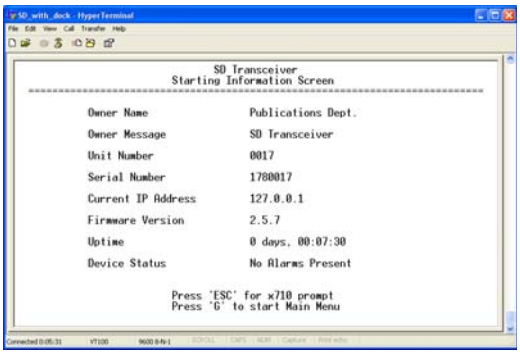
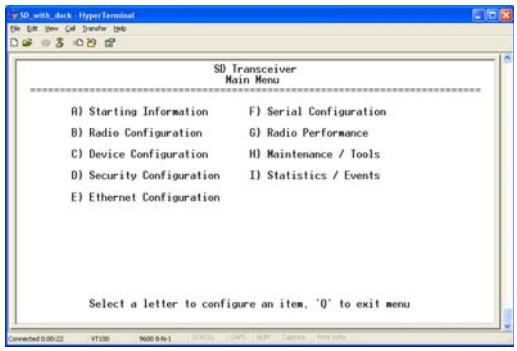
MDS SD Series

Serial/Telnet Management Instructions

Including Command Line Interface (CLI) Scripting





For ES/SS Units with Firmware Version 3.x and Higher

MDS 05-6193A01, Rev. A
FEBRUARY 2011 (Preliminary 2.0)

Digital Energy
MDS

Serial-Telnet Supplement

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Manual Revision and Accuracy

This manual was prepared to cover a specific version of firmware code. Accordingly, some screens and features may differ from the actual unit you are working with. While every reasonable effort has been made to ensure the accuracy of this publication, product improvements may also result in minor differences between the manual and the product shipped to you. If you have additional questions or need an exact specification for a product, please contact GE MDS using the information at the back of this guide. In addition, manual updates can often be found on our web site at www.gemds.com.

Related Manual

This manual is furnished as a supplement to the main product manual for the SD Transceiver. Prior to operation, refer to the MDS SD Series Technical Manual, 05-4846A01 for operational and safety warnings, installation instructions, and other related information.

1.0 INTRODUCTION

This document is a supplement to the *SD Series Technical Manual* (05-4846A01). It explains how to configure and manage the SD transceiver using Serial or Telnet methods from a connected PC.

Transceiver firmware version 4.0 and higher provides a web-based tool known as a *Device Manager*, which offers an intuitive, graphical approach to transceiver management. While this method is preferred for most users, some may be running an earlier version of the firmware, or may wish to use an alternative management method in automated control systems. This guide covers connection, log-in, and management of the radio via Serial or Telnet control methods.

2.0 CONNECTING A PC

2.1 Differences Between Serial & Telnet

Serial and Telnet both present identical menu screens, but the method of access is different for each. Serial involves an RS-232 serial connection from a PC to one of the radio's DB-9 ports (typically COM1). Telnet uses an Ethernet PC connection to the radio's LAN port. Maximum recommended cable length for a serial connection is 50 feet (15 meters). Telnet can be connected to the radio from any network point that has connectivity with the management PC, including remotely, over the Internet.

The focus of these instructions is on *Serial* access, but Telnet may also be used by following these additional points, which replace Steps 1-3 below:

- Connect to the radio with a PC that is on the same IP network as the transceiver. Launch a Telnet program, and connect to the radio using its programmed IP address.
- The default IP address for an SD is 192.168.1.1. If you do not know the IP address of the radio, follow the serial configuration instructions below, where you can determine the radio's address and continue configuration of the radio.

Connecting a PC & Setting Basic Parameters

Follow these steps to configure the transceiver for its first use:

1. Connect a PC to the radio's COM1 serial port as shown in Figure 1. (Maximum recommended cable length: 50 ft./15 m)

NOTE: Not all PCs include a serial port. If one is not available, a USB port may be used, along with a USB-to-Serial adapter (with appropriate driver software). Adapters are available from many manufacturers, including GE MDS.

NOTE: If COM1 has been configured to boot into data mode, pressing **ENTER** within 10 seconds of boot-up switches it into console (management) mode. Console mode is required for the following steps.

2. Launch a terminal communications program, such as HyperTerminal (included with many Windows®-based PCs) with the following communication parameters: **8 bits, no parity, one stop bit (8N1), flow control disabled, VT100 emulation.** The radio's COM1 port automatically determines the connected baud rate (within the range of 1200–115200 bps). The preferred baud rate is 9600 bps.

   To use the autobaud feature, press the **ENTER** key several times at half-second intervals to lock into the correct baud rate.

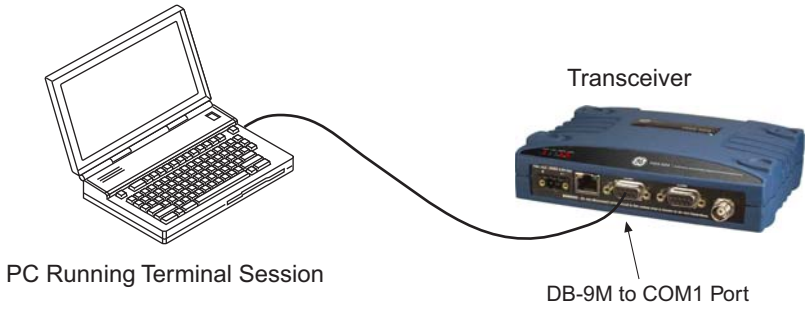

Figure 1. PC Connection to Transceiver

3. Press the **ESCAPE** key followed by a series of **ENTER** key presses (at half-second intervals) to receive the **Login:** prompt. This indicates that the radio is ready to receive commands. (If a ">" or ">>" symbol is seen, the radio is set to command line mode. Enter **Menu** to leave command line.)

4. At the **Login:** prompt, enter **admin** (lower case) and press **ENTER**.

NOTE: Passwords are case sensitive and may use up to 13 alpha-numeric characters. Do not use punctuation mark characters.

5. If no password has been previously set, enter the default password (**admin**) and press **ENTER**; Otherwise, enter the saved password at the **Password:** prompt. (Before placing the unit in final service, it is recommended that the default password be changed using the Security Configuration Menu.)

6. After successful login, the Starting Information Screen appears (Figure 2), showing summary information about the radio. This screen is read-only, but some of the fields change based on user-supplied data at other menu screens.

NOTE: TX and RX frequencies may not be set when the radio is shipped from the factory, depending on ordering options. If frequencies have not been set, **Major Alarms Present** will be displayed on the Starting Information Screen and the PWR led will flash. These will be cleared after the frequencies are set. In *all* cases, users should verify that the frequencies are properly set according to the station license.

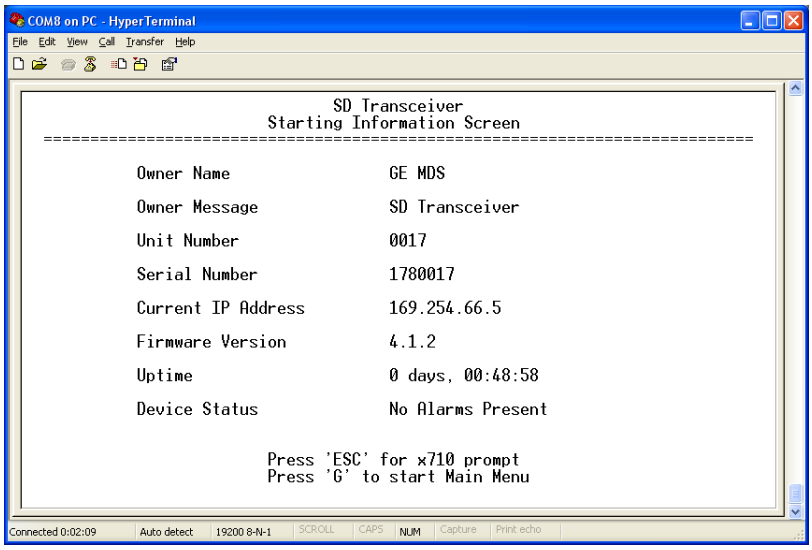

Figure 2. Starting Information Screen
(First screen displayed upon login)

7. Press **G** to access the Main Menu (Figure 3). This is the gateway to all settable parameters of the radio. Menu selections are made by pressing the letter shown to the left of a item name.

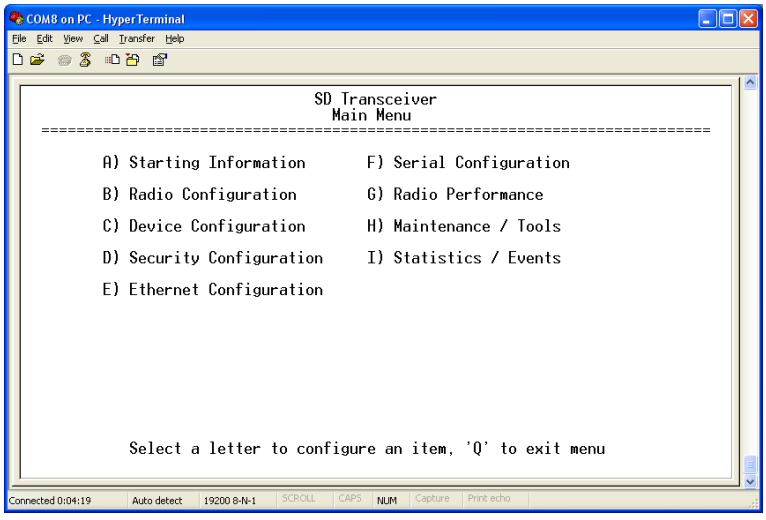

Figure 3. Main Menu Screen
(Entry point for all transceiver menus)

8. Select **Radio Configuration** from the Main Menu and then select **Basic Settings**. The screen shown in Figure 4 appears. Review these basic settings to determine if they are appropriate for your system.

   - The default **RF Output Power** default setting is **37** dBm (5 watts), but you may wish to set it lower if full power is not required for your system. MDS SD2 power is limited to 2 watts in Band B (220-222 MHz) to meet regulatory requirements.
   - The **Modem Type** default setting is **Modem 9600**. This corresponds to 9600 bps over-the-air data speed in a 12.5 kHz channel. Other selections are possible by selecting the item and using the space-bar to cycle through the available choices. (A chart of modem selections and their associated bandwidths is provided in Table 2 on Page 18.)
   - The **RX** (receive) and **TX** (transmit) frequencies may be unprogrammed when shipped from the factory. Set the frequencies by pressing the letter to the left of **RX** and **TX**, and entering the correct frequencies in MHz (**xxx.xxxxx**) as authorized by your station license. Press **ENTER**. (If no frequency is set, the value will indicate **None** and the power LED will flash as a reminder to set the frequency.)

NOTE: Operation on exact multiples of 25 MHz is not supported by the SD4 transceiver (i.e., 400, 425, 450, 475, and 500 MHz).

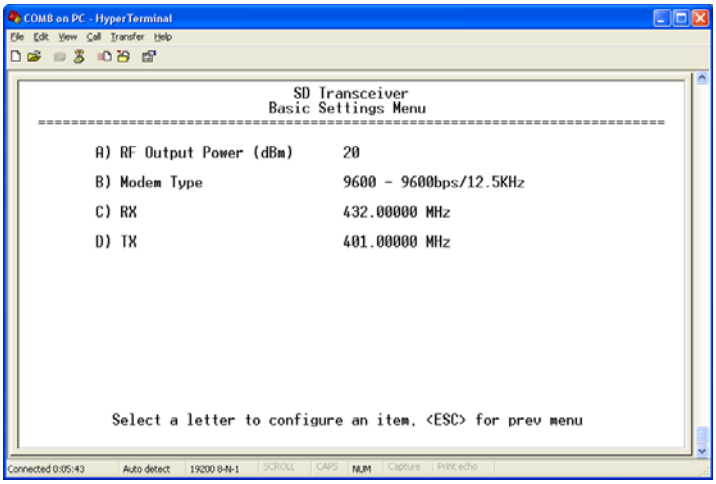

Figure 4. Radio Configuration>>Basic Settings Menu

9. When done, exit the Basic Settings Menu by pressing the **ESCAPE** key, which returns you to the Main Menu. Check the other menu screens to review the default settings and make any necessary changes.

This completes the initial setup and configuration of the radio via Serial/Telnet connection.

3.0 USING THE MENU SYSTEM

This section covers the management and programming tasks that can be performed with the transceiver's built-in menu system. A top level view of the menu tree is shown, as well as a chart listing commonly-needed tasks and the appropriate menu(s) to refer to.

No attempt has been made to show *every* possible submenu of the transceiver here. The objective is to explain how to locate the proper menu for a specific task and what selections to use once you are there. A complete listing of all menu screens is provided in the Menu Reference section at the back of this manual.

NOTE: This manual assumes menu-based control as the primary method of managing the radio. To return to menu control from other programming modes, enter the command **menu**.

For specialized applications, a command line interface is described in "APPENDIX-A CLI Scripting Interface" on Page 91.

3.1 Menu Access

The section titled "Connecting a PC & Setting Basic Parameters" on Page 1 explains how to log into the menu system and access the Main Menu (Figure 5). The Main Menu is the entry point for *all* transceiver functions. Review the login information if you have not yet established a PC connection with the radio.

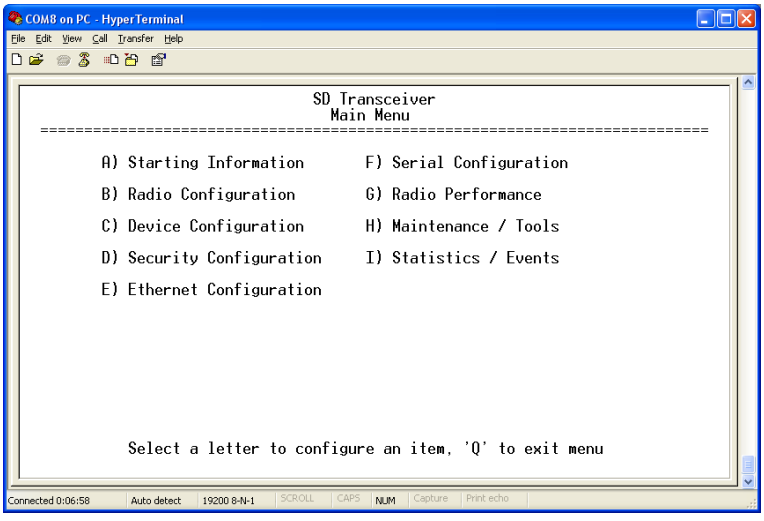

Figure 5. Main Menu Screen
(Entry point for all transceiver menus)

3.2 Menu Structure

The transceiver menus are arranged in a hierarchal format based on the major tasks that can be performed. An overall view of the menu system is shown in Figure 6.

3.3 Menu Navigation

Starting Information Screen

When you first log in to the menu system, the Starting Information Screen appears with a summary of current operating conditions. Pressing **G** from this screen takes you to the Main Menu, which is the entry point for *all* transceiver menus.

Using the Main Menu

Individual menus are selected from the Main Menu by typing the letter shown to the left of the entry. When the chosen menu appears, settings may be viewed or changed as applicable. In most cases, pressing the ESCAPE key moves the screen back one level in the menu tree.

Making Menu Changes

When you arrive at a menu with user-controllable parameters, you select menu items by pressing the associated letter on the keyboard. If there is a user-definable value, the field clears to the right of the menu item and a flashing cursor appears. you then type the value you wish to use. Follow this action by pressing the ENTER key to apply the change(s). If you make a mistake or change your mind before pressing the ENTER key, simply press ESCAPE to restore the previous values.

In some menus, when you type a letter to select a parameter, a message appears at the bottom of the screen stating that the available choices may be cycled by pressing your keyboard's spacebar. When the desired option appears, press the ENTER key to apply the selection. If you make a mistake or change your mind before pressing the ENTER key, simply press ESCAPE to restore the previous values.

3.4 Logging Out of the Menu System

To exit the menu system, press **Q** from any menu. The menu session will be terminated.

NOTE: To maintain security, it is best to log-out of the menu system as soon as you are done working with it. If you do not log out, the session automatically ends after 10 minutes of inactivity.

If the activity timer expires when the diagnostic link is set to ON, no prompt will be visible for logging back in to the menu system. If this happens, press the ENTER key a few times at half-second intervals to obtain the login prompt.

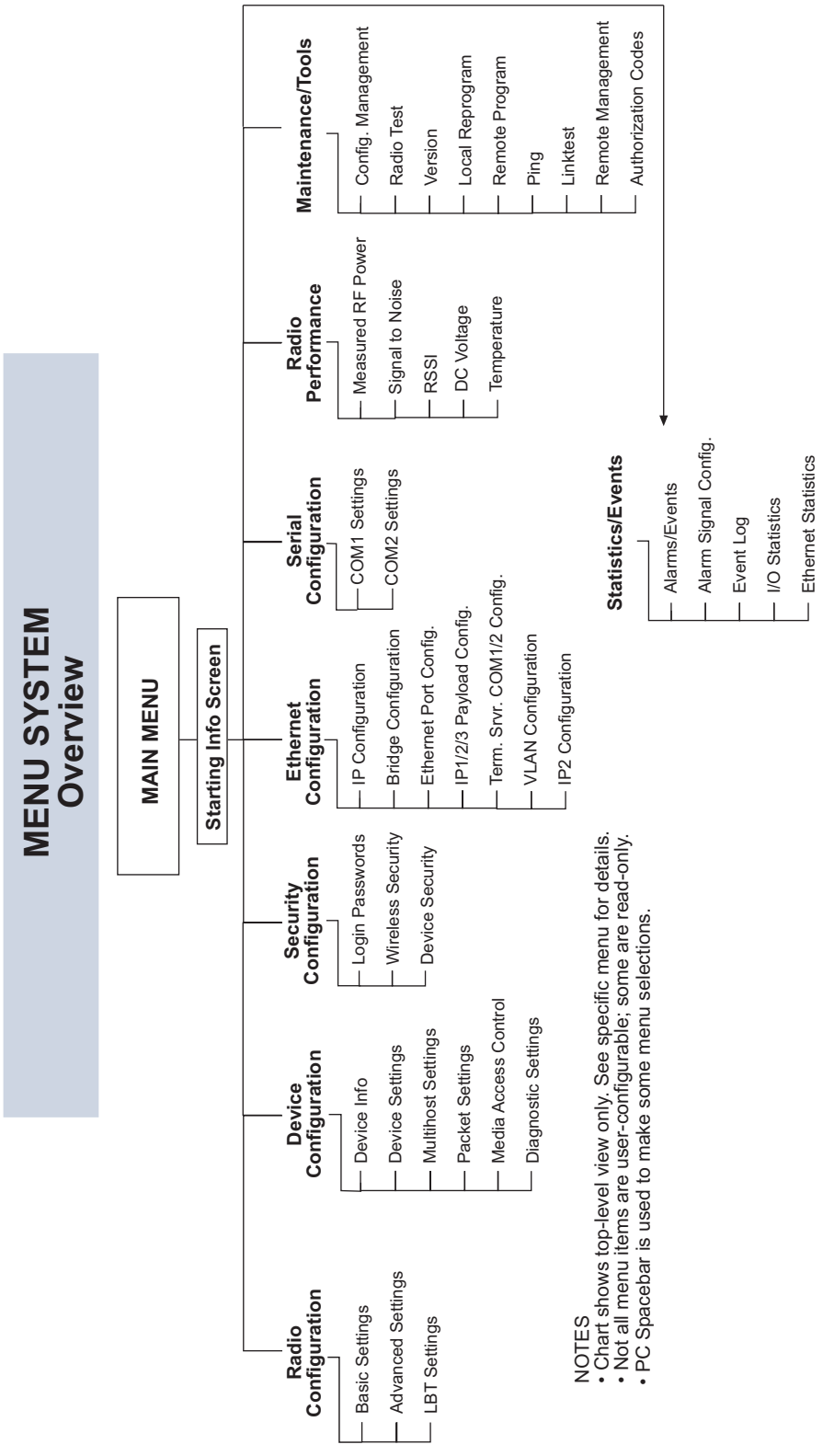

Figure 6. Menu System Overview

3.5 Task-Oriented Menu Chart

Table 1 is a task-oriented listing of user and maintenance tasks. To use the table, find the task you wish to perform, and then refer to the far right-hand column for the specific menu(s) to use. Additional coverage of menu tasks is provided in "Using the Menu System—Common Tasks" on Page 12 which immediately follows this table.

Table 1. Menu Selection Chart

Task Category	*If you wish to...*	*Refer to this Menu>>Submenu(s)*
View Overall Status & Performance Information	View top-level unit information (Owner Name/Message, Unit Number, IP Address, Serial No., Firmware version, Run time, Alarm presence, etc.)	**Starting Information Screen (See Figure 7 on Page 13)**
	View Radio Performance data (Power Output, Signal-to-Noise Ratio, Received Signal Strength, DC Input voltage, operating temperature)	**Radio Performance (See Figure 8 on Page 13)**
	View Serial No., Model 1 (hardware), Model 2 (software) version, Firmware Version, Build Date	**Device Configuration>> Device Info (See Figure 9 on Page 14)**
	View Bootloader version information, Active Firmware Image, Firmware Version level	**Maintenance/Tools>> Version (See Figure 10 on Page 14)**
	View Alarm/Event information, I/O Statistics, Ethernet Statistics	**Statistics/Events>> Alarms/Events Event Log I/O Statistics Ethernet Statistics (See Figure 11 on Page 15 & following submenus)**

Table 1. Menu Selection Chart *(Continued)*

Task Category	*If you wish to...*	*Refer to this Menu>>Submenu(s)*
View/Set Radio (RF) Operating Parameters	Set RF Output Power, Modem Type, RX/TX Frequency	**Radio Configuration>> Basic Settings (See Figure 16 on Page 18)**
	View/Set Soft-Carrier Dekey status, RX/TX Time-Out options	**Radio Configuration>> Advanced Settings (See Figure 17 on Page 20)**
	Data-Key and RTS-Key settings (ON/OFF)	**Radio Configuration>> Advanced Settings (See Figure 17 on Page 20)**
	Push-to-Talk/Clear-to-Send Delay times (ms)	**Radio Configuration>> Advanced Settings (See Figure 17 on Page 20)**
	Automatic Frequency Correction (AFC) setting	**Radio Configuration>> Advanced Settings (See Figure 17 on Page 20)**
	Switched Carrier ON/OFF setting	**Radio Configuration>> Advanced Settings (See Figure 17 on Page 20)**
	Configure Listen-Before-Transmit (LBT) collision avoidance	**Radio Configuration>> LBT Settings (See Figure 18 on Page 23)**
	View Received Signal Strength (RSSI) level	**Radio Performance (See Figure 19 on Page 25)**
	Key the radio transmitter, view power output	**Radio Test>>RF Keying Test (See Figure 49 on Page 65)**
	Monitor local radio emissions for possible interference	**Radio Test>>Spectrum (See Figure 50 on Page 66)**
View/Set Device Configuration	View Serial No., Model 1 (hardware), Model 2 (software) version, Firmware Version, Build Date	**Device Configuration>> Device Info (See Figure 21 on Page 26)**
	Set Owner Name/Message, enable/disable Sleep Mode, set COM LED mode, Radio Mode	**Device Configuration>> Device Settings (See Figure 23 on Page 28)**
	Configure radio to support multiple hosts on serial and Ethernet ports.	**Device Configuration>> Multihost Settings (See Figure 24 on Page 31)**
	Configure time delays to identify packets on serial ports	**Device Configuration>> Packet Settings (See Figure 25 on Page 31)**
	Configure Unit ID and/or DLINK diagnostics settings	**Device Configuration>> Diagnostic Settings (See Figure 27 on Page 34)**
Security Settings	Set Password for radio	**Security Configuration>> Password (See Figure 29 on Page 36)**
	Set Device Security (enable/disable local login requirement, enable/disable Telnet access)	**Device Security Menu (See Figure 31 on Page 38)**
	Set Wireless Security parameters (Encryption on/off, phrase, DLINK Security on/off)	**Security Configuration>> Wireless Security (See Figure 30 on Page 37)**

Table 1. Menu Selection Chart *(Continued)*

Task Category	*If you wish to...*	*Refer to this Menu>>Submenu(s)*
Ethernet Port Configuration	Configure the IP settings (Static IP Address, Static IP Netmask, Static Default Gateway, DHCP enable/disable, Virtual Radio Channels–VRCs)	**Ethernet Configuration>> IP Configuration (See Figure 33 on Page 40)**
	Configure Ethernet Bridging	**Ethernet Configuration>> Bridge Configuration (See Figure 34 on Page 42)**
	Configure the Ethernet Port settings (Enable/disable port, set mode, Local IP Port, Destination IP Address, Destination IP Port, TCP Keepalive time)	**Ethernet Configuration>> Ethernet Data Port (See Figure 36 on Page 45)**
Serial Port Configuration	Configure COM1 settings (Startup mode, Data Baud Rate, Data format, Virtual Radio Channels–VRCs)	**Serial Configuration>> COM1 Port Settings (See Figure 42 on Page 56)**
	Configure COM2 settings (Mode, Baud Rate, Format, Buffer on/off, Device Type, Virtual Radio Channels–VRCs)	**Serial Configuration>> COM2 Port Settings (See Figure 43 on Page 58)**

Table 1. Menu Selection Chart *(Continued)*

Task Category	*If you wish to...*	*Refer to this Menu>>Submenu(s)*
Transceiver Maintenance and Diagnostic Tests	View Radio Performance data (Power Output, Signal-to-Noise Ratio, Received Signal Strength, DC Input voltage, operating temperature)	**Radio Performance (See Figure 19 on Page 25)**
	Perform radio tests (Radio Keying, run Spectrum Analyzer, run RTU Simulator)	**Maintenance/Tools>> Radio Test (See Figure 48 on Page 64)**
	View Bootloader version information, Active Firmware Image, Firmware Version level	**Maintenance/Tools>> Version (See Figure 10 on Page 14)**
	Locally Reprogram the Transceiver via Serial or TFTP transfer	**Maintenance/Tools>> Local Reprogram (See Figure 72 on Page 89)**
	Broadcast Remote Configuration settings to *all* radios in the network	**Maintenance/Tools>> Remote Reprogram Menu (See Figure 66 on Page 83)**
	Work with Configuration Files... –Restore Factory default configuration –Save/restore user configuration –View/restore key configuration parameters –Save/load key configuration parameters using file transfer (TFTP)	**Maintenance/Tools>> Configuration Management (See Figure 44 on Page 60)**
	Start radio network reprogramming (and monitor progress)	**Maintenance/Tools>> Remote Reprogram (See Figure 66 on Page 83)**
	Perform Ethernet PING to local Ethernet host	**Maintenance/Tools>> PING (See Figure 56 on Page 70)**
	Test communications to specific Remote radio	**Maintenance/Tools>> Linktest (See Figure 57 on Page 70)**
	Enter a Factory Authorization code, or view currently enabled features	**Maintenance/Tools>> Authorization Codes (See Figure 58 on Page 71)**
	View active Alarms/Events	**Statistics/Events Menu>> Alarms/Events (See Figure 59 on Page 72)**
	View logged Events	**Statistics/Events Menu>> Event Log (See Figure 13 on Page 16)**
	Adjust alarm signal output (active high/low)	**Statistics/Events Menu>> Alarm Signal Config. (See Figure 60 on Page 74)**
	View I/O Statistics for COM1, COM2, Ethernet Port, Remote Programming, Ethernet Interface, Data Link Layer, and MAC)	**Statistics/Events Menu>> I/O Statistics (See Figure 14 on Page 16)**

3.6 Using the Menu System—Common Tasks

The transceiver is designed for rapid installation with a minimum number of menu configuration steps. In many cases, only the receive (RX) and transmit (TX) frequencies need to be set to begin basic operation. Nevertheless, proper use of the menu system allows the transceiver to be tailored for optimal performance, and allows several key status points to be observed in real time.

This section describes common tasks performed with the menu system. Some of these might be performed at the time of installation, while others are intended for later management, programming or maintenance activities. For easy reference, the tasks described here are presented in the same order as those listed in Table 1.

