



TERABEAM®

# Terabeam Gigalink

## Field Installation and Service Manual

Version 2.1  
September, 2002

**THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS. (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRE OPERATION.**

**IF THIS PRODUCT IS SUSPECTED OF CAUSING HARMFUL INTERFERENCE WITH OTHER EQUIPMENT, DIS CONTINUE OPERATION IMMEDIATELY AND CONTACT TERABEAM.**

**FCCID # O2700001-30-30**



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# 1 Introduction

## Gigalink Product Family

The Terabeam® Gigalink™ millimeter wave radio system represents an entirely new approach to broadband communications. Based on our extensive experience with millimeter wave systems for military and research applications, we now apply these techniques to a commercially priced version with our ultra-broadband family of Gigalink radio products.

The Gigalink broadband radio system operates in the FCC Part 15.255 unlicensed band covering a frequency range of 57.05 – 64.0 GHz. Due to the unlicensed status of this band, FCC license or special authorization is not required to operate our Gigalink systems. In addition, the high atmospheric absorption of RF energy at this frequency virtually eliminates any chance of interference from competing systems or unauthorized interception of the broadcast signal.

The installation procedures detailed within this guide are similar to those used to install any wireless system. In fact, certain attributes of the 57.05 – 64.0 GHz band actually simplify deployment. The key to any successful installation project is proper planning and design. The Gigalink radio product has been designed for ease of installation and trouble-free operation. We recommend that you read and fully understand this guide prior to initiating the actual installation work.

As stated above, the key to successful installation is proper system planning and execution. As with most wireless systems, the Gigalink radio system requires un-obstructed Line of Sight (LOS) to operate reliably. Because of the extremely high data bandwidth provided by the Gigalink system (1.25Gbps) it is likely that our radio systems will be utilized as a critical or primary network connection. This absolute reliance on our systems for connectivity demands a focused attention to detail in order to assure un-interrupted operation.

## Reliability

All Gigalink products are designed to provide a minimum statistical path availability of 99.99% ( $BER < 1 \times 10^{-9}$ ) when operated within the recommended range envelope. Exceeding the specific model range restrictions will result in unreliable operation particularly during adverse weather.

Statistical availabilities in excess of 99.99% may be achieved by choosing the next longer range system for a given path or by co-locating two Gigalink systems. Traditional circuit redundancy methods utilizing collapsible ring architectures or media diversity may also increase statistical availability.

# Gialink Model 6451e Specifications

## Data Transmission

Bit Rate 1.25Gbps Full Duplex  
Protocol Gigabit Ethernet (1000BaseFX)

## Interfaces

Data FC Connector (850-nm MMF)  
Monitor/Management (Ethernet) RJ-45 Connector and FC Connector (1310nm MMF)  
DC Power Proprietary 3 terminal DC Receptacle and Connector Kit

## Operational Parameters

Frequency Range 57.05 – 64 GHz  
Output Power 10mW (antenna injection)  
Antenna Type Integral 13" parabolic  
Antenna Gain 40dBi, Min.  
Beam Width 1.0°, Max.

## Regulatory Compliance

Electrical CE – 60950 (Pending)  
Electromagnetic FCC – Part 15.255, Certification #O2700001-30-30  
CE – EMC and R&TTE Directive (Pending)

## Power

DC Input Voltage -48 VDC +/- 20%  
Maximum DC Input Current 1.5 Amperes  
DC Power Consumption 75 Watts

## Environmental

Operating Temperature -20°C to 50°C (-4°F to 122°F)  
Storage Temperature -30°C to 85°C (-22°F to 185°F)  
Relative Humidity Up to 95%, Non-Condensing

## Mechanical

Transceiver H x W x D 33 x 33 x 20 cm (13.0 x 13.0 x 7.9 in.)  
Transceiver Weight 17 lbs (7.7 kg)

## FCC Compliance Statement

The Terabeam Gigalink family of products is type-certified for unlicensed operation in compliance with FCC Part 15.255. Terabeam Gigalink radio products are factory set for frequency, frequency stability and transmitter power levels. No user-authorized adjustments are provided. **Changes or modifications not expressly approved by the party responsible for compliance will void the user's authority to operate this equipment.**

For detailed information on Gigalink Part 15.255 type certification and rules governing Part 15 Unlicensed operation, please visit the Federal Communications Commission home page at <http://www.fcc.gov>

## 2 Gigalink Installation Quick Guide

The Terabeam Gigalink millimeter wave radio system represents an entirely new approach to broadband communications. Based on our extensive experience with millimeter wave systems for military and research applications, we now apply these techniques to a commercially priced version with our ultra-broadband family of Gigalink radio products.

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Throughout this guide, important topics, instructions or warnings are identified by symbols notated by the following.



Indicates time saving recommendations



Indicates potential for equipment damage, or unsatisfactory operation



Identifies areas of safety hazards or potential injury

## Unpacking the Kit and Verifying Contents

Your Gigalink system will arrive in two separate boxes, one containing the high band radio terminal, DC Connector kit, mounting hardware and documentation and one containing the low band radio terminal, DC Connector kit, mounting hardware and documentation. The contents of both boxes should be identical with the exception of the fiber optic loop-back cable, supplied only with one terminal.

| <b>Item/Description</b>                    | <b>Qty Supplied</b> | <b>Re-Order #</b> |
|--|---------------------|-------------------|
| 1. Gigalink Radio Transceiver              | 1                   | Same as Model #   |
| 3. Fiber Loop-Back Jumper                  | 1                   | SFOFC-01          |
| 4. 10BaseT SNMP Adaptor Cable              | 1                   | 3028              |
| 6. Pipe Mount L-Bracket                    | 1                   | 2842-1            |
| 7. Terminal Mount Hardware Kit (stainless) | 1                   | 2901              |
| 8. Gigalink Installation/Operation Manual  | 1                   | (not shown)       |



With receipt of system delivery, each carton should be inspected to confirm complete content. If any items are found to be missing, installers should contact the factory to arrange delivery.



**NOTE:** During shipping kit inspection, do not remove the contents of Gimbal Mount #2289 or Hardware kit #2901 in order to avoid mixing-up or losing the hardware.

## Gigamon Software Installation

The SNMP is accessed through the Gigamon™ Graphic User Interface (GUI). The Gigamon Interface is the primary tool for precision alignment of the Gigalink terminals. Through Gigamon, the SNMP utility is also used to set terminal configurations and provide ongoing monitoring of critical radio parameters.

Before proceeding with terminal installation the Gigamon GUI application must be installed on the technician's laptop computer.



**NOTE:** Installing the Gigamon monitoring software in two laptop computers will simplify precision alignment. If two laptops with Ethernet cards are available, it is recommended that both receive the software.

## System Requirements

For proper operation of the Gigamon monitoring utility the following minimum system requirements must be met.

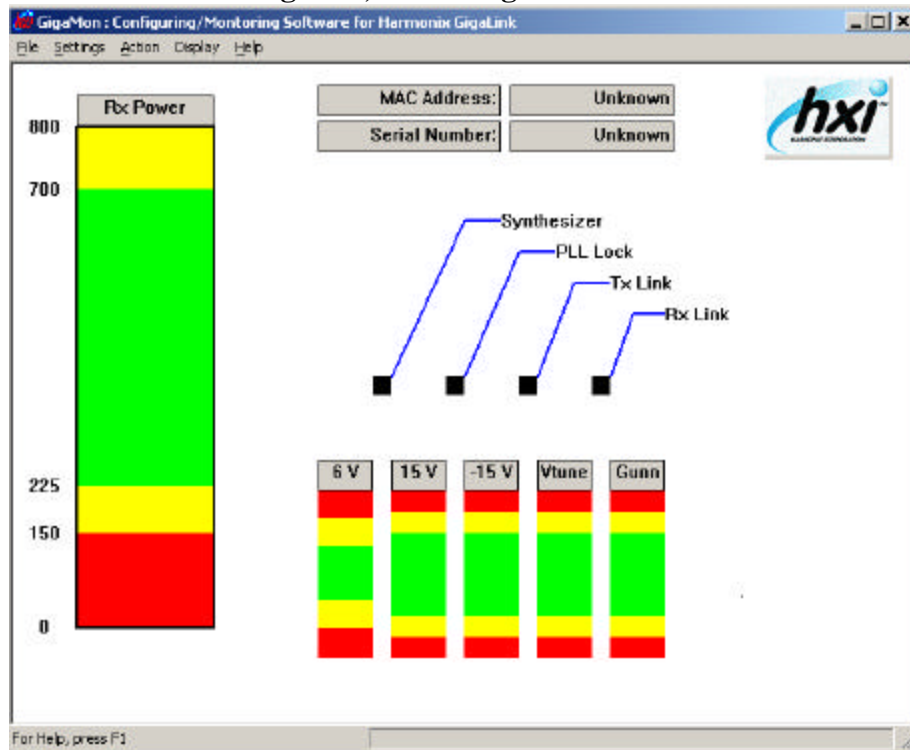
1. Computer running Windows NT/2000, 2000ME or Windows XP
2. A 10/100 Ethernet Adapter card, installed in the computer.
3. Screen resolution should be 1024x768 or higher. To change screen resolution,
  - 3.1 Click on 'Start' menu
  - 3.2 Select 'Settings'
  - 3.3 Select 'Control Panel'
  - 3.4 Double click on 'Display' icon.
  - 3.5 Click on 'Settings', and move the slider in 'Screen Area' to adjust the display

## Gigamon Setup and Installation Procedure

1. Insert the resource disc and double click on the “GigaMon Install” icon.
2. Run “**setup.exe**”. This will install the drivers in Windows System directory, copy main executable file “**GigaMon.exe**” to the user’s specified path and add the program name to program menu.
  - 2.1 Copy **W32N50.DLL** to the Windows System directory, usually the appropriate directory will be C:\WINNT\SYSTEM.
  - 2.2 Copy “**PCANDIS5.SYS**” to the Windows System directory, usually the appropriate directory will be C:\WINNT\SYSTEM.
  - 2.3 Copy “**moncfg.exe**” to the preferred path.

At the conclusion of the Installation Session, a Gigamon Icon will be displayed on the Computer desktop. Double clicking on this Icon will produce the window shown in Figure 3. If problems are encountered during the Gigamon monitor software installation process, refer to the more detail description of the Gigalink SNMP utility and Gigamon monitoring software (sections 3 and 4) of the enclosed “Users Manual”.

