GDI Communications, LLC

Graphical User Interface

User Manual

Version 1.0.1

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Introduction

This user's manual provides information on using the GDI Communications software with its products. The GDI Communications Graphical User Interface is designed to enable users to communicate and configure several GDI products in various setups and scenarios. This software targets users who sustain different levels of experience when it comes to traffic communications.

The GUI is designed to allow a "man in the street" to connect to the radio and do basic troubleshooting. On the other hand, it is also designed to meet advance requirements for testing and troubleshooting radios and modems. Although the GUI was primarily made to connect and configure the SS900FH radio, it can also be used to connect and configure smart modems and other serial interfaced devices. This new approach was developed to overcome the setbacks of the old utilities used to communicate with GDI's products.

The GUI contains the main functions present in other graphical interfaces used for the same purpose and other new features. This enables the GUI to perform better and give the user a more efficient and controlled testing environment. In this manual, a detailed description of the functions of the GUI will be presented. A summary and a list of suggested reference Material will follow.

Installation

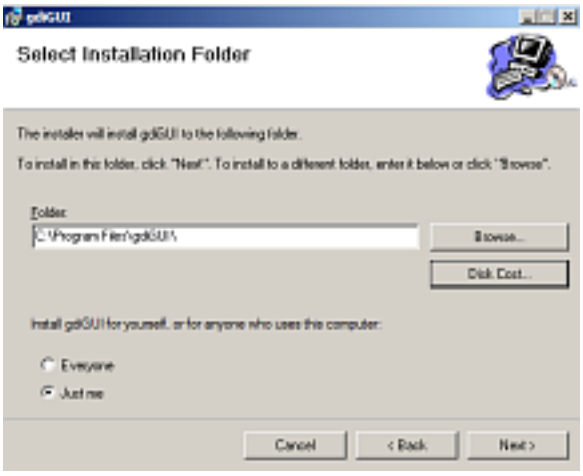
System Requirements:

Windows 98 or higher

Installation Steps:

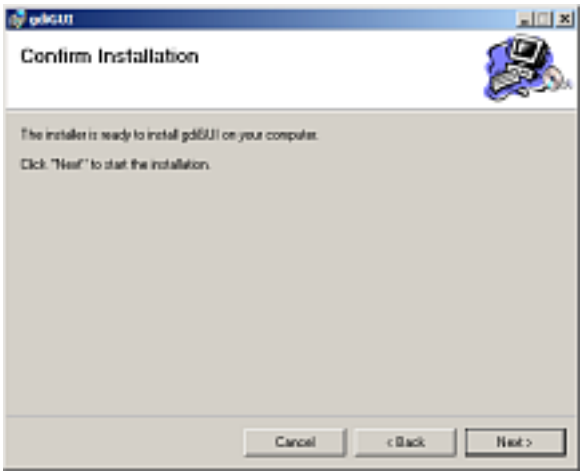
The installation script is compressed into a “zip” file (gdiGUI.zip) for ease of deployment.
After decompressing the file (“unzipping” it), run the installation script gdiGUI.msi.
If there is a previous version of the GDI GUI already installed the msi will prompt you to remove it. After the previous installation is removed, re-run the gdiGUI.msi.

When the Setup Wizard appears click on the “Next” button.

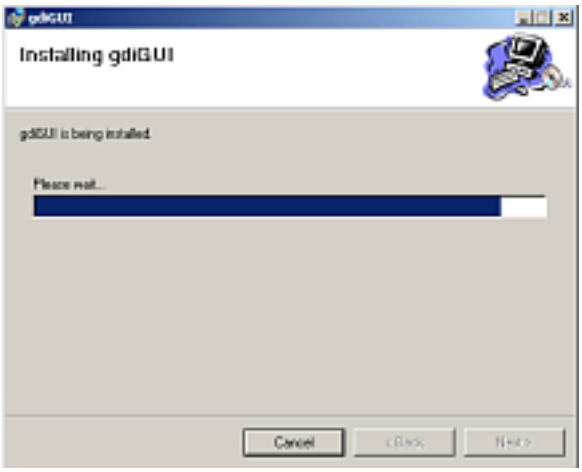


Leave the Installation folder set to the default.
Leave the user access to “Just me.”
Click on the “Next” Button.

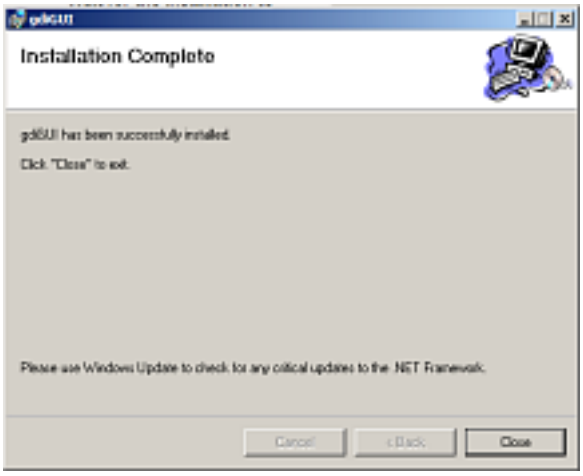
Click “Next” to start the installation.



Wait for the installation to complete.



Click “Close” when the installation is complete.



Click on the Start button, and then select “All Programs -> GDI Communications -> gdiGui” to run the program.

Getting Started

This program is designed to allow users to communicate with and configure SS900fh modems. Users utilizing this software can have varying levels of expertise in the field from beginners to experts.

Features

This program includes several features including but not limited to:

- **Store and upload configuration sets to the SS900FH radio**
- **Update the SS900FH firmware**
- **Communicate and configure GDI SS900FH modems**
- **Serial port loopback testing using the BERT function**
- **Polling, Spectrum Analyzer, Power and Data Monitoring**
- **Terminal Interface**

Compatibility

This program was tested on several windows platforms. Its is not compatible with Linux or other, non windows, operating systems.

Scalability

This software is designed to run multiple instances, if required, on the same workstation. This can come in handy if the workstation has multiple COM ports connected to different radios and the user is running polling or loopback testing.

Using the Program

Main Menu

The main menu is designed to allow easy access to all the functions of the program. The default view displays all the function buttons. However these can be hidden and the functions can be accessed through the "Tools" menu.

Figure 1 – Main Menu

Using the mouse to click on the GDI logo will open the default web browser to the GDI web site. This user guide and other documentation can be opened through the "Help" menu.

File Menu

The file menu consists of several functions including: Opening a new configuration, opening an existing configuration file, saving a configuration file, A list of the most recent files opened, printing the current configuration and exiting the program (Figure 2).

The functions in the file menu are straight forward and are commonly used except for two main utilities: the Manual Configuration and the Configuration Wizard used to create new configuration files.