Viewing Status and Performance Information

Perhaps the most common use for the menu system is to check the overall health and operating status of the radio. The arrangement of the menu system makes it easy to view this information in several different ways. Listed below are the key menus where status and performance information are displayed.

Starting Information Screen

When you first log in to the menu system, the **Starting Information Screen** appears (Figure 7). This screen is read-only, and provides key information about the current operating conditions of the transceiver. While changes cannot be made here, some of the entries (such as **Owner Name/Message, Unit Number, and Current IP Address**) are determined by information entered on other screens. To go to the Main Menu from here, press **G**.

NOTE: Pressing ESC at the Starting Information Screen switches the radio into x710 mode, which is not covered by this manual. Refer to the MDS SD Series Technical Manual, 05-4846A01 for more information.

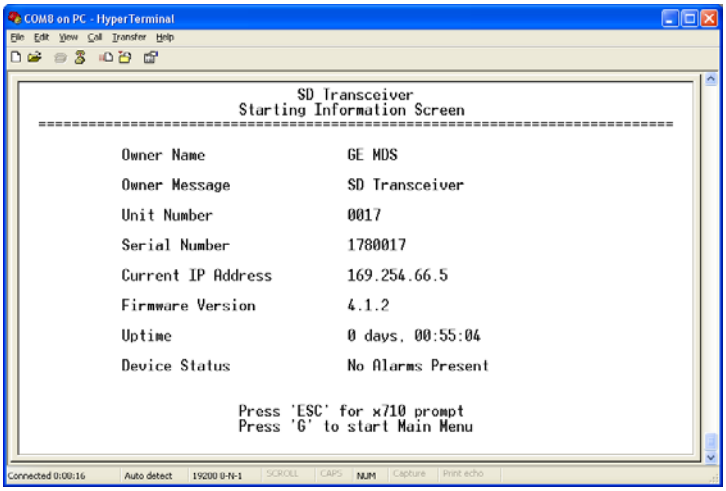

Figure 7. Starting Information Screen

Radio Performance Menu

The **Radio Performance Menu** (Figure 8) is another source of real-time operating information for the transceiver. It is available directly from the Main Menu.

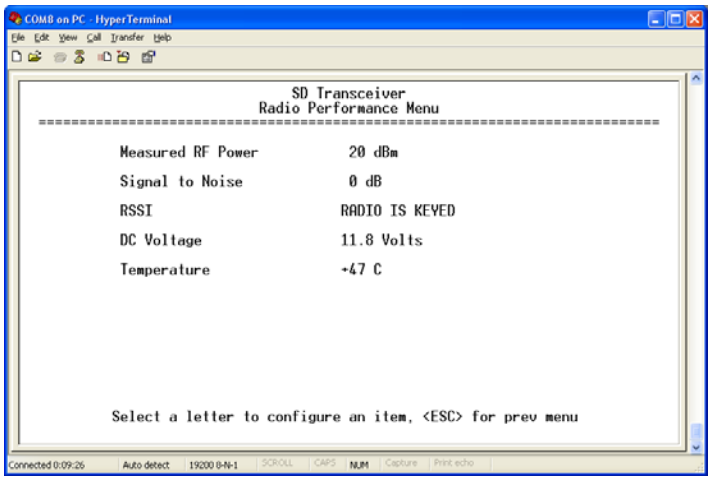

Figure 8. Radio Performance Menu

This menu displays the radio's RF output power, signal-to-noise ratio, received signal strength indication (RSSI), DC input voltage, and internal operating temperature. The information on this screen is read-only.

Device Info Menu

The **Device Info Menu** (Figure 9) shows additional read-only information for the radio, including its serial number, hardware configurator string (Model 1) software configurator string (Model 2), firmware version, build date, and Ethernet MAC address. This menu is accessed by selecting **Device Configuration>>Device Info** from the Main Menu. The information on this screen is read-only.

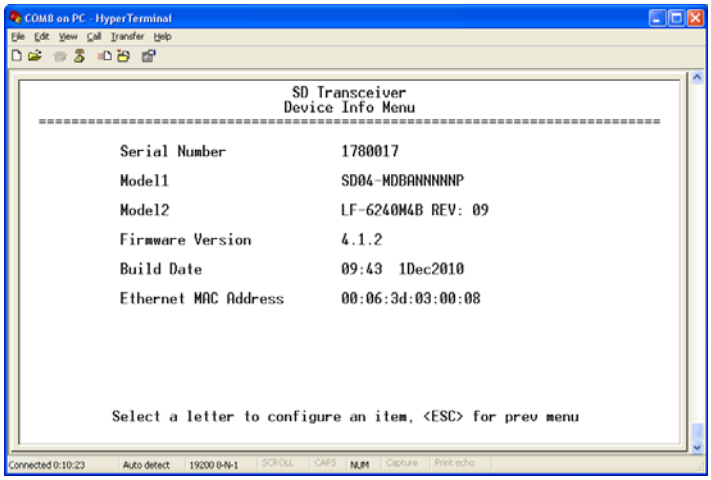

Figure 9. Device Info Menu

Version Menu

The **Version Menu** (Figure 10) shows Bootloader version information and indicates which firmware image (1 or 2) is currently active, as well as the firmware version of each image. It is accessed by selecting **Maintenance/Tools>>Version.** The information on this screen is read-only.

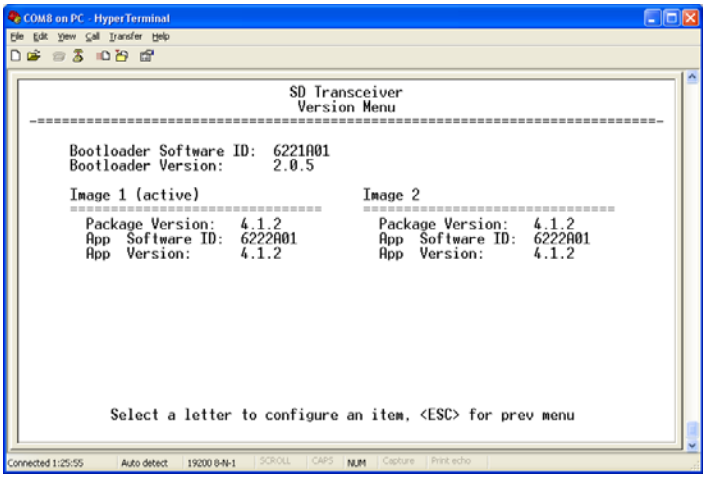

Figure 10. Version Menu

Statistics /Events Menu

From the **Statistics/Events Menu** (Figure 11), you can access submenus showing current and logged alarms/events, I/O statistics, and Ethernet statistics. These submenus are continually refreshed to show the most current information.

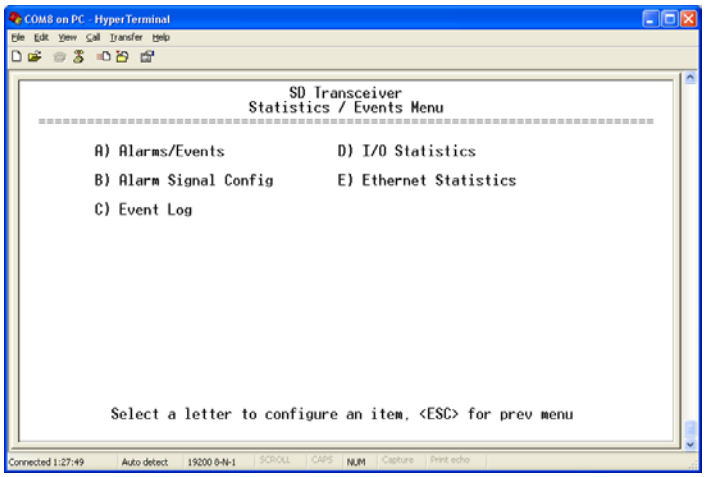

Figure 11. Statistics/Events Menu

The **Alarms/Events** submenu (Figure 12) shows a summary of current alarms (major and minor), status conditions, the status of the Alarm Output Signal, and a hexadecimal code for active alarm (if any). This code is useful for processing alarm reports by automated equipment. At the bottom of the screen are selections for displaying specific Alarms, conditions, and informational events. Additional information on dealing with alarms/events is provided in “Viewing Active Alarms/Events” on Page 72.

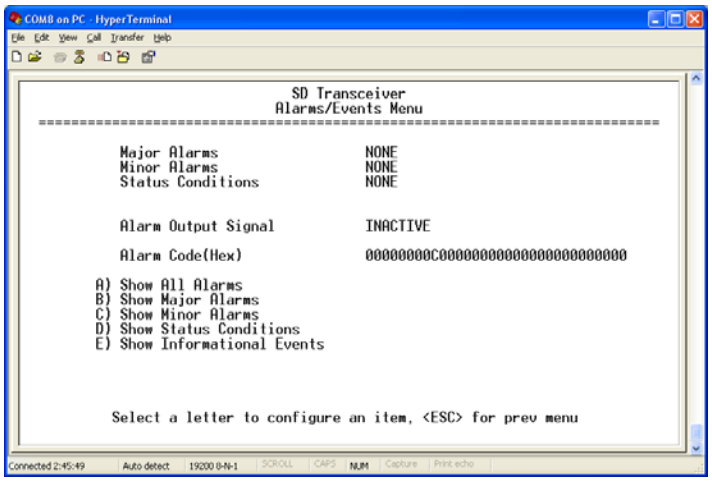

Figure 12. Alarms/Events Menu

The Event Log Menu (Figure 13) is used to display all events stored by the transceiver, even if the radio has been power-cycled. It also shows a running total of alarms stored. Select **Show Log** to view stored events, and **Clear Log** to erase all stored entries.

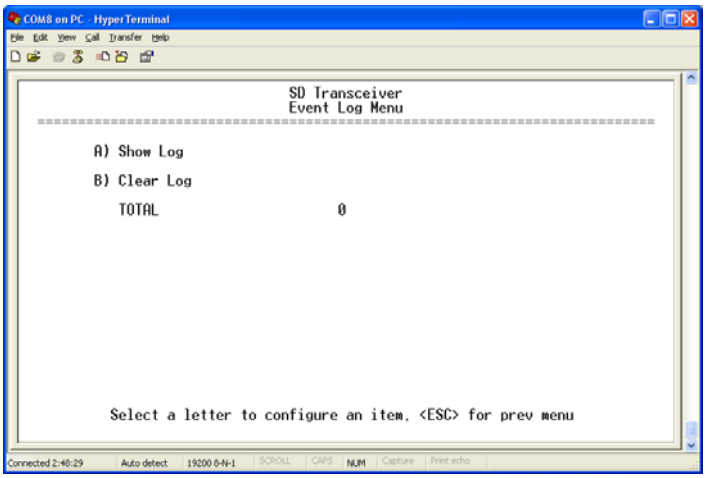

Figure 13. Event Log Menu

The **I/O Statistics** submenu (Figure 14) allows viewing transmitted and received bytes on any of the transceiver interface modules as selected by the user. Available selections are: **COM1, COM2, Ethernet data port, Remote Reprogram, Ethernet Interface, Modem, Drivers, Miscellaneous, All, Data Link Layer, Media Access Controller,** and **Port(s).**

Once a module is selected, a summary of TX and RX bytes is presented, along with the number of packets missed, retries, and number of blocks (as applicable, depending on the interface selection). The display is continually refreshed to show the latest information, and may be cleared at any time by selecting **Clear Module Statistics.**

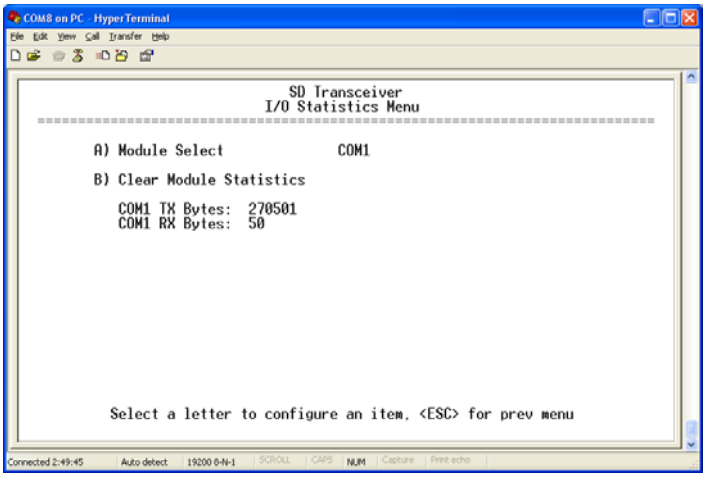

Figure 14. I/O Statistics Menu
(Example shows Statistics for COM1 Interface)

The **Ethernet Statistics** Submenu (Figure 15) presents a detailed summary of packets received and transmitted, dropped packets, errors, overruns of the buffer, RX data rate (bps), and RX/TX data for Unicast, Multicast, and Broadcast transmissions. Data may be cleared at any time by selecting **CLEAR** from the menu.

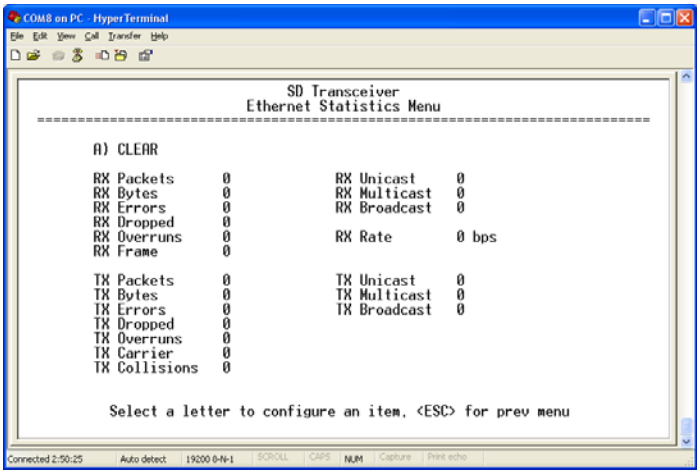

Figure 15. Ethernet Statistics Submenu

3.7 View/Set Radio (RF) Operating Parameters

RF Output Power Setting

The RF output power of the transceiver may be set between 20 and 37 dBm (0.1 to 5 watts) in1 dB increments. The default setting is **37 dBm.** Full power is not required in many cases, and lower settings will place less demand on the DC power supply and may reduce the chance of interference with other stations. Only the power necessary to carry out reliable communications should be used

To view or adjust the RF output power setting, proceed as follows:

1. Access the Basic Settings Menu by following this navigation path: **Radio Configuration Menu>>Basic Settings Menu** (see Figure 16). The power level is displayed to the right of **RF Output Power.**

2. If changes are needed, select **RF Output Power** and enter a new value in the field to the right of the parameter. Press the ENTER key to apply the change.

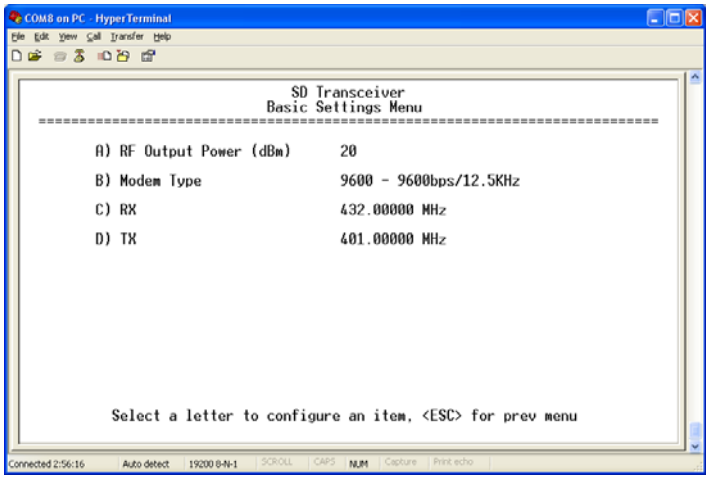

Figure 16. Basic Settings Menu
(Radio Configuration Menu>>Basic Settings Menu)

Modem Type Setting

The over-the-air data speed and bandwidth of the radio's transmitted signal is determined by the **Modem Type** setting on the Basic Settings sub-menu (Figure 16). All radios in the network must use the same modem setting if they are to communicate with one another. The default setting is **Modem 9600**, but it may be set to any of the selections shown in Table 2. The table also lists modem sensitivity ratings for the various modems. Note that some modem choices are limited based on the model purchased.

Table 2. Modem Selection vs. Speed, Bandwidth & Sensitivity

Modem Type Selection	OTA Speed (bps)	B/W (kHz)	Sensitivity (SD2)	Sensitivity (SD4)
Modem 9600[1]	9600	12.5	-112 dBm	-112 dBm
Modem 4800[1, 2]	4800	12.5	-112 dBm	-112 dBm
Modem 3200[1]	3200	5.0	-108 dBm	*N/A*
Modem 9600M[1, 2]	9600	12.5	-106 dBm	-106 dBm
Modem 4800F	4800	6.25	-108 dBm	-108 dBm
Modem 9600B[1]	9600	12.5	-106 dBm	-106 dBm
Modem 4800B[1]	4800	12.5	-110 dBm	-110 dBm
Modem BELL[1]	1200	12.5	-110 dBm	-110 dBm
Modem V23	1200	12.5	-110 dBm	-110 dBm
Modem 19200N	19200	12.5	-100 dBm	-100 dBm
Modem 19200E[2]	19200	12.5	-96 dBm	-96 dBm
Modem 9600N	9600	6.25	-98 dBm	-98 dBm
Modem 19200	19200	25.0	-105 dBm	-105 dBm

1) For MDS x710-compatible operation.

2) For ETSI compliance.

To change the modem type setting, proceed as follows:

1. Select **Modem Type** in the menu and press the spacebar to cycle through the available choices.

2. When the desired selection is displayed, press the ENTER key to apply the change.

NOTE: Some modem options may not be available depending on configuration and agency compliance restrictions.

RX and TX Frequencies

The receive (RX) and transmit (TX) frequencies may be viewed or set on the Basic Settings submenu (Figure 16). If no frequencies have been entered, the fields will be blank and the radio's PWR led will flash, indicating that an entry is needed. Frequencies *must* be entered for the radio to operate. Consult your station license to determine the authorized frequencies for your system. If changes are needed, proceed as follows:

1. Select **RX** from the menu and enter the receive frequency (in MHz) in the field to the right of the screen (**xxx.xxx**). Press the ENTER key to apply the change.

2. Select **TX** from the menu and enter the transmit frequency (in MHz) in the field to the right of the screen (**xxx.xxxxx**). Press the ENTER key to apply the change.

Soft-Carrier Dekey Setting

The Soft Carrier Dekey setting is located on the **Advanced Settings Menu** (Figure 17). It specifies how long (in ms) to wait after the removal of the keying signal before actually dropping the transmitter's carrier. The default setting is **0**, but it may be set to any value up to **255** ms.

In most cases, no change is required from the Soft-Carrier Dekey default setting. A possible exception may be if the transceiver will be inter-working with certain early-generation MDS radio equipment. If changes are required, proceed as follows:

1. Select **Soft Carrier Dekey** from the menu. The field to the right of the item clears and presents a flashing cursor.

2. Enter the desired soft-carrier dekey time and Press the ENTER key to apply the change.

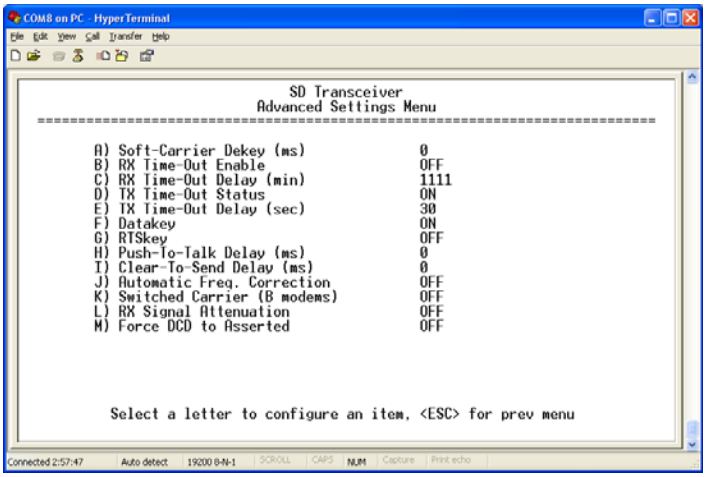

Figure 17. Advanced Settings Menu
(Radio Configuration>>Advanced Settings)

RX and TX Time-Out Settings

RX and TX timeouts may be used to set limits on how long the receiver and transmitter can operate continuously before shutting down. These settings are located on the Advanced Settings Menu (Figure 17).

RX Time-Out

RX Time-Out protects against a receiver which fails to receive data for a period exceeding the time-out setting. When the time is exceeded, an alarm is issued. The alarm can be used to signal switchover to an alternate unit in redundant systems. The RX time-out is cleared when the radio receives a new Carrier Detect signal.

The default setting for RX Time-Out is **OFF** (no time-out limit). To change the setting, proceed as follows:

1. Select **RX Time-Out Enable** from the menu and press the spacebar to change the display to the desired setting (**OFF** or **ON**).

2. When the desired selection is shown, press the ENTER key to apply the change.

If the RX Time-Out feature is set to **ON**, you must also specify a time-out time. Do this as follows:

1. Select **RX Time-Out Delay** from the menu and enter the time (in minutes) that you wish to impose for a delay. This parameter may be set anywhere between 1 and 1440 minutes (24 hours).

2. After the delay has been entered, press the ENTER key to apply the change.

TX Time-Out

TX Time-Out protects against a transmitter which remains keyed for a period exceeding the time-out setting. When this time is exceeded, the transmitter is taken offline, preventing disruption of the wireless network. The TX time-out is cleared when the keying source goes away and the radio keys again.

The default setting for TX Time-Out is **ON**. To change the setting, proceed as follows:

1. Select **TX Time-Out Status** from the menu and press the spacebar to change the display to the desired setting (**OFF** or **ON**).

2. Press the ENTER key to apply the change.

If the TX Time-Out feature is set to **ON**, you must also specify a time-out time. Do this as follows:

1. Select **TX Time-Out Delay** from the menu and enter the time (in seconds) that you wish to impose. The default setting is 30 seconds, but it may be set anywhere between 1 and 255 seconds.

2. After the delay has been entered, press the ENTER key to apply the change.

Datakey Setting

This setting determines whether or not the radio is configured to key (transmit) upon receipt of payload data at its interface port. The default setting is **ON**. To change the setting, proceed as follows:

1. Select **Datakey** from the menu and press the spacebar to change the setting to **OFF** or **ON**.

2. Press the ENTER key to apply the change.

RTSkey Setting

This setting determines whether or not the radio is configured to key (transmit) upon receipt of an RTS (ready to send) signal at its interface port. The default setting is **ON**. To change the setting, proceed as follows:

1. Select **RTSkey** from the menu and press the spacebar to change the setting to **OFF** or **ON**.

2. Press the ENTER key to apply the change.

NOTE: If your application does not use RTS, **RTSKey** should be set to **OFF** to avoid unexpected key-ups.

Push-To-Talk Delay

This setting allows programming a brief time delay after a keying event, which must expire before the radio is allowed to transmit. The allowable range is 0 to 255 ms, with the default being 0. To change the setting, proceed as follows:

1. Select **Push-To-Talk Delay (ms)** from the menu. A flashing cursor appears in the field to the right of the item.

2. Enter the desired delay time (0 to 255 ms) and press the ENTER key to apply the change.

Clear-to-Send Delay

This setting allows programming a brief time delay between when an RTS (ready-to-send) signal is received and when the CTS (clear-to-send) signal is returned. The allowable range is 0 to 255 ms, with the default being 0. To change the setting, proceed as follows:

1. Select **Clear-To-Send Delay (ms)** from the menu. A flashing cursor appears in the field to the right of the item.

2. Enter the desired delay time (0 to 255 ms) and press the ENTER key to apply the change.

Automatic Frequency Correction (AFC) Setting

Automatic Frequency Correction (AFC), is used to counteract the slight RF frequency drift that may occur over time or through wide swings of ambient temperature. The default setting for AFC is **ON**. To change the setting, proceed as follows:

1. Select **Automatic Frequency Control** from the menu and press the spacebar to change the display to the desired setting (**OFF** or **ON**).

2. Press the ENTER key to apply the change.

Switched Carrier Setting (B Modems Only)

In some networks, the master unit is not keyed continuously, and transmits only when it has data to send to remotes. This is known as *Switched Carrier* operation, and is only for use on radios with "B" modem suffixes. ("B" modems are intended for compatibility with earlier MDS x710 radios. See "Modem Type Setting" on Page 18 for a list of available modem types.)

Remote radios *always* operate in a Switched Carrier mode and should be set accordingly.

To change the Switched Carrier setting, proceed as follows:

1. Select **Switched Carrier** from the menu and press the spacebar to change the display to the desired setting (**OFF**, **ON**, or **AUTO**).

2. Press the ENTER key to apply the change.

RX Signal Attenuation

Limits the strength of incoming signals, for use in strong signal environments.

Listen Before Transmit (LBT) Feature

One challenge of operating a network with multiple data points is the avoidance of "collisions" caused by stations transmitting at the same time. The SD Transceiver provides an optional collision avoidance scheme called *Listen Before Transmit* (LBT). It employs P-Persistent CSMA protocol, which senses channel usage and inhibits transmission if the channel is currently in use. CSMA is an abbreviation for Carrier Sense Multiple Access.

NOTE: The Listen Before Transmit (LBT) feature requires radios to be configured for Packet Mode operation. Packet with MAC operation provides an alternative media access method.

LBT can be configured to behave in one of two ways; either *listen on the radio's transmit frequency (TX)* or *listen on the radio's receive frequency (RX)*. Typically, Remote radios are configured to **Listen on RX** (the default selection) to avoid collisions with the Master unit. In peer-to-peer configurations, **Listen on TX** may be preferred. Optimal choices depend on the data transmission characteristics of the connected system. This, and all other LBT parameters, are set using the LBT Settings Menu (Figure 18).

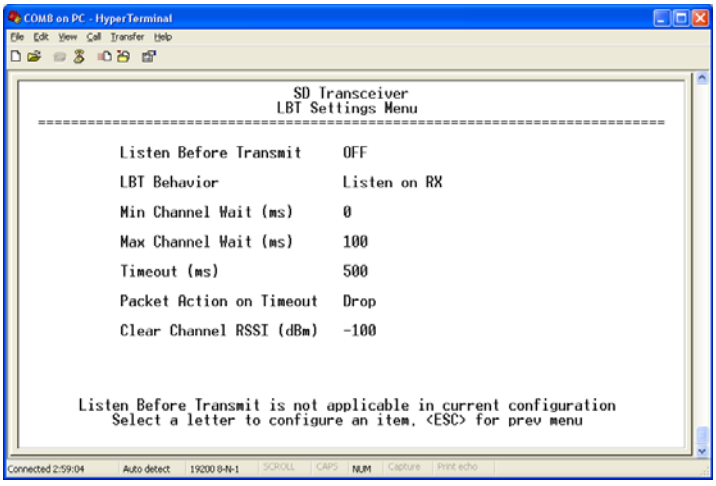

Figure 18. Listen Before Transmit (LBT) Settings Menu

Enabling LBT and Setting its Behavior

To activate the LBT feature, select the **Listen Before Transmit** menu item, and press the spacebar to change the field at the right to **ON**.

Setting LBT Channel Wait Times

The LBT menu provides a minimum and maximum channel wait time that may be set as required. These settings refer to the time period (in milliseconds) to wait after the channel is free before transmission is allowed.

Minimum wait time: Normally, the minimum channel wait time should not be changed from its default setting of **0** ms unless performing advanced operations, such as staggering the responses from multiple Remotes.

Maximum wait time: Normally, this setting should not be changed from its default of 100 ms unless performing advanced operations. Some examples of when this may be beneficial include:

- There is a need to stagger responses from several Remote radios.
- The transmission latency from the time the channel is free is too high, in which case a lower value can be entered.
- Collisions over the air are too high, in which case a higher value can be entered.