**Figure 3, Initial Gigamon Screen**



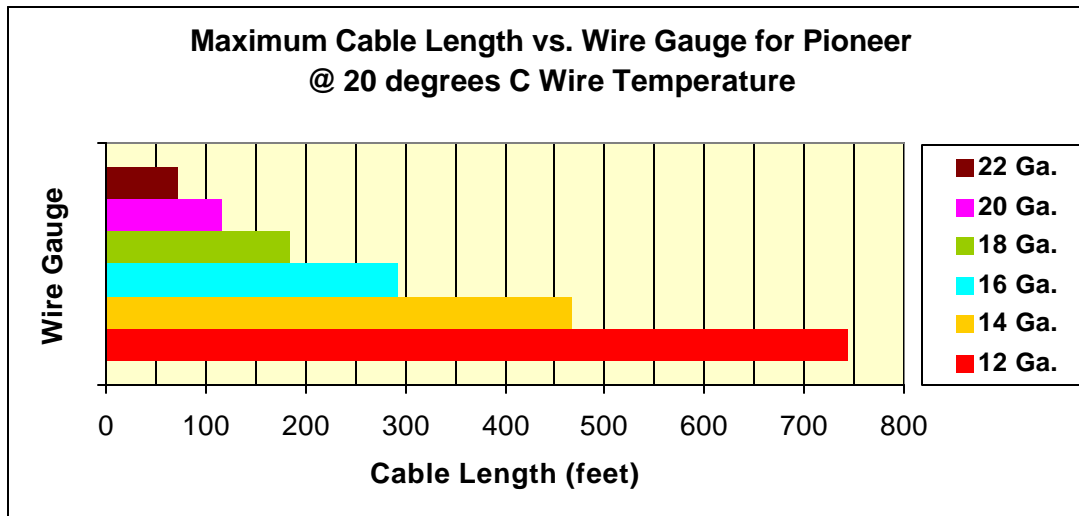
## Electrical Services



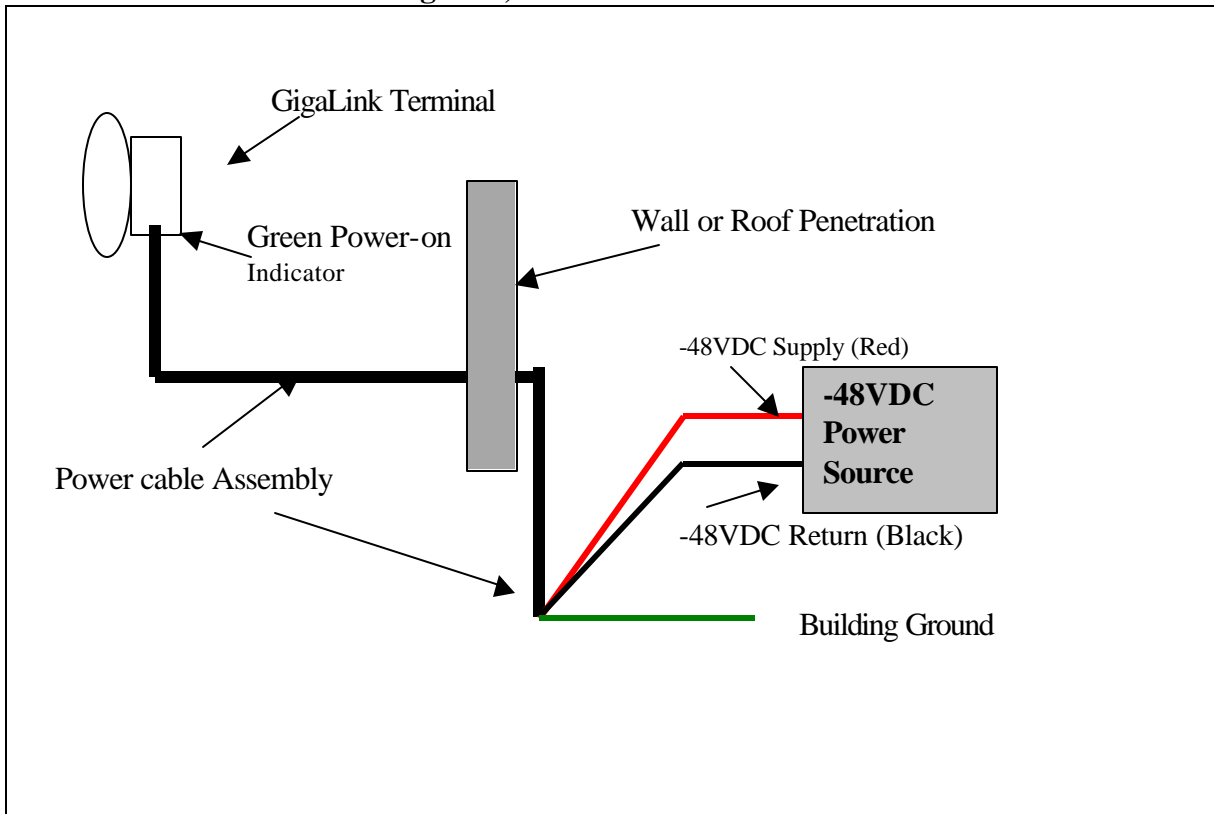
**WARNING:** The Gigalink Radio Terminal electrical connection at the radio terminal must be made first in order to avoid arcing and possible damage to the radio terminal connector. Once the radio connection has been made, power may be applied to the circuit.

### Electrical Power

The Gigalink Model 6451e terminal operates on a single -48VDC supply. Power may be provided from a regulated power supply or battery plant. The installer must provide a 3 stranded conductor DC power cable of a gauge sufficient for the intended application. Installers should use the guide below to determine the minimum wire gauge needed based on the length of the DC power cable run.



**Figure 5, DC Power Connections**



## Network Interfaces

The GigaLink terminals utilize a weatherproof, FC type fiber connector on the radio terminal and a proprietary 10BaseT interface for SNMP communications. Network Fiber must be supplied to the radio terminal location and terminated in FC Male. The supplied Gigamon adapter cable (Figure 1, Item 4) can be permanently installed for the SNMP network connection by attaching a standard CAT 5 coupler and cable.

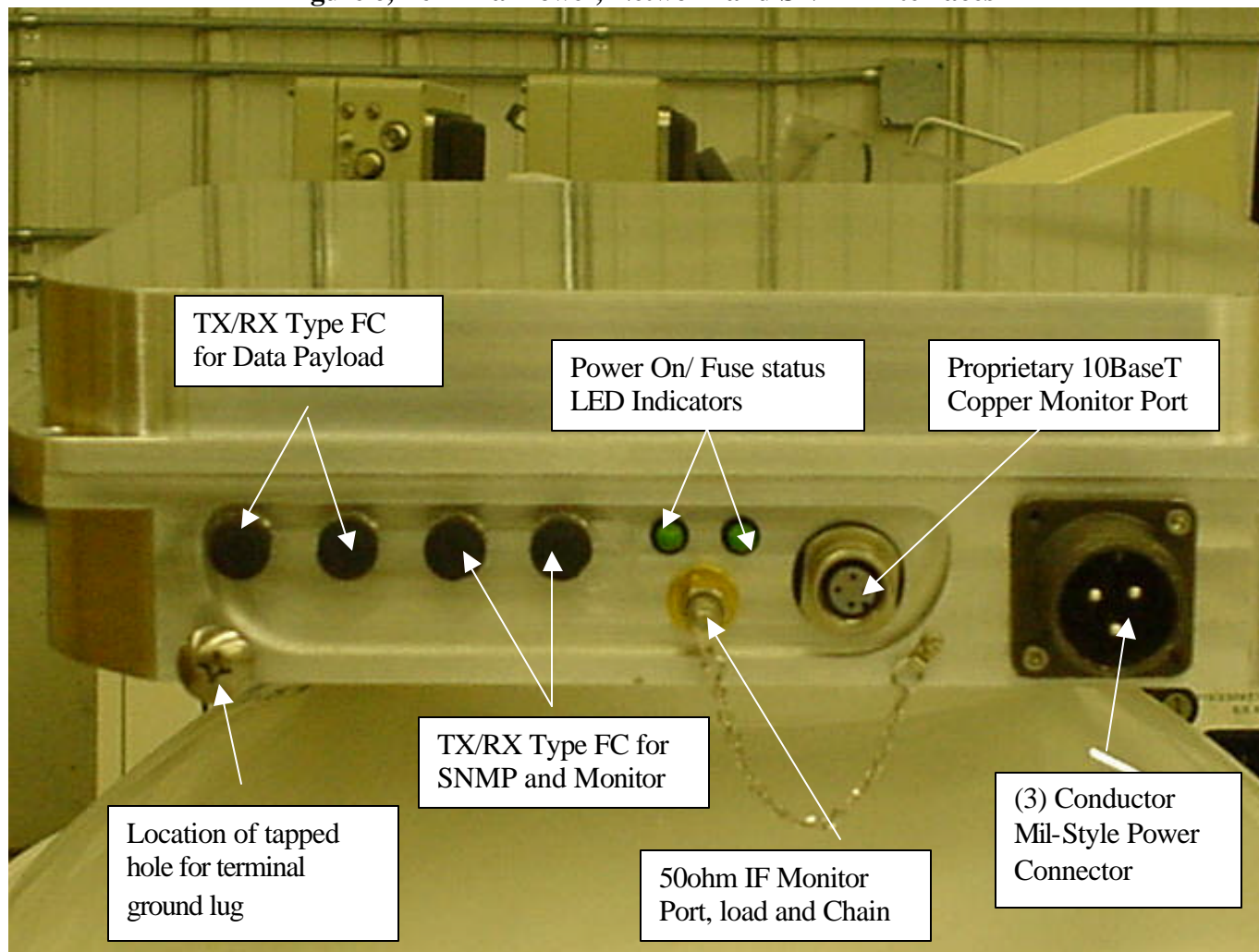
The Gigamon adapter cable is wired in a straight configuration to enable communication directly with the installer's laptop. For connection to a network switch, a length of cross connect cable is necessary between the radio terminal and switch.

The IF Monitor port is provided for factory test and diagnostics only and should remain capped in final installation.

