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AS9100 Rev B / ISO9001:2000 Registered Company



DMD1050

Satellite Modem Board Installation and Operation Manual

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



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DMD1050

Satellite Modem Board Installation and Operation Manual

Part Number MN-DMD1050
Revision 9

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PREFACE

About this Manual

This manual describes the installation and operation of the DMD1050.

Conventions and References

Trademarks

Product names mentioned in this manual may be trademarks or registered trademarks of their respective companies and are hereby acknowledged.

Related Documents

- Department of Defense (DOD) MIL-STD-188-165A, *Interoperability and Performance Standards for SHF Satellite Communications PSK Modems (FDMA Operation)* (dated November 2005)
- Department of Defense (DOD) MIL-STD-188-114A, *Electrical Characteristics of Digital Interface Circuits*
- EN300-421 and EN301-210 ETSI
- *INTELSAT Earth Station Standards IESS-308, -309, -310, and -315*

Cautions and Warnings



IMPORTANT or **NOTE** indicates a statement associated with the task being performed or information critical for proper equipment function.



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



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

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Chapter 1. Introduction

This chapter provides an overview of the DMD1050 Satellite Board Modem, which is designed for satellite IP, telecom, video and internet applications.

1.1 Overview

- Duplex L-Band modem
- MIL-STD-188-165A standards
- IDR, IBS and DVB
- Data rates up to 20 Mbps

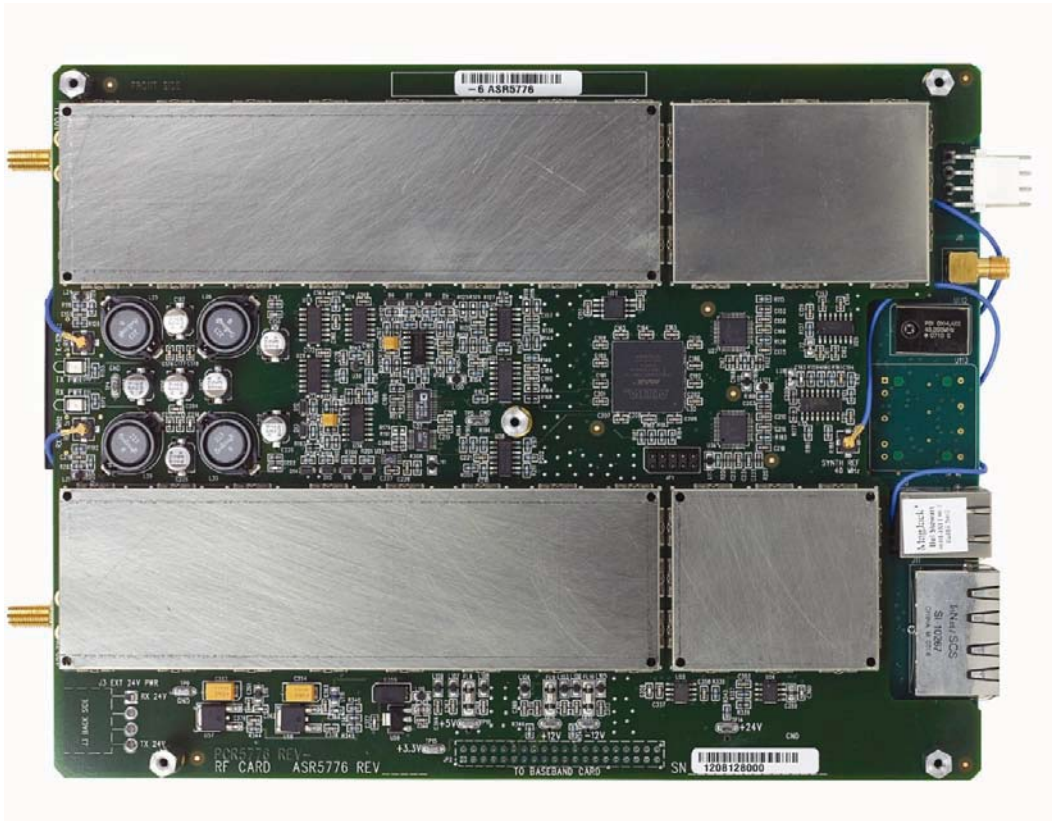


Figure 1-1. DMD1050 Satellite Board Modem (Top View)

The DMD1050's impressive remote accessibility rivals all others in the field. Remote control via RLLP (Radyne Link Level Protocol), Ethernet 10 Base-T SNMP and Web Browser includes control of all the modem's features plus software maintenance. The unit presents monitor and control functions on the screen.

Additional options and configuration (such as Monitor and Control (M&C) Functions) can be activated in seconds via the Web Browser.

Compatibility with current modems, such as the DMD2050, DMD50, DMD20 and the DISA certified MIL-188-165 compliant DMD15L are maintained for seamless substitution and addition to existing systems.

This unit offers built in Standard Interfaces that are selectable from MIL-188-114A and a Dual Port Ethernet Bridge.

1.2 DMD1050 Configurations

The DMD1050 can be configured in the following different ways:

- Features and options that are installed when the unit is ordered
- Feature upgrades
- Hardware options that the user can install at their own location
- Options that are installed to a unit that is sent to a comtech service center

1.2.1 Features/Options Installed at Time of Order

Features installed at the time of ordering are the options pre-installed/initialized in the factory prior to shipment. These can be reviewed from the web browser. Refer to Section 4, User Interfaces for information on how to view these features.

Factory installed options are chassis and board configurations that are introduced during manufacture.

1.2.2 Feature Upgrades

Feature Upgrades are a simple and quick way of changing the feature set of an installed modem. Feature upgrades are how most DMD1050 options are implemented. Features may be purchased at any time by contacting a salesperson. Refer to Section 3 and Appendix D, for information on how upgrade features.

1.3 Function Accessibility

All functions can be accessed with a terminal or personal computer via a serial link for complete remote monitoring and control capability.

Chapter 2. Installation

This section provides instructions on unpacking and installation, as well as storage of the unit.

2.1 Installation Requirements

Installation of the DMD1050 Modem Board requires adequate planning by the user to ensure no damage will occur to the unit. Package design considerations for the modem board include mounting, temperature limits, adequate ventilation, limited vibration, no exposure to condensation/ moisture and a stable power source.

Mating connectors are supplied with each unit. A full description of the modems pin outs can be found in Section 4. Appendix E gives details of the various connectors and mating connectors supplied.



WARNINGS

1. *The DMD1050 contains a Lithium Battery. **DANGER OF EXPLOSION** exists if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with local and national regulations*
2. *Make sure to eliminate the potential for Static Discharge that can damage the Modem Board.*
3. *There are no user-serviceable parts or configuration settings located inside the DMD105.*



CAUTION

Before connecting power to the unit, disconnect the transmit output from the operating ground station equipment. Communication traffic can be disrupted by connecting power to a unit when the configuration settings are not known and may be incorrect.

Make sure to obey proper ESD practices to avoid damaging the unit.

2.2 Unpacking

The DMD1050 Universal Satellite Modem was carefully packaged to avoid damage and should arrive complete with the following items for proper installation:

- DMD1050 Modem Board
- Installation and Operation Manual

2.3 Removal and Assembly

The DMD1050 Modem Unit is shipped fully assembled.



CAUTION

Make sure to obey proper ESD practices to avoid damaging the unit.

Carefully unpack the unit and ensure that all of the above items are in the carton. If the available Power cable and Data cables can be supplied.

2.4 Installation Considerations

User must consider adequate ventilation when installing the DMD1050 into the final package. The recommended ambient temperature for the modem board should be between 10° and 35°C, and held constant for best equipment operation. Ventilated air should be clean and relatively dry. Modem board must have adequate spacing between other products to avoid cross talk or electrical shorts. Modems should not be placed immediately above a high-heat or EMF Generator to ensure the output signal integrity and proper receive operation.

Do not install the DMD1050 in an unprotected outdoor location where there is direct contact with rain, snow, wind or sun. The only tools required for installing the DMD1050 are five (5) mounting holes. Caution should be exercised when installing the modem board to ensure the modem board is not bent, warped or compressed to ensure the unit does not get damaged.

2.5 DMD1050 Initial Configuration Check

The DMD1050 is shipped from the factory with preset factory defaults. Upon initial power-up, a user check should be performed to verify the shipped modem configuration. Refer to Section 4; User Interfaces, to locate and verify that the following configuration settings are correct:



First, make sure to select the DMD1050 Interface Type (MIL-188-114A or Ethernet Data Interface) BEFORE you install the mating connectors. Failure to do this can damage the Data Interface.

2.5.1 Standard DMD1050 Factory Configuration Settings



Implementing Strap Code 26 can set the following modem configuration. Refer to Table 4-4 for an explanation and tabular listing of available Strap Codes. The Frequency and Modulator Output Power are set independently of the strap code.

Modulator:

Data Rate:	2.048 Mbps
Mode:	Closed Network
Satellite Framing:	None
Scrambler:	V.35 (IESS)
Inner FEC:	1/2 Rate Viterbi
Outer FEC:	Disabled
Modulation:	QPSK
Frequency:	950 MHz
Modulator Output Power:	-20 dBm

Demodulator:

Data Rate:	2.048 Mbps
Mode:	Closed Network
Satellite Framing:	None
Scrambler:	V.35 (IESS)
Inner FEC:	1/2 Rate Viterbi
Outer FEC:	Disabled
Modulation:	QPSK
Frequency:	950 MHz

To lock up the modem, enter 'IF Loopback Enable' under the Test Menu, or connect a Loopback Cable from TX port to RX port.



Using the modem's loopback capabilities with the Ethernet data interface can cause undesirable network loops. Before you do any data test with an Ethernet interface, make sure to use two modems connected back-to-back. If you use one modem and a loopback, the results will not be as desired.

2.6 Modulator Checkout

The following descriptions assume that the DMD1050 is installed in a suitable location with clean, stable DC power. Make sure that DC spikes are not present during initial power up.

2.6.1 Initial Power-Up



Make sure that the modem's input DC power is clean, stable and free of spikes. If the input DC power is of poor quality, it will damage the unit .

Before connecting power to the unit, disconnect the transmit output from the operating ground station equipment. Communication traffic can be disrupted by connecting power to a unit when the configuration settings are not known and may be incorrect.



New units are shipped with the transmit carrier set to OFF.

The initial field checkout of the modem can be accomplished from the Web Browser or Terminal Mode. The Web Browser and Terminal Mode has the advantage of providing full screen access to all of the modem's parameters, but requires a separate terminal or computer running a Terminal Program. The modem is configured with the Web Browser enabled.

2.6.2 M&C Web Browser Setup

The Ethernet M&C Interface requires a standard RJ45 Male connector. The Ethernet Interface is shipped from the factory in an addressable defaulted condition that allows the user to access the unit. This condition is identified as IP TEST MODE. .

Boot Modes:	IPTEST
IP Address Mask:	255.255.255.000
Modem IP Address:	192.168.0.238
Server IP Address:	192.168.000.101
Router IP Address:	192.168.000.102

Refer to section C & D for proper setup of the Ethernet M&C Interface.

Connect an Ethernet cable between the unit and a computer that has web browser capability.

Access the browser and enter the default web address for the unit.

Refer to [Section 4](#) for a complete description of the GUI Interface operation and parameters.

Refer to [Appendix C](#) and [Appendix D](#) for proper setup of the TCP-IP interface and Web Browser Setup.

2.6.3 M&C Terminal Setup

The initial field checkout of the modem can also be accomplished from the Terminal Mode. The Terminal Mode has the advantage of providing full screen access to the modem's parameters, but requires a separate terminal or computer running a Terminal Program such as Hyper-terminal and connection to the applicable pins on the M&C connector J1. The recommended terminal setup is as follows (These settings can be changed via the Web Browser):

	Emulation Type:	VT-100
Baud Rate:	19.2 K	
Data Bits:	8	
Parity:	No Parity (Fixed)	



Web Browser and Terminal Interfaces Reset

If you cannot access the Web Browser or Terminal interface, reset the interface defaults. To reset the interface defaults, use the shorting plug (CNRSHUNT). Obey these steps:

- 1. Make sure the electrical power to the unit is disconnected.**
- 2. Find the JP5 and JP6 connectors.**
- 3. Find pins 1 and 2 on the JP5 and JP6 connectors.**
- 4. Install the CNRSHUNT shorting plug on pins 1 and 2 of JP5 and pins 1 and 2 of JP6.**
- 5. Connect the electrical power to the unit.**
- 6. This will reset the interface defaults.**

See Section 3 for more information.

2.7 Storage

It is recommended that the unit be stored in its original sealed packing. The unit should be stored in a dry location where the temperature is stable, away from direct contact with rain, snow, wind, sun, or anything that may cause damage.

Chapter 3. Theory of Operation

3.1 DMD1050 Hardware

The DMD1050 is based on a two printed circuit card design. The standard configuration consists of an L-Band Assembly and a Digital Baseband Assembly. This configuration includes built in Data interfaces and a number of different software upgrade options. A block diagram of the DMD1050E is shown in Figure 3-1.

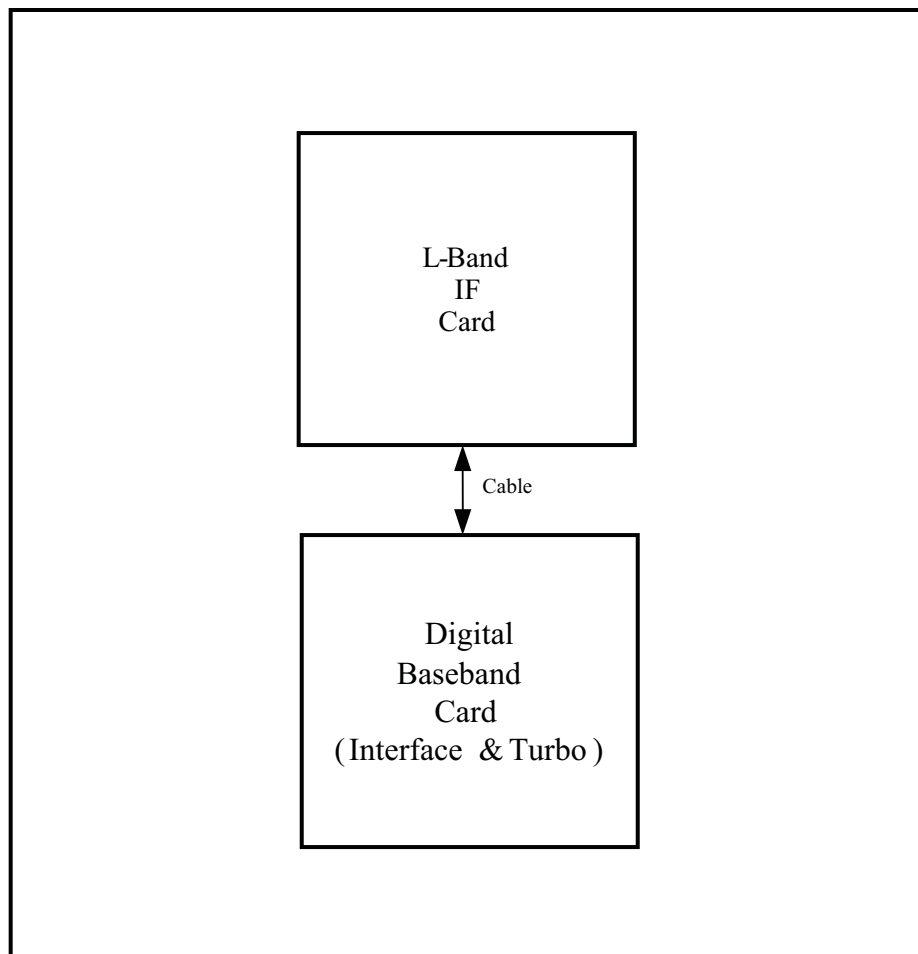


Figure 3-1. DMD1050 Block Diagram

3.1.1 DMD1050 L-Band Printed Circuit Card

The L-Band/IF Printed Circuit Card consists of an analog modulation function, an analog complex down conversion, and two wide-band digital synthesizers. The block diagram of the L-Band Assembly is shown in Figure 3-2.

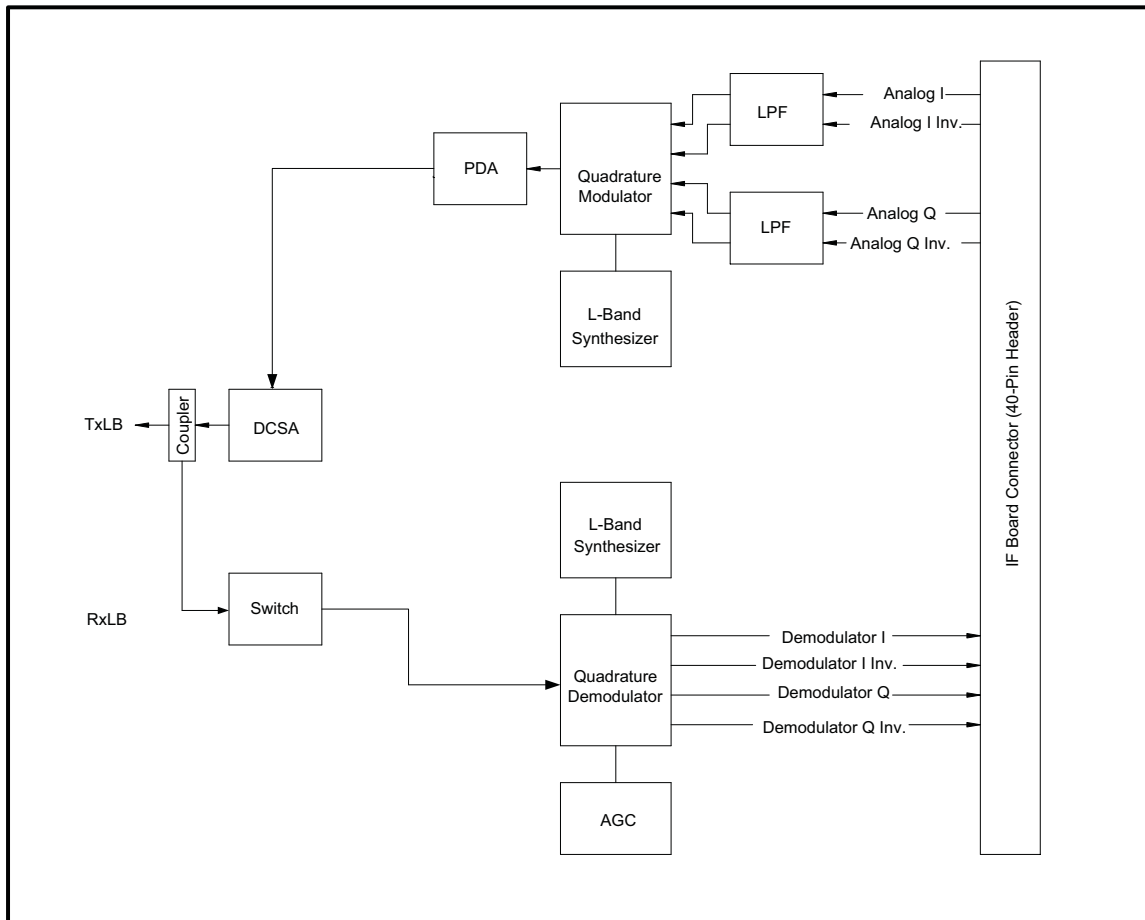


Figure 3-2. L-Band Assembly

In the modulator, analog in-phase (I) and quadrature (Q) signals are generated on the Digital Baseband Printed Circuit Card, routed to the L-Band Printed Circuit Card, and modulated at the desired frequency. The L-Band modulated signal is then passed through a microprocessor controlled variable attenuator providing gain control of the output signal.

In the complex downconverter, the signal for demodulation is amplified and sent through a variable wideband attenuator for AGC. The gain-controlled signal is then passed through a complex downconverter to a low IF.

3.1.2 DMD1050 Baseband Processing Printed Circuit Card

The advent of million-plus gate count FPGAs, advanced logic synthesis tools, and DSPs providing hundreds of MIPs enabled the design of a software configurable modem. Large, fast FPGAs now provide designers with what is essentially an on the fly programmable ASIC. High speed, complex digital logic functions that previously could only be implemented in dedicated integrated circuits are now downloaded from a micro-controller through a serial or peripheral interface. When a new digital logic function is needed, a new configuration file is loaded into the

FPGA. There is no limit to the number of digital logic configurations available to the FPGA, aside from the amount of Flash memory available to the system microprocessor for storage of configuration files.

The DMD1050 Baseband Processing Printed Circuit Card provides a flexible architecture that allows many different modes of terrestrial and satellite framing, various FEC options, digital voice processing, and several different modulation/demodulation formats. Also included on the Baseband Printed Circuit Card is a MIL-188-114A/RS-422 synchronous interfaces and a two port 10/100 Ethernet Bridge interface.

A block diagram of the Baseband Processing Card is shown in Figure 3-3.

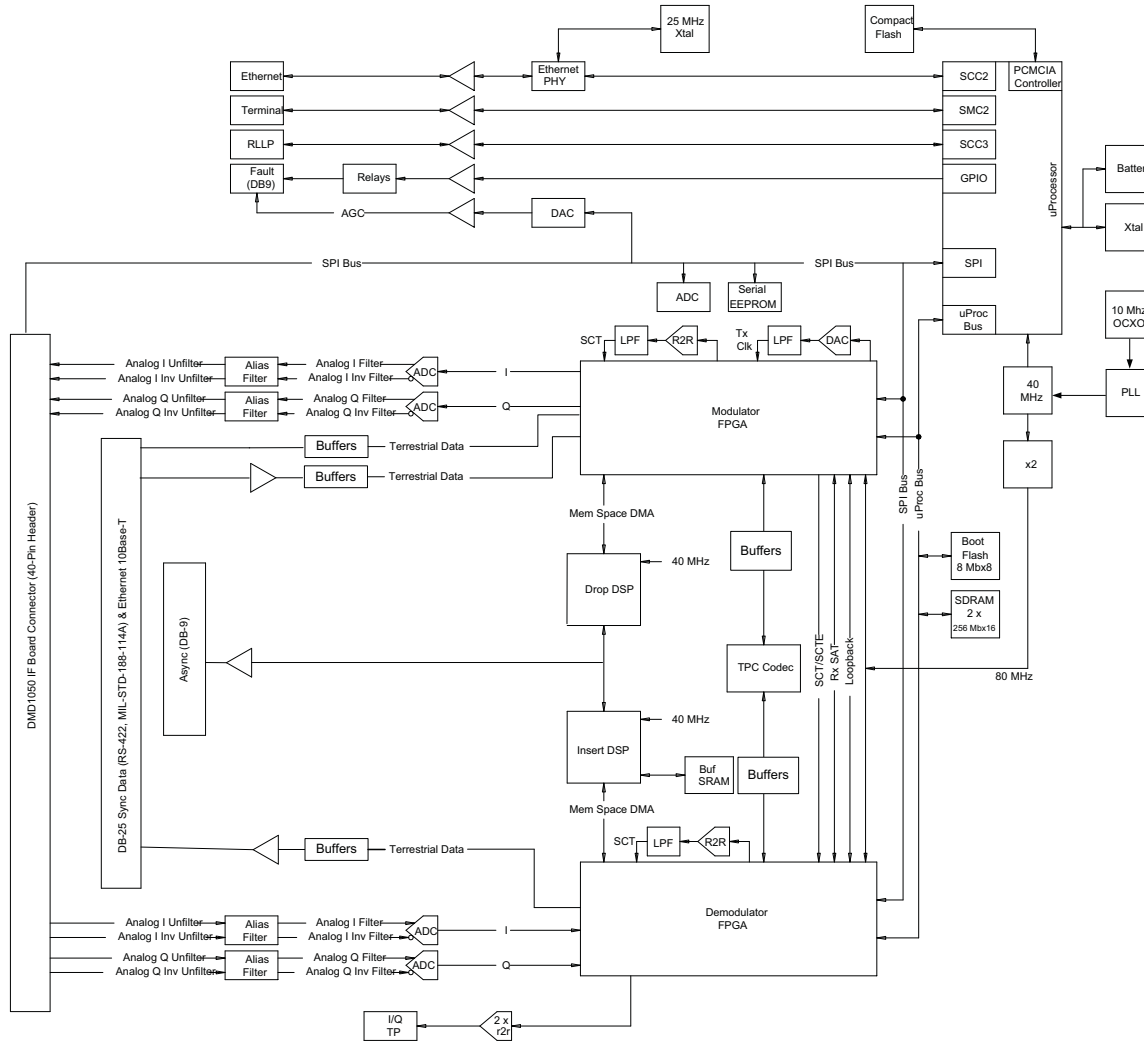


Figure 3-3. DMD1050 Baseband Processing Card Block Diagram

The Baseband Printed Circuit Card also contains the Monitor and Control (M&C) Circuitry responsible for:

- Programmable part setup and initialization
- Continuous control and adjustment of some functions
- Calibration
- Monitoring fault status
- Calculating and displaying measurements
- Calculations
- User monitor and control interface including front panel and remote
- Unit's configuration and feature set

The M&C System is based on a powerful microprocessor with a large amount of Flash memory. Several bus architectures are used to interconnect the M&C to all components of the DMD1050. Communication to the outside world is done via connections to the remote port, terminal port, Ethernet port, and alarm ports. The M&C runs off software programmed into its Flash memory. The memory can be reprogrammed via the Ethernet port to facilitate changes in software.

3.2 DMD1050 Functional Block Diagram

Figure 3-4 represents the DMD1050 Functional Blocks. The modem is shown in a typical application with customer data, Tx/Rx RF equipment and an antenna.

3.2.1 Baseband Processing

The Baseband Processor performs all of the functions required for an IBS/IDR Framing Unit, a Reed-Solomon Codec. In addition, the Baseband Processing Section provides for transmit clock selection and rate adaptation as well as a rate adapter and Plesiochronous/Doppler (PD) Buffer in the receive direction. A multiplexer is also provided for the SCT Clock Source for Loop Timing Applications. The transmit and receive paths may be configured independently under processor control.



The DMD1050 supports IBS & IDR compatible framing modes. Since the modem does not have all supporting interfaces as stipulated by IESS308/309, it is not 100% compliant. IBS and IDR framing modes are supported in a Closed network Mode.

3.2.2 Tx Baseband Processing

The Tx Data and Clock enters the Baseband Processor, passes through a Rate Adapting FIFO and enters the Framer Processor. In Closed-Net Mode, the data passes through the framer unaltered. In IDR & IBS framing enabled, it adds the appropriate framing as defined in IESS-308 and 309. The data is then sent to the Reed-Solomon Encoder.

The Reed-Solomon Encoder, encodes the data into Reed-Solomon Blocks. The blocks are then interleaved and synchronized to the frame pattern as defined by the selected specification (IESS-308, IESS-309, DVB, etc.). After Reed-Solomon Encoding, the composite data and clock are applied to the BB Loopback Circuit.

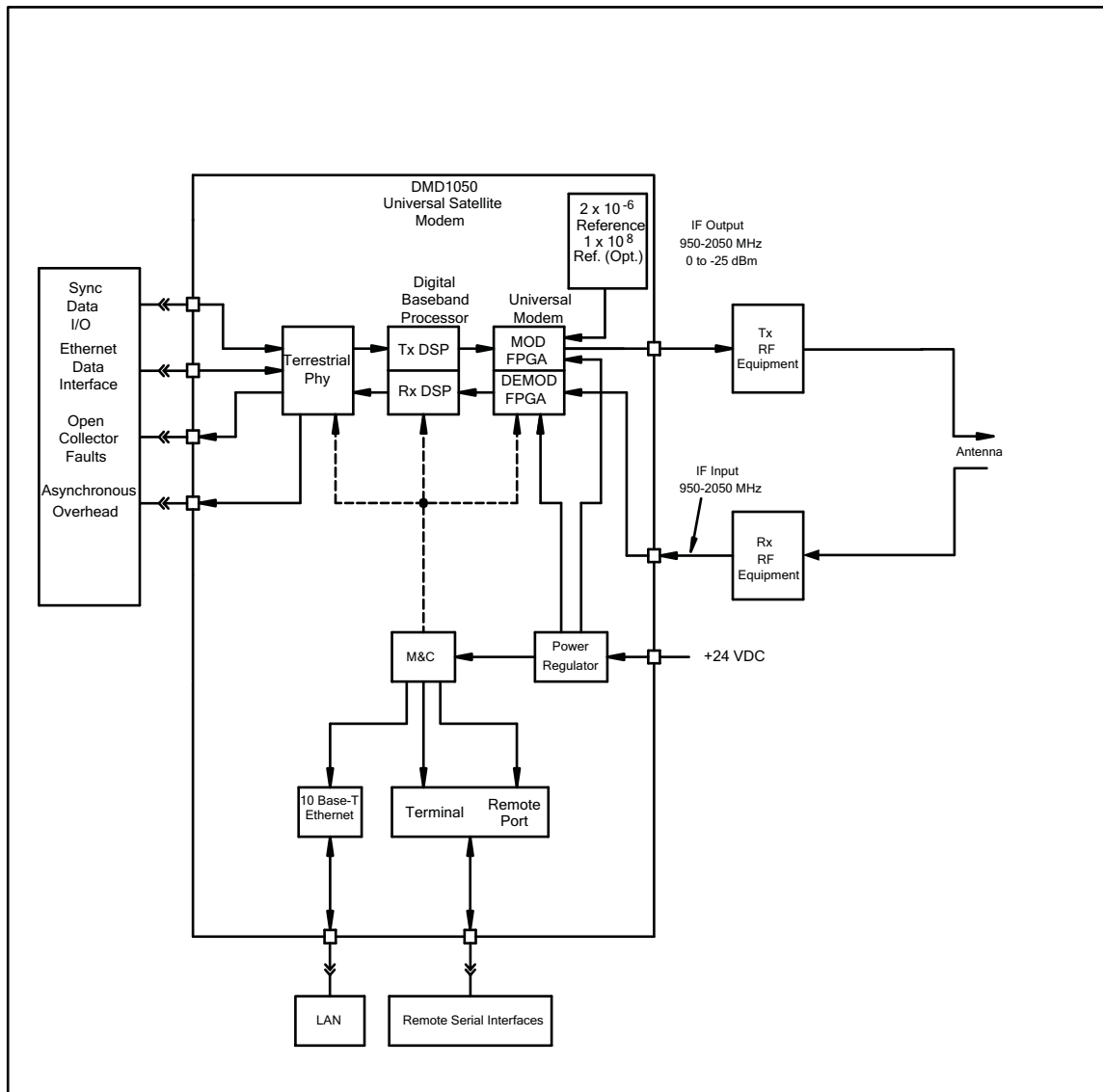


Figure 3-4. DMD1050 Universal Satellite Modem Functional Block Diagram

3.2.3 Rx Baseband Processing

The Receive Processor performs the inverse function of the Tx Processor. Data received from the satellite passes through the BB Loopback Circuit to the Reed-Solomon Decoder to the Deframer. The Deframer acquires the IBS/IDR/DVB frame, synchronizes the Reed-Solomon Decoder and extracts the received data and overhead from the frame structure, placing the data into the PD Buffer, sending the overhead data to the UIM. The data is extracted from the buffer and is sent to the UIM. Backward Alarm indications are sent to the M&C Subsystem.

3.3 Monitor & Control (M&C)

The modems M&C system is connected to most of the circuitry on any board contained in the modem. These connections provide status on the working condition of the circuitry as well as providing the data required for the various measurements the modem provides. The M&C

processes this information and generates status indications as well as alarms when necessary. Detailed status information is available via the modems various user interfaces including the remote and terminal ports. An external summary fault is available on the RS422 Data interface

The M&C contains a high-performance microprocessor and is responsible for overall command and control of modem functions. The M&C is constantly monitoring all subsystems of the modem by performing a periodic poll routine and configures the modem by responding to commands input to the system. During each poll cycle, the status of each of the subsystems is collected and reported to each of the external ports. Performance statistics such as Eb/No, buffer fill %, etc. are compiled. If faults are detected, the M&C will take appropriate actions to minimize the effect of such faults on the system (refer to the Fault Matrices in Section 6).

The DMD1050 supports the following M&C protocols: These are:

- Terminal Interface (Section 3.3.1)
- Remote Port Interface (Section 3.4)
- Web Browser (Section 3.5)
- M&C Default/Reset Plug Settings (Sections 3.6 and 4.4.4.1)
- SNMP (Simple Network Management Protocol (Refer to TM117 Remote Protocol Manual)

3.3.1 Terminal Port/ES-ES Communications (J1)

J1 functions as the Modem Remote Port, Terminal Port or ES-ES Communications. For Terminal port application, it supports an asynchronous control protocol. It may be configured to support either RS-232 or RS-485 signal levels. This port is intended for use in computer-based remote M&C. All functions of the modem may be monitored and controlled from this port via a common terminal connected to the Terminal Port. This function is front panel selectable.

This port is also dedicated for ES-ES Communications. The port may be configured for a number of communications protocols. Overhead data to/from the UIM is routed to/from the framer/deframer. This port may be configured to support either RS-232 or RS-485 signal levels. The baud rate and protocol can be selected from the Web Browser.

3.3.2 Terminal Mode Control

The DMD1050 Terminal Mode Control allows the use of an external terminal or computer to monitor and control the modem from a full screen interactive presentation operated by the modem itself. No external software is required other than VT-100 Terminal Emulation Software (e.g. "Procomm" for a computer when used as a terminal. The Control Port is normally used as an RS-232 Connection to the terminal device. The RS-232 operating parameters can be set using the modem Front Panel and stored in Non-volatile memory for future use (refer to the Remote Protocol Manual TM117 for setup and terminal screens).

3.3.3 Modem Terminal Mode Control

The modem can be interactively monitored and controlled in the Terminal Mode, with a full screen presentation of current settings and status. Programming is accomplished by selecting the item to be modified and pressing the terminal key of the option number. For example, to change the transmit data rate, enter '33' at the terminal. The modem will respond by presenting the options available and requesting input. Two types of input may be requested. If the input is multiple choice, the desired choice is selected by pressing the 'Space' key. When the desired

option is displayed, press the ‘Enter’ key to select that option. The other possible input type requires a numerical input (such as entering a frequency or data rate). This type of input is followed by pressing the ‘Enter’ or carriage return key. An input can be aborted at any time by pressing the ‘ESC’ key. Invalid input keys cause an error message to be displayed on the terminal.

The Terminal Control Mode supports serial baud rates of 150, 300, 1200, 2400, 4800, 9600, 19200, and 38400. The connection must be set for 8 data bits, 1 stop bit and no parity (8,N,1). Three terminal emulations are supported: VT-100, WYSE 50, and ADDS-VP.

“\$” is used for setting the screen when the terminal is used for the first time the non-volatile memory is reset.

3.3.4 Modem Setup for Terminal Mode

Terminal Mode Communications and Protocol is set from the Web Browser by setting the “Control Mode” Parameter to “Terminal”, and then setting the “Modem Port”, “Term Baud” and “Emulation” Parameters as desired. Then a terminal is connected to J1 connector. All operating software for the Terminal Mode is contained within the DMD1050 Modem Internal Control Software.

A “break” signal on the communications line, pressing “ESC” on the terminal or Power On of the modem will initiate full screen terminal mode printing and redraw the full screen. The Terminal Mode displays the present status of all user parameters controlled and read by the processor, and offers a menu allowing change to any controlled parameter.

The Terminal Mode uses eight “Screens,” each of which have the basic contents of the three modem monitor and control areas as set in the Front Panel matrix columns. This screen is used for setting the parameters of the Modulator, Demodulator, Event, Alarm, Latched Alarm, and Interface Areas.

The Terminal Control Mode is menu-driven and the allowable values for each item number will be shown. To change an item, type in its number followed by <ENTER>. If the parameter to be changed requires a numeric value, enter the number followed by <ENTER>. If the parameter is non-numeric, press <SPACE> to cycle through the list of available entries.



Items that do not have ID numbers are Status only and cannot be changed.

3.3.5 Connecting the Terminal

1. Connect the computer to the DMD1050 Remote Connector (J1) on the board using the RS-232 Cable.
2. Enable the terminal by selecting Terminal Mode under the Web Browser
3. Verify that your emulation software is set to the following:

8 data bits
no parity

1 stop bit

3.3.6 Terminal Screens



Refer to the Remote Protocol Manual (TM117) for the terminal screens.

3.4 Modem Remote Communications (RLLP)

The Remote Port located on J1 allows for control and monitoring of parameters and functions via an RS-232 Serial Interface, or RS-485 for RLLP Protocol. ‘Equipment Remote Mode’ setup can be entered from the Web Browser interface under the “System” menu. This requires the user to first set the Remote Port Control to “Remote” then set the Multidrop Address as needed followed by setting the Remote Interface to RS232 or RS485.

Control and status messages are conveyed between the modem and all subsidiary modems and the host computer using packetized message blocks in accordance with a proprietary communications specification. This communication is handled by the Radyne Link Level Protocol (RLLP), which serves as a protocol ‘wrapper’ for the RM&C data. Complete information on monitor and control software is contained in the following sections.

3.4.1 RLLP Protocol Structure

The Communications Specification (COMMSPEC) defines the interaction of computer resident Monitor and Control Software used in satellite earth station equipment such as modems, redundancy switches, multiplexers, and other ancillary support gear. Communication is bi-directional, and is normally established on one or more full-duplex 9600-baud multi-drop control buses that conform to EIA Standard RS-485.

Each piece of earth station equipment on a control bus has a unique physical address, which is assigned during station setup/configuration or prior to shipment. Valid decimal addresses on one control bus range from 032 through 255 for a total of up to 224 devices per bus. Address 255 of each control bus is usually reserved for the M&C computer.



Refer to the Remote Protocol Manual (TM117) for the RLLP Protocol.

3.5 Modem Setup for Ethernet M&C (J10)

This port is dedicated for Ethernet Communications supporting SNMP, FTP and Web Browser. The port is configured for 10 Base-T communications protocols. The Ethernet M&C Interface requires a standard RJ45 Male connector. The Ethernet Interface is shipped from the factory in an addressable “BOOT MODE” state that allows the user to access the unit. This “BOOT MODE” state is set to “IP TEST”.

Connect an Ethernet cable between the unit and a computer that has web browser capability. Access the browser and enter the default web address for the unit. Refer to [Section 4](#) for a complete description of the GUI Interface operation and parameters. Refer to Appendix C and Appendix D for proper setup of the TCP-IP interface and Web Browser Setup.

3.6 M&C Default/Reset Plug Settings (JP5 & JP6)

If the user is experiencing difficulty accessing the Web Browser or the Terminal Interface, the user can reset the interface settings by utilizing the supplied default plug CNRSHUNT. on the JP5 and JP6 connectors. Refer to Figure 4-5. By installing the default plug onto pins 1 & 2 of JP5 and JP6 and cycling power, the unit communication parameters will be reset to the following settings:

- TCP-IP BOOT MODE will be set to IP TEST. (Refer to TCP-IP Setup Appendix)
- Remote Control Mode will be set to Terminal
- Terminal port will be set to RS232
- Web Browser Names and Passwords are Reset: (Refer to Web Browser Setup Guide, Appendix D)

Once default settings have been activated, remove Jumpers.

3.7 Ethernet Data Interface – (J11)

If the Ethernet Data Interface is selected, then the Tx Clock Source will default to SCTE and the Clock Polarity will default to Normal. The Ethernet Bridge Interface makes connecting LAN's via satellite easy to do. Simply select Ethernet as your terrestrial interface and plug your LAN into any of the two RJ-45 connectors on the unit. With its multi-port interface, automatic Learning and Aging, Auto-Crossover, Auto-Polarity, Auto-Negotiation and embedded Quality of Service, the Enhanced Ethernet Interface offers true Plug-n-Play connectivity.

The DMD1050 Ethernet Interface maintains backward compatible with the DMD20/20LBST/DMD50/DMD2050 and the OM20. It Allows for all higher level protocols like DHCP, UDP, TCP, HTTP, and FTP, etc. to pass transparently. And with it's line speed learning capability, traffic is forwarded immediately to the appropriate ports without any unnecessary startup delay.

For users who desire more control over their traffic, the Ethernet interface provides additional QOS controls and new features such as port based priorities, strict priority queuing, and the ability to operate in a FIFO like mode.

When it comes to performance, the full duplex capability of the standard 10/100 interface allows it to pass up to 20 Mbps in each direction over the satellite.



The DMD1050 supports Radyne HDLC and Comtech HDLC modes, offering compatibility with the SLM5650A Bridge Interface.

3.7.1.1 Configuring the Modem to use the Ethernet Data Interface

When the optional Ethernet Data Interface Card is selected, all of the Ethernet related menus can be used to control the interface as follows:

Setup the TX Interface Menu to: (refer to Section 7.3.4.3 Figure 7-16 for Interface/TX Setup)

- Set the Terrestrial Interface to Ethernet.
- Set the Ethernet Flow Control as desired
- Set the Ethernet Daisy Chain as desired
- Set the Ethernet QOS Type as desired
- Set the Ethernet QOS Queue as desired
- Tx Clock is set to SCTE.

Set the Tx Clock Polarity to Normal.

Setup the RX Interface Setup Menu to: (refer to Section 7.3.4.3 Figure 7-17 for Interface/RX Setup)

- Set the Terrestrial Interface to Ethernet.
- Set the Buffer Size to Zero.
- Buffer Clock is set to Rx Sat.
- Set the Buffer Clock Polarity to Normal.

3.7.1.2 Ethernet Flow Control

When disabled, if a packet is received for transmission and no packet buffer space is available, the incoming packet is discarded.

When enabled, flow control is used to throttle the transmission station in order to avoid overrunning the transmit buffers, which would in turn cause packets to be dropped. The throttling mechanism used depends upon the interface and whether it is half-duplex or full duplex.

3.7.1.3 Half-Duplex Flow Control

In half-duplex mode, the unit uses industry standard backpressure to support flow control as follows:

When available buffer space is almost gone, the modem will force a collision on the input port when it senses an incoming packet. This collision will cause the transmitting station to back off and retry the transmission.

The interface will stop forcing collisions as soon as free buffer space becomes available.

3.7.1.4 Full-Duplex Flow Control

In full-duplex mode, the interface implements IEEE 8802.3x flow control as follows:

When available buffer space is almost gone, the unit sends out a pause frame with the maximum pause time to stop the remote nodes from transmitting.

The interface sends out another pause frame with the pause time set to zero as soon as free buffer space becomes available.

3.7.1.5 Ethernet Daisy Chain

When disabled, Port 2 on the Ethernet Data Interface operates normally. Data received on Port 2 that is not addressed to other equipment on the LAN side, is transmitted over the satellite.

When Port 2 is selected for Daisy Chain, any data received on Port 2 is forwarded to of the other LAN side ports (Ports 1) and is not transmitted over the satellite. This is extremely useful in a point-to -multipoint configuration as illustrated in Figure 3-5.

3.7.1.6 Ethernet QOS Type

When Normal QOS is selected, the interface determines a packets priority based on the following:

- IEEE 803.3ac Tag when present
- IPv4 Type of Service / Differentiated Services Field
- Ipv6 Traffic Class

When Port Based QOS is selected, the interface determines the priority of a packed based upon the port on which it arrived.