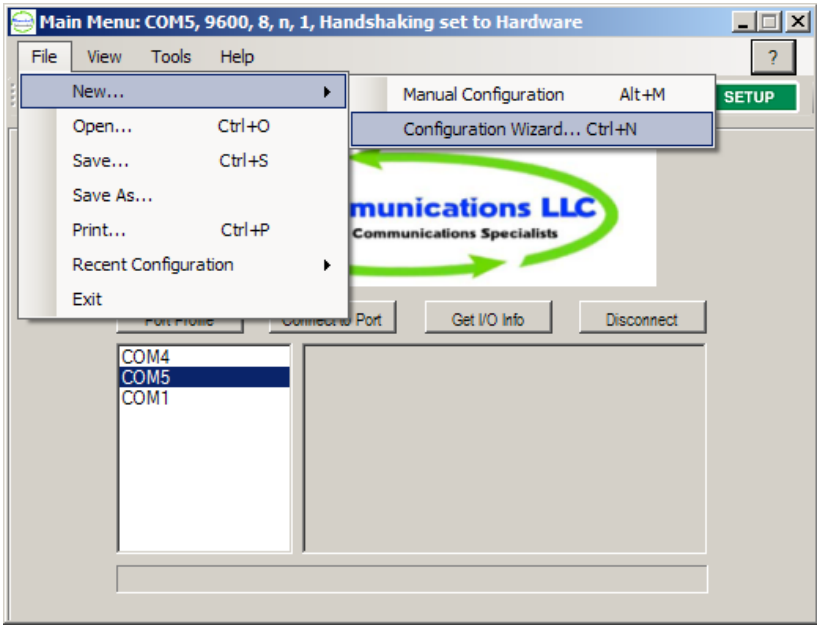
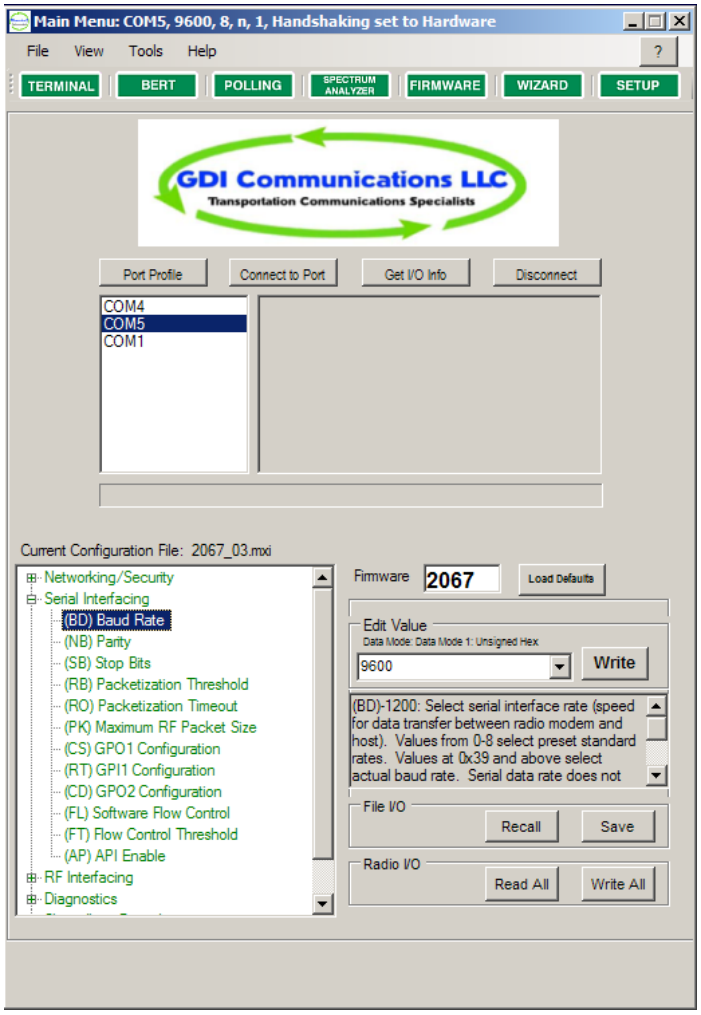


Figure 2 – File Menu

Manual Configuration

This function is used for creating a configuration file from scratch. When "File->New File ->Manual Configuration" is clicked in the File menu, an extended portion of the main menu is opened that contains all necessary tools to establish a configuration file.



To get started, the firmware version must first be selected in the "Firmware Defaults" pop-up window. Selecting the firmware, populates the configuration parameters that are on the left side of the extended section seen here in green. When a parameter is selected, its value and description are loaded into the edit pull down and the description box. If the parameter is of the indexed type (ie., Baud rate) the possible values are loaded into the pull down menu. If the parameter is of the variable type (ie., Maximum RF Packet Size), only the value will be loaded. To change a value, either use the pull down menu or highlight the old value and enter the new value. All changes will be saved but not written to the SS900FH until the "Write" or "Write All" button is depressed.

The "Load Defaults" button restores all parameters to the currently displayed version default settings.

The “File I/O” buttons allow configurations to be saved and recalled from files. These files can be used to configure multiple SS900FH modems.

The “Radio I/O” buttons allow configurations to be read from or written to the currently attached SS900FH.

To exit the setup mode and collapse the extended display, click on the “SETUP” button again..

Configuration Wizard

The configuration wizard was designed to step through the configuration of a SS900FH modem. Figure 4 shows the welcome page of the wizard.

Figure 4 – Configuration Wizard

The second step in the wizard selects the version of SS900FH. Upon selection a picture of the switching configurations shown to the left. The user can click on it to open a pdf file of the image.

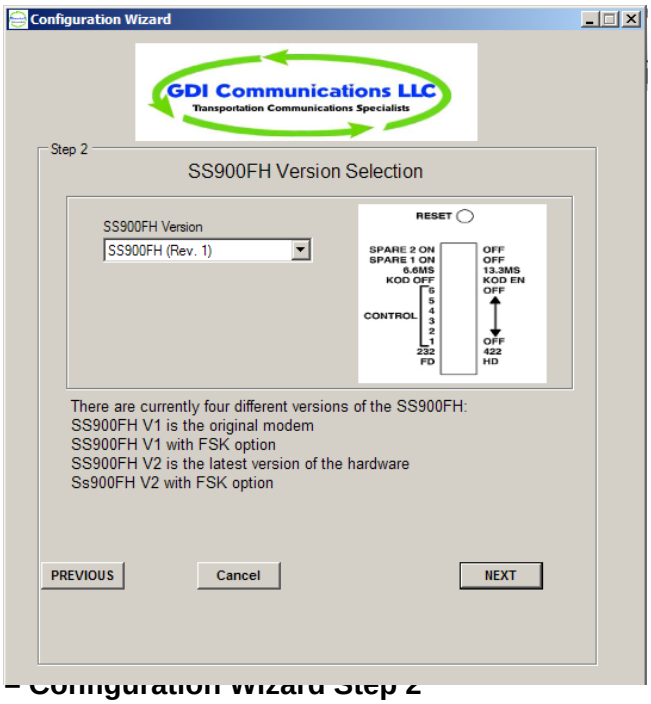


Figure 5 – Configuration Wizard Step 2

Step 3 of the wizard. In this step the user is asked to enter the baud rate and parity that the radio will be communicating on.

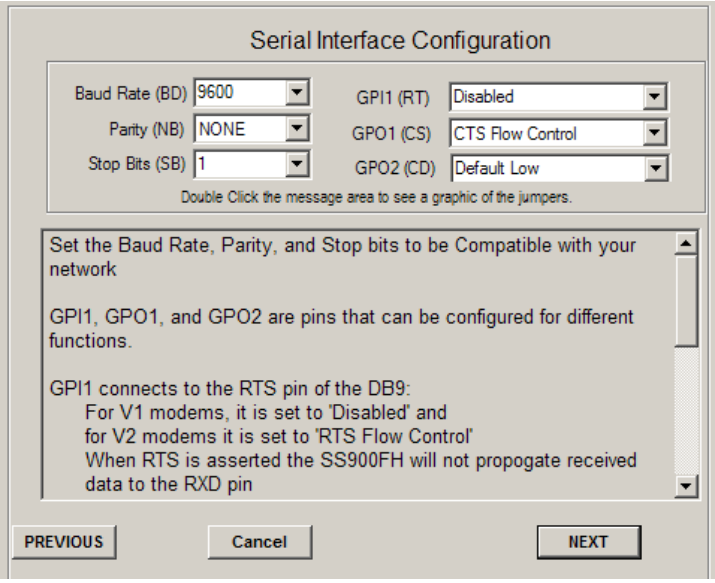


Figure 6 – Configuration Wizard Step 3

Step 4, asks the user to input the hopping sequence the radio is to be operating on and the Vendor ID.

