement compared with every other FEC method in use today • No pronounced threshold effect – fails gracefully • Exceptional bandwidth efficiency • Coding gain independent of data rate (in this implementation) • Low decoding delay • Easy field upgrade	Nothing!

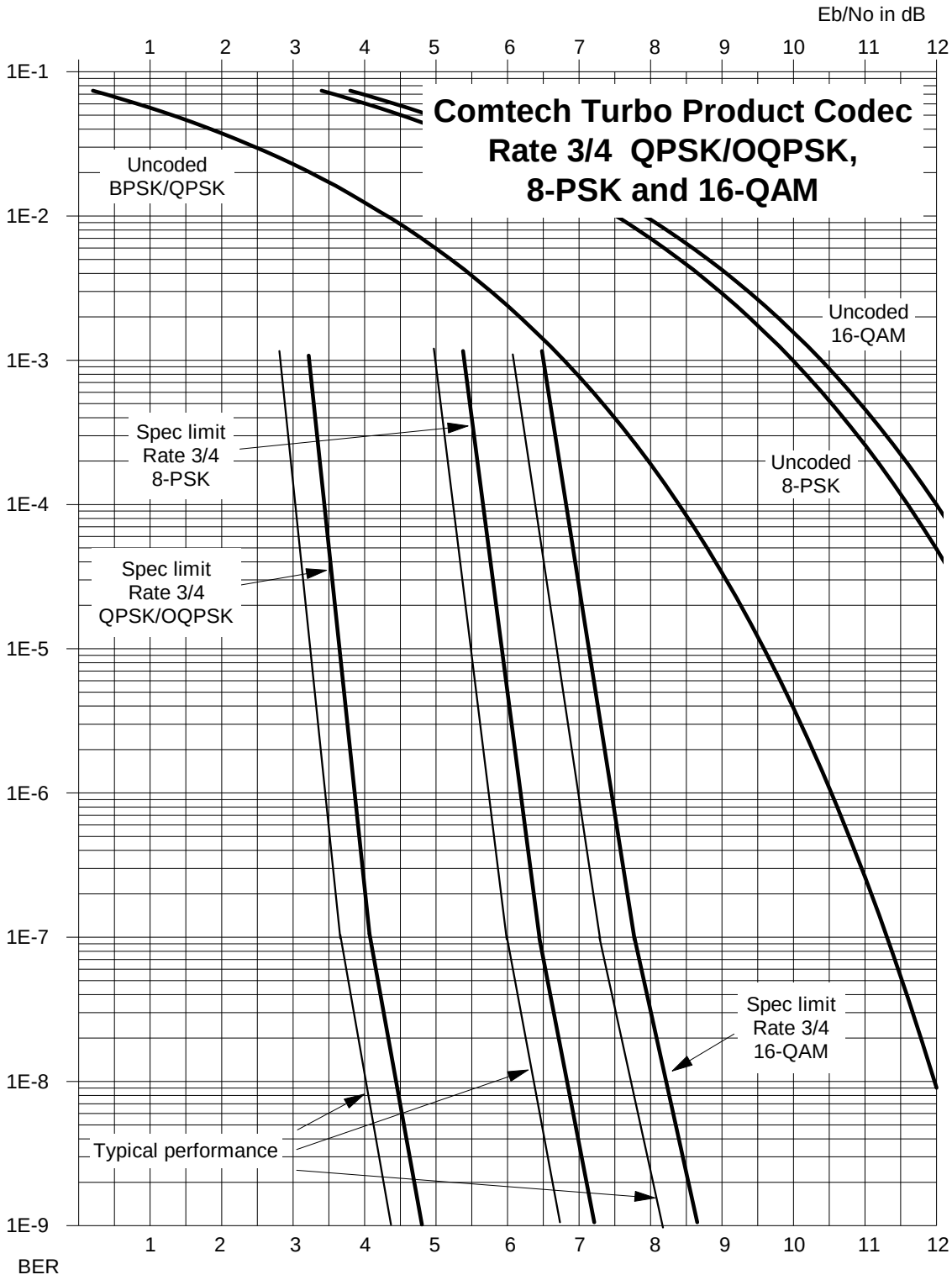


Figure B-1. Comtech EF Data Turbo Product Codec Rate 3/4 QPSK (OQPSK), 8-PSK, and 16-QAM

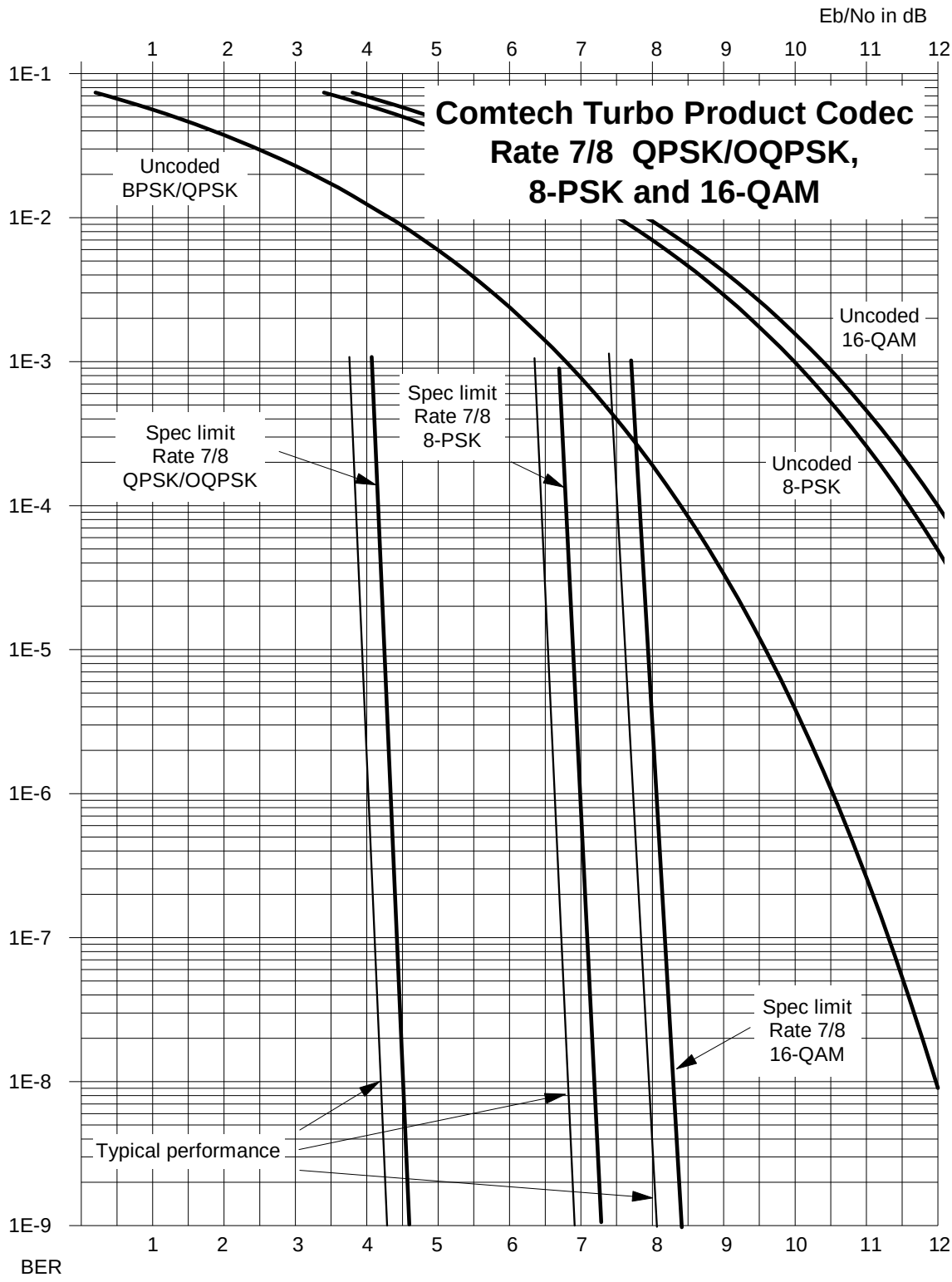


Figure B-2. Comtech EF Data Turbo Product Codec Rate 7/8 QPSK(OQPSK) , 8-PSK, and 16-QAM

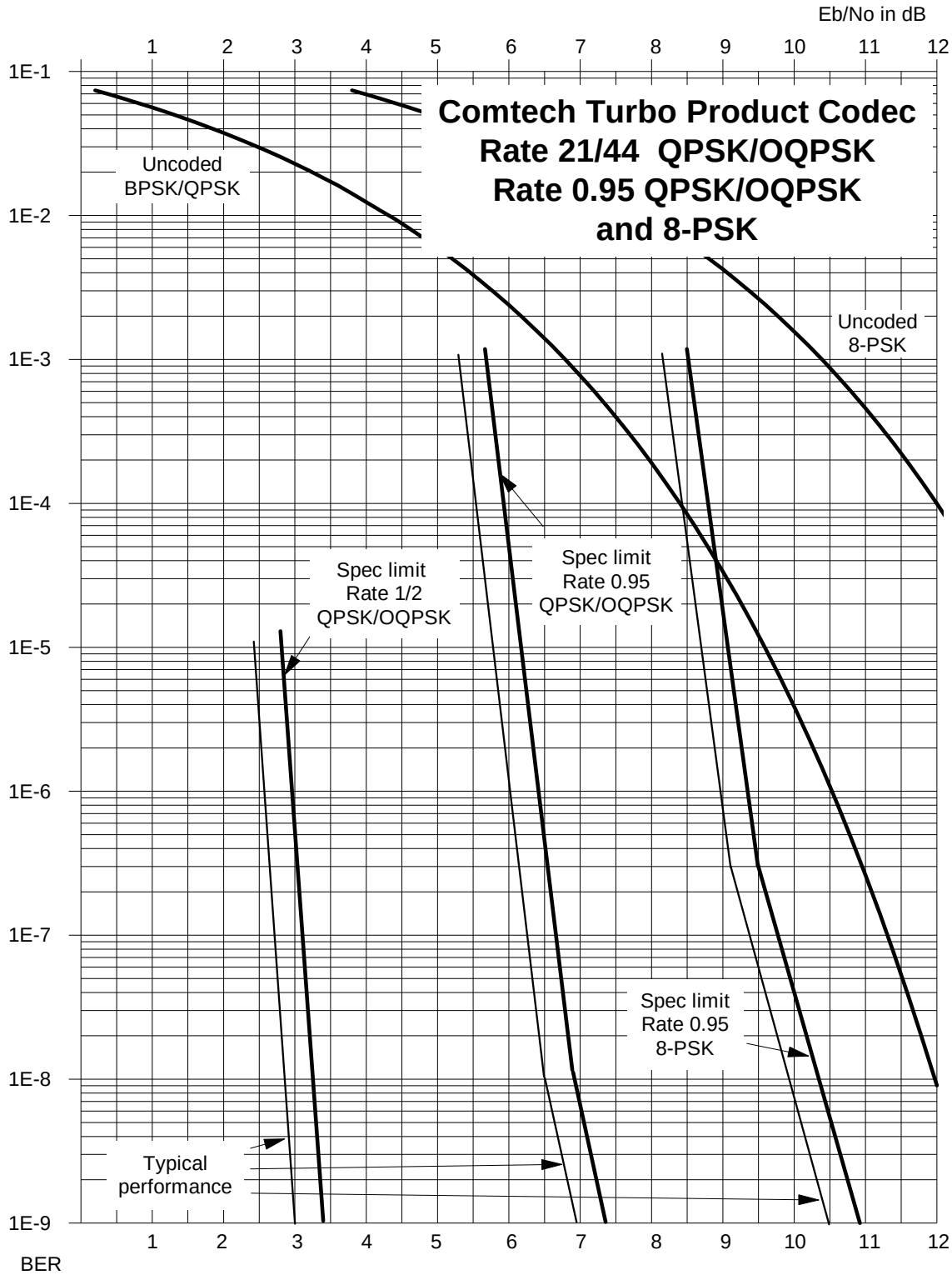


Figure B-3. Comtech EF Data Turbo Product Codec
Rate 21/44 QPSK, Rate 0.95 QPSK, and Rate 0.95 8-PSK

Appendix C. E_b/N_0 MEASUREMENT

Although the CDD-56X Satellite Demodulator calculates and makes the value of receive E_b/N_0 available through the remote port of the unit, it is sometimes useful to measure the value using a spectrum analyzer, if one is available.