- Port 1 (JS1) has the highest priority
- Port 2 (JS2) has the second highest priority

3.7.1.7 Ethernet QOS Queue

When Fair Weighted queuing is selected, the interface transmits packets at a rate of 8, 4, 2, and 1 from the highest priority queue to the lowest respectively. With fair weighted queuing, all queues with data in them are guaranteed to receive some bandwidth.

When Strict Priority is selected, the interface transmits packets from the highest priority queue until it is empty. It then begins transmitting data from the next highest priority queue. If higher priority data arrives, the interface finishes the current packet and then goes back to transmitting packets from the higher priority queue until it is again empty. Care must be taken when selecting Strict Priority, as it is entirely possible for the lower priority queues to be stalled indefinitely.

3.7.1.8 Setting Up The DMD1050 Ethernet Bridge To Operate Like A FIFO

In certain circumstances, it may be desirable to have the Ethernet interface operate in a FIFO like manner with no reordering of packets. This can be established by using a single port on the Ethernet interface and setting the Ethernet QOS Type to Port Based and the Ethernet QOS Queue to Strict Priority. When Setup and used in this manner, the packets will be transmitted in the exact order in which they are received.

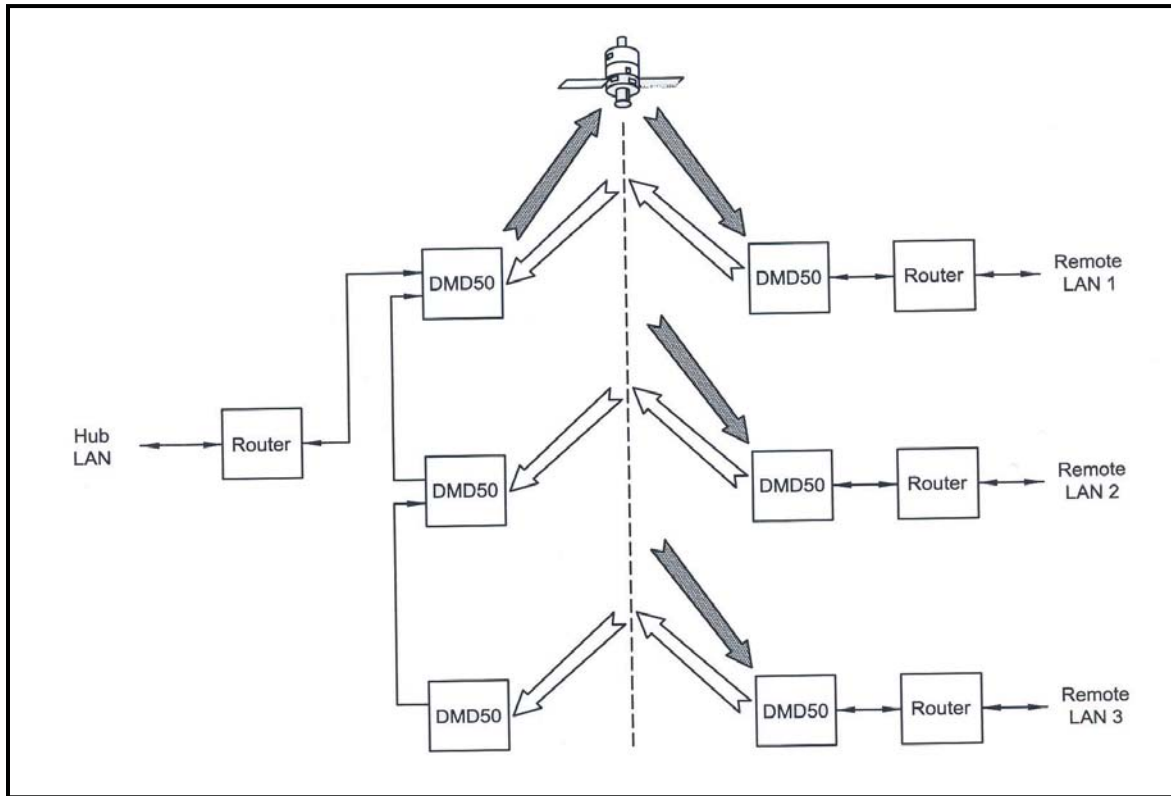


Figure 3-5. Point-to-Multipoint with Daisy Chaining

3.7.1.9 Packet Statistics

The following statistics are available under the Monitor Menu when the Ethernet Data Interface is selected.

Total Packets: This Counter displays the total number of Ethernet packets received from the satellite.

Error Packets: This counter displays the total number of Ethernet packets received from the satellite that had errors.

Packet Error Rate: This displays the Ethernet Packet Error Rate (PER) from the satellite.

Packet Statistics Reset: Allows the user to reset the Ethernet Total Packets and Ethernet Error Count by pressing <Enter>.

Link Status: The following status is available under the Monitor Menu/Link Status Sub-Menu when the Ethernet Data Interface is selected:

Port 1 Status: Displays the current status of LAN Port 1.

Port 2 Status: Displays the current status of LAN Port 2.

For each of the above-listed ports, the status may take on one of the following values/meanings.

Down: The link is down.

Unresolved: Unable to agree on connection speed.

10 Mbps Half: Connected at 10 Base-T Half Duplex.

10 Mbps Full: Connected at 10 Base-T Full Duplex.

100 Mbps Half: Connected at 100 Base-T Half Duplex.

100 Mbps Full: Connected at 100 Base-T Full Duplex.

If all LAN Ports are down, a Tx Data Activity Minor Alarm will be generated.

If the WAN Port is down, a Tx and Rx Ethernet WAN Major Alarm will be generated.

3.8 Internal Clock

The time and date is kept in order to 'time-tag' system events. User can change the time and date via the Web Browser.

3.9 Loopback Features (Terrestrial & IF)

The modem provides for a number of different loopbacks. The Loopback supported are:

- IF Loopback – Tx IF port is looped back to the Rx IF port
- TX Terrestrial Loopback - Tx Data port is looped back to the Rx Data port after the interface driver/receiver. (prior to the framing unit)
- TX Baseband Loopback - Tx Data port is looped back to the Rx Data port after the interface driver/receiver. (after the framing unit)
- RX Terrestrial Loopback - Receive Data from the satellite is looped back for retransmission to the satellite, providing a far end loopback. (prior to the framing unit)
- RX Baseband Loopback - Receive Data from the satellite is looped back for retransmission to the satellite, providing a far end loopback. (after to framing unit)
- TX/RX Terrestrial Loopback - provides both Terrestrial loopbacks simultaneously
- TX/RX Baseband Loopback - provides both Baseband loopbacks simultaneously

Refer to Figure 3-6 through Figure 3-8 for loopback functional block diagrams.



Usage of the modems loopback capabilities in conjunction with the Ethernet data interface can produce undesirable network loops. In order to run any type of data test with an Ethernet interface you must utilize two modems connected back to back. Simply using one modem and a loopback will not produce the desired results.

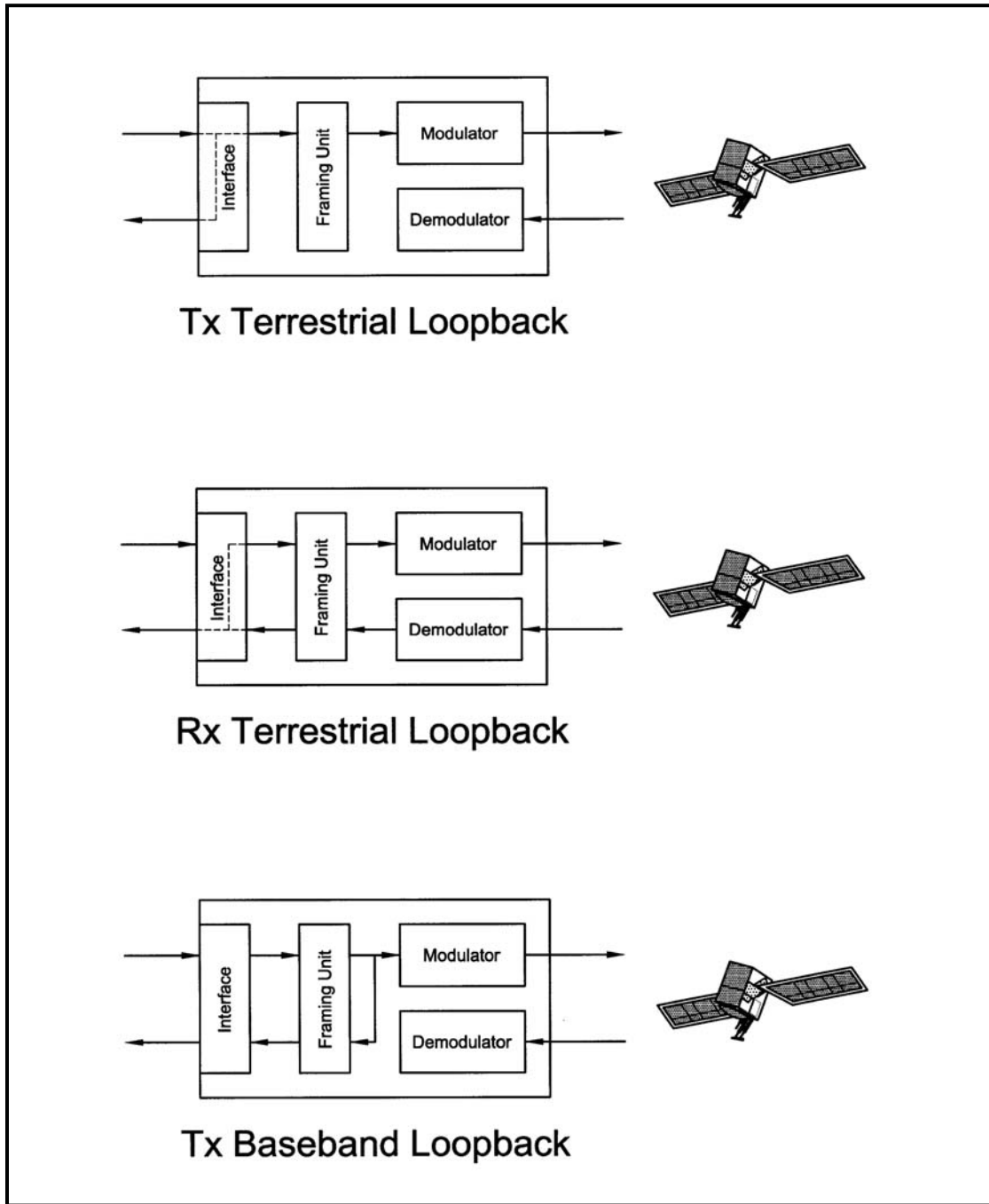


Figure 3-6. Loopback Functional Block Diagram

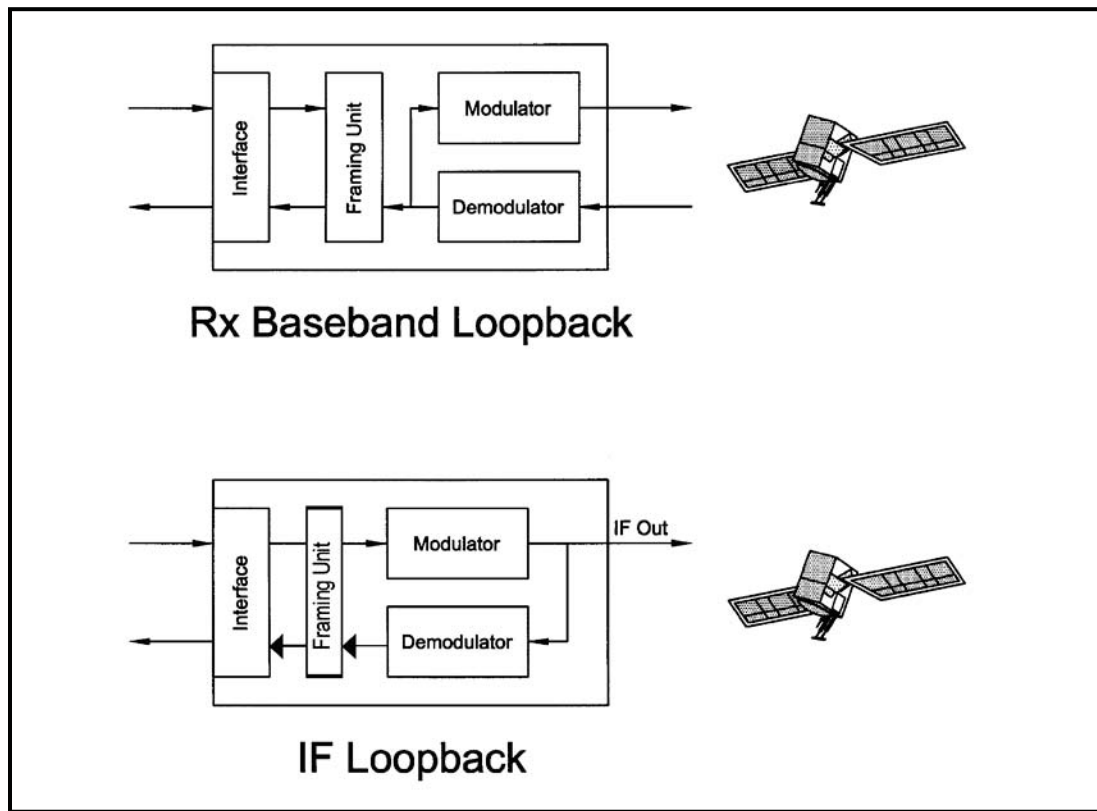


Figure 3-7. Loopback Functional Block Diagram

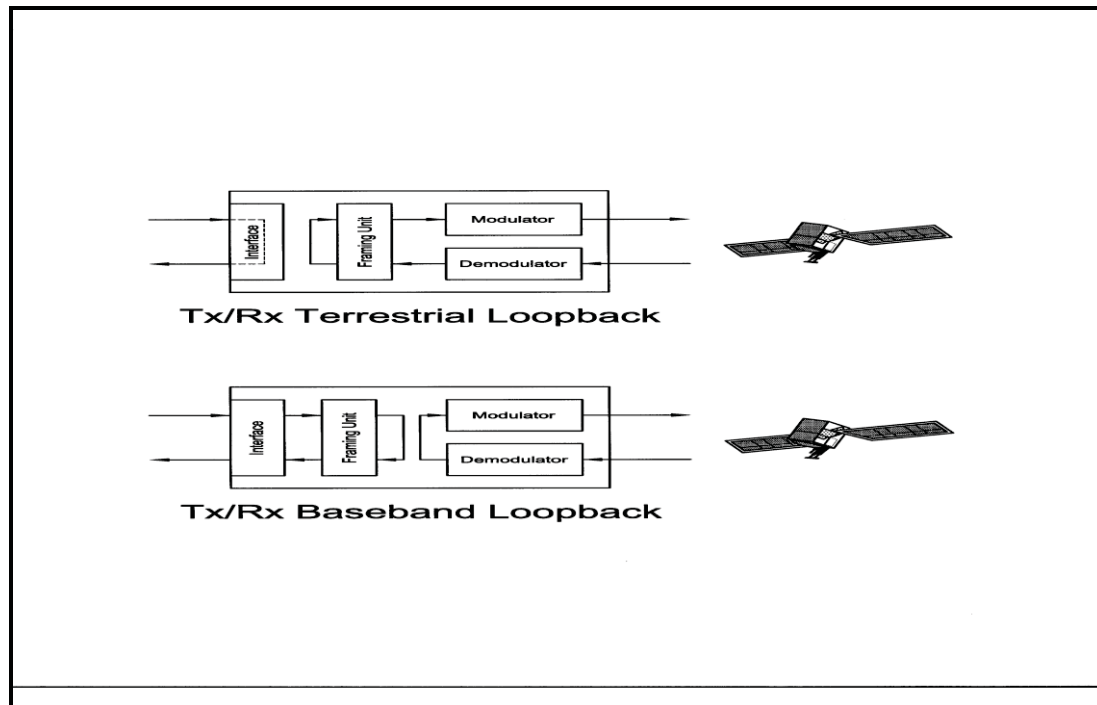


Figure 3-8. Loopback Functional Block Diagram

3.10 DMD1050 Clocking Options

The DMD1050 supports a number of different clocking options that can be recovered from the satellite or the terrestrial links. The various clocking options allow users to determine which clock will best fit their applications. Figure 3-9 gives an overview on how the modem processes the various clocks for the Tx Clock source and the Rx Buffer Clock source. Tx and Rx Clocks may be independently locked.

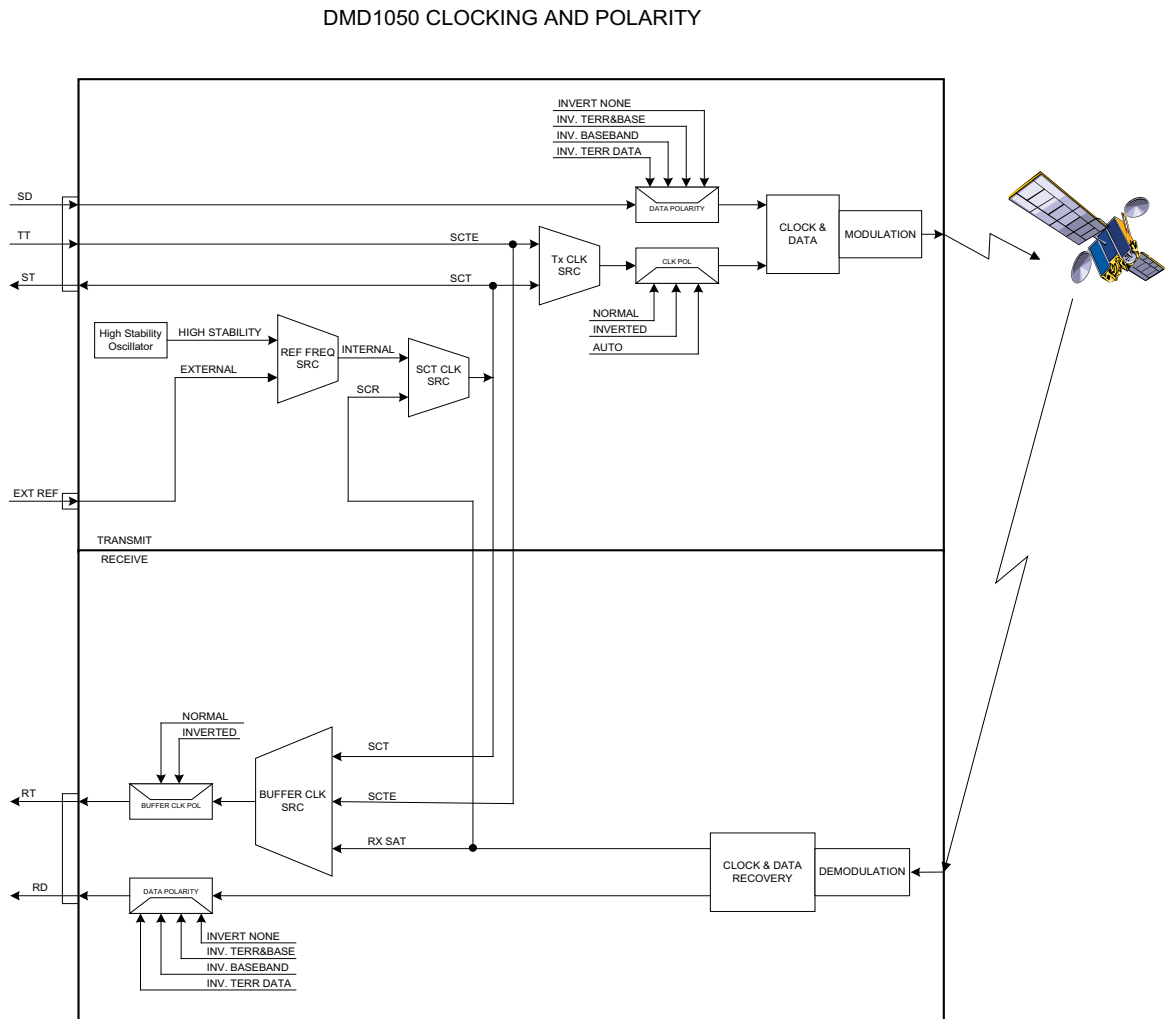


Figure 3-9. Clocking and Polarity Diagram

3.10.1 TX Clock Options

TX clock options can be recovered from the terrestrial interface, satellite interface or internally generated. The allows users to select SCTE Clock (Terrestrial) or the SCT internal clock. The modem also allows user to recover the SCT Clock from the satellite (SCR) or from the modem internally. The modem allows users to select clock polarity. The Tx clock selections available are:

The following paragraphs define the types of clocking options available to the user at the Front Panel.

- SCT (Internal Oscillator)
- SCTE (External Tx Terrestrial Clock)
- Rx Satellite Clock

3.10.1.1 SCTE: Serial Clock Transmit External

The SCTE clock is the Transmit Terrestrial Clock associated with the data interface. SCTE is an external clock received from the terrestrial equipment and the modem utilizes the terrestrial clock to lock the internal clock.

In Figure 3-9, the Transmit Terrestrial Data enters the modem and is clocked into a delay FIFO. Data is clocked out of the FIFO by the Modulator Clock. The Modulator Clock and Phase-Locked Loop (PLL), in conjunction with the Dejitter FIFO, which reduces the input jitter. Jitter reduction exceeds the jitter transfer specified in CCITT G.821.

SCTE is sometimes referred to as Tx Terrestrial Timing or Terminal Timing. Terminal Timing is reference to the RS422 or MIL 188-114A synchronous interfaces.

3.10.1.2 SCT: Serial Clock Transmit

The SCT clock can be generated internally or recovered from the satellite. The SCT clock source can be used as the TX clock source, RX Buffer Clock source and the Terrestrial Terminal equipment for clocking the transmit data. If the SCT clock is recovered from the satellite, then it is referred to as SCR. SCR is also referred to as Receive Clock, Satellite Clock, or Receive Timing (RT).

When SCT clock is configured as Internal, the frequency of the clock is set the same as the Transmit Terrestrial Clock rate. If SCT clock is configured as SCR, the internal clock is set to the same rate as the incoming receive satellite clock. SCT is sometimes referred to as Internal Timing or Send Timing (ST). In the event that the satellite clock is lost, the modem will automatically switch over to the Internal Clock and revert back to SCR when activity is detected.

If SCT is selected, then Terrestrial data that is synchronous to the SCT Clock is required to be supplied by the modem. It is intended for the terminal equipment to use the SCT as its clock source. The Autophase Circuit will automatically ensure that the data is clocked correctly into the modem. Therefore, a return clock is not necessary. The Clock Polarity should be set to Auto.

3.10.2 RX Buffer Clock Options

The DMD1050 supports a number of RX Buffer clock options that can be recovered from the satellite, terrestrial links or internally. The various clocking options allow users to determine which clock will best fit their applications. Figure 3-9 gives an overview on how the modem processes the various clocks for the Tx Clock and the Rx Buffer Clock. Tx and Rx Clocks may be independently locked. The following Buffer clock selections are available on the DMD1050:

- SCTE (External Tx Terrestrial Clock)
- SCT (Internal Oscillator)
- Rx Satellite Clock

The DMD1050 handles RX Buffer clock selections based on source priority levels. Refer to Appendix D “Web Browser Setup”. The user assigns priorities to the clock sources based on source selections. Source 1 has the highest priority and Source 3 has the lowest priority. If a fallback clock is selected and activity is lost at the highest priority source, the modem will fall back to the next highest priority clock with activity. When activity resumes on a higher priority source, the modem resumes using the higher priority source

<u>Clock Source</u>		<u>Priority</u>	
RX SAT	1	of	3
SCTE	2	of	3
SCT	3	of	3

3.10.3 RX SAT Clock

The RX Sat clock is recovered from the satellite that is received from the distant end. If selected the Buffer Clock is lock to the RX sat clock.

3.10.4 SCTE: Serial Clock Transmit External

When SCTE is selected as the Rx Buffer clock, the modem receives the clock from the Transmit Terrestrial interface.

3.10.5 SCT: Serial Clock Transmit

If SCT clock is selected as the RX Buffer clock source, then it should be configured for internal. SCT is sometimes referred to as Internal Timing or Send Timing (ST).

3.10.5.1 External Reference: J8 SMA Female

This is not actually a clock, but does have some clocking implications. When the external reference is used, the master oscillator within the DMD1050 is locked to the external reference, and the internal accuracy and stability of the DMD1050 assumes that of the External Reference. Therefore, not only are the transmit frequencies of the DMD1050 locked to the external reference, but the modem’s internal SCT Oscillator is locked to the external reference as well.

3.11 Ethernet Data Interface

The modem supports dual port 10/100 Base T Interface. When selected, the Tx Clock Source will default to SCTE and the Clock Polarity will default to Normal. In addition, the Buffer Clock will default to RxSat and the Buffer Clock Polarity will default to Normal. Refer to Appendix C for interface set up and supporting features.

3.12 Reed-Solomon Codec



Refer to Figure 3-10, Figure 3-11 and Table 3-1.

Utilizing a Reed-Solomon (R-S) Outer Codec concatenated with a Convolutional Inner Codec is an effective way to produce very low error rates even for poor signal-to-noise ratios while requiring only a small increase in transmission bandwidth. Typically, concatenating an R-S Codec requires an increase in transmission bandwidth of only 9 – 12% while producing a greater than 2 dB improvement in E_b/N_o . R-S is a block Codec where K data bytes are fed into the encoder which adds $2t = (N - K)$ check bytes to produce an N byte R-S block. The R-S decoder can then correct up to “t” erred bytes in the block.

3.12.1 Reed-Solomon Operation in the DMD1050

When the Reed-Solomon Codec is enabled, data is fed to the R-S Encoding Section of the DMD1050 where it is scrambled, formed into blocks, R-S encoded, and interleaved. Unique words are added so that the blocks can be reformed in the Receiving Modem (Refer to Figure 3-10 and Figure 3-11). Data is then sent to the modulator where it is convolutionally encoded, modulated and transmitted to the satellite.

When the signal is received and demodulated by the Receiving Modem, it is fed to a Viterbi Decoder for the first layer of error correction. After error correction is performed by the Viterbi Decoder, the unique words are located and the data is deinterleaved and reformed into blocks. The R-S Decoder then corrects the leftover errors in each block. The data is then descrambled and output from the R-S Section.

3.12.2 Reed-Solomon Code Rate

The Standard R-S Code Rate is defined by (N, K) where N is the total R-S block size in bytes - data + check bytes - and K is the number of data bytes input into the R-S Encoder. The transmission rate expansion required by the R-S Codec is then defined by N/K . In Closed Net Mode, the DMD1050 allows the following N and K setting: (126, 112), (219, 201), (194, 178), (225, 205). Table 3-1 reflects IBS/IDR compliant modes.

Custom Reed Solomon rate are available as an option.

3.12.3 Interleaving

The DMD1050 allows for interleaving depths of 4 or 8 R-S Blocks so that burst errors are spread over 4 or 8 R-S blocks to enhance the error correction of the R-S Codec. In Closed Network Mode, manually set the interleaver depth to 4 or 8. In DVB Network Mode, the DMD1050 sets the interleaver depth to 12 automatically.

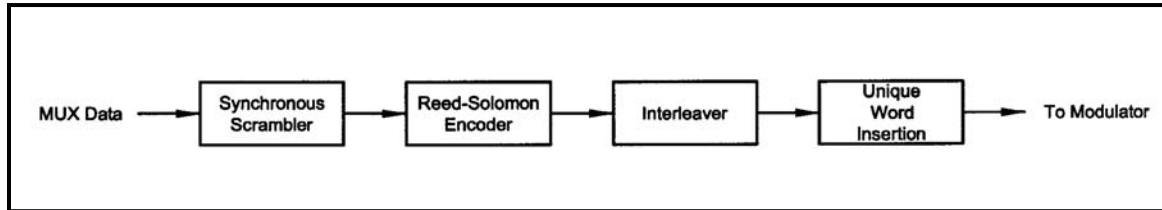


Figure 3-10. Reed-Solomon Encoder Functional Block Diagram

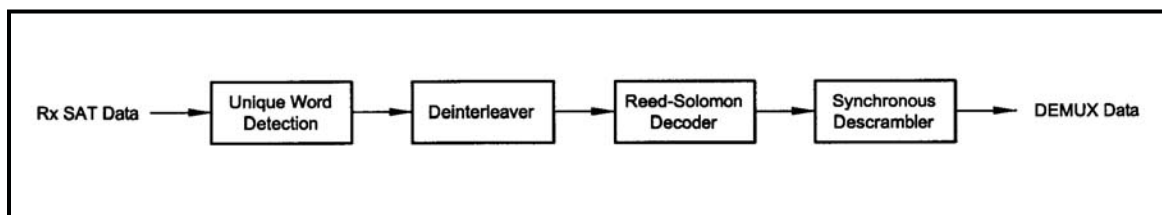


Figure 3-11. Reed-Solomon Decoder Functional Block Diagram

Table 3-1. Reed Solomon Codes

Type of Service	Data Rate (Kbps)	R-S Code (n, k, t) ¹	Bandwidth Expansion [(n/k) -1]	Interleaving Depth	Maximum ² R-S Codec Delay (ms)
Small IDR (With 16/15 O/H)	64	(126, 112, 7)	0.125	4	115
	128	(126, 112, 7)	0.125	4	58
	256	(126, 112, 7)	0.125	4	29
	384	(126, 112, 7)	0.125	4	19
	512	(126, 112, 7)	0.125	4	15
	768	(126, 112, 7)	0.125	4	10
	1024	(126, 112, 7)	0.125	4	8
IDR (With 96 Kbps O/H)	1536	(126, 112, 7)	0.125	4	5
	1544	(225, 205, 10)	0.0976	4	9
	2048	(219, 201, 9)	0.0896	4	7
	6312	(194, 178, 8)	0.0899	4	2
8PSK	8448	(194, 178, 8)	0.0899	4	<2
	1544	(219, 201, 9)	0.0896	8	18
	2048	(219, 201, 9)	0.0896	8	13
	6312	(219, 201, 9)	0.0896	8	4
DVB	8448	(219, 201, 9)	0.0896	8	3
	All	(204, 188, 8)	0.0851	12	-

1. n = code length, k = information symbols and t = symbol error correcting capability.
2. Design objective.

3.13 DMD1050 Automatic Uplink Power Control (AUPC Operation)

The modem has an optional built-in provision for Automatic Uplink Power Control, AUPC. AUPC is useful when operating power levels are affected by environmental changes in the atmosphere. AUPC attempts to adjust local power output to maintain a constant E_b/N_o at the receiver location.

The modem supports three versions of AUPC. They include Radyne AUPC, EF AUPC and Near Side AUPC. Radyne AUPC and EF AUPC use satellite overhead to send messages between the local and remote ends of an SCPC link. The messaging is done with IBS 1/15 and EF AUPC Framing messages.



Implementing Strap Code 26 can set the following modem configuration. Refer to Table 4-4 for an explanation and tabular listing of available Strap Codes. The Frequency and Modulator Output Power are set independently of the strap code.

3.13.1 Radyne AUPC

In this case, Target E_b/N_o indicates the remote value the local unit wants to maintain by adjusting the local power level.

Radyne AUPC can be set to operate on either or both directions of a link but always require a bi-directional channel. Enabling AUPC on one side of the link will activate AUPC on the distant end of the link. It is necessary that both the Modulator and Demodulator be set to the appropriate framing for AUPC options to be editable and for the AUPC function to operate properly.

Examples of the basic Radyne AUPC Operations are described as follows:

Assume that the two modems, one at each end of the link, are set to Radyne AUPC operation. Only one direction is discussed, but the same functions could be occurring in both directions simultaneously.

Local Modem is transmitting to Remote modem under normal conditions and the Remote modem has a receive E_b/N_o of 7.5 dB. Local modem has been set to a Target E_b/N_o of 7.5 dB with an output power level of -15 dBm.

It begins raining at Remote site and the E_b/N_o drops to -7.0 then -6.8 dB. Remote Modem is constantly sending update messages of its E_b/N_o to Local modem. When Local modem sees the drop in the remote E_b/N_o , it slowly begins to raise the output power, and will continue to adjust if the remote E_b/N_o continues to drop. As the rain increases in intensity, the remote E_b/N_o decreases but Local modem continues to increase its power level to compensate.

When the rain diminishes, Local modem will see the remote E_b/N_o begin to increase. Local modem will lower its power level. The operation is therefore a feedback control loop with the added complication of a significant time delay.

3.13.2 EF AUPC

In this case, Target E_b/N_o indicates the local unit wants the remote unit to maintain a power level sufficient to provide the local E_b/N_o value.

EF AUPC can be set to operate on either or both directions of a link but always require a bi-directional channel. Enabling AUPC on one side of the link will activate AUPC on the distant end of the link. It is necessary that both the Modulator and Demodulator be set to the appropriate framing for AUPC options to be editable and for the AUPC function to operate properly.

Examples of the basic EF AUPC Operations are described as follows:

Assume that the two modems, one at each end of the link, are set to AUPC operation. Only one direction is discussed, but the same functions could be occurring in both directions simultaneously.

The local modem is transmitting to modem at a remote locale under normal conditions. The remote modem has a receive E_b/N_o of 7.5 dB. The local modem has been set with a Target E_b/N_o of 7.5 dB, and has a current power output of -15 dBm.

It begins to raining at the local site, and the E_b/N_o drops to -7.0 then -6.8 dB. The local modem is constantly sending update messages of its E_b/N_o to the remote modem. When the remote modem sees the drop in the E_b/N_o , it slowly begins to raise it's output power, and will continue to do so until the Target E_b/N_o is restored at the local site.

When the rain diminishes, the local modem's E_b/N_o will begin to increase. The remote modem will now lower its power level to restore the target value. The operation is therefore a feedback control loop with the added complication of a significant time delay.

3.13.3 Near Side AUPC

Near Side AUPC is a loop back system that adjusts the broadcast uplink signal when local conditions change. This is done by having the Near Side AUPC attempt to adjust the outbound power to compensate for local weather.

The local receiver must be tuned and locked to the transmitter and then the internal E_b/N_o , is used for feedback. This creates a Tx-Satellite-Rx control loop is created.

Near Side AUPC is primarily used for broadcast applications since the modem cannot expect to receive data from a distant location. Near Side AUPC can be utilized with any satellite framing mode.

There are safeguards built into the AUPC System. First, the modulator has two parameters, which allow control of the maximum and minimum output power Levels. Second, a nominal, or default, power level is specified which takes effect if the receive signal or messaging is lost. This nominal power should be set to a level high enough to re-establish communications regardless of rain fade.

EF AUPC, also provides some control over the rate of power change; while the Radyne and Near Side AUPC use a optimized rate for rain fade compensation.

The AUPC Menu Functions and their descriptions are shown on Table 3-2 and Table 3-3.

Table 3-2. Local AUPC Functions

Function	AUPC Available Options	Description
AUPC MODE	DISABLE, NEARSIDE, RADYNE, EFDATA	Enables/Disables the AUPC to function locally
NOMINAL POWER	0 TO -25 dB	Sets default output power to be used
MINIMUM POWER	0 TO -25 dB	Sets minimum output power to be used
MAXIMIM POWER	0 TO -25 dB	Sets maximum output power to be
TARGET Eb/No	4.0 TO 16 dB	Desired E_b/N_0 of remote modem
TRACKING RATE	6.0 to 0.5 dB/MIN	Adjustable in .5dB increments
LOCAL CL ACTION	HOLD, MAXIMUM, NOMINAL	Allows user to determine what power setting the remote modem will use in the event of a carrier loss at the local side.
REMOTE CL ACTION	HOLD, MAXIMUM, NOMINAL	This setting allows users to determine what local output power setting to use in the event that the remote end has a carrier loss.
1. The AUPC Menus are located under the Modulator Menu as shown in Section 4. 2. The EF AUPC Menu displays when EFAUPC Framing is enabled in the Demod and Mod set up menus. 3. Highlighted areas are activated when modem is set to EF AUPC		

Table 3-3. Remote AUPC Functions (EF AUPC Only)

Function	AUPC Available Options	Description
AUPC MODE	Disable, EFDATA	Enables/Disables the AUPC to function remotely
LOOPBACK	Enabled/Disabled	Loop back test over satellite link
TX 2047 TEST BER	Enabled/Disabled	Initiates 2047 Test pattern BER Test
RX 2047 BER	Status Menu	Identifies the BER status on the distant RX side
AUPC DEF LVL		Sets default output power to be used
The Remote AUPC Menus are only supported by EFAUPC		

3.14 Asynchronous Overhead Operation (J1)

This port is also dedicated for ES-ES Communications. The port may be configured for a number of Asynchronous communications protocols. Protocol supported are Standard IBS ES-ES, Enhanced Asynchronous and SCC. Overhead data to/from the UIM is routed to/from the framer/deframer. This port may be configured to support either RS-232 or RS-485 signal levels. The baud rate and protocol can be selected from the Web Browser.

The Asynchronous Framing/Multiplexer is capable of multiplexing a relatively low-speed overhead channel onto the terrestrial data stream resulting in a slightly higher combined or aggregate data rate through the modem. The overhead channel is recovered at the far end. This added channel is termed variously "An Overhead Channel", "Service Channel", "Async Channel" or in IESS terminology an "ES to ES Data Channel." The basic frame structure used by the multiplexer is that specified in the IESS-309 Standard, resulting in a 16/15 Aggregate to through-Data Ratio.

IBS 1/15 framing supports two Asynchronous protocols.

For Regular Async: (ES to ES), the Baud Rate is approximately 1/2000 of the Data Rate listed in Table 3-3.

For Enhanced Async: (Radyne Proprietary Async.), the Baud Rate is selectable, but Data Rate is limited. Refer to Table 3-3 for differences between Regular and Enhanced Async.

The maximum Baud Rate is 19,200 bps for IBS Async. Two software-controlled modes are designed into the card to best utilize the available bits; "Standard IBS ES to ES" and "IBS (Enhanced Async)".

The Async Channel can be set under software-control to either RS-232 or RS-485 mode. The pin assignments for both modes are shown in Table 3-4. The "RS-485" Setting controls the output into tri-state when the modem is not transmitting data, allowing multiple modem outputs to be connected together.

Table 3-4. Pin Assignments

Kbps	Baud Rate Example for Standard IBS	Kbps	Baud Rate Example for Enhanced Mode
128	64	9.6	300
256	128	19.2	600
384	192	32	600
512	256	64	1200
640	320	128	2400
768	384	192	4800
896	448	256	4800
1024	512	320	9600
1152	576	384	9600
1280	640	448	9600
1408	704	512	9600
1536	768	576	9600
1664	832	640	19200
1792	896	704	19200
1920	960	768	19200
1920	960	768	19200
2048	1024	832	19200
		896	19200
		960	19200
		1024	19200
		1088	19200
		1152	19200
		1216	19200
		1280	19200
		1344	19200
		1408	19200
		1472	19200
		1536	19200
		1600	19200
		1664	19200
		1728	19200
		1792	19200
		1856	19200
		1920	19200
		1984	19200
		2048	19200

3.15 Standard IBS ES to ES Mode

In the first or “Normal” mode, all bit assignments are per the IBS standard. The bits of Overhead Housekeeping byte 32 are implemented as shown in Table 3-5 below:

Table 3-5. IBS Standard

Bit 1	ES to ES Data Channel	This bit is routed directly to the ES to ES Data Channel. Its data rate is 1/512 th of the aggregate rate (or 1/480 th of the through terrestrial data rate), and is normally used to super-sample an asynchronous data channel.
Bit 2	Frame Alignment	Part of the Frame Alignment word.
Bit 3	Backward Alarm	Transmit and Receive with main processor to activate Main Alarm/LED.
Bit 4	Multiframe Message	As per IBS.
Bits 5 and 6	Spare	Not currently utilized.
Bits 7 and 8	Encryption Utilization	Not currently utilized.

The ratio of the Through Terrestrial Data Channel Rate to the aggregate rate is 15/16. The standard transmit and receive channels of the ES to ES Data Channel in a Standard IBS Mode are raw channels operating at the specific bit rate as controlled by the data channel rate, without buffering. In addition, no clocks are provided with this channel. Since it would be rare that the data rate provided was exactly that required for a standard rate device, the only method of communicating using this channel is to allow it to super-sample the user data.

3.16 Enhanced Asynchronous Mode (Radyne Proprietary)

Since many of the frame bits in the standard IBS mode are not used, an “Enhanced” Multiplexer Mode has been implemented that can be engaged under software control. Since this mode changes the use of many of the framed non-data bits, this mode is only usable when the DMD1050 is at both ends of a link. In this mode, the overhead signaling bytes 16 and 48 can be used to implement a significantly higher speed ES to ES Data Channel under software control. When implemented, this rate is 16 times that of the normal ES to ES IBS mode, or 1/30th of the terrestrial data rate (1/32nd of the aggregate rate).



*The IBS 1/15 framing mode **MUST** be selected for Asynchronous channel operation to be available.*

3.17 Satellite Control Channel (SCC) - J1

The SCC format uses a variable overhead rate to transmit an asynchronous data channel in addition to the normal data channel. The SCC asynchronous mode implemented on the DMD20 is "PassThru" Mode.

In Pass Thru Mode, there is no formatting or deformatting of the input data in the buffer, and it is transmitted on a first-in first-out basis. In band data entering the remote port is inserted into the user data stream. The in-band data is received and passed on to the user without any deformatting or depacketizing involved. The maximum in band rate supported is 115200bps.

The Asynchronous Data Interface (J1) is a 10-Pin Dual Row header. The data interface can be configured for RS232 or RS485 via the Web Browser or Terminal Screen. Refer to Table 4.3.4 for pinouts.