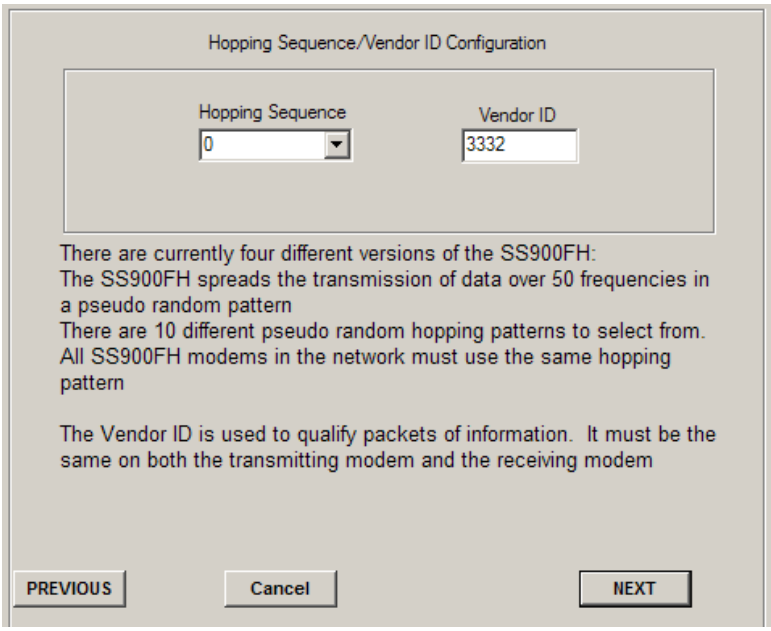
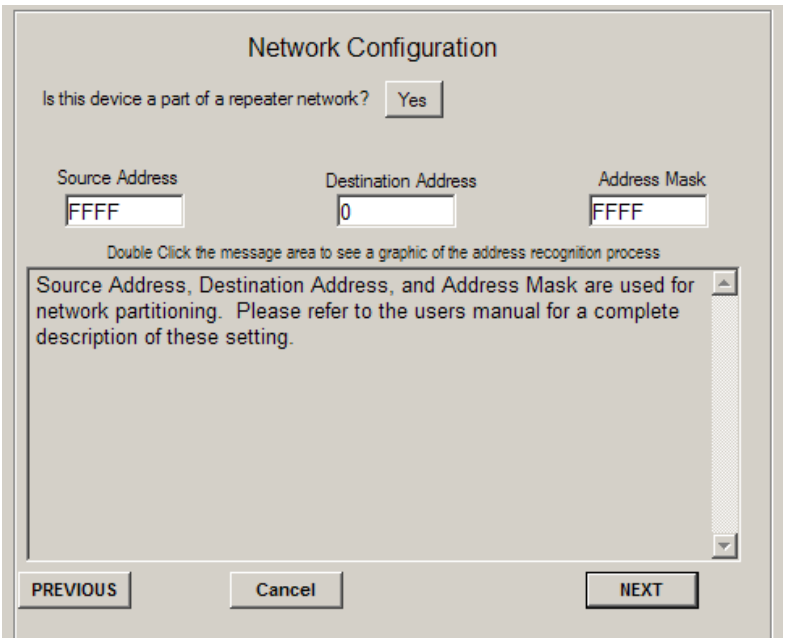
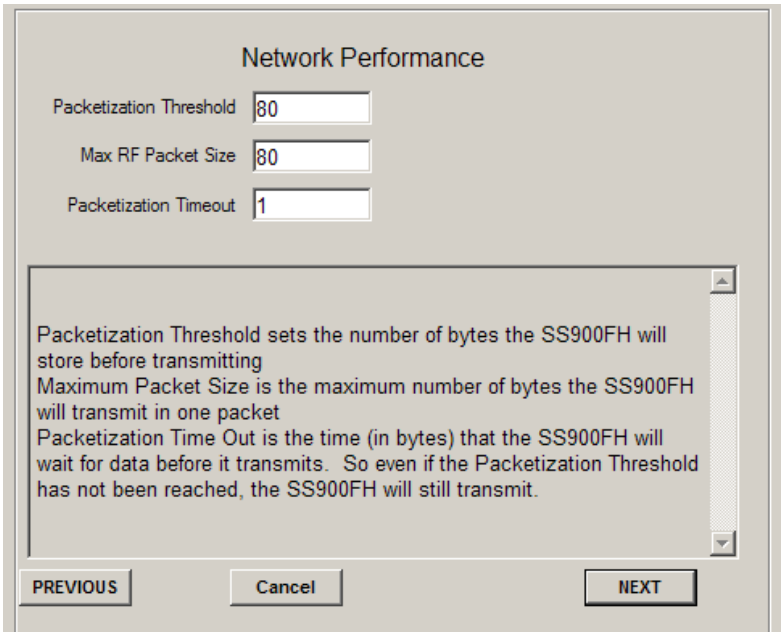


Figure 7 – Configuration Wizard Step 4

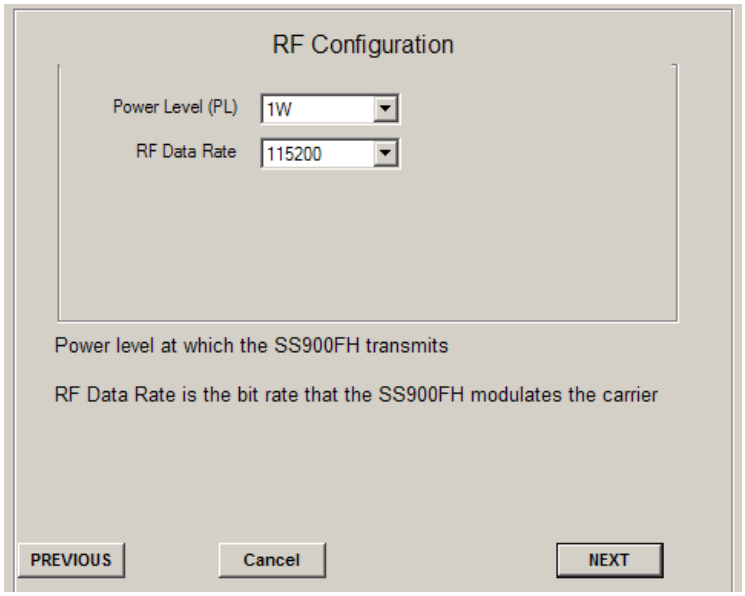
Step 5 is used to set the radio in a repeater network as either: a repeater, a master, or an end node. If the user selects one of the three options then he is prompt to specify values for addressing parameters. Step 5 is shown in Figure 8.



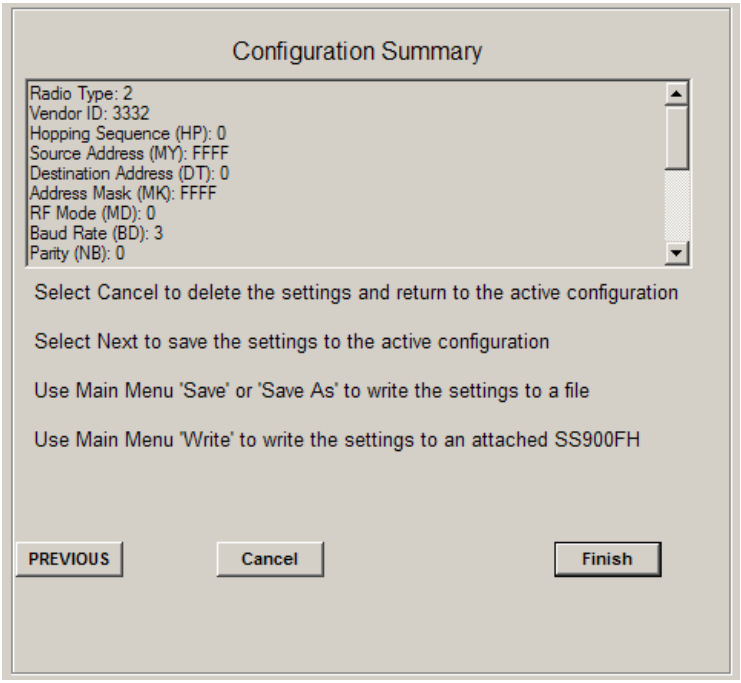
Step 6 is where the network performance is adjusted. Higher values yield more stable communications. Lower values minimize the round trip delay.