It should be noted that the lower the value of the Maximum Wait Time, the higher the chances of collisions occurring over-the-air. Conversely, the higher the value of the Maximum Wait Time, the higher the transmission latency.

To change the channel wait times, proceed as follows:

1. Select the desired menu item (**Min Channel Wait** or **Max Channel Wait**). The field to the right of the item clears and a flashing cursor appears.

2. Enter the desired wait time(s) in milliseconds and press the ENTER key to apply the change.

Setting LBT Timeout and Packet Action

The LBT menu provides a setting for the maximum time to wait (in milliseconds) for the channel to become free, referred to as **Timeout (MS)** on the menu. When this time is exceeded, the radio follows the action defined in the **Packet Action on Timeout** menu setting (either **Drop** or **Send**). To change the timeout setting, proceed as follows:

1. Select **Timeout (MS)** from the menu. The field to the right of the item clears and a flashing cursor appears.

2. Enter the desired timeout time in milliseconds and press the ENTER key to apply the change.

A related setting to **Timeout** is **Packet Action on Timeout**. This setting determines what to do with a packet once the timeout period has expired and the channel is still not available. If set to **Drop**, the packet is discarded. If set to **Send**, transmission of the packet is attempted despite the channel being busy.

Setting the LBT Clear Channel Threshold

LBT works by sensing the presence of a carrier signal on the radio's operating frequency. If a carrier is present, transmission is inhibited. The **Clear Channel RSSI** setting allows a threshold to be set which, when equaled or exceeded, declares the channel busy and therefore unavailable for transmitting.

Proceed as follows to set the **Clear Channel RSSI** parameter:

1. Select **Clear Channel RSSI** from the menu. The field to the right of the item clears and a flashing cursor appears.

2. Enter the desired signal threshold (in dBm) to specify the level at which a busy channel is declared. Press ENTER to apply the change.

View Received Signal Strength (RSSI)

The radio's built-in Received Signal Strength Indication (RSSI) is helpful for aligning directional antennas for best receiving performance, and for checking the quality of an incoming signal. This parameter is available on the Radio Performance Menu (Figure 19). The reading is expressed in dBm, thus the less negative the number, the stronger the signal (*i.e.*, a -70 dBm signal is stronger than a -80 dBm signal).

NOTE: The RSSI facility limits the maximum displayed signal strength to –60 dBm.

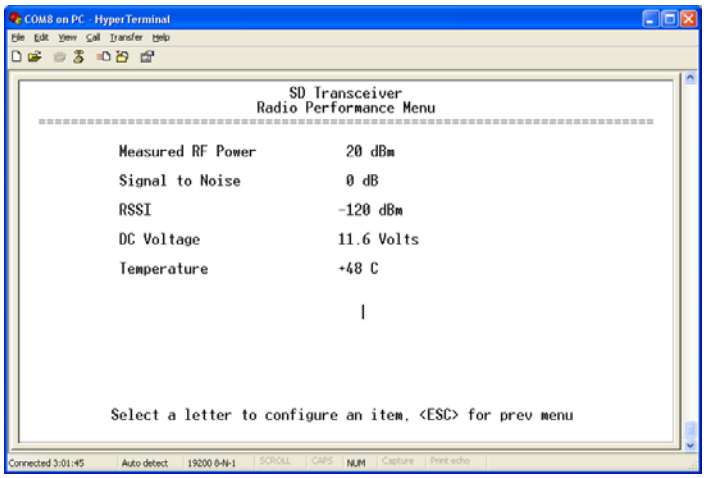

Figure 19. Radio Performance Menu

3.8 View/Set Device Configuration

Viewing Serial Number and Version Information

The radio's serial number and active firmware version are shown on the Starting Information Screen (Figure 20), which appears automatically at start-up, or by selecting **Main Menu>>Starting Information Screen.**

Version information may also be viewed on the Device Info Menu (Figure 21), which provides additional information, including the build date and Model1/Model2 identifier strings. **MODEL 1** displays *software* configuration data on how the radio was configured when shipped from the factory, while **MODEL 2** shows an identifier string associated with the radio's *hardware* bill of materials and revision.

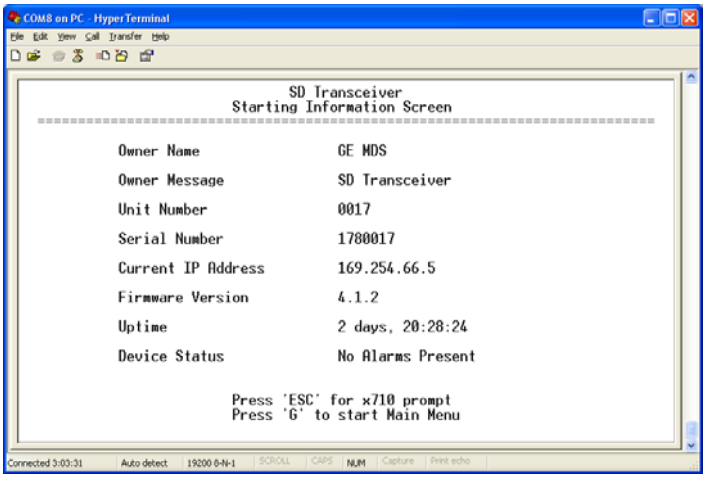

Figure 20. Starting Information Screen

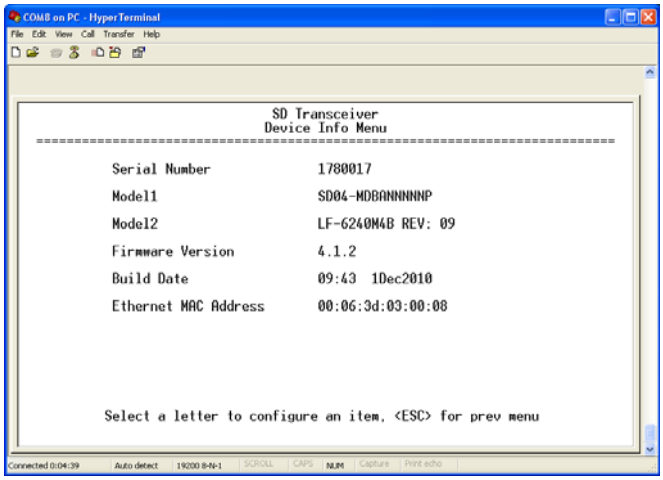

Figure 21. Device Info Menu

To view detailed version information for *both* active and inactive firmware images, use the radio's Version Menu (Figure 22). Navigation path: **Maintenance/Tools Menu>>Version Menu.**

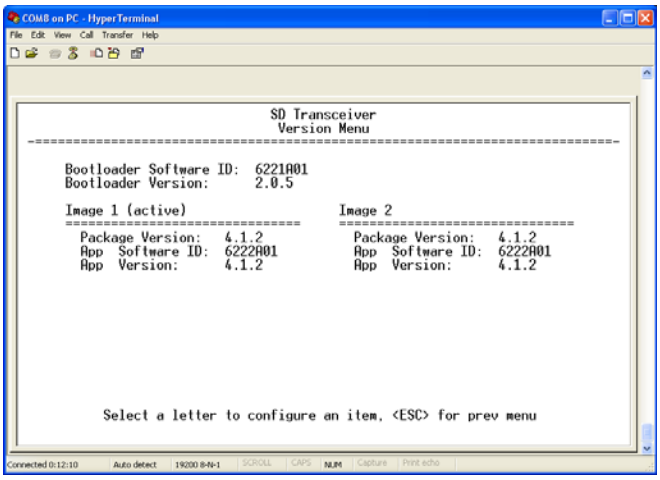

Figure 22. Version Menu

Setting Owner Name/Message

An owner name and message may be entered for the radio for informational purposes. These are "free-form" fields which do not affect the operation of the radio in any way. Such fields might be used to identify the network administrator/company name, and include a site-specific message (*i.e.*, **Unit 2 at North Tower site**).

The Owner Message appears at the top of every screen in the menu system, whereas *both* the Owner Message and Owner Name appear on the Starting Information Screen in a read-only format.

To edit either the Owner Name or Owner Message, follow this Navigation path and follow the steps given below: **Device Configuration Menu>>Device Settings Menu.**

1. At the Device Settings Menu (Figure 23) select **Owner Name** or **Owner Message** from the menu. The field to the right clears and a flashing cursor appears.

2. Enter the desired characters and press the ENTER key to apply the change. A limit of 30 alpha-numeric characters may be entered (there is no minimum), and any printable characters may be used.

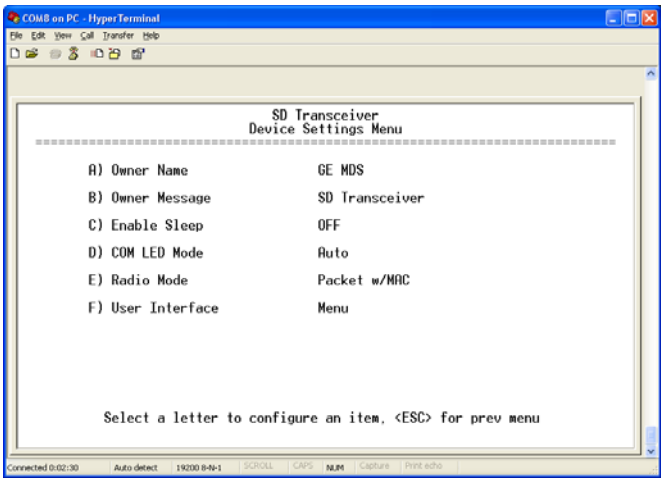

Figure 23. Device Settings Menu

Enabling/Disabling Sleep Mode

Sleep Mode places the transceiver into a "hibernated" low power state, with a nominal current draw of less than 10 mA (at 13 Vdc). "Wake-up" time is approximately 50 milliseconds. Sleep Mode is frequently used at battery/solar-powered sites to conserve power.

The ability to enter Sleep Mode is controlled through the Device Settings Menu (Figure 23), but an active low on Pin 4 of the COM2 port is what actually puts the radio to sleep. This signal must be supplied by the equipment connected to the radio (*i.e.*, RTU, PLC, etc.).

To enable or disable the Sleep Mode feature, select **Enable Sleep** from the Device Settings Menu and use the spacebar to toggle the selection to ON or OFF. Press the ENTER key to apply the change.

Setting Serial COM LED Mode

The behavior of the radio's COM/DATA LEDs may be configured using the Device Settings Menu (Figure 23 above). By default, the LEDs show dual port activity (menu selection **Auto**). Four LED modes may be selected as summarized in Table 3.

Table 3. COM/DATA LED Modes vs. Behavior

LED Mode Selection	Serial COM/DATA LED Behavior	
	LED1 Function	**LED2 Function**
x710	Monitors TXD on COM2 port	Monitors RXD on COM2 port
COM1 Activity	Monitors any COM1 RX or TX activity	OFF
COM2 Activity	OFF	Monitors any COM2 RX or TX activity
Dual Port Activity (**Auto** Default)	Monitors any COM1 RX or TX activity	Monitors any COM2 RX or TX activity

1. To select the LED Mode, access the Device Settings Menu and select **COM LED Mode**. Press the spacebar to cycle through the available choices.

2. When the desired selection is displayed, press the ENTER key to apply the change.

Viewing/Setting Radio Mode

The radio can operate in one of several modes. The available selections are: Packet, Packet with MAC, x710, and Transparent. To view or change the current operating mode, access the Device Settings Menu (see Figure 23 above). The radio mode is displayed on this menu. To change the mode, follow these steps:

1. Select **Radio Mode** from the menu. A flashing cursor appears in the field to the right of the item.

2. Press the spacebar until the desired operating mode is displayed. Press the ENTER key to apply the change.

Setting the User Interface Type

The Device Settings Menu contains the parameter **User Interface**, where you can select the method of radio management. The default selection is **Menu**, which presents the type of screens shown in this section of the manual.

Alternatively, you may select **CLI**, which switches the radio to a Command Line Interface. With a CLI interface, commands are entered in text-based fashion, as described in *APPENDIX-A CLI Scripting Interface*.

To change the User Interface setting, proceed as follows:

1. Select **User Interface** from the menu. A flashing cursor appears in the field to the right of the item.

2. Press the spacebar until the desired interface type is displayed. Press the ENTER key to apply the change.

NOTE: When switching to CLI mode, it is necessary to quit the menu system by pressing **Q**, and then log in again. A >> prompt will be received upon log-in, where any valid command may be entered. (Entering **help** provides a list of all CLI commands.)

To return to menu mode, enter **menu** and log in again.

Configuring the Radio to Support Multiple Hosts

(Only if operating in Packet mode without MAC)

A "host" in a telemetry system refers to the polling application and coordinates the routing of data between the master unit site and the remote locations. Many systems employ only one host computer, and no special settings beyond the default menu selections are needed.

In some systems, however, *multiple* host applications (possibly on different computers) may be operating at the master unit site. These computers can be running completely separate data streams, and yet both can use the SD Transceiver to communicate their data to and from the data equipment at associated remote sites. This is accomplished by connecting each host to one of the data interface ports on the SD transceiver.

Multihost configuration is only set at the Master site. Enabling Multihost causes the radio to allow single poll response transactions in a "round-robin" fashion on each enabled port. The ports can be physical ports like COM1 and COM2 or Payload ports (up to three, using the radio's one physical LAN connection).

The Multihost Settings Menu (Figure 24) is used to view or set the multihost parameters for the radio. This menu may be accessed by the following navigation path: **Main Menu>>Device Configuration>>Multihost Settings.** To make changes in the settings, proceed as follows:

1. To enable or disable multihost capability, select **Multihost Enable** from the menu. A flashing cursor appears in the field to the right of the item.

2. Press the spacebar until the desired selection is shown, and press ENTER to apply the change.

3. To set/change the multihost delay time, select Multihost Delay from the menu. A flashing cursor appears in the field to the right of the item.

4. Enter the desired delay time (in ms) and press ENTER to apply the entry.

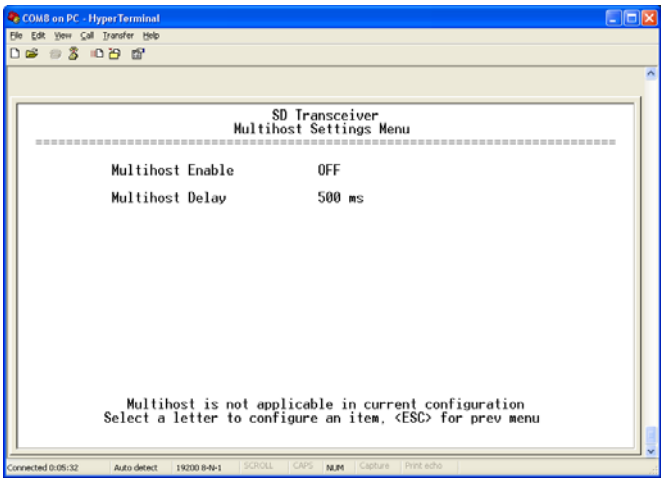

Figure 24. Multihost Settings Menu
(Note: Used for Packet mode only. Packet with MAC has an alternate media access method)

Configuring Packet Settings

For radios operating in Packet Mode, there are a number of settable parameters available on the Packet Settings Menu (Figure 25). This menu is accessible from the following navigation path: **Main Menu>>Device Configuration>>Packet Settings.**

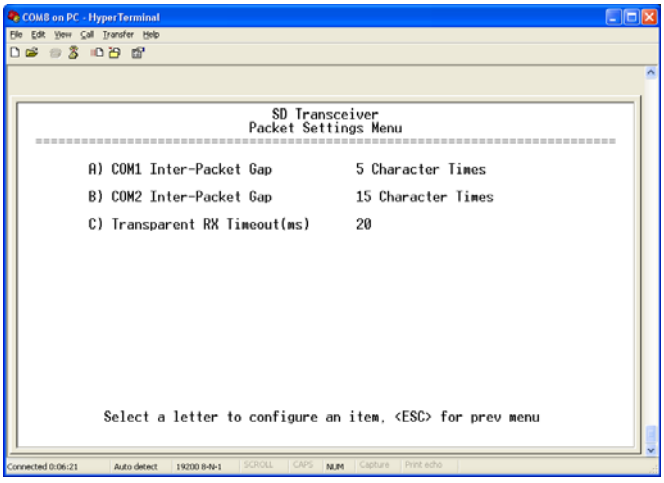

Figure 25. Packet Settings Menu

The settable parameters on this menu are: **Packet Mode, COM1 Inter-Packet Gap, COM2 Inter-Packet Gap,** and **Transparent RX Timeout.** If changes are required, follow the steps below for each of these parameters.

Packet Mode

Packet Mode may be set to **ON** or **OFF** as follows:

1. Select Packet Mode from the menu. A flashing cursor appears in the field to the right of the item.

2. Press the spacebar until the desired selection appears, and press ENTER to apply the selection.

COM1/COM2 Inter-Packet Gap

For radios operating in Packet Mode, the inter-packet gap is a timing setting used to delimit a packet on the serial interface. Too short of a time can cause serial streams to be combined into one large packet instead of two smaller ones. Too long of a time can effectively slow down the communications channel. The transceiver's Inter-Packet Gap is specified by the number of character times (the time it takes to send an individual character).

To set the Inter-Packet Gap for COM1 or COM2, proceed as follows:

1. Select **COM1 Inter-Packet Gap** or **COM2 Inter-Packet Gap** from the menu. The field clears to the right of the item and a flashing cursor appears.

2. Enter the number of character times desired and press ENTER to apply the selection. The field changes to show the number entered followed by the words "Character Times" (*i.e.*, **5 Character Times**).

Transparent RX Timeout

This setting is similar to the timing parameters for **COM1/COM2 Inter-Packet Gap**, but it applies to data received *over-the-air*. It tells the radio how to build an Ethernet packet based on a transparent data stream received over the radio channel.

If changes are needed to the this parameter, proceed as follows:

1. Select **Transparent RX Timeout** from the menu. The field clears to the right of the item and a flashing cursor appears.

2. Enter the number of milliseconds desired for the Transparent RX Timeout setting and press ENTER to apply the selection.

Media Access Control Settings
(Packet with MAC operation)

The Media Access Control (MAC) feature is designed to prevent collisions when two or more radios attempt to use the radio channel at the same time. The menu screen is shown in Figure 25. It is accessible from the following navigation path: **Main Menu>>Device Configuration>>Media Access Control.**

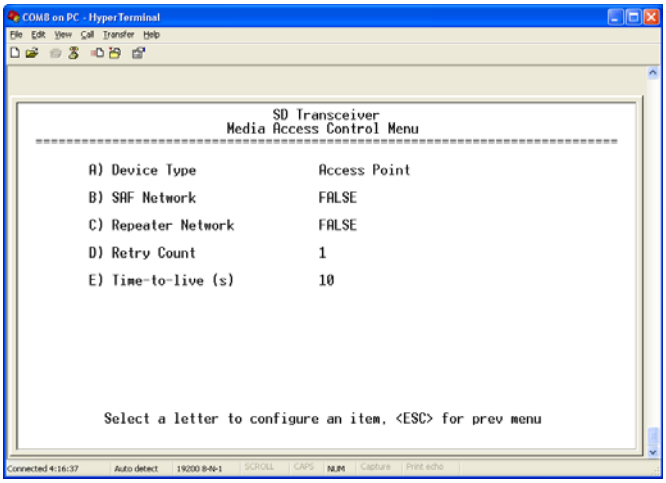

Figure 26. Media Access Control Menu

Device Type Selects **Access Point**, **Remote**, or **Store and Forward**. An Access Point serves as the Controller of the RF network. Only one radio is configured as an AP. Typically this is the "polling master." A **Remote** is connected to end devices in the field (*e.g.* PLC, RTU), and there can be any number of these in a network. Each Remote must have a unique Unit Address, however, which is set on the Diagnostic Settings screen (see below). A Store and Forward device is a radio designated to retransmit data to/from an outlying Remote (see SAF Network, below).

SAF Network This item (AP Only) selects whether or not a Store and Forward radio is present in the network (**True**), or disabled (**False**). Store and Forward allows extending the coverage area of a network beyond the primary "footprint" of the system. This can be used to link outlying Remotes (or Remotes blocked by terrain or other obstructions) into the network. A detailed discussion on using Store and Forward is provided in the MDS SD Series Technical Manual, 05-4846A01.

Repeater Network This setting (AP Only) must be enabled if the RF network contains a repeater station, or communications will not work. Remotes automatically learn this setting from the AP.

Retry Count If a message is not acknowledged after transmission it will be resent. This value controls how many times the radio attempts to resend the message before discarding it.

Time to Live (s) When a message arrives from the payload interface(s) it is time-stamped and queued for radio transmission. If the radio cannot transmit the message before the Time-to-live (TTL) value, the message is discarded. This helps prevent stale or old data from being sent over the air.

Configuring Diagnostic Settings

The Diagnostic Settings Menu (Figure 27) is used to configure the radio for Network Wide Diagnostics, which uses the GE MDS-proprietary DLINK protocol. Explanations of these menu items are provided below. For more detailed information on diagnostics, refer to "Performing Network-Wide Remote Diagnostics" on Page 78.

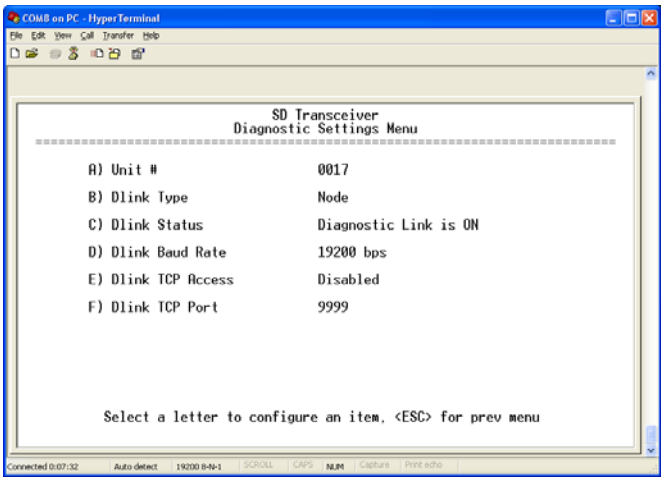

Figure 27. Diagnostic Settings Menu

Unit #

This parameter identifies the radio in the wireless network with a specific ID during diagnostic sessions. To change the setting, proceed as follows:

1. Select **Unit #** from the menu. The field to the right of the item clears and a flashing cursor appears.
2. Enter the desired 4-digit unit ID number and press ENTER to apply the change.

DLINK Type

This setting identifies the radio as either a *Node*, *Root*, *Repeater*, *Peer*, or *Gate*. Each of these are operating modes of the transceiver with respect to diagnostic/management activities. (See "Performing Network-Wide Remote Diagnostics" on Page 78 for details.) To make changes to this setting, proceed as follows:

1. Select DLINK Type from the menu. A flashing cursor is presented in the field to the right of the item.
2. Press the spacebar until the desired entry is shown, and press ENTER to apply the change.

DLINK Status

This item is used to enable or disable diagnostics functionality. Setting it to **ON** configures the radio to pass the diagnostic link protocol (DLINK) over the radio's COM1 management port. To make changes to this setting, proceed as follows:

1. Select **DLINK Status** from the menu. A flashing cursor is presented in the field to the right of the item.

2. Press the spacebar until the desired entry is shown (**Diagnostic Link is ON** or **Diagnostic Link is OFF**), and press ENTER to apply the change.

Dlink Baud Rate

This setting determines the diagnostics data communication rate in bits-per-second (bps). To change the setting, proceed as follows:

1. Select **Dlink Baud Rate** from the menu. A flashing cursor is presented in the field to the right of the item.

2. Press the spacebar until the desired entry is shown (**1200, 2400, 4800, 9600, or 19200 bps**), and press ENTER to apply the change.

3.9 Security Settings

The transceiver offers a number of safeguards against unauthorized management access and protection of payload data. All of these features are accessed via the Security Configuration Menu (Figure 28).

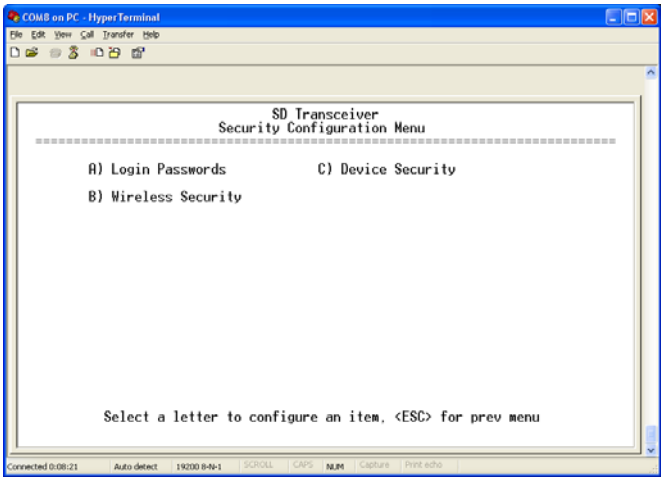

Figure 28. Security Configuration Menu

Setting a Password

When the transceiver is shipped from the factory, the password is normally set to the default entry of **admin**. However, it is recommended that it be changed at the time of installation to one that is known only to the Administrator or authorized user of the system. The password should be changed periodically to maintain the best security. To set a new password, proceed as follows:

1. Select **Password** from the Security Configuration Menu. The screen changes to the Password Menu screen (Figure 29).

2. Select **Administrator** from the menu. The field of asterisks to the right of the item clears, and a flashing cursor appears.

3. Type a new password. Passwords are case sensitive and may use up to 13 alpha-numeric characters. Do not use punctuation mark characters. Press ENTER to apply the change.

4. At the **Retype Password** prompt, enter the password again and press ENTER. (This step protects against setting a wrong password, as both entries must match exactly.)

5. The confirmation message **Passwords changed successfully** appears.

TIP: For enhanced security, consider using misspelled words, a combination of letters and numbers, and a combination of upper and lower case letters. Also, the more characters used (up to 13), the more secure the password will be. These strategies help protect against sophisticated hackers who may use a database of common words (for example, dictionary attacks) to determine a password.

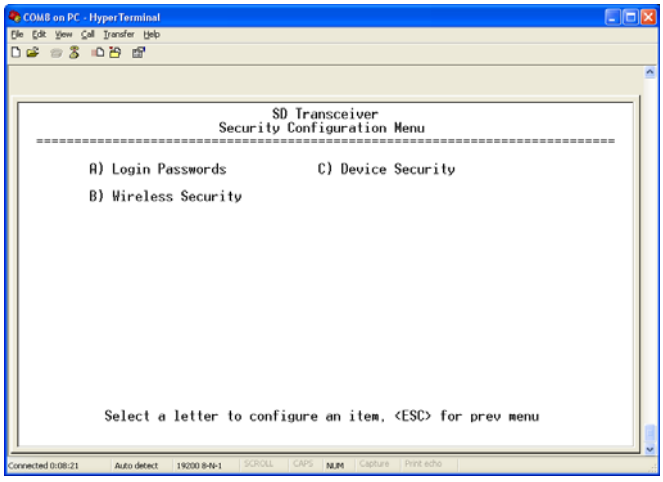

Figure 29. Password Menu

Setting the AES Wireless Security Parameters

When operating in Packet mode, the radio can encrypt data sent over the air using the AES 128 security standard, if desired. This applies a 128-bit encryption security algorithm to the data based on a user-defined phrase. To enable or disable wireless security, proceed as follows:

1. Select **Encryption** from the Wireless Security Menu (Figure 30). A flashing cursor appears in the field to the right of the item.

2. Press the spacebar until the desired setting appears (**OFF** or **AES 128**) and press ENTER to apply the change.

Phrase Entry

If AES 128 encryption has been enabled, a valid "phrase" must also be set. Both the sending and receiving station must have the same phrase for communication to occur. To set or change the encryption phrase, proceed as follows:

1. Select **Phrase** from the menu. The field to the right of the item clears, and a flashing cursor appears.

2. Enter the desired phrase. Press ENTER to apply the change.

3. Enter the characters again at the **Retype Phrase** prompt, and press ENTER. (This step protects against setting a wrong phrase, as both entries must match exactly.)