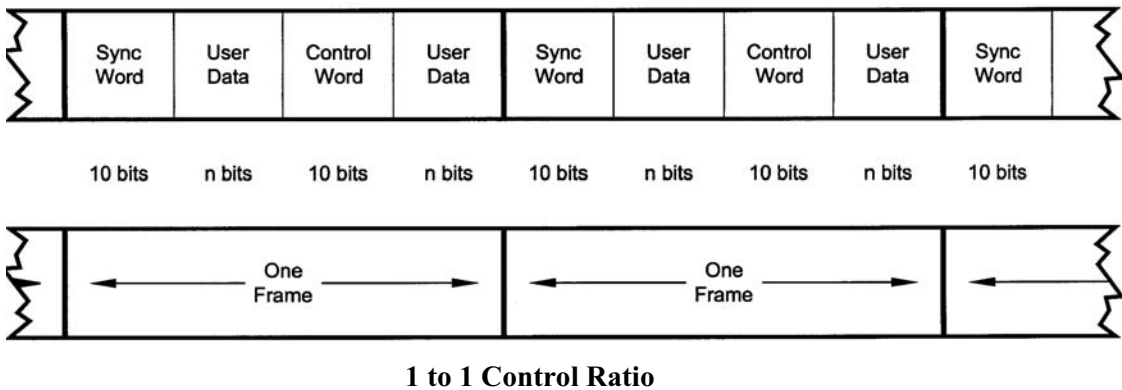
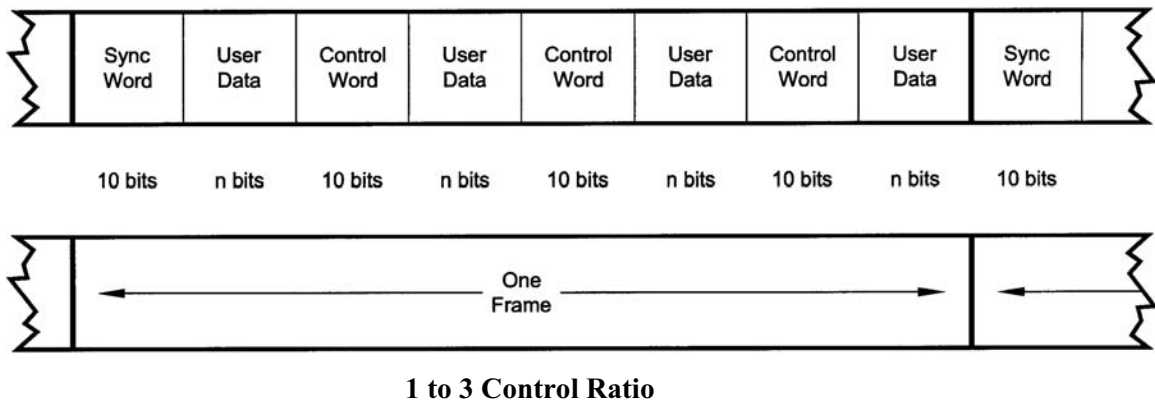
3.17.1 SCC Framing Structure

Each SCC frame consists of the following:

- A 10-bit synchronization pattern called the Synchronizing Word.
- Multiple variable length slots filled with user data.
- Multiple 10-bit control words that contains eight bits of in-band data (the extra two bits are for the async start/stop).

The number of user data slots and control words per frame is selected by the SCC Control Ratio Parameter. This can be any value from 1 to 1 through 1 to 7. A higher ratio allows a lower overhead rate but since there are less Sync Words, there is a higher acquisition time.

The following examples show a control ratio of 1 to 3 and 1 to 1. Example 1 shows three Control Words for every Synchronizing Word, and Example 2 shows one Control Word for every Synchronizing Word.



The Control Ratio of the receiving units must match the Control Ratio of the transmitting unit.

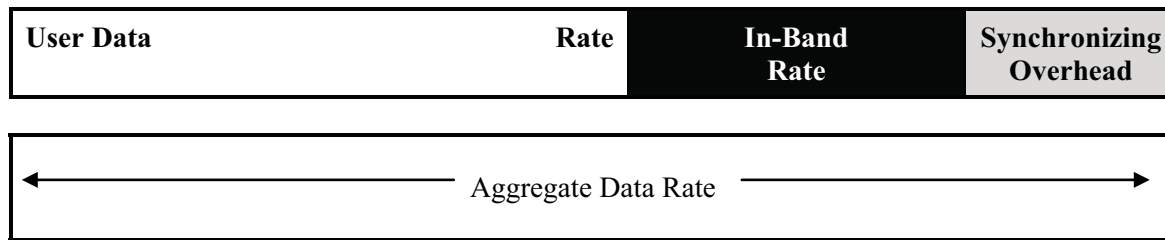
3.17.2 Aggregate Data Rate

The aggregate data rate equals the following:

$$\text{User Data Rate} + \text{In-Band Rate} + \text{Synchronizing Overhead Rate}$$

Because SCC must adjust the overhead so that there are an equal number of user data bits in each slot, the synchronizing overhead cannot be easily calculated. However, dividing the In-Band Rate by the Control Ratio can approximate it. The following equation shows the basic calculation of this rate:

$$\text{Aggregate Date Rate} = \text{User Data Rate} + \text{In-Band Rate} + (\text{In-Band Rate}/\text{Control Ratio})$$



As an example, given the following parameters:

User Data Rate:	1,024,000 bps
In-Band Rate:	19,200 bps
Control Ratio:	1 to 7

Aggregate data rate = 1,024,000 + 19,200 + (19,200/7) or approximately 1,045,942 (actually 1045974).

This gives an overhead ratio of $1,045,974/1,024,000 = 1.021$

In addition, another constraint changes the actual Aggregate Data Rate. The user data slot size is limited to 2,500 bits. Because of this, the modem increases the in-band rate to reduce the user data slot size. This only happens at higher user data rates.

NOTE: The Maximum In-Band rate is 115200. The Async interface Rate must be equal or greater in value.

3.17.3 Overhead Rate Comparison

The SCC Overhead Ratio varies depending on the User Data Rate, the In-Band Rate, and the Control Ratio. This gives SCC the advantage of lower overhead rates when compared to IBS, which has a fixed overhead ratio of 16/15 or 1.067. The following table gives some examples of SCC overhead rates for different user data and control ratios.

User Data Rate	In-Band Rate	Control Ratio	Aggregate Data Rate	Overhead Ratio
512,000	19,200	1/7	533,974	1.043
1,024,000	19,200	1/7	1,045,974	1.021
2,048,000	19,200	1/7	2,069,951	1.011
3,072,000	19,200	1/7	3,093,943	1.007
4,096,000	19,200	1/7	4,117,951	1.005
6,312,000	19,200	1/7	6,337,248	1.004
6,312,000	19,200	1/3	6,337,606	1.004
6,312,000	19,200	1/1	6,350,418	1.006

3.17.4 Actual Overhead Rate Calculation

The following is the actual calculation the modem does to calculate the overhead ratio:

1. The modem calculates the minimum in-band rate to limit the size of the user data slots to 2,500 bits (the result is truncated to an integer).

$$\text{Minimum In-Band} = (\text{User Data Rate} * \text{Control Ratio}) / ((\text{Control Ratio} + 1) * 250)$$

2. Using the bigger of Minimum In-Band or the selected In-Band, the modem calculates the number of bits for each user data slot (result is truncated to an integer).

$$\text{Slot Bits} = (\text{User Data Rate} * (\text{Control Ratio} * 10)) / (\text{In-band Rate} * (\text{Control Ratio} + 1))$$

Note: Slot bits of 0 are invalid.

The actual ratio the modem uses is:

$$\text{Actual Ratio} = (\text{Slot Bits} + 10) / \text{Slot Bits}$$

Example 1:

User Data Rate: 1,024,000 bps

In-Band Rate: 19,200 bps

Control Ratio: 1 to 7

$$\text{Minimum In-Band} = (1,024,000 * 7) / ((7 + 1) * 250) = 3,584 \text{ (less than In-Band Rate)}$$

$$\text{Slot Bits} = (1,024,000 * (7 * 10)) / (19,200 * (7 + 1)) = 466$$

$$\text{Actual Ratio} = (466 + 10) / 466 = 1.021$$

Example 2:

User Data Rate: 6,312,000 bps

In-Band Rate: 19,200 bps

Control Ratio: 1 to 7

3.17.5 SCC Overhead Channel Setup

1. Set the Framing Mode (located under Mod and Demod Data Menus) to SCC. After doing this, two new menus will appear to the right of the Framing Menu, for both the Mod and Demod. The new menus will be:

SCC CTL RATIO
SCC INBAND RATE

2. Set the desired SCC control ratio:

SCC CTL RATIO {1/1, 1/2, 1/3, 1/4, 1/5, 1/6, 1/7}

This allows the user to simulate the framing used by the Satellite Control Channel Option (Pass-Thru Mode only). The SCC CTL RATIO is the ratio of overhead in-band data to synchronizing words.

3. Set the desired SCC in-band rate:

SCC INBAND RATE {300 to 115200}

This allows the user to request the rate of in-band data for the overhead channel. This sets the overhead amount only. The actual amount of data that can be passed through the overhead channel will be set under “ES Baud Rate” (see Step 6 below).

4. Under the Interface > General menus, locate the TX ASYNC MODE (menu).

5. Under the TX ASYNC MODE Menu, set the desired ES Interface type:

ES INTERFACE {RS-232, RS-485}

This allows the user to select the interface type.

6. Under TX ASYNC MODE Menu, set the desired baud rate for the ASYNC Port (J1). This will be the baud rate that will pass through the overhead channel:

ES BAUD RATE {150 - 115200}

This allows the user to select the baud rate of the ASYNC port (J1) in SCC Mode.

7. Under TX ASYNC MODE Menu, set the desired ES BITS/CHAR:

ES BITS/CHAR {7,8}

This allows the user to choose between 7 or 8 bits of data.

8. Repeat Steps 4 through 7 under the RX ASYNC MODE (menu)

9. The physical connection to the overhead channel will be a 10 pin dual row male header (J1). Refer to Appendix E for mating connector details.

SCC Overhead Chart Examples (Viterbi 3/4 w/V.35 Scrambler)			
Modem Data Rate Kbps	SCC Control Channel Rate	In-Band Overhead Rate Setting	Symbol Rate
9.6	1/1	300	6800
9.6	1/2	300	6700
9.6	1/3	300	6667
9.6	1/4	300	6650
9.6	1/5	300	6641
9.6	1/6	300	6634
9.6	1/7	300	6629
9.6	1/1	9600	19200
9.6	1/2	9600	17067
9.6	1/3	9600	15543
9.6	1/4	9600	14400
9.6	1/5	9600	14400
9.6	1/6	9600	14400
9.6	1/7	9600	14400
512	1/1	9600	354165
512	1/2	9600	350948
512	1/3	9600	349867
512	1/4	9600	349346
512	1/5	9600	349201
512	1/6	9600	348802
512	1/7	9600	348658

3.18 DMD1050 ID Codes (Feature Upgrades)

The modem has unique ID codes that allow the user to add feature upgrades to the modem without the unit having to be returned to the factory. Users are required to identify these ID codes when they want additional features added to their unit. Comtech will supply a new ID code that is required to be entered in the ID code field. Once the new ID code is entered, the modem will activate the new features.

ID Codes can be located in the Section 7, “Web Browser”, Figure 7-28 - System Setup Menu.

3.19 Strap Codes

The Strap Code is a quick set key that sets many of the modem parameters. For quick setup of the DMD1050, Strap Codes are very helpful. When a Strap Code is entered, the modem is automatically configured for the code’s corresponding data rate, overhead, code rate, framing, scrambler type and modulation. An example of how to set a strap code follows:

Example: In the Ethernet interface <Modulator> Menu, depress the Transmit Gel-tab, then move the cursor down and depress “General”. Now move the cursor over to ‘Strap Code’. Click inside the box and enter the new strap code submenu and enter #16. The DMD1050 will be automatically configured to the parameters shown below in the highlighted row ‘Strap Code 16’.

Refer to [Appendix G](#) for the various strap code options.

Chapter 4. Rear Panel Interface

This section discusses the electrical interfaces available from the rear panel. All locations are as viewed from the rear of the unit unless otherwise specified.

4.1 DMD1050 Connections

All DMD1050 connections are made to labeled connectors located on the Modem Board. (refer to Figures 4-1, 4-2, 4-3 and 4-4). The connector definitions below are those on the DMD1050 unit. Any connection interfacing to the DMD1050 must be the appropriate mating connector. Refer to Appendix E for various connectors that will be used to operate the DMD1050.

The DMD1050 consists of two PC board assemblies.

- RF Board (ASR5776)
- Baseband Board (AS/5780)

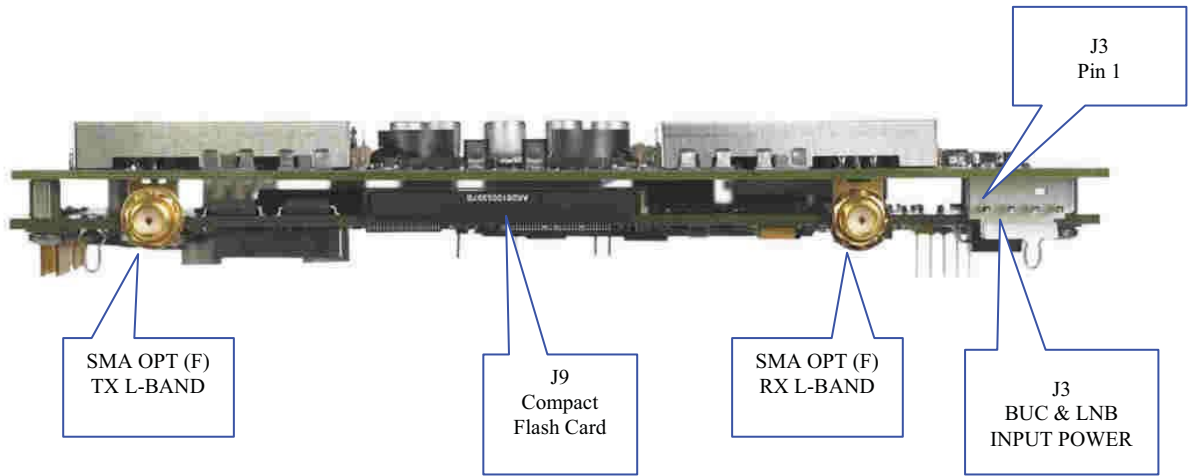


Figure 4-1. DMD1050 Front View

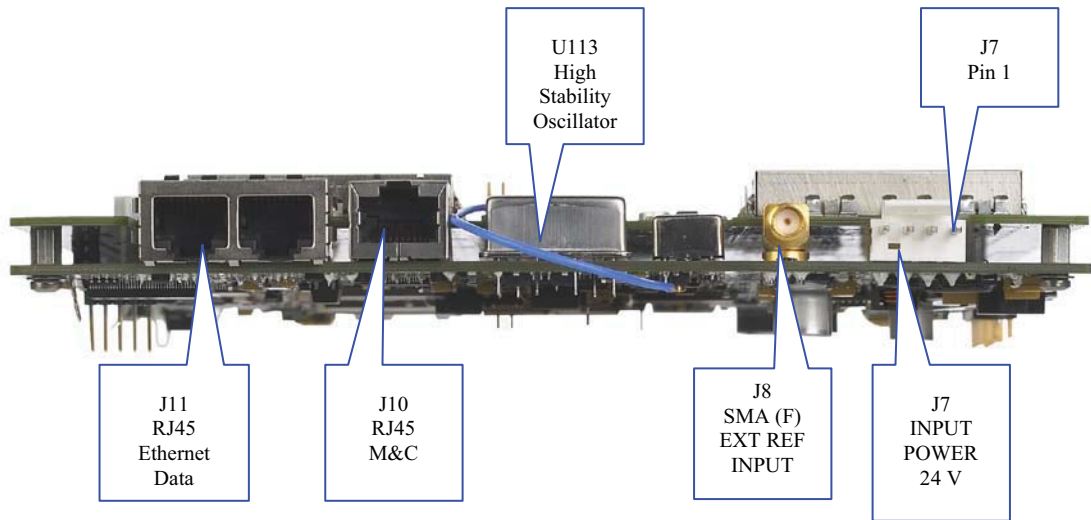


Figure 4-2. DMD1050 Rear View



Figure 4-3. DMD1050 Top View

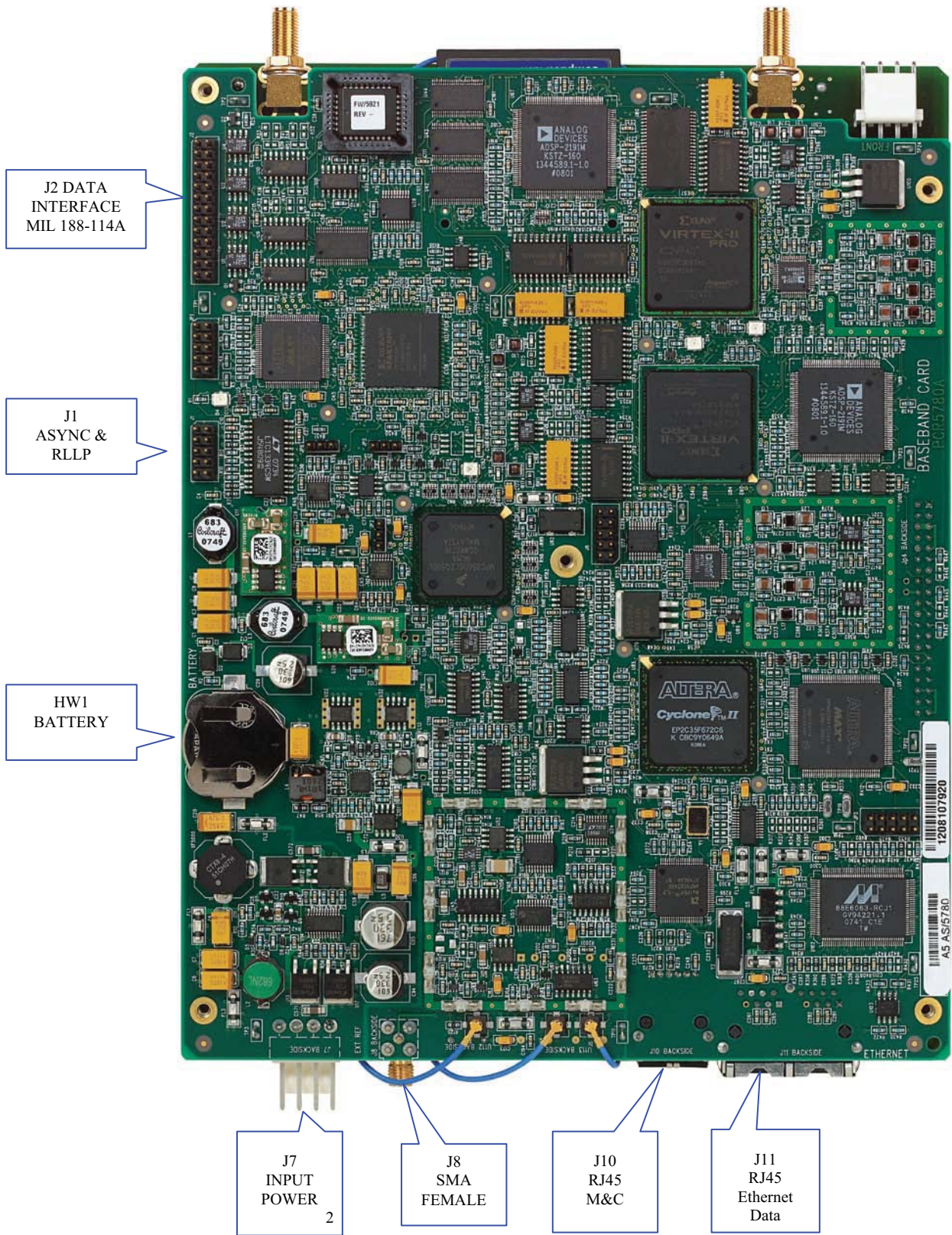


Figure 4-4. DMD1050 Bottom View

4.2 Compact Flash (J9)

The compact flash slot is located on the right side as viewed from the rear of the unit. A 256 Mbit flash memory card stores all the modem M&C and operational data. It must be present when the modem is operating.

4.3 Power Input (J7)

The Input DC Power for the modem board requires +21 to +24.5 Volts DC. Manufacturer part number for this connector is referenced in Appendix E. Refer to Table 4-1 for pin out descriptions.

Table 4-1 DC Input Power Ports (J7)		
Pin No.	Signal Name	Signal
1	Ground	GND
2	Ground	GND
3	24 Volts DC	---
4	24 Volts DC	---

Table 4-1. Power Input Connector (J7)

4.4 Chassis Connections (Standard)

4.4.1 EXT REF (J8)

The External Reference Port is a 50 Ohm Female SMA Connector and will accept the following frequencies: 1.0, 1.544, 2.0, 2.048, 5.0, and 10.0 MHz).

Input Level: 0.1 Vp-p to 5 Vp-p (Sine or Square wave)

4.4.2 TX L-Band IF (J1)

The Transmit IF Output Port is a 50 Ohm SMA Female Connector that can be used for L-Band IF. The power level is programmable from 0 to -25 dBm, in 0.1 dBm steps. The IF Frequency can be programmed to 950 – 2050 MHz, in 1 Hz Steps.

4.4.3 RX L-Band IF (J2)

The Receive IF Input Port is a 50 Ohm SMA Female Connector that can be used for L-Band IF. The IF Frequency can be programmed from 950 to 2050 MHz in 1 Hz Steps.

4.4.4 ASYNC & Remote Port (J1) - 10 Pin Dual Row Header

This port support both the Async and the Remote interfaces. The remote port can support RS485 or RS232. This port is a 10 pin dual row header. Manufacturer part number for this connector is referenced in Appendix E. Refer to Table 4-2 for pinouts.

Table 4-2 ASYNC & Remote Ports (J1)			
Pin No.	Signal Name	Signal	Direction
1	RX_ASYNC_B	485/RXD_B	Output
2	RX_ASYNC_A	485/RXD_A	Output
3	TX_ASYNC_B	485/TXD_B	Input
4	TX_ASYNC_A	485/TXD_A	Input
5	RX_RLLP_B	485/CTS	Input
6	RX_RLLP_A	485-A_232	Input
7	TX_RLLP_B	485-B	Output
8	TX_RLLP_A	485-A_232	Output
9	Ground	GND	---
10	No Connect	---	---

Table 4-2. ASYNC & Remote Ports (J1)

4.4.4.1 Default/Shorting Plug (JP5 JP6) - 3 Pin Male Connector

If user is experiencing difficulty accessing the Web Browser or the Terminal Interface, the user can reset the M&C interface settings by utilizing the supplied default plug (CNRSHUNT). By installing the default plug across pins 1 and 2 of JP5 & JP6 connector and cycling power, the interface default settings will be reset. Default jumper/shunts are supplied with the supplied connector kit. The default jumper may be installed between pins 2 and 3 and user can reposition the jumper across pins 1 & 2. Once default settings have been activated, remove Jumpers.

Table 4-2-1. Default/Reset connections: 3-Pin male Connector (JP5 & JP6)
Install shunt/jumper Between Pin No.
Pin 1 & 2

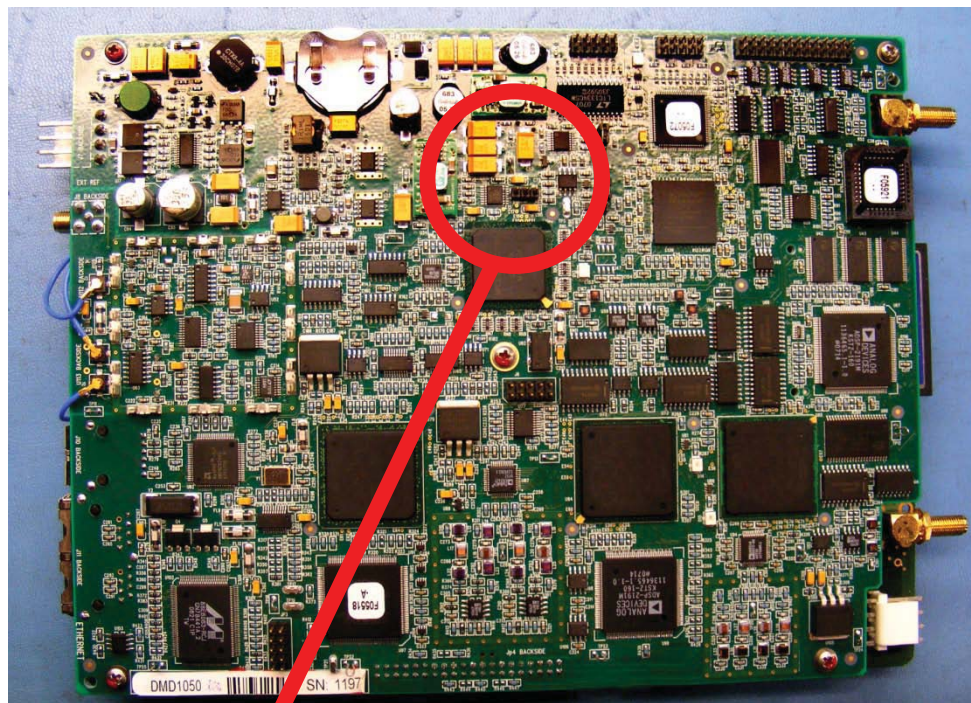


Figure 4-5a

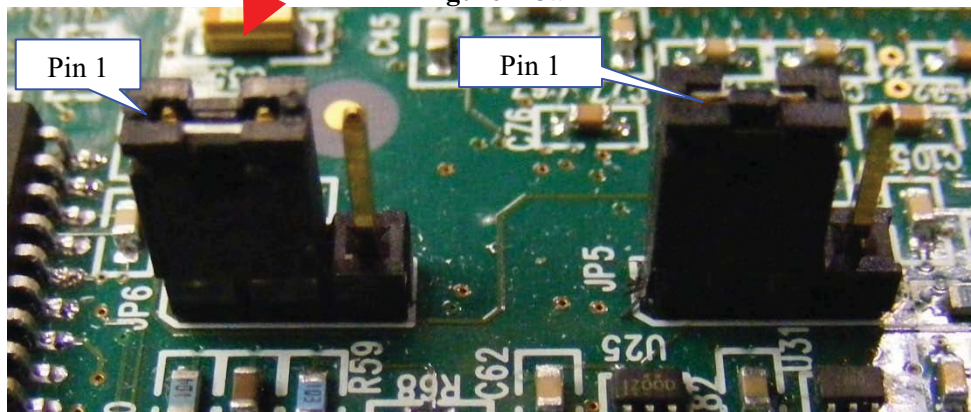


Figure 4-5b

4.4.5 TERMINAL - Factory use only

4.4.6 MIL-188-114A (J2) EIA-530 Port RS-422

See Appendix E for the manufacturer part number for this connector.

Table 4-3. MIL-188-114A Port (RS-422) 26-Pin Dual Row Male Header (J2)			
Pin No.	Signal Name	Signal	Direction
1	Ground	---	---
2	Send Data B (+)	SD-B	Input
3	Send Data A (-)	SD-A	Input
4	Send Timing A (-)	ST-A	Output
5	Receive Data A (-)	RD-A	Output
6	Receive Data B (+)	RD-B	Output
7	Request To Send A (-)	RS-A	Input
8	Receive Timing A (-)	RT-A	Output
9	Clear To Send A (-)	CS-A	Output
10	Modulator Fault - Open Collector	MF	Output
11	Data Mode A (-)	DM-A	Output
12	Request To Send B (+)	RS-B	Input
13	Ground	GND	---
14	Data Terminal Ready A (-)	TR-A	Input
15	Receiver Ready A (-)	RR-A	Output
16	Demodulator Fault	DF	Output
17	Receive Timing B (+)	RT-B	Output
18	Data Mode B (+)	DM-B	Output
19	Receiver Ready B (+)	RR-B	Output
20	Data Terminal Ready B (+)	TR-B	Input
21	Terminal Timing B (+)	TT-B	Input
22	Terminal Timing A (-)	TT-A	Input
23	Send Timing B (+)	ST-B	Output
24	Antenna AGC	---	Output
25	Clear T Send B (+)	CS-B	Output
26	No Connect	---	---

4.4.7 ETHERNET M&C (J10)

The Ethernet M&C Port is a 10 Base-T Interface. J10 can be used for the Monitor & Control (M&C) Functions of the unit. The physical interface is a standard female RJ-45 Connector.

4.5 Ethernet Data Interface (J11)

The DMD1050 Ethernet Data Interface provides two RJ-45, Auto-Crossover and Auto-Sensing, 10/100 Ethernet Data Ports. Refer to Figures 4-3 for configurations.

4.6 BUC & LNB Power Input (J3)

The BUC and LNB input connector allows the user to externally inject DC voltage for the BUC and LNB voltage. Manufacturer part number for this connector is referenced in Appendix E. Refer to Table 4-4 for pin out descriptions.

Table 4-4 BUC & LNB DC input connector		
Pin No.	Signal Name	Signal
1	LNB DC Input	
2	Ground	GND
3	Ground	GND
4	BUC DC Input	

Chapter 5. Maintenance and Troubleshooting



*The DMD1050 contains a Lithium Battery. **DANGER OF EXPLOSION** exists if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with local and national regulations.*

5.1 Periodic Maintenance

The DMD1050 does not require periodic maintenance.

5.2 Troubleshooting

Should a unit be suspected of a defect in field operations after all interface signals are verified, the correct procedure is to replace the unit with another known working DMD1050. If this does not correct the problem, wiring or power should be suspect.

The following is a brief list of possible problems that could be caused by failures of the modem or by improper setup and configuration for the type of service. The list is arranged by possible symptoms exhibited by the modem.

Symptom	Possible Cause
The Modem will not acquire the incoming carrier:	There is an improper receive input to modem.
	The Receive Carrier Level is too low.
	The Receive Carrier Frequency is outside of the acquisition range.
	The Transmit Carrier is incompatible.
	Modem is in Test Mode.
The Async Port is not configured correctly.	The switches may not be set in the correct positions.

5.2.1 Alarm Faults

5.2.1.1 Major Tx Alarms

Alarm	Possible Cause
FPGA CFG	Shows a transmit FPGA hardware failure.
DSP CFG	Shows a transmit FPGA failure.
SCT Clock PLL	Shows that the Tx SCT Clock PLL is not locked. This alarm flashes during certain parameter changes. A steady display shows a problem in the modem configuration.
SYM Clock PLL	Shows that the Tx Symbol Clock PLL is not locked. This alarm flashes during certain parameter changes. A steady display shows a problem with the incoming clock to the modem (SCTE).
LB Synth PLL	Shows that the Tx L-Band Synthesizer is not locked. This alarm flashes during certain parameter changes. A steady display shows a configuration problem in the modem.
Ethernet WAN	Shows that the WAN Port is down.

5.2.1.2 Major Rx Alarms

Alarm	Possible Cause
FPGA CFG	Shows a receive FPGA hardware failure.
DSP CFG	Shows a receive DSP failure.
SIGNAL LOCK	Shows that the demod is unable to lock to a signal.
FRAME LOCK	Shows that the Framing Unit is unable to find the expected framing pattern.
MULTIFRAME LOCK	Shows that the Framing Unit is unable to find the expected framing pattern.
LB SYNTH PLL	Shows that the Rx L-Band Synthesizer is not locked. This alarm flashes during certain parameter changes. A steady display shows a problem in the modem configuration.
Ethernet WAN	Shows that the WAN Port is down.

5.2.1.3 Minor Tx Alarms

Alarm	Possible Cause
TERR CLK ACT	Shows no Terrestrial Clock activity.
TERR DATA ACT	Shows no Tx Data activity.
TX TERR AIS	Shows that AIS has been detected in the Tx Data Stream.
TX DVB FRAME LOCK	Shows that the Tx Input Data Stream Framing does not match the selected Tx Terr Framing. Incorrect Tx Terr Framing is selected. Incorrectly framed Tx Input Data Stream exists.

5.2.1.4 Minor Rx Alarms

Alarm	Possible Cause
BUFF UNDERFLOW	Shows that a Doppler Buffer underflow has occurred.
BUFF NEAR EMPTY	Shows that the Doppler Buffer is about to underflow.
BUFF NEAR FULL	Shows that the Doppler Buffer is about to overflow.
BUFF OVERFLOW	Shows that a Doppler Buffer overflow has occurred.
RX DATA ACTIVITY	Shows that there is no Rx Data activity. For the Ethernet Interface, Shows that no Ethernet port is active (no cable is plugged in).
SAT AIS	Shows that AIS has been detected in the receive satellite data stream.
IFEC LOCK	Shows that the Inner Codec is not locked.
OFEC LOCK	Shows that the Reed-Solomon Decoder is not locked.
INTERLEAVER	Shows that the Reed-Solomon Interleaver is not synchronized.
EBNO (dB)	Shows that the Eb/No is outside of limits.
IBS BER	Shows that there are more than one in 1000 bits in error in IBS mode.
RX DVB FRAME LOCK	Shows that the Rx Satellite Data Stream Framing is not DVB.

5.2.1.5 Common Major Alarms

Alarm	Possible Cause
TERR FPGA CFG	Shows an Interface Card FPGA configuration failure probably caused by a missing, or wrong file.
CODEC FPGA CFG	Shows Turbo Codec Card FPGA configuration failure probably caused by a missing, or wrong file.
+1.5V RX SUPPLY	Shows the measured voltage of the 1.5 Volt Rx power bus located inside the modem.
+1.5V TX SUPPLY	Shows the measured voltage of the 1.5 Volt Tx power bus located inside the modem.
+3.3V SUPPLY	Shows the measured voltage of the +3.3 Volt power bus located inside the modem.
+5V SUPPLY	Shows the measured voltage of the +5 Volt power bus located inside the modem.
+12V SUPPLY	Shows the measured voltage of the +12 Volt power bus located inside the modem.
+24V SUPPLY	Shows the measured voltage of the +24 Volt power bus located inside the modem.
EXT CLOCK ACT	Shows that the External Clock is not active.
EXT REF ACT	Shows no activity on the External Reference.
EXT REF LOCK	Shows that the External Reference PLL is not locked.

5.2.2 Alarm Masks

The DMD1050 performs a high degree of self-monitoring and fault isolation. The alarms for these faults are separated into the following three categories:

- Active Alarms
- Common Equipment Alarms

A feature exists that allows the user to ‘Mask’ out certain alarms as explained below. Alarms that are recorded in the event buffer are the same as the alarm buffer.



Masking alarms may cause undesirable modem performance .

When an alarm is masked the Fault Relay do not get asserted, but the Alarm will still be displayed. This feature is very helpful during debugging or to lock out a failure of which the user is already aware.

5.2.2.1 Active Alarms

5.2.2.1.1 Major Alarms

Major Alarms indicate a modem hardware failure. Major Alarms may flash briefly during modem configuration changes and during power-up but should not stay illuminated. Alarms are grouped into Transmit and Receive Alarms - Transmit and Receive are completely independent.

5.2.2.1.2 Minor Alarms

Minor Alarms indicate that a problem may persist outside the modem such as loss of Terrestrial Clock, loss of terrestrial data activity, or a detected transmit or receive AIS condition. Alarms are grouped into Transmit and Receive Alarms - Transmit and Receive are completely independent.

5.2.2.1.3 Common Equipment Faults

Common equipment faults indicate hardware or configuration problems in the modem that effect both transmit and receive operation. Most common faults indicate a hardware failure within the modem, such as a bad power supply. Common faults for the External Reference and External Clock indicate a bad modem configuration, not a hardware failure.

5.2.2.2 Latched Alarms

Latched Alarms are used to catch intermittent failures. If a fault occurs, the fault indication will be latched even if the alarm goes away. After the modem is configured and running, it is recommended that the Latched Alarms be cleared as a final step.

Chapter 6. Technical Specifications

6.1 Data Rates

BPSK Uncoded	4.8 Kbps to 10.0 Mbps
1/2 Rate BPSK	2.4 Kbps to 10.0 Mbps
3/4 Rate BPSK	3.6 Kbps to 10.0 Mbps
7/8 Rate BPSK	4.2 Kbps to 10.0 Mbps
QPSK Uncoded	9.6 Kbps to 10.0 Mbps
1/2 Rate QPSK	4.8 Kbps to 20.0 Mbps
3/4 Rate QPSK	7.2 Kbps to 20.0 Mbps
7/8 Rate QPSK	8.4 Kbps to 20.0 Mbps
Rate 2/3 8PSK	9.6 Kbps to 20.0 Mbps
3/4 Rate 16QAM	14.4 Kbps to 20.0 Mbps
7/8 Rate 16QAM	16.84 Kbps to 20.0 Mbps

6.2 Modulator

Modulation	BPSK, QPSK, and OQPSK, 8PSK, 16QAM
L-Band Tuning Range	950 to 2050 MHz in 1 Hz Steps
Impedance	SMA, 50 Ohm or F-Type 75 Ohm (Optional)
Connector	SMA, or F-Type (Optional)
Return Loss	SMA 2.0:1
Output Power	0 to -25 dB
Output Stability	L-Band, ± 1.0 dB Over Frequency and Temperature
Output Spectrum	Selectable and Meets MIL-188-165A or IESS 308/309/ 310 Power Spectral Mask
Spurious	-55 dBc In-Band -45 dBc Out-of-Band
On/Off Power Ratio	>60 dB
Scrambler	OM-73, CCITT V.35 or IBS
FEC	Viterbi, K = 7 at 1/2, 3/4 and 7/8 2/3 Rate Trellis Turbo Product Code (Optional) BPSK 21/44 QPSK/OQPSK 1/2, 3/4, 7/8 8PSK/16QAM 3/4, 7/8
Outer Encoder Options	Reed-Solomon INTELSAT (DVB Optional) Custom (N, K) Reed-Solomon
Data Clock Source	Internal, External, Rx Recovered

Internal Stability	+/- 1 x 10 ⁻⁶
High Stability (optional)	+/- 5 x 10 ⁻⁸

6.3 Demodulator

Demodulation	BPSK, QPSK, and OQPSK, 8PSK, 16QAM
IF Tuning Range	L-Band Tuning Range 950 to 2050 MHz in 1 Hz Steps
Impedance	SMA, 50 Ohm, F-Type 75 Ohm (Optional)
Connector	SMA, F-Type (Optional)
Return Loss	SMA 2.0:1
Spectrum	Selectable and Meets MIL-188-165A or INTELSAT IESS 308/309/310 Compliant
Input Level	-55 to +10 dBm
Total Input Power	+20 dBm or +40 dBc (the Lesser)
FEC	Viterbi, K = 7 at 1/2, 3/4 and 7/8 Rate, Rate Sequential 1/2 Rate, 3/4, 7/8 (Optional) Trellis 2/3 Turbo Product Code (Optional) BPSK 21/44 QPSK/OQPSK 1/2, 3/4, 7/8 8PSK/16QAM 3/4, 7/8
Decoder Options	Reed-Solomon INTELSAT (DVB Optional) Custom (N, K) Reed-Solomon
Descrambler	OM-73, CCITT V.35 or IBS
Acquisition Range	Programmable ±1 kHz to ± 255 kHz
Reacquisition Range	Programmable ±1 Hz to 25000 Hz
Sweep Delay Value	0 to 6000 seconds in 100 msec Steps

6.4 Plesiochronous Buffer

Size	0 msec to 64 msec
Centering	Automatic on Underflow/Overflow
Centering Modes	IBS: Integral Number of Frames IDR: Integral Number of Multi-Frames
Clock	External, Rx Recovered or SCT (Internal)

6.5 Monitor and Control

Ethernet 10 Base-T/Web Browser, Remote RS-485/Terminal RS-232

6.6 Terrestrial Interfaces

MIL-188-114A	All Rates, Differential, Clock/Data, DCE
Ethernet 2 Port 10/100 Base-T	Two RJ-45, Auto-Crossover, Auto-Sensing, 10/100 Ethernet Data Ports. Complies with IEEE 802.3 and IEEE 802.3u.