The Network and SNMP interfaces are shown below.



Figure 6, Terminal Power, Network and SNMP Interfaces







## LED Operation Truth Table

| LED Condition | Terminal Status                               |
|---------------|---|
| Both Lit      | presence of -48VDC power and internal fuse OK |
| One Lit       | -48VDC present but internal fuse blown        |
| None Lit      | No -48VDC power present                       |

## Mechanical Installation

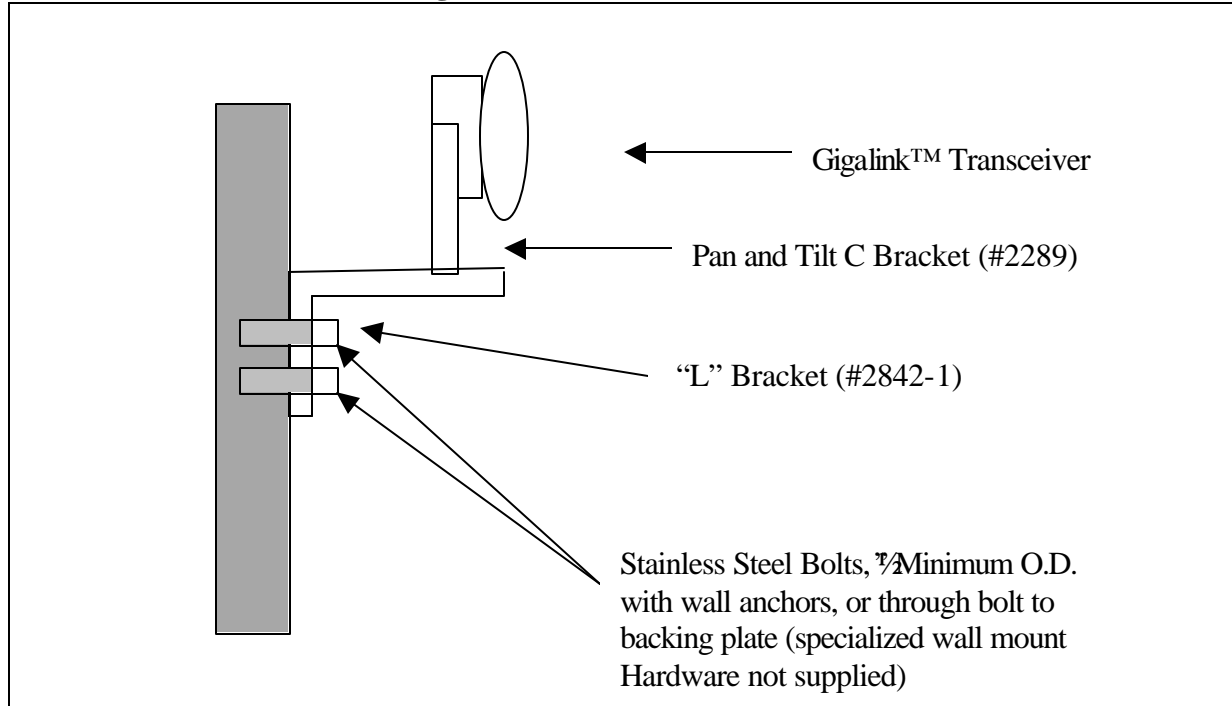
### Attaching the Gimbal Mount

Before actual terminal mounting can be accomplished, it is necessary to attach the Pan and Tilt Gimbal Mount to the Gigalink radio terminal housing. The necessary hardware for this attachment is provided with the Pan and Tilt Gimbal Mount # 2289-1 and consists of (4) M8 x 1.5cm stainless steel bolts, flat washers and lock washers. Figure 6, details the Gimbal mounting procedure.

## Selecting the Optimum Terminal Mounting Method

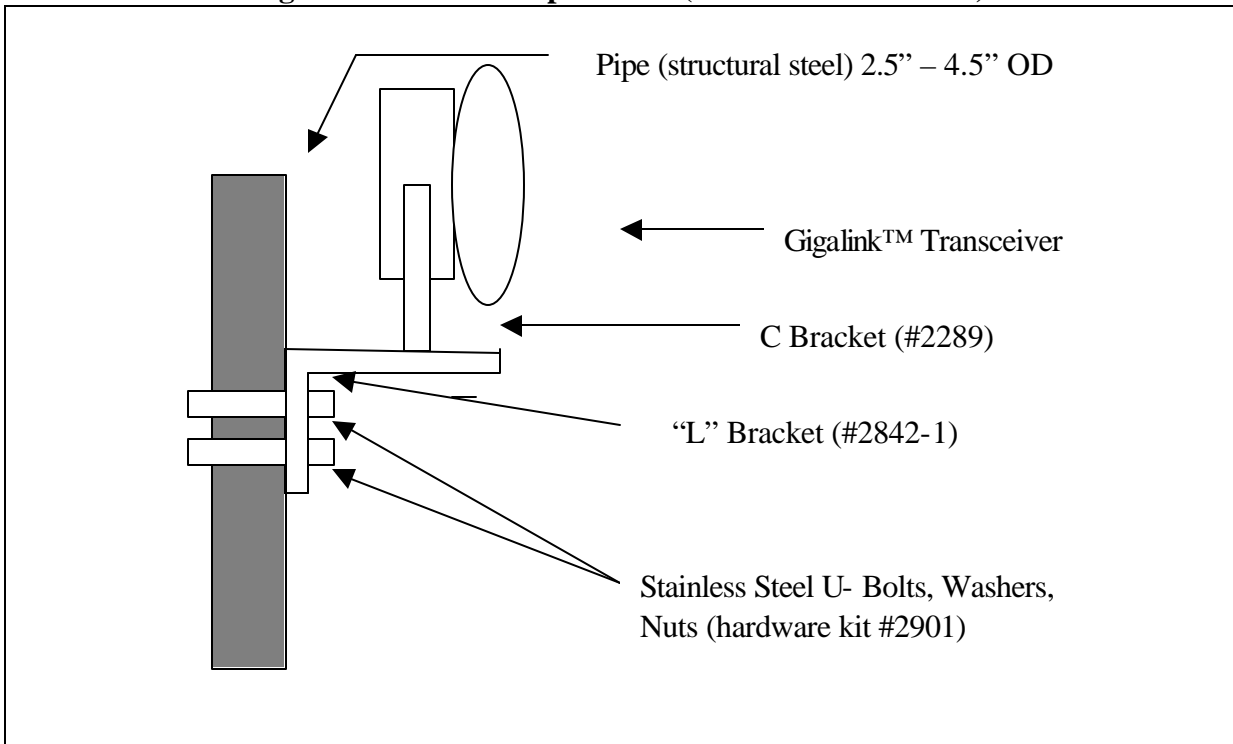
The following sections detail available mounting methods and hardware for the Gigalink product.

**Figure 11, Standard Wall Mount**



**WARNING:** It is the responsibility of the installer to assure that the radio terminal is mounted securely enough to prevent falling. Particular care must be used when wall mounting the radio terminal above areas frequented by personnel. In some cases, it may be advisable to attach a safety chain or lanyard through the gimbal mount to provide additional security.

**Figure 12. Standard Pipe Mount (all hardware included)**



### **Rough Mechanical (Visual) Alignment**

Once the Gigalink Radio Terminals are securely fastened to the mounting locations, the installer should visually align the terminals. Visual alignment is accomplished by loosening both the C Bracket Attachment bolts and L Bracket Mounting bolts slightly. With these (7) bolts loosened the terminal can be aligned (aimed) toward the other terminal by sighting along the radio housing body.

Once satisfied that both terminals are aimed at each other, all seven bolts can be snugged up enough just to hold the desired position.

## Final Terminal Alignment



**NOTE:** Although it is possible for a single technician to perform final terminal alignment, Terabeam recommends that two technicians with monitor-enabled laptops be dedicated to this task. By dedicating two technicians equipped with cellular phones or two-way radios, final alignment can be accomplished at both terminal sites concurrently, eliminating the need to constantly travel between sites.

## Radio Terminal Power-Up

Once the Radio terminals have been mechanically mounted in place and visually aligned, both radio terminals must be powered up, and network services connected.

### Terminal Power up

Power-up the Gigalink terminal as follows.

1. Attach DC power cord securely to the radio terminal
2. Attach power leads to –48VDC source Red to –48VDC supply, Black to –48VDC return and Green to Building Ground.
3. Power up –48VDC circuit.
4. Verify power on condition via Green “Power-on” LED’s located on the bottom of the terminal housing

### Connecting Network Services

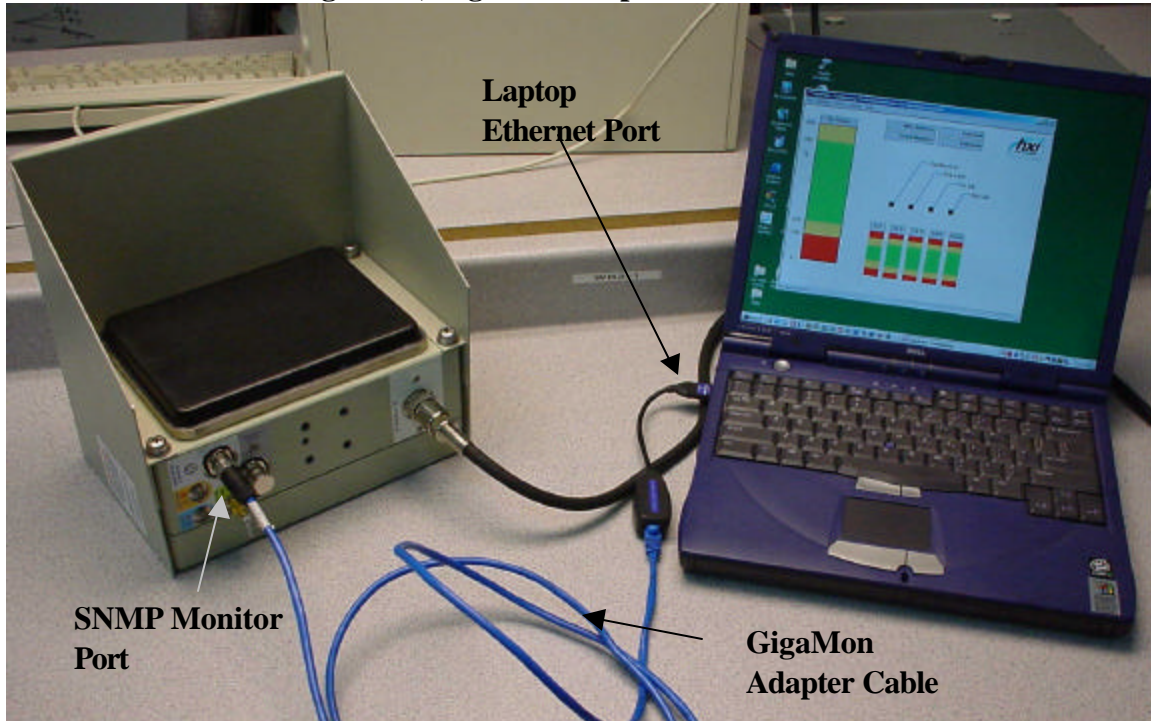
Once the power has been applied to the Gigalink terminal, Network services can be connected and verified. The network Fiber connections to the Gigalink terminal are Type FC male terminated fiber optic cables. Make these connections by aligning the connector body index tab, then tightening the outer collar in a clockwise rotation.