4. The confirmation message **Phrase changed successfully** appears.

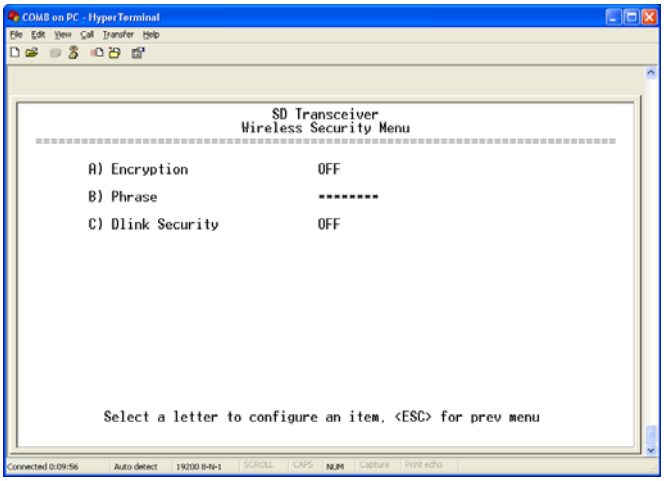

Figure 30. Wireless Security Menu

Dlink Security Setting

Security restrictions may also be applied to network-wide diagnostic data using this menu. To enable or disable diagnostic security, select **Dlink Security** from the menu and press the spacebar to display **OFF** or **ON** in the field to the right, as desired. The default setting is **OFF**. Press ENTER to apply the change.

If **Dlink Security** enabled, users performing network-wide diagnostics must log in before being able to change the configuration of the radio via Dlink.

Menu

The Device Security Menu (Figure 31) is used to set the access method for the transceiver's menu system, and also to determine if Telnet access is permitted.

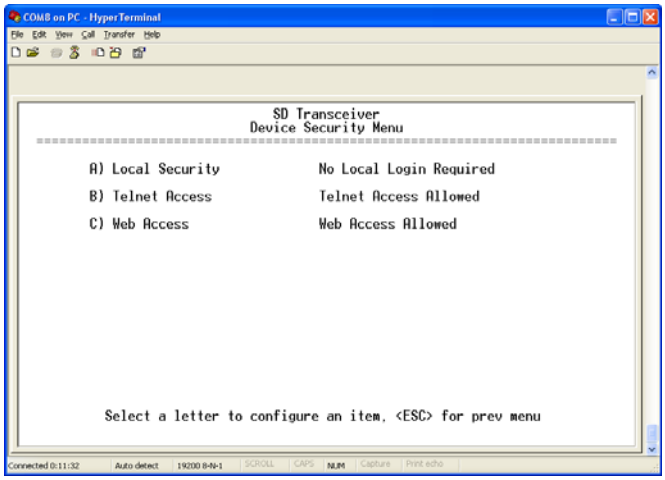

Figure 31. Device Security Menu

Local Security (Login) Setting

The Local Security parameter is used to specify whether or not a local log-in is required when using the transceiver's menu system. The default setting is **Local Login Required**, and is appropriate for most circumstances. Setting this parameter to **No Local Login Required** might be useful in cases where only a small number people with administrative duties have physical access to the radio, and need to access the menu frequently. In this mode, the menu operation behaves identically to the Administrator level login.

To change the Local Security setting, proceed as follows:

1. Select **Local Security** from the menu. A flashing cursor appears in the field to the right of the item.

2. Press the spacebar until the desired selection is displayed. Available selections are: **Local Login Required**, and **No Local Login Required**. Press ENTER to apply the change.

Telnet Access

Telnet access is a powerful feature that allows management of the radio via an Ethernet connection. This may be done locally, using a short cable connected to the management PC, or could be performed at any distance using an IP/Ethernet network connection. Telnet access is also possible over the air if the Ethernet Bridging feature is enabled (see Page 41). Any user with the IP address of the radio can log in to the unit with this method. The Telnet menus are identical to the screens described in this section of the manual.

The default setting is to allow Telnet access to the radio. In some cases, you may not wish to allow access for security or operational reasons. To change the Telnet Access setting, proceed as follows:

1. Select **Telnet Access** from the menu. A flashing cursor appears in the field to the right of the item.

2. Press the spacebar until the desired selection is displayed. Available selections are: **Telnet Access Allowed**, and **No Telnet Access Allowed.** Press ENTER to apply the change.

Web Access

Web access to the unit's management system is normally allowed. To disable web access, proceed as follows:

1. Select **Web Access** from the menu. A flashing cursor appears in the field to the right of the item.

2. Press the spacebar until the desired selection is displayed. Available selections are: **Web Access Allowed**, and **No Web Access Allowed.** Press ENTER to apply the change.

3.10 Ethernet Configuration

The transceiver provides Ethernet functionality for applications utilizing IP traffic, or for device management (see *SD Technical Manual*, 05-4846A01 for Device Manager information). Such applications must be aware of the amount of traffic they are sending. IP protocols have more overhead and tend to send multiple messages when compared to traditional serial protocols. If too much traffic is generated this will make it difficult for a radio to get onto the channel and data loss may occur.

NOTE: If higher layer IP services (Telnet/FTP/TFTP, etc.) are required across the radio network, it is recommended that polling be temporarily suspended until those services are complete.

The Ethernet Configuration Menu (Figure 32) is the central location for setting/viewing all IP and Ethernet parameters for the radio. It contains three types of submenus: IP Configuration, Ethernet Bridge Configuration, and IP Payload configuration.

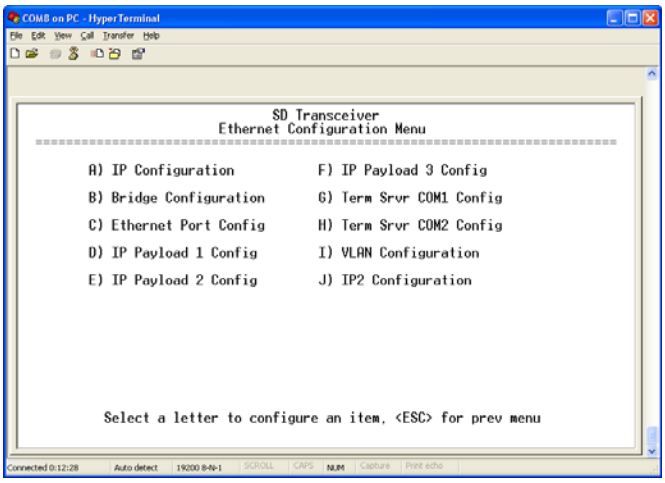

Figure 32. Ethernet Configuration Menu

Configuring the IP Settings

The IP Configuration Menu (Figure 33) contains various settings for the IP data stream. Each item is listed below along with instructions for making changes. Note that the bottom of the screen displays the *current settings* that have been applied to the radio in a read-only fashion.

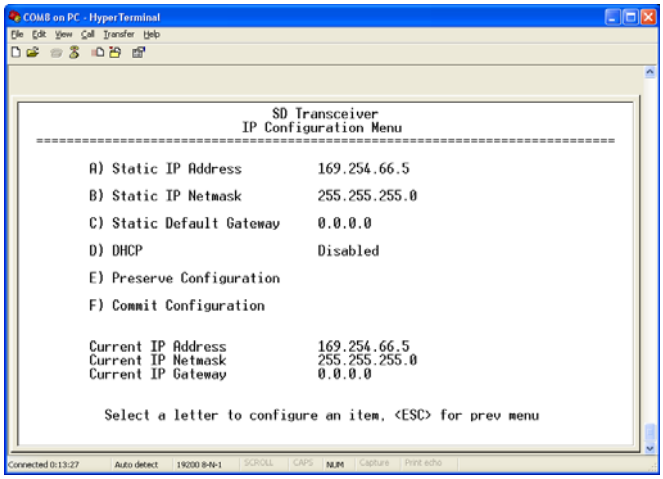

Figure 33. IP Configuration Menu

Static IP Address

The radio requires a local IP address to support remote management and serial device (terminal server) services. An IPv4 IP address should be entered in this field, unless DHCP is enabled, in which case it is not required. To set or change the radio's static IP address, proceed as follows:

1. Select **Static IP Address** from the menu. The field to the right clears and a flashing cursor appears.

2. Enter an IPv4-compliant IP address string and press ENTER to apply the change.

Static IP Netmask

This refers to the radio's IPv4 local subnet mask. This parameter is used when the radio attempts to send a locally-initiated message, either from the terminal server, or a management process. You need not define it if DHCP is enabled. To set or change the radio's static IP netmask, proceed as follows:

1. Select **Static IP Netmask** from the menu. The field to the right clears and a flashing cursor appears.

2. Enter an IPv4-compliant IP netmask string and press ENTER to apply the change.

Static Default Gateway

This is the IPv4 address of the default gateway device, typically a router connected to the radio. To set or change the static default gateway, proceed as follows:

1. Select **Static Default Gateway** from the menu. The field to the right clears and a flashing cursor appears.

2. Enter an IPv4-compliant static gateway address and press ENTER to apply the change.

DHCP

Dynamic Host Configuration Protocol (DHCP) handles the assignment of IP parameters (Address, Netmask, Gateway) to all units in a network, and allows for introducing new devices on the network with minimal manual intervention. The assigned parameters are valid for a specific "lease" time, at which point they can be reassigned or renewed. To enable or disable DHCP, proceed as follows:

1. Select **DHCP** from the menu. A flashing cursor appears in the field to the right.

2. Press the spacebar until the desired state (**Enabled** or **Disabled**) is displayed and press ENTER to apply the change.

Ethernet Bridge Configuration

Ethernet Bridging is a feature that allows the radio to transparently exchange Ethernet packets with other properly configured units. In this way, locally-connected devices at the Master site (*e.g.*, a PC or PLC) can communicate via Ethernet with devices connected at Remote radios (*e.g.*, an RTU or other data device), and vise versa.

NOTE: To make use of Ethernet Bridging, the radio must be properly authorized. If it is not, contact your sales representative for further information. Bridging is only available on ES models.

Ethernet Bridging preserves the original overhead (*i.e.*, Ethernet and IP headers) of the Ethernet frames that are received from the only supported port: The RJ-45 Ethernet port. While this is a robust, full-featured method of exchanging Ethernet data, it is not as efficient as the IP Payload method described in "IP Payload 1/2/3 Configuration Settings" on Page 44. It also increases the chance of data collisions in a network.

The following points apply to the use of Ethernet Bridging:

- Bridging is only available on radios configured to operate in *Packet* mode or *Packet with MAC* mode.
- Ethernet Bridging must be enabled at both the Master unit and each Remote radio that requires Ethernet communications.
- Ethernet Bridging may be used for remote RTU diagnostics as well as for MODBUS TCP polling, although poll times may need to be extended due to the narrowband transmission mode used.
- The transceiver is still able to pass serial polling and IP payload data (which is distinctly different from Ethernet Bridging data) during the time that Ethernet Bridging is active.

The **Bridge Configuration Menu** is shown in Figure 34. This is where Ethernet Bridging can be enabled and various filter parameters set as required for your network.

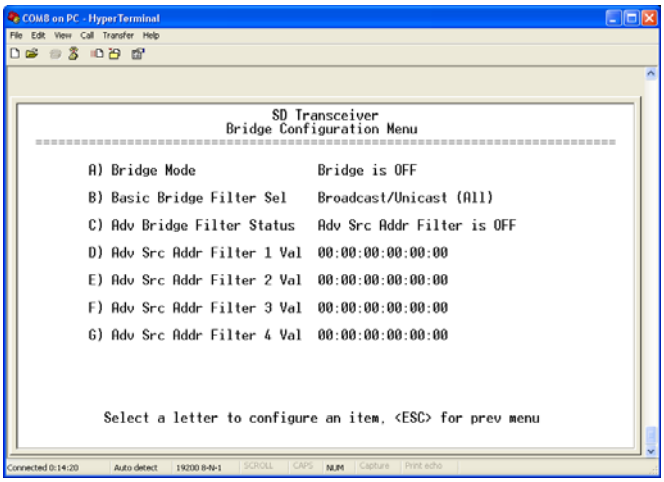

Figure 34. Bridge Configuration Menu

Enabling Ethernet Bridging

To enable Ethernet Bridging on the radio, proceed as follows:

1. Select **Bridge Mode** from the menu. A flashing cursor appears in the field to the right of the item.

2. Press the spacebar until the desired selection is displayed (**Bridge is OFF** or **Bridge is ON**). Press ENTER to apply the change.

Basic Bridge Filter Selection

The purpose of this filter is to minimize the amount of Ethernet traffic between the Polling radio and the Remote radios for more efficient operation. For example, Unicast and ARP allows pings as well as UDP and TCP polling in the transceiver's bridge, but it does *not* allow some protocols that tend to flood a network, including Spanning Tree Protocol (STP).

To set the Basic Bridge Filter Selection, proceed as follows:

1. Select **Basic Bridge Filter Sel** from the menu. A flashing cursor appears in the field to the right of the item.

2. Press the spacebar until the desired selection is displayed. Available selections are: **Broadcast/Unicast (All), Unicast and ARP,** and **Unicast Only.** Press ENTER to apply the change.

Setting the Advanced Bridge Filter Status

The purpose of this filter is to only bridge the Ethernet traffic received from a specific Ethernet-enabled device.

To set the Advanced Bridge Filter Status, follow these steps:

1. Select **Adv Bridge Filter Status** from the menu. A flashing cursor appears in the field to the right of the item.

2. Press the spacebar until the desired selection is displayed. Available selections are: **Adv Src Addr Filter is OFF,** or **Adv Src Addr Filter is ON.** Press ENTER to apply the change.

Setting the Advanced SRC Address Filter Value

To set the Advanced SRC Address Filter Value, follow the steps given below:

1. Select **Adv Src Addr Filter Val** on the menu. The field to the right of the item clears and a flashing cursor appears.

2. Enter the desired filter value, and press ENTER to apply the change. The entry format must be **xx:xx:xx:xx:xx:xx.**

Ethernet Port Configuration

The Ethernet Port Configuration submenu (Figure 35) is where the Auto Power Save feature may be set (Enable/Disable). Enabling auto power save prevents the Ethernet port from shutting down if an Ethernet link is not detected. The submenu also shows the assigned Ethernet Address.

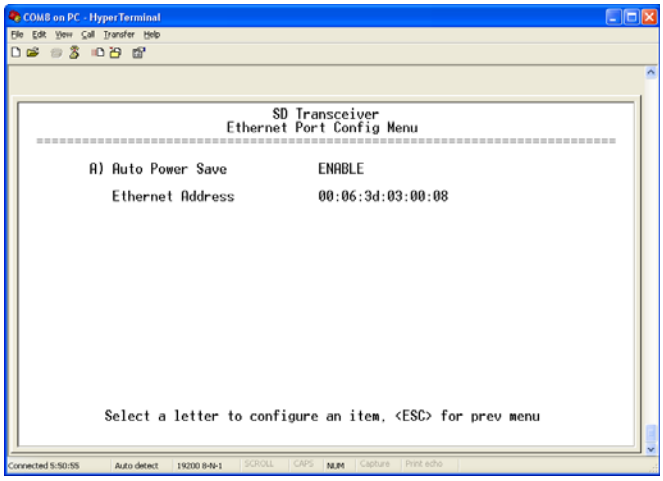

Figure 35. Ethernet Port Configuration Submenu

IP Payload 1/2/3 Configuration Settings

This section describes how to setup and configure the radio for exchanging IP/Ethernet Payload data with Remote radios. It is an efficient feature that supports Ethernet connectivity with maximum over-the-air (OTA) efficiency for UDP and TCP data streams. Remote radios receiving the data can then forward this traffic to their serial ports or the Ethernet port. This feature is particularly useful for adding Ethernet devices to a mixed SD/x710 system. This feature is distinctly different than *Ethernet Bridging*, which is described above.

NOTE: To make use of this feature, the radio must be properly authorized for Ethernet data. If it is not, contact your sales representative for further information.

It is helpful to understand that IP data is terminated at the radio, yet the payload data is transmitted OTA. As such, the radio acts as a *terminal server* that converts IP data into a serial "over-the-air port." In other words, a transmitting radio receives an IP message, strips off the IP headers, and sends it over the air with VRC identification (VRC-1, VRC-2, or VRC-3). A receiving radio may then be set up, for example, to have COM2 or an IP port deliver all VRC-1 traffic.

The transceiver supports operation on *three* IP payload ports. These settings are made on the **IP Payload Configuration Menu** (1, 2, or 3) as shown in Figure 36. In the Master unit only, Multihost may need to be enabled if more than one IP Payload port is required.

IP Payload is intended to be used in a poll-response system. An Ethernet device at the master sends UDP/TCP poll messages to the master radio's Ethernet port which is configured to listen for data. The poll is sent OTA and a RTU/PLC attached to one of the Remote radios (via serial or Ethernet) responds. The response is sent OTA back to the Master radio. The Master radio then sends the response back to the polling station via Ethernet.

When configuring this feature, you are notified of the success or failure of the operation. Additionally, Ethernet and OTA statistics can be monitored to inspect the success of the poll-response communication.

The following additional points apply to Ethernet payload operation:

- To make efficient use of limited bandwidth, this feature transports the *payload content* of Ethernet data to be sent over the air.
- This feature does *not* bridge Ethernet networks separated by radios. For Ethernet Bridging information, refer to “Ethernet Bridge Configuration” on Page 41.
- A *broadcast* poll-response network is assumed, where addressing information is contained in the payload portion of the UDP/TCP messages.

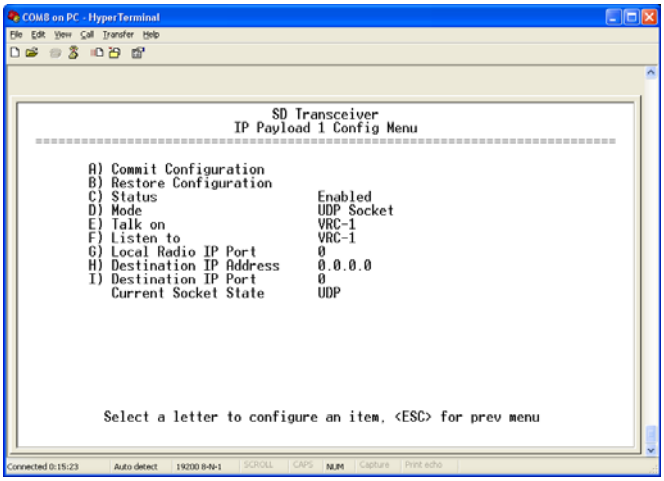

Figure 36. IP Payload Configuration Menu
(Three such menus are provided for Payload 1, 2, and 3)

Understanding Virtual Radio Channels (VRC) for IP and Serial Data

Instructions for common menu tasks are provided below. The use of **Virtual Radio Channels (VRCs)** may require additional explanation for new users. VRCs allow over-the-air data to be directed to specific interface ports (IP or Serial). Conceptually, this can be pictured as creating “pipes” for delivery of data to the desired radio interfaces.

VRC works by associating data from a specific port (IP and Serial) with a VRC channel number (1, 2, or 3). Each port at the receiving end then filters incoming data based on the associated VRC number.

NOTE: The Virtual Radio Channel (VRC) feature only works on radios configured to operate in Packet Mode.

To create the "pipes" that direct data to the desired ports, a route must be established using the IP Payload Configuration Menu (or the COM1/COM2 Settings Menu for serial data). The default menu setting is to listen to *all* channels.) The **Talk on** parameter is used to specify the VRC used for sending the data stream out, while the **Listen to** parameter specifies the VRC(s) for incoming data. Use of these parameters is described below.

Any combination of the three VRC numbers may be entered in the menu fields. Figure 37 illustrates the relationship between the VRC settings and the routing of data between units.

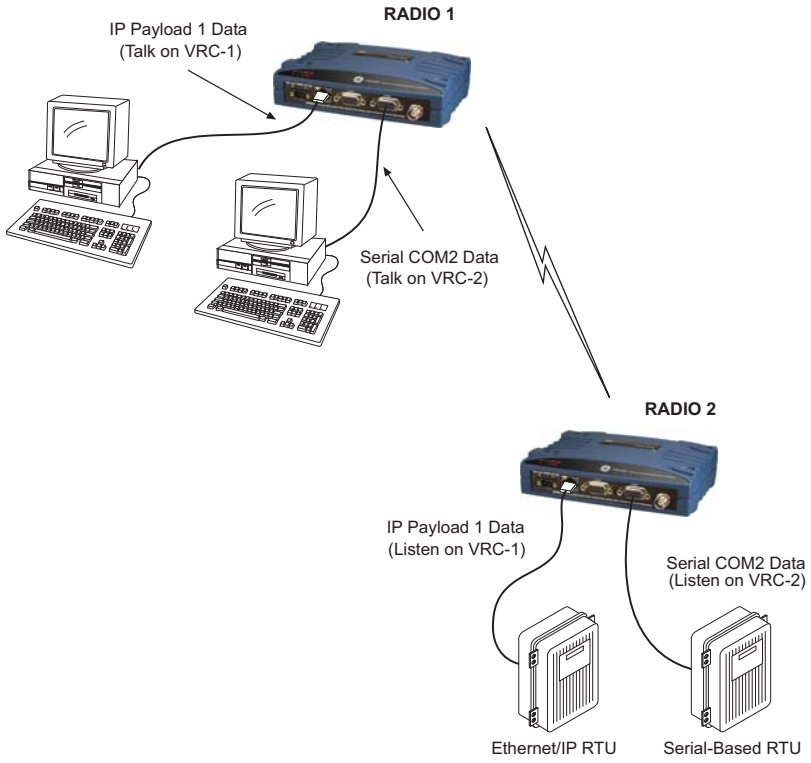

Figure 37. Virtual Radio Channel (VRC) Concept

IP Payload Configuration—Menu Selections

Enabling/Disabling the IP Payload Port

To enable or disable an IP payload port, proceed as follows:

1. Select **Status** on the menu. A flashing cursor appears in the field to the right of the item.

2. Press the spacebar until the desired selection is displayed (**Disabled** or **Enabled**), and press ENTER to apply the change.

Setting the Mode

The operating mode for the IP port may be set to **UDP Socket, TCP Client Socket, TCP Server Socket,** or **TCP Server/Client Socket** to match the service in which it will operate. Proceed as follows to set the port mode:

1. Select **Mode** on the menu. A flashing cursor appears in the field to the right of the item.
2. Press the spacebar until the desired mode is displayed, followed by ENTER to apply the change.

Talk on/Listen to Settings (Virtual Radio Channel—VRC)

Any combination of the three Virtual Radio Channels may be entered in these menu fields. For more information on how these settings are used, see "Understanding Virtual Radio Channels (VRC) for IP and Serial Data" on Page 45. To specify the VRCs used to send and receive data streams, proceed as follows:

1. Select **Talk on** from the IP Payload Configuration Menu. A flashing cursor appears in the field to the right of the item.
2. Press the spacebar until the desired Virtual Radio Channel is displayed, followed by ENTER to apply the change.
3. Select **Listen on** from the Menu. A flashing cursor appears in the field to the right of the item.
4. Press the spacebar until the desired virtual channel selection is displayed (**VRC-1**, **VRC-2**, **VRC-3**, **ALL**, or **NONE**), followed by ENTER to apply the change.

Local Radio IP Port

The Local Radio IP Port setting is used to specify a port number for the RJ-45 modular connector on the radio's front panel. To set the port number, proceed as follows:

1. Select **Local Radio IP Port** on the menu. The field to the right of the item clears and a flashing cursor appears.
2. Enter the desired port number, followed by ENTER to apply the change. As a general rule, port numbers below 2000 should be avoided, as some are reserved for special applications in data networks.

Destination IP Address

This setting specifies the IP address associated with the device connected through the RJ-45 modular connector on the radio's front panel (typically a PC). Any valid IP address may be entered. To set the address, proceed as follows:

1. Select **Destination IP Address** on the menu. The field to the right of the item clears and a flashing cursor appears.

2. Enter the desired IP address, followed by ENTER to apply the change.

Destination IP Port

The Destination IP Port setting is used to specify a port number for the RJ-45 modular connector on the connected device (typically a PC). To set the port number, proceed as follows:

1. Select **Local Radio IP Port** on the menu. The field to the right of the item clears and a flashing cursor appears.

2. Enter the desired port number, followed by ENTER to apply the change. Port numbers below 2000 should be avoided, as some are reserved for special applications in data networks.

Connection Timeout

This setting specifies the number of seconds that the TCP socket is active after the receipt of data. To set the time, proceed as follows:

1. Select **Connection Timeout** on the menu. The field to the right of the item clears and a flashing cursor appears.

2. Enter the number of seconds for the TCP socket to remain active after the receipt of data, followed by ENTER to apply the setting.

Restoring Configuration

In some cases, you may wish to revert to the previous configuration of the menu, prior to any changes being committed. This might be useful if one or more settings were inadvertently changed and you wish to return to a known menu state. To restore the menu settings, simply select **Restore Configuration.** The message **Configuration restored** appears at the bottom of the screen to confirm the action.

Committing Configuration Settings

Once you are satisfied with all of the settings on the menu, you make them active by selecting **Commit Configuration** on the menu. The message **Changes committed** appears at the bottom of the screen to confirm the action.

Terminal Server COM1/2 Configuration

The Terminal Server is an available feature which encapsulates serial data from the radio's COM1/COM2 ports, and sends it over the air as IP packets. The data is then decapsulated at the receiving end and routed to the appropriate COM ports. It allows IP addressing of serial interface ports on individual radios in the network.

In contrast to the radio's IP Payload feature, having a terminal server at the Remotes means that Ethernet data can be delivered to *specific* devices connected to these radios.

The Terminal Server supports the following communication protocols:

- Point-to-Point: TCP or UDP
- Point-to-Multipoint[1]: UDP (One of the Destination IP Addresses is a multicast IP address)
- Multipoint-to-Multipoint[1]: UDP (Two or more of the Destination IP Addresses are a multicast IP address)

[1]Data from local multicast IP addresses is always delivered to the socket layer by the radio's TCP/IP stack. Therefore, to receive data from local multicast IP addresses, simply set the Local Radio IP Port equal to the destination IP port of the multicast IP packet.

The Terminal server menu is shown in Figure 38. Additional information, including application examples, is presented in the MDS SD Series Technical Manual, 05-4846A01.

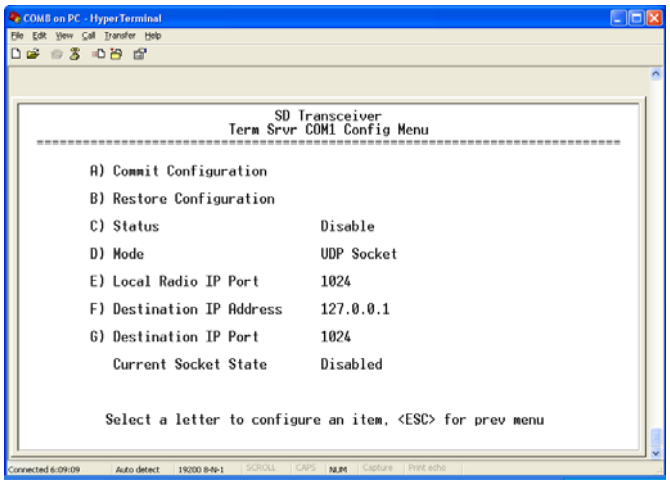

Figure 38. Terminal Server COM1/2 Configuration Menu

NOTE: Available selections vary depending on the mode selected.

Status

This selection enables or disables the Terminal Server feature. To set this item, proceed as follows:

1. Select **Status** on the menu. A flashing cursor appears in the field to the right of the item.
2. Press the spacebar until the desired setting is displayed, followed by ENTER to apply the change.

Commit Configuration

Selecting this item applies all changes that have been on the menu screen in one step.

Restore Configuration

Selecting this item removes all changes that have been on the menu screen, and returns the configuration to its original format.

Mode

This item sets the operating mode for the IP port. It may be set to **UDP Socket, TCP Client Socket, TCP Server Socket,** or **TCP Server/Client Socket** to match the service in which it will operate. To set this item, proceed as follows:

1. Select **Mode** on the menu. A flashing cursor appears in the field to the right of the item.
2. Press the spacebar until the desired setting is displayed, followed by ENTER to apply the change.