6.7 Environmental

Prime Power	+21 to +24.5 Volts DC
Operating Temperature	0 to +50°C, 95% Humidity, Non-Condensing
Storage Temperature	-20 to 70°C, 99% humidity, Non-Condensing

6.8 Physical

Size	7" W x 9.125 D x 1.0" H / (17.78 x 23.12 x 2.54 cm)
Weight	1.2 Pounds (0.544 Kg)

6.9 DMD2050 Data Rate Limits

6.9.1 Non-DVB

Modulation	Code Rate	Min Data Rate	Max Data Rate
BPSK	NONE	4800	10000000
BPSK	VIT 1/2	2400	10000000
BPSK	VIT 3/4	3600	10000000
BPSK	VIT 7/8	4200	10000000
BPSK	SEQ 1/2	2400	2048000
BPSK	SEQ 3/4	3600	2048000
BPSK	SEQ 7/8	4200	2048000
BPSK	TPC 21/44	2400	4772727
BPSK	TPC 3/4	4800	7500000
BPSK	TPC 7/8	4800	8750000
BPSK	TPC .495	2376	4950000
BPSK	TPC .793	3806	6312000
QPSK	NONE	9600	20000000
QPSK	VIT 1/2	4800	20000000
QPSK	VIT 3/4	7200	20000000
QPSK	VIT 7/8	8400	20000000
QPSK	SEQ 1/2	4800	2048000
QPSK	SEQ 3/4	7200	2048000
QPSK	SEQ 7/8	8400	2048000
QPSK	TPC 1/2	4582	9545454
QPSK	TPC 3/4	7200	15000000
QPSK	TPC 7/8	8400	17500000
QPSK	TPC .495	4752	6312000
QPSK	TPC .793	7612	6312000
OQPSK	NONE	9600	20000000
OQPSK	VIT 1/2	4800	20000000
OQPSK	VIT 3/4	7200	20000000
OQPSK	VIT 7/8	8400	20000000
OQPSK	SEQ 1/2	4800	2048000
OQPSK	SEQ 3/4	7200	2048000

OQPSK	SEQ 7/8	8400	2048000
OQPSK	TPC 1/2	4582	9545454
OQPSK	TPC 3/4	7200	15000000
OQPSK	TPC 7/8	8400	17500000
8PSK	TRE 2/3	9600	20000000
8PSK	TPC 3/4	10800	20000000
8PSK	TPC 7/8	12600	20000000
16QAM	VIT 3/4	14400	20000000
16QAM	VIT 7/8	16800	20000000
16QAM	TPC 3/4	14400	20000000
16QAM	TPC 7/8	16840	20000000

6.9.2 DVB

187 Mode			
Modulation	Code Rate	Min Data Rate	Max Data Rate
BPSK	VIT 1/2	2400	4583333
BPSK	VIT 2/3	2934	6111111
BPSK	VIT 3/4	3300	6875000
BPSK	VIT 5/6	3667	7638888
BPSK	VIT 7/8	3850	8020833
QPSK	VIT 1/2	4400	9166666
QPSK	VIT 2/3	5867	12222222
QPSK	VIT 3/4	6600	13750000
QPSK	VIT 5/6	7334	15277777
QPSK	VIT 7/8	7700	16041666
8PSK	TRE 2/3	8800	18333333
8PSK	TRE 5/6	11000	20000000
8PSK	TRE 8/9	11550	20000000
16QAM	TRE 3/4	13200	20000000
16QAM	TRE 7/8	15400	20000000

188 Mode			
Modulation	Code Rate	Min Data Rate	Max Data Rate
BPSK	VIT 1/2	2400	4607843
BPSK	VIT 2/3	2950	6143790
BPSK	VIT 3/4	3318	6911764
BPSK	VIT 5/6	3687	7679738
BPSK	VIT 7/8	3871	8063725
QPSK	VIT 1/2	4424	9215686
QPSK	VIT 2/3	5899	12287581
QPSK	VIT 3/4	6636	13823529
QPSK	VIT 5/6	7373	15359476
QPSK	VIT 7/8	7742	16127450
8PSK	TRE 2/3	8848	18431372
8PSK	TRE 5/6	11059	20000000
8PSK	TRE 8/9	11797	20000000
16QAM	TRE 3/4	13271	20000000
16QAM	TRE 7/8	15483	20000000

204 Mode			
Modulation	Code Rate	Min Data Rate	Max Data Rate
BPSK	VIT 1/2	2400	5000000
BPSK	VIT 2/3	3200	6666666
BPSK	VIT 3/4	3600	7500000
BPSK	VIT 5/6	4000	8333333
BPSK	VIT 7/8	4200	8750000
QPSK	VIT 1/2	4800	10000000
QPSK	VIT 2/3	6400	13333333
QPSK	VIT 3/4	7200	15000000
QPSK	VIT 5/6	8000	16666666
QPSK	VIT 7/8	8400	17500000
8PSK	TRE 2/3	9600	20000000
8PSK	TRE 5/6	12000	20000000
8PSK	TRE 8/9	12800	20000000
16QAM	TRE 3/4	14400	20000000
16QAM	TRE 7/8	16800	20000000

6.10 DMD1050 BER Specifications

6.10.1 BER Performance (Viterbi)

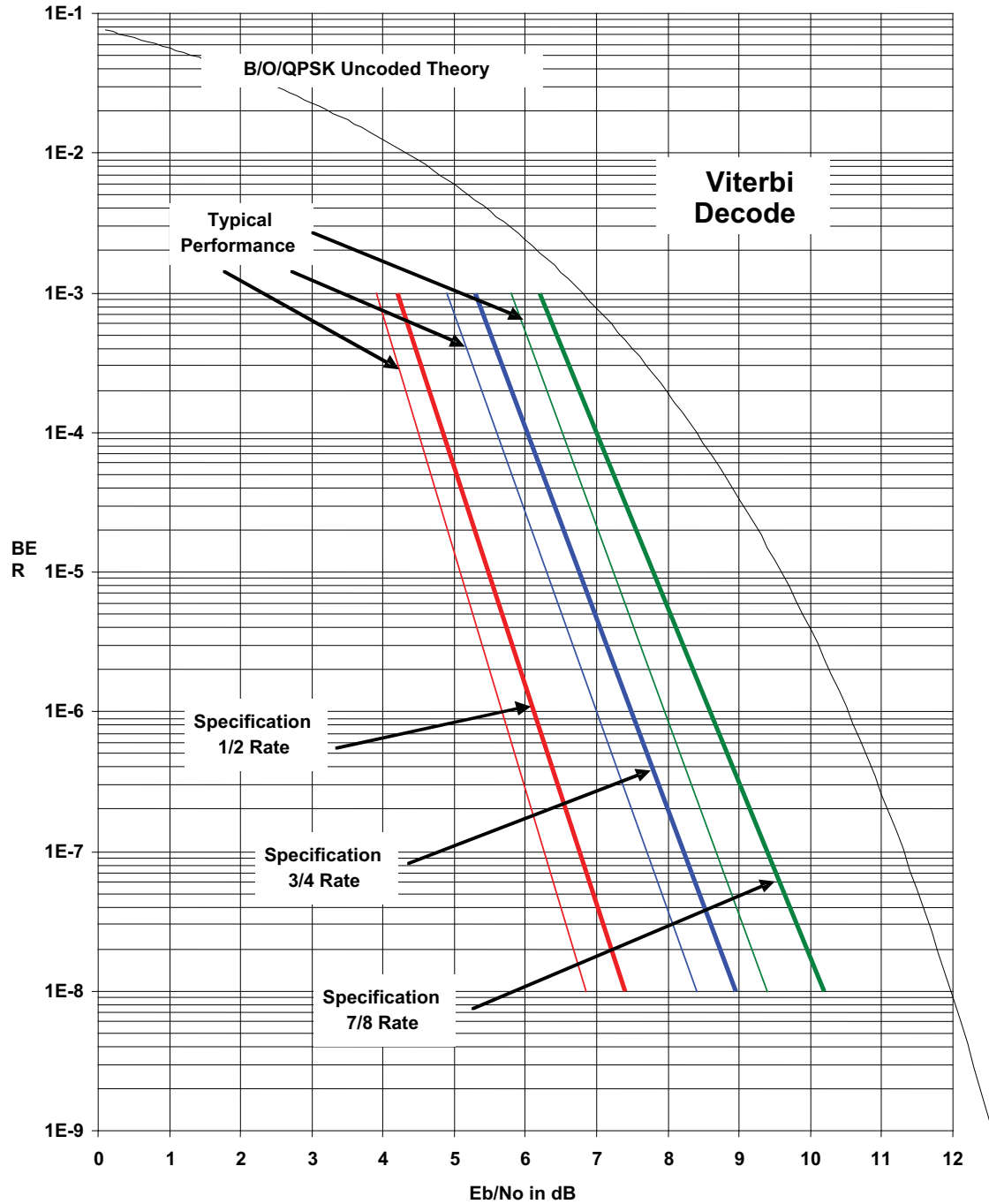


Figure 6-1. B/O/QPSK BER Performance (Viterbi)

Note: E_b/N_0 values include the effect of using Differential Decoding and V.35 descrambling.

6.10.2 BER Performance (Sequential)

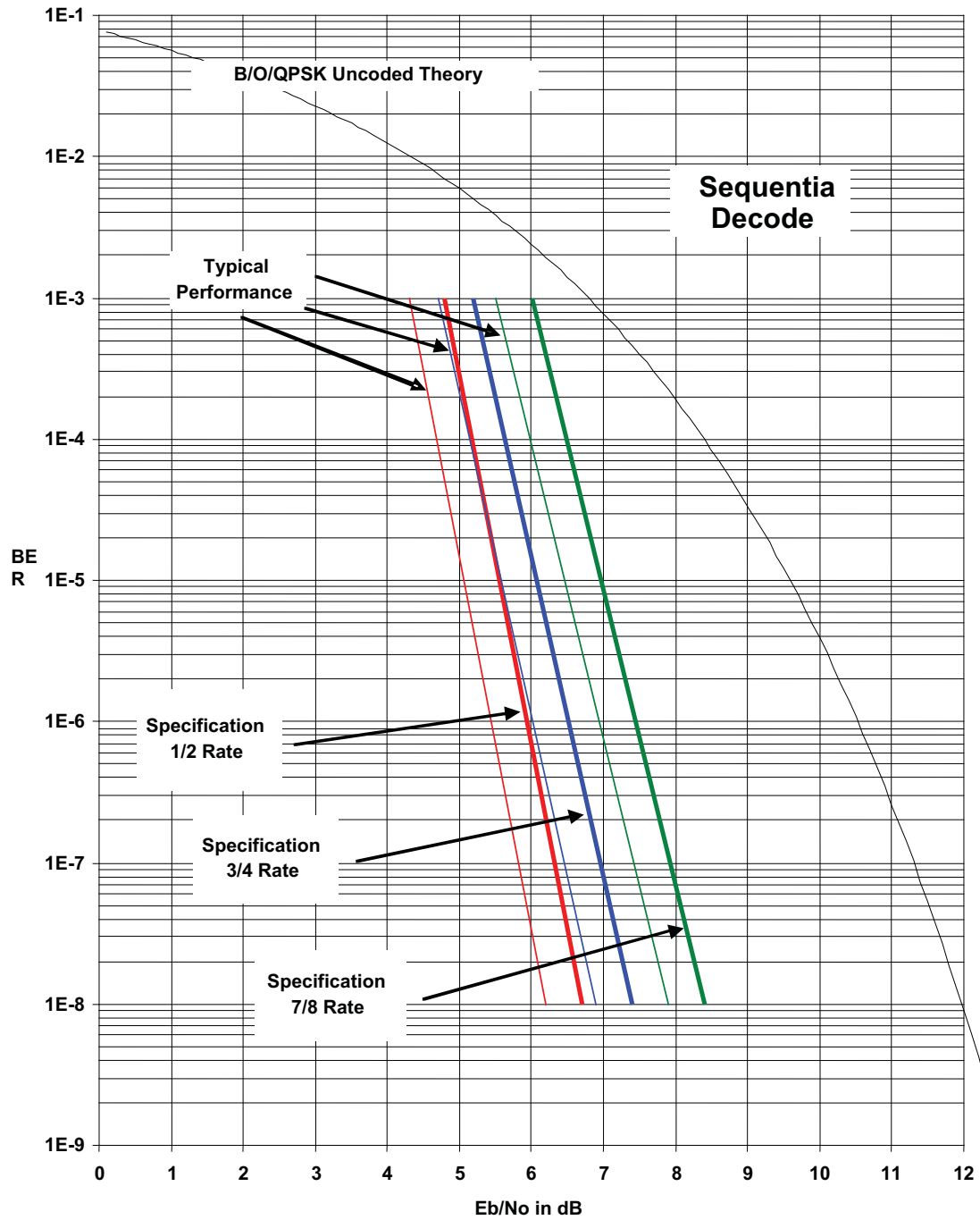


Figure 6-2. B/O/QPSK BER Performance (Sequential)

Note: E_b/N_0 values include the effect of using Differential Decoding and V.35 descrambling.

6.10.3 BER Performance (Viterbi with Reed-Solomon)

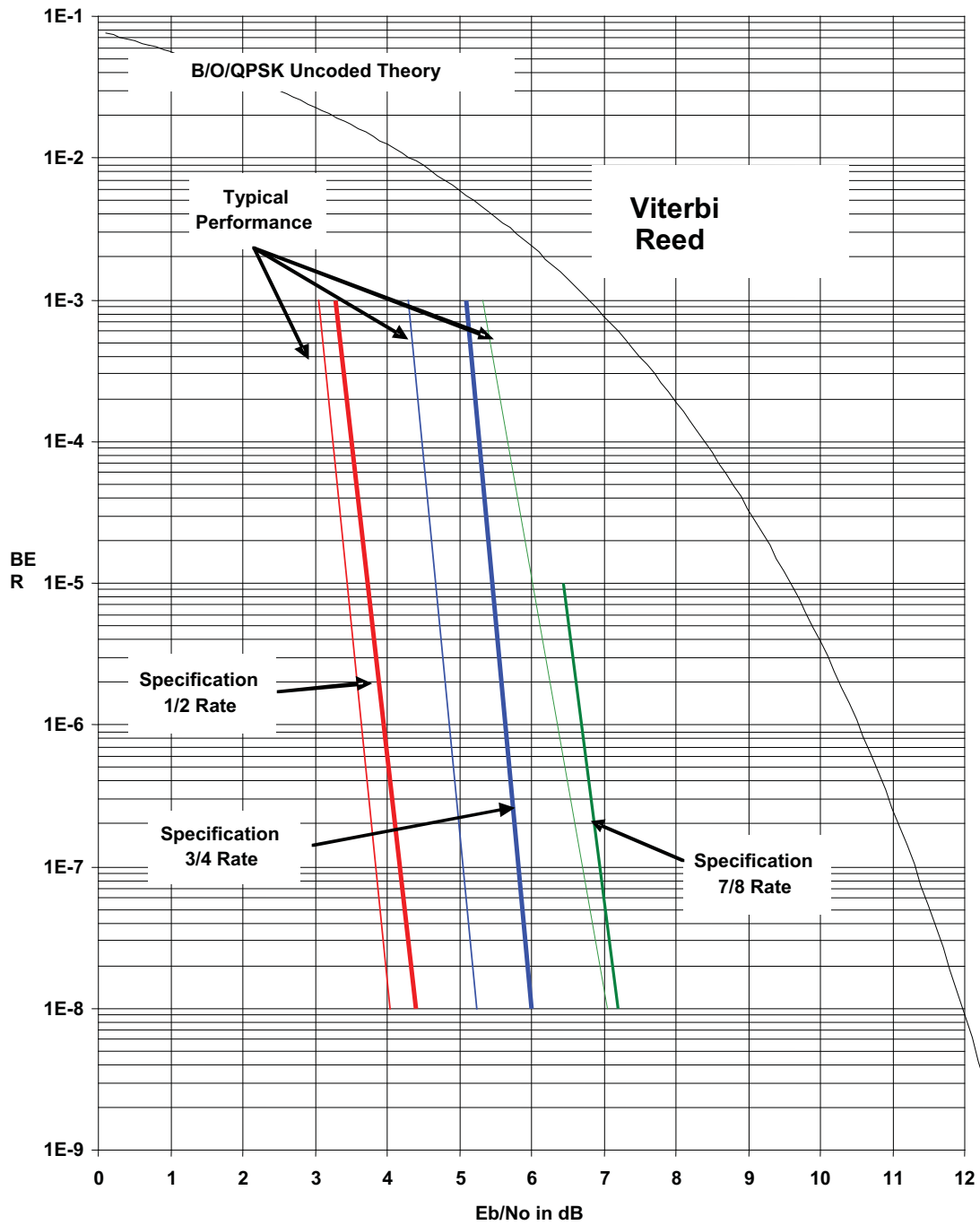


Figure 6-3. B/O/QPSK BER Performance (Viterbi – w/RS)

Note: E_b/N_0 values include the effect of using Differential Decoding.

6.10.4 BER Performance (8PSK Trellis)

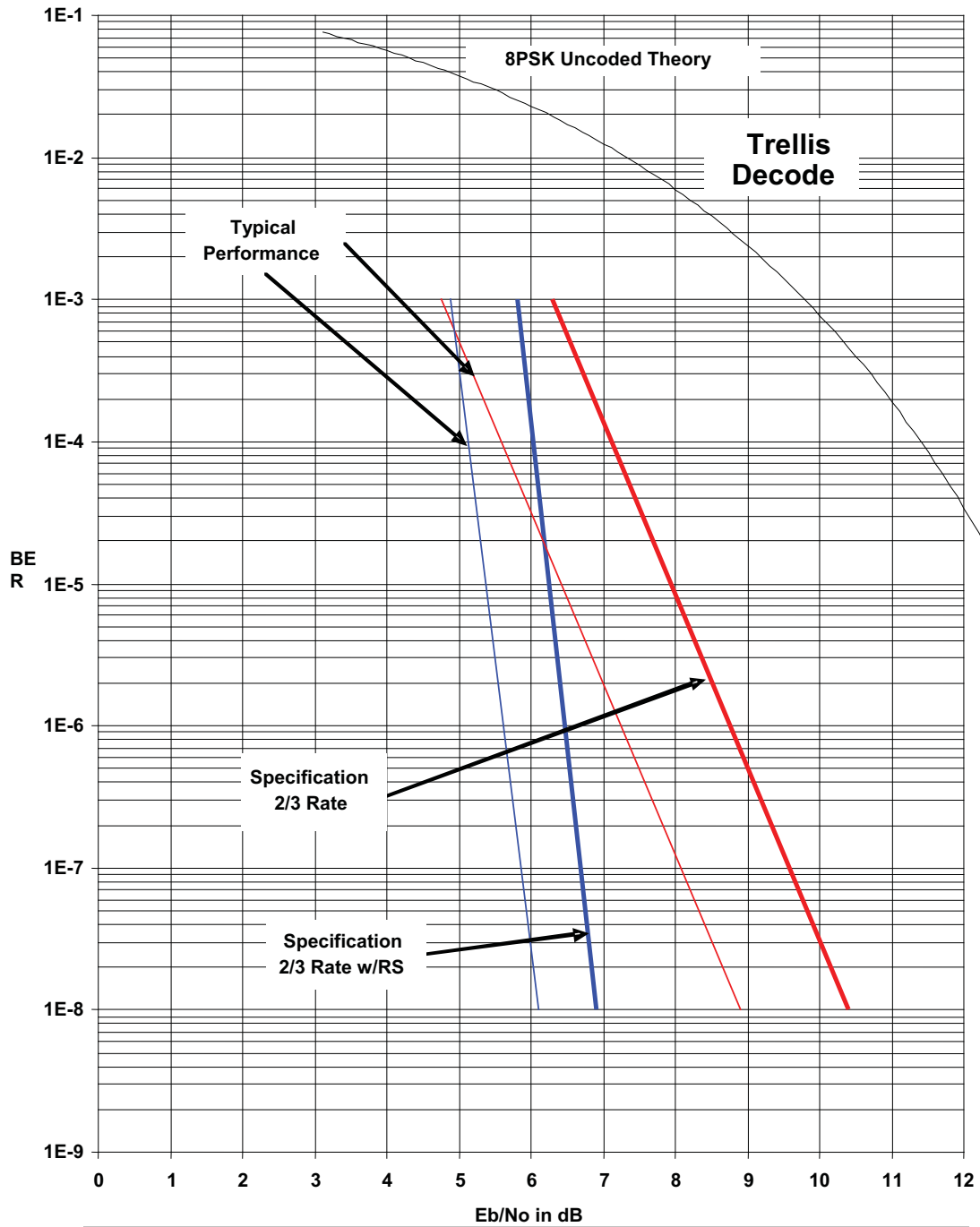


Figure 6-4. B/O/QPSK BER Performance (Trellis)

Note: E_b/N_0 values include the effect of using Differential Decoding and V.35 Descrambling.

6.10.5 BER Performance (16QAM Viterbi)

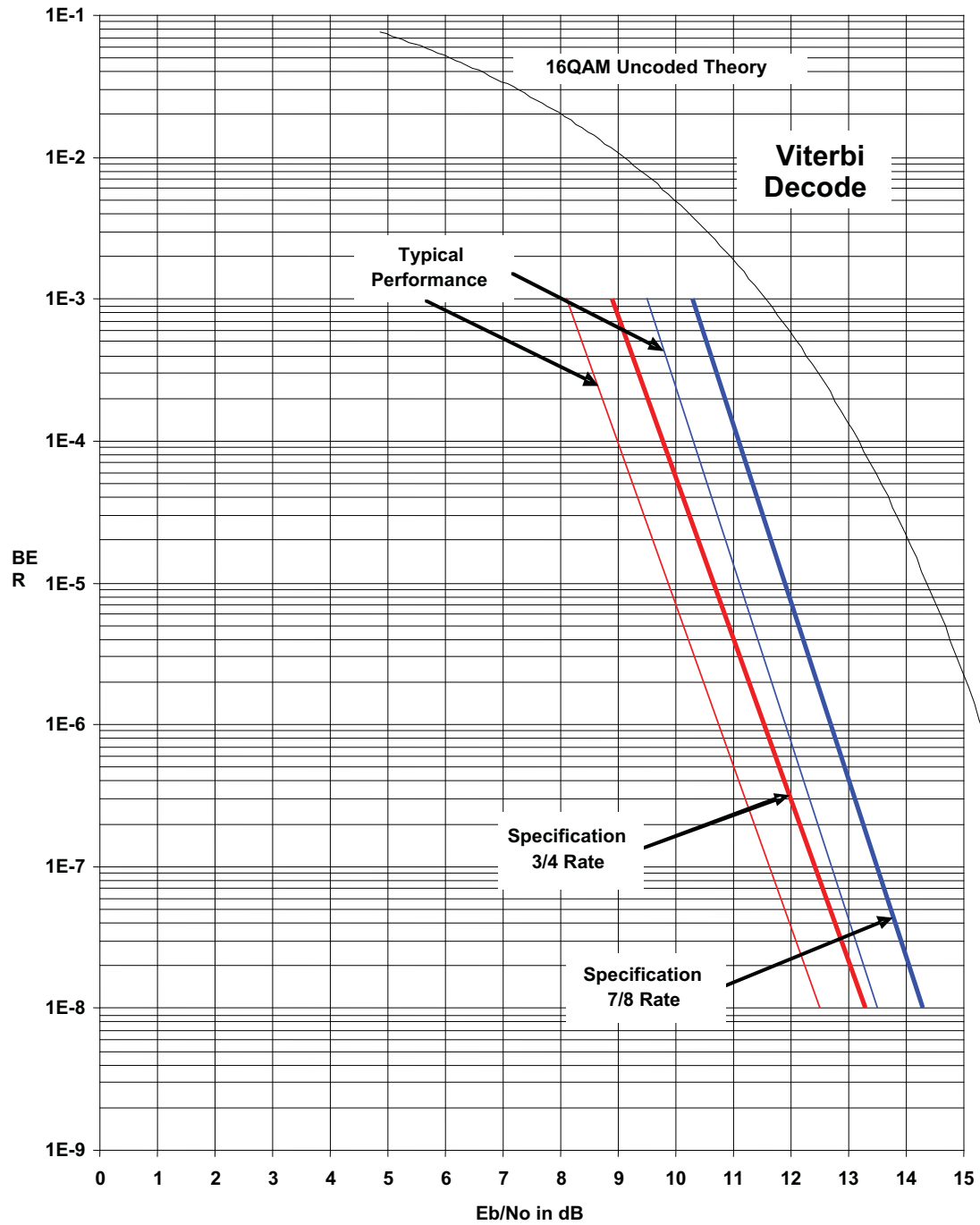


Figure 6-5. 16QAM BER Performance (Viterbi)

Note: E_b/N_0 values include the effect of using Differential Decoding and V.35 Descrambling.

6.10.6 BER Performance (16QAM Viterbi with Reed-Solomon)

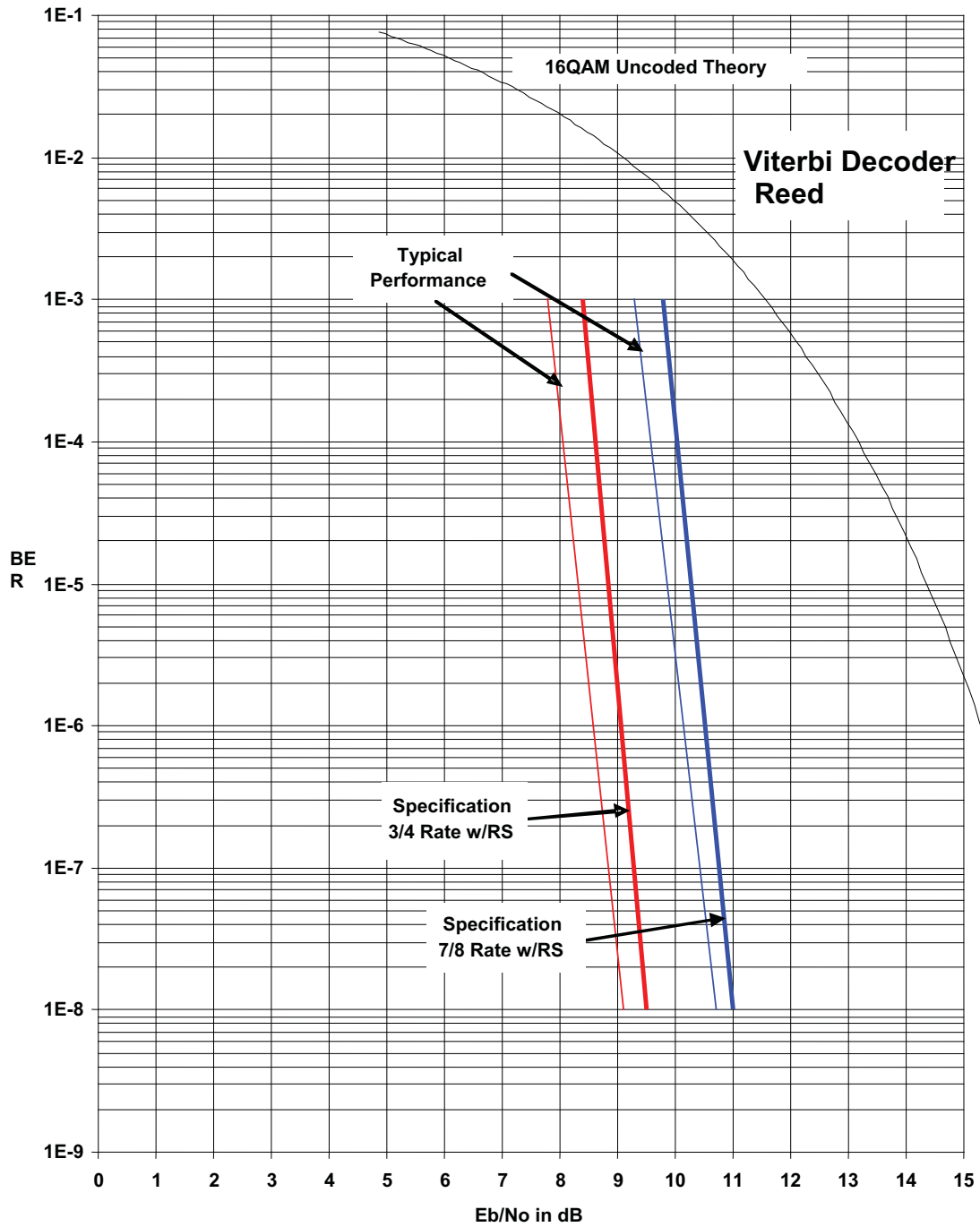


Figure 6-6. 16QAM BER Performance (Viterbi w/RS)

Note: Eb/No values include the effect of using Differential Decoding.

6.10.7 BER Performance ((O)QPSK Turbo)

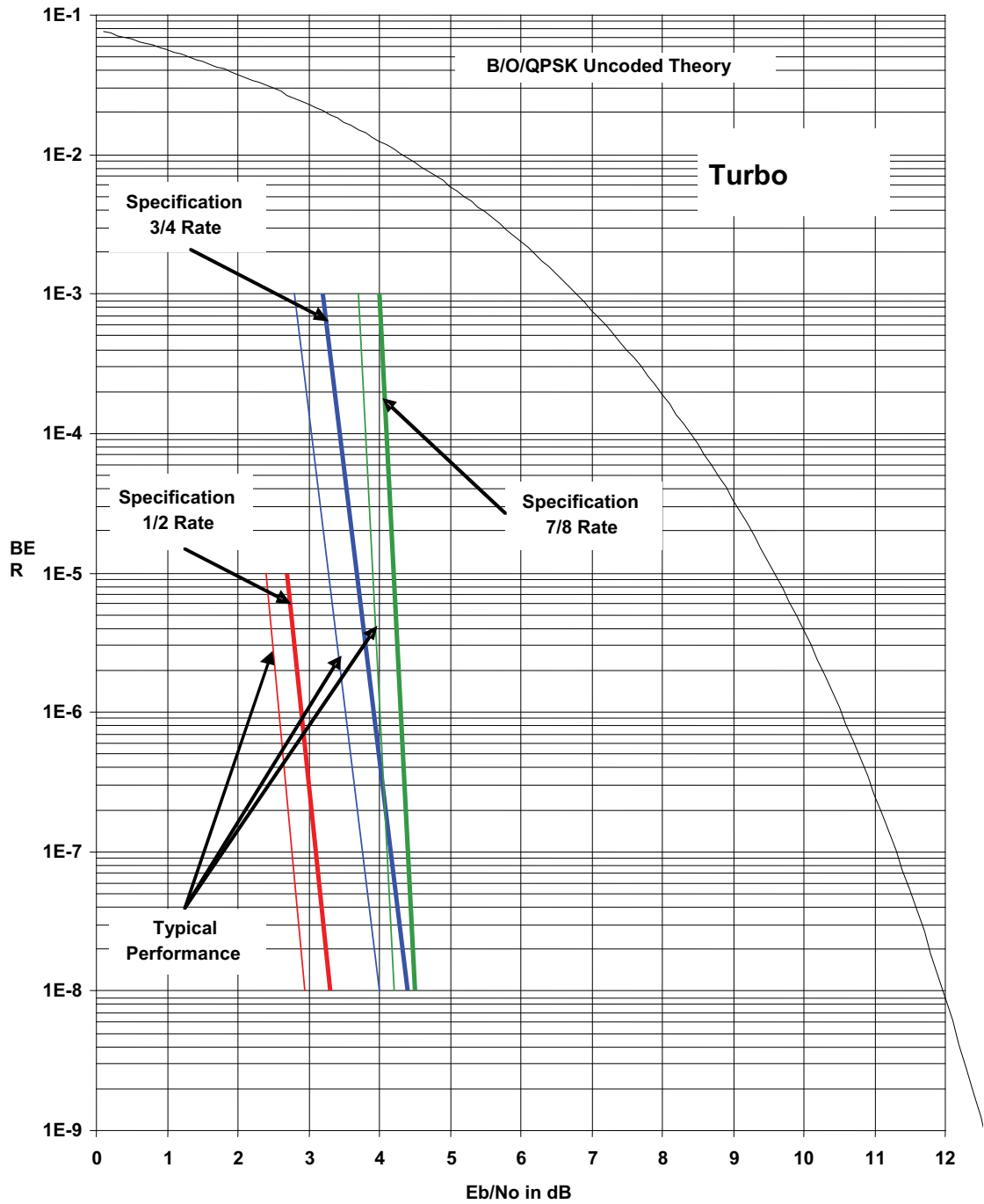


Figure 6-7. 16QAM BER Performance (Viterbi)

6.10.8 BER Performance (8PSK Turbo)

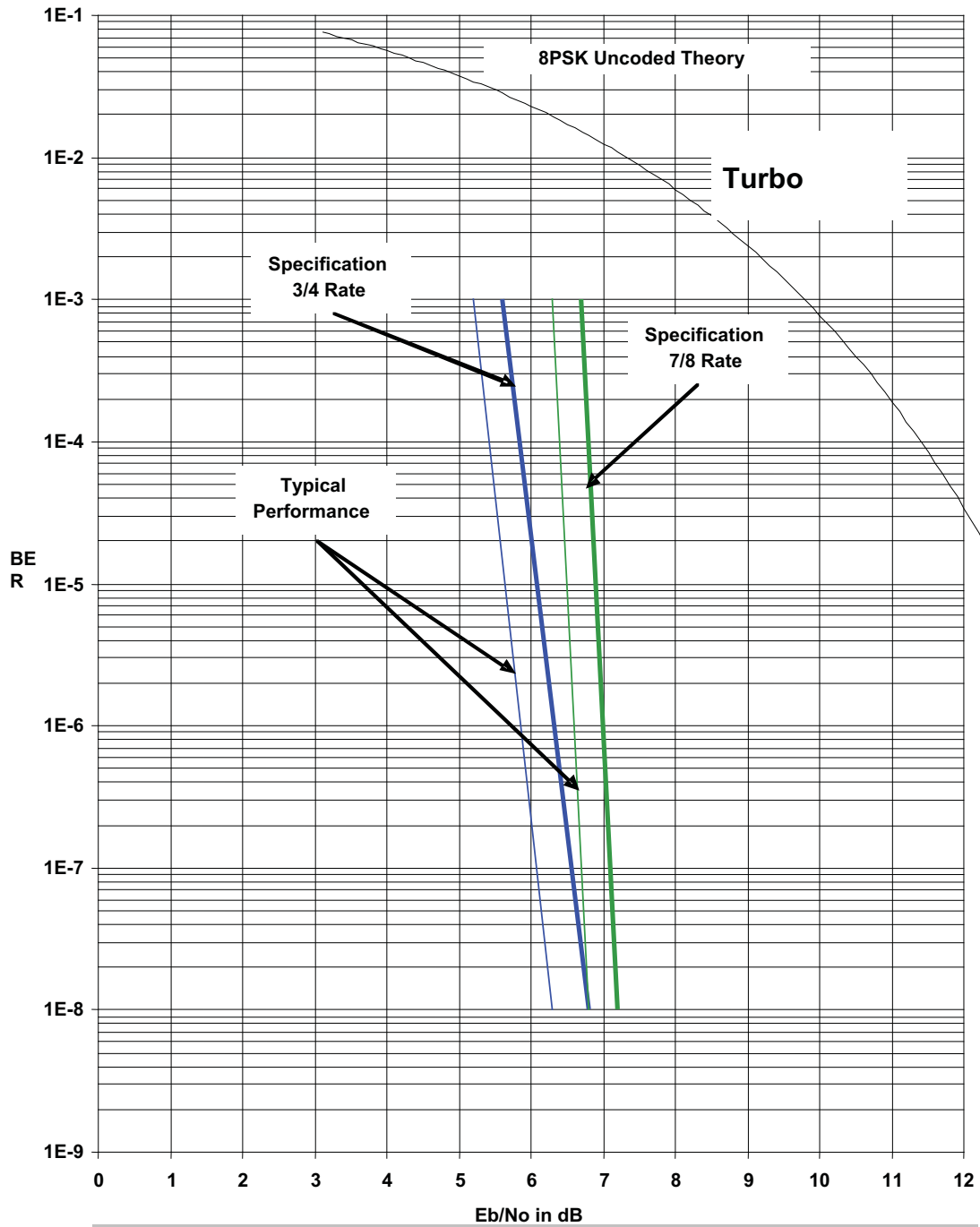


Figure 6-8. 8PSK BER Performance (Turbo)

6.10.9 BER Performance (16QAM Turbo)

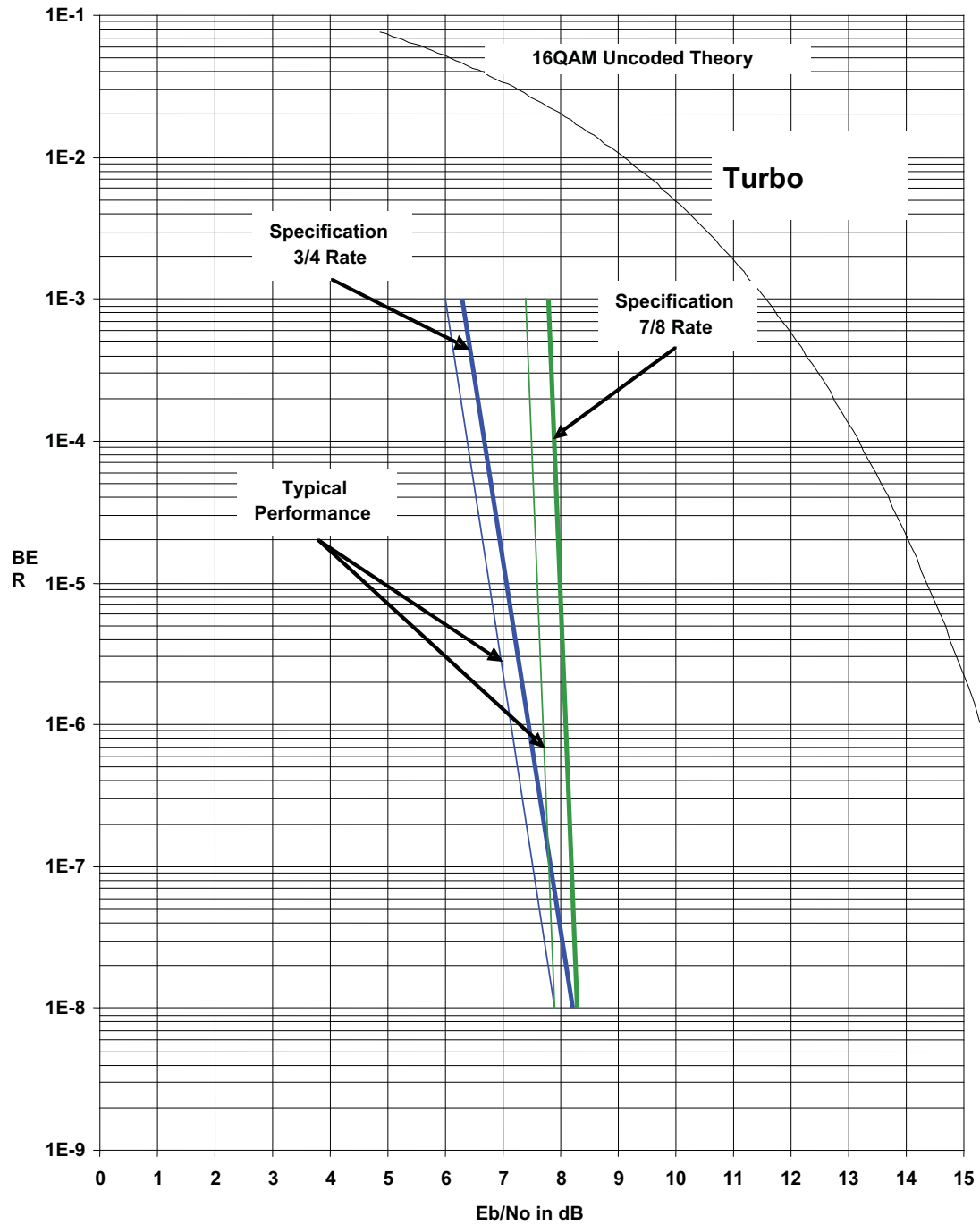


Figure 6-9. 16QAM BER Performance (Turbo)

Table 6-1 - B/O/QPSK BER Performance (Viterbi)						
BER	Specification			Typical		
	1/2 Rate	3/4 Rate	7/8 Rate	1/2 Rate	3/4 Rate	7/8 Rate
1E-3	4.2 dB	5.3 dB	6.2 dB	3.9 dB	4.9 dB	5.8 dB
1E-4	4.8 dB	6.1 dB	7.1 dB	4.5 dB	5.6 dB	6.5 dB
1E-5	5.5 dB	6.8 dB	7.9 dB	5.1 dB	6.3 dB	7.2 dB
1E-6	6.1 dB	7.6 dB	8.6 dB	5.7 dB	7 dB	7.9 dB
1E-7	6.7 dB	8.3 dB	9.3 dB	6.2 dB	7.7 dB	8.6 dB
1E-8	7.4 dB	8.9 dB	10.2 dB	6.8 dB	8.4 dB	9.4 dB
1E-9	8.2 dB	9.7 dB	11 dB	7.4 dB	9.1 dB	10.0 dB
1E-10	9 dB	10.3 dB	11.7 dB	8.1 dB	9.8 dB	10.5 dB

Table 6-2 - B/O/QPSK BER Performance (Sequential)						
BER	Specification			Typical		
	1/2 Rate	3/4 Rate	7/8 Rate	1/2 Rate	3/4 Rate	7/8 Rate
1E-3	4.8 dB	5.2 dB	6 dB	4.3 dB	4.7 dB	5.5 dB
1E-4	5.2 dB	5.7 dB	6.4 dB	4.7 dB	5.2 dB	5.9 dB
1E-5	5.6 dB	6.1 dB	6.9 dB	5.1 dB	5.6 dB	6.4 dB
1E-6	5.9 dB	6.5 dB	7.4 dB	5.4 dB	6.1 dB	6.9 dB
1E-7	6.3 dB	7 dB	7.9 dB	5.8 dB	6.5 dB	7.4 dB
1E-8	6.7 dB	7.4 dB	8.4 dB	6.2 dB	6.9 dB	7.9 dB
1E-9	7.1 dB	7.8 dB	8.9 dB	6.6 dB	7.4 dB	8.4 dB
1E-10	7.4 dB	8.3 dB	9.4 dB	6.9 dB	7.8 dB	8.9 dB

Table 6-3 - B/O/QPSK BER Performance (Viterbi - w/RS)						
BER	Specification			Typical		
	1/2 Rate	3/4 Rate	7/8 Rate	1/2 Rate	3/4 Rate	7/8 Rate
1E-3	3.3 dB	5.1 dB	-	3 dB	4.3 dB	5.3 dB
1E-4	3.5 dB	5.3 dB	-	3.2 dB	4.5 dB	5.7 dB
1E-5	3.8 dB	5.4 dB	6.5 dB	3.4 dB	4.7 dB	6 dB
1E-6	4.1 dB	5.6 dB	6.7 dB	3.6 dB	4.9 dB	6.4 dB
1E-7	4.2 dB	5.8 dB	6.9 dB	3.8 dB	5.1 dB	6.7 dB
1E-8	4.4 dB	6 dB	7.2 dB	4 dB	5.3 dB	7.1 dB
1E-9	4.7 dB	6.1 dB	7.5 dB	4.2 dB	5.4 dB	7.4 dB
1E-10	5 dB	6.3 dB	7.8 dB	4.4 dB	5.6 dB	7.7 dB

BER	Specification		Typical	
	2/3 Rate	2/3 Rate w/RS	2/3 Rate	2/3 Rate w/RS
1E-3	6.3 dB	5.8 dB	4.8 dB	4.9 dB
1E-4	7.3 dB	6.1 dB	5.6 dB	5.1 dB
1E-5	8.2 dB	6.3 dB	6.4 dB	5.4 dB
1E-6	9 dB	6.5 dB	7.2 dB	5.6 dB
1E-7	9.8 dB	6.7 dB	8.1 dB	5.8 dB
1E-8	10.4 dB	6.9 dB	8.9 dB	6.1 dB
1E-9	11.1 dB	7.1 dB	9.7 dB	6.3 dB
1E-10	11.9 dB	7.3 dB	10.5 dB	6.6 dB

BER	Specification		Typical	
	3/4 Rate	7/8 Rate	3/4 Rate	7/8 Rate
1E-3	8.9 dB	10.3 dB	8.1 dB	9.5 dB
1E-4	9.8 dB	11.1 dB	9 dB	10.3 dB
1E-5	10.7 dB	11.9 dB	9.9 dB	11.1 dB
1E-6	11.5 dB	12.7 dB	10.7 dB	11.9 dB
1E-7	12.4 dB	13.5 dB	11.6 dB	12.7 dB
1E-8	13.3 dB	14.3 dB	12.5 dB	13.5 dB
1E-9	14.2 dB	15.1 dB	13.4 dB	14.3 dB
1E-10	15 dB	15.9 dB	14.2 dB	15.1 dB

BER	Specification		Typical	
	3/4 Rate	7/8 Rate	3/4 Rate	7/8 Rate
1E-3	8.4 dB	9.8 dB	7.8 dB	9.3 dB
1E-4	8.6 dB	10.1 dB	8.1 dB	9.6 dB
1E-5	8.9 dB	10.3 dB	8.3 dB	9.9 dB
1E-6	9.1 dB	10.5 dB	8.6 dB	10.2 dB
1E-7	9.3 dB	10.8 dB	8.8 dB	10.4 dB
1E-8	9.5 dB	11.0 dB	9.1 dB	10.7 dB
1E-9	9.8 dB	11.3 dB	9.3 dB	11.0 dB
1E-10	10.0 dB	11.5 dB	9.6 dB	11.3 dB

Table 6-7 - (O)QPSK BER Performance (Turbo)						
BER	Specification			Typical		
	1/2 Rate	3/4 Rate	7/8 Rate	1/2 Rate	3/4 Rate	7/8 Rate
1E-3	-	3.2 dB	4 dB	-	2.8 dB	3.7 dB
1E-4	-	3.4 dB	4.1 dB	-	3 dB	3.8 dB
1E-5	2.7 dB	3.6 dB	4.2 dB	2.4 dB	3.2 dB	3.9 dB
1E-6	2.9 dB	3.8 dB	4.3 dB	2.6 dB	3.4 dB	4 dB
1E-7	3.1 dB	4.1 dB	4.4 dB	2.8 dB	3.7 dB	4.1 dB
1E-8	3.3 dB	4.4 dB	4.5 dB	3 dB	4 dB	4.2 dB

Table 6-8 - 8PSK BER Performance (Turbo)				
BER	Specification		Typical	
	3/4 Rate	7/8 Rate	3/4 Rate	7/8 Rate
1E-3	5.6 dB	6.7 dB	5.2 dB	6.3 dB
1E-4	5.8 dB	6.8 dB	5.4 dB	6.4 dB
1E-5	6 dB	6.9 dB	5.6 dB	6.5 dB
1E-6	6.3 dB	7 dB	5.8 dB	6.6 dB
1E-7	6.5 dB	7.1 dB	6.0 dB	6.7 dB
1E-8	6.7 dB	7.2 dB	6.3 dB	6.8 dB

Table 6-9 - 16 QAM BER Performance (Turbo)				
BER	Specification		Typical	
	3/4 Rate	7/8 Rate	3/4 Rate	7/8 Rate
1E-3	6.3 dB	7.8 dB	6 dB	7.4 dB
1E-4	6.7 dB	7.9 dB	6.4 dB	7.5 dB
1E-5	7 dB	8 dB	6.7 dB	7.6 dB
1E-6	7.4 dB	8.1 dB	7.1 dB	7.7 dB
1E-7	7.8 dB	8.2 dB	7.5 dB	7.8 dB
1E-8	8.2 dB	8.3 dB	7.9 dB	7.9 dB

Table 6-10. IBS/IDR Compliant Framing Modes				
BER	Specification		Typical	
	IBS	IDR	IBS	IDR
	1/2 Rate	3/4 Rate	3/4 Rate	3/4 Rate
1E-3	4.1 dB	5.2 dB	4.2 dB	4.35 dB
1E-4	4.6 dB	6.0 dB	4.9 dB	5.25 dB
1E-5	5.3 dB	6.7 dB	5.6 dB	5.9 dB
1E-6	6.0 dB	7.5 dB	6.3 dB	6.6 dB
1E-7	6.6 dB	8.2 dB	6.9 dB	7.3 dB
1E-8	7.1 dB	8.7 dB	7.5 dB	7.8 dB

6.10.11 ACG Output Voltage

The AGC Output Voltage is a function of the Input Power Level in dBm. The AGC Output Voltage is found on the Alarm connector Pin 24 of J2.