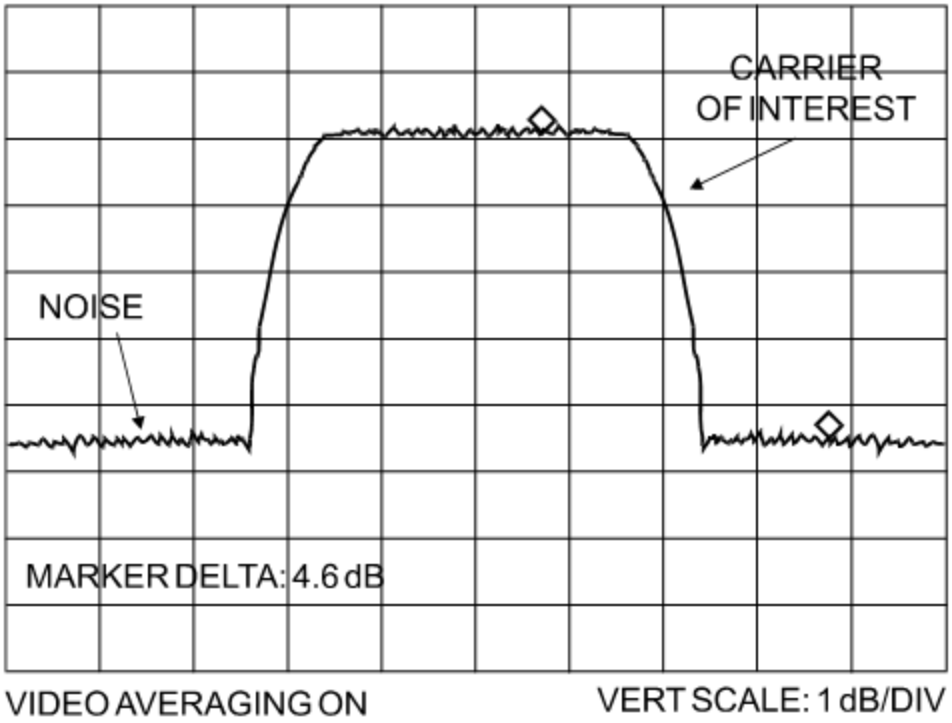
The idea is to accurately measure the value of (Co+No)/No, (Carrier density + Noise density/Noise density). This is accomplished by tuning the center frequency of the Spectrum analyzer to the signal of interest, and measuring the difference between the peak spectral density of the signal (the flat part 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 0.2 dB.
- 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 that follows, the (Co+No)/No measured is 4.6 dB. If Rate 1/2 QPSK is being used, this would correspond to an E_b/N_0 of approximately 2.6 dB.



The exact relationship used to derive the table values is as follows:

$$\mathbf{E_b/N_0 = 10 \log_{10} (10^{(Co+No/No)/10)} -1) - 10 \log_{10} (FEC\ Code\ Rate) - 10 \log_{10} (bits/symbol)}$$

Where:

- E_b/N_0 and (Co+No)/No are expressed in dB
- Bits/symbol = 1 for BPSK
- Bits/symbol = 2 for QPSK
- Bits/symbol = 3 for 8-PSK/8-QAM
- Bits/symbol = 4 for 16-QAM
- Code Rate for ‘uncoded’ = 1
- Pay close attention to the sign of the middle term

(Co+No) /No	Eb/No Uncoded BPSK	Eb/No Rate 1/2 BPSK	Eb/No Rate 21/44 BPSK	Eb/No Rate 5/16 BPSK	Eb/No Uncoded QPSK	Eb/No Rate 1/2 QPSK	Eb/No Rate 3/4 QPSK	Eb/No Rate 7/8 QPSK	Eb/No Rate 0.95 QPSK	Eb/No Rate 2/3 8-PSK	Eb/No Rate 3/4 8-PSK	Eb/No Rate 7/8 8-PSK	Eb/No Rate 0.95 8-PSK	Eb/No Rate 3/4 16-QAM	Eb/No Rate 7/8 16-QAM
1.4	-	-	-	0.8	-	-	-	-	-	-	-	-	-	-	-
1.6	-	-	-	1.5	-	-	-	-	-	-	-	-	-	-	-
1.8	-	-	-	2.1	-	-	-	-	-	-	-	-	-	-	-
2.0	-	0.7	0.9	2.7	-	-	-	-	-	-	-	-	-	-	-
2.2	-	1.2	1.4	3.2		-	-	-	-	-	-	-	-	-	-
2.4	-	1.7	1.9	3.7	-	-	-	-	-	-	-	-	-	-	-
2.6	-	2.1	2.3	4.2	-	-	-	-	-	-	-	-	-	-	-
2.8	-	2.6	2.8	4.6	-	-	-	-	-	-	-	-	-	-	-
3.0	0.0	3.0	3.2	5.0	-	-	-	-	-	-	-	-	-	-	-
3.5	0.9	3.9	4.1	5.9	-	0.9	-	-	-	-	-	-	-	-	-
4.0	1.8	4.8	5.0	6.8	-	1.8	-	-	-	-	-	-	-	-	-
4.5	2.6	5.6	5.8	7.6	-	2.6	0.8	-	-	-	-	-	-	-	-
5.0	3.3	6.3	6.5	8.4	-	3.3	1.5	0.9	-	-	-	-	-	-	-
5.5	4.1	7.1	7.3	9.1	1.1	4.1	2.3	1.7	1.3	-	-	-	-	-	-
6.0	4.7	7.7	7.9	9.8	1.7	4.7	2.9	2.3	1.9	-	-	-	-	-	-
6.5	5.4	8.4	8.6	10.4	2.4	5.4	3.6	3.0	2.6	-	-	-	-	-	-
7.0	6.0	9.0	9.2	11.1	3.0	6.0	4.2	3.6	3.2	-	-	-	-	-	-
7.5	6.6	9.6	9.8	11.7	3.6	6.6	4.8	4.2	3.8	-	-	-	-	-	-
8.0	7.3	10.3	10.5	12.3	4.3	7.3	5.5	4.9	4.5	-	-	-	-	-	-
8.5	7.8	10.8	11.0	12.9	4.8	7.8	6.0	5.4	5.0	4.8	-	-	-	-	-
9.0	8.4	11.4	11.6	13.4	5.4	8.4	6.6	6.0	5.6	5.4	4.9	-	-	-	-
9.5	9.0	12.0	12.2	14.0	6.0	9.0	7.2	6.6	6.2	6.0	5.5	4.8	4.5	-	-
10.0	9.5	12.5	12.7	14.6	6.5	9.5	7.7	7.1	6.7	6.5	6.0	5.3	5.0	-	-
10.5	10.1	13.1	13.3	15.1	7.1	10.1	8.3	7.7	7.3	7.1	6.6	5.9	5.6	5.3	-
11.0	10.6	13.6	13.8	15.7	7.6	10.6	8.8	8.2	7.8	7.6	7.1	6.4	6.1	5.8	5.2
11.5	11.2	14.2	14.4	16.2	8.2	11.2	9.4	8.8	8.4	8.2	7.7	7.0	6.7	6.4	5.8
12.0	11.7	14.7	14.9	16.7	8.7	11.7	9.9	9.3	8.9	8.7	8.2	7.5	7.2	6.9	6.3
12.5	12.2	15.2	15.4	17.3	9.2	12.2	10.4	9.8	9.4	9.2	8.7	8.0	7.7	7.4	6.8
13.0	12.8	15.8	16.0	17.8	9.8	12.8	11.0	10.4	10.0	9.8	9.3	8.6	8.3	8.0	7.4
13.5	13.3	16.3	16.5	18.3	10.3	13.3	11.5	10.9	10.5	10.3	9.8	9.1	8.8	8.5	7.9
14.0	13.8	16.8	17.0	18.8	10.8	13.8	12.0	11.4	11.0	10.8	10.3	9.6	9.3	9.0	8.4
14.5	14.3	17.3	17.5	19.4	11.3	14.3	12.5	11.9	11.5	11.3	10.8	10.1	9.8	9.5	8.9
15.0	14.9	17.9	18.1	19.9	11.9	14.9	13.1	12.5	12.1	11.9	11.4	10.7	10.4	10.1	9.5
15.5	15.4	18.4	18.6	20.4	12.4	15.4	13.6	13.0	12.6	12.4	11.9	11.2	10.9	10.6	10.0
16.0	15.9	18.9	19.1	20.9	12.9	15.9	14.1	13.5	13.1	12.9	12.4	11.7	11.4	11.1	10.5
16.5	16.4	19.4	19.6	21.4	13.4	16.4	14.6	14.0	13.6	13.4	12.9	12.2	11.9	11.6	11.0
17.0	16.9	19.9	20.1	21.9	13.9	16.9	15.1	14.5	14.1	13.9	13.4	12.7	12.4	12.1	11.5
17.5	17.4	20.4	20.6	22.4	14.4	17.4	15.6	15.0	14.6	14.4	13.9	13.2	12.9	12.6	12.0
18.0	17.9	20.9	21.1	23.0	14.9	17.9	16.1	15.5	15.1	14.9	14.4	13.7	13.4	13.1	12.5
18.5	18.4	21.4	21.6	23.5	15.4	18.4	16.6	16.0	15.6	15.4	14.9	14.2	13.9	13.6	13.0
19.0	18.9	21.9	22.1	24.0	15.9	18.9	17.1	16.5	16.1	15.9	15.4	14.7	14.4	14.1	13.5
19.5	19.5	22.5	22.7	24.5	16.5	19.5	17.7	17.1	16.7	16.5	16.0	15.3	15.0	14.7	14.1
20.0	20.0	23.0	23.2	25.0	17.0	20.0	18.2	17.6	17.2	17.0	16.5	15.8	15.5	15.2	14.6

Notes: IBS Framing: add 0.2 dB EDMAC Framing: rates below 2048 kbps add 0.2 dB, otherwise 0 Reed-Solomon: add an *additional* 0.4 dB to the values shown

Notes:

Appendix D. CDM/CDD NMCS REMOTE PRODUCT MANAGEMENT PROTOCOL

Date	Rev.	Author	Comments
12/08/05	1.0	Harish Talanki	Created from CDM-570/570L NMCS document.
09/10/09	N/A	CEFD Tech Pubs	Document content reformatted to incorporate Addendum A into the MN/CDD564L.IOM CDD-562L/564/564L Installation and Operation Manual as Appendix D.