Local Radio IP Port

This selection is used to specify a port number for the RJ-45 modular connector on the radio's front panel. As a general rule, port numbers below 2000 should be avoided, as some are reserved for special applications in data networks. To set this item, proceed as follows:

1. Select **Local Radio IP Port** on the menu. A flashing cursor appears in the field to the right of the item.
2. Enter the desired IP port number, followed by ENTER to apply the change.

Destination IP Address

This menu item specifies the IP address associated with the device connected through the RJ-45 modular connector on the radio's front panel (typically a PC). Any valid IP address may be entered here. To set this item, proceed as follows:

1. Select **Destination IP Address** on the menu. A flashing cursor appears in the field to the right of the item.
2. Enter the desired IP address, followed by ENTER to apply the change.

Destination IP Port

This selection is used to specify a port number for the RJ-45 modular connector on the connected device (typically a PC). Port numbers below 2000 should be avoided, as some are reserved for special applications in data networks. To set this item, proceed as follows:

1. Select **Destination IP Port** on the menu. A flashing cursor appears in the field to the right of the item.
2. Enter the desired IP port, followed by ENTER to apply the change.

TCP Server IP Address

This menu item specifies the IP address of the TCP server being used. To set this item, proceed as follows:

1. Select **TCP Server IP Address** on the menu. A flashing cursor appears in the field to the right of the item.
2. Enter the desired TCP server IP address, followed by ENTER to apply the change.

TCP Server IP Port

This selection specifies the port number of the TCP server being used. To set this item, proceed as follows:

1. Select **TCP Server IP Port** on the menu. A flashing cursor appears in the field to the right of the item.

2. Enter the desired TCP server IP port, followed by ENTER to apply the change.

Connection Timeout

This item specifies a time, in seconds, after which the connection will be dropped following a period of inactivity. To set this item, proceed as follows:

1. Select **Connection Timeout** on the menu. A flashing cursor appears in the field to the right of the item.

2. Enter the desired time, in seconds, followed by ENTER to apply the change.

Persistent Connection

This menu item, when set to **Yes**, maintains the server connection continuously, even during periods of inactivity. To set this item, proceed as follows:

1. Select **Persistent Connection** on the menu. A flashing cursor appears in the field to the right of the item.

2. Press the spacebar until the desired setting is displayed, followed by ENTER to apply the change.

VLAN Configuration

A VLAN (Virtual Local Area Network) is essentially a limited broadcast domain, meaning that all members of a VLAN receive broadcast frames sent by members of the same VLAN but not frames sent by members of a different VLAN. The SD supports port-based VLAN at the Ethernet interface and over the air, in accordance with the IEEE 802.1Q standard. When VLAN Mode is enabled, the wireless port of both AP and remote radios act as a trunk port.

The Ethernet port of an AP radio is normally configured as a trunk port. This type of port expects incoming frames to have a VLAN ID and sends outgoing frames with a VLAN structure as well. The Ethernet port of a Remote radio can be configured as an access port or as a trunk port.

When the Ethernet port of a Remote radio is configured as an Access Port, the radio tags incoming traffic with a VLAN ID, and strips the tag before sending out traffic. This traffic is known as the DATA VLAN. Additionally, a *second* VLAN is assigned for other traffic that is termi-

nated at the radio, such as Web, Telnet, DLINK over TCP, TFTP reprogramming, etc. This traffic is known as the management VLAN. Traffic directed to the terminal server or IP payload service should be sent via the DATA VLAN.

When the Ethernet port of a Remote radio is configured as a VLAN trunk, the radio expects all incoming Ethernet frames to be tagged, and passes through all outgoing frames as received from the wireless link with the unchanged VLAN tag.

Figure 39 shows the VLAN Configuration menu, with descriptions following. Additional information on VLAN arrangements is provided in the MDS SD Series Technical Manual, 05-4846A01.

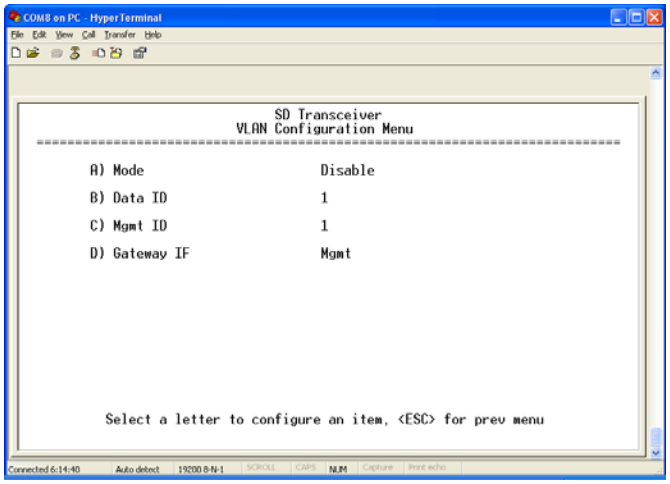

Figure 39. VLAN Configuration Menu

Mode

Defines the Ethernet port as **Trunk**, **Access**, or **Disable** (an untagged port). The default setting is **Disable**. **The mode should be the *last* parameter changed when configuring the VLAN feature, since any Telnet or web connections will be lost after it is changed.** Also, configure the appropriate IP and IP2 settings before changing this parameter. To set this item, proceed as follows:

1. Select **Mode** on the menu. A flashing cursor appears in the field to the right of the item.

2. Press the spacebar until the desired setting is displayed, followed by ENTER to apply the change.

Data ID

Defines the VLAN ID assigned to the AP's LAN traffic that is to be delivered to an Access Port, and the terminal server service, or the IP payload service. The ID is used for filtering and tagging purposes. Any valid ID from 1 to 4095 may be entered. The default is 1. To set this item, proceed as follows:

1. Select **Data ID** on the menu. A flashing cursor appears in the field to the right of the item.

2. Enter the desired ID, followed by ENTER to apply the change.

Mgmt ID

Defines the VLAN ID assigned to the AP's LAN traffic that is to be delivered to the SD radio. Note that traffic for the terminal server and IP payload service is expected in the data VLAN. This ID is used for filtering and tagging purposes. Any valid ID from 1 to 4095 may be entered. The default is 2. To set this item, proceed as follows:

1. Select **Mgmt ID** on the menu. A flashing cursor appears in the field to the right of the item.

2. Enter the desired ID, followed by ENTER to apply the change.

Gateway IF

Defines the VLAN that contains the default gateway in the radio. Available selections are **Mgmt** and **Data.** The default setting is **Mgmt.** To set this item, proceed as follows:

1. Select **Gateway IF** on the menu. A flashing cursor appears in the field to the right of the item.

2. Press the spacebar until the desired setting is displayed, followed by ENTER to apply the change.

NOTE: The VLAN Mode parameter must be consistent at both the AP and Remote radios in order for data to flow correctly. Failure to do so may result in data not being transported correctly even when the radios are able to communicate over-the-air via an RF link.

IP2 Configuration

Figure 40 shows the IP2 Configuration Menu, with menu descriptions following.

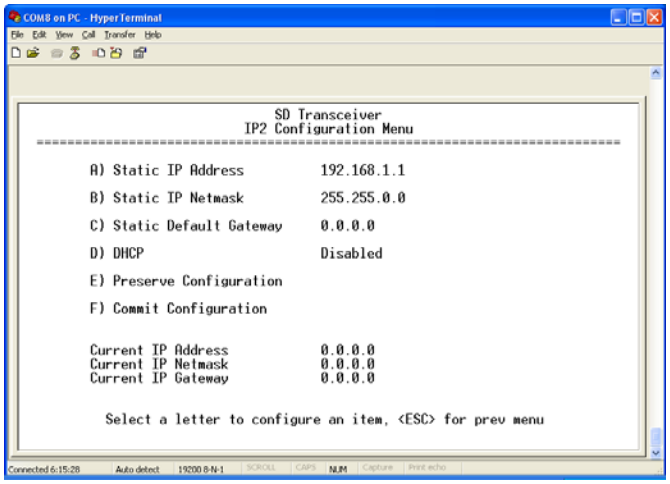

Figure 40. IP2 Configuration Menu

Static IP Address

The radio requires a local IP address to support remote management and serial device (terminal server) services. An IPv4 IP address should be entered in this field, unless DHCP is enabled, in which case it is not required. To set this item, proceed as follows:

1. Select **Static IP Address** on the menu. A flashing cursor appears in the field to the right of the item.
2. Enter the desired address, followed by ENTER to apply the change.

Static IP Netmask

This refers to the radio's IPv4 local subnet mask. This parameter is used when the radio attempts to send a locally-initiated message, either from the terminal server, or a management process. You need not define it if DHCP is enabled. To set this item, proceed as follows:

1. Select **Static IP Netmask** on the menu. A flashing cursor appears in the field to the right of the item.
2. Enter the desired netmask, followed by ENTER to apply the change.

Static Default Gateway

This is the IPv4 address of the default gateway device, typically a router connected to the radio. To set this item, proceed as follows:

1. Select **Static Default Gateway** on the menu. A flashing cursor appears in the field to the right of the item.
2. Enter the desired default gateway, followed by ENTER to apply the change.

DHCP Dynamic Host Configuration Protocol (DHCP) handles the assignment of IP parameters (Address, Netmask, Gateway) to all units in a network, and allows for introducing new devices on the network with minimal manual intervention. The assigned parameters are valid for a specific "lease" time, at which point they can be reassigned or renewed. To set this item, proceed as follows:

1. Select **DHCP** on the menu. A flashing cursor appears in the field to the right of the item.
2. Press the spacebar until the desired setting is displayed, followed by ENTER to apply the change.

Preserve Configuration Selecting this item keeps all menu parameters at their original settings, before any changes were made.

Commit Configuration Selecting this item applies all changes made to the menu screen.

Current IP Address Read-only indication of the current IP address programmed.

Current IP Netmask Read-only indication of the current IP netmask programmed.

Current IP Gateway Read-only indication of the current IP gateway programmed.

3.11 Serial Configuration

This section explains the settings for the COM1 and COM2 serial ports of the transceiver. These settings are accessed from the Serial Configuration Menu (Figure 41).

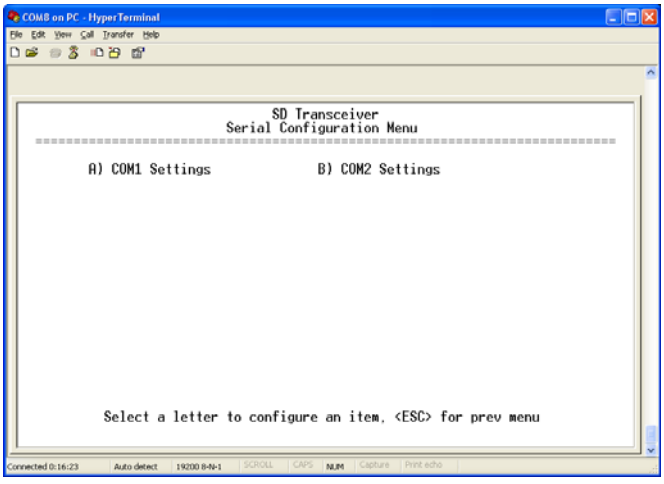

Figure 41. Serial Configuration Menu

Configuring COM1 Settings

COM1 is the default port for radio management activities using a connected PC. This is known as “Console” operation. The COM1 Port Settings Menu (Figure 42) contains a number of settings that may be configured to suit your system.

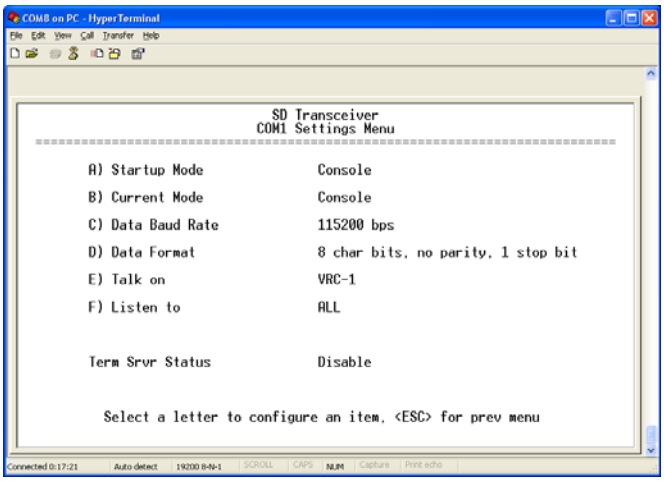

Figure 42. COM1 Port Settings Menu

Setting the COM1 Startup Mode

The default mode for COM1 is **Console** when the transceiver is first powered up, but the startup mode may be changed as follows:

1. Select **Startup Mode** from the menu. A flashing cursor appears in the field to the right.
2. Press the spacebar until the desired startup mode is displayed (**Console** or **Data**) and press ENTER to apply the setting.

Setting the COM1 Current Mode

The mode setting for the COM1 port may be changed on demand as follows:

1. Select **Current Mode** from the menu. A flashing cursor appears in the field to the right.
2. Press the spacebar until the desired mode is displayed (**Console** or **Data**) and press ENTER to apply the setting.

Setting the COM1 Data Baud Rate

The default data rate for COM1 is 115200 bps, but it may be set to any of the following speeds: 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200. To change the setting, proceed as follows:

1. Select **Data Baud Rate** from the menu. A flashing cursor appears in the field to the right.

2. Press the spacebar until the desired baud rate setting is displayed and press ENTER to apply the setting.

Setting the COM1 Data Format

The default data format for the transceiver is 8 character bits, no parity, and 1 stop bit (8N1). A number of settings are possible as listed below:

8 character bits, no parity, 1 stop bit (Default)
8 character bits, no parity, 2 stop bits
8 character bits, odd parity, 1 stop bit
8 character bits, odd parity, 2 stop bits
8 character bits, even parity, 1 stop bit
8 character bits, even parity, 2 stop bits
7 character bits, no parity, 1 stop bit
7 character bits, no parity, 2 stop bits
7 character bits, odd parity, 1 stop bit
7 character bits, odd parity, 2 stop bits
7 character bits, even parity, 1 stop bit
7 character bits, even parity, 2 stop bits

To change the data format, proceed as follows:

1. Select **Data Format** from the menu. A flashing cursor appears in the field to the right.

2. Press the spacebar until the desired format is displayed. Press ENTER to apply the setting.

Talk on/Listen to Settings (Virtual Radio Channel—VRC)

Any combination of the three Virtual Radio Channels may be entered in these menu fields. For more information on how these settings are used, see "Understanding Virtual Radio Channels (VRC) for IP and Serial Data" on Page 45. To specify the VRCs used to send and receive data streams, proceed as follows:

To specify the virtual channels used to send and receive data streams, proceed as follows:

1. Select **Talk on** from the Settings Menu. A flashing cursor appears in the field to the right of the item.

2. Press the spacebar until the desired Virtual Radio Channel is displayed, followed by ENTER to apply the change.

3. Select **Listen on** from the Settings Menu. A flashing cursor appears in the field to the right of the item.

4. Press the spacebar until the desired virtual channel selection is displayed (**VRC-1**, **VRC-2**, **VRC-3**, **ALL**, or **NONE**), followed by ENTER to apply the change.

Configuring COM2 Settings

COM2 is the standard port used for connection of serial payload data. The COM2 Port Settings Menu (Figure 43) contains a number of settings that may be configured to suit the needs of your system.

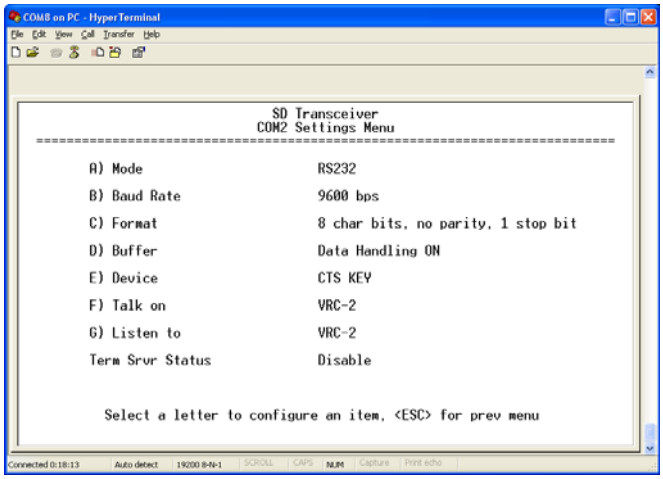

Figure 43. COM2 Port Settings Menu

Setting the COM2 Mode

The COM2 port can operate in either RS-232 or RS-485 mode. The default is RS-232. Proceed as follows to change the mode:

1. Select **Mode** from the menu. A flashing cursor appears in the field to the right.
2. Press the spacebar until the desired mode is displayed (**RS232** or **RS485**) and press ENTER to apply the setting.

Setting the COM2 Baud Rate

The default data rate for COM2 is 9600 bps, but it may be set to any of the following speeds: 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200. To change the setting, proceed as follows:

1. Select **Baud Rate** from the menu. A flashing cursor appears in the field to the right.
2. Press the spacebar until the desired baud rate setting is displayed and press ENTER to apply the setting.

Setting the COM2 Data Format

The default format for the COM2 port is 8 character bits, no parity, and 1 stop bit (8N1). A number of settings are possible as listed below:

8 character bits, no parity, 1 stop bit (Default)
8 character bits, no parity, 2 stop bits
8 character bits, odd parity, 1 stop bit
8 character bits, odd parity, 2 stop bits
8 character bits, even parity, 1 stop bit
8 character bits, even parity, 2 stop bits
7 character bits, no parity, 1 stop bit
7 character bits, no parity, 2 stop bits
7 character bits, odd parity, 1 stop bit
7 character bits, odd parity, 2 stop bits
7 character bits, even parity, 1 stop bit
7 character bits, even parity, 2 stop bits

To change the data format, proceed as follows:

1. Select **Data Format** from the menu. A flashing cursor appears in the field to the right.

2. Press the spacebar until the desired format is displayed. Press ENTER to apply the setting.

COM2 Buffer Mode Setting

The transceiver's buffer provides a way of handling data "over-runs," where more data is passing through the COM2 port than can be immediately handled by the unit. When the buffer is on, any such data is stored up and processed in the appropriate order.

To change the buffer setting, proceed as follows:

1. Select **Buffer** from the menu. A flashing cursor appears in the field to the right.

2. Press the spacebar until the desired setting is displayed (**Data Handling ON** or **Data Handling OFF**) and press ENTER to apply the setting.

COM2 Device Setting

This setting controls the device behavior of x710 legacy radios. It does not apply to packet or Ethernet radios, and may be disregarded for these models.

Talk on/Listen to Settings (Virtual Radio Channel—VRC)

Refer to the instructions provided for the COM1 Settings Menu beginning on Page 57.

3.12 Maintenance & Diagnostic Tests

The menus in this section are used to access the radio's built-in tools for maintaining the radio and evaluating performance parameters.

Managing Configuration Files

The Configuration Management Menu (Figure 44) is used to load new configuration files into the radio or to export existing files, as well as perform other management tasks related to configuration files. The Menu is accessed via the following path: **Main Menu>>Maintenance/Tools Menu>>Configuration Management.**

Configuration files are especially useful when programming a large number of radios in a network, when each radio will have essentially the same settings. Rather than individually programming each radio via the menu system, configuration files expedite this process by automatically

defining the settings for each radio. Site-specific settings or exceptions can still be made using the menu system, but the use of the configuration file greatly shortens the time needed to program a radio.

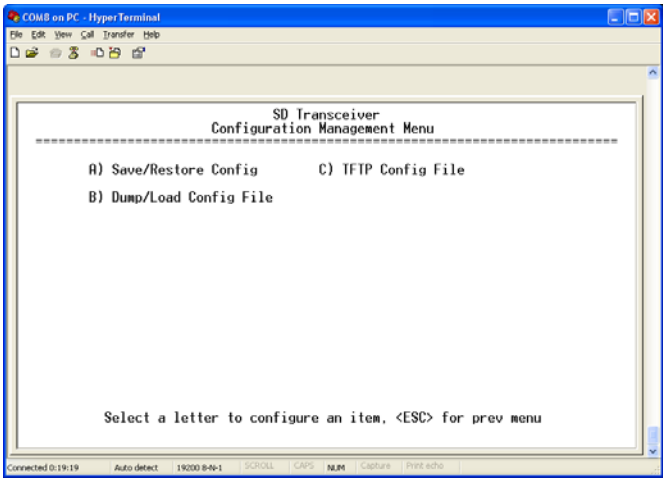

Figure 44. Configuration Management Menu

Saving/Restoring Configuration Files

To save or restore a configuration file, select **Save/Restore Config** from the menu. The screen shown in Figure 45 appears.

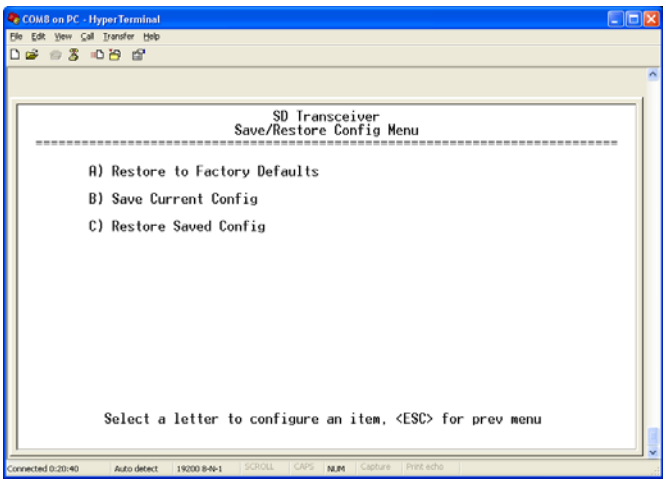

Figure 45. Save/Restore Configuration Menu

To restore the radio's configuration settings to the factory defaults, proceed as follows:

1. Select **Restore to Factory Defaults** from the menu.

2. A challenge message appears briefly, informing you that a reboot is required if the operation is performed. Answer **y** if you wish to proceed.

3. The system resets all configuration parameters to the factory default settings and a confirmation message appears.

To save the radio's current configuration, proceed as follows:

1. Select **Save Current Configuration** from the menu.
2. A challenge message appears briefly, informing you that the previously saved configuration file (if any) will be overwritten by the current one. Answer **y** if you wish to proceed.
3. The system saves the current file and returns to the Save/Restore Configuration Menu.

To restore the radio's configuration to the last saved version, proceed as follows:

1. Select **Restore Saved Config** from the menu.
2. A challenge message appears briefly, informing you that a reboot is required if the operation is performed. Note that the radio's password will be reset to the factory default (**admin**). Answer **y** if you wish to proceed.
3. The system changes to the last saved version of the configuration file.

Dumping (viewing) Configuration File

The current configuration file can be viewed as follows:

1. Select **Dump/Load Config File** and then **Dump Current Config** from the menu. The screen clears and the message **Press any key to start...** appears.
2. Press any keyboard character to immediately display the configuration file on the screen. The file will likely fill more of the screen than can be viewed at one time. Use the scroll bar at the right side of the screen to view the entire file contents.

Loading a Configuration File

A configuration text file may be loaded as follows:

1. Select **Dump/Load Config File** followed by **Load Config File** on the menu that appears. The screen clears and the message **Please send config text file** appears.
2. Send the new configuration text file to the radio's COM1 port. This may be done by selecting **Send Text File** in the communications program, or by performing a "paste" operation.

TFTP Setup Parameters

The TFTP Configuration File Menu (Figure 46) contains settable parameters for TFTP file transfers and also selections for Importing/Exporting configuration Files via TFTP. Each menu item is reviewed below the figure, along with important information for using each parameter.

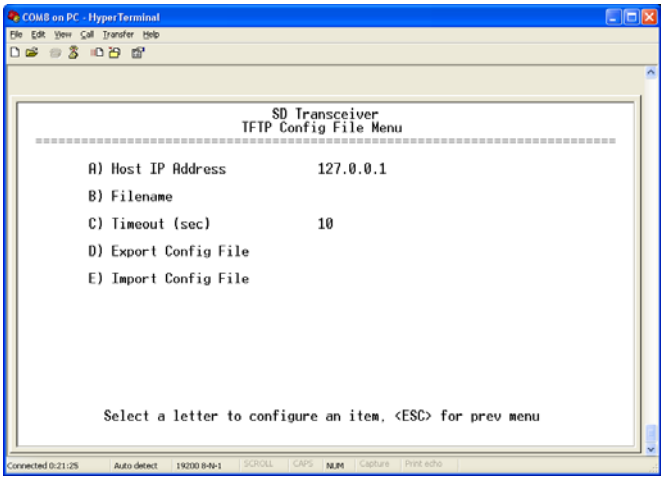

Figure 46. TFTP Configuration File Menu

- **Host IP Address**—Select this item from the menu and enter a valid IP address for the host computer (where the configuration file resides).
- **Filename**—Select this item from the menu and enter the exact name of the configuration text file that will be used by the radio to import or export configuration data.
- **Timeout (sec)**—This parameter determines the amount of time in seconds that the radio should wait for a TFTP server to respond. The default setting is 10 seconds, and will not require any change in most cases. If a change is needed, select the item and enter a new timeout value.
- **Export Config File**—Exports the configuration file from the radio to a TFTP server. (This process requires that a TFTP server be properly connected and configured.)
- **Import Config File**—Imports a configuration file to the radio from the TFTP server. (This process requires that a TFTP server be properly connected and configured.)

Performing Remote Management

The transceiver has the facilities for reprogramming key settings of other radios in the network. These functions are contained on the Remote Management Menu as shown in Figure 47.

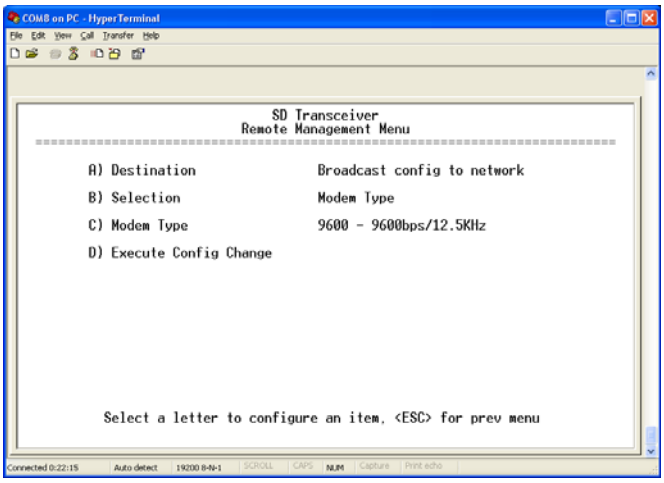

Figure 47. Remote Management Menu

Setting the Destination for Remote Management

The available choices are **Broadcast config to network** or **Change config on local device**. The first choice broadcasts the change to every station that can hear it. The second choice changes the configuration on the current radio.

Selection Parameters for Remote Management

This selection is used to choose what configuration parameter to change: **Radio Mode** (packet, packet with MAC, x710, transparent), **Modem Type, Bridge** (On/Off), **Frequencies** (TX, RX), or force a **Reboot**. Depending on the selection made, new fields populate the menu directly below it. For example, if **Radio Mode** is chosen, a new field appears where you can select **packet, x710** or **transparent** operating modes.

Executing the Configuration Change

Selecting this item prompts for confirmation and then either changes the local configuration or sends the configuration over-the-air to listening devices (depending on **Destination**).

Performing Radio Tests

The radio's menu system contains several tools useful for testing the RF performance of the unit. A key menu for this function is the Radio Test Menu (Figure 48). It provides a way to key (activate) the transmitter, measure power output, run a spectrum test, and enable the built-in RTU simulator.

The Radio Performance Menu (Figure 8 on Page 13) should also be checked when running radio tests. It provides important information on signal quality, DC input voltage, and internal operating temperature of the radio.