In the network switch room, insert the other end of each fiber optic cable into the appropriate TX and RX switch ports. If done correctly, a link light should be visible. If no link light is visible, make sure the radio is powered up and swap the fibers.

## Using Gigamon Software for Precision Alignment

The Gigamon software previously installed in the technician's laptop will be the primary tool used for precision alignment. To initiate the Gigamon session, install the SNMP adaptor cable between the laptop Ethernet adaptor and the proprietary 10BaseT connector on the radio terminal.

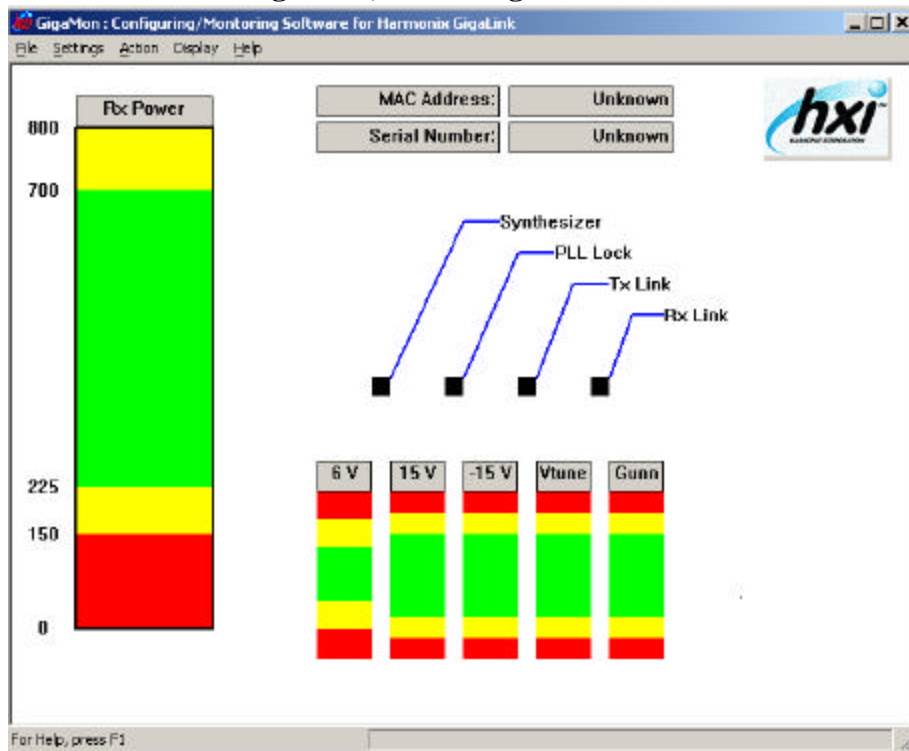
**Figure 13, Gigamon Adapter Cable Connection**



Follow these steps to initiate the Gigamon alignment tool.

1. Double click the Gigamon Icon to launch the Gigamon utility.

**Figure 14, Initial Gigamon Screen**



- From the “Action” Menu select “Refresh”

**Figure 15, Gigamon Screen “Refreshed”**

The screenshot displays the Gigamon software interface with the title bar "GigaMon : Configuring/Monitoring Software for Harmonix GigaLink". The menu bar includes "File", "Settings", "Action", "Display", and "Help". A window titled "Refreshed GigaLink Information" is open, showing the following details:

- GigaLink Radio MAC Address: 00:30:30:00:00:32
- Serial Number: 515
- Firmware Version: 1.0.0
- Manufacture Date: 05-13-2002

Below this information are two sections for SNMP parameters:

- SNMP Network Parameters:**
  - GigaLink SNMP Agent IP: 10.0.0.200
  - Subnet Mask: 255.255.255.0
  - Gateway IP: 10.0.0.254
  - SNMP Manager IPs: 10.0.0.51
  - Report Frequency: 5 minute
- SNMP Thresholds Parameters:**

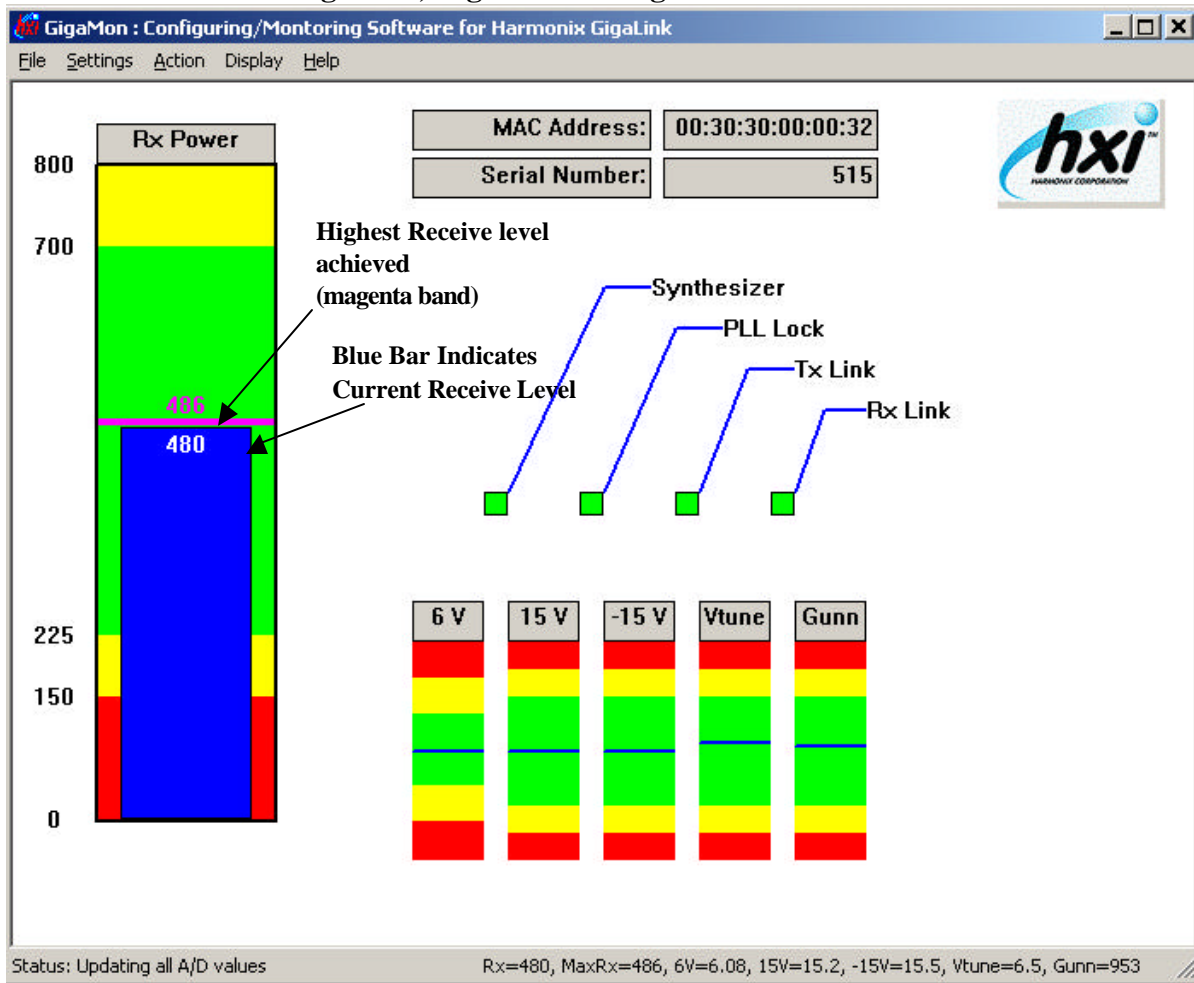
|  | Low   | High |
|--|---|------|
| <input checked="" type="checkbox"/> 6 Volt   | 5.6   | 6.6  |
| <input checked="" type="checkbox"/> 15 Volt  | 10.5  | 19.5 |
| <input checked="" type="checkbox"/> -15 Volt | 10.5  | 19.5 |
| <input type="checkbox"/> Vtune mV            | 0   | 0    |
| <input checked="" type="checkbox"/> Gunn mA  | 590   | 1300 |
| <input checked="" type="checkbox"/> Rx Power | 300   | 1000 |
| <input checked="" type="checkbox"/> Tx Link  | <input checked="" type="checkbox"/> PLL         |      |
| <input checked="" type="checkbox"/> Rx Link  | <input checked="" type="checkbox"/> Synthesizer |      |

An "OK" button is located at the bottom of the information window. Below the window, there are five vertical bar graphs showing signal levels. The first graph on the left has a scale from 0 to 150 and shows a blue bar with red and yellow segments. The other four graphs show similar stacked bar patterns with red, yellow, and green segments.

The status bar at the bottom of the application window displays: "Status: Information updated by GigaLink Rx=480, MaxRx=480, 6V=6.08, 15V=15.2, -15V=15.5, Vtune=6.5, Gunn=953".

- From the “Action” Menu select “Align” then “Run”

**Figure 16, Gigamon in “Alignment Run” Mode**



When in the “Align”, “Run” mode the Gigamon monitor displays a continually updated receive level. The task during precision alignment is to maximize or peak the receive level. Precision alignment is made in both the vertical and horizontal plane (up and down, left and right) separately, one terminal at a time.