D.1 Introduction

This appendix defines the Remote Control interface for the CDM/CDD family of products. The primary interface is to be Telnet; however, other interfaces may adapt to the **CIM** implementation, programmatically, via specific **API** calls.

D.2 Architecture

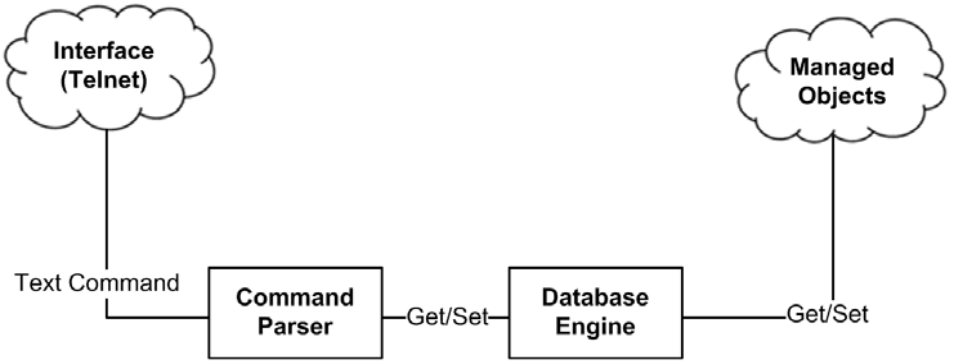


Figure D-1. CDM/CDD NMCS Basic Architecture Layout

The Remote **NMCS** connects to an external interface such as Telnet, and processes basic text-based commands to the **CIM** database manager. As shown in **Figure D-1**, the database manager is responsible for resolving **GET** and **SET** actions to **Local** and **Remote** objects.

D.3 NMCS Protocol

D.3.1 Overview

The sections that follow outline the basic command set supported in this version of the **CIM NMCS** protocol.

D.3.2 Telnet Interface

Telnet interface into the **NMCS** system must be on port 7023, which has been reserved for this protocol by the **IANA**.

The login process requires a user name and password, which are defined by the systems administrator. This user name and password are usually associated to the name and password of an administrator account.

D.3.3 Basic Protocol

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

All messages from Controller to Target require a response as indicated. This will be either to return data that has been requested by the controller, or to acknowledge reception of an instruction to change the configuration of the target.

D.3.4 Command Structure

Controller-to-Target							
Start of Packet	**Target Address**	**Address Delimiter**	**Instruction Code**	**Row Index (Optional)**	**Instruction Code Qualifier**	**Optional Arguments**	**End of Packet**
< ASCII code 60 (1 character)	1-4 characters	/ ASCII code 47 (1 character)	(3 characters)	1-3 characters contained with '[' ']' brackets	= or ? ASCII codes 61 or 63 (1 character)	(n characters)	Carriage Return and Line Feed ASCII codes 13 and 10 [0x0D, 0x0A] (2 characters)

Examples: <0135/TFQ=1949.2345{CR}

<1/rte[1]= rt1|239.022.033.044.32|1|**********|0011|0|0|0|0|3

Target-to-Controller						
Start of Packet	**Target Address**	**Address Delimiter**	**Instruction Code**	**Instruction Code Qualifier**	**Optional Arguments**	**End of Packet**
> ASCII code 62 (1 character)	(4 characters)	/ ASCII code 47 (1 character)	(3 characters)	=, ?, !, *,#, or ~ ASCII codes 61,63,33,42, 35, or 126 (1 character)	(From 0 to n characters)	Carriage Return, Line Feed ASCII codes 13,10 (2 characters)

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

<RTE[4]?

>0001/rte[4]=rt4|239.022.033.044.32|1|**********|0011|0|0|0|0|3

D.3.4.1 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. For multi line text message, each line should end with a new line character '\n'. The carriage return & new line [\r\n] combination should present only at the end of the message.

D.3.4.2 Target Address

Up to 9,999 devices can be uniquely addressed. While any number of devices can be addressed, all devices should be associated with single IP Address.

- For a CDM-570, an address of '1' is being used to address both modulator and demodulator.
- For the CDD-564, each demodulator is identified by unique address, from 1 to 4 respectively, for all four demodulators.

The address is not significant for commands targeted system wide. But, it does has significance when associated with demod specific commands like Frequency, data rate etc.

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.

D.3.4.3 Address Delimiter

This is the character '/' (forward slash) (ASCII code 47).

D.3.4.4 Instruction Code

This is a three-character alphabetic sequence that identifies the subject of the message. Wherever possible, the instruction codes have been chosen to have some significance.

For Example: TFQ for **T**ranmsit **F**re**Q**uency; **RMD** for **R**eceive **M**o**D**ulation 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).

D.3.4.5 Instruction Code Qualifier

This single character 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	This code 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) that follow it. For example: In a message from Controller-to-Target, TFQ=0950.0000 would mean 'set the Tx frequency to 950 MHz'
? (ASCII code 63)	This code 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)	This code is used in two ways: First, if the Controller has sent a query code to a Target (for Example: TFQ?, meaning '*what is the Tx 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, and if the value sent in the argument is valid, then the Target will acknowledge the message by replying with TFQ= (with no message arguments).
! (ASCII code 33)	This code 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. If the controller sends an instruction code which the target does not recognize, then the target will acknowledge the message by echoing the invalid instruction, followed by the ! character. Example: XYZ! At present, the CDD software is not organized to categorize various error codes, so it combines various errors into a single code (!).

D.3.4.6 Optional Message Arguments

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

D.3.4.7 Table Support Qualifier

In order to support accessing information that is represented in a table, the following syntax is supported:

D.3.4.7.1 Index

The desired row shall be encapsulated within '[' and ']' brackets. This option is only applicable for data that is represented as table. For example:

Get a route table entry (will return the contents of the four route table entry):

```
<1/RTE[4]?
```

Get a the entry route table (will return the contents of the four route table entry):

```
$NumEntries = <0/RTN?

for($I=1, $I<$NumEntries, $I++)
{
  entryInfo[$I] = <0/RTE[$I]?
}
```

To add a new route table entry:

```
$NumEntries = <0/RTN?
$NewRouteEntry = $NumEntries + 1

<1/RTE[$NewRouteEntry]=       rt4|239.011.033.022.32|1|192.168.001.221|00ab|1|0|1|4|3
```

To modify an existing route table entry:

```
<1/rte[1]=          rt4|239.011.033.022.32|1|192.168.001.221|00ab|1|0|1|4|3
```

D.3.4.7.2 Argument Lists

In order to enforce atomic reads and writes, and to also allow for checking related parameter for validity, multi-argument lists have the following format:

- Arguments are positioned in fixed length format (see specification for each argument).
- '|' Is used to separate different argument values from each other.

D.3.4.8 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' (ASCII code 13), and 'Line Feed' (ASCII code 10). Both indicate the valid termination of a packet.

D.4 Commands and Queries

Unless otherwise specifically called out in the IP Commands section, the remaining commands are provided as part of the base modem command set and are defined in the ***CDM-570/570L Satellite Modem with Optional IP Module Installation and Operation Manual.***

Index Notes: Column 'C' = Command; **Column 'Q'** = Query: Columns marked '**X**' designate instruction code as *Command only*, *Query only*, or *Command/Query*.

CODE	C	Q	PAGE
ACD	X		D-10
ACE	X	X	D-10
ACL	X	X	D-10
ADP	X	X	D-10
ADU	X	X	D-10
ARD	X		D-20
ARN		X	D-20
ARP	X	X	D-20
BBI	X	X	D-22
BLI	X	X	D-22
CCA	X	X	D-22
DDK	X	X	D-10
DEK	X	X	D-10
DRA	X	X	D-20
DRM	X	X	D-11
DSR	X	X	D-17
DTG		X	D-17
EMO	X	X	D-11
ERT		X	D-30
ESC	X		D-30
ESM	X	X	D-16

CODE	C	Q	PAGE
ETM		X	D-16
ETT		X	D-30
HAD	X	X	D-16
HRA	X	X	D-11
HRR	X	X	D-11
HRU	X	X	D-11
ICV	X	X	D-20
IDT		X	D-28
IFT		X	D-29
IFW		X	D-23
IGE	X	X	D-11
IGQ	X	X	D-20
IGT		X	D-21
IMR	X	X	D-21
INM	X	X	D-21
IPA	X	X	D-16
IPM	X	X	D-16
IPS		X	D-28
IRI	X	X	D-21
IRO	X	X	D-21
IRQ	X	X	D-21
LPS	X		D-22

CODE	C	Q	PAGE
PFI	X	X	D-22
PRA	X	X	D-11
PRE	X	X	D-12
QML		X	D-17
QSA	X		D-31
QSC	X		D-31
QSD	X		D-17
QSE	X	X	D-12
QSM	X	X	D-18
QSN		X	D-18
QSR	X	X	D-19
QST		X	D-31
QTL	X	X	D-18
RCG		X	D-25
RED		X	D-25
RFD	X		D-23
RHE	X	X	D-12
ROP	X	X	D-12
ROU	X	X	D-12
RSC	X		D-28
RST	X		D-23
RTD	X		D-25
RTE	X	X	D-25
RTN		X	D-25
RWP	X	X	D-12
RWU	X	X	D-12

CODE	C	Q	PAGE
SCG		X	D-12
SCS	X		D-24
SDM	X	X	D-12
SDN	X	X	D-13
SIA	X	X	D-13
SPE	X	X	D-13
SRC	X	X	D-13
SRT		X	D-27
SSC	X	X	D-13
SSL	X	X	D-13
SSN	X	X	D-13
STA	X	X	D-14
STB	X	X	D-14
STT		X	D-27
STV	X	X	D-14
SWC	X	X	D-14
SWM	X	X	D-14
SWR		X	D-24