Step 7 is for adjusting the power and frequency of the radiated RF signal. One watt works for most applications. However it can be decreased if necessary.



The last step of the configuration wizard, Figure 9, shows a summary of the radio configuration with the user's changes included. The user can then upload the configuration to the radio. If the user clicks the "Finish" button before uploading then all changes are lost.



View Menu

The View Menu contains an option to display a Tools toolbar that will appear on the main page when selected (Figure 11).

Figure 11 – View Menu

Toolbars

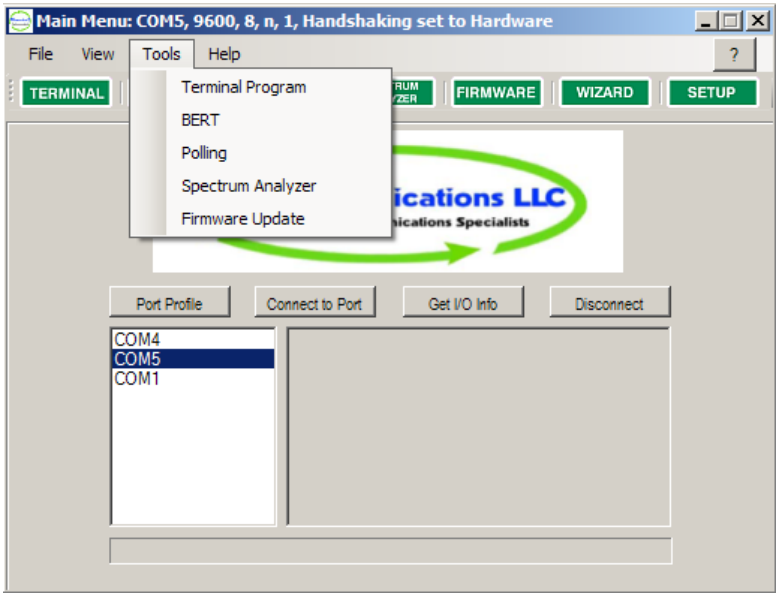
Figure 12, shows the Tools toolbar present on the main page.

Figure 12 – Main Page with Tools Toolbars

Tools Menu

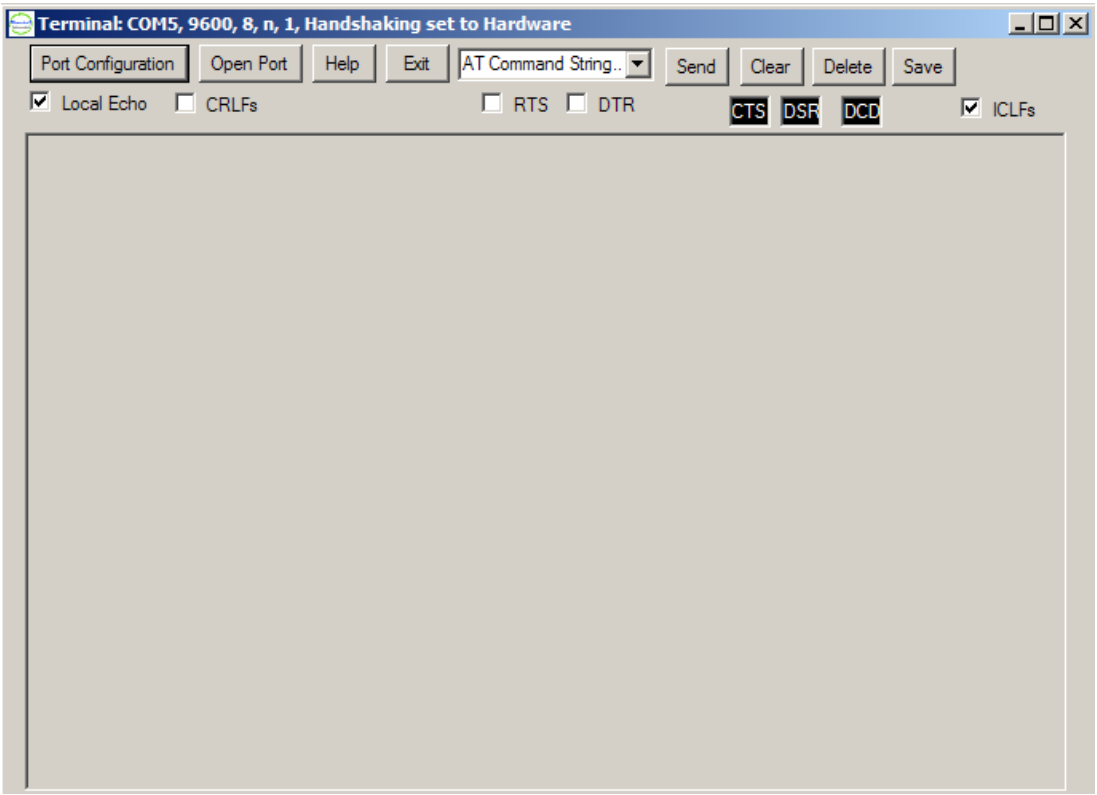
The Tools Menu contains five main utilities: Terminal, BERT, Polling, Firmware Update, and Spectrum Analyzer.

Figure 13 – Tools Menu

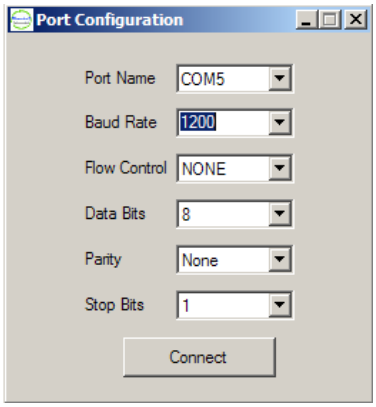


Terminal Program

The Terminal Program is a terminal emulation tools that can be used with any modem.



The first button on the upper left of this utility is the “Port Configuration” button which activates the Port Configuration” tool used to configure the COM port and its properties. After configuring the COM port, the terminal window turns white and you can start communicating with your device.

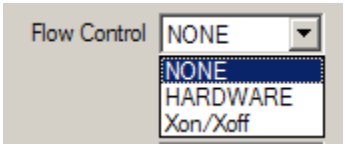


Port Configuration:

When the menu appears, the currently active port is closed and deactivated.

Port Name: When activated, the Connection Configuration tool scans the system for available serial communications ports. These ports can be real hardware ports or they can be virtual ports.

Baud Rate: The baud rate can be selected from the pull down menu and ranges from 1200bps to 230400bps.



Flow Control: There are three choices for flow control.

NONE – Handshaking is turned off and the control signals are fixed in the transmit mode.

HARDWARE: Activates the control signals to control the flow of data.

Xon/Xoff: This is a special software control of data flow and is not yet implemented. The menu item is present only for display purposes.

Data Bits: Select the number of bits per data packet. Choices are 6, 7, or 8.

Parity: Choices for parity are None, Odd, Even, Mark, and Space.

Stop bits: Select the number of stop bits. Choices are 1 or 2.

Connect: Activates the selected ports with the selected parameters.

Next to the “Port Configuration” button is the **Open/Close Port** toggle button. Closing the port allows access to it from other programs.

The **Help** button when activated will show help messages when the cursor is maneuvered over a button or window. The button will turn green when active.
There are two ways to exit the Terminal program. Using the cursor, position it over the “X” box  found in the upper right hand corner of the window and depress the left mouse button. The other way is to click on the “**Exit**” button.

The “Clear” button, clears the text from the terminal window.

The AT Command String pull down list can save up to six command strings that can be sent to the device by clicking on the “**Send**” button. The user can also delete these commands by first selecting the command and then click on the “**Delete**” button. The “**Save**” button saves the entire AT Command String list to a file which will be recalled when the program is used again.