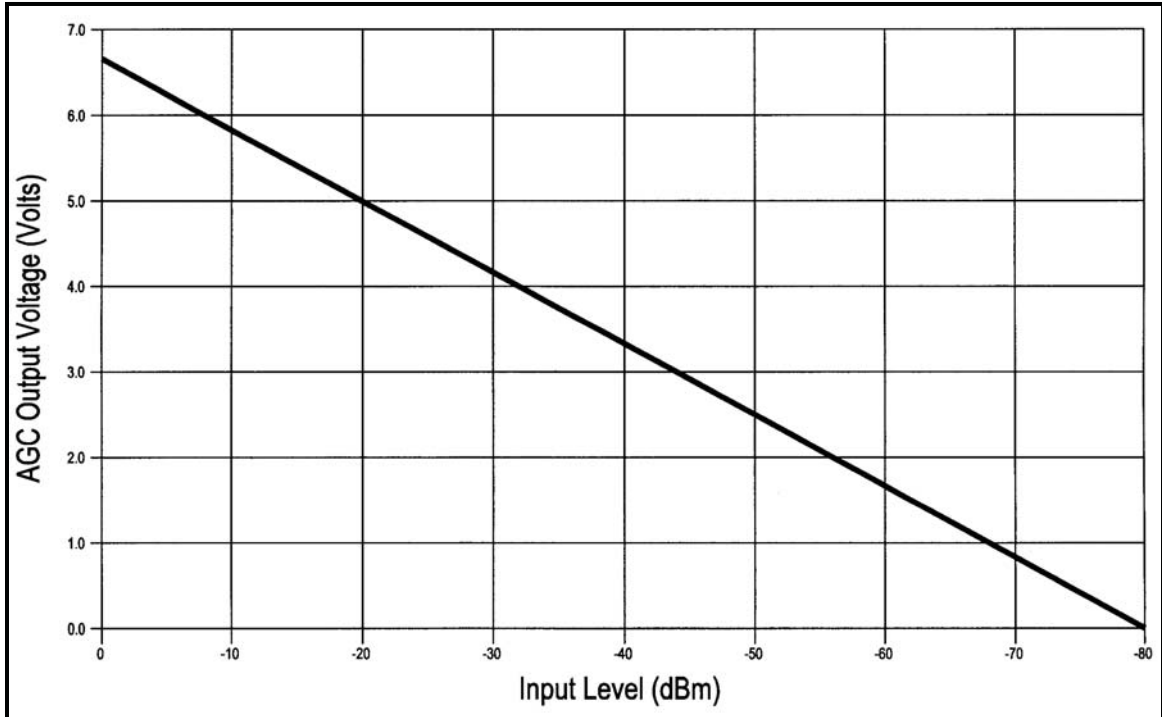


Figure 6-13. AGC Voltage Monitor

Chapter 7. Web Browser

7.1 Web Browser User Interface

The Web Browser interface for DMD1050 can be accessed through the RJ45 (J10), SNMP port located on the unit. Instructions on how to configure the interface for this application are discussed.



The Web Browser menus for the DMD1050 can only be accessed utilizing Microsoft Internet Explorer 6 or greater .

7.2 Configuring Your PC

An example of a GUI layout is shown in Figure 7-1, showing the location and labeling of the Interface. The graphical user interface is designed to replicate the front panel. For users familiar with the front panel interface adjusting to the GUI interface should be seamless. The GUI Interface is divided into four functional areas: the Front Panel Display simulation, Gel-tab area, information/data entry and product information and contact area.



Figure 7-1. Web User Interface

7.2.1 Appearance

This site is a monitor and control of an individual complete satellite terminal. With a front panel look and feel, and an appearance that resembles the DMD20 layout, the product features a familiar look.

7.2.2 Navigation

The navigation scheme consists of gel tabs that correspond to the front panel top-level menu selections. When the mouse is dragged over a tab, it gets highlighted with a rollover effect and a sub-level of selections is revealed. These typically correspond to the front panel sub-menus, but some areas have been combined.

Below the navigation menus, a content page will show the current control scope. This will be the last user selected control page. At the top of the page, breadcrumb links remind the user how the page is selected.



The menu works as follows:

- Mousing over a global navigation link causes the corresponding subglobal division to be revealed and all other sub global divisions to be hidden.
- Mousing off a sub global menu link (outside a specified region x and y pixels from the top of the page), causes *all* sub global divisions to be hidden.
- The position of the mouse is continuously being monitored.

Thus, we have a show-hide layer submenu effect.



Table 7-1

Description	Function
Product Name	This shows which product is connected to the interface.
Product Name/Location	This shows the name and location of the unit.
Alarm and Monitor	This shows fault and performance status.
Menu Tabs	The menu tabs give you access to data and control entry. Move the cursor to a tab and a drop-down menu opens.
Data Entry Area	Edit parameters in this area.
Product Information	This gives you access to technical trouble-shooting, product options and specifications.
Contact Information	Select Contact Us to email Customer Service.

7.2.3 LED Indicators

Twelve LEDs on the DMD1050 GUI Interface (Refer to Table 7-2) indicate the status of the DMD1050's operation. The LED colors maintain a consistent meaning. Green is appropriate for normal operation, Yellow means that there is a condition not proper for normal operation, and Red indicates a fault condition that will result in lost communications.



Table 7-2.

LED	Color	Function
Modem LED Indicators		
Power	Green	Indicates that the unit is turned on.
Fault	Red	Indicates a hardware fault for the unit.
Event	Yellow	Indicates that a condition or event has occurred that the modem has stored in memory. The events may be viewed from the GUI or in the Terminal Mode.
Remote	Green	Indicates that the unit is in the process of updating firmware with FTP.
Modulator LED Indicators		
Transmit On	Green	Indicates that the Modulator transmitter is on.
Major Alarm	Red	Indicates that the Transmit Direction has failed, losing traffic.
Minor Alarm	Yellow	Indicates that a Transmit Warning Condition exists.
Test Mode	Yellow	Indicates that the transmitter is involved in a current Test Mode activity.
Demodulator LED Indicators		
Signal Lock	Green	Indicates that the receiver locked to an incoming carrier and data, including FEC Sync.
Major Alarm	Red	Indicates that the Receive Direction has failed, losing traffic.
Minor Alarm	Yellow	Indicates that a Receive Warning Condition exists.
Test Mode	Yellow	Indicates that the receiver is involved in a current Test Mode activity.

7.3 GUI Screen Menus

There are four main menus displayed on the Introduction screen upon startup of the web browser. This screen will give a brief overview of the product and contains no configurable items. The four main menus and with submenus are:


- **Introduction**
- **Password Setup**
 - Access
 - Preferences
- **IP Administration**
 - Modem Addressing
 - Configure Apps
 - Configure PC
- **Monitor and Control**
 - Transmit
 - Receive
 - Interface
 - Monitor
 - Alarms
 - System
 - Test

7.3.1 Introduction Menu


This menu will first appear when starting up the web browser. This page lists the general features of the unit, and lists a brief description of the unit. Notice on the bottom of the page that there are selections for Technical Specifications, Product Options, Troubleshooting, About Us, and Contact us. Access these areas for further detailed description of the selection.

DMD1050 MIL-STD-188-165A Compliant Modem

[Introduction](#) | [Password Setup](#) | [IP Administration](#) | [Monitor & Control](#)

Introduction /


Introduction



Overview

Radyne's new DMD1050 L-Band Satellite Modem breaks new ground offering a complete modem on a compact PCB daughter board. The compact size saves space and offers system engineers greater flexibility integrating the modem board into the host system. With standards including IDR, IBS and DVB, and covering data rates up to 29 Mbps, DMD1050 covers virtually all your Satellite IP, Telecom, Video and Internet applications, based on MIL-STD-188-165A and the ability

Better All Around

The extensive list of integrated hardware and software options give you the ability to integrate the modem on many platforms and provide an upgrade path for future networks. Options may be purchased with the product or easily upgraded in the field through the web browser or terminal port.

The DMD1050 has an impressive remote accessibility line-up. Remote control via Radyne's trusted RLLP (Radyne Link Level Protocol), 10 Base-T SNMP Ethernet or Web Browser interfaces allow for monitor and control of all the modem's features.

Supported by Radyne's extensive line of rack mount modems, encoders and decoders, the DMD1050 can be built into any satellite requirement. Compatibility with current modems, such as Radyne's DMD20, DMD50 and DMD2050, are maintained for seamless substitution and addition to your existing systems.

Radyne's DMD1050 modem board integrates supporting hardware for BUC and LNB. Interconnects allow the user to supply external voltages and 10 MHz Reference for BUC and LNB.

Highlights

- Fully Compliant with MIL-STD-188-165A and IESS 308/309/310/314/315
- Compact size 7 x 9.125 Inches x 1 Inch
- 950 to 2050 MHz L-Band Tx/Rx Operation
- BPSK/QPSK/OQPSK/8PSK/16QAM Operation
- 2.4 Kbps to 20 Mbps, 1bps Steps
- FEC - Viterbi, Reed-Solomon, Sequential, Trellis, Turbo Product Code
- Optional 10 MHz High-Stability Reference
- Input Connectors for BUC and LNB Voltages
- Excellent Spurious Performance
- Fully Compliant with IESS 308/309/310/314/315
- Optional DVB to EN301-210 and EN300-421
- Built in MIL 188-114A and Ethernet data interfaces
- Standard Features Include: ReedSolomon, Asynchronous Overhead and Automatic Uplink Power Control (AUPC)
- M&C Options include SNMP, Web Browser, RLLP & RS232 Terminal Ports

Options

Hardware Options Include:	Software Options Include:
<ul style="list-style-type: none"> ■ 10 MHz High-Stability Reference ■ SMA (50 ohm) or F-Type (75 ohm) Female connectors ■ DC Input Power 48 VDC 	<ul style="list-style-type: none"> ■ Data Rate Upgrades ■ Turbo FEC ■ IDR, IBS Framing ■ Sequential FEC ■ 8PSK ■ 16QAM ■ DVB-S

[Technical Specifications](#) | [Product Options](#) | [Troubleshooting](#) | [About Us](#) | [Contact Us](#) | ©2006 Radyne Corporation


Figure 7.2. Introduction Screen

7.3.1.1 Login Screen

Upon initially accessing the Password Setup, IP Administration and Monitor & Control configuration menu tabs a login prompt will appear. In order to gain access to any of the configuration menus, log in with the correct user name and password. (The factory default login name is “admin” and the default password is “admin”). For further information on setting user profiles see [Section 7.2.3 IP and Application Administration Menu](#).

DMD1050 MIL-STD-188-165A Compliant Modem

Introduction Password Setup IP Administration Monitor & Control

Introduction / **Introduction** 

Overview

Radyne's new DMD1050 L-Band Satellite Modem breaks new ground offering a complete modem on a compact PCB daughter board. The compact size saves space and offers system engineers greater flexibility integrating the modem board into the host system. With standards including IDR, IBS and DVB, and covering data rates up to 29 Mbps, DMD1050 covers virtually all your Satellite IP, Telecom, Video and Internet applications, based on MIL-STD-188-165A and the ability

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- Excellent Spurious Performance
- Fully Compliant with IESS 308/309/310/314/315
- Optional DVB to EN301-210 and EN300-421
- Built in MIL 188-114A and Ethernet data interfaces
- Standard Features Include: ReedSolomon, Asynchronous Overhead and Automatic Uplink Power Control (AUPC)
- M&C Options include SNMP, Web Browser, RLLP & RS232 Terminal Ports
- 10 MHz High-Stability Reference
- SMA (50 ohm) or F-Type (75 ohm) Female connectors
- DC Input Power 48 VDC
- Data Rate Upgrades
- Turbo FEC
- IDR, IBS Framing
- Sequential FEC
- 8PSK
- 16QAM
- DVB-S

Technical Specifications | Product Options | Troubleshooting | About Us | Contact Us | ©2006 Radyne Corporation

Figure 7-3. Login Screen

7.3.2 Password Setup

The Access Menu allows for multiple operators to be allowed access to the system. User access priorities can be set by completing the fields in the Access menu below.

Access Menu

DMD1050 Satellite Modem Sign Out

Introduction | **Password Setup** | IP Administration | Monitor & Control

Password Setup / Access **RADYNE**

Access

Sign Out
Hello admin
Select user, then choose new password. Click **Save** when you're done.

Please Note: To better protect user accounts, please make sure passwords are memorable. Do not share passwords, and never use the same passwords that have been used in the past. For security purposes, passwords should be a minimum of five characters long. A strong password contains a combination of uppercase and lowercase letters, numbers, and special characters.

Edit User:

User Access Group:

Enter User Name:

Enter a New Password:

Confirm New Password:

Technical Specifications | Product Options | Troubleshooting | About Us | Contact Us | ©2006 Radyne Corporation

Figure 7-4. Access Menu

Edit User	{USER 1, USER 2, USER 3} Allows the operator to assign the applicable user group.
User Access Group	{Guest, Operator, Admin} Allows the operator to assign the applicable user Access Level group.
Enter User Name	Allows the operator to assign the applicable user name used for login.
Enter a New Password	Allows the operator to assign the applicable user name password used for login.
Confirm New Password	Allows the operator to confirm the applicable user password (this must exactly match the previously entered Password entry for the system to accept).

Preferences Menu

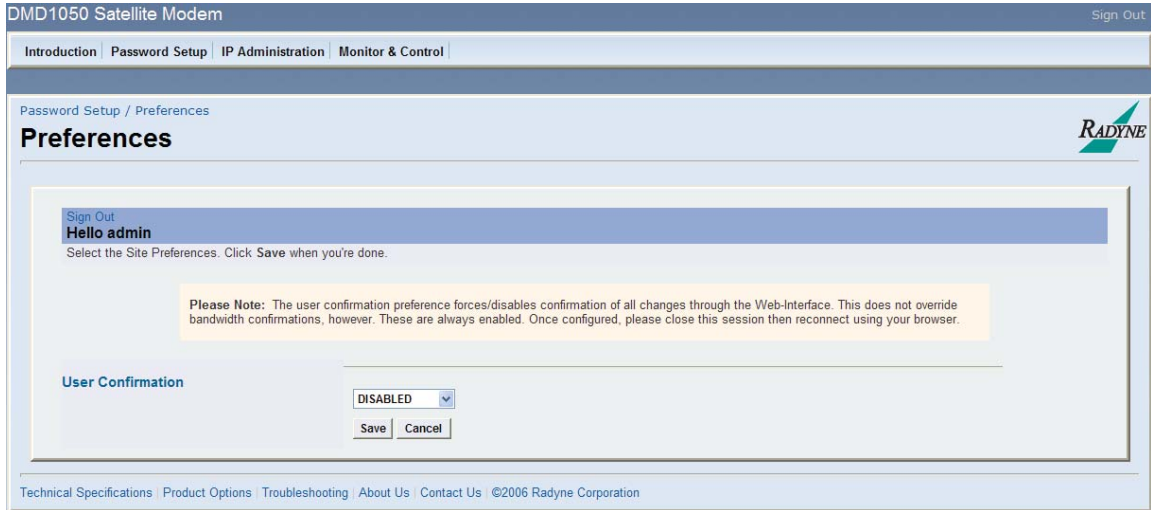


Figure 7-5. Modem Preferences menu

User Confirmation:

{DISABLED, ENABLED}

The user confirmation preference allows the user to force/disable confirmation of all changes through the web interface. This does not override bandwidth confirmations. However, these are always enabled.

7.3.3 IP and Application Administration

The Modem Addressing menu provides instructions on how to configure the modem, applications and PC.

Modem Addressing

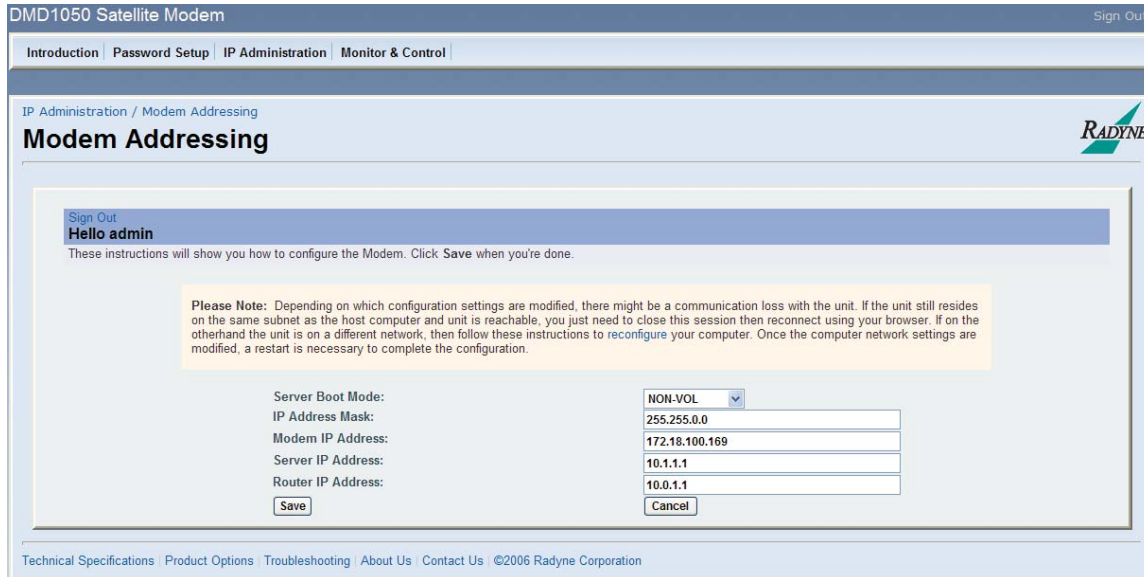


Figure 7-6. Modem Addressing

Server Boot Mode: {DEFAULT, NON-VOL, BOOTP, IP TEST}

Default: All of the following parameters as shown in Table 7-3 through 7-8 will be set and will not change until the boot mode is changed.

Table 7-3. IP Parameters

IPMASK:	255.000.000.000
MODEM IPADDR:	010.000.000.001
SERVER IP ADDR:	010.001.001.001
ROUTER IP ADDR:	010.000.001.001

IP TEST: The IP Test boot mode has a similar behavior to the default boot mode. The Terminal, IP, SNMP, FTP and Web parameters changed by the default setting will also be reset by the IP Test boot mode. However, instead of the IP addresses being set to an unreadable address, it will be set as follows as shown in Table 7-4:

Table 7-4. IP Test

IP ADDRESS MASK:	255.255.255.0
MODEM IP ADDRESS:	192.168.000.238
SERVER IP ADDRESS	192.168.000.101
ROUTER IP ADDRESS:	192.168.000.102

IP Address Mask:

{XXX.XXX.XXX.XXX}

The IP Address Mask of the local network. The mask is expressed in a decimal format, and must be a valid TCP/IP Mask. This field should be set before changes are made to the Modem or Router Address.

Modem IP Address:

{XXX.XXX.XXX.XXX}

The IP Address of the modem. This address should be consistent for the mask defined. This address is expressed in decimal format. Broadcast and loop back addresses will not be allowed. These are addresses with all subnet bits set to 0's or 1's.

Server IP Address:

{XXX.XXX.XXX.XXX}

The IP Address of the Boot Server and the address of the SNMP Trap Server when SNMP is active. If a server is used and there is no local router, this address must be consistent with the modem address. If a router has been specified, the address is presumed to be reachable via the router. Broadcast and loop back addresses will not be allowed. These are addresses with all subnet bits set to 0's or 1's.

Router IP Address:

{XXX.XXX.XXX.XXX}

The IP Address of the Local Network Router. If a router is present on the local network, this address must be consistent with the IP Mask and the subnet of the modem. If no router is present, then the address should be set to a foreign address. This address is expressed in decimal format. Broadcast and loop back addresses will not be allowed. These are addresses with all subnet bits set to 0's or 1's.

Configuring Applications

DMD1050 Satellite Modem Sign Out

Introduction Password Setup IP Administration Monitor & Control

IP Administration / Configure Apps

Configure Applications

RADYNE

Sign Out
Hello admin

The following will allow you how to configure the modem Network Applications. Click Save when you're done.

Please Note: Depending on which configuration settings are modified, the host application might get limited access rights or lose communication with the unit. Please make sure your host settings are modified to match your current changes.

SNMP Setup

SNMP Version:
V1 & V2

Trap Version:
V1

Authorization:
TRAPS OFF

Read Community:
public

Read/Write Community:
public

FTP Setup

User ID:
User

Password:
Password

Save Cancel

Technical Specifications Product Options Troubleshooting About Us Contact Us ©2006 Radyne Corporation

Figure 7-7. Configuring Applications

SNMP Setup:

SNMP Version:	{V1 & 2, V3} Default = V1 & V2
Trap Version:	{V1 & 2} Default = V1
Authorization:	{TRAPS ON, TRAPS OFF} Default = TRAPS OFF
Read Community:	{Public} Default
Read/Write Community:	{Public} Default

FTP Setup:

UserID:	User
Password:	Password

Table 7-5. SNMP Parameters

SNMP VERSION: V1 & V2			
TRAP VERSION: V1			
AUTHORIZATION: TRAPS OFF			
RD COMMUNITY: PUBLIC			
RDWR COMMUNITY: PUBLIC			
USER 1 Viewer-md5	USER 2 Viewer-sha	USER 3 Oper-md5	USER 4 Oper-sha
ACCESS GROUP VIEWER	ACCESS GROUP VIEWER	ACCESS GROUP OPER	ACCESS GROUP OPER
AUTH PASSWORD Viewer	AUTH PASSWORD Viewer	AUTH PASSWORD Oper	AUTH PASSWORD Oper
PRIV PASSWORD Viewer	PRIV PASSWORD Viewer	PRIV PASSWORD Oper	PRIV PASSWORD Oper
AUTHENTICATION MD5	AUTHENTICATION SHA	AUTHENTICATION MD5	AUTHENTICATION SHA
PRIVACY DES	PRIVACY DES	PRIVACY DES	PRIVACY DES

Table 7-6. FTP Parameters

USER ID:	USER
PASSWORD:	PASSWORD

Table 7-7. Web Parameters

Confirmation: disabled		
USER 1 guest	USER 2 oper	USER 3 admin
ACCESS GROUP guest	ACCESS GROUP oper	ACCESS GROUP admin
AUTH PASSWORD guest	AUTH PASSWORD oper	AUTH PASSWORD admin

Table 7-8. Terminal and Remote Port Parameters

Type	VT100
baud rate	19200
interface	rs232
remote control	terminal

NON-VOL: Stores and uses IP Mask and addresses as provided by the user.

BOOTP: At boot time, use Bootp Protocol to get names, masks, and IP Addresses of the modem, router, and server.

Configuring the PC

The screenshot displays the 'Configure the PC' page within the 'IP Administration' section of the DMD1050 Satellite Modem web interface. The page includes a navigation bar with 'Introduction', 'Password Setup', 'IP Administration', and 'Monitor & Control'. The main content area is titled 'Configure the PC' and features a 'Sign Out' button and a 'Hello admin' message. A 'Please Note' box states that instructions apply only to Windows 2000 or XP using the Classic interface. The configuration is divided into four steps:

- Step 1:** Click the Start button, select Settings, click the Control Panel icon, and double-click the Network and Dial-up Connection icon.
- Step 2:** Select the Local Area Connection icon for the applicable Ethernet adapter (usually the first Local Area Connection listed). Double-click the Local Area Connection. Click the Properties button.
- Step 3:** Make sure the box next to Internet Protocol (TCP/IP) is checked. Highlight Internet Protocol (TCP/IP), and click the Properties button.
- Step 4:** Select Obtain an IP address automatically if your network supports this capability and all generated IP addresses will be on the same subnet as the unit. Select 'Use the following IP address' otherwise. Once the new window appears, click the OK button again to complete the PC configuration, then restart your computer.

Three Windows dialog boxes are shown as examples of the configuration process:

- Local Area Connection Status:** Shows connection details such as Status (Connected), Duration (5 days 01:27:21), and Speed (100.0 Mbps). It also displays activity statistics for sent and received packets.
- Local Area Connection Properties:** Shows the 'General' tab with 'Internet Protocol (TCP/IP)' selected. It lists other services like Client for Microsoft Networks, File and Printer Sharing, and QoS Packet Scheduler.
- Internet Protocol (TCP/IP) Properties:** Shows the 'General' tab with 'Obtain an IP address automatically' selected. It also shows options for DNS server addresses.

At the bottom of the interface, there is a footer with links for 'Technical Specifications', 'Product Options', 'Troubleshooting', 'About Us', and 'Contact Us', along with the copyright notice '©2006 Radyne Corporation'.

Figure 7-8. Configuring the PC

7.3.4 Monitor and Control Menu

Under this menu, all modem functions that are monitored and/or controlled are accessible. To access the M&C sub menu options drag the cursor across the gel-tabs. Note that as the cursor passes over a tab it is highlighted and a menu drops below the tab. Stop on the desired tab move the cursor down and then across to the desired function. Select the desired sub menu function and the data entry menu will appear in the data entry section allowing for adjustments to the parameters displayed.

7.3.4.1 Transmit Menu

The Transmit menu contains sub menus; General/IF, Data, Reed Solomon, ODU-BUC and AUPC.

Transmit General / IF Menu



Figure 7-9. Transmit General | IF Menu

Network Spec: {CLOSED NET, DVB SAT}

Supports *IDR and IBS Framing Modes in Closed Net*

The Network Spec Command sets a number of parameters within the modem to meet a set specification. The purpose is to eliminate keystrokes and potential compatibility problems.

Additionally, data rates not covered by the given network specification of operation will not be allowed. If the mode of operation is selected after the data rate has been entered, then the data rate must be compatible with the desired mode of operation or the mode will not be allowed. The following parameters are set and cannot be changed while the unit is in the given mode of operation:

MIL-STD 188-165A:
(MILSTD-188-165A)

For Data Rates: 9.6 K – 20.0 Mbps
 Framing: None
 Scrambler: OM73
 Spectrum MIL 188 165A

DVB:

EN301-201 and EN300-421
 Data Rates: All Rates
 Framing Type: DVB
 Scrambler Type: DVB
 Spectrum Mask: DVB 0.25, 0.35

Closed Net:

All possible combinations allowed, however, the DVB settings require the DVB network spec.

Strap Code:

{Refer to Strap Code Guide, Table 4-4}

The Strap Code is a quick set key that sets many modem parameters. Consult the strap code guide for available strap codes. Parameters set by strap code:

Data Rate

Inner Code Rate
 Satellite Framing
 Scrambler
 Drop and Insert
 Outer Code Rate (Reed-Solomon)
 Modulation

Frequency (MHz):

{950 - 2050 MHz}

Allows the user to enter the Modulator IF Output Frequency of the modem in 1 Hz increments.

Power (dBm):

{0 to -25 dBm}

Allows the user to enter the Transmitter Power Level.

Carrier Control:

{ON, OFF, AUTO, VSAT, RTS}

Allows the user to select the carrier type. Refer to Appendix C for further information.

Spectrum:

{Normal, Inverted}

Allows the user to invert the direction of rotation for PSK Modulation. Normal meets IESS Specification. Spectral inversion may be required if the BUC LO is higher in frequency than the BUC output frequency. This creates a spectral inversion and the IF spectrum must be again inverted to compensate.

- Modulation:** {QPSK, BPSK, OQPSK, 8PSK, 16QAM}
Allows the user to select the modulation type.
- Spectral Mask:** { MIL-188-165A, Intelsat 0.35, DVB SAT 0.35, DVB SAT 0.25}
Allows the user to set the spectral shape of Tx Data Filter
- Compensation:** {0.0 – 1.0}
Allows you to offset output power by up to 1 dBm. This is intended as a correction for user cabinet connectors.

Transmit / Data Menu



Figure 7-10. Transmit / Data Menu

- Data Rate (bps):** {Refer to Technical Specs for Data Rates}
Allows the user to set the Data Rate in bps steps.
- Symbol Rate (sps):** Allows the user to view the Symbol Rate.
- Inner FEC:**
 - Viterbi** {1/2, 3/4, 7/8, None}
 - Optional FEC Rates:**
 - Sequential** {1/2, 3/4, 7/8}
 - Trellis 8PSK** {2/3}
 - Turbo** {1/2, 3/4, 7/8}
 - CSC** {3/4}
 - DVB VIT** {2/3, 5/6}
 - DVB Trellis** {3/4, 5/6, 7/8, 8/9}

Allows the user to select the Tx Code Rate and Type.
- TPC Interleaver:** {DISABLE, ENABLE}
Allows user to disable or enable the TPC Interleaver. Valid only for Radyne turbo codes TPC.495 and TPC.793. Only available for Radyne Legacy Turbo.
Contact factory for availability.

Differential Coding:	{ENABLED, DISABLE} Allows the user to enable or disable the Differential Encoder. Having the encoder enabled ensures proper phase lock. May not be adjustable in some modes.
Scrambler Selection:	{NONE, V.35-IESS, V.35 CITT, V.35 EF, IBS w/Optional Framing and optional Reed-Solomon, Reed-Solomon Scrambler w/Optional Framing, CCITT, V.35FC, OM-73, V.35EF_RS, TPC SCRAMBLER (Turbo Codec), DVB, EDMAC} Allows the user to select the descrambler type.
Scrambler Control:	{ENABLED, DISABLE} Allows the user to enable or disable scrambler operation.
Satellite Framing:	{1/15 (IBS), 1/15 (Async), 96 Kbps (IDR), DVB, EDMAC, EFAUPC, SCC, None} <i>Used with IDR, IBS, or Asynchronous Interface Only.</i> Allows the user to select the framing type.
Terrestrial Framing:	{NONE, 188, 204} DVB Only
Data Polarity:	{INV. TERR & BASE, INV. BASEBAND, INV.TERR DATA, NONE} Allows the user to invert the Tx Data polarity.
Symbol Pair:	{NONE, SWAPPED} Allows the user to swap the I & Q Channels. (BPSK Mode Only)
ESC Overhead:	{VOICE X2, DATA 64KBPS} IDR ESC Channel used for Voice or 64 K data channel.
SCC Control Ratio:	{1:1,1:2, 1:3, 1:4, 1:5, 1:6, 1:7} This function is only available when Tx Satellite Framing is set to SCC. Allows the user to simulate the framing used by the Satellite Control Channel Option. Allows the user to set the ratio of overhead in-band data to synchronizing words.
SCC Inband Rate:	{300 to 200000} This function is only available when Tx Satellite Framing is set to SCC. Allows the user to request the rate of in-band data for the overhead channel.
Async Inband Rate:	{75, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200} Allows the user to select the async inband rate.

Transmit / Reed-Solomon Menu

These selections are active only when the Reed-Solomon Option is installed.

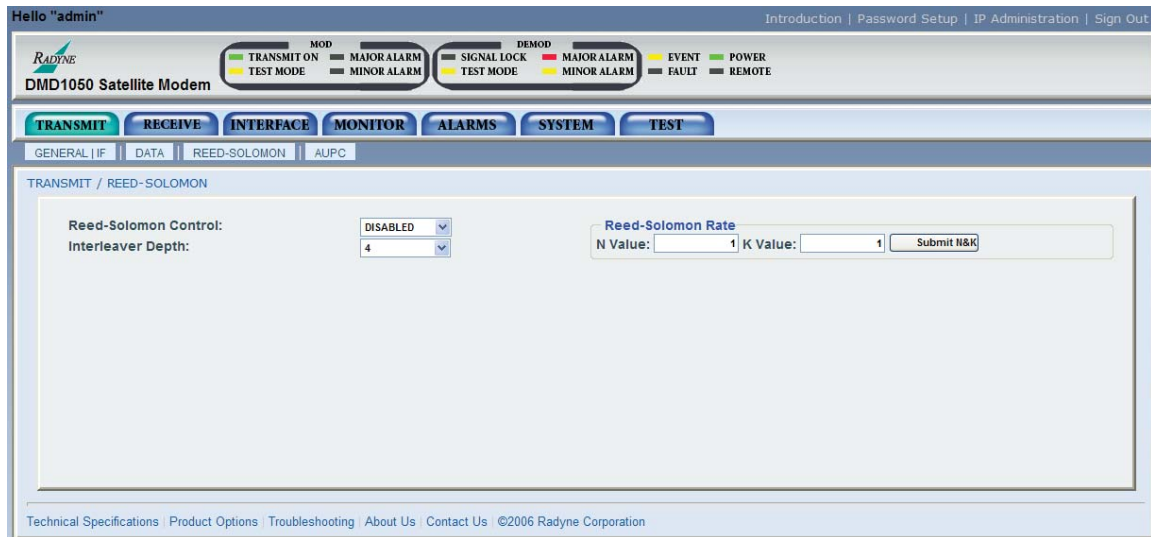


Figure 7-11. Transmit / Reed-Solomon Menu

- Reed-Solomon Control:** {ENABLED, DISABLE}
Allows the user to Enable/Disable the Reed-Solomon Encoder.
- Reed-Solomon Rate
N Value, K Value:** {Refer to Table 3-1 for valid N/K values}
Displays the currently used n, k Reed-Solomon Codes. In Closed Net Mode, the user may select custom R-S Codes.
- Interleaver Depth:** {4, 8, 12}
Allows the user to select the Reed-Solomon interleaver depth. In Closed Net Mode, a depth of 4, 8 or 12 may be selected.

Transmit / AUPC Menu

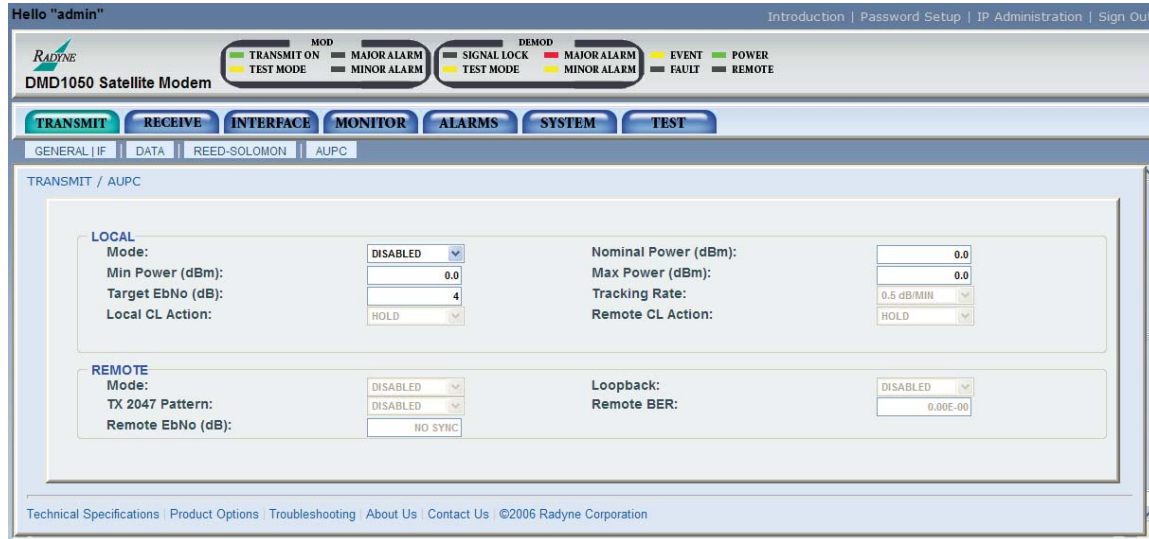


Figure 7-12. Transmit / AUPC Menu

LOCAL AUPC (menu)

The 'LOCAL AUPC CONFIGURATION' Menu contains the local configuration parameters for the AUPC Function.

AUPC MODE

{DISABLED, NEARSIDE, RADYNE, EFDATA}

DISABLED: Allows the user to enable or disable the Local AUPC Function of the local modem.

EFDATA: Enables EFDATA Local AUPC Function. In the event that the remote or local demodulator losses lock, the output power level will adjust itself to the level settings indicated in the 'REMOTE CL ACTION' Menu or the 'LOCAL CL ACTION'.

RADYNE: Enables Radyne Local AUPC Function. In the event the remote demodulator losses lock, the local output power level will adjust itself to the nominal level. This nominal power should be set to a level high enough to re-establish communications regardless of rain fade.

NEARSIDE: Enables NEARSIDE Local AUPC function. In the event the local demodulator losses lock due to signal loss, the output power level will adjust itself to the nominal level. This nominal power should be set to a level high enough to re-establish communications regardless of rain fade.

NOMINAL TX POWER

{0 TO -25 dB}

This allows the user to set the nominal Transmit Power. The nominal transmit power is the default output power level.

MINIMUM TX POWER

{0 to -25 dB}

This allows the user to set the minimum Transmit Power.

EFDATA AUPC: When configured for EFDATA AUPC the minimum Transmit Power is the lowest power setting that will be used when the local modem commands a decrease of the Transmit Power from the Remote modem.

RADYNE: When configured for Radyne AUPC, the minimum Transmit Power is the lowest power setting that will be used when the remote modem commands a decrease of the Transmit Power from the Local modem.

NEARSIDE: When configured for NEARSIDE AUPC the minimum Transmit Power is the lowest power setting that will be used by the local modem when the E_b/N_0 increases above the E_b/N_0 target.

MAXIMUM TX POWER

{0 to -25 dB}

This allows the user to set the maximum Transmit Power.

EF AUPC: When configured for EF AUPC, the maximum Transmit Power is the highest power setting that the local modem will use when the local modem commands an increase in Transmit power from the Remote modem.

RADYNE: When configured for Radyne AUPC, the maximum Transmit Power is the highest power setting that will be used when the remote modem commands an increase of the Transmit Power from the Local modem

NEARSIDE: When configured for NEARSIDE AUPC the maximum Transmit Power is the highest power setting that will be used by the local modem when the E_b/N_0 decreases below the E_b/N_0 target.

TARGET E_b/N_0

{4.0 to 16 dB}

This allows the user to set the desired E_b/N_0 for the local receiver.

RADYNE AUPC: When configured for Radyne AUPC, this setting is compared against the remote E_b/N_0 and commands to the local modem to increase or decrease the local transmit power.

EF AUPC: When configured for EF AUPC, this setting is compared against the local received E_b/N_0 and commands to the remote modem to increase or decrease transmit power.

NEARSIDE: When configured for NEARSIDE AUPC, this setting is compared against the received E_b/N_0 of the local modem and commands to the local modem to increase or decrease transmit power.

TRACKING RATE	{0.5 to 6.0} Allows the user to set the rate at which the commands to increase or decrease Transmit Power are sent. Each command will result in a 0.5 dB increase or decrease in Transmit Power from the remote transmitter. The tracking rate is adjustable from 0.5 dB per minute to 6.0 dB per minute in 0.5 dB steps. (Only available when EFAUPC is selected as the framing)
LOCAL CL ACTION	{HOLD, NOMINAL, MAXIMUM} This allows the user to set the Remote Transmit Power Setting to be used when the local modem receiver loses lock. The setting can be 'HOLD' (no action taken), 'NOMINAL' (the nominal Transmit Power Setting is used), and 'MAXIMUM' (the maximum Transmit Power Setting is used). (Only available when EFAUPC is selected as the framing)
REMOTE CL ACTION	{HOLD, NOMINAL, MAXIMUM} This allows the user to set the Local Transmit Power Setting to be used when the remote modem receiver loses lock. The setting can be 'HOLD' (no action taken), 'NOMINAL' (the nominal Transmit Power Setting is used), and 'MAXIMUM' (the maximum Transmit Power Setting is used).
REMOTE AUPC (menu)	The 'REMOTE AUPC CONFIGURATION' Menu contains the remote configuration parameters for the AUPC Function. Remote AUPC menus are only available when modem is configured for EF AUPC
AUPC MODE	{DISABLE, EFDATA} Allows the user to enable or disable the AUPC Function of the remote modem. The remote AUPC Function is the response of the local modem to commands for an increase or decrease of the Transmit Power in 0.5 dB steps and the command to change to the setting indicated in the 'REMOTE CL ACTION' Menu of the remote modem upon receiver loss of lock.
LOOPBACK	{DISABLE, ENABLE} Allows the user to enable or disable the Baseband Loopback Test Mode of the remote modem.
TX 2047 TEST	{DISABLE, ENABLE} Allows the user to enable or disable the Transmit 2047 Pattern Test Mode of the remote modem.
RX 2047 BER:	Reports the BER measurement of the receiver 2047 Pattern Test Mode of the remote modem. BER is reported from the 1×10^{-5} to 1×10^{-7} in tenth decade steps. If the pattern does not synchronize or is out of range, 'NO DATA' will be displayed.



When modems are configured for Radyne AUPC, the remote Eb/No will be displayed in the Monitor Menus.

7.3.4.2 Receive Menu

The Receive menu contains sub menus; General | IF, Data, Reed Solomon and ODU-LNB.

Receive General | IF Menu

The screenshot shows the web interface for the DMD1050 Satellite Modem. The top navigation bar includes links for Introduction, Password Setup, IP Administration, and Sign Out. Below this, there are status indicators for MOD (TRANSMIT ON, TEST MODE, MAJOR ALARM, MINOR ALARM), DEMOD (SIGNAL LOCK, TEST MODE, MAJOR ALARM, MINOR ALARM), EVENT (FAULT), and POWER (REMOTE). The main menu has tabs for TRANSMIT, RECEIVE, INTERFACE, MONITOR, ALARMS, SYSTEM, and TEST. The RECEIVE tab is active, and the sub-menu shows GENERAL | IF, DATA, and REED-SOLOMON. The RECEIVE GENERAL / IF menu is displayed, showing the following parameters:

Network Spec:	CLOSED NET	StrapCode:	26
Frequency (MHz):	1250.000000	Demodulation:	QPSK
Spectrum:	NORMAL	Sweep Range (+/-KHz):	25
Spectral Mask:	INTELSAT 0.35	Reacquisition Range (+/-Hz):	0
Sweep Delay (sec):	0.5	Fast Acquisition:	DISABLED
Adj Carrier Power:	NORMAL	Eb/No Alarm Thrsh:	0.0
Carrier Input Level Limit:	-90		

At the bottom of the interface, there are links for Technical Specifications, Product Options, Troubleshooting, About Us, and Contact Us, along with the copyright notice ©2006 Radyne Corporation.