CODE	C	Q	PAGE
TDE	X	X	D-14
TET	X	X	D-15
THE	X	X	D-15
TLE	X	X	D-15
TPE	X	X	D-15
USI	X	X	D-24
UUT	X	X	D-24
WSC	X		D-27

D.4.1 IP Commands and Queries

D.4.1.1 Admin Commands and Queries

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
Access List Delete	ACD=x	1-byte numerical 1…4	Command only. Deletes the specified access list entry from the access list table in the form <1/ACD=x, where x is value of 1…4	ACD= ACD!	N/A	ACD=x [1..4] (see Description of Arguments)
Access List Enforcement	ACE=	1 byte, value of 0 or 1	Command or Query. Enables or disables access list enforcement, where: 0 = Disabled 1 = Enabled	ACE = ACE!	ACE?	ACE=x (see Description of Arguments)
Access Client List	ACL=	18 bytes, numerical	Command or Query. Sets the Access list entry, which contains a subnet and mask. Once access list is enabled, only devices from the allowed ranges are allowed to communicate with the modem, in the form xxx.xxx.xxx.xxx/yy, where: xxx.xxx.xxx.xxx is the IP address, and yy is the network prefix (0-31) Returns 000.000.000.000/32 when a particular Access Client is not configured. Example: <1/ACL[1]=010.006.030.001.24	ACL = ACL!	ACL?	ACL=xxx.xxx.xxx.xxx.yy (see Description of Arguments)
Administrator Password	ADP=	11 bytes No spaces allowed.	Command or Query. Changes the administrator password. Example: ADP=comtech	ADP = ADP!	ADP?	ADP=xxxxxxxxxxx (see Description of Arguments)
Administrator UserName	ADU=	11 bytes No spaces allowed.	Command or Query. Changes the administrator username. Example: ADU=comtech Note: To activate the new user name, ADP must be issued immediately after ADU. Then query ADU? to see new value.	ADU = ADU!	ADU?	ADU=xxxxxxxxxxx (see Description of Arguments)
3xDES Decrypt Key	DDK[1..8]=	48 bytes, numerical	Command or Query. 3xDES decrypt key, where all are HexadeCIMal digits. [0…F], a total of 48 Hex digits. Example: DDK:0=22222222222222224444444444444444666666666666666	DDK = DDK!	DDK[1..8]?	DDK=x [1..48] (see Description of Arguments)
3xDES Encrypt Key	DEK[1..8]=	48 bytes, numerical	Command or Query. 3xDES encrypt key [192-Bit], where all are HexadeCIMal digits. [0…F], a total of 48 Hex digits. Example: DEK[1]=22222222222222224444444444444444666666666666666	DEK = DEK!	DEK[1..8]?	DEK=x [1..48] (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
Downlink Route All Multicast	DRM=	1 byte, 0 or 1	Command or Query. Enable/Disable Downlink Route All Multicast option, where: 0 = Disabled 1 = Enabled	DRM= DRM!	DRM?	DRM=x x – 0 or 1.
EasyConnect Multicast Option	EMO=	1 byte, value of 0 or 1	Command or Query. Valid only when in EasyConnect mode on CDM-570. Enables or disables forwarding of multicast traffic while in EasyConnect mode, where: 0 = Disabled 1 = Enabled	EMO = EMO!	EMO?	EMO=x (see Description of Arguments)
Header Compression Refresh rate – All Others	HRA=	3 bytes	Command or Query. Restrictions: CDM-570 only Refresh rate for all other streams, where Header compression refresh rate = 1 to 600; Resolution=1 packet Example: HRU =50	HRA = HRA!	HRA?	HRA=xxx (see Description of Arguments)
Header Compression Refresh rate – UDP/RTP1	HRR=	3 bytes	Command or Query. Restrictions: CDM-570 only Refresh rate for UDP/RTP1 streams, where Header compression refresh rate = 1 to 600, Resolution=1 packet Example: HRR=50	HRR = HRR!	HRR?	HRR=xxx (see Description of Arguments)
Header Compression Refresh rate –UDP	HRU=	3 bytes	Command or Query. Restrictions: CDM-570 only Refresh rate for UDP only stream, where Header compression refresh rate = 1 to 600; Resolution=1 packet Example: HRU =50	HRU = HRU!	HRU?	HRU=xxx (see Description of Arguments)
IGMP enable/disable	IGE=	1 byte, value of 0 or 1	Command or Query. Enables or disables the IGMP feature, where: 0 = Disabled 1 = Enabled	IGE = IGE!	IGE?	IGE=x (see Description of Arguments)
Payload Compression Refresh rate	PRA=	3 bytes	Command or Query. Restrictions: CDM-570 only Refresh rate for all other streams, where Payload compression refresh rate = 1 to 600; Resolution=1 packet Example: PRU =50	PRA = PRA!	PRA?	PRA=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
Ping Reply Enabled	PRE=	1 byte, value of 0 or 1	Command or Query. Enables or disables ping reply, where: 0 = Disabled 1 = Enabled Note: When disabled, the modem will not respond to pings (network security feature)	PRE = PRE!	PRE?	PRE=x (see Description of Arguments)
Enable/Disable QoS Feature	QSE=	1 byte value 0 – Disable 1 – Enable	Command or Query. Sets the Quality of Service feature, where: 0 = Disabled 1 = Enabled	QSE= QSE!	QSE?	QSE=x
RX Header Compression enable/disable	RHE=	1 byte, value of 0, 1, 2 or 3	Command or Query. Enables or disables the Transmit 3xDES feature, where, 0 = Disabled 1 = Enabled Restriction: *Cannot* enable if the 3xDES FAST feature has not been purchased	RHE = RHE!	RHE?	RHE =x (see Description of Arguments)
ReadOnly Password	ROP=	11 bytes No spaces allowed.	Command or Query. Changes the ReadOnly password. Example: ROP =comtech	ROP = ROP!	ROP?	ROP=xxxxxxxxxx (see Description of Arguments)
ReadOnly UserName	ROU=	11 bytes No spaces allowed.	Command or Query. Changes the ReadOnly username. Example: ROU=comtech Note: To activate the new user name, ROP must be issued immediately after ROU.	ROU = ROU!	ROU?	ROU=xxxxxxxxxx (see Description of Arguments)
ReadWrite Password	RWP=	11 bytes No spaces allowed.	Command or Query. Changes the ReadWrite password. Example: RWP=comtech	RWP = RWP!	RWP?	RWP=xxxxxxxxxx (see Description of Arguments)
ReadWrite UserName	RWU=	11 bytes No spaces allowed.	Command or Query. Changes the ReadWrite username. Example: RWU=comtech Note: To activate the new user name, RWP must be issued immediately after RWU.	RWU = RWU!	RWU?	RWU=xxxxxxxxxx (see Description of Arguments)
System Configuration Get	None	String of Variable byte size	Query only. Querying SCG? dumps the system configuration. This can be used for updating the GUI parameters. See the Appendix section for more information on individual field.	SCG= SCG!	SCG?	SCG=string of variable byte size.
SMTP Domain Name	SDM=	128 bytes, characters, no spaces	Command or Query. SMTP Domain name of up to 128 characters. Note: Entering an empty string will delete the domain name. To delete the domain name, issue <1/SDM= Example: SMTP=somedomainname	SDM = SDM!	SDM?	SDM=x [1..128] (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
SMTP Destination Name	SDN=	128 bytes, characters,	Command or Query. SMTP Destination name of up to 128 characters. Note: Entering an empty string will delete the destination name. To delete the destination name, issue <1/SDN= Example: <1/SMTP=somedestinationname	SDN = SDN!	SDN?	SDN=x [1..128] (see Description of Arguments)
SMTP Server IP Address	SIA=	15 bytes, numerical	Command or Query. Used to set the IP address of the SMTP server where mail should be sent, in the format xxx.xxx.xxx.xxx, where xxx.xxx.xxx.xxx is the IP address. Example: <1/SIA=010.006.030.001. Note: When not configured, it returns >0001/SIA=0.0.0.0	SIA = SIA!	SIA?	SIA=xxx.xxx.xxx.xxx (see Description of Arguments)
SNMP Enabled	SPE=	1 byte, value of 0 or 1	Command or Query. Enables or disables the snmp interface, where: 0 = Disabled 1 = Enabled Note: When disabled, the user will not be able to use the snmp interface.	SPE = SPE!	SPE?	SPE=x (see Description of Arguments)
SNMP Read Community	SRC=	255 bytes, characters, no spaces	Command or Query. Assigns SNMP read community string. Example: <1/SRC=public Note: Empty string is *not* allowed	SRC = SRC!	SRC?	SRC=x (see Description of Arguments)
SNMP System Contact	SSC=	128 bytes, characters,	Command or Query. Assigns SNMP System Contact string. Example: <1/SSC=Joe Net Admin. Note: If not configured it returns empty string. <1/SSC=	SSC = SSC!	SSC?	SSC=x [1..128] (see Description of Arguments)
SNMP System Location	SSL=	128 bytes, characters,	Command or Query. Assigns SNMP System Location string. Example: <1/SSL=Upstairs back right. Note: If not configured it returns empty string. <1/SSL=	SSL = SSL!	SSL?	SSL=x [1..128] (see Description of Arguments)
SNMP System Name	SSN=	128 bytes, characters,	Command or Query. Assigns SNMP System Name string. Example: <1/SSN=Remote1. Note: If not configured it returns empty string. <1/SSN=	SSN = SSN!	SSN?	SSN=x [1..128] (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
SNMP Trap Destination IP Address	STA=	15 bytes, Numerical	Command or Query. Sets the IP address of the SNMP Trap destination IP Address where traps will be sent, in the format xxx.xxx.xxx.xxx where: xxx.xxx.xxx.xxx is the IP addresss Example: <1/STA=010.006.030.001 Note: If not configured it returns >0001/STA=0.0.0.0	STA = STA!	STA?	STA=xxx.xxx.xxx.xxx (see Description of Arguments)
SNMP Trap Destination IP Address-2	STB=	15 bytes, Numerical	Command or Query. Sets the IP address of the SNMP Trap destination IP Address where traps will be sent, in the format xxx.xxx.xxx.xxx where: xxx.xxx.xxx.xxx is the IP addresss Example: <1/STA=010.006.030.001 Note: If not configured it returns >0001/STB=0.0.0.0	STB = STB!	STB?	STB = xx.xxx.xxx.xxx (see Description of Arguments)
SNMP Trap Version	STV=	1 byte, value of 0 or 1	Command or Query. Specifies the version of SNMP traps that should be sent, where: 1 = Snmpv1 2 = Snmpv2	STV = STV!	STV?	STV = x (see Description of Arguments)
SNMP Write Community	SWC=	255 bytes, characters, no spaces	Command or Query. Assigns SNMP write community string. Example: <1/SWC=public Note: Empty string is ***not*** allowed	SWC = SWC!	SWC?	SWC =x (see Description of Arguments)
System Working Mode	SWM=	1 byte, value of 0 through 1	Command or Query. Sets the system working mode, where: 1 = Router - Small Network 2 = Router - Large Network 3 = Router - Point to Point 4 = Router - Vipersat 5 = EasyConnect. Note: Router-Vipersat mode needs the Vipersat option to be available on the modem. Changing the address/working mode may reboot the modem.	SWM= SWM!	SWM?	SWM =x (see Description of Arguments)
Transmit DES enable/disable	TDE=	1 byte, value of 0, 1, 2 or 3	Command or Query. Enables or disables the Transmit 3xDES feature, where: 0 = Disabled 1 = Enabled (EasyConnect Only mode) 2 = PerRoute (read-only when FAST feature is purchased in router mode) 3 = Unavailable (read-only when FAST feature not purchased) Note: Acts as command only in EasyConnect mode; on router mode, it is read-only. Restriction: Cannot enable if the 3xDES FAST feature has not been purchased.	TDE = TDE!	TDE?	TDE =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
Telnet timeout	TET=	2 bytes	Command or Query. Defines inactivity timeout on CLI menu screen, where Telnet login timeout = 1 to 60; Resolution=1 minute Example: <1/TET=50	TET = TET!	TET?	TET =xx (see Description of Arguments)
TX Header Compression enable/disable	THE=	1 byte, value of 0, 1, 2 or 3	Command or Query. Enables or disables the Transmit 3xDES feature, where: 1 = Enabled (EasyConnect Only mode) 2 = PerRoute (read-only when FAST feature is purchased in router mode) 3 = Unavailable (read-only when FAST feature not purchased) Note: Acts as command only in EasyConnect mode; in router mode, it's read-only. Restriction: Cannot enable if the 3xDES FAST feature has not been purchased.	THE = THE!	THE?	THE =x (see Description of Arguments)
Telnet Enabled	TLE=	1 byte, value of 0 or 1	Command or Query Enables or disables the telnet interface, where: 0 = Disabled 1 = Enabled Note: When disabled, the user will not be able to log in to the telnet interface.	TLE = TLE!	TLE?	TLE =x (see Description of Arguments)
TX Payload Compression enable/disable	TPE=	1 byte, value of 0, 1, 2 or 3	Command or Query Enables or disables the Transmit 3xDES feature, where: 0 = Disabled 1 = Enabled (EasyConnect Only mode) 2 = PerRoute (read-only when FAST feature is purchased in router mode) 3 = Unavailable (read-only when FAST feature not purchased) Note: Acts as command only in EasyConnect mode; in router mode, it's read-only. Restriction: Cannot enable if the 3xDES FAST feature has not been purchased	TPE = TPE!	TPE?	TPE =x (see Description of Arguments)