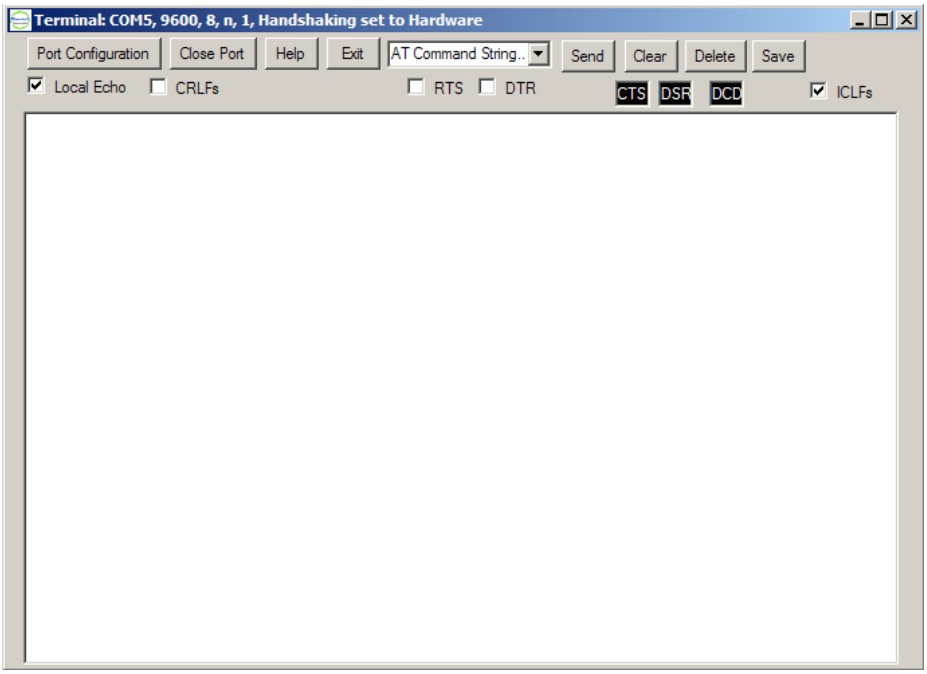


Figure 14 – Terminal Program

The “Local Echo” check box when checked, enables the printing of characters typed on the keyboard. When it is not checked, The attached device must “echo” the characters back to the screen.

“CRLFx” when checked will append carriage return (0xD) and line feed (0xA) characters to the end of transmitted data.

“ICLFs” when checked will append the carriage return and line feed characters to incoming data.

When “Hardware” handshaking is selected the RTS and DTR check boxes assert or deassert RTS and DTR. They are disabled when the handshaking is set to “None.”

The three status displays, CTS, DSR, and DCD indicate the current state of those signals. When the signal is asserted the display will be green.

Otherwise it is black.

BERT

The “BERT Tester” is a very useful utility for testing and troubleshooting SS900FH modems, and other GDI modems. It has been designed to be a general purpose BERT tester that can be used on a wide range of devices.

The BERT tester transmits a selected data packet to the device under test. It then waits for the device to send the data packet back. A comparison is made between the transmitted packet and the received packet. The test then repeats until the user intervenes.

Unlike other windows based test programs, this program performs dynamic hardware handshaking. Typically, windows based test programs use the control signal RTS and CTS as a means to enable the PCs COM port UART. Data is then transmitted and received without control. But this program asserts RTS and then waits for CTS to be asserted by the attached modem, and then transmits the selected pattern. At the end of the transmission, RTS is de-asserted until the next transmission. Before the program will receive data, DCD must be asserted by the attached modem. In this way, not only is the data path tested but also the control signals.

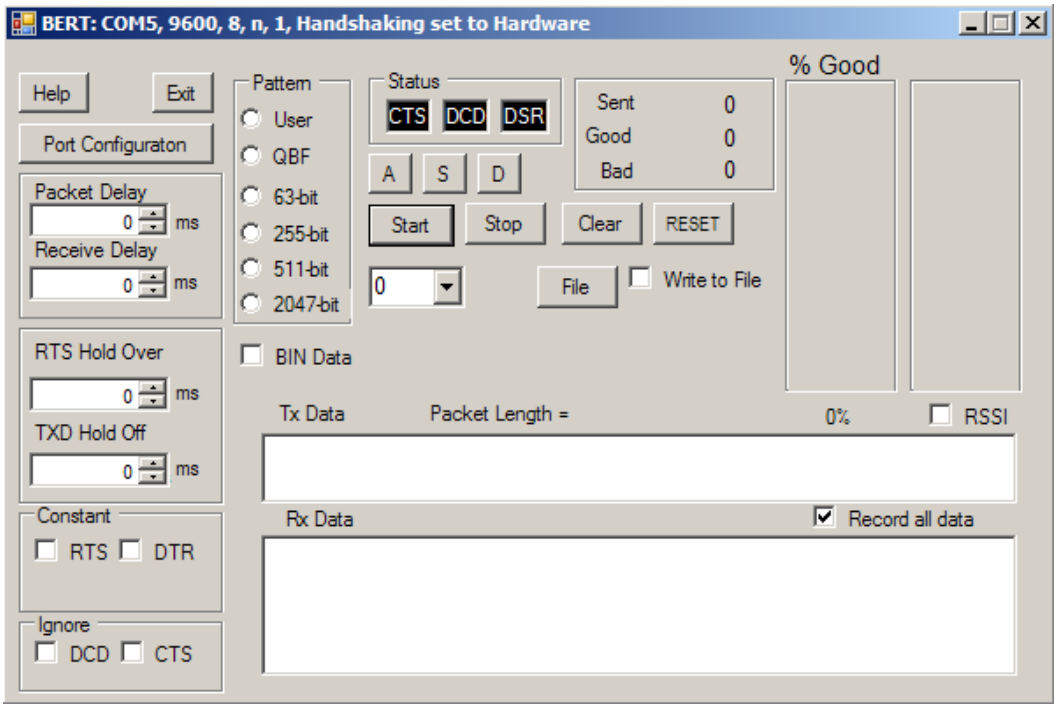


Figure 15 – BERT Tester

The “**Help**” button when activated will show balloon tips that can provide the user with some information about each control. The “**Help**” button will turn green when active. The “**Exit**” button closes the “BERT Tester” and takes you back to the “Main Page”.

After the COM port is configured, the first step for running a BERT test is to select a test “Pattern.” One of the five standard patterns can be used or the user can input a custom pattern either by typing it in or “Pasting” it from a separate source. The pattern selections are as follows:

User: A default string is generated and may be used or a alternate pattern can be entered either by typing or by “Copy” and “Pasting” from another source of text. The default string is useful because it creates a waveform on an oscilloscope with an easily recognizable marker.

QBF: The following text string “THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG 0123456789.”

63-BIT: A 63 byte long, non-repeating data pattern.

255-BIT: A 255 byte long, non-repeating data pattern.

511-BIT: A 511 byte long, non-repeating data pattern.

2047-BIT: A 2047 byte long, non-repeating data pattern.

BERT “BIT” patterns are designed to test every combination of a specific number of bits or word length. For instance for a six bit word length there would be 2^6 or 64 combinations of bits. If 0 is the starting pattern then hex number patterns 0 – 63 will be generated, arranged into a random order, packed into 8 bit serial bytes, and transmitted out the serial port. To transmit all 64 different combinations of 6 bits, a data string of “63” bytes is generated.

Packet Delay: Sets a delay (in ms) between data packets during the BERT test.

Receive Delay: Sets a delay (in ms) to check for data on the receive port. When working with the store and forward technology of the SS900FH, it is sometimes necessary to wait for the data to pass through the network before receiving it. This is equivalent to the TIMEOUT delay on a controller.