Begin alignment by aiming the radio terminal slowly up while observing the change in receive level. Typically, the receive level will rise, then fall and then rise again slightly on both sides of the optimum alignment as the receiver moves from the center main beam to the edge side-lobes of the radiation pattern. It is recommended that the technician move the alignment through the main lobe and into both side-lobes until returning to the center peak



receive level. When satisfied that the maximum receive level has been reached, tighten the Gimbal side adjuster bolts to hold the desired vertical alignment angle. To facilitate this task, Gigamon displays the highest receive level recorded as a magenta bar at the top of the receive level bar.

Repeat this procedure for the Azimuth (Horizontal) alignment by slightly loosening the Gimbal base mounting bolts and rotating the alignment from right to left. Again, by observing changes in the receive level monitor, identify both side-lobe areas and return the alignment to the center “Peak” position.

Repeat the previous two alignment procedures at the other Gigalink terminal while maintaining the position of the original terminal. During these procedures, the receive level should continuously improve. Optimum terminal alignment is best accomplished by small adjustments at both terminal sites.



**NOTE:** Precision alignments are made most easily by make very slight incremental adjustments to the radio alignment. Care must be taken not to over-adjust the alignment. To facilitate precision alignment, tighten all adjusting bolts to allow movement only when bumping terminal firmly with your hand.

An acceptable receive level will be indicated by the Blue Gigamon receive level indicator as a level approaching the Maximum recorded receive level (Magenta line) and as a level falling somewhere in the upper half of the green region behind the blue indicator bar. An acceptable numeric measure would be a level above 450 as indicated by the large level number displayed below the receive level indicator.

When satisfied that optimum alignment has been achieved, tighten the (3) Gimbal base mounting bolts and the (4) Gimbal side adjuster bolts to secure the desired position.

As a final installation step, perform the “Save GigaMon Information in a File as” operation as prompted when exiting the application. The saved radio parameter information can be used for future comparisons to gauge ongoing radio performance.

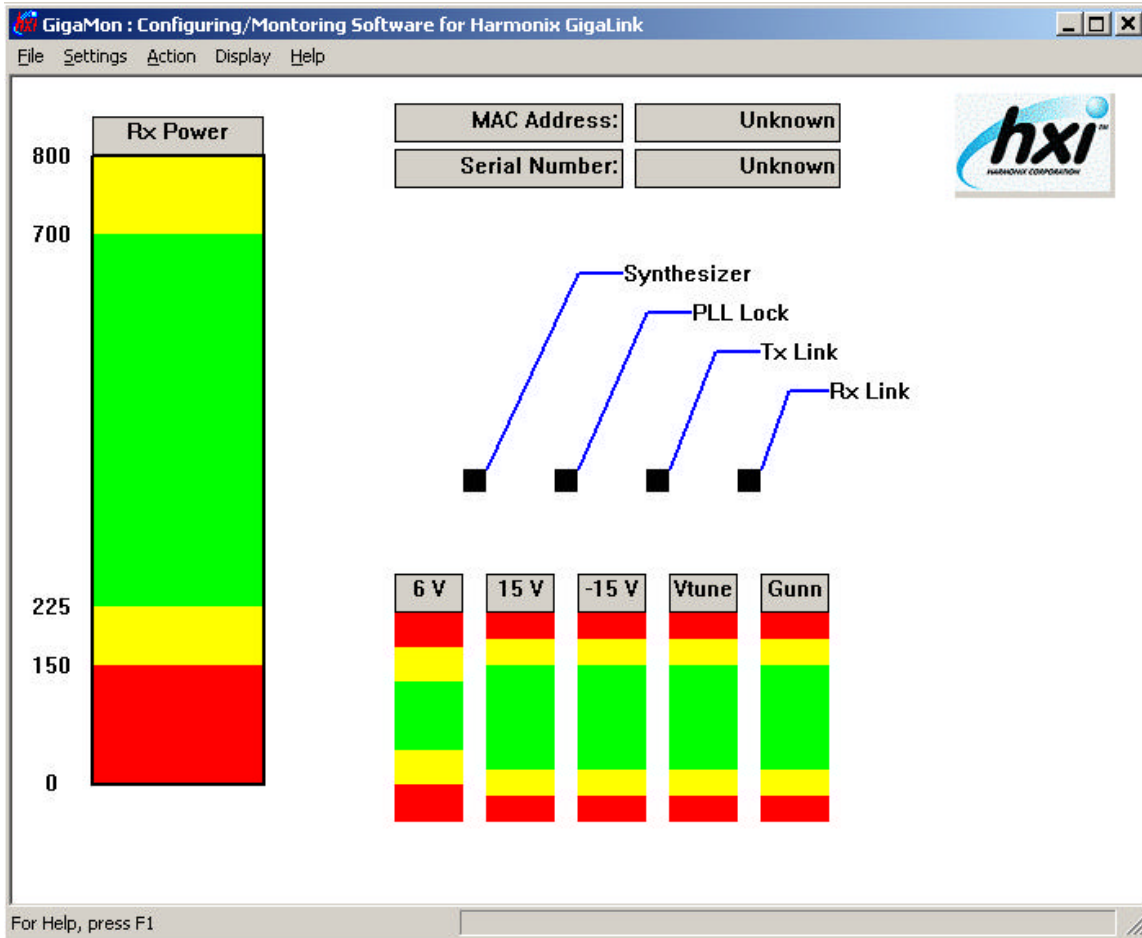
## Verifying Network Operation

Once an acceptable (optimum) receive level has been achieved, the Gigalink system will provide an error free RF link between the two network devices at both sites. If no link is obtained, check the network fiber, routing table configurations and other network parameters. If an error free link still cannot be established, consult the Troubleshooting/Diagnostic section of the Gigalink User’s Manual.



### 3 Gigamon Software

1. Run “**setup.exe**” from installation diskette or resource disc. This setup program will copy the following files into your system.
  - 1.1.W32N50.DLL in Windows System directory, it is “C:\WINNT\SYSTEM32 “ for Windows NT/2000 and “C:\WINNT\SYSTEM32 “ for Windows 9x.
  - 1.2.PCANDIS5.SYS (for Windows NT/2000) or PCANDIS3.VXD (for Windows 9x) in Windows System directory.
  - 1.3.The main executable Gigamon.exe in the "preferred path" (the path selected by user during setup program).
  - 1.4.The help file Gigamon.chm in the “preferred path\Hlp” directory.
  - 1.5. The uninstaller file “Uninst.isu” in the “preferred path” so that the user can uninstall Gigamon from the list in “Add/Remove Programs” of “Control Panel”.
  - 1.6. A desktop shortcut and the program name in the program menu. **You need to restart your computer before running Gigamon.exe for the driver PCANDIS5.SYS or PCANDIS3.VXD to be loaded.**
2. Connect computer’s Ethernet card with the Gigalink radio terminal 10BaseT terminal with the supplied SNMP Adapter Cable.
3. Power up the Gigalink terminal by connecting AC power and the DC power cable.
4. Double Click the “Gigamon” Icon to run the program.



**Initial Screen**

## Descriptions of Gigamon Components and Their Functions

The main function of Gigamon is to detect all the Gigalink terminals connected within the same network (connected via hub/switches) and to configure/monitor their parameters. Gigamon will detect and read the parameters of multiple Gigalink terminals (up to 8) at the same time, but it configures/monitors only the Gigalink currently selected. After selecting 'Refresh' from the 'Action' menu, the first Gigalink detected becomes the currently selected; all the components of the main window display the parameter values of the currently selected Gigalink terminal. The user can select another Gigalink terminal by clicking on option "Select Gigalink" in "File" menu and selecting that terminal from the list displayed.

Before going into the operating details, some terminology, and the color convention used should be explained.

## Terminology

- ‘Monitoring’ is an action state defined as ‘Runmode’/’Alignment’ and/or reading current Gigalink terminal parameters. ‘Runmode’ is the state where Gigamon reads the Gigalink terminal parameters (specially for Rx Power/Receive Level) while continuously updating the display.
- ‘Setting Network Parameters’ , ‘Setting Threshold Parameters’ and ‘Setting Factory Parameter’ are all part of “Configuring Gigalink”. Setting a parameter means saving that value in Gigalink terminal’s EEPROM image, once saved the terminal will keep the new values even if Gigalink terminal is powered off and back on.

## Color Convention

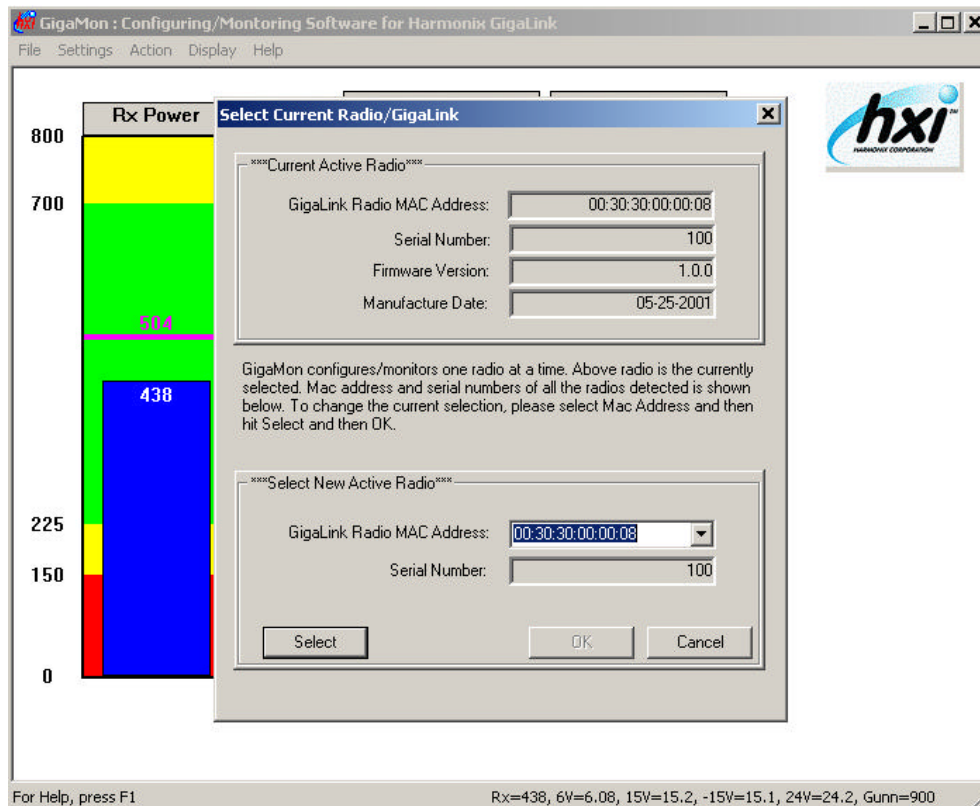
The status colors of the Gigamon display are:

- Black      Unknown
- Green      Safe range/On/Running
- Red        Danger range/Off/Stopped
- Yellow     Warning range
- Blue        Current/Latest read Value
- Grey        Read-Only

## Components of the Main Window

- **MAC Address:** The MAC or Hardware address of the Gigamon utility resident in the Gigalink terminal. This unique address is set at the factory and cannot be changed. Initially the Gigamon program does not know this MAC address of the connected Gigalink(s), and so the value “Unknown” is displayed. When ‘**Refresh**’ is selected from Action menu, the program tries to get the MAC addresses of all the Gigalink terminals connected to the network segment, and then ‘Unknown’ value becomes the MAC address of the first Gigalink terminal MAC address detected. By default, the first Gigalink terminal detected during refresh becomes the “Currently Selected” Gigalink.
- **Serial Number:** This value is set at the factory and cannot be changed. The value displayed, also corresponds to the currently selected Gigalink.

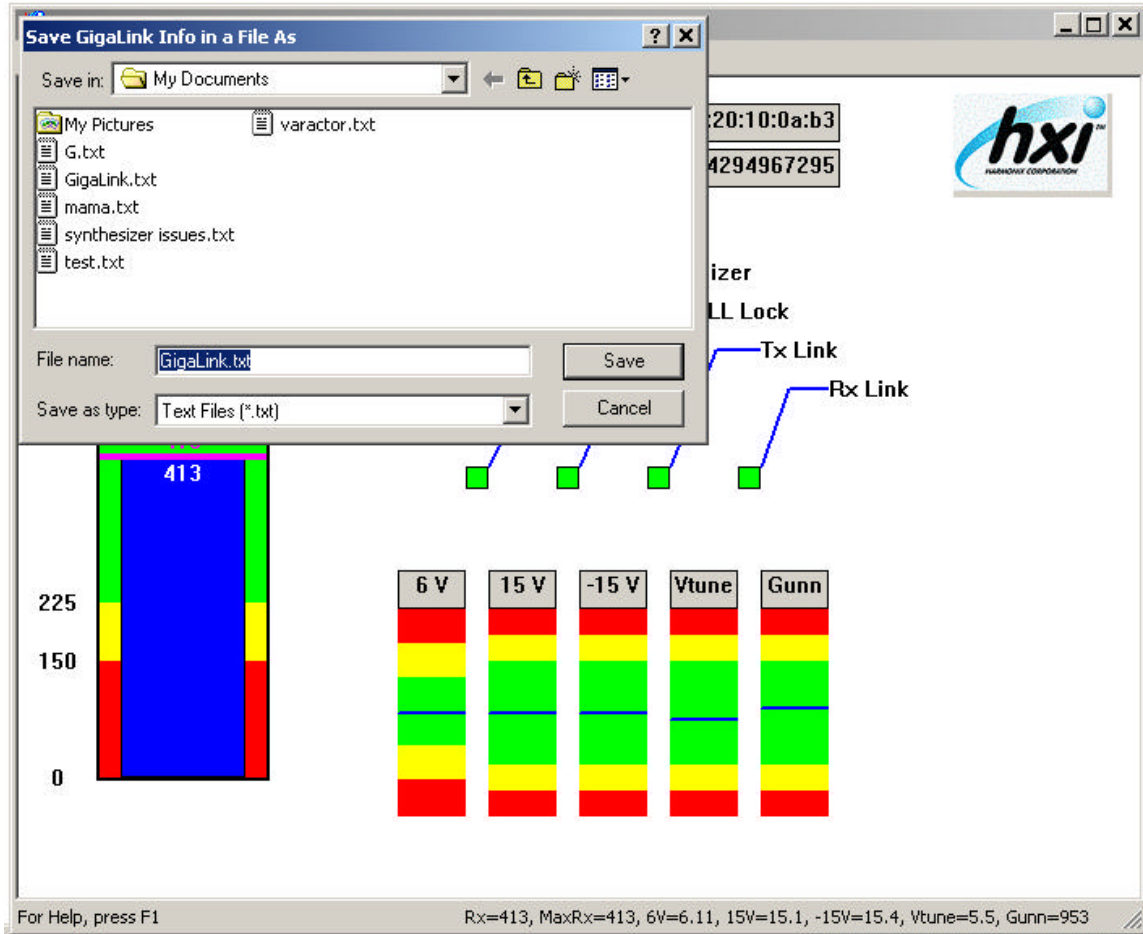
- **Synthesizer, PLL, TX Link, and RX Link:** These are discrete values that indicate an acceptable or unacceptable state for critical monitoring points within the Gigalink radio terminal. The rectangles associated with the Synthesizer and PLL Lock display green if they are locked (acceptable), or display red if unlocked (unacceptable). The rectangles for Tx Link and Rx Link are green if an optical signal is present on the fiber segment, and turn red if no signal is present.
- **Rx Power:** In “Align/Run” mode, the blue rectangle represents current Receive Level. If ‘Run’ is chosen from the ‘Align’ submenu of ‘Action’ menu, it starts displaying this value continuously. A higher Rx Power indicates better alignment. As the user does adjustment in “Run” mode changing the Gigalink terminal alignment, Rx Power varies. A magenta, horizontal, line is displayed on the top of the blue receive level rectangle indicates the highest/maximum value reached so far. A numeric value of the maximum receive level is displayed adjacent to the magenta line. The blue inner rectangle represents the current value. The current Rx Power’s numeric value is also shown below the rectangle in a large font to facilitate alignment with higher visibility.
- **6 Volt, 15 Volt, -15 Volt, Vtune, Gunn:** These are other variable values. During ‘Refresh’ and ‘Run’, Gigamon retrieves the current values and displays these values as a blue horizontal line. These rectangles are divided into safe, warning and danger regions. If the current value is the optimum then the blue line should be at the middle. For 6 Volt rectangle, the optimum value is 6.10, top to middle, or bottom to middle is the 10% of optimum value, and so, for 6 volt top= $6.1+(0.61*1)=6.71$ , and bottom= $6.1-(0.61*1)=5.49$ . For all others, top to middle, or bottom to middle is 40% of the optimum value. So for 15 Volt, the optimum value is 15.0, top= $15.0+(1.5*4)=21.0$ , bottom= $15.0-6.0=9.0$ . The optimum values of -15 Volt, 24 Volt and Gunn are 15.0, 24.0, and 850 respectively.
- **Status bar:** The status bar at the bottom of the screen is for displaying current status, error, and some numeric values. Errors and status are shown at the left, and values at the right. Most importantly, during refresh, it shows the numeric value of all variable parameters.
- **Menu:**
  1. File Menu: **The ‘File’ menu has following options:**
    - ‘Select Gigalink’ to open the “Select Current Radio/Gigalink” dialog box as shown below.



**“Select Current Radio/ Gigalink” Screen**

The “Select Current Radio/Gigalink” window displays the factory-set parameters of the currently selected/active Gigalink at the top and a combo box (list) of MAC addresses for all the Gigalink terminals found. Choosing a different MAC address from the combo list updates serial number field with corresponding value for that terminal. If **‘Select’** and then **‘OK’** buttons are pressed then Gigamon selects only the radio with the MAC address currently selected in **“Gigalink Radio MAC Address”** combo box as the currently selected/active Gigalink. Pressing **‘Cancel’** button after **‘Select’** undoes the selection and keeps previous selection of currently active radio.

- **‘Save Info As’** to open a dialog box **“Save Gigalink Info in a File As”** for the user to select a text filename to save all the parameters for all the Gigalink terminals detected. The dialog box shows the default filename as **“Gigalink.txt”**. The user can type/select any filename and save to any location. Gigamon will create the file if does not exist or open the file without deleting old data if it already exists.

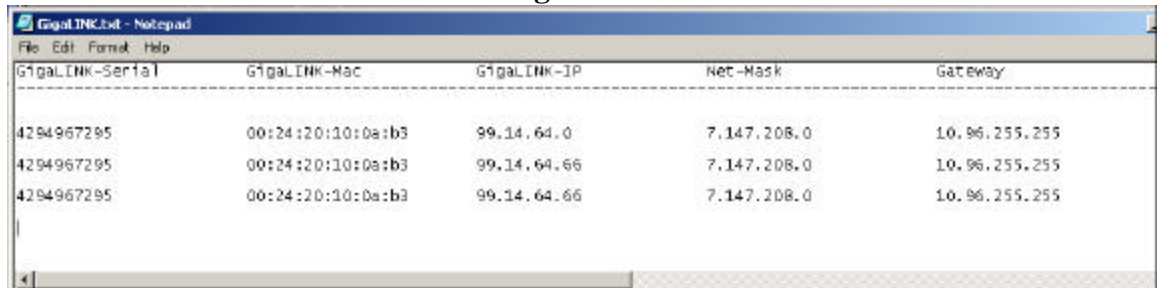


### “Save GigaLink Info in a file as’ Screen

The “**Save GigaLink Info**” command will write/append a line of parameter values for each GigaLink terminal detected in the current session. These values are tab delimited, and so they can be copied and pasted into an Excel spreadsheet. Each line/record has timestamps (date and time) with seconds resolution so the saved file may have several lines for the same GigaLink terminal if appending to an existing file or the user chooses ‘Save Info As’ several time during the current session. But the time-stamp will be unique for each line. The file content will be saved in the format shown below:

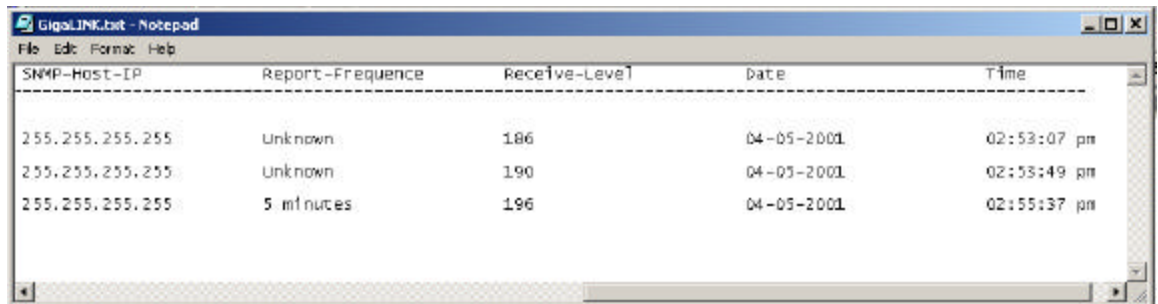


## Format of “Save Gigalink Info” file



| GigaLINK-Serial | GigaLINK-Mac      | GigaLINK-IP | Net-Mask    | Gateway       |
|-----------------|-------------------|-------------|-------------|---------------|
| 4294967295      | 00:24:20:10:0a:b3 | 99.14.64.0  | 7.147.208.0 | 10.96.255.255 |
| 4294967295      | 00:24:20:10:0a:b3 | 99.14.64.66 | 7.147.208.0 | 10.96.255.255 |
| 4294967295      | 00:24:20:10:0a:b3 | 99.14.64.66 | 7.147.208.0 | 10.96.255.255 |

The Left portion of the “Save Gigalink Info” file data



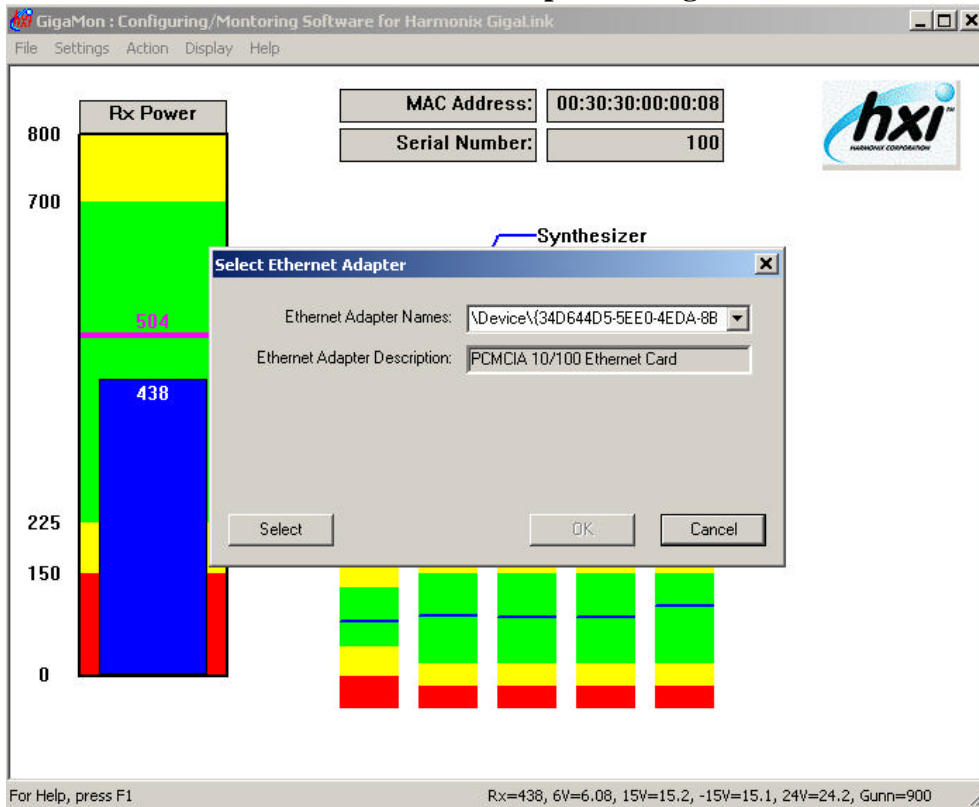
| SNMP-Host-IP    | Report-Frequency | Receive-Level | Date       | Time        |
|-----------------|------------------|---------------|------------|-------------|
| 255.255.255.255 | unknown          | 186           | 04-05-2001 | 02:53:07 pm |
| 255.255.255.255 | unknown          | 190           | 04-05-2001 | 02:55:49 pm |
| 255.255.255.255 | 5 minutes        | 196           | 04-05-2001 | 02:55:37 pm |

The Right portion of the “Save Gigalink Info” file data

- The “**Select Ethernet Adaptor**” window appears by menu option ‘**File->Select Ethernet Adaptor**’. It also appears when program is launched if multiple network adapters are found in the computer.

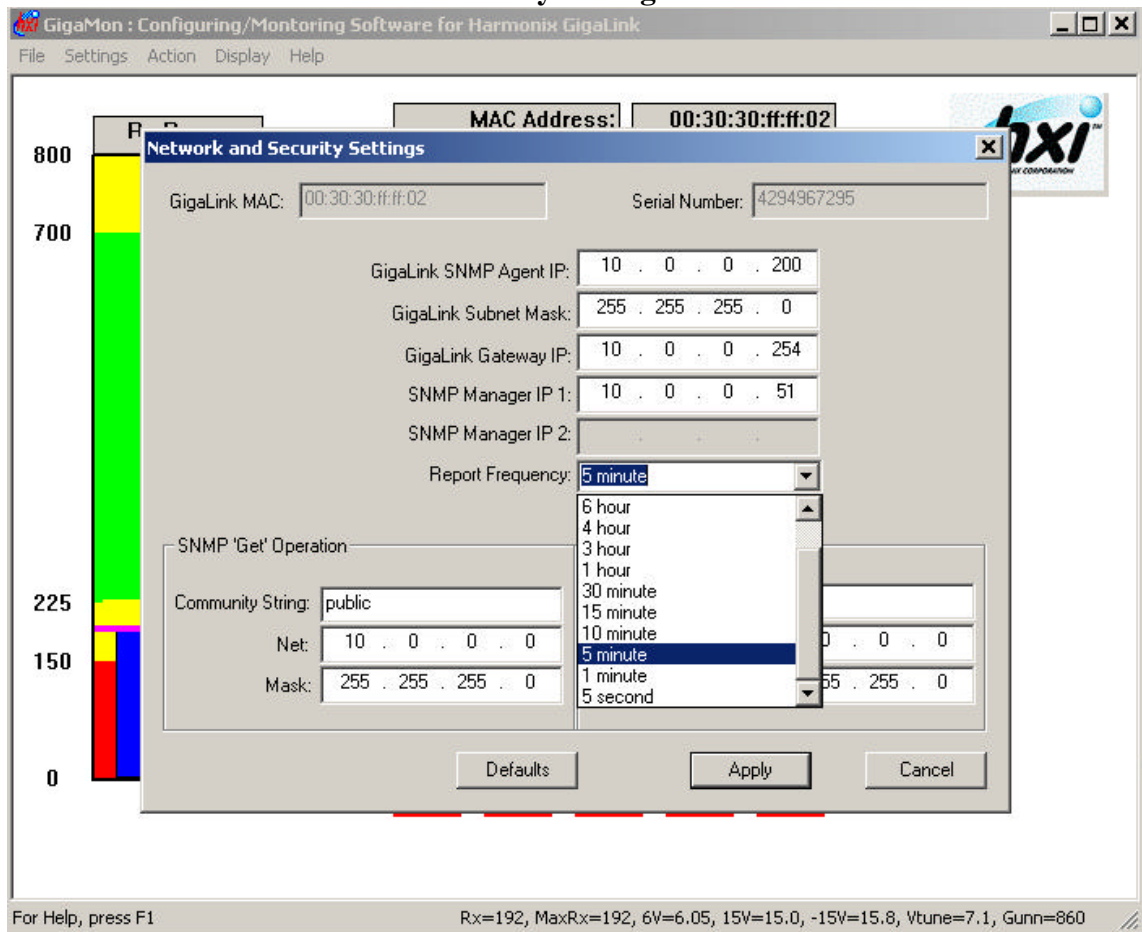
It displays the device names and descriptions for all of the network adapters detected by Gigamon. If ‘**Select**’ and then ‘**OK**’ buttons are pressed then Gigamon recognize only the Ethernet adaptor chosen.

## “Select Ethernet Adapter” dialog box



- The **‘File->Exit’** command closes the application, but before exiting initiates the **‘Save Info As’** to prompt the user to save the retrieved data if desired.
2. The **‘Settings’** menu has the following options:
- The **“Factory Settings”** command is used to set read only information such as serial number, MAC address, Version number, and Manufacture date. This option is for factory use only and remains disabled for the non-factory user.
  - The **‘Network and Security’** option from **‘SNMP’** submenu of **‘Settings’** menu opens **“Network and Security Settings”** dialog box for writing/setting SNMP Network configuration to the Gigalink terminal currently selected.