Figure 7-13. Receive General | IF Menu

Network Spec:

{CLOSED NET, DVB SAT}

Supports IDR and IBS Framing. Modes in Closed Net

The Mode Command sets a number of parameters within the modem to meet a set specification. The purpose is to eliminate keystrokes and potential compatibility problems. Additionally, data rates not covered by the given mode of operation will not be allowed. If the mode of operation is selected after the data rate has been entered, then the data rate must be compatible with the desired mode of operation or the mode will not be allowed. The following parameters are set and cannot be changed while the unit is in the given mode of operation:

MIL188-165A:
(MILSTD-188-165A)

For Data Rates: 9.6 K – 20.0 Mbps
 Framing: None
 Scrambler: OM73
 Spectrum MIL 188 165

DVB:
(Per EN301 201 and 300 421)

Data Rates: All Rates
 Framing Type: DVB
 Scrambler Type: DVB
 Spectrum Mask: DVB 0.25, 0.35

Closed Net:

All possible combinations allowed, however, DVB settings requires the DVB network spec.

Strap Code:

The Strap Code is a quick set key that sets many modem parameters. Consult the strap code guide for available strap codes. Refer to Appendix G. Parameters set by strap code:

Data Rate

Inner Code Rate
 Satellite Framing
 Scrambler
 Drop and Insert
 Outer Code Rate (Reed-Solomon)
 Modulation

Frequency (MHz):

{950 – 2050 MHz}

Allows the user to enter the Modulator IF Frequency in 1 Hz increments.

Spectrum:

{Normal, Inverted}

Allows the user to invert the direction of rotation for PSK Demodulation. Normal meets IESS Specification.

Demodulation:

{QPSK, BPSK, OQPSK, 8PSK, 16QAM}

Allows the user to select the demodulation type.

Spectral Mask:

{ MIL-188-165A, Intelsat 0.35, DVB 0.35, DVB 0.25}

Allows the user to invert the direction of rotation for PSK Modulation. Normal meets the IESS Specification.

Sweep Range (kHz):

{±0 to 255 kHz}

Allows the user to set the acquisition range for the demodulator

Sweep Delay (sec):	{0.0 – 900.0 sec} Allows the user to set the reacquisition delay time in 1/10 th second increments.
Reacquisition Range (Hz):	{0 – 32000 Hz} Allows the user to set the reacquisition sweep in 1 Hz increments.
Adj Carrier Pwr:	{Normal, Suppressed} Allows the user to indicate adjacent carrier as Normal or Suppressed (High Power). Unit will increase or decrease post dissemination gain appropriately.
Fast Acquisition:	{DISABLED, ENABLED} Allows the user to disable or enable the Rx fast acquisition capability.
Carrier Input Level Limit:	{-30 to 90 dBm} Allows the user to adjust the low level threshold limit for input power. Input power level below the threshold limit will trigger a major alarm on the demodulator.
EB/NO Alarm Thrsh	{0.0 to 9.90 dB} Allows the user to set the desired E_b/N_o for the local receiver. This setting is compared against the receive E_b/N_o and commands to the remote modem to increase or decrease Transmit Power accordingly are sent.

Receive / Data Menu



Figure 7-14. Receive / Data Menu

Data Rate (bps):	{Refer to Technical Specs for Data Rates} Allows the user to set the Data Rate in bps steps via the Front Panel Arrows or Keypad.
Symbol Rate (sps):	Allows the user to view the Symbol Rate.
Inner Fec:	Viterbi {1/2, 3/4, 7/8, None} Optional FEC Rates: Sequential {1/2, 3/4, 7/8} Trellis 8PSK {2/3} Turbo {1/2, 3/4, 7/8} CSC {3/4} DVB VIT {2/3, 5/6} DVB Trellis {3/4, 5/6, 7/8, 8/9} Allows the user to select the Rx Code Rate and Type.
TPC Interleaver	{DISABLED, ENABLED} Allows the user to disable or enable TPC Interleaver. Valid only for Radyne turbo codes TPC.495 and TPC.793. Only available for Radyne legacy Turbo. Contact factory for availability.
Differential Coding	{ENABLED, DISABLE} Allows the user to enable or disable the Differential Decoder. Having the decoder enabled ensures proper phase lock. May not be adjustable in some modes.

Scrambler Selection	{NONE, V.35-IESS, V.35 CITT, V.35 EF, IBS w/Optional Framing and optional Reed-Solomon, Reed-Solomon Scrambler w/Optional Framing, CCITT, V.35FC, OM-73, V.35EF_RS, TPC SCRAMBLER (Turbo Codec), DVB, EDMAC} Allows the user to select the descrambler type.
Scrambler Control	{ON, OFF} Allows the user to enable or disable the descrambler operation.
Satellite Framing	{1/15 (IBS), 1/15 (Async), 96 Kbps (IDR), EDMAC, EFAUPC, SCC, None} <i>Used with IDR, IBS, or Asynchronous Interface Only.</i> Allows the user to select the Framing Type.
Terrestrial Framing	{NONE, 188, 204} DVB only Allows the user to select the Receive Terrestrial Framing.
Data Polarity	{INV. TERR & BASE, INV. BASEBAND, INV.TERR DATA, NONE} Allows the user to invert the Rx Data polarity.
Symbol Pair:	Symbol Pair: {NONE, SWAPPED} Allows the user to swap the I & Q Channels. (BPSK Mode Only)
ESC Overhead	{VOICE X2, DATA 64KBPS} IDR ESC Channel used for Voice or 64 K data channel.
SCC Control Ratio	{1/1, 1/2, 1/3, 1/4, 1/5, 1/6, 1/7} NOTE: Only available (visible) when SCC is selected for the Rx Satellite Framing Allows the user to simulate the framing used by the Satellite Control Channel Option (Pass Thru Mode only). The SCC CTL RATIO is the ratio of overhead in-band data to synchronizing words.
SCC Inband Rate	{300 to 200000} NOTE: Only available (visible) when SCC is selected for the Rx Satellite Framing Allows the user to request the rate of in-band data for the overhead channel.
Async Inband Rate:	{75, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200} Allows the user to select the async inband rate.

Receive / Reed-Solomon Menu

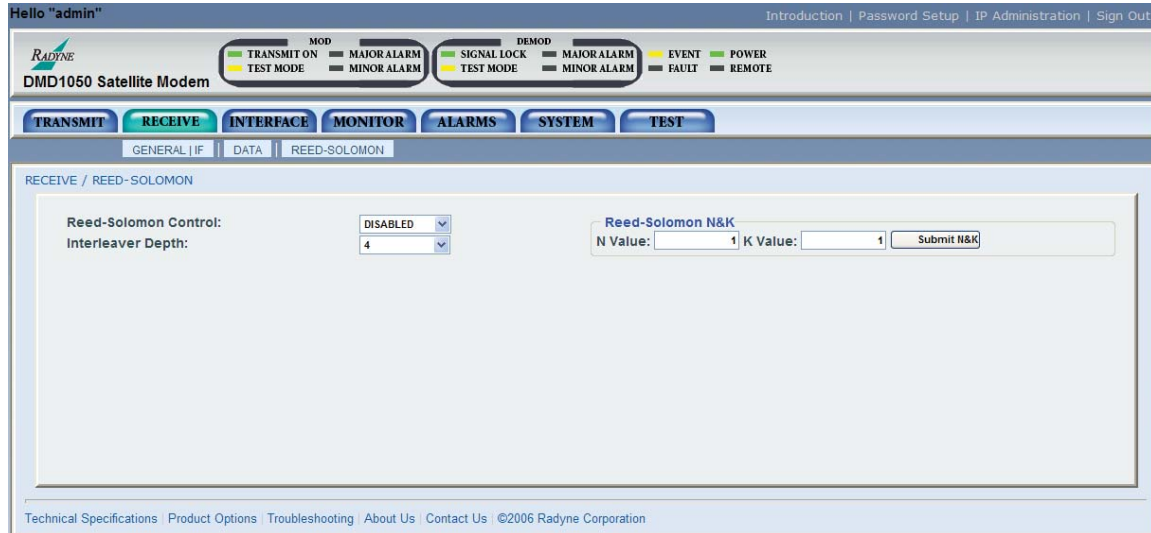


Figure 7-15. Receive / Reed-Solomon Menu

ReedSolomon Control:	{ENABLED, DISABLED} Allows the user to Enable/Disable the Reed-Solomon Encoder.
RS N Value:	{Refer to Table 3-1 for valid n/k values} Displays the currently used N value, Reed-Solomon Codes. In Closed Net Mode, the user may select custom R-S Codes if optional Reed Solomon Card is installed.
RS K Value:	{Refer to Table 3-1 for valid n/k values} Displays the currently used K value, Reed-Solomon Codes. In Closed Net Mode, the user may select custom R-S Codes if optional Reed Solomon Card is installed.
Rx Interleaver Depth:	{4, 8, 12} Allows the user to select the Reed-Solomon interleaver depth. In Closed Net Mode, a depth of 4 or 8 may be selected.

7.3.4.3 Interface Menu

Interface / TX Setup Menu

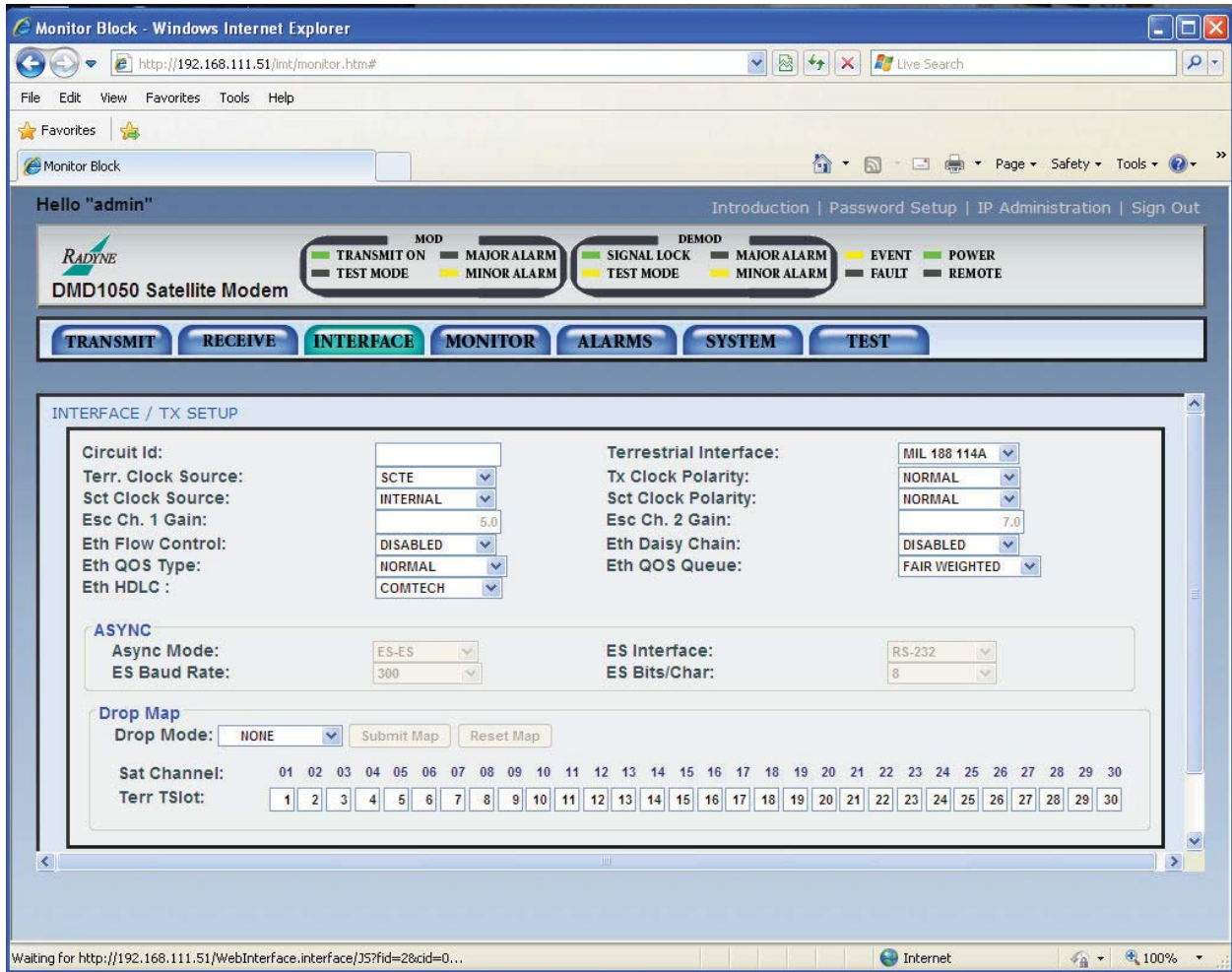


Figure 7-16. Interface / TX Setup Menu

Circuit ID : Allows the user entry of a Tx Circuit Identifier. Circuits can be given up to an 11 Character alphanumeric identity such as LINK1.

Terrestrial Interface: {MIL 188-114A, ETHERNET}
Allows the user to select the Transmit Type.

Terr. Clock Source: {SCTE, SCT}
Allows the user to select the Transmit Clock Source.

Tx Clock Polarity: {AUTO, NORMAL, INVERTED}
Allows the user to select the Clock Polarity for the Tx Terrestrial Clock relative to the Tx Data. “Auto” detects wrong polarity and automatically corrects.

SCT Clock Source:	{INTERNAL (SCT), SCR (Rx SAT CLK)} Select SCT Source to be the SCT Oscillator or the RX Satellite Clock. Rx SAT CLK is for loop timing.
SCT Clock Polarity:	{AUTO, NORMAL, INVERTED} Select the Clock Polarity for the Tx Terrestrial Clock relative to the Tx Data. "Auto" detects wrong polarity and automatically corrects.
Eth Flow Control:	{Disabled, Enabled} Disable or enable flow control. <i>Only visible when Ethernet is selected as the interface type.</i>
Eth Daisy Chain:	{Disabled, Enable} Disable the Ethernet Port Daisy Chaining or enable it on Port 2. <i>Only visible when Ethernet is selected as the interface type.</i>
ETH QOS Type	{NORMAL, PORT BASED} Select the priority hierarchy of processing an IEEE 803.0ac Tag, Ipv4 Type of Service Field/Differentiated Services Field, or Ipv6 Traffic Class Field. The Port Based priority overrides any standard priority. When operating in this mode, Port 1 has the highest priority and Port 2 has the lowest.
ETH QOS Queue	{FAIR WEIGHTD, STRICT PRIORITY} Select the queue weighting of 8, 4, 2 or 1, so that even the lowest priority traffic gets some bandwidth. Strict Priority makes sure that the higher priority traffic is transmitted before the lower priority traffic. Note: Strict Priority can limit lower priority traffic severely.
ETH HDLC	{RADYNE, COMTECH} Select Radyne HDLC or Comtech HDLC (Bridge Mode only). Note: Comtech HDLC is supported by the SLM5650A Modem.
ASYNC	
TX Async Mode:	{ES-ES, ESC ENHANCED} ES-ES is the normal IBS Async Channel. ESC Enhanced can be selected in Closed Net and uses the Overhead Signaling bytes in the IBS Overhead to pass asynchronous data.
ES Interface:	{RS-232, RS-485} Select the interface type.
ES Baud Rate:	{150 - 19200} Select the baud rate in Enhanced Async Mode. Table 3-3 shows the rates.
ES Bits/Char:	{7,8} Select 7- or 8-bit data.

Interface / RX Setup Menu

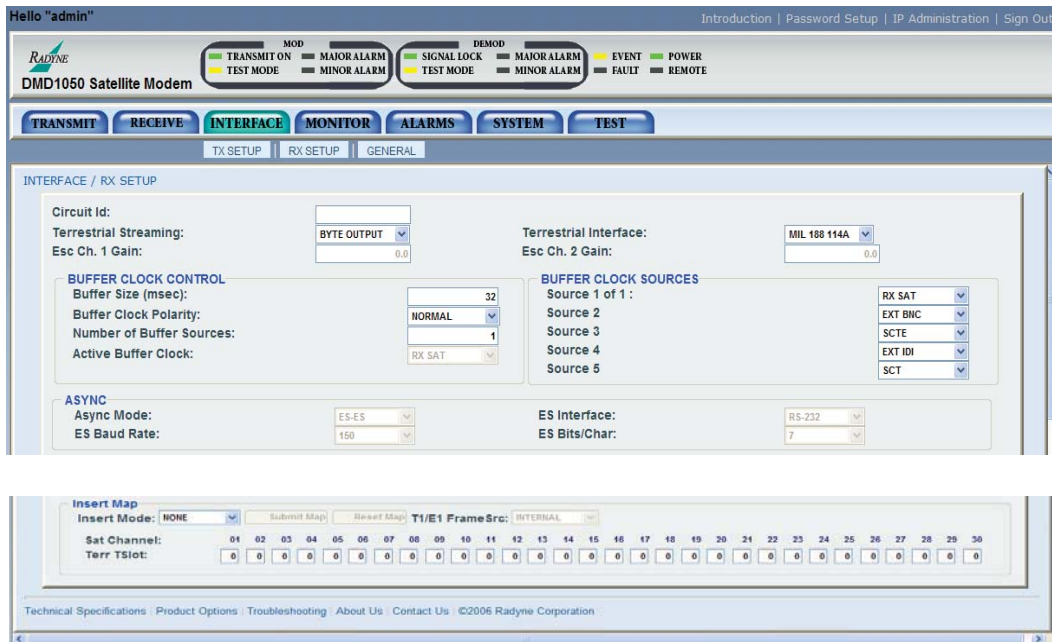


Figure 7-17. Interface / RX Setup Menu

Circuit ID: Provides entry of Rx Circuit Identifier. Circuits can be given up to an 11 Character alphanumeric Identity such as DLINK1

Terrestrial Streaming: **{BYTE OUTPUT, PACKET OUTPUT} ASI only**
 Byte output = continuous
 Packet output = burst

Terrestrial Interface: **{ETHERNET, MIL-188-114A}**
 Allows the user to select the Receive Type.

BUFFER CLOCK CONTROL

Buffer Size (msec): **{0 - 64 msec}**
 Allows the user to set the Doppler Buffer Size in msec.

Buffer Clock Polarity: **{NORMAL, INVERTED}**
 Allows the user to select the Buffer Clock Polarity for the Tx Terrestrial Clock relative to the Tx Data. If G.703 Interface is selected, this selection cannot be changed.

Number of Buffer Sources: **{1 – 5}**
 Allows the user to select up to 5 clock sources.

Active Buffer Clock: **{RXSAT, EXTBNC, SCTE, SCT, EXT IDI}**
 Shows the current active buffer clock source.

BUFFER CLOCK SOURCES**{SCTE (External), SCT (Internal), Rx Sat}****Priority {1-5}****SRC DEPTH {1-5}**

The user must assign priorities to the clock sources. 1 being the highest priority and 5 being the last resort. The menu has three fields; the first field is the name of the clock source, the second field is the priority entry area, and the last field is the depth of the list. In the priority field, the up/down arrow keys will scroll through the list displaying the names and the current priority. When the desired clock name is displayed, the number keys may be used to assign a priority value. Pressing <Enter> will re-sort the list. Do this until the clock sources are prioritized in the order desired. Use the left/right arrow keys to move the cursor to the depth field. This field assigns the number of entries to use. The number keypad or the up/down arrows can be used to change the value.

<u>Clock Source</u>	<u>Priority</u>		<u>SRC DEPTH</u>		
RX SAT	1	of	3	}	Only
SCTE	2	of	3		
SCT	3	of	3		

ASYNC**RX Async Mode: {ES-ES, ESC ENHANCED}**

ES-ES is the normal IBS Async Channel. ESC Enhanced can be selected in Closed Net and uses the Overhead Signaling bytes in the IBS Overhead to pass asynchronous data.

ES Interface: {RS-232, RS-485}

Allows the user to select the interface type.

ES Baud Rate: {150 - 19200}

Allows the user to select the baud rate in Enhanced Async Mode. Available rates are listed in Table 3-3.

ES Bits/Char: {7,8}

Allows the user to choose between 7 or 8 bit data.

Interface / General Menu

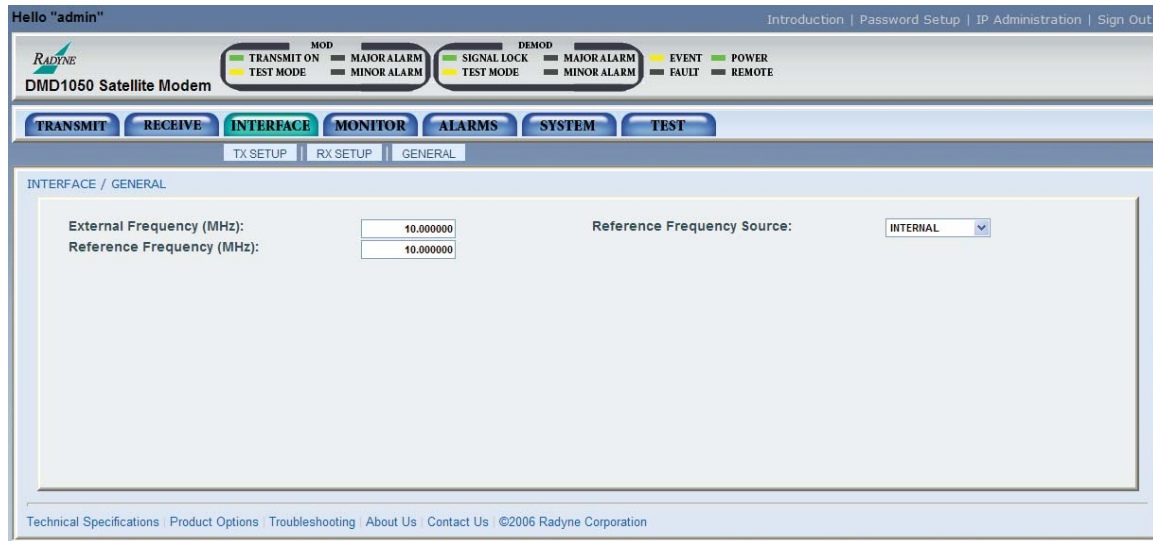


Figure 7-18. Interface / General Menu

External Frequency (MHz): {Variable Through Data Rate}
Allows the user to select the external clock frequency in MHz.

Reference Frequency Source: {EXTERNAL, HIGH STABILITY}
Allows the user to select the Frequency Reference Source.

Reference Frequency (MHz): {EXTERNAL, HIGH STABILITY}
Allows the user to select the Frequency Reference Source.

7.3.4.4 Monitor Menu

Monitor | Voltages Menu

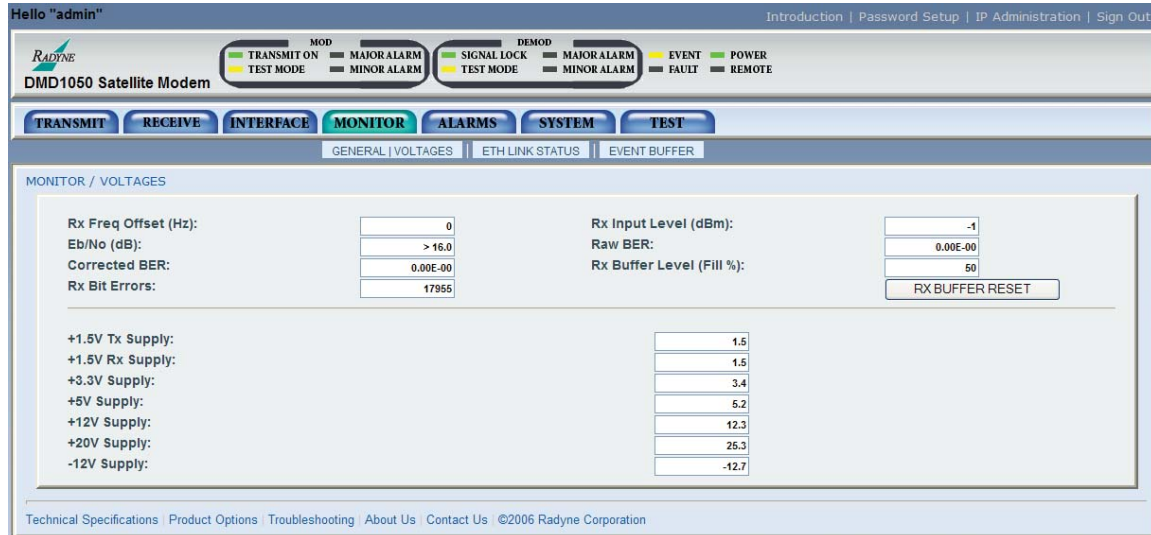


Figure 7-19. Monitor | Voltages Menu

- Rx Offset Frequency (Hz):** Displays the received carrier frequency offset as measured by the modem.
- Rx Input Level (dBm):** Displays the estimated receive signal level as seen by the Demodulator. This window is active continuously and is above the Gel Tab area.
- Eb/No (dB):** Displays the estimated E_b/N_0 as seen by the demodulator. This window is active continuously and is above the Gel Tab area.
- REMOTE EB/NO (dB)** Displays the estimated E_b/N_0 of the Remote site when configured for Radyne AUPC.
- Raw BER:** Displays the estimated channel error rate (before decoding) measured by the modem. This window is active continuously and is above the Gel Tab area.
- Corrected BER:** The CBER display shows an estimated corrected bit error rate of the modem. Depending on the symbol rate the modem is running, the high-end performance scale of this display will vary ($10 E^{-9}$, 10^{-10} or 10^{-11}). At some symbol rates, a better than scale reading will appear as 0.0×10^{-00} . At other symbol rates, it will appear as E^{**} . In either case, they both mean performance is better than the scale upper limit. This window continuously is active and is above the Gel Tab area.

Rx Buffer Level (Fill %):	{0 – 100%} Displays the status of the Doppler Buffer. This window is above the Gel Tab area.
RX Buffer Reset (ENTER)	Allows the user to re-center the Doppler Buffer when <ENTER> is pressed on the web browser screen.
Rx Bit Errors:	Displays the current error count from the Viterbi Decoder.
+1.5V TX Supply	Displays the measured voltage of the 1.5 Volt Tx power bus located inside the modem.
+1.5V RX Supply	Displays the measured voltage of the 1.5 Volt Rx power bus located inside the modem.
+3.3V Supply	Displays the measured voltage of the +3.3 Volt power bus located inside the modem.
+5V Supply	Displays the measured voltage of the +5 Volt power bus located inside the modem.
+12V Supply	Displays the measured voltage of the +12 Volt power bus located inside the modem.
+20V Supply	Displays the measured voltage of the +20 Volt power bus located inside the modem.

Monitor / Eth Link Status Menu

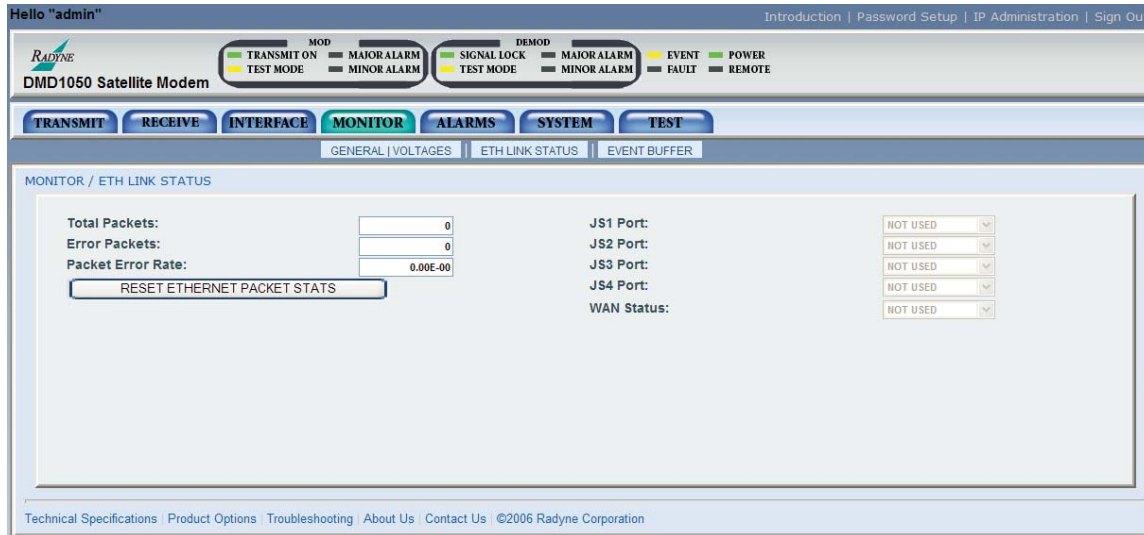


Figure 7-20. Monitor / ETH Link Status Menu

- Total Packets:** Displays the total number of Ethernet packets received from the satellite (*Only visible when Ethernet is selected as the interface type*).
- Error Packets:** Displays the number of erred Ethernet packets received from the satellite (*Only visible when Ethernet is selected as the interface type*).
- PKT Error Rate:** Displays the satellite Packet Error Rate (*Only visible when Ethernet is selected as the interface type*).
- Reset Ethernet Packet Stats:** Allows the user to reset the Ethernet packet statistics by pressing this button (*Only visible when Ethernet is selected as the interface type*).

The status of the following ports may be one of the following:



- Down: The link is down.
- Unresolved: Unable to agree on connection speed.
- 10 Mbps Half: Connected at 10 Base-T Half Duplex.
- 10 Mbps Full: Connected at 10 Base-T Full Duplex.
- 100 Mbps Half: Connected at 100 Base-T Half Duplex.
- 100 Mbps Full: Connected at 100 Base-T Full Duplex.
- Unused: The port is not available.

PORT 1 STATUS

{See the note above}

Displays the current status of LAN Port 1.

PORT 2 STATUS

{See the note above}
 Displays the current status of LAN Port 2.

WAN STATUS

{See the note above}
 Displays the current status of the WAN Port.

Event Menu

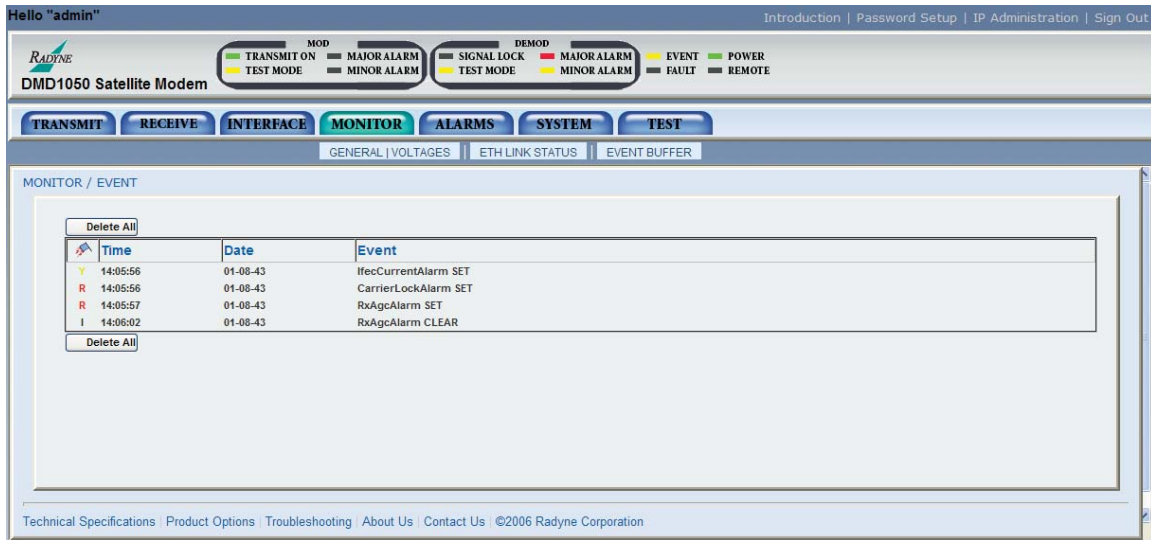


Figure 7-21. Event Menu

Delete All: Cleans the entire event buffer.

Event Type:

- I Informational
- Y Yellow alarm. Indicates a transmit or receive warning condition.
- R Red alarm. Indicates a transmit or receive failure, losing traffic.



The Event Buffer may be sorted by warning level, time, date, or event description. This feature may be used to further investigate event occurrences.

7.3.4.5 Alarms Menu

Alarms / Transmit Menu



Figure 7-22. Alarms /Transmit Menu

MAJOR ALARMS

- FPGA Config:** {Pass/Fail, Unmasked/Masked}
Indicates a transmit FPGA configuration failure.
- DSP Config:** {Pass/Fail, Unmasked/Masked}
Indicates a transmit DSP configuration failure.
- Sct Clock PLL:** {Pass/Fail, Unmasked/Masked}
Indicates that the Tx SCT Clock PLL is not locked. This alarm will flash on during certain modem parameter changes. A solid indication points toward a configuration failure within the modem.
- Sym Clock PLL:** {Pass/Fail, Unmasked/Masked}
Indicates that the Tx Symbol Clock PLL is not locked. This alarm will flash on during certain modem parameter changes. A solid indication points toward a problem with the incoming clock to the modem (SCTE).
- LB Synth PLL:** {Pass/Fail, Unmasked/Masked}
Indicates that the Tx L-Band Synthesizer is not locked. This alarm will flash on during certain modem parameter changes. A solid indication points toward a configuration problem within the modem.

Ethernet WAN**{Pass/Fail, Unmasked/Masked}**

Indicates that the interface card is faulted and will not pass data
(displays only when the Ethernet Card is installed and the Ethernet Interface is selected).

MINOR ALARMS**Terr Clock Act:****{Pass/Fail, Unmasked/Masked}**

Indicates no Terrestrial Clock activity.

Terr Data Act:**{Pass/Fail, Unmasked/Masked}**

Indicates no Tx Data activity.

Terr AIS:**{Pass/Fail, Unmasked/Masked}**

Indicates that AIS has been detected in the Tx Data Stream.

DVB Frame Lock:**{Pass/Fail, Unmasked/Masked}**

Indicates that Tx input data stream framing does not match the user selected TX TERR FRAMING.

RESET LATCHED ALARMS:

Clicking on this button will reset (Clear) all Latched Alarms

FORCE ALARM TEST:

Clicking on this button will force alarms

Alarms / Receive Menu



Figure 7-23. Alarms / Receive Menu

MAJOR ALARMS

FPGA Config:	{Pass/Fail, Unmasked/Masked}
Indicates a receive FPGA hardware failure.	
DSP Config:	{Pass/Fail, Unmasked/Masked}
Indicates a receive DSP failure.	
Signal Lock:	{Pass/Fail, Unmasked/Masked}
Indicates that the demod is unable to lock to a signal.	
Input Level;	{Pass/Fail, Unmasked/Masked}
Indicates Rx signal level has fallen below input threshold.	
Frame Lock:	{Pass/Fail, Unmasked/Masked}
Indicates that the Framing Unit is unable to find the expected framing pattern.	
MFrameLock:	{Pass/Fail, Unmasked/Masked}
This alarm will flash on during certain modem parameter changes. A solid indication points toward a problem with the incoming clock to the modem (SCTE).	
LB Synth PLL:	{Pass/Fail, Unmasked/Masked}
Indicates that the Rx L-Band Synthesizer is not locked. This alarm will flash on during certain modem parameter changes. A	

solid indication points toward a configuration problem within the modem.

Ethernet WAN:	{Pass/Fail, Unmasked/Masked} Indicates that the interface card is faulted and will not pass data (<i>displays only when the Ethernet Card is installed and the Ethernet Interface is selected</i>).
MINOR ALARMS	
Buffer Underflow:	{Pass/Fail, Unmasked/Masked} Indicates that a Doppler Buffer underflow has occurred.
Buff Near Empty:	{Pass/Fail, Unmasked/Masked} Indicates that the Doppler Buffer is about to underflow.
Buff Near Full:	{Pass/Fail, Unmasked/Masked} Indicates that the Doppler Buffer is about to overflow.
Buffer Overflow:	{Pass/Fail, Unmasked/Masked} Indicates that a Doppler Buffer overflow has occurred.
Rx Data Activity:	{Pass/Fail, Unmasked/Masked} Indicates that there is no Rx Data activity.
Satellite AIS:	{Pass/Fail, Unmasked/Masked} Indicates that AIS has been detected in the receive satellite data stream.
IFEC Lock:	{Pass/Fail, Unmasked/Masked} Indicates that the Framing Unit is unable to find the expected framing pattern.
OFEC Lock	: {Pass/Fail, Unmasked/Masked} Indicates that the Reed-Solomon Decoder is not locked.
Interleaver:	{Pass/Fail, Unmasked/Masked} Indicates that the Reed Solomon Interleaver is not synchronized.
RS Uncorr. Word:	{Pass/Fail, Unmasked/Masked} Indicates status of the Reed Solomon uncoded word fault.
Ebno:	{Pass/Fail, Unmasked/Masked} Indicates that the Eb/No is outside of limits.
Rx Level:	{Pass/Fail, Unmasked/Masked} Indicates if Rx level is below allowable limits.
IBS BER:	{Pass/Fail, Unmasked/Masked} Indicates that there are more than one in 1000 bits in error in IBS Mode.
DVB Frame Lock:	{Pass/Fail, Unmasked/Masked} Indicates that the Rx Satellite Data Stream Framing is not DVB.

RESET LATCHED ALARMS Clicking on this button will reset (Clear) all Latched Alarms

FORCE ALARM TEST Clicking on this button will force alarms.

Alarms / Common Menu



Figure 7-24. Alarms / Common Menu

COMMON ALARMS

- Terr FPGA Cfg:** {Pass/Fail, Unmasked/Masked}
Indicates an Interface Card FPGA configuration failure.
- Codec FPGA Cfg:** {Pass/Fail, Unmasked/Masked}
Indicates Turbo Codec Card FPGA configuration failure.
- Codec Dev Cfg:** {Pass/Fail, Unmasked/Masked}
Indicates Turbo Codec Card ASIC configuration failure.
- ExtRef Activity:** {Pass/Fail, Unmasked/Masked}
Indicates External Reference Activity failure.
- ExtRef Lock:** {Pass/Fail, Unmasked/Masked}

VOLTAGE ALARMS

- +1.5V RX Supply** {Pass/Fail, Unmasked/Masked}
Displays the measured voltage of the 1.5 Volt Rx power bus located inside the modem.
- 1.5V TX Supply** {Pass/Fail, Unmasked/Masked}
Displays the measured voltage of the 1.5 Volt Tx power bus located inside the modem.

- +3.3V Supply** {Pass/Fail, Unmasked/Masked}
Displays the measured voltage of the +3.3 Volt power bus located inside the modem.
 - +5V Supply** {Pass/Fail, Unmasked/Masked}
Displays the measured voltage of the +5 Volt power bus located inside the modem.
 - +12V Supply** {Pass/Fail, Unmasked/Masked}
Displays the measured voltage of the +12 Volt power bus located inside the modem.
 - +24V Supply** {Pass/Fail, Unmasked/Masked}
Displays the measured voltage of the +24 Volt power bus located inside the modem.
- RESET LATCHED ALARMS** Clicking on this button will reset (Clear) all Latched Alarms

Alarms / Backwards Menu

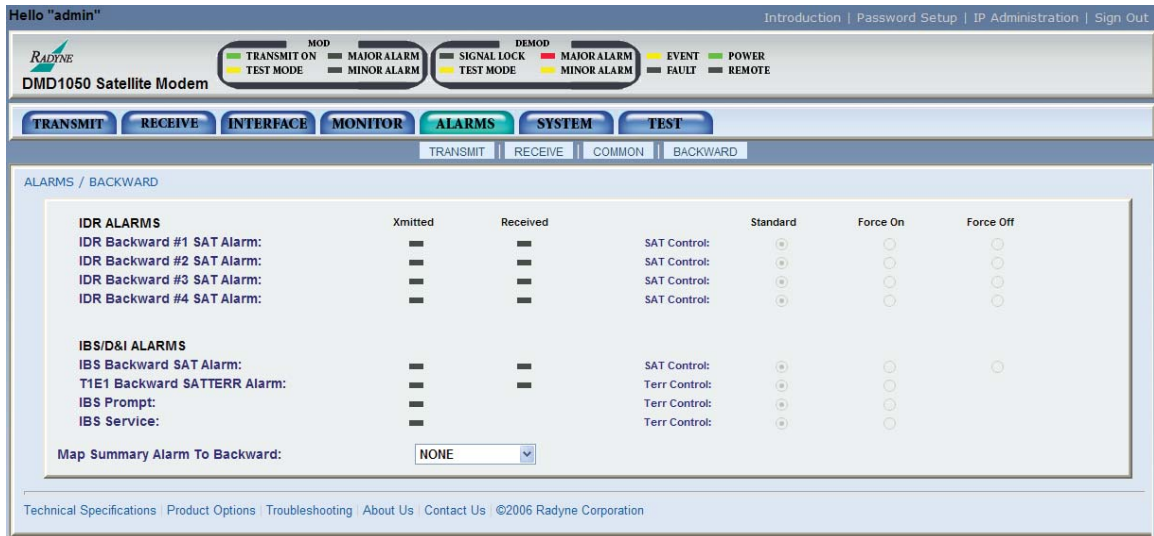


Figure 7-25. Alarms / Backwards Menu



IBS and IDR Backward Alarms are only available via User Interface i.e. Web Browser, SNMP, Terminal Screens and RLLP. There are no physical contacts available for the backward alarms.