TXD Hold Off: This is the time interval between when CTS is asserted and when data is transmitted. When the BERT transmits s data packet, it first asserts RTS. It then waits for CTS to be asserted by the modem. The BERT then waits the time specified by the TXD Hold Off value (in ms) before transmitting the data.

The time interval between RTS and CTS is dependent on the modem. If the modem asserts CTS immediately, this setting can be used to create an artificial delay.

Values are in ms.

RTS Hold Over: After the entire data packet has been transmitted, the BERT de-asserts RTS. Some of the data may be "cut off" if there is a delay between the input and output of the attached device. This setting can extend the time that RTS remains asserted past the end of the data transmission. Values are in ms.

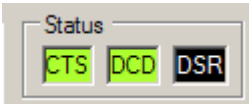
Constant RTS: Sets RTS in the asserted mode.

Constant DTR: Set DTR in the asserted mode.

Ignore DCD: When checked the BERT will ignore DCD.

Ignore CTS: When checked the BERT will ignore CTS..

The “**Status**” box shows the status of CTS, DCD and DSR for the connected COM port. During any testing, these status indicators are active. A yellow green light indicates that the signal is on or high, whereas black indicates the signal is off or low.

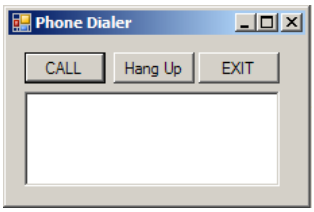


The three buttons in the middle are special function buttons.

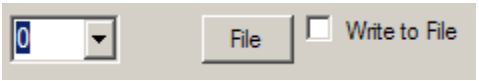
Button “**A**” performs an analysis of the timing and shows both the CTS delay time and the data Round Trip Delay time. RTD is from start of transmitted data to end of received data.

Button “**S**” is used to test the anti-streaming function. To use this function, click on the button. After it turn green, start the BERT program. As long as there is RXD data, the counter will continue, when RXD data stops, so does the counter.

Button “**D**” is used to test smart modems. Clicking on this button opens the “Dialer” window with which you can send AT commands to the attached smart modem. Finally it can be used call another smart modem. After connection, the BERT test can be ran across the two smart modems.



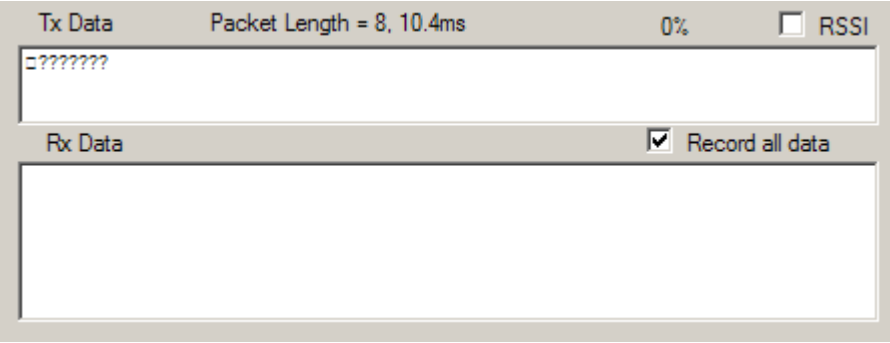
The loop count pull down box set the number of loops the BERT will run. If it is set to 0, the BERT will run forever.



To log the data results, click on file, create a filename, and then check the “Write to File” box. This writes the send and receive data to a file.

The Tx Data window displays the current test pattern. It's length in bytes and its length in ms based on the current baud rate.

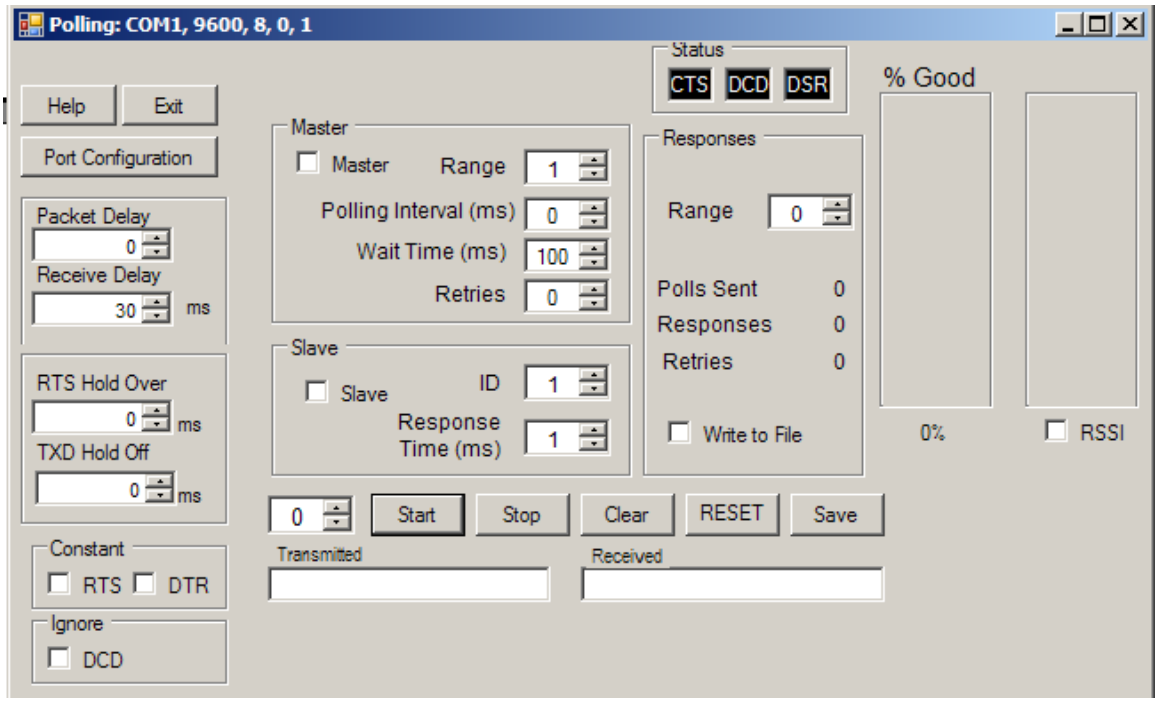
The Rx Data window displays RXD data for each loop. "Record all data" turns off this display.



On the right side of the "BERT Tester" are the "Packets Meter" and the "RSSI Meter". The "Packet Meter" indicates how many received packets were the same as the transmitted packets and how many were in error. The meter shows the value where as the "Serial Data Analysis" group box shows the numeric representation. The "RSSI Meter" shows the current value of the received signal strength off the SS900FH radio. The "RF Data Analysis" group box indicates the number of good RF packets received, the ones in error and the percentage of good RF packets.

Note: The "RSSI Meter" can only be used with the SS900FH where as the "Packets Meter" can be used with other devices during a Loopback test.

Polling

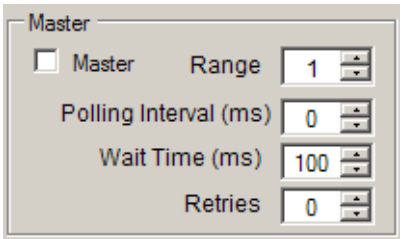


To use the Polling utility, there must be two modems attached to the PC or two PCs each with one modem attached.

There are similar items on this menu as there were on the BERT menu and therefore will not be discussed here.

Master:

Master Check box: Selects the attached modem as the polling master



Range: Sets the number of slave modems to poll.

Polling Interval: Set the time between each poll in ms.

Wait Time: Set the time to wait for the poll response from each slave modem.

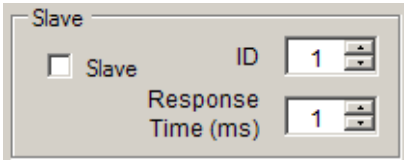
Retries: Set the number of times the poll will be retried.

Slave:

Slave Check Box: Selects the attached modem as a polling slave.