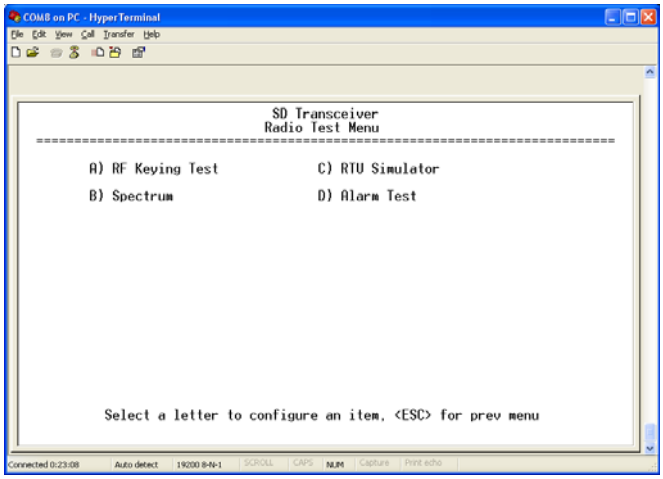

Figure 48. Radio Test Menu

Keying the Transceiver (for testing)

During maintenance and testing activities, it may be necessary to make a manually-controlled transmission with the radio. This can be done to check the measured RF power output, measure reflected power from an antenna system, or to provide a signal at a receiving station so that RSSI can be checked.

To manually key the transceiver, proceed as follows:

1. Select **RF Keying Test** from the Radio Test Menu. This results in the submenu shown in Figure 49.

2. Select **Key Radio** from the submenu. A flashing cursor appears in the field to the right of the item. Use the spacebar to set the field to **ON**.

3. Press the ENTER key to initiate a transmission. Transmission continues until you dekey the radio, or until the TX time-out timer expires. The RF Keying Menu displays the measured (actual) RF Power from the transceiver when it is keyed.

4. To dekey the radio, select **Key Radio** again and use the spacebar to set the field at the right to **OFF**. Press the ENTER key to apply the change.

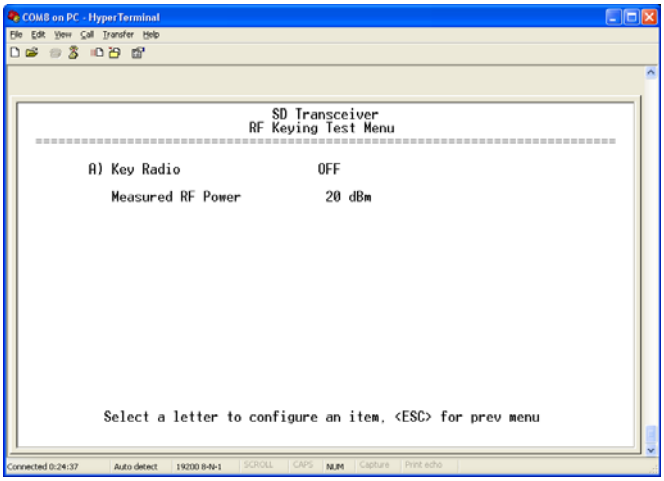

Figure 49. RF Keying Test Menu
(Maintenance/Tools Menu>>Radio Test Menu>>RF Keying Test Menu)

Using the Built-in Spectrum Analyzer

A unique feature of the transceiver is the ability to view the RF spectrum above and below the operating frequency using its built-in Spectrum Analyzer. Often, this can assist you in diagnosing the cause of interference, or to view other signals near your operating frequency.

To use the Spectrum Analyzer, you must first specify a *center frequency* and a *span frequency*. The center frequency is the frequency that you wish the spectrum analysis display to be centered on. The span frequency defines the width of the overall spectrum to be examined. Follow these steps to use the spectrum analyzer:

1. Select **Spectrum** from the RF Test Menu to bring up the Spectrum Analyzer screen (Figure 50).

2. Select **Center Frequency** from the menu. The field to the right clears and presents a flashing cursor.

3. Enter the frequency that you wish the spectral analysis to be centered on. Press the ENTER key to apply the change.

4. Select **Span Frequency** from the menu. The field to the right clears and presents a flashing cursor.

5. Enter the frequency range that you wish to examine. Press the ENTER key to apply the change.

6. Select **Start Spectrum Analyzer** from the menu and press the ENTER key. A results screen is presented showing all detected signals in the specified range. (See Figure 50). The vertical bars show detected RF signals. The scale on the left side shows the amplitude level of these signals in dBm.

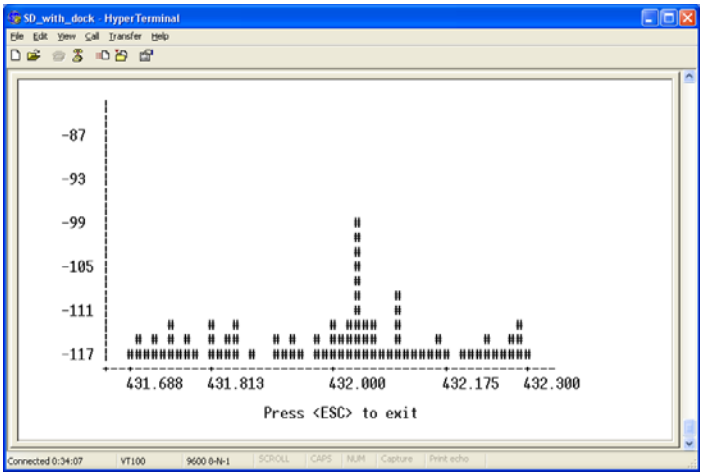

Figure 50. Spectrum Analyzer—Results Screen
(Example only--Display will vary with channel conditions)

RTU Simulator

The unit's built-in RTU simulator generates random data similar to what would be supplied by an external RTU connected to the radio. It is useful for system testing within the radio network by providing realistic data to pass over the radio channel. Proceed as follows to use the RTU simulator:

1. Select **RTU Simulator** from the Radio Test Menu (Figure 48). The submenu shown in Figure 51 appears.

2. Select **RTU Enable** from the menu. A flashing cursor appears in the field to the right of the item.

3. Press the spacebar to set this field to **ON**. Press ENTER to apply the setting.

4. Select **RTU Number**. A flashing cursor appears in the field to the right of the item. Enter the desired RTU number and press ENTER to apply the setting. The RTU simulator is now operational.

5. To deactivate the RTU Simulator, select **RTU Simulator** again from the menu and press the spacebar to set the item to **OFF**. Press ENTER to apply the setting.

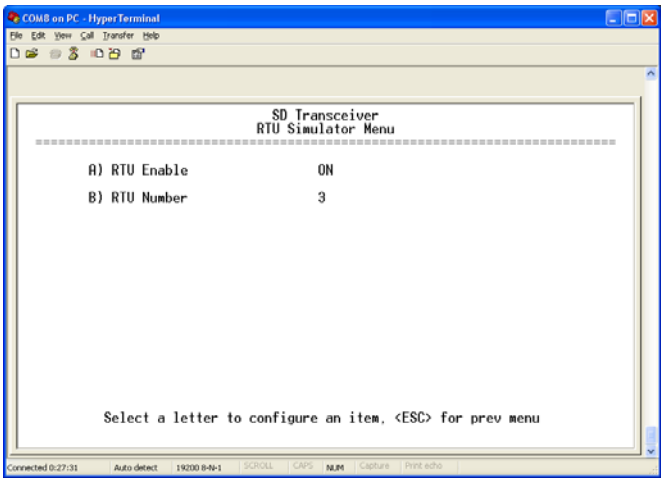

Figure 51. RTU Simulator Menu

Reprogramming the Transceiver

From time to time, GE MDS releases updated firmware for many of its products, for the purpose of adding features or improving overall operation. You can benefit from these updates by downloading them from **www.gemds.com>>Resources>>Downloads** and installing them in your radio. Be sure to read any associated release notes before installing any firmware to ensure that it is applicable to the model and configuration you have.

The transceiver contains built-in tools to manage the reprogramming of its firmware image(s). This section identifies the menu screens used in reprogramming and directs you to more detailed procedures elsewhere in this manual.

Local Reprogramming (via Serial or TFTP Transfer)

Local reprogramming is performed by connecting a PC to the transceiver's COM1 port (serial method) or Ethernet port (TFTP method). The Local Reprogram Menu (Figure 52) is the starting point for both of the reprogramming methods.

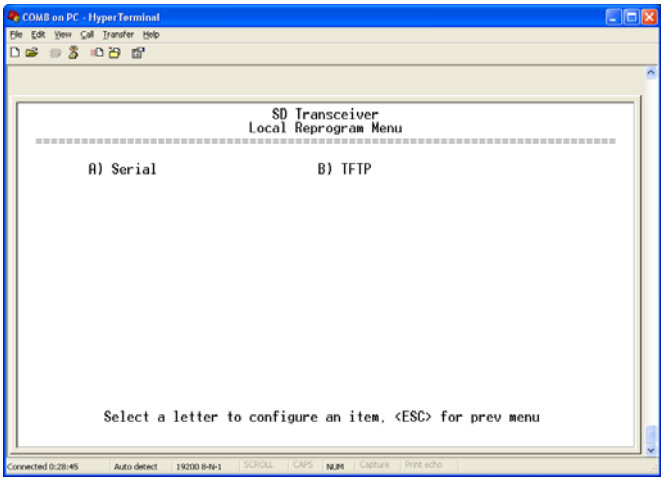

Figure 52. Local Reprogram Menu

For serial reprogramming, select **Serial** from the Local Reprogram Menu. This brings up the Serial Menu shown in Figure 53 below. This menu contains all of the tools needed for loading firmware images locally over a serial connection.

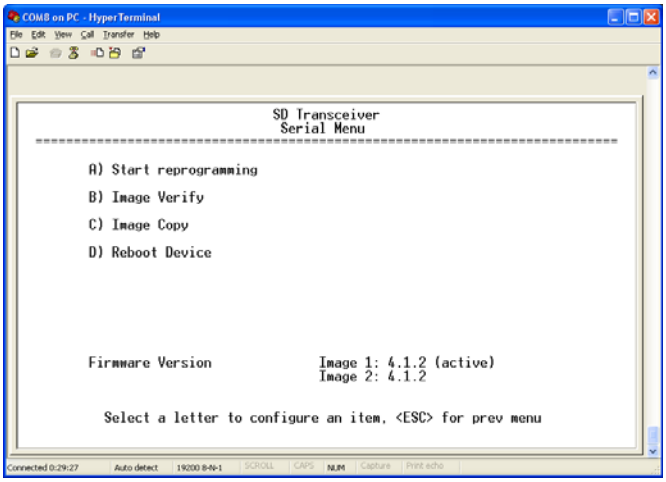

Figure 53. Serial Menu

For TFTP reprogramming, select **TFTP** from the Local Reprogram Menu. This brings up the TFTP Menu shown in Figure 54 below. This menu contains all of the tools needed for loading firmware images locally over a TFTP connection.

Detailed procedures for local upgrades are provided in “Over-the-Air Firmware Upgrades” on Page 79 of this manual.

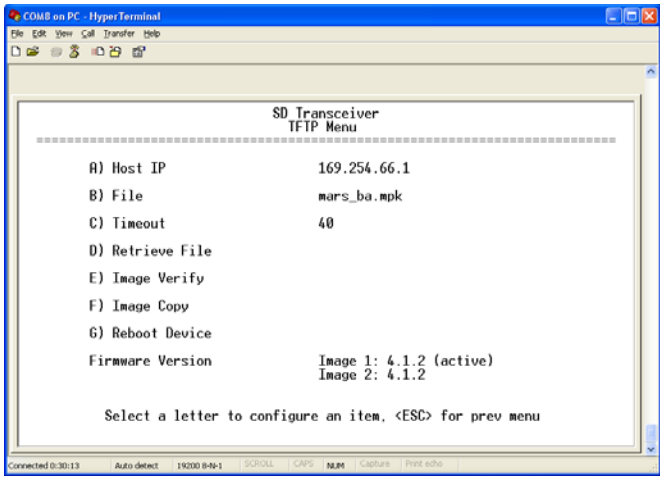

Figure 54. TFTP Menu

Remote Reprogramming

Remote reprogramming of the radio's firmware is possible using the Remote Reprogram Menu (Figure 55). This method has the advantage of being able to distribute and load new firmware into network radios without personally visiting each site.

Remote programming takes longer than local reprogramming, and the time required depends on whether the process is being performed intrusively or passively. Complete details for remote programming, including time estimates, are provided in "Over-the-Air Firmware Upgrades" on Page 79 of this manual.

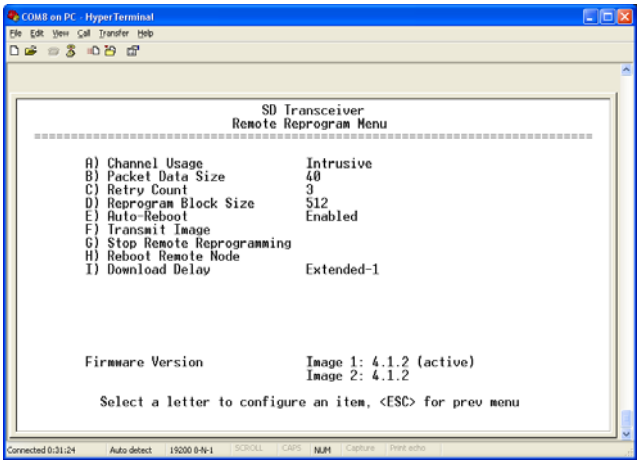

Figure 55. Remote Reprogramming Menu

Conducting a PING Test

A connectivity test to a specific destination address may be performed using the radio's PING Menu (Figure 56).

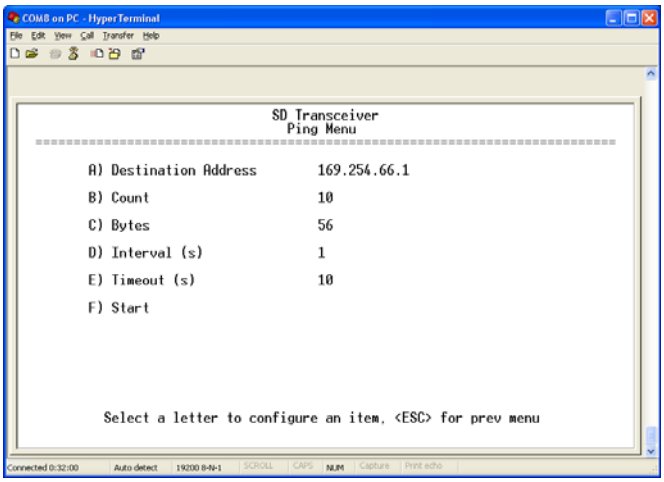

Figure 56. PING Menu

Conducting a Linktest

Only available in packet mode, the primary intent of the Linktest is to verify that a specific radio's settings are consistent with the initiator including: assigned frequency, unit number setting, encryption (if enabled), etc. Also collected at the same time is an indication of link quality. All radios are always ready to respond to a Linktest message. Only the initiating radio requires configuration, using the menu shown in Figure 57.

NOTE: When performing a Linktest, no other data traffic should be active.

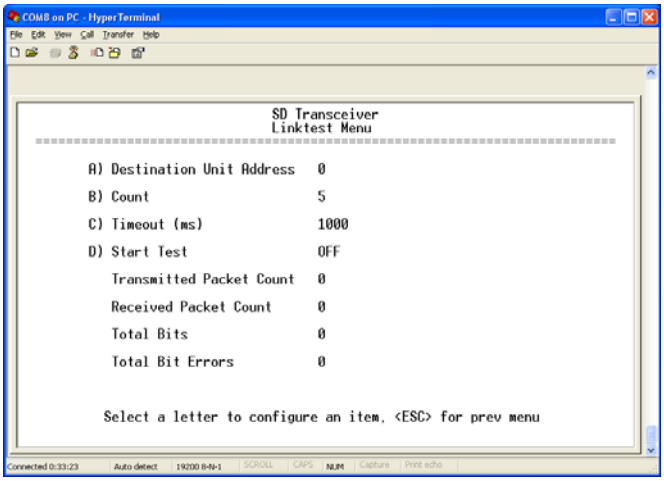

Figure 57. Linktest Menu

Viewing Enabled Features

The radio's Authorization Code/Key determines which of the radio's available features are active when it is shipped from the factory. A check can be made of these features by viewing the Authorization Codes Menu (Figure 58). It lists the available features and shows which ones are active (**ON**) or inactive (**OFF**). Instructions for entering a new Authorization Key are provided below.

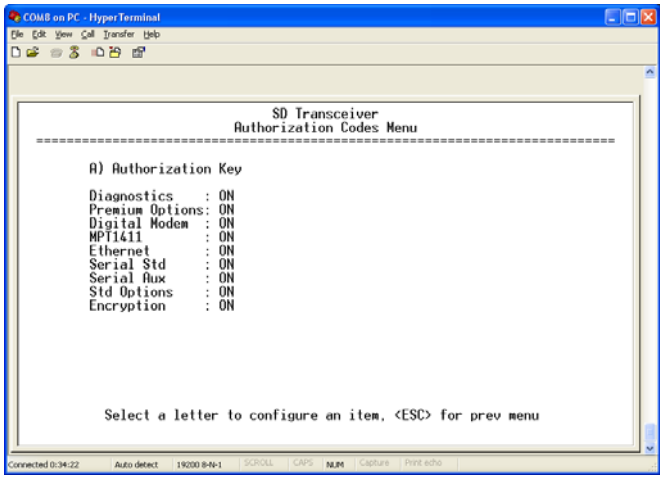

Figure 58. Authorization Codes Menu

Entering a New Authorization Key

The transceiver's feature set may be expanded (if all features are not currently enabled) by entering a new authorization key, which may be purchased from GE MDS. Contact the factory to obtain a new Authorization Key.

To enter the key, proceed as follows:

1. Select **Authorization Key** from the menu. A flashing cursor appears to the right of the item.

2. Carefully enter the exact code that was provided to you by your GE MDS representative, and press the ENTER key to apply.

3. If the code was entered properly, a confirmation message appears at the bottom of the screen. Also, the list of enabled features is updated to indicate the new profile.

Viewing Active Alarms/Events

The Alarms/Events Menu (Figure 61) may be used to view all alarms and events that have been logged by the transceiver. This screen shows a summary of current alarms, and allows options for what alarms, conditions, and events will be shown. In addition, the alarm output signal status is displayed, along with the hexadecimal code for active alarms. More information on this menu and related screens is provided in the section titled “Statistics /Events Menu” on Page 14.

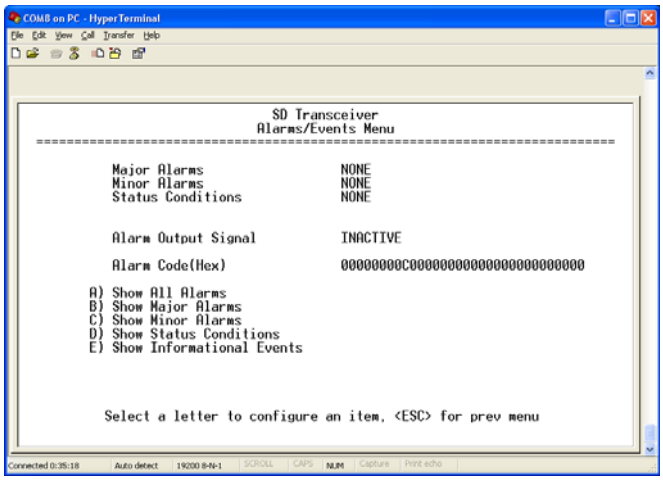

Figure 59. Alarms/Events Menu

Configuring the Alarm Signal

The Alarm Signal Configuration Menu (Figure 60) is used to set several parameters related to alarm behavior. These settings are intended mainly for use in redundant systems or in systems where alarms are processed by external equipment. Proper alarm signal configuration ensures that the desired actions take place (*i.e.*, switchover to an alternate transceiver, alarm notifications, automated logging of alarms by external equipment, etc.)

Alarm Signal Sense

This parameter may set to either **Active High** or **Active Low**. An active high means that Pin 6 on the COM2 port will output a *high* DC signal when an alarm exists. (This is the default behavior.) An active low means that Pin 6 on the COM2 port will output a *low* DC signal when an alarm exists. To change the setting, proceed as follows:

1. Select **Alarm Signal Sense** from the menu. A flashing cursor appears in the field to the right of the item.

2. Press the spacebar to select either **Active High** or **Active Low.** Press the ENTER key to apply the setting.

Alarm Signal Mask (Hex)

This selection allows you to enter an alarm signal code in hexadecimal format that is used by external equipment to process alarm signals. The alarm output signal mask is a 128 bit mask with the most significant bit representing Alarm #0. Setting a bit in the mask to **1** will cause the corresponding alarm to activate the Alarm Output Signal. The alarm output signal can be configured to be activated on any combination of Status, Minor, or Major alarms.

The Alarm Mask is set by entering one or more hex characters. Punctuation and spaces will be ignored and the mask will be **0** padded to the right. For example, to set the mask to **ffffffff00000000000000000000000**, enter **ffff ffff** or **ffff:ffff:0000:0000.**

Only defined alarms of alarm class Major, Minor, or Status may be set. Informational Events cannot be set in the mask.

To enter an Alarm Signal Mask, proceed as follows:

1. Select **Alarm Signal Mask (Hex)** from the menu. The field to the right clears and a flashing cursor appears.

2. Enter a hexadecimal string that defines the alarm mask you wish to use. Press the ENTER key to apply.

Set Signal by Class

The user menu system provides a shortcut for setting the mask by alarm class. Here, you to specify what types of alarms result in an alarm signal being produced. The choices are:

Never assert Alarm Signal
Assert signal on Major Alarm
Assert Signal on Major or Minor Alarm
Assert Signal on Any Alarm or Status

To set this parameter, proceed as follows:

1. Select **Set Signal by Class** from the menu. A flashing cursor appears in the field to the right of the item.

2. Press the spacebar to scroll through the available selections. Press the ENTER key to apply the setting.

Set/Clear Events in Alarm Signal Mask

This menu item provides a way to set or clear each alarm one at a time. Each alarm is presented in sequence for your review and action. Alarms are presented in the order of alarm class with major alarms listed first, followed by minor alarms, and then status messages.

To set or clear alarms, proceed as follows:

1. Select **Set/Clear Events in Alarm Signal Mask** from the menu.

2. Press the ENTER key to step through the list of alarms. At each alarm shown, you may use the spacebar to toggle between **SET** or **CLEAR**, or press the ENTER key to display the next alarm. When you reach the end of the alarms the menu returns to its previous status.

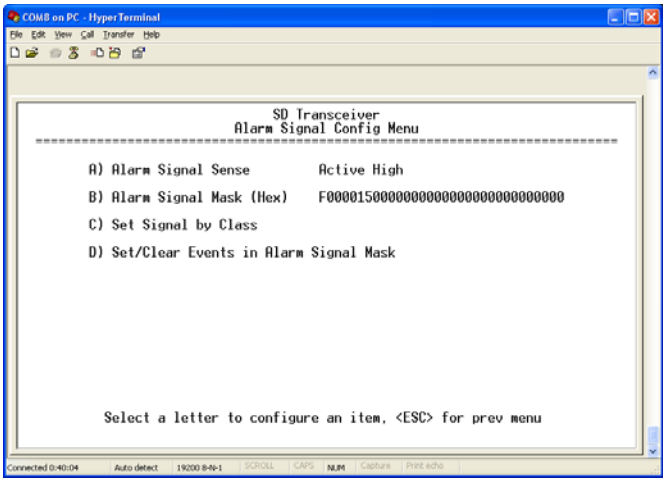

Figure 60. Alarm Signal Configuration Menu

3.13 Event Codes

When an alarm condition exists, the transceiver logs it as an "event" that can be read on a connected PC via the **Statistics/Events Screen.**

Using the **Alarms/Events** screen, users can check for currently active alarms, whether they be Major, Minor, Status Conditions, or Informational Events.

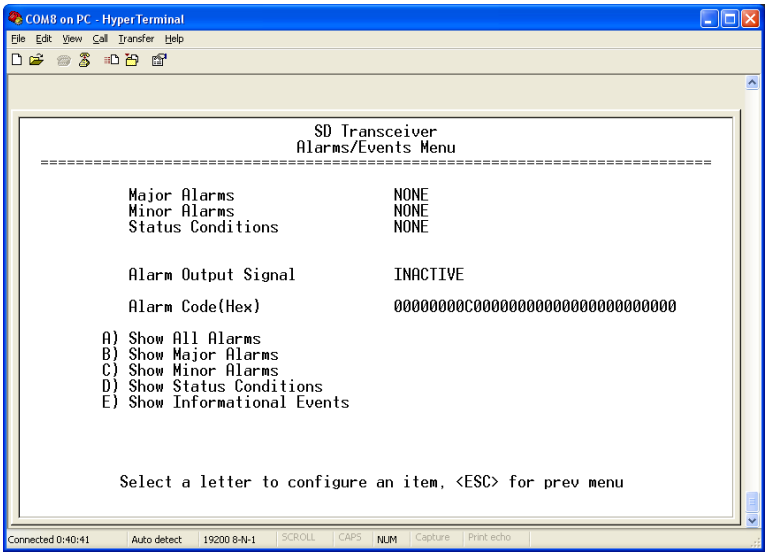

Figure 61. Alarms/Events Screen

Checking for Alarms

To check for alarms, access the following path on a connected PC: **Statistics/Events>>Alarms/Events.**

If an alarm exists, it will be displayed and identified as a Major or Minor Alarm. The screen also offers many options for more detailed views of alarms, status conditions, and informational messages.

A hexadecimal representation of alarms is also provided. This is intended for use by automated systems that process alarm reports from the transceiver.

Major Alarms vs. Minor Alarms

Major Alarms report serious conditions that generally indicate a hardware failure, or other abnormal condition that will prevent (or seriously hamper) further operation of the transceiver. Major alarms generally indicate the need for factory repair. Contact your factory representative for further assistance.

Minor Alarms report conditions that, under most circumstances will not prevent transceiver operation. This includes out-of-tolerance conditions, baud rate mismatches, etc. The cause of these alarms should be investigated and corrected to prevent system failure.

Status and Informational Events

Status events indicate current states or conditions that are not errors. They are used merely to indicate process functions (*i.e.*, **Reprogramming in Process**).

Informational (Info) events pertain to those items which have occurred since bootup. They may or may not indicate an error, and they do not show current conditions, just an even that occurred at some point after boot-up (*i.e.*, Event #32 **Booting Up**).

Event Code Definitions

Table 4 contains a listing of event codes that may be reported by the transceiver. The codes shown are a subset of a larger pool of codes used for various GE MDS products. For this reason, the table does not show a sequential listing of *all* code numbers. Only the codes applicable to this product series are shown.

Table 4. Event Codes

Event Code	Event Class	Description
01	Major	Improper software detected for this radio model.
03	Major	Authorization fault detected.
04	Major	The RF synthesizer is reporting an out-of-lock condition.
08	Major	The system is reporting that it has not been calibrated. Factory calibration is required for proper radio operation.

Table 4. Event Codes *(Continued)*

Event Code	Event Class	Description
12	Major	Receiver time-out. No data received within the specified receiver time-out time.
13	Major	Transmitter time-out detected.
16	Minor	Unit address not programmed.
17	Minor	A data parity alarm has been detected on the COM2 INTERFACE connector. This usually indicates a parity setting mismatch between the radio and the RTU.
18	Minor	A data framing error has been detected on the COM2 INTERFACE connector. This may indicate a baud rate mismatch between the radio and the RTU.
26	Minor	The DC input voltage is out-of-tolerance. If the voltage is too far out of tolerance, operation may fail.
29	Minor	RF Output Power not in valid range.
31	Minor	The transceiver's internal temperature is approaching an out-of-tolerance condition. If the temperature drifts outside of the recommended operating range, system operation may fail.
32	Info	Unit is booting up.
33	Info	System initialization complete.
37	Minor	Unexpectedly executing APP 1.
38	Minor	Unexpectedly executing APP 2.
39	Minor	Boot error; active image unknown.
40	Minor	Ethernet interface error.
41	Minor	Forced a restart of the Ethernet interface.
42	Minor	Reprogramming failure.
43	Status	Reprogramming in progress.
44	Info	Firmware Update Successful.
45	Info	Reprogramming cancelled.
46	Info	Remote rebooted.
64	Minor	A socket operation failed.