D.4.1.2 Interface Commands and Queries

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
Ethernet speed mode	ESM=	1 byte, value of 1..5	Command or Query. Specifies the speed and mode of Ethernet interface, where: 1 = Auto 2 = 10 MB/sec Half Duplex 3 = 100 MB/sec Half Duplex 4 = 10 MB/sec Full Duplex 5 = 100 MB/sec Full Duplex	ESM = ESM!	ESM?	ESM = x (see Description of Arguments)
Ethernet MAC	NONE	12 bytes	Query only. Returns the Ethernet MAC address. Example: ETM=0006B0000178	ETM!	ETM?	ETM=xxxxxxxxxxxx (see Description of Arguments)
HDLC Address	HAD	4 bytes, Numerical	Command or Query. Sets the one of four HDLC addresss, where: In small network mode, value is 0x01-0xFE In large network mode, value is 0x0001-0x7FFE To delete, set the value to 0xFFFF. Examples: <1/HAD[3]=AB will set the HDLC address to 0xAB <1/HAD[2]=FFFF will Clear/Delete the HDLC Address. Note: In Point-to-Point or Vipersat modes, the values are not used.	HAD= HAD!	HAD?	HAD= xxxx (see Description of Arguments)
IP Address of Ethernet interface	IPA=	15 bytes length.	Command or Query. Sets the IP address and mask of the Ethernet interface, in the format: xxx.xxx.xxx.xxx where: xxx.xxx.xxx.xxx is the IP address. Example: 010.006.030.001 Notes: To make the IPA= command effective, one needs to issue the IPM command immediately following IPA command. IPM should be issued even if there is no change in the subnet mask. Changing the IP address will cause the telnet/socket connection to break. So, the telnet/application should reconnect to the new IP address after timeout. For Reading also, IPA? is followed by IPM?	IPA = IPA!	IPA?	IPA= xxx.xxx.xxx.xxx (see Description of Arguments)
IP Address Mask of Ethernet Interface	IPM=	Value of 8 – 32	Command or Query. Sets the IP Subnet mask for the interface IP address, where: yy is the submet mask in bits [8..32] Refer to IPA Notes	IPM= IPM!	IPM?	IPM=yy

D.4.1.3 QoS Commands and Queries

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
DiffServ Rule	DSR=	48 bytes, numerical	Command or Query. Note: To set DSR, the system has to be set in DiffServ mode by issuing <1/QSM=3. The value in this is broken into separate values: Read/Get Format: cccc|ddd ddd|mmmmm|MMMMM|p where: cccc = DiffServ class name ddd ddd = DiffServ Code Point. The code point has 0, 1, X mmmmm = Minimum bandwidth in kbps (range = 0..99999 kbps) MMMMM = Maximum bandwidth in kbps (range = 0..99999 kbps) p = priority is fixed and assigned by system. User is allowed to modify Assured Class Rules 9, 10, 11, 12 ONLY, while the QoS [QSM=3] is in DiffServ mode. Write/Set Format Example: DSR[9]=00100|00400 Sets min bw to 100, max bw to 400.	DSR= DSR!	DSR?	DSR =x [1..48] (m = Min value, M = Max value)
DiffServ Table Get	DTG?	String of DiffServ Table	Query only. Displays the complete diffserv rules. Can be issued when QoS mode is set in Diff Serv. There are 12-rows/rules. Each rule is separated by chr(13). >0001/DTG=chr(13) EXFD|101 110|00000|99999|1chr(13) CLS1|001 000|00000|99999|1chr(13) CLS2|010 000|00000|99999|2chr(13) CLS3|011 000|00000|99999|3chr(13) CLS4|100 000|00000|99999|4chr(13) CLS5|101 000|00000|99999|5chr(13) CLS6|110 000|00000|99999|6chr(13) CLS7|111 000|00000|99999|7chr(13) ASF1|001 xx0|00011|01111|8chr(13) ASF2|010 xx0|00022|02222|8chr(13) ASF3|011 xx0|00000|99999|8chr(13) ASF4|100 xx0|00000|99999|8chr(13)chr(10)	DTG= DTG!	DTG?	DTG=ssssss…..ss Display all 12 diffserv rules.
QoS Maximum System Latency	QML=	1-Byte value 0 – 5000 ms.	Query only. Gets the QoS typical system latency Value range from 0 – 5000 mSec.	QML = QML!	QML?	QML=x x = A value of 0-5000 ms
Delete a QOS Rule entry	QSD=	QSD =2bytes, numerical	Command Only. Deletes the QoS rule entry at the specified index number Example: QSD=3 (deletes the 3rd qos rule)	QSD = QSD!	N/A	QSD = xx (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
QoS mode	QSM=	1 byte, value of 1, 2 or 3.	Command or Query. QoS operating mode, where: 1 = Priority/Max 2 = Min/Max 3 = DiffServ Example: <1/QSM=2	QSM = QSM!	QSM?	QSM =x (see Description of Arguments)
Number of QOS Rule entries	QSN	QSN=2 bytes numerical	Query Only. Returns the number of active QoS rules. Does not count default rule. Note: This command should be issued whenever a new rule is added/deleted.	QSN = QSN?	QSN?	QSN = xxx (see Description of Arguments)
QoS Typical System Latency	QTL=	1-Byte value 0 – 5 Seconds.	Command or Query. Sets/Gets the QoS typical system latency. At low data rates of up to 1Mbps this value can range from 0 – 5 seconds. At data rates above 1Mbps, the value range from 0 – 2 seconds.	QTL = QTL!	QTL?	QTL=x x = value of 0-5 Seconds.

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
QoS Rule	QSR=	QSR[0..32]= Index-0 is the default rule	Command or Query. QSR=tt|p|sss.sss.sss.sss/ss|ddd.ddd.ddd.ddd/dd|AAAAA|BBBBB|CCCCC|DDDDD|mmmmm|MMMMM|w|f Where t = Protocol Type: 01 - UDP 02 - TCP 03 - ICMP 04 - RTP 05 - VOCE 06 - VDEO 07 - RTPS 08 - FTP 09 - HTTP 10 - TELN 11 - SMTP 12 - SNMP 13 - SAP 14 - ORCL 15 - CTRX 16 - SQL 17 - IP 18 - N-IP 19 - ALL [Valid only for default rule] Where p = PRI=1..8 (only applies in max/priority mode). In Min/Max mode priority for all rules is fixed at 8. User should not be alled to change priority in Min/Max mode. Priority-9 is being used for default rule, and obtained from PARAM file. Pri-9 cannot be used for configuring other rules. Where s = Source IP SIP=xxx.xxx.xxx.xxx/yy [yy – subnet mask]. All '*' signifies all IP address range[***.***.***.***/**]. Where d = Destination IP DIP=xxx.xxx.xxx.xxx/yy [yy – subnet mask]. All '*' signifies all IP address range, like [***.***.***.***/**] All '*' signifies all port range of 00000 – 65535 for TCP/UDP. All port numbers should in fixed length of 5-chars Where A = TCP/UDP Source Port range SPS=aaaaa [Source Port range Start] Where B = [Source Port range Finish] SPF=bbbbb Where C = [Dest Port range Start] DPS=ccccc Where D = [Dest Port range Finish] DPF=ddddd Where m = MINBW = mmmmm (meaningful in min.max mode). This is 0 in Max Priority mode. The number should be mentioned with preceding zeros, to make it a fixed length of 5-chars. Where M = MXB=MMMMM (meaningful in max/pri and min./max modes only). The number should be mentioned with preceding zeros, to make it a fixed length of 5-chars. W = WRED = 0-No 1-Yes F = FILTER = 0-No 1-Yes Example: >0001/qsr[1]=05|5|***.***.***.***/**|***.***.***.***/**|*****|*****|*****|*****|00000|22222|0|1 Example: [Default rule] Note: All QoS related commands can only be issued only when the system is in QoS-Max/Priority or QoS-Min/Max mode. It may return QSR! While not in any of these modes.	QSR = QSR!	QSR[0..32]? Index-0 is the default rule	QSR[0..32] = See Description of Arguments Index-0 is the default rule