ID: Set the ID of the slave modem.

Response Time: Time to wait in ms to transmit a polling response.



Transmitted Window: Displays the Poll that is being transmi

Received Window: Displays the polling Response.

Responses:

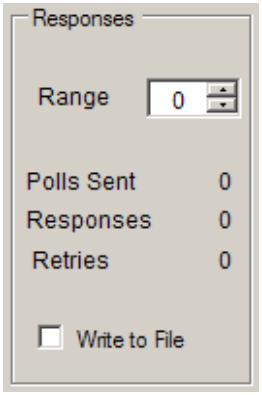
Range: The ID of the slave modem of which to report. 0 indicates all.

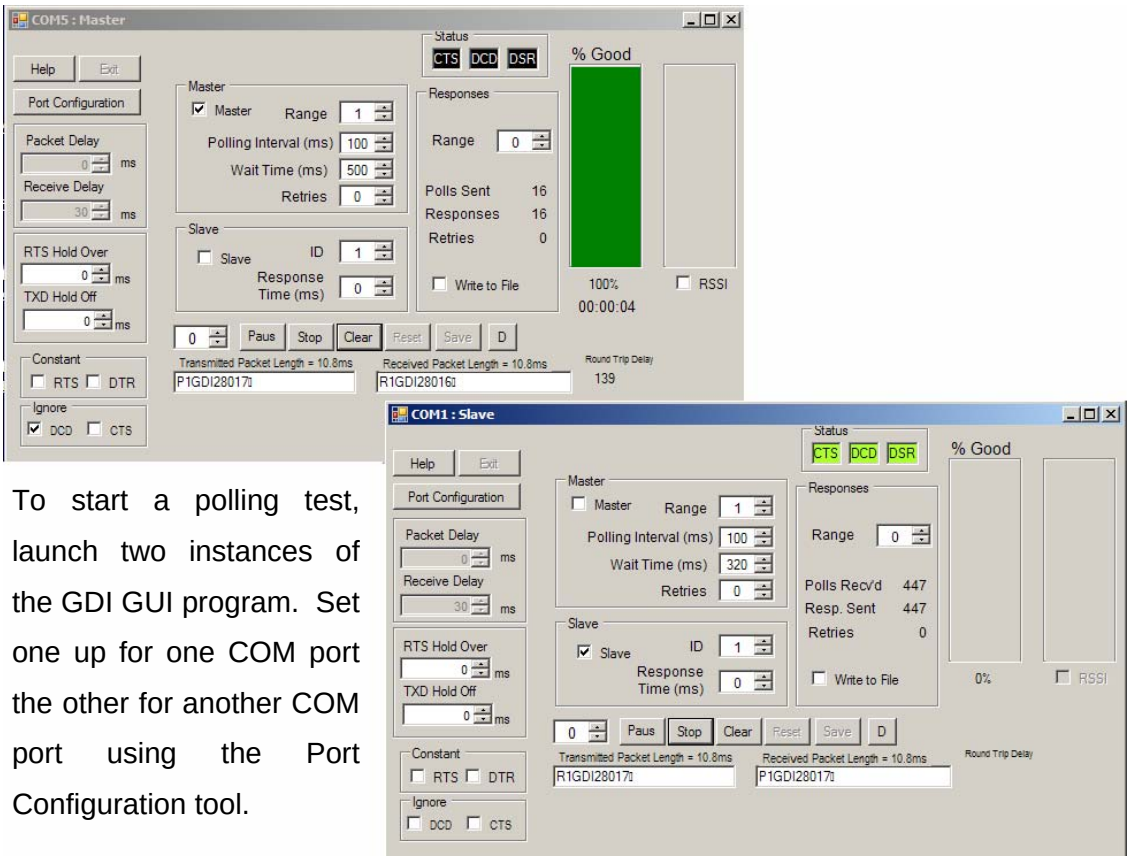
Polls Sent: Total number of polls transmitted.

Responses: Total number of responses received.

Retries: Number of retries.

Write to File: Write data to a log file.



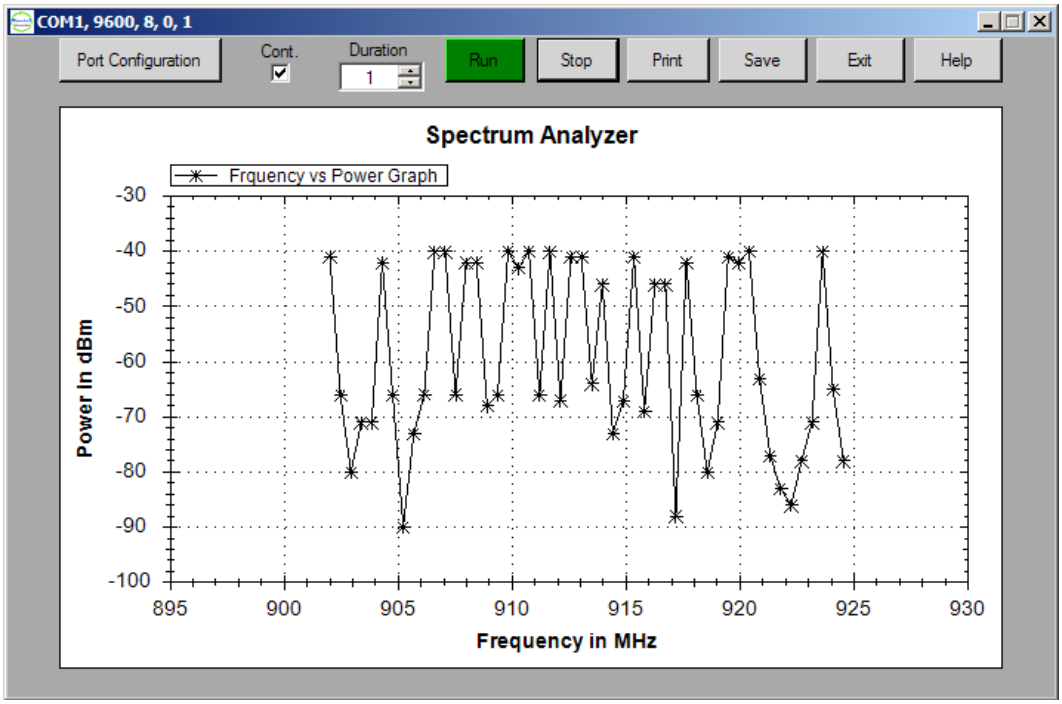


To start a polling test, launch two instances of the GDI GUI program. Set one up for one COM port the other for another COM port using the Port Configuration tool.

Set the first instance as the master and the second instance as the slave.

Click run on the slave first and then click run on the master. The “Wait time” on the master may have to be adjusted to accommodate the store and forward nature of the SS900FH. Its value will depend on the packet settings.

Spectrum Analyzer



The Spectrum Analyzer provides a means to monitor the transmissions levels of the SS900FH by reporting the receive level of the modem that the Spectrum Analyzer is being ran on. The signal strength can then be adjusted through the standard means.

The chart represents the 50 channels that the SS900FH Hops through for each transmission versus its received signal strength. Note that the frequencies are not accurate and are representative of the actual frequencies.

Port Configuration works the same as the other utilities.

Run – The run button starts the Spectrum Analyzer according to the Cont. and Duration setups.

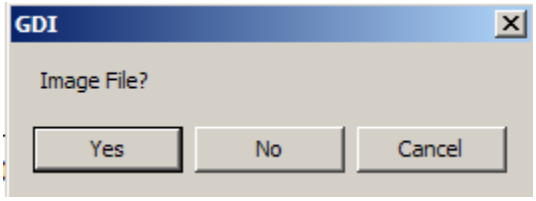
Stop – Stops execution and keeps the last sweep on the screen for examination and/or saving to a file.

Cont. – When checked the analyzer runs continuously. When not checked the analyzer will run once.