Viewing I/O Statistics

The **I/O Statistics** submenu (Figure 14) allows viewing transmitted and received bytes on any of the transceiver interface modules as selected by the user. More detailed information on this screen is provided in the section titled "Statistics /Events Menu" on Page 14.

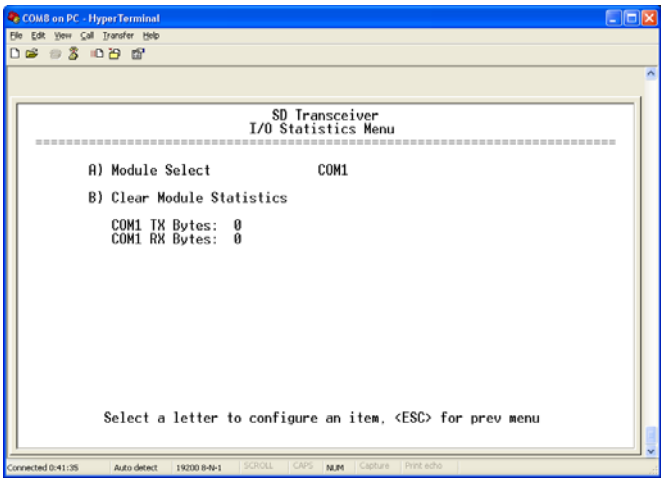

Figure 62. I/O Statistics Menu
(Example shows Statistics for COM1 *Interface)*

The **Ethernet Statistics** Submenu (Figure 63) presents a detailed summary of packets received and transmitted, dropped packets, errors, overruns of the buffer, RX data rate (bps), and RX/TX data for Unicast, Multicast, and Broadcast transmissions. More detailed information on this screen is provided in the section titled “Statistics /Events Menu” on Page 14.

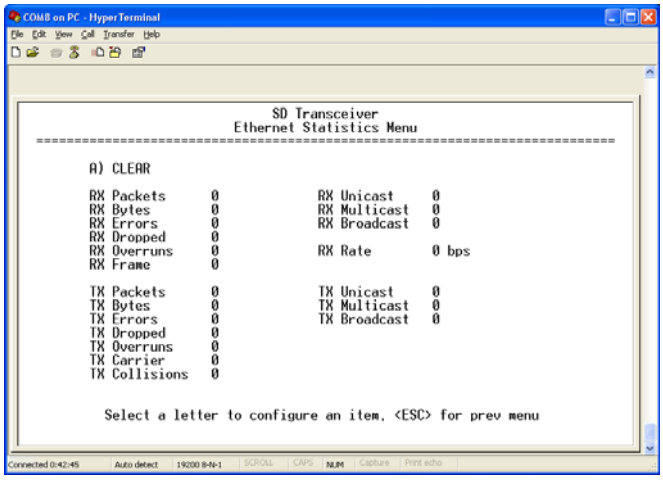

Figure 63. Ethernet Statistics Menu

3.14 Performing Network-Wide Remote Diagnostics

Diagnostics data from a remote radio can be obtained by connecting a laptop or personal computer running GE MDS diagnostic software, such as MDS PulseNET or MDS InSite to any radio in the network. Figure 64 shows a sample arrangement for performing network-wide remote diagnostics.

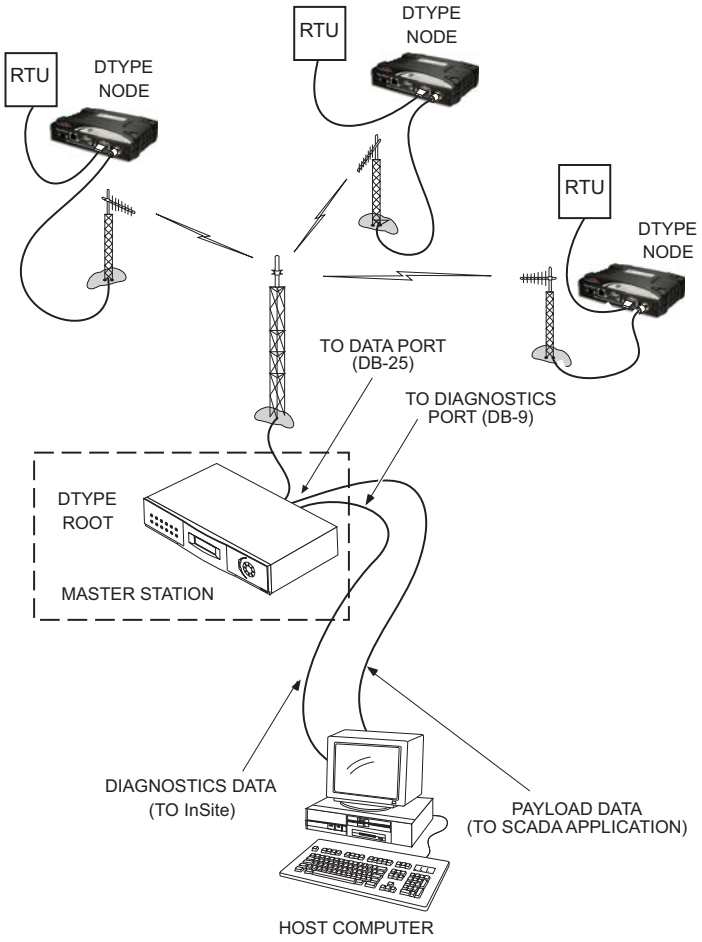

Figure 64. Network-Wide Remote Diagnostics Setup

If a PC is connected to any radio in the network, intrusive polling (polling which briefly interrupts payload data transmission) can be performed. To perform diagnostics without interrupting payload data transmission, connect the PC to a radio defined as the "root" radio. A radio is defined as a root radio using the following path on a connected PC:

Device Configuration>>Diagnostic Settings screen>>Dlink Type>>Root

A complete explanation of remote diagnostics can be found in the *Network-Wide Diagnostics System Handbook* (Part No. 05-3467A01). See the Handbook for more information about the basic diagnostic procedures outlined below.

1. Program one radio in the network as the root radio as described above.

2. At the root radio, set the **Dlink Status** to **ON**. This configures the diagnostic link protocol for the COM1 management port.

3. Set the **Dlink Type** for all other radios in the network to **Node**.

NOTE: **SWC** must be set to **ON** for switched carrier operation.

---

4. Use the COM1 Port Settings screen to place COM1 into data mode on the root radio. (Nodes do not need COM1 in DLINK mode unless they are serially chained to other radios.)

NOTE: Any radio using DLINK on the COM1 port has to be put into DLINK mode using the Diagnostic Settings screen, entering Q (quit) on the screen, or allowing the user interface to time out after 10 minutes of no keyboard activity.

---

5. Connect radios located at the same site (if any) using a null-modem cable between the radios' diagnostic ports.

6. Connect a PC running the management software (i.e., MDS InSite or NETview MS to the root radio, or to one of the nodes, using the radio's COM1 port. (This PC may also be the PC being used to collect payload data, as shown in Figure 64.)

7. Launch the management application at the PC. (See the associated User's Guide for instructions—InSite: Part No. 05-3696A01; NETview MS: 05-2973A01.)

3.15 Over-the-Air Firmware Upgrades

A major benefit of the transceiver is the ability to reprogram remotes in the network without the need to physically visit each radio site. This is accomplished using the over-the-air (OTA) channel. OTA reprogramming always re-programs the "Inactive" firmware image of the radio.

NOTE: OTA reprogramming over a narrowband radio channel can be a lengthy process, requiring several hours to complete. The time required depends on several factors, as discussed below.

Intrusive vs. Passive (Non-Intrusive) Mode

Firmware code may be transmitted to stations in either intrusive or passive (non-intrusive) mode using the built-in diagnostic capabilities of the radio. When OTA reprogramming is initiated from either a root or node the firmware image is broadcast to *all* Remotes in intrusive or passive use of the channel.

Intrusive operation means that the payload application data will be interrupted while programming data is sent over the air. This is the fastest method of programming radios over the air, but it comes at the cost of interruptions in the primary use of the radio network. See Table 5 for the approximate times needed for intrusive reprogramming.

Table 5. Approximate Reprogramming Times—*Intrusive Mode*

Modem Speed (bps)	Approximate Time Required
4800	1 hour, 30 minutes
9600	35-40 minutes
19200	20-25 minutes

Radio assumptions: *Signal strength -85 dBm or stronger, Packet Size: 40, Block Size: 512, Retry: 3*

Polling assumptions: *Serial polling with 1-second poll time, sending random data at 50-100 bytes. Slower polling times will significantly increase completion time.* ***Polling should be temporarily suspended while OTA reprogramming is active.***

NOTE: Intrusive mode should be used only when the radio channel can be devoted to the reprogramming operation.

Passive (Non-intrusive) operation "piggy-backs" reprogramming data onto normal payload data streams, thus allowing payload data to continue uninterrupted. This mode *requires* payload data to be sent so that the reprogramming data can be conveyed.

The disadvantage to this type of operation is that it takes longer to convey the reprogramming information since it is must be attached to existing data transactions. See Table 6 for the approximate times needed for passive reprogramming.

Table 6. Approximate Reprogramming Times—*Passive Mode*

Modem Speed (bps)	Approximate Time Required
4800	6 hours, 7 minutes
9600	1 hour, 30 minutes
19200	1 hour, 30 minutes

Radio assumptions: *Signal strength -85 dBm or stronger, Packet Size: 40, Block Size: 512, Retry: 3*

Polling assumptions: *Serial polling with 1-second poll time, sending random data at 50-100 bytes. Slower polling times will significantly increase completion time.*

NOTE: It is possible for Remote radios receiving a firmware upgrade to complete reprogramming before the initiating station does. This is because transmissions are sent out "broadcast style" and will be sent up to the number of times entered in the **Retry Count** parameter of the radio. In a strong signal environment, the image may be received successfully the first time, but the initiator does not know this, and continues broadcasting image data blocks until the specified retry count has been reached.

OTA Reprogramming Overview

The "Root" is the central location from which polling originates. Other locations in the network should be designated as "Nodes" which are the receiving stations. Over-the-air firmware upgrades should always be initiated from the Root. This ensures that all radios in the network will be properly updated.

Once an OTA reprogram session has started, the initiating radio selects either the active or inactive image stored in its non-volatile storage which is copied to all the other radios in the network.

The initiator broadcasts a series of messages to one or more remote Nodes to accomplish the reprogramming process. The "broadcast" method is used to program the greatest number of radios in the shortest amount of time, however, the initiating station remains unaware of the number or success of downstream radios participating in reprogramming.

During reprogramming the status of the reprogramming will be available on all the radios participating in process. Because the initiator is "broadcast-only" this status can only indicate progress toward sending out of *all* messages. On the Nodes, the progress toward completion of reception of reprogramming information is indicated.

Receiving stations can automatically reboot to the new image after successful reprogramming. Alternatively, there is an OTA reboot command that can be broadcast from the initiator to all receiving stations. This last option instructs the receivers to reboot to a specific firmware revision if available, and not already running at that revision.

Cancelling OTA Reprogramming

During the reprogramming operation the user has the ability to cancel reprogramming at anytime either on the initiator, which will affect all radios, or on individual receiving stations. Note that cancelling reprogramming at the initiator results in all radios in the network having only one (instead of two) applications programmed in their image banks. That is, the "inactive" image (which was only partially upgraded) will be corrupt and unusable until reprogrammed at a later time.

Error Conditions/Recovery

Other than cancelling the reprogramming process, there are few error conditions that the initiator knows or can do anything about. Receiving radios perform checks and verification on the incoming data. If after the end of the reprogramming sequence a radio still has an invalid image (for whatever reason) the radio will *not* reboot but continue running with its active, and valid image.

Execution and screen Examples

User data explanations

Displayed information during reprogramming (at Root radios):

- **Progress** (Percent Complete—Read-only): This parameter indicates percent complete of a firmware upgrade. The calculation is done each time a block of data is successfully transmitted or received.

User Command explanations

Command options available during reprogramming (at Root radios):

- **Abort**—Terminate remote firmware upgrade for all remote nodes in the network. Inactive images on non-root radios will be invalid. (No change to status of root radio images)
- **Reboot**—Manually send a reboot to all remote nodes in the network. All remote nodes will reboot to their inactive image, unless already at the desired version of firmware chosen to reboot to, or if neither the active nor inactive image is equal to the desired version.

Command options available during reprogramming (at "Non-Root" radios):

- **Abort**—Terminate Remote Reprogramming for local radio. Inactive image will be invalid.

Screen Examples:

Pubs Note: This subsection to be revised to reflect web-based Device Manager...

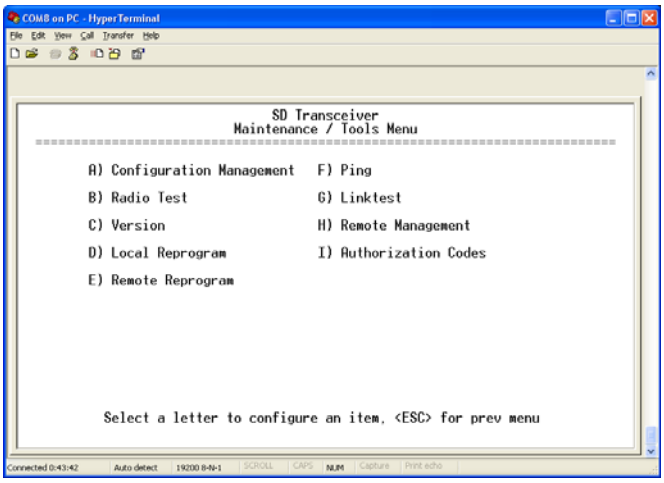

Figure 65. Maintenance/Tools Screen
(Select Remote Reprogram screen)

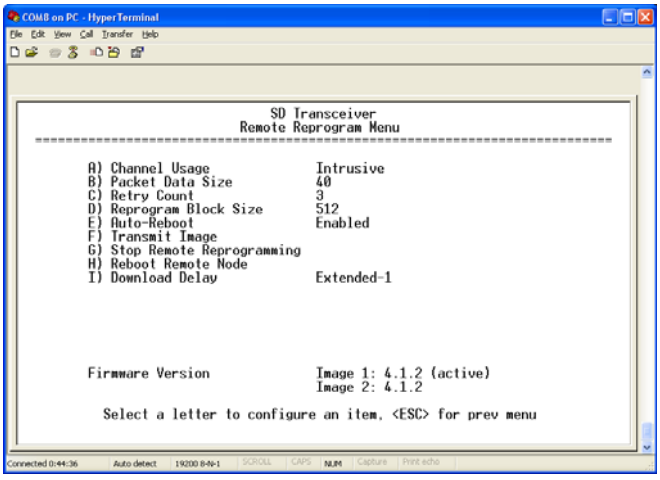

Figure 66. Remote Reprogram Screen

3.16 COM1 Operating Modes

The COM1 port can operate in one of several possible modes. From the user's perspective, it can be considered to be in Data mode or Management mode, where user input can be accepted via either a menu interface, a command line interface, or a diagnostic interface such as GE MDS-proprietary DLINK protocol. The list below shows all possible modes for the COM1 port:

- ***Menu mode***—For serial-based "console terminal" control of the radio. Menu screens are presented where you make selections and apply them with the Enter key.
- ***Data mode***—Where COM1 is used for payload data, and not user control/management of the transceiver.
- ***DLINK (diagnostics) mode***—Where a PC running InSite or NETview management software is connected to COM1.
- ***Command line/scripting mode***—Where text-based commands are used to manage the radio, typically by means of an automated "scripting" system, rather than by manual entry. (Refer to "APPENDIX-A CLI Scripting Interface" on Page 91 for a summary of text commands.)

Options

User-configurable parameters on the COM1 Port Settings screen (Figure 67) are used to determine which mode the port is currently running in, as well as which mode the radio will run in upon initial bootup/initialization. The port may be configured to start up in any of the modes listed above (except command line).

Configuring the radio for DLINK operation provides the GE MDS-proprietary diagnostics protocol to manage and configure the radio using software packages such as "MDS InSite" or "MDS NETview MS." When using these packages, set **Dlink Status** to **ON** in the Diagnostic Settings Screen prior to connecting the software to the COM1 port.

NOTE: **SWC** must be set to **ON** for switched carrier operation.

Changing COM1 Modes

The following are the methods for changing COM1 modes:

From Menu Mode to...

- ***Menu to Command line***—Press **X** at any menu (except Starting Information Screen).
- ***Menu to Diagnostic Mode***—In the Diagnostic Settings Menu, make sure DLINK is enabled. In the COM1 Port Settings Menu, make sure startup mode is set to **Console**. Press **Q**, reboot or allow 10 minute inactivity timeout.
- ***Menu to Data Mode***—In COM1 Port Settings Menu, switch current mode to **DATA**.
- ***Menu to Data Mode (on bootup)***—In COM1 Port Settings Menu, make sure startup mode is set to **DATA**. Press **Q**, reboot, or allow 10 minute inactivity timeout.
- ***Menu to x710 Command Line***—Press the Escape key at the Starting Information Screen and **Y** at confirmation prompt.

From Diagnostic Mode to Menu Mode

- ***Diagnostic Mode (DLINK) to Menu—***Autobaud: (Press carriage return at 1/2 second intervals 2-10 times at supported user interface baud rate, 8N1 data parameters)

From Data Mode to...

- ***Data Mode to Menu***—Enter +++ at configured COM1 baud rate and format. Switch to supported user interface baud rate and 8N1 parameters as necessary, and autobaud as described above.
- ***Data Mode to Menu (on bootup)***—Autobaud as described above during the first 10 seconds of bootup.

From Command Line Mode to...

- ***Command line to Menu***—Enter **Menu** at the command prompt.
- ***x710 Command Line to Menu***—This requires switching operating mode to packet or transparent mode (requires authorization). Enter **menu** and then **Y** at the confirmation prompt.

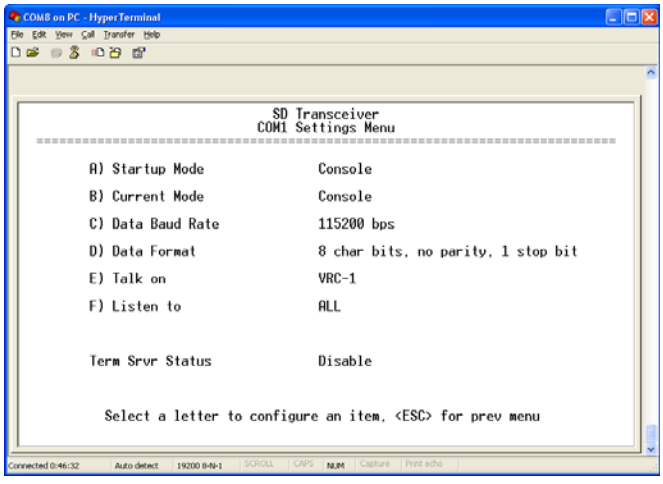

Figure 67. COM1 Port Settings Menu

3.17 Upgrading Firmware (Local Method)

NOTE: Once reprogramming is initiated, it must be allowed to complete or be cancelled before another reprogramming task is allowed. Only over-the-air reprogramming may be manually cancelled by the user prior to completion.

From time to time, updated firmware files are released for GE MDS products. These files can be installed in existing units to take advantage of engineering improvements or additional features that have been added. Two methods may be used to load new firmware into the radio: TFTP and Serial Transfer.

Upgrading Firmware via TFTP (LAN port)

Firmware files are available free-of-charge online at:
www.gemds.com/Resources/TechnicalSupport

NOTE: Only firmware specifically designed for this model of radio may be installed in the unit.

Prerequisites for TFTP Upgrade:

1. A valid firmware file (see web address above).

2. A PC with a TFTP server running. A Windows-based TFTP server may be downloaded from the GE MDS Web site at:
   www.gemds.com/Resources/TechnicalSupport

3. The IP address of the PC running the TFTP server. If you do not know your computer's address on a Windows PC, use the **RUN** function from the **Start** screen and enter **winipcfg** or **ipconfig** to determine the address.

4. The IP address of the radio. The radio's IP address can be found under the **IP Configuration** screen shown later in this procedure.

Connecting the Transceiver for Firmware Upgrade

There are several alternatives to connecting the transceiver for firmware upgrade. Figure 68 and Figure 69 show two variations. It is essential that all equipment be on the same subnet.

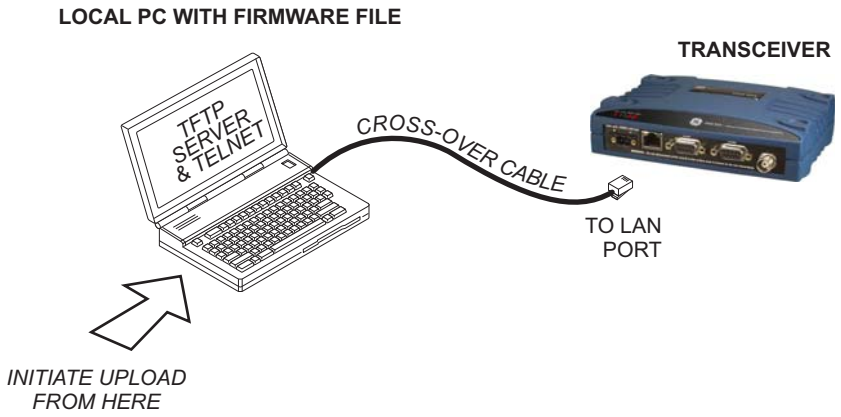

Figure 68. Firmware Upgrade Setup—Option 1
(TFTP Server and Firmware File Reside on Same CPU)

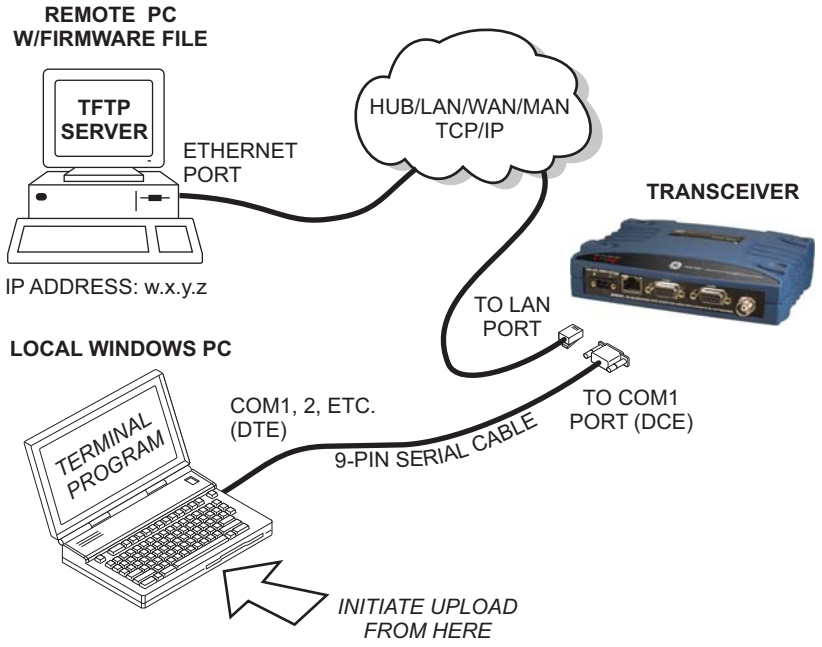

Figure 69. Firmware Upgrade Setup—Option 2
(TFTP Server & Firmware File Reside on Remote Server; Requires a private/quiet Ethernet LAN.)

Upgrade Procedure

NOTE: The flow of payload data is maintained during TFTP reprogramming.

To load a new firmware file (**filename.mpk**) into the transceiver, use the following procedure:

1. Connect an Ethernet cable between the radio's LAN port and the PC (refer to Figure 68 or Figure 69, as applicable).

2. Launch the TFTP server and click the **Options** tab (A in Figure 70 below) and modify the **Outgoing path** (B) using your browser to point to the folder where the reprogramming package (**.mpk** file) is located.

The path (C) will be displayed once the operation is completed. Leave the application running until reprogramming on the radio is complete.

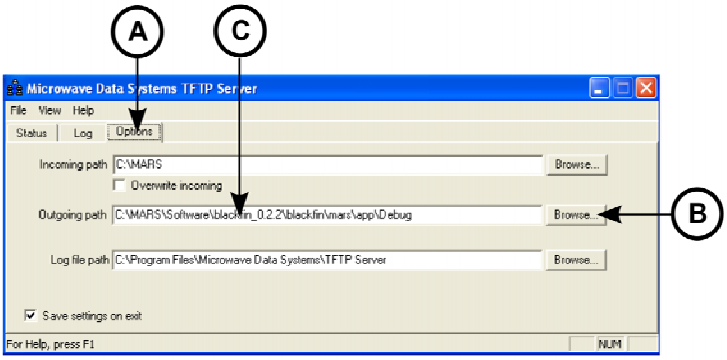

Figure 70. TFTP Server Screen
(GE MDS Server shown)

3. Verify the radio's IP address by navigating to the IP screen (**Main screen>>Ethernet Configuration>>IP**). The screen shown in Figure 71 appears.

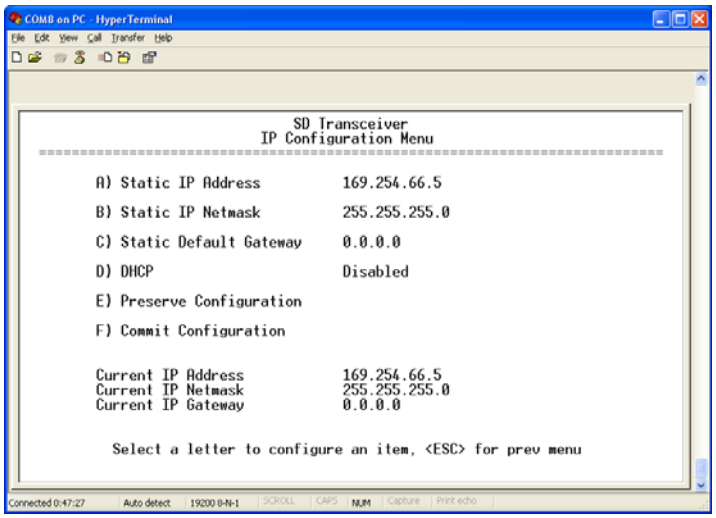

Figure 71. IP Configuration screen

4. Set the IP Address, Netmask, and Default Gateway as appropriate. Note the default gateway must be on the same subnet as the transceiver. Alternately, if a DHCP server is available, enable DHCP and wait several seconds for the IP setting to be obtained from the server. The IP settings used are shown at the bottom of the screen.

5. Ping radio's IP address from the PC using a Ping Utility. Verify that the radio responds.

6. Access the Local Reprogram screen (Figure 72).
(**Main screen>>Maintenance/Tools>>Local Reprogram screen**)

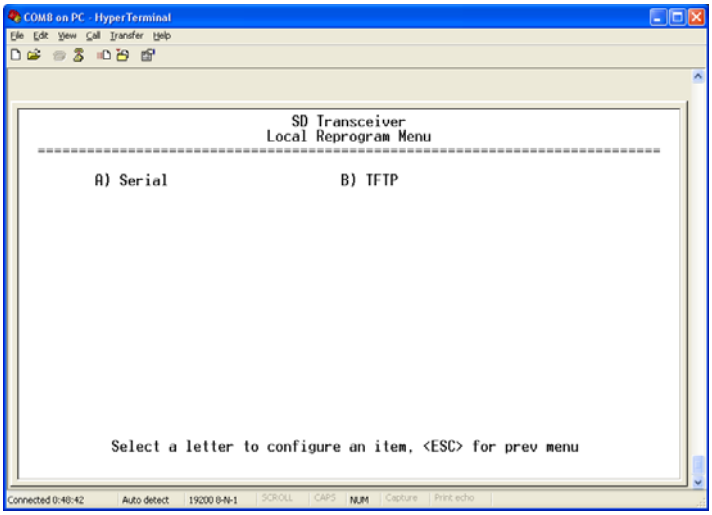

Figure 72. Local Reprogram screen

7. On the Local Reprogram screen, verify that the radio has the right IP address for the TFTP server on the **HostIP** option. Set the path where the reprogramming file is located in the TFTP server on the **File** option.