IDR ALARMS

IDR Backwards #1

SAT Alarm: {Pass/Fail, Unmasked/Masked}

IDR Backwards #2
SAT Alarm: {Pass/Fail, Unmasked/Masked}

IDR Backwards #3
SAT Alarm: {Pass/Fail, Unmasked/Masked}

IDR Backwards #4
SAT Alarm: {Pass/Fail, Unmasked/Masked}

IBS ALARMS

IBS Backward
SAT Alarm: {Pass/Fail, Unmasked/Masked}

SATTERR Alarm: {Pass/Fail, Unmasked/Masked}

IBS Prompt: {Pass/Fail, Unmasked/Masked}

IBS Service: {Pass/Fail, Unmasked/Masked}

7.3.4.5.1 System Menu

System / Terminal / Remote Menu

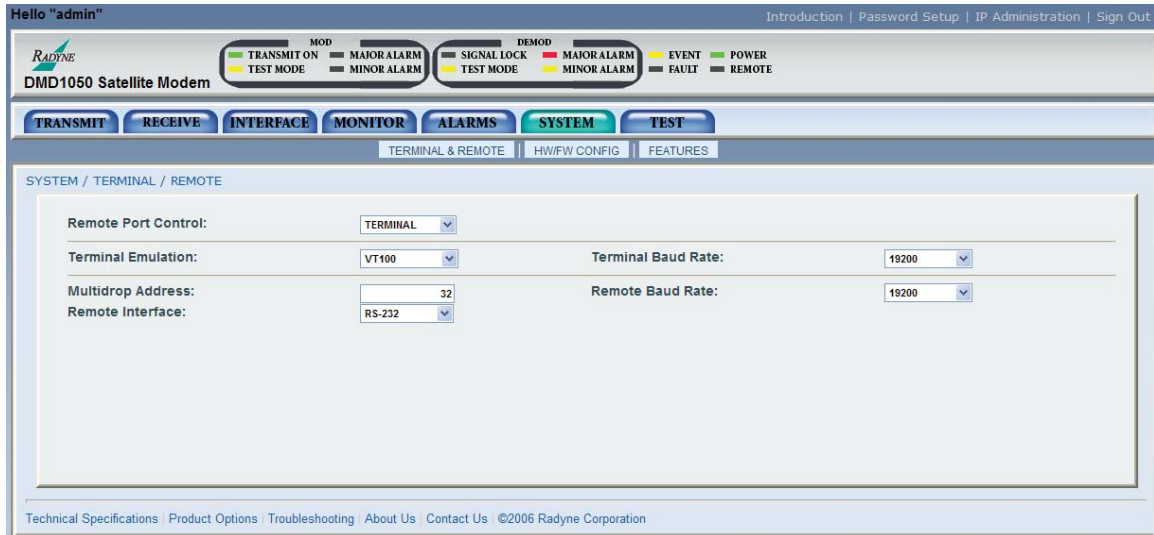


Figure 7-26. System / Terminal / Remote Menu

Remote Port Control	{ TERMINAL, COMPUTER }
	Allows the user to select between terminal RS-232 control and remote port M&C RS-232/-485 control.
Terminal Emulation:	{ VT-100, WYSE50, VT100 }
	Allows the user to select the emulation type.
Terminal Baud Rate:	{ 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 }
	Allows the user to enter the terminal baud rate.
Multidrop Address:	{ 32 - 255 }
	Allows the user to enter the Remote Port Multidrop Address.
Remote Interface:	{ RS-232, RS-485 }
	Allows the user to enter the Remote Port interface type.
Remote Baud Rate:	{ 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38,400, 57,600, 115200 }
	Allows the user to enter the Remote Port Baud Rate.

System / HW-FW Configuration Menu

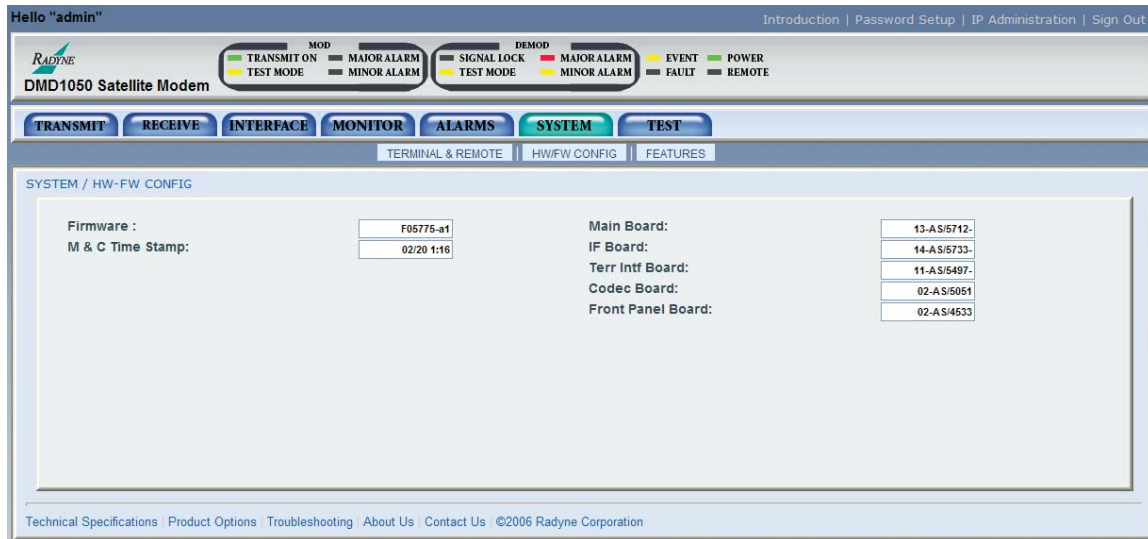


Figure 7-27. System / HW-FW Configuration Menu

Firmware Revision:	Displays the installed firmware revision.
M&C Revision:	Displays the installed Monitor and Control revision.
Main Board:	Indicates the Radyne part number for the Baseband Board Assembly.
IF Board:	Indicates the Radyne part number for the IF Board Assembly.
Terr Intf Board:	Indicates the Radyne assembly number for the Terrestrial Interface Assembly.
Codec Board:	Indicates the Radyne part number for the Codec Board.

System / Features Menu

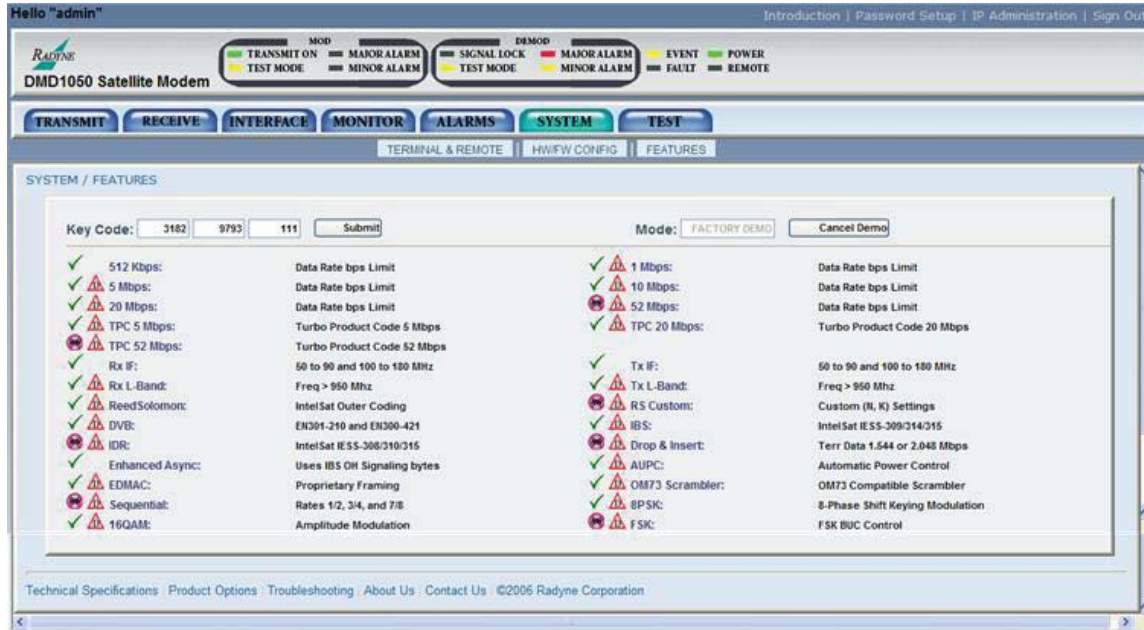







Figure 7-28. System / Features Menu

The Web Browser menu allows viewing of actively enabled features. Each feature displays a series of symbols that describe feature status. The following symbols indicate:

	Installed
	No hardware available. Requires hardware for upgrade.
	Feature is in Demo Mode and will expire.
	Key Code Required
	Call customer service. Feature is enabled for customer use, but the DMD1050 hardware required has not been detected or has failed.

Features upgrades can also be implemented through the Web Browser interface.

7.3.4.6 Test Menu

Test Pattern | Carrier Menu

Technical Specifications | Product Options | Troubleshooting | About Us | Contact Us | ©2006 Radyne Corporation

Figure 7-29. Test Pattern | Carrier Menu



Usage of the modems loopback capabilities in conjunction with the Ethernet data interface can produce undesirable network loops. In order to run any type of data test with an Ethernet interface you must utilize two modems connected back to back. Simply using one modem and a loopback will not produce the desired results.

- Tx Test Pattern:** {NONE, 2047, 2¹⁵-1, 2²³-1}
Allows the user to enable the transmit test patterns listed above.
- Rx Test Pattern:** {NONE, 2047, 2¹⁵-1, 2²³-1}
Allows the user to enable the receive test pattern listed above.
- Rx Pattern Sync:** {YES, NO}
Yes indicates that the received test pattern is in sync.
- Loopback Type:** {NONE, TERR RX, BASEBAND RX, TERR TX, BASEBAND TX, IFEC TX, IF, BASEBAND RX/TX}
- Pattern Ber:** {NO SYNC, nnnn x 10ⁿ}
Displays the measured Bit Error Rate for the received test pattern.

Pattern Error Count: {NO SYNC, nnnn x 10ⁿ}
Displays the number of errors detected by the test pattern checker.

Carrier Type: {NORMAL, CW, DUAL, OFFSET POS FIR, NEG FIR}

RESTART TEST PATTERN:
Click to reset the test pattern counter and generator.

Test / IQ Plot Menu

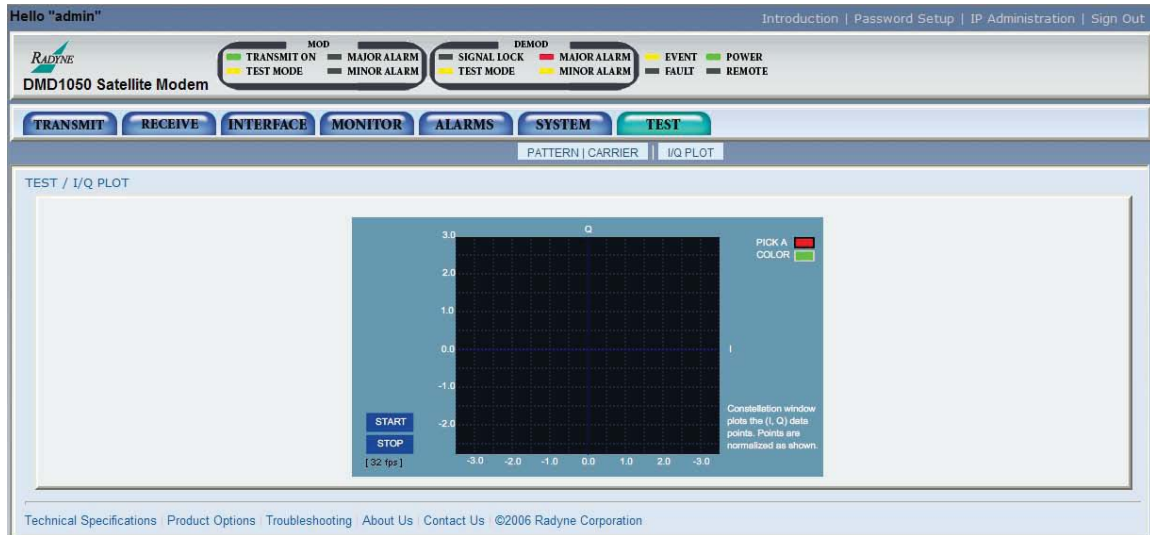


Figure 7-30. Test / IQ Plot Menu

PICK A COLOR: {RED, GREEN}

START: {}
Allows the user to run I/Q Plot by clicking Start.

STOP: {}
Allows the user to terminate the I/Q Plot by clicking Stop.

Appendix A. Product Options

A.1 Hardware Options

The following enhanced interface cards are available.

A.2 Internal High-Stability

The DMD1050 can be equipped with a $\pm 5 \times 10^{-8}$ or better Stability Frequency Reference as an add-on enhancement. This is a factory upgrade only.

A.3 Customized Options

The DMD1050 may be customized for specific customer requirements. Most modifications or customization can be accomplished by means of firmware/software modifications. The following are examples of the types of customization available to the user:

- Customized Data Rates.
- Customized Scrambler/Descramblers.
- Customized Overhead Framing Structures.
- Customized Modulation Formats.

Contact the Comtech EF Data Customer Service or Sales Department at (480) 333-4357 for all requests.

Appendix B. Carrier Control

B.1 States

The DMD1050 transmitter will turn off the carrier output automatically when the modem determines there is a major alarm. This is done to prevent the carrier from outputting an unknown spectrum and possibly disturbing adjacent carriers. This automatic drop of the carrier can be overridden by masking the alarm that is causing the fault. This will keep the modulator output spectrum transmitting, even when the fault occurs. The following Carrier Control states are available:

- Carrier **OFF**
- Carrier **ON**
- Carrier **AUTO**
- Carrier **VSAT**
- Carrier **RTS**

B.2 Carrier Off

Modulator output is disabled.

B.3 Carrier On

Modulator output is turned off before reprogramming modulator functions that may alter the output spectrum through the front panel, and the user is required to enter “Yes” to re-enable output after the change. When using the terminal, the modulator is turned off while reprogramming modulator functions that may alter the output spectrum, and the user is required to manually turn on the output after the reprogramming.

B.4 Carrier Auto

Modulator output is turned off before reprogramming modulator functions that may alter the output spectrum through the front panel, but the output is automatically turned on after the change. When using the terminal, the modulator is turned off while re-programming modulator functions that may alter the output spectrum, and but the output is automatically turned on after the change.

B.5 Carrier VSat

Modulator output is turned off before reprogramming modulator functions that may alter the output spectrum through the front panel, and the user is required to enter “Yes” to re-enable output after the change. When using the terminal, the modulator is turned off while re-programming modulator functions that may alter the output spectrum, and the user is required to manually turn on the output after the reprogramming (same as “Carrier On”). Additionally “VSat” mode disables the modulators output is the modems demodulator does not have signal lock. When signal lock returns to the demodulator, the modems modulator turns the carrier back on.

B.6 Carrier RTS

Modulator output is turned off before reprogramming modulator functions that may alter the output spectrum through the front panel, and the user is required to enter “Yes” to re-enable output after the change. When using the terminal, the modulator is turned off while re-programming modulator functions that may alter the output spectrum, and the user is required to manually turn on the output after the reprogramming (same as “Carrier On”). Additionally “RTS” (Request To Send) mode enables the modulator’s output based on the RTS lead of the data interface. When RTS is enabled on the data interface, the modulator turns on the carrier, when the RTS is disabled the modulator turns off the carrier.

Appendix C. TCP/IP Ethernet Setup

C.1 Introduction

The modem supports SNMP, FTP protocols and the Web Browser. Utilization of the protocols is dependent upon proper set up of the TCP-IP menus. This document is to be used only as a guideline for setting up the TCP-IP menus. Contact the IT manager for proper guidance to ensure setup is successful. For additional information on the various WEB or SNMP configurations and descriptions refer to the Remote Protocol Manual (TM117).

C.2 TCP/IP Network Configuration

Using the Front Panel display and arrow keys, scroll thru the System menu until the TCP / IP sub menu is displayed. Each unit requires proper configuration with the correct network settings. Contact the IT manager for a valid IP address mask, Modem, server and router IP addresses.

Enter into the TCP / IP menu and the following Sub menus will appear, however the order may vary.

1. **Boot Mode:** This allows for the selection of the operating boot mode for the TCP / IP. Several selections are available and are described below. When configuring the modem for Web Browser, Boot Mode must be set to “NON-VOL”. A brief description of the available selections are:
 - a. **Default:** If the Ethernet interface is not to be used, select this mode. No IP Address or mask changes will be allowed while in this mode of operation. The following parameters will be set and will not change until the boot mode is changed. The IP addresses are non accessible addresses.

• IP MASK	255.000.000.000
• MODEM IP ADDR	010.000.000.001
• SERVER IP ADDR	010.001.001.001
• ROUTER IP ADDR	010.000.001.001
 - b. **BOOTp:** When enabled, at boot time, the modem will use the Bootp Protocol to automatically get names, masks, and IP Addresses of the modem, router, and server from the Network Manager. This should be consistent with the tag expected by the users

Bootp Server (see the next menu selection for setting the BOOTp TAG). If Bootp is not enabled, the modem will ignore the BOOTp Tag setting.

- c. **NON-VOL:** This will allow for setting up all required IP Addresses and will store the information to the non-volatile memory. Upon power cycle, the modem will restore the saved settings into the correct fields.
- d. **IP TEST:** The IP Test selection is similar in behavior to the Default selection. When enabled, the following preset parameters will be programmed and will not change until the selection is changed. To edit these parameters, change the boot mode to NON-VOL.

▪ IP MASK	255.255.255.000
▪ MODEM IP ADDR	192.168.000.238
▪ SERVER IP ADDR	192.168.000.101
▪ ROUTER IP ADDR	192.168.000.102



The DMD1050 is shipped from the factory with the Boot Mode configured as Default. Verify that the Boot Mode is set for Default. To access the unit via the Ethernet port, set the selection to IP TEST. This will set the IP parameter to an accessible address. If user wants to utilize an alternate address, user must set the selection to NON-VOL. As an example, we will use a new modem IP address of 172.018.100.205 for the remaining of the TCP-IP setup procedure. Contact the IT manager for proper guidance to ensure setup is successful.

2. **BOOT SERVER TAG:** This allows for the selection of the operating boot tag when operating in the BOOTp Mode. The default setting of 206 is automatically selected when the boot mode is set to 'DEFAULT' (factory preset mode).
3. **MODEM HOST:** This displays the unit Host name that is operating, such as "DMD20". This is a read only display.
4. **IP ADDR MASK:** This will allow for the entry of the IP Address Mask. This will need to be entered based on the Network settings. Refer to your IP Administrator if you do not know this address for the correct address setting. Example IP Address Mask setting: 255.255.000.000.
5. **MODEM IP ADDR:** This will allow for the entry of the Modem's individual network IP Address. Each device on the network will have a unique address. Refer to the IT administrator for the correct address setting. Example Modem IP Address setting: 172.018.100.215.
6. **SERVER IP ADDR:** This allows for the setup of the Network Server IP Address. This section refers to the Host that will be used to optionally boot the DMD20 on power-up and is the SNMP Trap Server. This IP Address needs to be consistent with the Modem IP Address. Broadcast and loop back addresses will not be allowed. Example Server IP Address setting: 172.018.004.250.
7. **ROUTER IP ADDR:** This allows for the setup of the Network Router IP Address. If a router is present on the local network, and it is to be used, this address must be consistent with the IP Address Mask and the subnet of the modem. If no router is present, then the address should be set to a foreign address. Broadcast and loop back addresses will not be allowed. Router not used example: Router IP Address setting: 010.000.001.001.

8. **MODEM EADDR:** This displays the Modem (Unit) Ethernet Address. The Modem Ethernet Address is configured at the factory. It is a unique Radyne equipment identifier Address.
Example: 0010650903EB
9. **ETHER RATE:** This displays the current Ethernet port data rate. If multiple rates are available, then a selection can be made to specify the Ethernet port data rate (10BaseT). Example Ethernet port Data Rate: 10 MBPS/HD

C.3 Network Configuration Summary

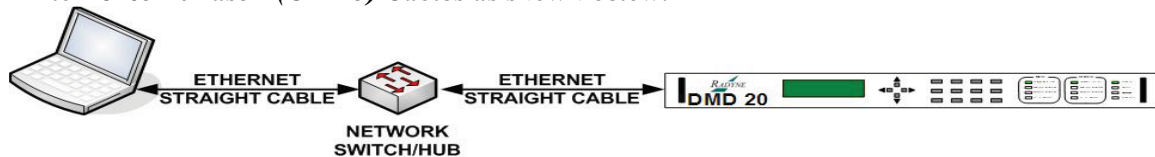
If the above steps were followed and the information was entered, then the following would be the TCP / IP configuration summary for a 'no router specified' setup:

1. Boot Mode = NON-VOL
2. Bootp Server Tag = 206
3. Modem Host= DMD20
4. IP Address Mask = 255.255.0.0
5. Modem IP Address = 172.18.100.215
6. Server IP Address = 172.18.4.250
7. Router IP Address = 010.000.001.001
8. Modem Ethernet Address= 0010650903EB
9. Ethernet Rate = 10 MBPS/HD

C.4 Ethernet Test

Connecting the Modem Ethernet Cable to a Network Link

1. *Connect the Network Switch (Hub) to the Modem Ethernet port (J9) using standard RJ-45 to RJ-45 10BaseT (CAT-5) Cables as shown below.*



NETWORK TYPE CONNECTION

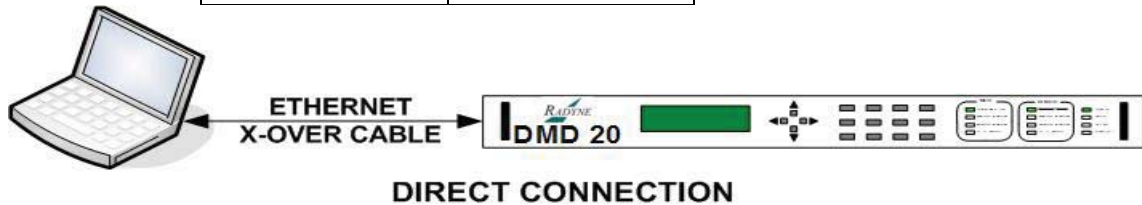
DMD20 Ethernet Network Connection

Connecting the Modem Ethernet Cable Directly to a Computer (without a Network)

You can connect to the equipment directly without connecting to a network. This occurs at remote sites where a network is not available. Use an Ethernet Crossover (Null) cable to connect directly.

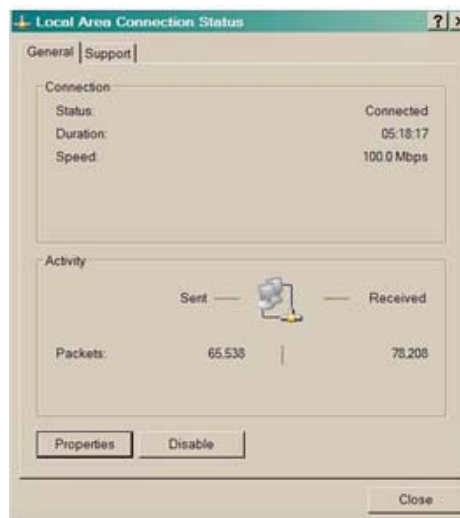
The pinout for this Ethernet Crossover (Null) cable is as follows:

RJ45 Connector A	RJ45 Connector B
Pin #1	Pin #3
Pin #2	Pin #6
Pin #3	Pin #1
Pin #4	Pin #4
Pin #5	Pin #5
Pin #6	Pin #2
Pin #7	Pin #7
Pin #8	Pin #8



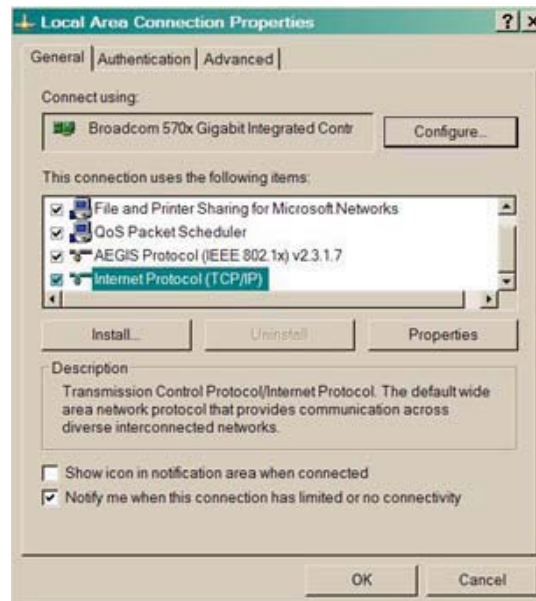
The Computer TCP/IP must be properly configured in order to obtain connectivity. The following set-up procedure can be used as a guide to aide in this setup. The following instructions apply only to Windows 2000 or XP Classic.

1. Click on the Start Button. Select Settings and click on the Control Panel Icon. Double click the Network Connections Icon.
2. Select the Local Area Connection icon for the applicable Ethernet adapter. Usually it is the first Local Area Connection listed. Double click the Local Area Connection. Click on the Properties icon.



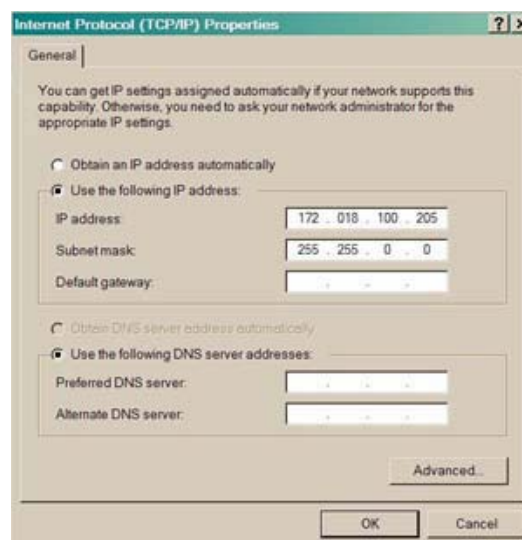
Local Area Connection Status Box

3. Make sure that the box next to the Internet Protocol (TCP/IP) is checked. Highlight Internet Protocol (TCP/IP) and click on the Properties button.



Local Area Connection Properties Box

4. Select “Use the following IP Address”. Enter in the IP Address that is offset by 5 or so numbers from the equipment address (the computer and the equipment that it is connecting to can not have identical addresses) and Subnet Mask (this is identical to the subnet mask programmed into the equipment) into the corresponding fields. Click the OK button to complete the PC Configuration. Note: some computers may require that the computer be restarted for the changes to take effect.



Internet Protocol (TCP/IP) Properties Box

5. To reconnect the computer to a network, select the “Obtain an IP address automatically” selection in the screen shown above.

C.5 Testing the Ethernet Connection using the Ping Program (Optional)

To verify that connectivity and settings are correct, use the Ping command to report if the Host (Equipment) is correctly responding. This is accomplished by opening the MSDOS Command Prompt and executing a Ping command as shown in the following example.

1. Open MSDOS Command Prompt. The Screen will display:

```
Microsoft Windows XP [Version 5.1.2600]  
(C) Copyright 1985-2001 Microsoft Corp.
```

2. At the Command Prompt Enter “ping 172.18.100.215” (Enter the IP Address of the equipment to be tested). The screen will display:

```
Microsoft Windows XP [Version 5.1.2600]  
(C) Copyright 1985-2001 Microsoft Corp.
```

```
C:\> ping 172.18.100.215
```

3. If the ping is successful the screen will display:

```
C:\>ping 172.18.100.215
```

```
Pinging 172.18.100.215 with 32 bytes of data:
```

```
Reply from 172.18.100.215: bytes=32 time=109ms TTL=64  
Reply from 172.18.100.215: bytes=32 time<1ms TTL=64  
Reply from 172.18.100.215: bytes=32 time=2ms TTL=64  
Reply from 172.18.100.215: bytes=32 time=123ms TTL=64
```

```
Ping statistics for 172.18.100.215:
```

```
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

```
Approximate round trip times in milli-seconds:
```

```
Minimum = 0ms, Maximum = 123ms, Average = 58ms
```

4. If the ping is unsuccessful the screen will display:

```
C:\>ping 172.18.100.215
```

```
Pinging 172.18.100.215 with 32 bytes of data:
```

```
Request timed out.
```

```
Request timed out.
```

```
Request timed out.
```

```
Request timed out.
```

```
Ping statistics for 172.18.100.215:
```

```
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

Check the following items that may lead to the unsuccessful response:

- a. Verify that the correct cables are connected to the Ethernet port and that they are secured.
- b. The Link Light is illuminated.
- c. The IP Address that is used matches the Modem's IP Address.
- d. The Server and Modem are on the same subnet.

Appendix D. Web Browser Setup Guide

D.1 Introduction

This section provides quick setup instructions to access the Web Browser through the RJ45 Ethernet interface. The Web user interface allows for complete monitoring and control of all modem parameters and functions via a 10BaseT Ethernet connection. For more details on the various WEB configurations and a description of all the available selections, please refer to the manuals.

D.2 Required Items

- Modem
- RJ45 to RJ45 crossover cable
- Computer
- Default Plug/Jumper if needed for (JP5 & JP6)

D.3 Web Interface Setup Guidelines

D.3.1 Preparing the DMD1050 for Web Setup

The unit is shipped from the factory with the IP addresses pre-configured to an accessible IP address known as IP TEST MODE (see below). If user has difficulty accessing the Web Browser interface, then it is recommended that the user install the Default Jumper/Plug that will change the IP addresses to an accessible address. To reset IP addresses, user must install the Default Plug between pins 1 & 2 on JP5 and JP6. Jumpers are supplied in the connector kit. This will change the IP network setting that the user can access.

1. Turn off power to the DMD1050.
2. Install the Reset jumper between pins 1 & 2 of JP5 and JP6 connector. Refer to figure 4-5 for jumper location.

3. Turn on power to the DMD1050 and allow it to run for 2 minutes.
4. Turn off power and remover the Reset mating connector from JP5 & JP6.
5. The IP addresses are now configured to the following:

Boot Modes:	IPTEST
Bootp Server Tag:	206
IP Address Mask:	255.255.255.000
Modem IP Address:	192.168.0.238
Server IP Address:	192.168.000.101
Router IP Address:	192.168.000.102

6. In order for the computer to recognize the modem, the computers subnet Mask must match the Subnet Mask of the modem. The IP Address Mask is 255.255.255.000. To ensure the safety of the network, it may be necessary to contact the network administrator.
7. Turn on the unit. The unit is now ready to connect to the computer. Connect the RJ45 cable from the DMD1050 to the computer/router/bridge as illustrated in Figure D-1.

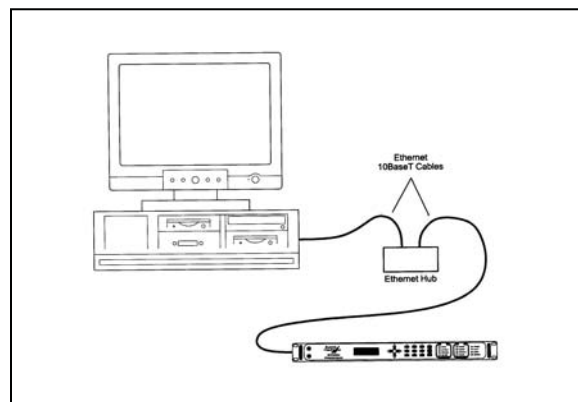


Figure D-1. Ethernet Connection

8. Initiate PING test to ensure there is communication between the modem and the computer

Example: ping 192.168.0.238

If everything is functioning correctly, replies from the modem will appear on the computer screen along with the time it took to respond. If unsuccessful, verify the following:

- A. The cables are secured.
- B. The Link Light is illuminated.
- C. The IP Address that is used matches the Modem's IP Address.
- D. The Server and Modem are on the same subnet.

- Start the Internet browser on the computer and enter the IP Address 192.168.0.238 in the address field then press the Enter key per Figure D-2.



Figure D-2. Internet Browser Address

- The Web Browser should be displayed on your computer screen. The modem index page will be displayed per Figure D-3. No special access is required. General information on the modem, features, capabilities, and available options are listed. Complete technical specifications and product options are also available in a PDF format.

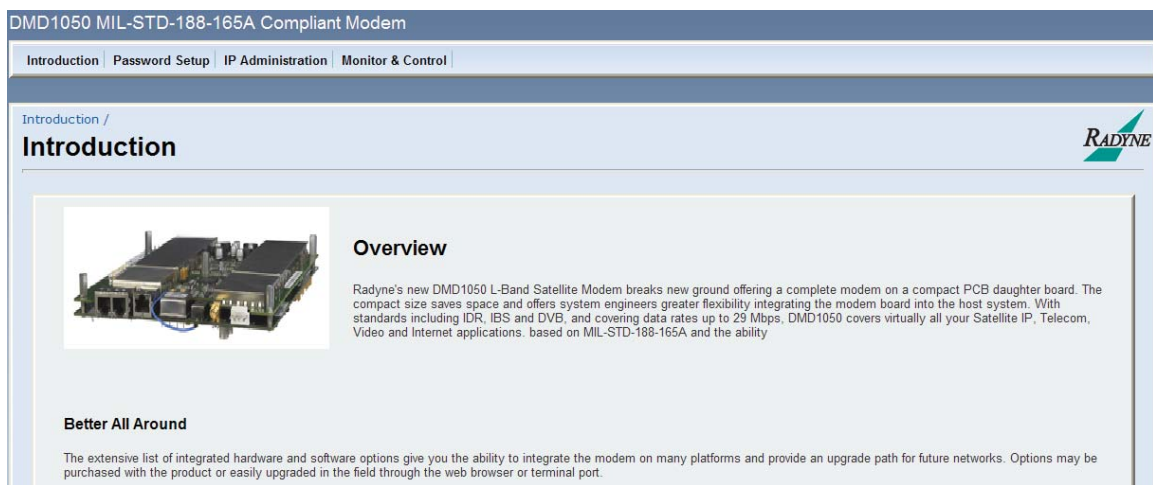


Figure D-3. Web Browser - Modem Introduction Page

- To navigate other parts of the site, the modem needs to know who the user is. Upon selecting any of the commands, the modem will request an authentication from the user. This authentication is done through the use of a username and secret password. The DMD1050 is initially configured with the following defaults as illustrated in Figure D-4.

User Name: admin
 Password: admin

Figure D-4. Password Setup Screen



The modem offers addition features that allow for specific administrative privileges for various users. Please refer to section 3.3 for additional information.

12. This concludes the initial set up that gives full access to the modem. If you need to change the IP Addressing to support a different network, then proceed to section 3.1.

D.4 IP Network Change from the Initial Web Setup

D.4.1 Configuring the modem

This section is a continuation from the initial setup or can be used on an existing system that requires a network setup change. The modem needs to be configured with the correct network settings. Please consult with your IT manager for an IP address mask, and modem, server, and router IP addresses valid for your network. To recognize a subnet, each system in the subnet must have the same subnet mask. This field should be set before changes are made to the Modem or Router Address. Refer to Figure D-5.

1. Configure the modem first with the new subnet addresses. From the modem introduction page, click the IP ADMINISTRATION tab located on the top of the screen.
2. Enter your username and password on the logon popup, and then press the Enter key.
3. Change the Boot Mode to NON-VOL. Change IP addresses, and subnet mask to the recommended settings and click on the Save button to accept the changes
4. (refer to section 3.2.2 for Boot Mode descriptions).



NON-VOL: Stores and uses IP Mask and addresses as provided by the user.

5. Click on the Cancel button at any time to abort and reload the current modem IP network settings.

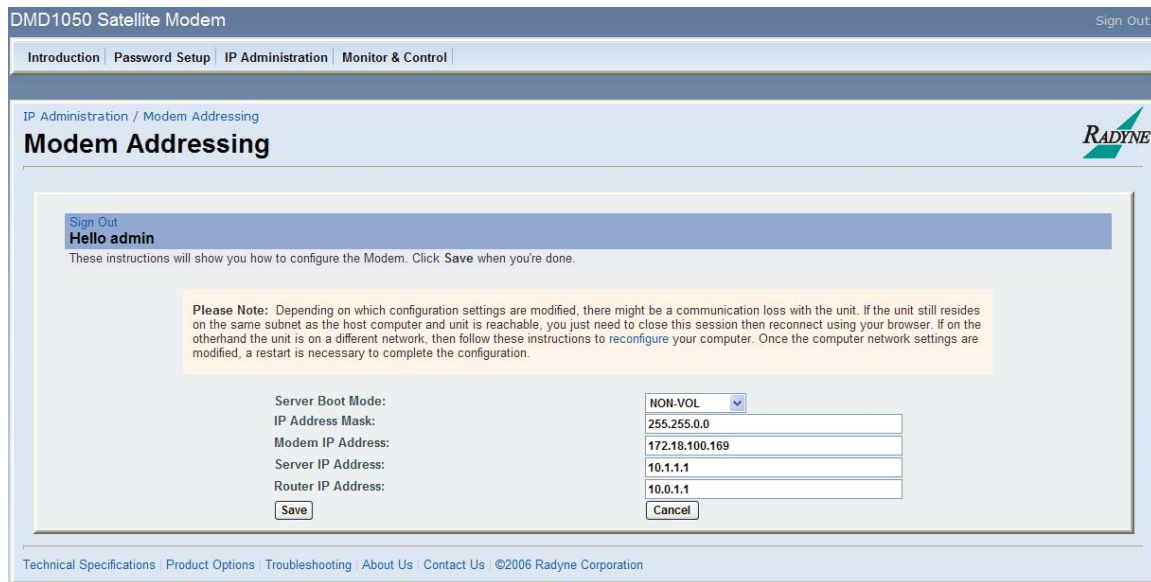


Figure D-5. Modem Addressing Screen

D.4.2 Configuring the Computer

This section is a continuation from the initial setup or can be used on an existing system that requires a network setup change. The computer needs to be configured with the correct network settings that were used for the Modem. Please consult with your IT manager for an IP address mask, and modem, server, and router IP addresses valid for your network. To recognize a subnet, each system in the subnet must have the same subnet mask. This field should be set after the changes are made to the Modem. Refer to Figure D-6.

1. Configure the computer with the new subnet addresses.
2. Initiate PING test to ensure there is communication between the modem and the computer

Example: ping 192.168.0.238

If everything is functioning correctly, replies from the modem will appear on the computer screen along with the time it took to respond. If unsuccessful, verify the following:

- a. The cables are secured.
 - b. The Link Light is illuminated.
 - c. The IP Address that is used matches the Modem's IP Address.
 - d. The Server and Modem are on the same subnet.
3. Start the Internet browser on the computer and enter the new IP Address assigned by the network administrator. Enter the new address field then press the Enter key. Reference Figure 2

D.5 WEB Users Setup and Configurations Controls Options

We use authentication and authorization together with a user database and a Security Realm to design a secure site. This makes use of users and groups, where users are generally people that may access the system, and groups represent the position that users can hold.

The web user database consists of three users, with initial default names of guest, oper, and admin. Access rights and authentication make it possible to restrict/control access to a specified set of web users. Any of the three user names can be modified. The user name can have up to 14 characters supporting alpha and numeric characters. Alpha characters can be entered using the up and down arrow keys. Numeric characters can be selected by using the number keys.

Web User	Authentication Password	Access Group
guest	guest	GUEST
oper	oper	OPER
admin	admin	ADMIN

Some of those selections are also available to a properly authenticated user with ADMIN privileges. Refer to Figure D-6.

1. From the modem introduction page, click the ADMINISTRATION tab.
2. If not already logged on, enter your username and password on the logon popup, and then press the Enter key.
3. Select USER1, USER2, or USER3 from the drop down Edit User menu. The corresponding username and access rights will get updated on the screen.
4. Select a new username if desired, and password. Confirm the new password then click on the Save button.
5. Click on the Cancel button at any time to abort and reload the current user settings.

DMD1050 Satellite Modem Sign Out

Introduction | Password Setup | IP Administration | Monitor & Control

Password Setup / Access **RADYNE**

Access

Sign Out
Hello admin
Select user, then choose new password. Click Save when you're done.

Please Note: To better protect user accounts, please make sure passwords are memorable. Do not share passwords, and never use the same passwords that have been used in the past. For security purposes, passwords should be a minimum of five characters long. A strong password contains a combination of uppercase and lowercase letters, numbers, and special characters.

Edit User:
 User Access Group:
 Enter User Name:
 Enter a New Password:
 Confirm New Password:

Technical Specifications | Product Options | Troubleshooting | About Us | Contact Us | ©2006 Radyne Corporation

Figure 6. User Settings/Access Screen

ACCESS rights represent the following:

GUEST: Users are able to navigate most of the site, and view modem parameter settings.

OPER: Users can monitor and control modem parameter settings, and change their own authentication passwords.

ADMIN: At this highest access right, the users can monitor and control the modems parameters, change any user's name and authentication password, and modify IP network settings. Admin setting allows access to the entire site.



User passwords must be memorable, never shared, and never reused. For better security, passwords should be a minimum of 5 printable characters long.

D.5.1 Change Authentication Password

The user can modify the Authorization Passwords. The user name can have up to 14 characters supporting alpha and numeric characters. Alpha characters can be entered using the up and down arrow keys. Numeric characters can be selected by using the number keys on the front panel. The user can clear all characters from the front panel screen.

D.5.2 Boot Mode Options (Reference only)

Boot Modes selections are based on the networks requirements needed for setting up the Web browser. Refer to the manual for more specific details.

Boot Mode options are:

DEFAULT: During initialization (boot up), the modem will restore the web setting to the standard IP Mask and addresses supplied by the modem. The modem will be taken off the network and will not be accessible. The Default settings are:

IP Address Mask:	255.000.000.000	(FF.00.00.00 hex)
Modem IP Address:	010.000.000.001	(C0.A8.00.EE hex)
Server IP Address:	010.001.001.001	(0A.01.01.01 hex)
Router IP Address:	010.000.001.001	(0A.00.01.01 hex)

BOOTP: During initialization (boot up), the modem will get the names, masks, and IP Addresses of the modem, router, and server.

NON-VOL: Stores and uses IP Mask and addresses as provided by the user.

IP TEST: Stores and uses IP Mask and addresses to fixed settings as listed below.

Bootp Server Tag:	206	
IP Address Mask:	255.255.255.000	(FF.FF.FF.00 hex)
Modem IP Address:	192.168.0.238	(C0.A8.00.EE)
Server IP Address:	192.168.000.101	(C0.A8.00.65)
Router IP Address:	192.168.000.102	(C0.A8.00.66)

Appendix E. User Interface Connections

E.1 User Interface Connections

Supplied mating connectors can be used, but are not required. Refer to section 5 for pin out definitions.

Connector Kit part numbers:

Radyne	P/N	Description	Connector Location
1.	CA/3446-9	RS530 Ribbon cable	J2
2.	CNRSHUNT	Shorting/default plug	JP5 & JP6
3.	CNR102387-1	Dual Row header 10 Pin	J1
4.	CNR102387-6	Dual Row Header 26 Pin	J2
5.	TMR102548-6	Receptacle Contacts	J1 & J2
6.	CNR09-50-3041	Conn Crimp 4 Terminal Housing	J3 & J7
7.	TMR08-56-0106	Terminal crimp 18-24AWG for 2139	J3 & J7

J1 & J2 Interface Connectors located on PCB

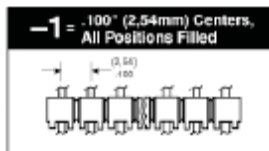
J1: Async Interface Connector - 10Pin Dual Row: Mfg (Samtec) P/N: TSW-1-05-7-G-D

J2: Mil 188-114A Connector - 26Pin Dual Row: Mfg (Samtec) P/N: TSW-1-13-7-G-D

MFG: Samtec connector information

TSW = Terminal strip series

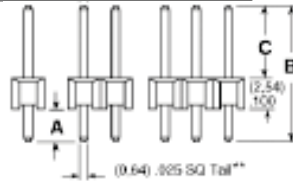
-1 = .100" Centers



05 or 13 = Number of pins per row

7 = Straight pin version dimensions

Straight Pin Versions
(Specify "LEAD STYLE" from chart)



Dimensions are in inches

Style	A	B	C
-07	.100	0.430	0.430

G = Gold plating

-G
= 10µ" (0.25µm) Gold on contact area, Gold flash on balance

D = Dual Row.