D.4.1.4 Protocol Commands and Queries

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
Delete an ARP entry	ARD=	ARD=xxx.xxx.xxx.xxx	Command Only. DeleteS the ARP entry associated with the specified IP Address. xxx.xxx.xxx.xxx IP address of ARP entry to delete. Example: <1/ARD=192.168.001.100	ARD = ARD!	N/A	ARD=xxx.xxx.xxx.xxx (see Description of Arguments)
Number of ARP entries	None	4 bytes, numerical	Query Only. Returns the number of static arp entries. Note: This command should be issued whenever a new ARP Entry is added/deleted.	ARN = ARN!	ARN?	ARN=nnnn (see Description of Arguments)
Static Arp table	ARP=	256 bytes characters	Command or Query. ARP Entry in format xxx.xxx.xxx.xxx|mm:mm:mm:mm:mm:mm where: xxx.xxx.xxx.xxx = IP address. mm:mm:mm:mm:mm:mm. = MAC Address. Note: Duplicate IP addresses are not allowed. They must also be locally attached (on the same subnet as the Ethernet interface). Using a different index with existing IP address may modify the existing ARP entry, rather than creating new one. Example: <1/arp[1]=010.020.030.040|00:11:ab:33:44:66 Returns >0001/ARP! When there is no ARP entry.	ARP = ARP!	ARP[1..256]?	ARP=x [1..256] (see Description of Arguments)
DHCP Relay IP Address	DRA=	15 bytes, numerical	Command or Query. Used to set the IP address of the DHCP Server, in the format xxx.xxx.xxx.xxx where: xxx.xxx.xxx.xxx is the IP address Example: <1/DRA=010.006.030.001 Returns >0001/DRA=0.0.0.0 when not configured.	DRA = DRA!	DRA?	DRA = xxx.xxx.xxx.xxx (see Description of Arguments)
IGMP Client: Version	ICV	1 byte, 0 or 1	Command or Query. Set the IGMP Version for Unsolicited Reports, where: 0 = V1 1 = V2 Recognize IGMP Queries Example: ICV =0	ICV = ICV!	ICV?	ICV =xxx (see Description of Arguments)
IGMP Server: IGMP Query Period	IGQ=	IGQ=xxx Where xxx is 1 to 600	Command or Query Sets the IGMP Query period in seconds while modem acting as IGMP Server.	IGQ= IGQ!	IGQ?	IGQ=xxx xxx – value of 1 to 600.

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
IGMP View Table	None	String value	Query only. Displays the IGMP table with different states. To see the entries, the system should have the IGMP feature enabled, and should be properly configured to forward IGMP packets. See WEB interface for proper table format. Note: Not yet supported in 1.5.3 Release, will be available in next release.	IGT= IGT!	IGT?	IGT=sssssss Table of IP Addresses and their state information.
IGMP Server: IGMP Max Resp. Time	IMR=	IMR=xxx Where xxx is value of 1 to 598	Command or Query. Sets the Maximum response time for the IGMP Query in seconds. Should always be 2 less than query period. The range is 1 to (IGQ – 2). If IGQ is at 30, then IMR can be set from 1 through 28.	IMR= IMR!	IMR?	IMR=xxx xxx - value of 1 to 598.
IGMP Server: Number of Missed Responses	INM=	2 bytes, Numerical 1..30	Command or Query. Number of missed responses before leaving the IGMP Group. Configured from 1…30 Example: INM=15	INM = INM!	INM?	INM =xxx (see Description of Arguments)
IGMP Client: Unsolicated Report Internval	IRI=	2 bytes 0..25	Command or Query. Sets the unsolicited Report Interval [Modem as Client], where: Range = 1..25 Example: <1/IRI=14	IRI = IRI!	IRI?	IRI =xxx (see Description of Arguments)
IGMP Client Router Alert Option for V1	IRO=	1 byte, 0 or 1	Command or Query. Enables/Disables Router Alert option for V1 Reports, where: 0 = No 1 = Yes Example: IRO =0	IRO = IRO!	IRO?	IRO =xxx (see Description of Arguments)
IGMP Client Recognize Queries	IRQ=	1 byte, 0 or 1	Command or Query. Enable/Disable Recognizing IGMP Queries, where: 0 = No 1 = Yes Example: IRQ=0	IRQ = IRQ!	IRQ?	IRQ =xxx (see Description of Arguments)

D.4.1.5 Operations and Maintenance Commands and Queries

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
Base Modem Boot From	BBI=	1 byte value 0,1,2	Command or Query. The binary image, which will be used by the base modem, to boot with, where: 0 = Latest 1 = Image in Slot# 1 2 = Image in Slot#2. Example: <1/BBI=0	BBI= BBI!	BBI?	BBI=x (see Description of Arguments)
Boot From Software Image	BLI=	1 byte, value of 0,1,2	Command or Query. Image which will be used the next time the system is booted, where: 0 = Latest 1 = Bulk Image # 1 2 = Bulk Image # 2 Example: BLI=1 (which is Image #1 active)	BLI = BLI!	BLI?	BLI =x (see Description of Arguments)
Codecast Multicast Address	CCA=	Multicast IP Address in xxx.xxx.xxx.xxx format	Command or Query. Sets the Code cast multicast address, through which the modem can receive the software updates via vLoad application. Only Multicast address in the range 224.xxx.xxx.xxx To 239.xxx.xxx.xxx are allowed. There are some reserved multicast addresses which cannot be used. This cannot be deleted.	CCA= CCA!	CCA?	CCA=xxx.xxx.xxx.xxx (see Description of Arguments)
Load Params from permanent storage	LPS=	1-Byte value 1 – load parameters	Command only. Set to '1' to load the system with parameters from permanent storage/flash. This may force unit reboot, depending on the mode of operation.	LPS= LPS!	N/A	LPS=x (see Description of Arguments)
Param file image to use	PFI=	1 byte, value of 1 or 3	Command or Query. Image which will be updated the next time firmware is uploaded to the system: 1 = Param1 3 = Factory Default To restore the Factory Defaults, set PFI=3 and issue RST to reset the box. This would bring up the box with factory default configuration. Example: PFI =1 (using param image on flash)	PFI = PFI!	PFI?	PFI =x (see Description of Arguments)

<table>
<tr><th>Parameter Type</th><th>Command (Instruction Code and Qualifier)</th><th>Arguments for Command or Response to Query</th><th>Description of Arguments</th><th>Response to Command</th><th>Query (Instruction Code and Qualifier)</th><th>Response to Query</th></tr>
<tr><td>IP Software Information</td><td>None</td><td>String</td><td>Query only.
Complete IP software information:
Example: FRW=
System time is THU DEC 22 14:53:50 2005
Booted using image #1
Using configuration parameters from PARAM #
<table>
<tr><th>Type</th><th>Date</th><th>Time</th><th>Name</th><th>Rev</th><th>Len</th></tr>
<tr><td>Boot</td><td>1/24/2006</td><td>15:26</td><td>FW/10873-1c</td><td>1.1.3</td><td>460804
chr(13)</td></tr>
<tr><td>IP Bulk#1</td><td>12/27/2005</td><td>17:27</td><td>5.3 Pre</td><td>1.5.3</td><td>2607240
chr(13)</td></tr>
<tr><td>IP Bulk #2</td><td>12/14/2005</td><td>14:19</td><td>5.3 Pre</td><td>1.5.3</td><td>2604308
chr(13)</td></tr>
<tr><td>EVENT LOG</td><td>02/01/2006</td><td>14:10</td><td>eventlog</td><td>1.5.3</td><td>128000
chr(13)</td></tr>
<tr><td>PARAM</td><td>1/26/2006</td><td>18:29</td><td>console</td><td>1.5.3</td><td>5160
chr(13)</td></tr>
<tr><td>BaseBoot</td><td>03/30/2004</td><td>-- --</td><td>FW/10804-1-</td><td>1.1.1</td><td>----
chr(13)</td></tr>
<tr><td>BaseBulk#1</td><td>01/26/2006</td><td>-- --</td><td>FW/10805T</td><td>1.5.1N</td><td>----
chr(13)</td></tr>
<tr><td>BaseBulk#2</td><td>01/04/2006</td><td>-- --</td><td>FW/10805R</td><td>1.5.1g</td><td>----
chr(13)
chr(10)</td></tr>
</table></td><td>IFW!</td><td>IFW?</td><td>IFW =x….x
(see Description of Arguments)</td></tr>
<tr><td>Restore Factory Defaults</td><td>RFD</td><td>1-Byte value
1 – restore</td><td>Command only.
Set to ‘1’ to bring the modem back to factory defaults. This may force unit reboot, depending on the mode of operation.</td><td>RFD=
RFD!</td><td>N/A</td><td>RFD=x
(see Description of Arguments)</td></tr>
<tr><td>Reset Unit</td><td>RST</td><td>1 byte value.
1 – reset system</td><td>Command only.
Set to ‘1’ to reset the system. Telnet2 connection needs to be re-established.</td><td>RST=
RST!</td><td>N/A</td><td>RST=x
(see Description of Arguments)</td></tr>
</table>

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
Save System Configuration Parameters	SCS=	1 byte value 1 – Save config	Command only Set to '1' to save all the active system configuration on to the Flash.	SCS= SCS!	N/A	SCS=x (see Description of Arguments)
Software Revision	N/A	34-37 bytes	Query only. Returns the value of the internal software revision installed in the unit. Example: >0001/SWR=Boot:1.1.1 Bulk1:1.5.1u Bulk2:1.5.1P	SWR!	SWR?	SWR=Boot:x.y.zz Bulk1:x.y.zz Bulk2:x.y.zz (see Description of Arguments)
Upgrade Slot	USI=	1 bytes, value of 0,1, or 2	Command or Query. Slot to upgrade new IP firmware where: 0 = Oldest 1 = Image 1 2 = Image 2 Example: UPS=0	USI = USI!	USI?	USI=x (see Description of Arguments)
Unit Up Time	N/A	String value	Query only Displays the unit up time in days, hours, minutes & seconds. Example: >0001/UUT=0 days 0 hours 13 mins 15 secs	N/A	UUT?	UUT=sssssss (see Description of Arguments)

D.4.1.6 Redundancy Query

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
Redundancy State	N/A	1 byte, value of 0 or 1	Query only. Returns the redundancy state of the unit, where 0 = Offline 1 = Online Example: RED=1 (which is Online)	N/A	RED?	RED=x (see Description of Arguments)

D.4.1.7 Routing Commands and Queries

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
Route Table Get	N/A	N/A	Query only. Gets the whole Routing Table of the modem. Each route entry is separated by '\r' [chr(13)] Notes: The route table will be displayed only if system's working mode is "Router –Small, Router-Large, Router-PtP. If the system is in EasyConnect mode, it may return RCG!	RCG!	RCG?	RCG= xxxxxxxxxxxxx xxxxxxxxxxxxx
Delete route entry	RTD=	RTD=4 bytes, numerical	Command Only. Deletes the route entry at the specified index number, if configured. Note: Returns RTD! if there is no route at the index.	RTD =	RTD!	RTD=xx.xx (see Description of Arguments)
Number of route entries	N/A	RTN=3 bytes, numerical	Query Only. Returns the number of route entries in the route table. Note: This command should be issued whenever a new route is added/deleted.	RTN = RTN!	RTN?	RTN=xxxx (see Description of Arguments)