Duration – Defines the time in seconds that the analyzer will sample the receive levels.

Print – Prints the chart to the default printer.

Save – Based on user input, saves either an image file or a text based data output.

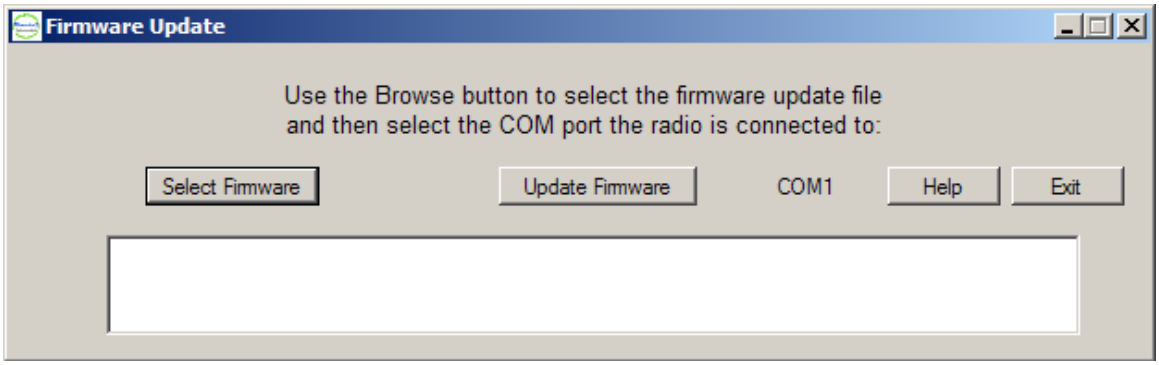


Exit – Exits the Spectrum Analyzer.

Help – Evokes the help cursor. Displays help information when displayed over a button.

Firmware Update

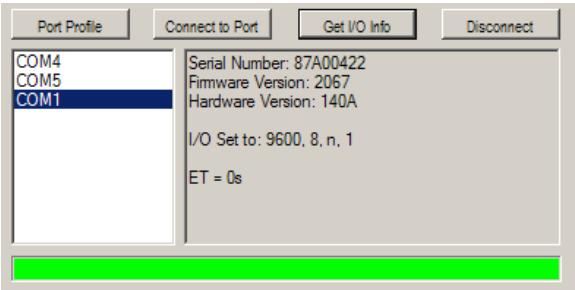
The “Firmware Update” utility enables the user to update the SS900FH firmware using files of extension .gdi. These files are distributed by GDI Communications and are not to be altered or changed by the user. The “Firmware Update” form is shown in Figure 16.



As shown in the figure above, the user can use the help button to get some tips on the controls present in the form.

To update the firmware follow the steps below:

1. Select a COM port and set the communications parameters by using the “Get I/O Info” function on the Main menu.
2. Click on the “FIRMWARE” button.
3. Click on the “Select Firmware” button to browse to the desired firmware button.
4. Click on “Update Firmware”



Note: Do not turn the SS900FH off once the firmware update starts. Doing so could cause the SS900FH to be unresponsive to further communications.

Help Menu

Typical and first time users of the software might wonder what some controls are meant to do. If so, they can go the 'Help Menu' on the main page or click the help button on other tools and get offline and online help. Figure 17 shows the 'Help Menu' on the main page.

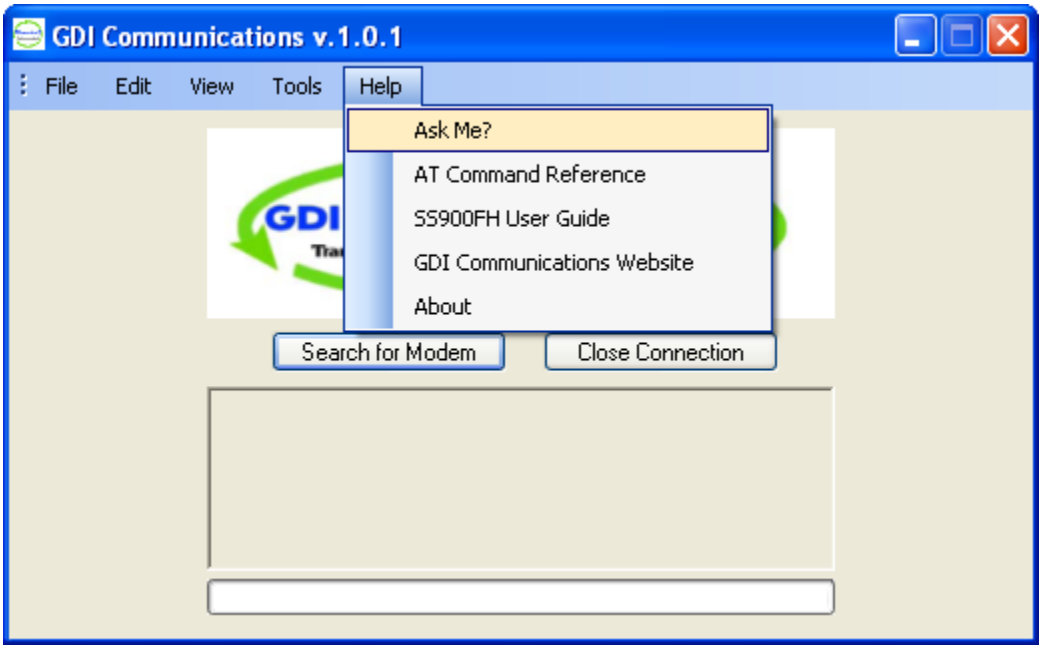


Figure 17– Help Menu

Users of this software can be testing a radio on the streets where Internet access is nonexistent. Thus offline help can be very handy. Offline Help consists of: the "Ask Me" function, two pdf files for the AT Commands and the SS900FH radio, Help buttons distributed on different forms and "About".

When selected, the "Ask Me" tool converts the cursor from its default style to the Help style (a cursor with a question mark attached). With that cursor the user can click any control and a balloon tip will show explaining what that control is used for. The Help buttons on the BERT Tester, Terminal Program, etc… does the same thing. To remove this help cursor the user has to click the "Ask Me" again (same for the help buttons).

The software comes with two pdf files present in the "Help Menu". The first is the "AT Command Reference" which shows all the AT commands used with the SS900FH radio.

The second file is the “SS900FH User Guide” which details more information about the radio.

The “About” shows the software version and GDI Communications physical address and phone support (Figure 18).

Figure 18– About

7.5.2 Online Help

Users who have access to the Internet can utilize two online help features in this software. They can click on the logo present in the “Main Page” which will direct them to the support link in the GDI Communications website. Also under the “Help Menu” the users can get to the official website of GDI Communications.

Summary

In this manual we have detailed the features of the software and explained how all its functions work. This software helps users to communicate with GDI products in a user friendly environment. This manual has been written for version 1.0.1 of the software. If more information is needed please visit GDI Communications website at (www.sgdi.net) where you can download the latest version of this software or any available user manual for any GDI product. You can also find the suggested reference material of section 9 on GDI Communications website for more details on AT Commands, the SS900FH radio or the bit error rate tester.

Suggested Reference Material

[1] “SS900FH User Guide”, GDI Communications,
http://www.sgdi.com/User%20Guides/Manuals/SS900FH%20User%20Guide.pdf
[2] “BT-1 BIT ERROR RATE TESTER USERS MANUAL”, GDI Communications,
http://www.sgdi.com/User%20Guides/Manuals/GDI%20BT-1%20Manual.pdf
[3] “SS900FH AT Command Reference”, GDI Communications,
http://www.sgdi.com/User%20Guides/Manuals/SS900FH%20AT%20Command%20Reference.pdf

Abbreviations

RTS: Request to Send
DTR: Data Terminal Ready
CTS: Clear to Send
DCD: Data Carrier Detect
DSR: Data Set Ready
WOO: Windows of Opportunity
SRT: Slave Response Time