J1 & J2 Information on Supplied Interface Connectors

J1	Async Interface	10Pin Dual Row:	Mfg (Tyco) P/N: 102387-1
J2	Mil 188-114A	26Pin Dual Row:	Mfg (Tyco) P/N: 102548-6
J1/J2	Receptacle Contacts:		Mfg (Tyco) P/N: 1-87309-4



AMPMODU Interconnection System



Mod IV Wire-Applied Housings, Double-Row, .100 x .100 [2.54 x 2.54] Centerline (Continued)

Center Polarized

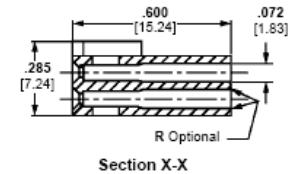
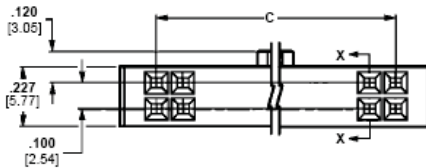
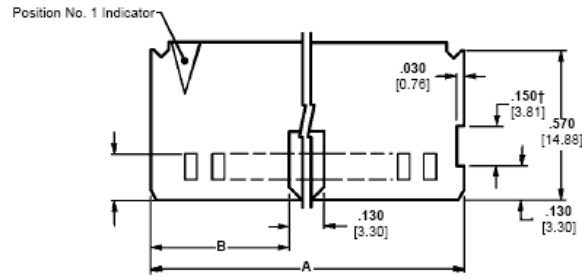


Material:

Black thermoplastic, flame retardant

Related Product Data:

- Contacts—pages 228-230
- Mateable Headers and Posts: Low Profile Shrouded Headers, Double-Row, Straight or Right-Angle Posts—pages 153-155
- Low Profile Shrouded Headers, Double-Row, Straight or Right-Angle Posts, with .585 [14.86] Ejection Latches—pages 156-157
- AMP-LATCH Ejection Headers with .576 [14.63] Ejection Latches—Catalog 82012, Part Nos. 102186-1 & 102320-1



No. of Pos.	Dimensions			Part Nos. (Stamped*)
	A	B	C	
10	.680 [17.27]	.275 [6.98]	.400 [10.16]	102387-1
26	1.480 [37.59]	.675 [17.15]	1.200 [30.48]	102387-6

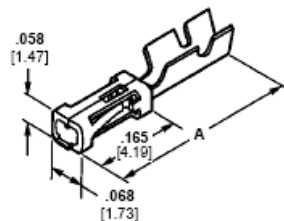
Mod IV Receptacle Contacts

Material and Finish:

Copper alloy C7025, plated as follows:

Intermediate Pressure (Mod IV.v)

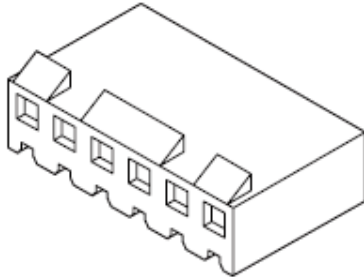
Wire Size Range AWG [mm ²]	Ins. Dia. (Max.)	Dimension A	Material	Finish	Part Nos.		Heavy Duty Miniature Applicator for AMP-O-ELECTRIC Machine*	Applicator for Stripper/Crimper Machine	Hand Tool Part Nos.	
					Strip Form	Loose Piece			Premium	Commercial
26-22 0.12-0.4	.061 [1.55]	.445 [11.30]	Cu-Sn-PhBz	Plating A	103171-4	103171-5	466571-2	466918-1	91517-1	58641-1*
			Cu-Sn-Ph Bz	Plating B	103171-1	103171-2				
			Be Cu	Plating E	102548-5	102548-6				
			Be Cu	Plating F	102548-1	102548-3				



J3 & J7 Information on Supplied Interface Connectors for DC & BUC Power

- J7 DC input Power - 4 Pin Crimp Terminal Hsg: Mfg (Molex) P/N: 09-50-3041**
- J3 BUC/LNB input - 4 Pin Crimp Terminal Hsg: Mfg (Molex) P/N: 09-50-3041**

3.96mm (.156") Pitch KK® Crimp Terminal Housing 2139



Features and Benefits

- Sizes 2 to 24 circuits
- Locking ramp available
- Molded void options available
- Standard ramp options available
- Polarizing pegs and keys available
- End-to-end stackable

Reference Information

Product Specification: PS-08-50
 Packaging: Bag
 UL File No.: E29179
 CSA File No.: LR19980
 Mates With: Molex KK 3.96mm (.156") pitch headers
 or 1.14mm (.045") pins
 Use With: 2478 and 2578
 Designed In: Inches

Electrical

Voltage: 250V AC max.
 Current: Phosphor Bronze—7.0A max.
 Brass—5.0A max.
 Dielectric Withstanding Voltage: 1500V AC
 Insulation Resistance: 50K Megohms min.

Mechanical

Contact Insertion Force: 1.8kg (4 lb) max.
 Contact Retention to Housing: 3.6kg (8 lb) min.
 Mating Force: Square pin—2.25 lb max.
 Round pin—1.60 lb max.
 Unmating Force: Square pin—0.84 lb min.
 Round pin—0.60 lb min.
 Normal Force: 0.75kg (1.65 lb)

Physical

Housing: Nylon, UL 94V-2 (see 41695 for
 UL 94V-0 polyester)
 Operating Temperature: 0 to +75°C

Part Number: Active **08-56-0106**

3.96mm (.156") Pitch KK® Crimp Terminal 2478, 18-24 AWG, Bag, Brass, 0.51µm (20µ") Selective Gold (Au)

Part Details:

General

Status	Active
Product Name	KK®
Molex Series	2478
Gender	Female
Wire Size [AWG]	18, 20, 22, 24
Wire Insulation Diameter	2.79mm (.110") max.
Packaging	Bag

Physical

Contact	Brass (CuZn)
Contact Material Thickness	0.27mm (.011")
Plating Contact	0.5µm (20µ") Gold (Au) Selective
Plating in Crimp Area	Gold (Au) Flash Overall

Reference

Mating Pins	1.14mm (.045") Round Pin, 1.14mm (.045") Square Pin
Termination	Good Crimps
990 Catalog Page	J-62
MX01 Catalog Page	D-3, L-52
Old Part Number	2478-1-(550)L

Note: Maximum Current 5.0A using 18AWG wire

APPLICATION TOOLING for 2139

Region	Description	Product Number
Americas	Extraction Tool	11-03-0016
Americas	Mini-Mac Applicator	11-18-2236

Appendix F. Ethernet Data Interface

F.1 Introduction

Just like the original Ethernet Bridge, the new Enhanced Ethernet Interface makes connecting LAN's via satellite easy to do. Simply select Ethernet as your terrestrial interface and plug your LAN into any of the four RJ-45 connectors on the back panel. With its multi-port interface, automatic Learning and Aging, Auto-Crossover, Auto-Polarity, Auto-Negotiation and embedded Quality of Service, the Enhanced Ethernet Interface offers true Plug-n-Play connectivity.

The Enhanced Ethernet Interface is backward compatible with the original and can be easily configured for the same bridge like operation. Allowing all higher level protocols like DHCP, UDP, TCP, HTTP, and FTP, etc. to pass transparently. And with it's line speed learning capability, traffic is forwarded immediately to the appropriate ports without any unnecessary startup delay.

For users who desire more control over their traffic, the EEI provides additional QOS controls and new features such as port based priorities, strict priority queuing, and the ability to operate in a FIFO like mode.

When it comes to performance, the full duplex capability of the standard 10/100 EEI allows it to pass up to 20 Mbps for DMD1050 and 52 Mbps in each direction over the satellite when installed in a DMD50 or DMD2050.



The DMD1050 supports Radyne HDLC and Comtech HDLC modes, offering compatibility with the SLM5650A Bridge Interface.

F.2 Point-to-Point Applications

Figure F-1 illustrates a typical application connecting a remote office to the corporate headquarters via satellite. Because the EEI places no restrictions on the IP addresses or subnet masks chosen for a particular implementation, there is no lengthy setup required and no need to change any existing network configurations. Simply connect the WAN port of each router to the Modem and your satellite network is up and running.

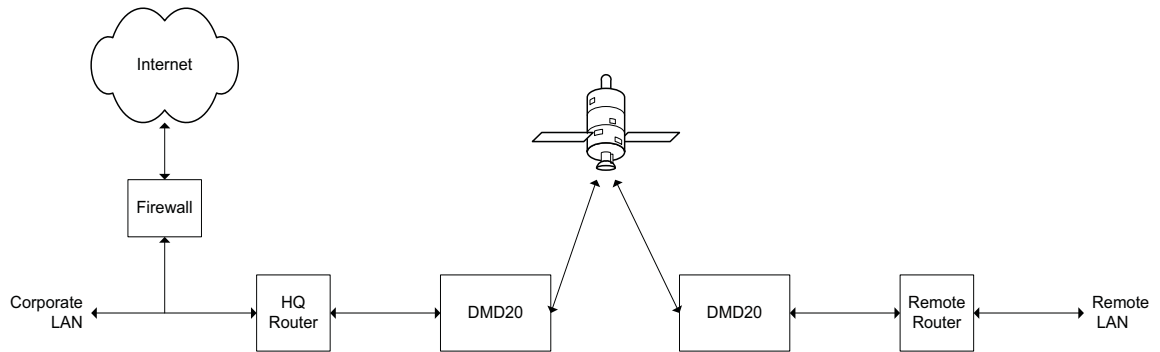


Figure F-1. Point-to-Point Applications

F.3 The Importance of Transparent Operation

In some situations, the remote site may be nothing more than PC's that need to be connected to a central office for E-mail, File Transfers, or Internet access. In these cases, it's often desirable to have all of the network IP addresses assigned dynamically on an as needed basis by a DHCP server. Because the EEI can be configured to work like a bridge and not like a router, the DHCP Requests and Responses required to bring the remote PC's online, are passed transparently across the satellite link. In addition, the four-port switch interface on the standard 10/100 EEI allows small remote networks, as illustrated in Figure F-2, to be set up without adding external switches or hubs.

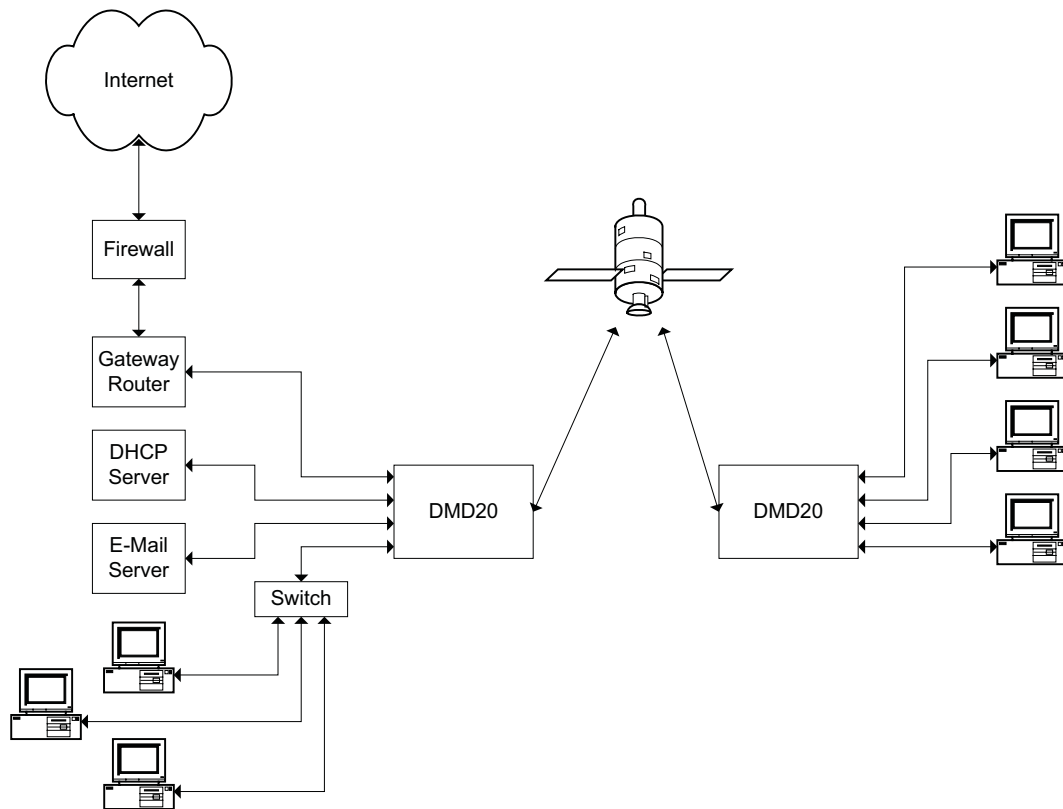


Figure F-2 - Central Office Assigns Network Addresses and Controls all Services

F.4 Point-to-Multipoint Applications

In many instances, customers need to connect multiple remote sites to a central hub, and here again, the EEI provides exceptional value and ease of use. With its multi-port interface and daisy chain capability, your hub router doesn't need to know that there are multiple return paths. And as your network grows, you won't need to change your network configuration or buy additional router blades for your hub. Simply add the new hub demod to the end of your existing daisy chain and you can bring a new remote online without any disruption to the existing traffic.

Figure F-3 illustrates how the DMD50, DMD20, and MD2401 multi demod can be utilized in the same network to provide a large outbound carrier and various return carriers, typical of an internet café application.

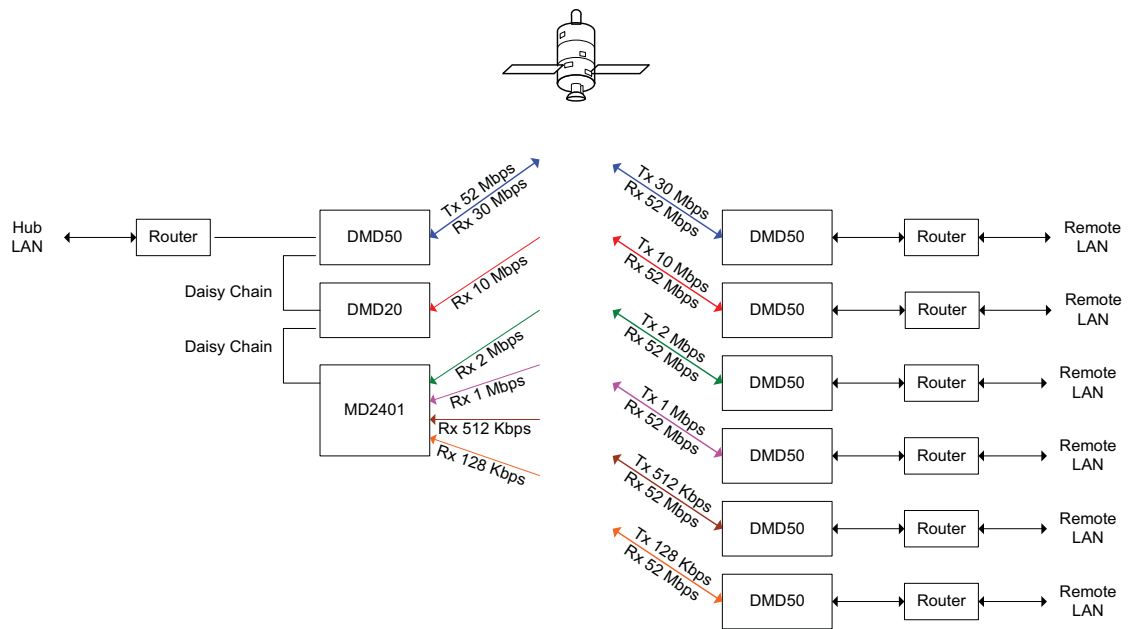


Figure F-3 – Point to Multipoint – Large Outbound, Smaller Returns

F.5 High Speed Mesh Applications

As shown in Figure F-4, the unique daisy chain capability of the EEI also lends itself to mesh networks. And as with the previous example, adding more nodes to your mesh system can be done without requiring additional router blades or disrupting the existing traffic.

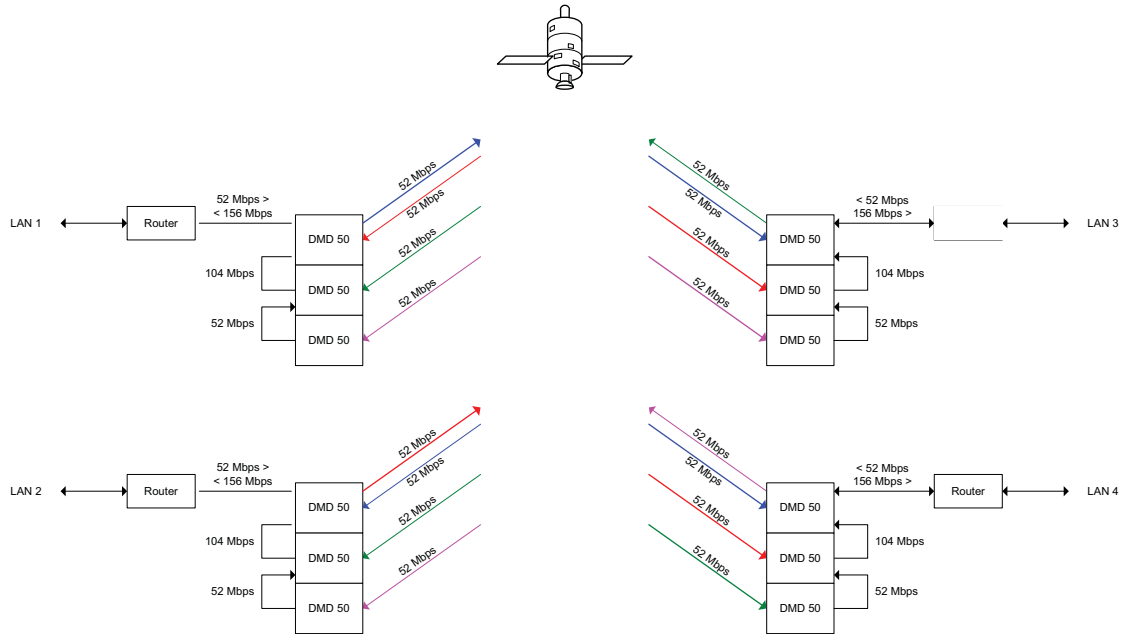


Figure 4 – High Speed Mesh

Figure F-4 – High Speed Mesh

F.6 Low Speed Mesh Applications

For mesh applications with data rates lower than 5 Mbps, the combination of a DMD20 and an MD2401 Multi-Demod as shown in Figure F-5 can provide a simple 8PSK with Turbo solution that requires no IP configuration or network setup.

When configured with the Ethernet option, the MD2401 automatically muxes the packets received from the multiple data streams onto a single 10/100 Ethernet port.

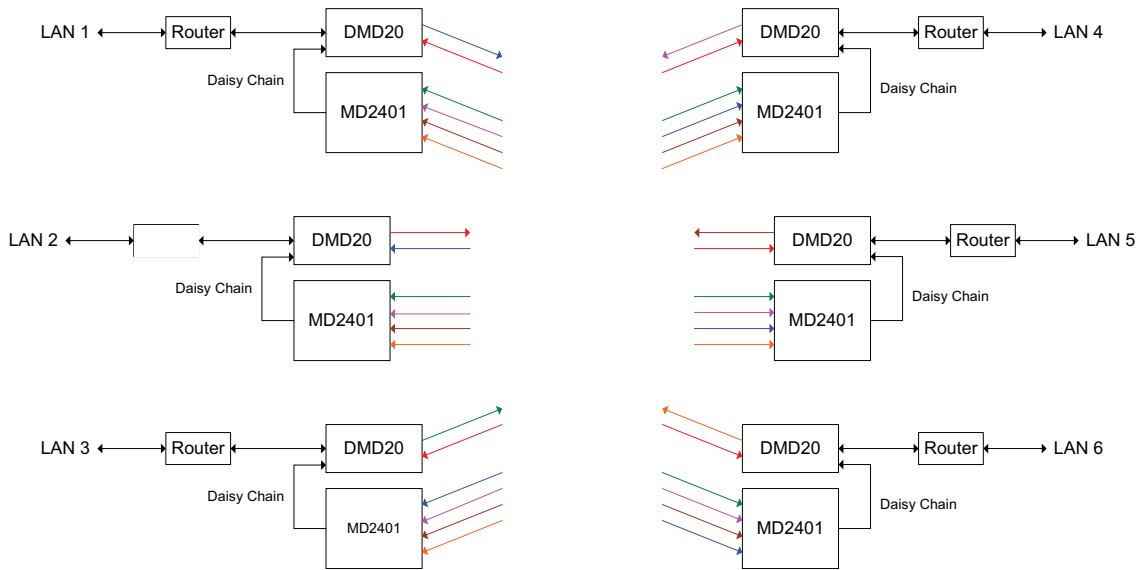


Figure F-5 – Low Speed Mesh

F.7 Remote Monitor and Control via SNMP

Simple Network Management Protocol (SNMP) is the most widely used protocol for network management available today. It provides a secure, open network standard whereby a PC with a MIB Browser can be used to monitor and control almost any Cisco router, gateway, or Radyne modem. And because the Enhanced Ethernet Interface offers a multi-port Ethernet interface and daisy chain capability, every modem, even those in complex point to multi-point systems, can be easily controlled from one central location. All without requiring extensive network setup or additional equipment at every remote site.

Figure F-6 illustrates complete Monitor and Control of all Radyne equipment from a centrally located PC at the Hub.

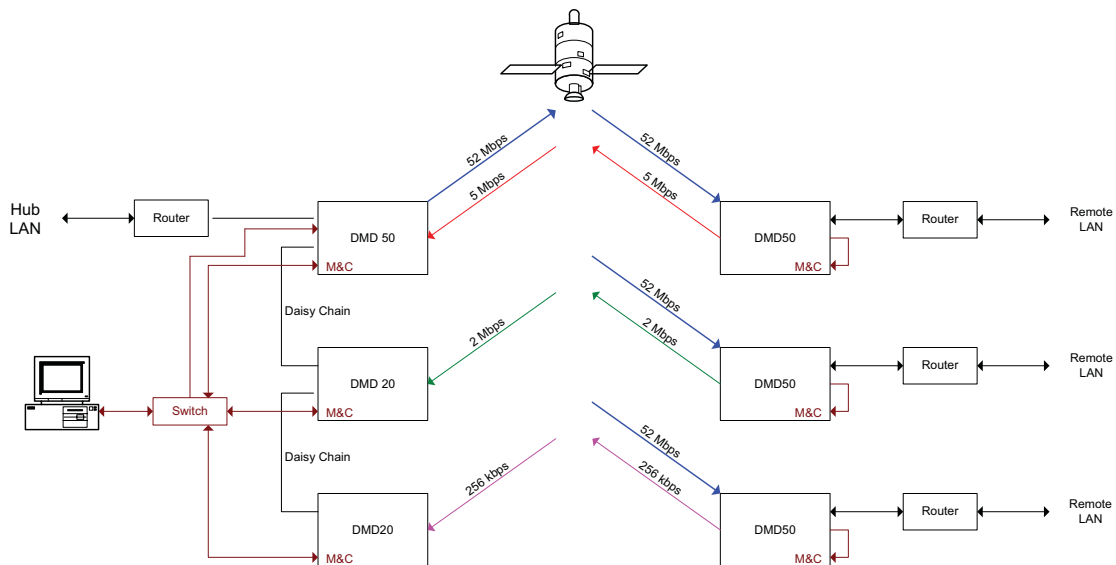


Figure F-6 – Remote Monitor and Control

F.8 Enhanced Quality of Service (QoS)

Most networks are comprised of various types of real-time and non real-time services. With its four prioritized output queues, the EEI can insure that higher priority traffic like voice and network controls are not backed up behind low priority traffic such as bulk transfers and games. In addition, EEI provides the operator with more control over how the QOS determination is made and how the queues are processed. And in all cases, the QOS determinations and queuing is performed at line speed.

Figure F-7 illustrates the prioritized queues and the traffic normally associated with those queues.

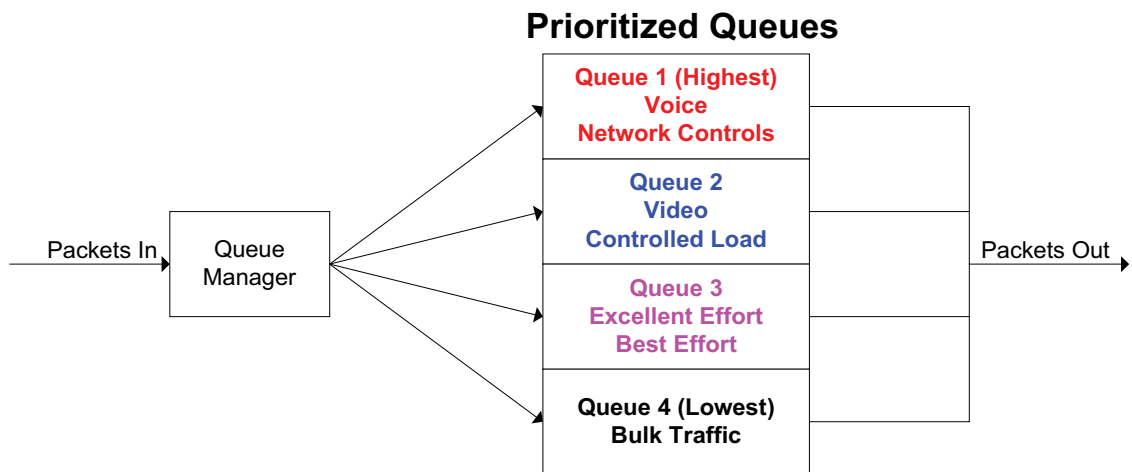


Figure F-7 – Prioritized Traffic Queues

F.8.1 Normal QOS

When Normal QOS is selected, the determination of traffic priority and queuing is based on information contained in the packet. This type of QOS is the default on the original Ethernet Bridge and is typically what most users require. Normal QOS uses the following packet information:

When a packet contains an IEEE802.3ac Tag (this tag is optional), the EEI uses the IEEE802.1p priority information embedded in the Tag.

When a packet does not contain the optional Tag, priority is determined using the

IPv4 Type of Service / Differentiated Service field
or
IPv6 Traffic Class field

F.8.2 Port Based QOS

When Port Based QOS is selected, the EEI ignores and QOS information embedded in the headers and instead priority and queuing is based on the port on which the traffic arrives. This type of QOS is typically used when the operator wants to control bandwidth allocation based upon ports. However, it can also be used to create a FIFO like operation where the data is transmitted in the exact order it is received. With Port Based QOS, Port 1 has the highest priority and Port 4 on the standard 10/100 EEI .

F.8.3 Fair Weighted Queuing

A fair weighted priority scheme allows higher priority traffic to move quickly through the system, while at the same time insuring that lower priority traffic isn't stalled indefinitely. Fair weighted queues are the default on the original Ethernet Bridge. When Fair Weighted queuing is selected, packets will be transmitted at a rate of 8, 4, 2, and 1 from the highest to lowest priority queues respectively.

F.8.4 Strict Priority Queuing

A strict priority scheme means that the highest priority traffic will always be transmitted first, even if it means that the lower priority traffic is stalled indefinitely. When Strict Priority queuing is selected, packets in the highest priority queue will be transmitted until that queue is empty. At that time, packets from the next highest priority queue will be transmitted until it is either empty or a higher priority packet arrives. If a higher priority packet arrives before a lower priority queue is empty, it will immediately go to the head of the line and be the next packet transmitted. Care needs to be taken when selecting this option as it is entirely possible that data in a lower priority queue might never be transmitted.

F.8.5 Satellite Packet Error Checking

Packet error checking is a standard part of any terrestrial Ethernet system and is performed using the CRC contained in the Ethernet wrapper. When a CRC error is encountered, the packet is discarded by the router, switch, or hub in which the error was detected.

A similar methodology is utilized over the satellite link where bit errors result in a corrupted packet with a bad CRC. And for the majority of the situations, the standard process of discarding these packets when they are encountered is the preferred methodology as the packet can simply be retransmitted.

However, there are some cases where the end device would rather receive the erred packet than no packet at all. Scenarios involving cryptography or where the end device has additional error correction capability are examples of two such situations. For these customers, the EEI provides the ability to turn off the satellite packet error checking and packets with bit errors will be output with a valid CRC so that they will pass through any routers or switches in between the modem and the receiving device.

For both sets of customers, the EEI maintains and reports satellite link statistics on total packets, erred packets, and packet error rate (PER).

F.8.6 Automatic Learning and Aging

The Automatic Learning and Aging function allows the EEI to be connected to a network without requiring extensive setup and programming by the operator. The learning process insures that local LAN traffic stays on the local LAN and that only traffic that is not destined for other equipment on the local LAN gets forwarded over the satellite link.

The aging process allows equipment to be shut off, moved, or even completely removed from the network without tying up resources or requiring operator intervention. For instance, a particular user might carry a laptop from remote office to remote office and use it to check their e-mail back at the corporate office. The apparent movement of the laptop's MAC address from one position in the network to another is automatically handled by the EEI.

The learned address database maintained by the EEI can hold up to 1024 MAC addresses. When a new LAN address is learned, it is placed in the database and an aging timer is started. Then, every time this learned address is heard from, its aging timer is reset and restarted. Finally, when the learned address has not been heard from for more than 5 minutes, it is removed from the database. All of the processing required for learning, searching, and aging is handled at line speed and without any unnecessary delay at startup.

F.8.7 Internal Buffer and Throttle

The Enhanced Ethernet Interface provides 120K bytes of internal data storage for buffering of Ethernet traffic. When this buffer is almost full, industry standard backpressure or an IEEE 802.3x Pause Frame is used to prevent the buffer from being overrun. Together the two provide an effective rate exchange and throttle between the Ethernet port and the satellite link.

F.8.8 Adding Acceleration, Compression, Network Security, and Traffic Shaping

Today, there are various acceleration, compression, IP security, and traffic shaping solutions available from numerous third party vendors. Some are proprietary implementations, while others are based on open standards such as MIL-STD-2045-44000 and CCSDS 714.0-B-1. Some may even be implemented in your current network and routers. And while different solutions (including none at all) make sense for different types of networks, the EEI is compatible with all of them.

F.8.9 Any Data Rate, Any Modulation Type, Any FEC, Any Application

The Enhanced Ethernet Interface can be used in conjunction with the appropriate DMD20, DMD50, or DMD2050 to provide a transparent satellite connection at data rates ranging from 4.8 kbps to 20 Mbps. It can be used with any available FEC and Modulation Type including DVB-S. It offers plug and play connectivity regardless of the protocols used to transfer data between applications:

- IPv4 or IPv6
- Older standards such as UDP and TCP
- Newer standards such as RTP for MPEG Video and HTTPS for secure Internet access
- The latest SCTP usage as a transport mechanization for SIP
- With or without IPSec and regardless of how its implemented
- Proprietary acceleration, an open network standard, or no acceleration at all
- 10/100BaseT

If the data is transmitted via Ethernet, the EEI will pass it transparently from one end of the satellite link to the other.

Appendix G. DMD1050 Strap Codes

G.1 Introduction

The Strap Code is a quick set key that sets many of the modem parameters. For quick setup of the DMD1050, Strap Codes are very helpful. When a Strap Code is entered, the modem is automatically configured for the code's corresponding data rate, overhead, code rate, framing, scrambler type and modulation. An example of how to set a strap code follows:

Example: At the Front Panel <Modulator> Menu, depress '↓', then move '→' to the 'Strap Code' Submenu and enter #16. The DMD1050 will be automatically configured to the parameters shown below in the highlighted row 'Strap Code 16'.

Use the Strap Code Guide (Table G-1) for available strap codes.

Table G-1. DMD1050 Strap Codes									
Dis = Disable									
Strap Code (Decimal)	Data Rate (Kbps)	Overhead	Code Rate	Type	Framing Type	Scrambler Type	Reed-Solomon	Modulation	Mode
12	2048	16-15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
24	56	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
33	56	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
34	64	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
36	64	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
40	128	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
48	128	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
65	256	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT

Table G-1. DMD1050 Strap Codes									
Dis = Disable									
Strap Code (Decimal)	Data Rate (Kbps)	Overhead	Code Rate	Type	Framing Type	Scrambler Type	Reed-Solomon	Modulation	Mode
66	256	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
68	320	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
72	320	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
80	384	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
96	384	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
129	512	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
130	512	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
132	768	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
136	768	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
144	896	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
44	896	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
7	1344	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
11	1344	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
13	1536	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
14	1536	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
19	1544	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
21	1544	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
22	1920	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
25	1920	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
26	2048	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
28	2048	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
37	2368	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
38	2368	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
41	48	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
69	6312	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
70	8448	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
73	3152	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
74	3152	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
76	3264	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
81	3264	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
97	1024	1	1/2	VIT	CNT	V.35 (IESS)	Dis	QPSK	CNT

Table G-1. DMD1050 Strap Codes									
Dis = Disable									
Strap Code (Decimal)	Data Rate (Kbps)	Overhead	Code Rate	Type	Framing Type	Scrambler Type	Reed-Solomon	Modulation	Mode
98	1024	1	3/4	VIT	CNT	V.35 (IESS)	Dis	QPSK	CNT
134	192	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
137	192	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
138	320	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
140	320	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
100	448	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
146	448	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
104	576	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
148	576	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
152	640	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
161	640	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
162	704	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
164	704	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
193	832	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
194	832	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
196	896	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
208	896	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
224	960	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
15	960	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
30	1088	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
39	1088	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
43	1152	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
46	1152	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
51	1216	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
53	1216	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
54	1280	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
57	1280	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
58	1344	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
67	1408	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
71	1408	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
75	1472	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT

Table G-1. DMD1050 Strap Codes									
Dis = Disable									
Strap Code (Decimal)	Data Rate (Kbps)	Overhead	Code Rate	Type	Framing Type	Scrambler Type	Reed-Solomon	Modulation	Mode
77	1472	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
78	1600	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
83	1600	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
85	1664	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
86	1664	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
89	1728	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
90	1728	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
92	1792	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
99	1792	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
102	1856	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
105	1856	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
106	2048	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
135	1984	16/15	1/2	VIT	IBS	IBS	Dis	QPSK	CNT
139	1984	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT
45	3088	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
141	3088	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
176	4000	1	1/2	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
116	4000	1	3/4	VIT	NONE	V.35 (IESS)	Dis	QPSK	CNT
60	1344	16/15	3/4	VIT	IBS	IBS	Dis	QPSK	CNT

Appendix H. Software Upgrade Procedure

H.1 Software Upgrade Procedure

The outdoor modem software may be upgraded via the terminal or the web interface.

H.2 Terminal Software Upgrade

The DMD1050 Outdoor Modem offers the ability to perform field upgrades of the modem's feature set quickly and easily from the Terminal Port. Purchased upgrades will become part of the modems permanent configuration. Demonstration upgrades will enable the optional features for a 30-day evaluation period.

H.3 Required Equipment

The DMD1050 Universal Satellite Modem is the only equipment required for this procedure.

H.4 Upgrade Procedure

The following paragraphs describe the procedure for permanently updating the feature set of the DMD1050 Universal Satellite Modem

1. The following steps allow users to quickly determine from the GUI Interface whether or not the desired feature(s) are supported by the hardware currently installed in the modem.

Using the GUI interface navigate to the Features menu under "System" gel-tab. Click on "features". This will show the available features and all features checked are the purchased/installed features.

2. Contact Customer Service with the Unit ID and Desired Upgrades. The modem's Unit ID can be found in the Terminal interface as follows:
 - a. From the main menu, the Features menu.
 - b. "Feature Id: is the unit ID number

The value displayed on the top line of this menu is the 12-digit Unit ID. It is displayed as 3 sets of 4 digits in a dot-delineated format as follows:

1 2 3 4 . 1 2 3 4 . 1 2 3 4

Your Sales Representative will ask you for this number along with your desired feature set upgrades when placing your order.

3. Once your order has been processed, you will be issued a 12-digit feature set upgrade code. This code is only good on the modem for which it was ordered. To enter this code from the terminal port, perform the following:
 - a. From the “Enter Selection Number” line type in 45.
 - b. Press Enter.
 - c. Enter the new code and press “Enter”
 - d. Your system is now up graded.

If the code entered is correct, the display will display **CODE ACCEPTED**, otherwise the display will display **INVALID CODE**.



Care should be taken to insure that the upgrade code is entered properly. After three unsuccessful attempts to enter a code, the upgrade and demonstration capability will be locked out and it will be necessary to cycle power on the modem in order to continue.

H.5 Demonstration Procedure

The procedure for enabling a 30-day demo of the DMD1050 options is similar to the procedure used for permanently updating the modems feature set. The one big difference being that at the end of 30 days, the demo features will automatically be disabled and the modem will revert back to its permanent configuration.



At the end of the demonstration period, when the modem reverts back to its permanent configuration an interrupt in traffic will occur, regardless of whether or not a demo enabled features was being run at the time. In addition, operator intervention may be required to restore the data paths. In order to avoid this interruption in service, the user can cancel the demonstration at any time by following the instructions outlined in the section on “Canceling Demonstration Mode.”

1. The following steps allow users to quickly determine from the GUI Interface whether or not the desired feature(s) are supported by the hardware currently installed in the modem.

Using the GUI interface navigate to the Features menu under “System” gel-tab. Click on “features”. This will show the available features and all features checked are the purchased/installed features.

2. Contact Customer Service with the Unit ID and Request a Demonstration. The modem’s Unit ID can be found in the Terminal interface as follows:

- a. From the main menu, the Features menu.
- b. “Feature Id: is the unit ID number

The value displayed on the top line of this menu is the 12-digit Unit ID. It is displayed as 3 sets of 4 digits in a dot-delineated format as follows:

1 2 3 4 . 1 2 3 4 . 1 2 3 4

Your Sales Representative will ask you for this number along with the features you wish to demo.

3. Once your order has been processed, you will be issued a 12-digit demonstration code. This code can only be used one time and it is only good on the modem for which it was originally requested. To enter this code, do the following:
 - a. From the “Enter Selection Number” line type in 45.
 - b. Press Enter.
 - c. Enter the new code and press “Enter”
 - d. Your system is now upgraded.

If the code entered is correct, the display will display CODE ACCEPTED, otherwise the display will read INVALID CODE



Care should be taken to insure that the demonstration code is entered properly. After three unsuccessful attempts to enter a code, the upgrade and demonstration capability will be locked out and it will be necessary to cycle power on the modem in order to continue.

H.6 Canceling Demonstration Mode

At any time, a demonstration may be canceled and have the modem return to its normal operation. Once the demonstration has been canceled, it cannot be restarted using the old demonstration code. In order to restart a demonstration, it will be necessary to obtain a new demonstration code.

To cancel a demonstration from the Terminal Port, perform the following:

1. From the Terminal Main Menu, type in 19 (Features) and press “Enter”.
2. From the “Enter Selection Number” line type in 45.
3. Press <ENTER>.
4. Using the numeric keypad, enter 0000 0000 0000
5. Press < ENTER>.

The modem will immediately terminate the demonstration and the feature set will revert back to the permanent configuration.

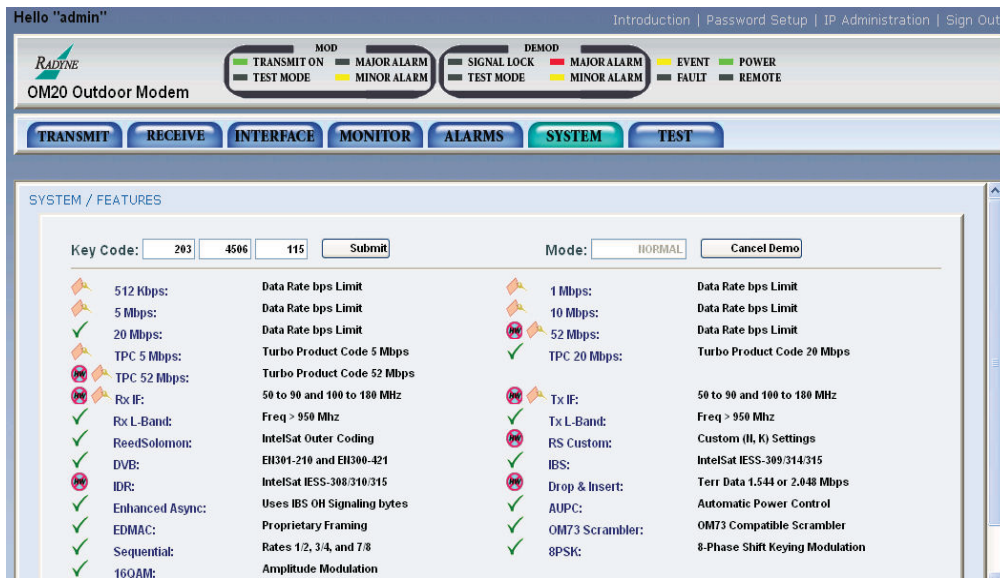
The Mod and Demod Test LED's will stop flashing.

H.7 Web Browser Software Upgrade

H.8 Monitor and Control

All modem settings can be monitored and controlled through the browser based on the user access rights. This is an easy-to-use navigation method that lets you view the current modem status and access the modem's controls.

1. From the modem introduction page, click the MONITOR & CONTROL tab.
2. If you are prompted, enter your username and password, and then press ENTER.



METRIC CONVERSIONS

Units of Length

Unit	Centimeter	Inch	Foot	Yard	Mile	Meter	Kilometer	Millimeter
1 centimeter	—	0.3937	0.03281	0.01094	6.214×10^{-6}	0.01	—	—
1 inch	2.540	—	0.08333	0.2778	1.578×10^{-5}	0.254	—	25.4
1 foot	30.480	12.0	—	0.3333	1.893×10^{-4}	0.3048	—	—
1 yard	91.44	36.0	3.0	—	5.679×10^{-4}	0.9144	—	—
1 meter	100.0	39.37	3.281	1.094	6.214×10^{-4}	—	—	—
1 mile	1.609×10^5	6.336×10^4	5.280×10^3	1.760×10^3	—	1.609×10^3	1.609	—
1 mm	—	0.03937	—	—	—	—	—	—
1 kilometer	—	—	—	—	0.621	—	—	—

Temperature Conversions

Unit	° Fahrenheit	° Centigrade
32° Fahrenheit	—	0 (water freezes)
212° Fahrenheit	—	100 (water boils)
-459.6° Fahrenheit	—	273.1 (absolute 0)

Formulas
$C = (F - 32) * 0.555$
$F = (C * 1.8) + 32$

Units of Weight

Unit	Gram	Ounce Avoirdupois	Ounce Troy	Pound Avoir.	Pound Troy	Kilogram
1 gram	—	0.03527	0.03215	0.002205	0.002679	0.001
1 oz. avoir.	28.35	—	0.9115	0.0625	0.07595	0.02835
1 oz. troy	31.10	1.097	—	0.06857	0.08333	0.03110
1 lb. avoir.	453.6	16.0	14.58	—	1.215	0.4536
1 lb. Troy	373.2	13.17	12.0	0.8229	—	0.3732
1 kilogram	1.0×10^3	35.27	32.15	2.205	2.679	—



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