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments	Response to Command	Query (Instruction Code and Qualifier)	Response to Query
Route Table	RTE	RTE[1..256]=variable	Command or Query. In the form sssssssssssss|ddd.ddd.ddd.ddd/DD|i|nnn.nnn.nnn.nnn|hhhh|t|p|c|k|S where: s = Route Name up to 13 characters. It should be unique. Reusing of route names with different index, will end up modifying the existing route. d = Destination IP Address in xxx.xxx.xxx.xxx/yy where: xxx.xxx.xxx.xxx is IP address and yy – Subnet mask bits. To mean 'Any IP Address' indicate it by ***.***.***.***/** format. D = Destination Subnet Mask Bits. i = Interface 1 – Sat and 0 – Ethernet n = Next Hop IP Address in xxx.xxx.xxx.xxx format. To be valid the next hop should be on the same subnet as the router IP Address. This field will be all '*' for a 'SAT' directed route. It means, for a route with valid HDLC address this field will be '**********'. h = HDLC Addr in 4-digit hexadeCIMal number. Valid range is 0x00 to 0xFE in Router-Small Network mode. and 0x0000 to 0x7FFE for Router-Large Network mode. This field will be all '*' for 'ETH' directed route, meaning if the route has a valid next-hop, then this field is '****' [meaning HDLC Address is not Used.]. HDLC Address is not used in point-to-point mode, may default to '1'. t = Header Compression 0 = No 1 = Yes. p = Payload Compression 0 = No 1 = Yes. c = DES Encryption 0 = No 1 = Yes. k = DES Key to use 0 = Don't use any key 1 – 8 = use as mentioned, and 9 = Use Random key. S = Multicast state 0 = None 1 = Eth-to-Sat 2 = Sat-to-Eth 3 = toBoth When called using an existing index, the command is treated as a "modify". Only new routes can be added at the END of the list: Example: RTN? RTN=3 <1/rte[3]=rt3|239.111.102.222.32|0|192.168.001.022|00AB|0|0|1|5|3 Sat Directed Route: >0001/RTE[1]=rt1|011.012.013.014/32|1|***.***.***.***|1111|0|0|0|0|0 Eth Directed Route: >0001/RTE[4]=rt4|012.013.014.015/32|0|192.168.001.111|****|0|0|0|0|0 Note: To be able to set/get the route entries, the system should be in the routing. It may return RTE! if system is in EasyConnect mode.	RTE = RTE!	RTE[1..256]?	RTE[1..256] = xxx (see Description of Arguments)

D.4.1.8 Statistics Commands and Queries

D.4.1.8.1 Wan Stats

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
WAN RX: Statistics	None	10 bytes, Numerical	Query only. Displays all WAN Receive Statistics.		SRT!	SRT?	Text display of all WAN/Satellite Transmit Statistics. \r =CR = 0x0D \n = Newline = 0x0A
			WAN Rx Bad Address Count WAN Rx Pkt Proc CRC Errors WAN Rx Abort/Oclet Errors WAN Rx Overrun Errors WAN Rx HDLC CRC Errors WAN Rx HDLC Payload Byte Count WAN Rx HDLC Header Byte Count WAN Rx HDLC Packet Count WAN Rx Invalid FlowID Errors WAN Rx SAR Re-Assemble Errors WAN Rx Header Decomp errors WAN Rx Memory Alignment Errors WAN Rx Bad CRC Errors	[0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13)chr(10)			
WAN TX: Statistics	None	10 bytes, Numerical	Query only. Displays all WAN Transmit Statistics.		STT!	STT?	Text display of all WAN/Satellite Transmit Statistics. \r =CR = 0x0D \n = Newline = 0x0A
			WAN Tx Error – No Route WAN Tx Error – Packet Start WAN Tx Error – Packet Front Length WAN Tx Error – Packet End Length WAN Tx Packet Invalid Length WAN Tx Packet Dropped – Sat Overdriven WAN Tx HDLC Header Byte Count WAN Tx HDLC Payload Count WAN Tx HDLC Packet Count WAN Tx Utilization Ethernet Traffic Destined to WAN Actual Satellite Traffic (kbps) Percentage of WAN Bandwidth Saved	[0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13)chr(10)			
WAN Stats Clear	WSC=	1Byte Numerical	Command only. Set to '1' to clear all WAN Statistics – clears both Transmit & Receive Stats.		WSC=	N/A	WSC= Clear WAN Stats.

D.4.1.8.2 IP Stats

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
Clear IP Route Statistics	RSC=	1Byte number 1 – Clear stats	Command only. Set this value to '1' to clear all IP Route Statistics – clears IP Route Stats, IP Filtered Stats, IP Dropped Stats.	RSC= RSC!	RSC?	RSC!
IP Dropped Statistics	None	10bytes numerical values	Query only. Displays all IP Route Dropped Packet Statistics in text. Dropped – Bad IP Header Checksum [0]chr(13) Dropped – Bad Buffer Length [0]chr(13) Dropped – Bad IP Version [0]chr(13) Dropped – TTL Expired [0]chr(13) Dropped – No Route [0]chr(13) Dropped – No ARP Entry [0]chr(13) Dropped – Multicast [0]chr(13) Dropped – Multicast Disabled Group [0]chr(13) Dropped – Total [0]chr(13)	IDT!	IDT?	Text display of all IP Dropped stats. \r =CR = 0x0D \n = Newline = 0x0A
IP Route Stats	N/A	10 bytes, Numericals	Query only. Displays all IP Route Packet Statistics in text. Total Packets From Etheret [58]chr(13) Total Packets To Ethernet [56]chr(13) Unicast Packets To Ethernet [56]chr(13) Multicast Packets To Ethernet [0]chr(13) Broadcast Packets To Ethernet [0]chr(13) Total Packets From Satellite [0]chr(13) Total Packets From Endstation [61]chr(13) Total Packets To Endstation [58]chr(13) IGMP Packets Received [0]chr(13) IP Option Packets Received [0]chr(13)chr(10)	IPS!	IPS?	Text display of all IP Route Stats. \r =CR = 0x0D \n = Newline = 0x0A

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 Filtered Stats	None	10 bytes, Numerical	Query only. Displays all IP Route Filtered Packet Statistics in text.		IFT!	IFT?	Text display of all IP Filtered stats. \r =CR = 0x0D \n = Newline = 0x0A
			Filtered – Boot	[8]chr(13)			
			Filtered – Flow Descriptor	[0]chr(13)			
			Filtered – Unknow Reason Code	[0]chr(13)			
			Filtered – Flow Correlator	[0]chr(13)			
			Filtered – Management Path	[0]chr(13)			
			Filtered – WAN Scaling	[0]chr(13)			
			Filtered – Ping	[0]chr(13)			
			Filtered – Access Control	[0]chr(13)			
			Filtered – Vipersat MCP	[0]chr(13)			
			Filtered – Vipersat UCP	[0]chr(13)			
			Filtered – Vipersat Remote	[0]chr(13)			
			Filtered – Codeload	[0]chr(13)			
			Filtered – Multicast	[0]chr(13)			
			Filtered – Bad Packet	[0]chr(13)			
			Filtered – Route	[0]chr(13)			
			Filtered – QoS Rule	[0]chr(13)			
			Filtered – Vipersat Loop	[0]chr(13)			
			Filtered – Bad Header Loop	[0]chr(13)			
			Filtered – Bad Data Ptr	[0]chr(13)			
			Filtered – MAC Split error	[0]chr(13)			
			Filtered – L3 Type Error	[0]chr(13)			
			Filtered – Local Destination	[0]chr(13)			
			Filtered – Redundancy Error	[0]chr(13)			
			Filter – ICMP Filter	[0]chr(13)			
			Filter – Port Error	[0]chr(13)			
			Filter - Total	[8]chr(13)chr(10)			

D.4.1.8.3 Ethernet Stats

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
Ethernet Rx Statistics	None	10 bytes, Numericals	Query only. Displays all the Ethernet Receive Statistics in text.		ERT!	ERT?	Text display of all Ethernet Receive statistics. \r =CR = 0x0D \n = Newline = 0x0A
			Ethernet Tx Bytes Ethernet Tx Good Frames Ethernet Tx Max Collision Count Etherent Tx Late Collision Count Ethernet Tx DMA Underrun Errors Ethernet Tx Lost Carrier Sense Count Ethernet Tx Deferred Count Ethernet Tx Single Collision Count Ethernet Tx Multicast Collision Count Ethernet Tx Total Collision Count	[0994]chr(13) [112]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13)chr(10)			
Clear Ethernet Stats	ESC=1	1byte number. 1 – Clear stats	Command only. Set value to '1' to clear all the Ethernet Receive & Transmit Statistics.		ESC= ESC!	ESC?	ESC!
Ethernet Tx Statistics	None	10 bytes, Numericals	Query only. Displays all the Ethernet Transmit Statistics in text.		ETT!	ETT?	Text display of all Ethernet Transmit statistics. \r =CR = 0x0D \n = Newline = 0x0A
			Ethernet Rx Bytes Etherent Rx Good Frames Ethernet Rx CRC Error Frames Ethernet Rx Allignment Errors Ethernet Rx Resource Errors Ethernet Rx Collision Detect Errors Ethernet Rx Runt Frames Ethernet Rx Flow Control Pause Frames	[6786]chr(13) [91]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13) [0]chr(13)chr(10)			

D.4.1.8.4 QoS Stats

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
Clear All QoS Queue Statistics	QSA=	QSA=x 1 – Clear all stats	Command only. Set QSA=1 to clear all QoS queue statistics. Also clears the default queue stats.	QSA= QSA!	None	QSA=x (see Description of Arguments)
Quality of Service Stats Clear	QSC=xx xx=QoS rule index	xx – QoS rule index for which to clear stats.	Command only. Clears the QoS statistics for a specified queue. To clear default queue stats use '0'. Examples: <1/QSC=0 will clear default queue stats <1/QSC=5 will clear stats of rule-5. Note: The command can be issued only on active/configured queue.	QSC= QSC!	None	QSC=xx (see Description of Arguments)
Quality of Service Statistics Get	N/A	String of QoS Stats	Query only. Displays the QoS queue statistics of all active queues, in the form: nnn|pp|aaaaaaaaaa|bbbbb|ccccccccc|ddddddddd|eeeeeeeee|fffff|ggggg|hhhhh|iiii where: n = QoS Rule Number p = Protocol number [Refer to QSR] a = Sent Packets b = Pkts per Second c = Sent Bytes d = Dropped Packets e = Dropped Bytes f = Current Transmit Rate [Kbps] g = Average Transmit Rate [Kbps] h = Maximum Transmit Rate [Kbps] I = Active Flow count associated with this QoS Queue. Example: >0001/QST= 0| 19| 0| 0| 0| 0| 0| 0| 0| 0| 0chr(13) 1| 0| 0| 0| 0| 0| 0| 0| 0| 0| 0chr(13)	QST!	QST?	QST=sssssssss… String displaying QoS stats of all active queues. \r – CR – 0x0D \n – Newline – 0x0A