8. Start reprogramming by selecting **Retrieve File** option from the screen. A progress string indicates the reprogramming status. At this point, the radio is programming the inactive image. (There is an Active and an Inactive image in the radio at all times).

9. As soon as reprogramming is complete, verify the package downloaded into flash using **Image Verify** option. Make sure to select the *inactive* image when the choice is presented.

10. Reboot to the inactive image once verification is completed successfully, using **Reboot Device.**

11. Verify that radio is running new application image by logging in and viewing the firmware version on the **Starting Information Screen.**

NOTE: If a firmware installation fails, the radio is left with the original active image intact. The installation may be attempted again.

Error Messages During File Transfers

It is possible to encounter errors during a file transfer. In most cases errors can be quickly corrected by referring to Table 7.

Table 7. Common Errors During TFTP Transfer

Error Message	Likely Cause/Corrective Action
Invalid File Type	Indicates that the file is not a valid firmware file. Locate proper file and re-load.
File not found	Invalid or non-existent filename on TFTP server
Invalid file path	Invalid or non-existent file path to TFTP server
Timeout	TFTP transfer time expired. Increase the timeout value.
Bad CRC	Cyclic Redundancy Check reporting a corrupted file. Attempt to re-load, or use a different file.
Socket Error	Can't connect to TFTP Server. Check cable connections, IP settings, and firewall on server

Upgrading Firmware (via Serial Port)

Firmware files are available free-of-charge online at:
www.gemds.com/Resources/TechnicalSupport

NOTE: Only firmware specifically designed for this model of radio may be installed in the unit.

With a PC terminal connected to the radio, use the Local Reprogram screen (**Maintenance/Tools>>Local Reprogram**) to upload the new firmware file into the radio.

APPENDIX-A
CLI SCRIPTING INTERFACE

NOTE: The transceiver's CLI (command line interface) is intended for use with *scripted/batch files*, rather than for manual control of the radio by a user. While manual control is possible, there is no clear benefit to doing so from a user interface standpoint. The radio's built-in menu system is recommended for most user-management operations.

Table 8 provides a quick reference to the text-based command line entries for the transceiver. Detailed descriptions for these entries are provided in"Detailed Command Descriptions" on Page 93.

The following points apply to CLI operation:

- The transceiver normally defaults to the Menu-based interface. The CLI is available by pressing **x** at any menu (except the Starting Information Screen). The mode is indicated by a >> prompt on the screen.
- The default operation of the radio may be changed to go directly to the CLI interface by navigating to **Device Configuration Menu>>Device Settings Menu>>User Interface Setting** and changing the setting to **CLI**.
- On boot-up or after an inactivity delay, the command interface usually reverts to the login prompt. If desired, this security feature can be disabled using the Security menu/command.

Entering Commands

To enter a command:

- Type the command (including any spaces), then press ENTER.

To request or set a value:

- Type the command, press =, then press ENTER.

For example:

- Type **COMMAND ARGUMENT=** to query a setting or value.
- Type **COMMAND ARGUMENT=VALUE** to set values.

To get help with a command:

- The command **HELP** lists all supported commands.

- Entering a command followed by SPACE and then a question mark gives detailed information and allowable entries. (Example: **COM1 ?** ENTER returns help on using the **COM1** command.)

Table 8. Remote Commands—Quick Reference

COMMAND	DESCRIPTION	COMMAND	DESCRIPTION
_? (after a command)	When entered after a command in this list, shows detailed information and allowable entries	**LOGOUT**	Logs the user off and ends the terminal session
ALARMS	Displays current alarm conditions by class	**MENU**	Return to Text menu operations
ASIG	Alarm Signal Status/Configure. Allows viewing/setting of alarm signal behavior.	**MULTIHOST**	Enable/Configure Multihost support information
AUTH	Set/display the Authorization Key and a list of authorized features	**PACKET**	Enable/Configure serial packet setting information
BRIDGE	Used to turn bridging on or off, set transmission type (broadcast/unicast, and ARP, unicast only), and set filter parameters.	**PASSWORD**	Sets the user log-in password for the user at current access level or below
COM1	Set/display the configuration of COM1 port (baud rate, data format, mode)	**PERF**	Display performance information
COM2	Sets/display the configuration of COM2 port (baud rate, data format, mode, buffer status, Radio Device Mode)	**PING**	Configure/Send Ethernet Ping to specified destination
CONFIG	Used to set/show/export/import the radio's configuration file	**REBOOT**	Restarts the radio firmware
DEVINFO	Set/display the device configuration, including serial number, hardware/software model strings, software version, and build date.	**REMOTE**	Initiates remote configuration change, with provision for specifying key radio parameters.
DEVSET	Display/configure device settings, including owner name/message, sleep status, LED mode, radio management mode	**REPROG_SER _LOC**	Used when reprogramming via serial connection, locally.
DLINK	Display/configure DLINK information	**REPROLOCAL**	Reprogramming Configuration for TFTP reprogramming (local)
ENCRYPT	Set/display the configuration for data encryption	**REPROREM**	Reprogramming Configuration for Over-the-Air Reprogramming
ETHCONFIG	Set/display the Ethernet port configuration	**RTU**	Configure built in RTU Simulator
ETHPORT	Display/configure Ethernet data support options	**SECURITY**	Sets security parameters (local login required/not required, and Telnet Access allowed/not allowed)
ETHSTATS	Display/Clear Ethernet Statistics	**SETADV**	Set advanced radio configuration parameters
HELP	Lists all supported commands. (See also **?** command at the beginning of this table.)	**SETBASIC**	Set radio configuration power, modem and frequency settings
IOSTAT	I/O Statistics. Allows viewing of I/O activity on of the radio's interface ports and modules.	**STAT**	Shows the alarm status of the radio, listed by Major, Minor, Status, and Informational events.
IPCONFIG	Configure/Display local IP configuration information	**UPTIME**	Display time since last boot in days, hours, min. and seconds
KEY	Enable transmitter keying. Optional argument PWR displays measured RF output power.	**VERSION**	Display version information of bootloader and loaded applications
LBT	Listen Before Transmit on/off and LBT behavior		
LINKTEST	Configure/Execute Linktest		
LOG	Sets or displays the event log information		

Detailed Command Descriptions

ALARMS

Displays the current alarm conditions by severity level. For each level, the specific events that caused an alarm are listed, along with a brief description of each alarm. Alarm levels are:

ALL—All alarm classes
MAJOR—Major alarm
MINOR—Minor alarm
STATUS—Status Condition
INFORM—Non-persistent information
DEBUG—Debug Events

Signal=<choices> Alarm output signal state

CLEAR—All clear
ALARMED—Alarmed

Condition=<choices> Alarm condition

NONE—No alarms present
MAJOR—Major alarm present
MINOR—Minor alarms present
STATUS—Status conditions present

Code=<string> Current alarm code (Hexadecimal)

ASIG

Used to view/configure alarm sense settings.

Optional arguments as follows:

CONFIG=Set/clear mask by event.

ASENSE=<choices> Alarm signal sense setting

LOW—Active low
HIGH—Active high

AMASK=<string>—Alarm signal mask (Hexadecimal)
LEVEL=<choices>—Set alarm signal mask by class

NONE—Never assert alarm signal
MAJOR—Assert signal on major alarm
MINOR—Assert signal on major or minor alarms
ALL—Assert signal on any alarm or status

AUTH

Displays the list of authorized features, or changes the Authorization Key that controls these features.

Optional arguments as follows:

FEATURES—Shows presently authorized features
key=<string>—Authorization key

BRIDGE Used to turn bridging on or off and specify bridge behavior. Optional arguments as follows:

MODE=<choices>—Current bridge mode.

OFF—Bridge is OFF.
ON—Bridge is ON.

BASICFILTER=<choices>—Basic Bridge Filter Selection.

ALL—Broadcast/Unicast (All)
ARP—Unicast and ARP
UNICAST—Unicast Only

ADVFILTER=<choices>—Adv Bridge Filter Status.

OFF—Adv Src Addr Filter is OFF
ON—Adv Src Addr Filter is ON

SRCADDR=<string>—Adv Src Addr Filter Val

CMD=<0|1>—Dump command line format

COM1 View/Configure COM1 port settings. Optional arguments as follows:

DEFMODE=<mode>—Sets or displays the COM1 port default mode on startup. Cannot be set to **DATA** unless the device has been authorized for serial payload.

CONSOLE: COM1 defaults to console (management) mode.
DATA: COM1 defaults to transparent data mode.

DATA=<choices>—Current operating mode.

OFF—Console (management) mode.
ON—Payload data mode.

BAUD=<bps>—Sets or displays the baud rate setting as **300** (available only in data mode), **1200, 2400, 4800, 9600, 19200, 38400, 57600,** or **115200** bps.

FORMAT=<choices>—Sets or displays the COM1 port data characters, parity, and stop bits setting. Valid data parameters are:

7N1—seven char bits, no parity, one stop bit
7N2—seven char bits, no parity, two stop bits
7O1—seven char bits, odd parity, one stop bit
7O2— seven char bits, odd parity, two stop bits
7E1—seven char bits, even parity, one stop bit
7E2—seven char bits, even parity, two stop bits
8N1—eight char bits, no parity, one stop bit (default setting)

8N2—eight char bits, no parity, two stop bits
8O1—eight char bits, odd parity, one stop bit
8O2—eight char bits, odd parity, two stop bits
8E1—eight char bits, even parity, one stop bit
8E2—eight char bits, even parity, two stop bits

NOTE: Entering data formats other than those listed above may cause undesired operation.

COM2

Sets or displays the COM2 port configuration.

Optional arguments:

MODE=<choices>—Serial port mode.

RS232—COM2 defaults to RS-232 operation
RS485—COM2 defaults to RS-485 operation

BAUD=<bps>—Sets or displays baud rate setting as 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200 bps.

FORMAT=<format>—Sets or displays the COM2 port data characters, parity, and stop bits setting. Valid data parameters are:

7N1—seven char bits, no parity, one stop bit
7N2—seven char bits, no parity, two stop bits
7O1—seven char bits, odd parity, one stop bit
7O2— seven char bits, odd parity, two stop bits
7E1—seven char bits, even parity, one stop bit
7E2—seven char bits, even parity, two stop bits
8N1—eight char bits, no parity, one stop bit (default setting)
8N2—eight char bits, no parity, two stop bits
8O1—eight char bits, odd parity, one stop bit
8O1—eight char bits, odd parity, two stop bits
8E1—eight char bits, even parity, one stop bit
8E2—eight char bits, even parity, two stop bits

NOTE: Entering data formats other than those listed above may cause undesired operation.

BUFF=<on/off>—Sets or displays the buffer status on COM2:

OFF—Data handling off
ON—Data handling on

The **DEVICE** command controls or displays the device behavior of the radio. The command parameter is either **DCE**.

In **DCE** mode (the default setting), CTS will go high following RTS, subject to the CTS programmable delay time. If the **DATAKEY** command is set to **ON**, keying can be stimulated by the input of characters at the data port. Hardware flow control is implemented by signaling the CTS line if data arrives faster than it can be buffered and transmitted.

CONFIG Saves or displays the current configuration. The output is in a format that may be copied back into the command line in order to set the configuration. Optional arguments as follows:

INIT—Restore factory configuration defaults.

SAVE—Save user configuration.

RESTORE—Restore user configuration.

SHOW—Displays all current settings.

LOAD—Load user configuration via console.

EXPORT—Export user configuration via TFTP.

IMPORT—Load user configuration via TFTP.

HOSTIP=<IP address>—TFTP server IP address.

FILE=<string>—Configuration file path.

TIMEOUT=<unsigned 8 bits>—TFTP Timeout.

DEVINFO Displays device information. Optional arguments as follows:

SER=<unsigned 32 bits>—Device serial number.

MODEL1=<string>—(*read only*) Displays *software* configuration data on how the radio was configured when shipped from the factory.

MODEL2 =<string>2—shows an identifier string associated with the radio's *hardware* bill of materials and revision.

SREV=<string>—(*read only*) Current package version.

BUILD=<string>—(*read only*) Current package build date.

MAC=<string> (read only)—Ethernet MAC address

DEVSET Used to display/configure Device Settings

Optional arguments:

Owner=<string>—Owner Name string
Message=<string>—Owner Message string
SLEEP=<choices>—Sleep Mode control

OFF—Sleep Mode off
ON—Sleep Mode on

LEDMODE=<choices>—COM LED behavior configuration

AUTO—Automatic/default behavior
X710—LED behavior same as MDS x710 radios
COM1—COM1 port activity
COM2—COM2 port activity
DUAL—Dual port activity

rmode=<choices>—SD operating mode

x710—MDS x710 mode
transparent—Transparent mode
packet—Packet mode

DLINK Used to display/configure DLINK information. Optional arguments as follows:

UNIT=<string>—Radio Unit Address used by DLINK
DTYPE=<choices>—Diagnostic Radio Type

NODE—Node radio
ROOT—Root radio
REPEATER—Repeater station
PEER—Peer unit
GATE—Gate unit

ENABLE=<choices>—Radio diagnostic status

ON—Diagnostic Link is ON
OFF—Diagnostic Link is OFF

BAUD=<choices>—DLINK baud speed

1200—1200 bps, **2400**—2400 bps, **4800**—4800 bps, **9600**—9600 bps, **19200**—19200 bps, **38400**—38400 bps, **57600**—57600 bps, **115200**—115200 bps

NOTE: **SWC** must be set to **ON** for switched carrier operation.

ENCRYPT Used to enable/configure/display encryption information. Optional arguments as follows:

ENABLE=<choices>—

OFF—Payload encryption OFF
ON—Payload encryption ON

DLINK Security=<choices>—DLINK Security

OFF—DLINK security OFF
ON—DLINK security ON

PHRASE—Payload encryption phrase

ETHCONFIG Sets or displays the configuration of the Ethernet port. The port can be set to a specific Ethernet address (static mode), or the address can be determined automatically based on the first received packet (autoselect mode). Optional arguments as follows:

MAC=<byte string>—Ethernet MAC Address
RXTHRE=<unsigned 32 bits>—Ethernet RX Rate Threshold

ETHPORT Used to display/configure Ethernet data support options. Optional arguments as follows:

RESTORE—Restore configuration
COMMIT—Commit changes
Enable =<choices>—Enables or disables this configuration

OFF—Ethernet port disabled
ON—Ethernet port enabled

MODE=<choices>—Specifies the type of socket to open

UDP—UDP socket
TCPCLIENT—TCP client socket
TCPSERVER—TCP server socket
TCPSERVERCLIENT—TCP server/client socket

LOCALPORT=<ranged unsigned 16 bits>—Local IP port for IP payload

0—Minimum destination IP port for IP payload

65535—Maximum destination IP port for IP payload

DEST ADDRESS=<IP Address>—Remote IP address for IP payload

DEST PORT=<range unsigned 16 bits>—Destination Port for IP payload for IP payload. 0 (minimum) to 65535 (maximum).

KEEPALIVE=<number of seconds>—Inactivity timer for TCP sessions, 0 to 600 seconds

STATE=<string>socket state

ETHSTATS Display/clear Ethernet statistics. Optional argument as follows:

CLEAR—Clears Statistics

HELP Lists commands supported for the current user log-in level.

IOSTAT Displays various I/O statistics. Optional arguments as follows:

CLEAR—Clear selected statistics
MODULE=<choices>—Selects I/O module

ALL—All modules
DLL—Data Link Layer
MAC—Media Access Controller
PMUX—Port(s)
COM1—COM1 (UART0)
COM2—COM2 (UART1)
ETHDATA—Ethernet data port
REPROG—Remote Reprogram
ETH/FC—Ethernet Interface
Modem—Modem
Drivers—Drivers
Miscellaneous—Miscellaneous
None—No module selected

IPCONFIG Configure/Display local IP configuration information. Optional arguments as follows:

UP—Bring Ethernet interface up
DOWN—Bring EThernet interface down
RENEW—Renew IP address

MAC=<byte string>—Ethernet MAC Address
NETIF=choices>—Ethernet Network Interface

UP—IP interface up

DOWN—IP interface down

DHCP=<choices>—DHCP status

Disabled—IP service disabled
Enabled—IP service enabled

IPADDR=<IP address>—Current IP Address
NETMASK=<IP address>—Current IP Netmask
IPGW=<IP address>—Current IP gateway
IPADDRESS=<IP address>—Radio address
IPNETMASK=<IP address>—Radio IP netmask
IPGATEWAY=<IP address>—Radio IP gateway

KEY Enable/disable transmitter keying. Optional arguments as follows:

ENABLE=<choices>—Enable transmitter keying

OFF—Dekey transmitter
ON—Key transmitter

PWR=<string>—RF power output in dBm

LBT **ENABLE=<choices>**—Listen Before Transmit Enable

OFF—LBT off
ON—LBT on

BEHAVIOR=<choices>—Listen Before Transmit Enable

TX—Listen on transmit
RX—Listen on receive

MINPERIOD=<unsigned 16 bits>—Minimum sampling period
MAXPERIOD=<unsigned 16 bits>—Maximum sampling period
TIMEOUT=<unsigned 16 bits>—CSMA Timeout
MODE=<choices>—CSMA Mode

drop—Discard packet
send—Send packet

CLEARRSSI=<signed 8 bits>—Clear channel RSSI Reference

LINKTEST Optional arguments as follows:

DESTADDR=<unsigned 16 bits>—
COUNT=<ranged unsigned 32 bits>—Link test requests to send

1—Minimum Value
1000000—Maximum Value

TIMEOUT=<ranged unsigned 16 bits>—Link test timeout (ms)

10—Minimum Timeout (ms)
10000—Maximum Timeout (ms)

ENABLE=<choices>—Lin test timeout (ms)

OFF—Link test off
ON—Link test on

TXPKTCOUNT=<unsigned 32 bits>—Packet TX Count
RXPKTCOUNT=<unsigned 32 bits>—Packet RX Count
BITCOUNT=<unsigned 32 bits>—Total Bit Count
BITERRORS=<unsigned 32 bits>—Total Bit Errors

LOG Sets or displays the event log information, and displays the number of entries in the event log. Optional arguments are used to clear or display the log.

Optional arguments:

CLEAR—Clear the event log

SHOW—Show the event log

TOTAL—Number of event log entries in log. Read only.

CMD—Displays all settable optional arguments and their current values. You can copy this list to a text file as a record of your configuration.

LOGOUT Logs the user out of the command interface.

MENU Changes user interface mode to radio's built-in menu.

MULTIHOST Optional arguments as follows:

ENABLE=<choices>—Lin test timeout (ms)

OFF—Multihost off
ON—Multihost on

TIMEOUT=<number of ms>—Multihost Response Timeout

0—Minimum timeout
65535—Maximum timeout

PACKET **ENABLE=<choices>**—Packet Mode Enable

OFF—Packet off
ON—Packet on

COM1GAP=<string>—Number of bytes to wait for a packet (COM1)
COM2GAP=<string>—Number of bytes to wait for a packet (COM2)

TIMEOUT=<ranged unsigned 16 bits>—Ethernet packet timeout

0—Minimum packet timeout (ms)
1000—Maximum packet timeout (ms)

PASSWORD Sets the log-in password for the user at current access level or below.

Optional arguments:

<username>—The log-in username to be associated with the password.

PERF Performance information. Optional arguments as follows:

PWR=<string>—Measured RF power output performance information
SNR=<string>—Signal-to-noise performance information
RSSI=<string>—Received Signal Strength performance information
DC=<string>—DC voltage level performance information
TEMP=<string>—Internal temperature performance information

PING PING test. Optional arguments as follows:

START—Initiate Ping request
DESTIP=<IP address>—Destination IP address
COUNT=<ranged unsigned 8 bits>—Ping requests to send

1—Minimum value
255—Maximum value

BYTES=<ranged unsigned 16 bits>—Data bytes in request

24—Minimum number of bytes
1460—Maximum number of bytes

INTER=<ranged unsigned 8 bits>—Ping test interval

1—Minimum time interval
60—Maximum time interval

TIMEOUT=<ranged unsigned 8 bits>—Ping request timeout

10—Minimum timeout
60—Maximum timeout

REBOOT Restarts the radio firmware.

Optional arguments:

SAME—Restarts the radio with the active firmware image

OTHER—Restarts the radio with the inactive image

APP1—Restarts the radio with Application Image 1

APP2—Restarts the radio with Application Image 2

REMOTE Remote Configuration. Optional arguments as follows:

START—Execute configuration change
DEST=<choices>—Destination of configuration change

BCAST—Broadcast configuration to network
LOCAL—Change configuration on local device

SFCC=<choices>—Destination of configuration change

SINGLE—Manage a single unit
FREQ—Frequencies

REBOOT—Reboot the device
FREQ—Frequencies
RMODE—Radio Mode
MODEM—Modem type
BRIDGE—Bridge

MODEM=<choices>—Modem type

19200—19200 bps/25.0 kHz
9600—9600 bps/12.5 kHz
4800—4800 bps/12.5 kHz (ETSI)
3200—3200 bps/5.0 kHz
9600M—9600 bps/12.5 kHz (ETSI)
4800F—4800 bps/6.25 kHz
NONE—None-Analog

MPT1411—Analog
9600B—x710B compatible
4800B—x710B compatible
BELL—x710B compatible
V23—1200 bps/12.5 kHz
19200N—19200 bps/12.5 kHz
19200E—19200 bps/12.5 kHz
9600N—9600 bps/6.25 kHz

REPROG_SER_LOC Serial Reprogramming (Local radio). Optional arguments as follows:

START—Initiate serial reprogramming
VERIFY—Verify image in flash
COPY—Copy the active image to the inactive
REBOOT—Reboot the device

REPROLOCAL Reprogramming (of Local radio) via TFTP. Optional arguments as follows:

START—Initiate TFTP reprogramming
VERIFY—Verify image in flash
COPY—Copy the active image to the inactive
REBOOT—Reboot the device
HOSTIP=<IP address>—TFTP server IP address
FILE<string>—Firmware file path
TIMEOUT=<unsigned 8 bits>—TFTP timeout

REPROREM Remote Firmware Upgrade. Optional arguments as follows:

START—Initiate remote firmware upgrade
STOP—Stop remote firmware upgrade
REBOOT—Remote node reboot by version
MODE=<choices>—Over the air channel usage

Intrusive—Intrusive (payload data interrupted during upgrade)
Passive—Passive (payload data not interrupted during upgrade)

PACKET<ranged unsigned 8 bits>—Data packet size in bytes

40—Minimum size value
120—Maximum size value

RETRY=<ranged unsigned 16 bits>—Block retry counter

100—Minimum size value
1024—Maximum size value

AUTOREBOOT<choices>—Auto Reboot after firmware update

Enabled—Auto reboot enabled
Disabled—Auto reboot disabled

MULTIHOP<choices>—Multi-tier network size

None—None
Extended-1—Extended-1
Extended-2—Extended-2
Extended-3—Extended-3

RTU Remote Terminal Unit (RTU) Simulator. Optional arguments as follows:

ENABLE<choices>—RTU Simulator status

OFF—RTU Simulator off
ON—RTU Simulator on

ADDR<ranged unsigned 32 bits>—Embedded RTU Simulator address

0—Minimum address
80—Maximum address

SECURITY Security settings for menu access. Optional arguments as follows:

LOCALSECURITY<choices>—Local security status

PASSREQ—Local login required
NOPASSREQ—No local login required

TELNETACCESS<choices>—Telnet access status

ALLOWED—Telnet access allowed
NOTALLOWED—No Telnet access allowed

SETADV Set advanced parameters of the transceiver. Optional arguments as follows:

SCD=<ranged unsigned 8 bits>—Soft carrier dekey

0—Minimum delay
255—Maximum delay

TELNETACCESS<choices>—Telnet access status

ALLOWED—Telnet access allowed
NOTALLOWED—No Telnet access allowed

RXTOTSTA<choices>—RX timeout timer status

OFF—Timeout timer off
ON—Timeout timer on

RXTOTDELAY<ranged unsigned 16 bits>—Receive timeout delay

0—Minimum delay
1440—Maximum delay

TOTstatus<choices>—Timeout enable

1—Minimum delay
255—Maximum delay

DATAKEY<choices>—Key-on-data mode

OFF—Key-on-data mode off
ON—Key-on-data mode on

RTSKEY<choices>—Key on RTS signal

OFF—RTS Key off
ON—RTS Key on

PTT<ranged unsigned 8 bits>—Push-to-Talk delay

0—Minimum delay
255—Maximum delay

AFC<choices>—Automatic Frequency Control

OFF—AFC off
ON—AFC on

SWC<choices>—Switched Carrier Mode

AUTO—SWC off
ON—SWC on
OFF—SWC off

SETBASIC Set basic radio operating parameters. Optional arguments as follows:

DEV<string>—Modem control deviation
PWR<ranged unsigned 8 bits>—Radio RF output power

20—Minimum RF output power
37—Maximum RF output power

MODEM<choices>—Modem type with optional arguments as follows:

19200—19200 bps/25.0 kHz
9600—9600 bps/12.5 kHz
4800—4800 bps/12.5 kHz (ETSI)
3200—3200 bps/5.0 kHz
9600M—9600 bps/12.5 kHz (ETSI)
4800F—4800 bps/6.25 kHz
NONE—None-Analog
MPT1411—Analog
9600B—x710B compatible
4800B—x710B compatible
BELL—x710B compatible

V23—1200 bps/12.5 kHz
19200N—19200 bps/12.5 kHz
19200E—19200 bps/12.5 kHz
9600N—9600 bps/6.25 kHz

STAT Displays alarm status information as follows:

MAJOR—OFF
MINOR—OFF
STATUS—OFF
INFORM—ON
DEBUG—ON

UPTIME Reports elapsed time since last boot-up of the radio. For example:
Uptime=2 days, 17:33:51

VERSION Displays the software version of bootloader and loaded applications.

IN CASE OF DIFFICULTY...

GE MDS products are designed for long life and trouble-free operation. However, this equipment, as with all electronic equipment, may have an occasional component failure. The following information will assist you in the event that servicing becomes necessary.

TECHNICAL ASSISTANCE

Technical assistance for GE MDS products is available from our Technical Support Department during business hours (8:30 A.M.–6:00 P.M. Eastern Time). When calling, please give the complete model number of the radio, along with a description of the trouble/symptom(s) that you are experiencing. In many cases, problems can be resolved over the telephone, without the need for returning the unit to the factory. Please use one of the following means for product assistance:

Phone: 585 241-5510	E-Mail: gemds.techsupport@ge.com
FAX: 585 242-8369	Web: www.gemds.com

FACTORY SERVICE

Component level repair of this equipment is not recommended in the field. Many components are installed using surface mount technology, which requires specialized training and equipment for proper servicing. For this reason, the equipment should be returned to the factory for any PC board repairs. The factory is best equipped to diagnose, repair and align your radio to its proper operating specifications.

If return of the equipment is necessary, you must obtain a Service Request Order (SRO) number. This number helps expedite the repair so that the equipment can be repaired and returned to you as quickly as possible. Please be sure to include the SRO number on the outside of the shipping box, and on any correspondence relating to the repair. No equipment will be accepted for repair without an SRO number.

SRO numbers are issued online at **www.gemds.com/support/product/sro/**. Your number will be issued immediately after the required information is entered. Please be sure to have the model number(s), serial number(s), detailed reason for return, “ship to” address, “bill to” address, and contact name, phone number, and fax number available when requesting an SRO number. A purchase order number or pre-payment will be required for any units that are out of warranty, or for product conversion.

If you prefer, you may contact our Product Services department to obtain an SRO number:

Phone Number: 585-241-5540
Fax Number: 585-242-8400
E-mail Address: gemds.productservices@ge.com

The radio must be properly packed for return to the factory. The original shipping container and packaging materials should be used whenever possible. All factory returns should be addressed to:

GE MDS, LLC
Product Services Department
(SRO No. XXXX)
175 Science Parkway
Rochester, NY 14620 USA

When repairs have been completed, the equipment will be returned to you by the same shipping method used to send it to the factory. Please specify if you wish to make different shipping arrangements. To inquire about an in-process repair, you may contact our Product Services Group using the telephone, Fax, or E-mail information given above.

GE MDS, LLC
175 Science Parkway
Rochester, NY 14620
Telephone: +1 585 242-9600
FAX: +1 585 242-9620
www.gemds.com