D.5 Param Files

Param File Tag	Values Associated with Parameter
SYS_WORKING_MODE	Router Mode Easy Connect Mode
EASYCON_MCAST_MODE	Enabled Disabled
HDR_REFRESH_UDP_RTP1	DeCIMal Value of 1…600
HDR_REFRESH_UDP	DeCIMal Value of 1…600
HDR_REFRESH_ALL_OTHERS	DeCIMal Value of 1…600
PAYLOAD_REFRESH	DeCIMal Value of 1…600
TELNET_TIMEOUT	DeCIMal Value of 1…60 Minutes
QOSMODE	Rule-Max/Pri Mode Rule-Min/Max Mode DiffServ Mode
DYNBUF_LATENCY	DeCIMal value of 200 to 5000 mSec.
Rt#0 …. Rt#nnn	Route table entries Rt#0 is the first entry and can go upto 256 entries. [No need to read this from param file, use RTG]
ROUTE_HDLC_ADDR_SAVE	Corresponding HDLC Addresses for Ethernet→Sat entries. [No need to read this from param file, use RTG]
DHCP_RELAY_IP_ADDR	DHCP Server IP Address. Possible values are: NOT-DEFINED – When the parameter not set. 10.20.30.40 – When a DHCP Server IP Address is set.
REDUNDANCY_ACTIVE	Enabled Disabled
BASE_BOOT_IMAGE	Latest Image 1 Image 2
UPGRADE_SLOT	Oldest Image 1 Image 2
BLINDLOAD_MCAST_ADDR	NOT-DEFINED when ip_addr is 0 Valid multicast IP address like 239.4.5.6

Param File Tag	Values Associated with Parameter
ADMIN_PWD	NONE – When not set Xxxx/yyy format with xxx-user name and yyy-password. Like comtech/comtech.
READWRITE_PWD	NONE – When not set Xxxx/yyy format with xxx-user name and yyy-password. Like comtech/comtech.
READONLY_PWD	NONE – When not set Xxxx/yyy format with xxx-user name and yyy-password. Like comtech/comtech.
ACCESS_CLIENT	NOT-DEFINED/NA – When not set Valid IP address like 192.168.001.001/32
ACCESS_ENFORCEMENT_ENABLE	Enabled Disabled
PING_REPLY_ENABLE	Enabled Disabled
TELNETD_ENABLE	Enabled Disabled
SNMP_ENABLE	Enabled Disabled
IGMP_ENABLE	Unavailable – If system does not has this FAST Feature available. Enabled Disabled
GENERIC_DOWNLINK_MCAST	Enabled Disabled
QOS_ENABLE	Unavailable – If system does not has this FAST Feature available. Enabled Disabled
TRANS_DES_ENABLE	Unavailable – If system does not has this FAST Feature available. Per Route – If the system working mode is Router-Small, Router-Large, Router-PtoP Enabled – If system working mode is EasyConnect Disabled – If system working mode is EasyConnect
TX_HDR_COMPRESSION_ENABLE	Unavailable – If system does not has this FAST Feature available. Per Route – If the system working mode is Router-Small, Router-Large, Router-PtoP Enabled – If system working mode is EasyConnect Disabled – If system working mode is EasyConnect
RX_HDR_COMPRESSION_ENABLE	Unavailable – If system does not has this FAST Feature available. Enabled Disabled

Param File Tag	Values Associated with Parameter
TX_PYLDCOMP_ENABLE	Unavailable – If system does not has this FAST Feature available. Per Route – If the system working mode is Router-Small, Router-Large, Router-PtoP Enabled – If system working mode is EasyConnect Disabled – If system working mode is EasyConnect
ENCRYPT_KEY# [0…7]	xxxxx….xx A 48 character length [192-Bit] 3xDES key. The key is formed with HexadeCIMal digits from 0..9,A,B,C,D,E,F only. Like 2222222222222222 4444444444444444 6666666666666666. Notice there is a space for every 16-HexadeCIMal digits for readability.
DECRYPT_KEY# [0…7]	xxxxx….xx A 48 character length [192-Bit] 3xDES key. The key is formed with HexadeCIMal digits from 0..9,A,B,C,D,E,F only. Like 2222222222222222 4444444444444444 6666666666666666. Notice there is a space for every 16-HexadeCIMal digits for readability.
SMTP_SERVER_IP_ADDRESS	NOT-DEFINED – If the parameter is not set. Other wise, IP address in the form 192.168.1.1
SMTP_DOMAIN	Empty string, when not set. In param file, there is nothing after = sign. Otherwise, a string of up to 128 character. Generally in domain name format.
SMTP_DESTNAME	Empty string, when not set. In param file, there is nothing after = sign. Otherwise, a string of up to 128 character.
SNMP_READ_COMMUNITY	String of up to 20 characters. [Empty string is not allowed]. Like “public”
SNMP_WRITE_COMMUNITY	String of up to 20 characters. [Empty string is not allowed]. Like “private”
SNMP_TRAP_COMMUNITY	String of up to 20 characters. [Empty string is not allowed]. Like “public”
SNMP_TRAP_DEST	NOT-DEFINED – When the parameter is not set IP address in string format like 11.12.13.14
SNMP_TRAP_DEST_2	NOT-DEFINED – When the parameter is not set IP address in string format like 11.12.13.14
SNMP_TRAP_VERSION	SNMPv1 – When SNMP version-1 trap generation is selected. SNMPv2 – When SNMP version-2 trap generation is selected.
SNMP_TRAP_ENABLE_AUTHEN_TRAP	UNKNOWN – When invalid value is set. Enabled – When set to send the Authentication Trap. Disabled
SNMP_SYSCONTACT	Empty string, when not set. In param file, there is nothing after = sign. Otherwise, a string of up to 128 character.
SNMP_SYSNAME	Empty string, when not set. In param file, there is nothing after = sign. Otherwise, a string of up to 128 character.
SNMP_SYSLOCATION	Empty string, when not set. In param file, there is nothing after = sign. Otherwise, a string of up to 128 character.
ETHER_MAC	Ethernet MAC Address in the format 00-06-B0-xx-xx-xx. All are hexadeCIMal digits.

Param File Tag	Values Associated with Parameter
ETHER_SPEED_MODE	Auto 10 MB/sec Half Duplex 100 MB/sec Half Duplex 10 MB/sec Full Duplex 100 MB/sec Full Duplex
ETHER_IP_SNET	IP Address in the format 192.168.1.50/24
HDLC_ADDR_MODE	Small Network Mode Large Network Mode Point-To-Point Mode
QOSC	If there are no QoS rules configured, (or) system is not in Max-Pri (or) Min-Max mode, then param file will not have an entry for QOSC. Otherwise, the rules will be in the following format. QOSC### = SrcIP/Mask DstIP/Mask PROT spm spM dpm dpM mxB mb P W F QOSC#1 = ***/* ***/* RTP *** *** *** *** 22222 0 4 N Y QOSC#2 = 11.12.13.14/32 22.22.33.44/32 UDP 11111 22222 33333 44444 99999 0 0 Y N Where spm – source port min; spM – source port Max; dpm – Destination port min; dpM – Destination port Max mxB – Max bandwidth in kbps; mb – minimum bandwidth in kbps [Total aggregate min bandwidth of all the qos rules should be less than the Tx-Data rate of the system.] P – Priority; W – WRED; F – Filter; [Y – Yes, N – No]
QOSCDEFR	The default rule always exists in the system and in param file, but not meaningful if QoS mode is DiffServ. The format is QOSC### = SrcIP/Mask DstIP/Mask PROT spm spM dpm dpM mxB mb P W F QOSCDEFR#0 = ***/* ***/* ALL *** *** *** *** 99999 0 9 N N
DIFFSSV#0 … DIFFSSV#11	The DiffServ rules are meaningful only when QoS mode is DiffServ. Otherwise, these parameters can be discarded. The format is as follows. The first column is DIFFSSV#0 = 0 99999 NOTE: Donot use this from PARAM file, instead use DTG? Command.
IGMP_QRYP	A deCIMal value of 1…600
IGMP_MXRT	A deCIMal value of 1…598
IGMP_MRP	A deCIMal value of 1…30
IGMP_QUERIES	Yes No
IGMP_ROUTERALERT_OPT	Yes No
IGMP_VERSION2	V1 V2

Param File Tag	Values Associated with Parameter
IGMP_URI	A deCIMal value of 0…25
SARP#0 …. SARP#255	Static ARP entry if there are any, in the format IP Addr Layer2 MAC Address [HexadeCIMal digits] 10.20.30.40 00:11:33:AA:BB:CC
MGC_SAVE	MGC Command response from the base modem. See the base modem document for more detail.
OGC_SAVE	OGC Command response from the base modem. See the base modem document for more detail.
LOGGING FEATURE	Enabled Disabled
LOGGING LEVEL	Errors Only Errors and Warnings All Information
HDLCADDR_SAVE	HDLC addresses in hexadeCIMal format aaaa bbbb cccc dddd … where: aaaa – First HDLC Address bbbb – Second HDLC Address…etc

METRIC CONVERSIONS

Units of Length

Unit	Millimeter	Centimeter	Inch	Foot	Yard	Meter	Kilometer	Mile
1 millimeter	1	0.1	0.0394	0.0033	0.0011	0.001	1×10^{-6}	6.214×10^{-7}
1 centimeter	10	1	0.3937	0.0328	0.0109	0.01	1×10^{-5}	6.214×10^{-6}
1 inch	25.4	2.54	1	0.0833	0.0278	0.0254	2.54×10^{-5}	1.578×10^{-5}
1 foot	304.8	30.48	12	1	0.3333	0.3048	3.048×10^{-4}	1.894×10^{-4}
1 yard	914.4	91.44	36	3	1	0.9144	9.144×10^{-4}	5.682×10^{-4}
1 meter	1000	100	39.37	3.2808	1.0936	1	0.001	6.214×10^{-4}
1 kilometer	1×10^{6}	1×10^{5}	3.938×10^{4}	3.281	1093	1000	1	0.6214
1 mile	1.609×10^{6}	1.609×10^{5}	6.336×10^{4}	5280	1760	1609	1.609	1

Temperature Conversions

Temperature	° Fahrenheit	° Centigrade
Water freezes	32	0
Water boils	212	100
Absolute zero	-459.69	-273.16

Formulas
° C = (F - 32) * 0.555
° F = (C * 1.8) + 32

Units of Weight

Unit	Gram	Ounce Avoirdupois	Ounce Troy	Pound Avoirdupois	Pound Troy	Kilogram
1 gram	—	0.03527	0.03215	0.002205	0.002679	0.001
1 oz. avoir.	28.35	—	0.9115	0.0625	0.07595	0.02835
1 oz. troy	31.10	1.097	—	0.06857	0.08333	0.03110
1 lb. avoir.	453.6	16.0	14.58	—	1.215	0.4536
1 lb. Troy	373.2	13.17	12.0	0.8229	—	0.3732
1 kilogram	1.0×10^{3}	35.27	32.15	2.205	2.679	—

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