## “Network and Security Settings” Screen



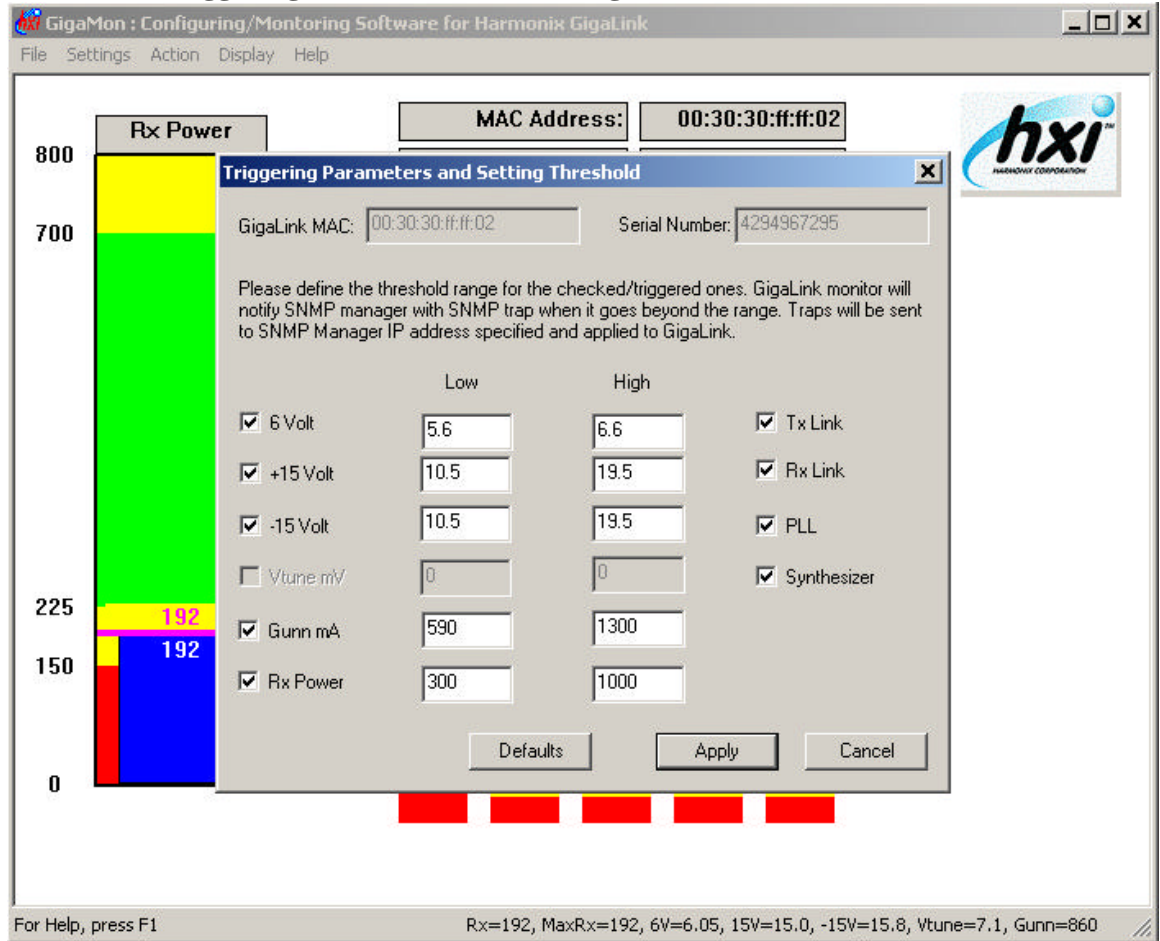
This dialog box displays the MAC and serial number of the currently selected Gigalink as read-only text. It also shows the current (Factory default) values of the following SNMP related settable/configurable parameters:

- **Gigalink SNMP Agent IP:** This value is needed for any SNMP monitoring software to request a Gigalink for any SNMP variable's value or to change value (SNMP Get/Set functions). It is also needed for SNMP monitoring software to distinguish the source of any SNMP trap packet sent by any Gigalink terminal. It may also be required for many other network activities like pinging a Gigalink terminal since this communication protocol uses IP packets. **An IP-Address/Net-Mask consists of 4 octets separated by dots and each octet's range is 0 to 255.**

- **Subnet Mask, and Gateway IP:** These parameters define which IP address range will be local for the Gigalink terminal. When the Gigalink terminal sends an IP packet, it does logical AND between this Subnet Mask and destination IP address to find out if the destination is in its local subnet. The Gigalink terminal needs to know the local “Subnet Mask” because if the destination is not within its local network, the Gigalink terminal will send the packet to the default destination, the Gateway, which is a router. For this reason, the Gateway/router’s IP address must be defined as well.
- **SNMP Manager IP:** The Gigamon user must define the IP address of the computer/host acting as SNMP Manager so that Gigalink terminal can send SNMP traps to the host.
- **Report Frequency:** The Gigamon user must define how frequently each radio terminal will send SNMP trap packets to the SNMP Manager reporting the status of the SNMP variables. The combo box gives list of report intervals to choose from. If ‘Unknown’ is chosen, pressing ‘Apply’ button will send the new parameter values to the currently selected Gigalink and write that value into Gigalink terminal EEPROM image.
- **SNMP ‘Get’/‘Set’ Operations:** The parameters ‘Community String’, ‘Net’ and ‘Mask’ ensure security of the SNMP ‘Get’/‘Set’ operations. The Gigalink matches the ‘Community String’ in the SNMP manager’s ‘Get’/‘Set’ request packet, and also checks if the SNMP manager’s IP address is within the range that is defined by ‘Net’ and ‘Mask’. If any of these validations fail, the Gigalink terminal will not respond to the request. ‘Community String’, ‘Net’ and ‘Mask’ can be different for ‘Get’ and ‘Set’ operations.
- **Community string:** The “Community String” is like a password for the SNMP ‘Get’/‘Set’ operation. If a community string is set, then the SNMP manager needs to provide it to the Gigalink terminal if sending ‘Get’/‘Set’ request. When the Gigalink terminal receives a request, it will match this string. If the match fails, the Gigalink terminal will not send requested parameter(s) values back to the SNMP manager on ‘Get’ request, and will not change its parameter values on ‘Set’ request. This string must be alphanumeric and no longer than 16 characters.
- **Net and Mask:** These two parameters define the range of IP addresses acceptable to the Gigalink terminal when responding to SNMP ‘Get’/‘Set’ requests. The format is x.x.x.x where x is a digit from 0 to 255. For example, if ‘Net’ is defined as 10.0.0.0 and ‘Mask’ as 255.255.255.0, then the range of IP addresses the Gigalink terminal will accept is 10.0.0.x where x = 1.254.

- **Defaults:** The ‘Defaults’ button is not available for users. This is used for initializing the above parameters at the Harmonix factory.
- The ‘Threshold and Trigger’ option from ‘SNMP’ submenu of ‘Settings’ menu opens the dialog box “Triggering Parameters and Setting Thresholds”.

**“Triggering Parameters and Setting Threshold” Screen**



These settings trigger parameters on/off and define the threshold range for the triggered parameters. The GigaLink terminal monitor will send the SNMP Host/Manager an SNMP alert trap when a trigger-enabled parameter goes beyond the set threshold range. Checking an item’s box will activate that parameter to be monitored against threshold ranges or an on/of condition. When the ‘Apply’ button is clicked the setting is written to the GigaLink terminal EEPROM. The description of each parameter and their corresponding threshold values are given below.

## Triggering Parameters and Threshold Setting Dialog Box Details

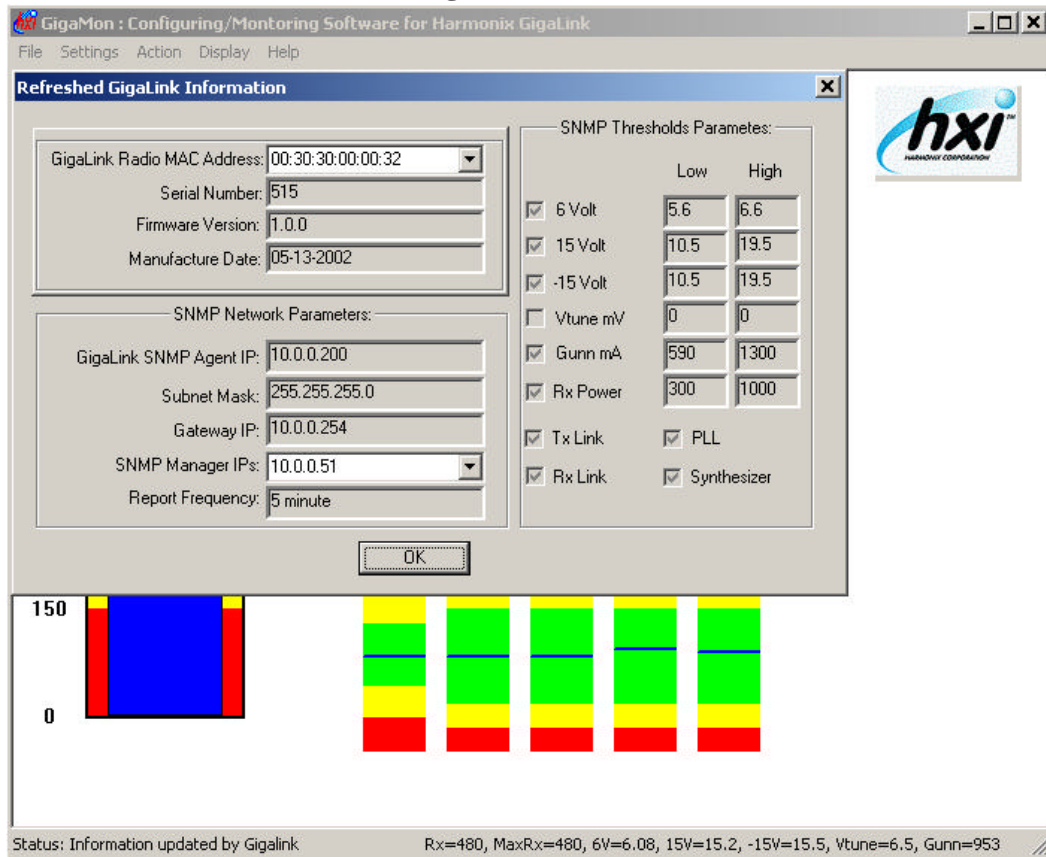
- **6 Volt:** A power supply voltage. Enter 'Low' for low threshold ranging (5.6 to 6.1), and enter 'High' for high threshold ranging (6.1 to 6.5). The optimum value is 6.1 volt.
- **+15 Volt:** A power supply voltage. Enter 'Low' for low threshold ranging (10 to 15), and enter 'High' for high threshold ranging (15 to 20). The optimum value is 15.0 volt.
- **-15 Volt:** A power supply voltage. Enter 'Low' for low threshold ranging (10 to 15), and enter 'High' for high threshold ranging (15 to 20). The optimum value is 15.0 volt. '-15' is only the name of this parameter, and all threshold values related to this parameter are set positive.
- **Vtune:** Varactor tuning diode voltage. Sampling this voltage provides another monitoring point for transmitter source stability. Vtune will typically fall between 4 and 7 Volts and may vary slightly during normal operation. Wide variations in varactor voltage beyond the initial reading may indicate a tuning problem with the fundamental GUNN diode oscillator source. The Vtune parameter does not offer a default threshold setting option nor will it trigger an alarm trap in response to changes to this reading.
- **Gunn:** The Gunn Oscillator current. Enter 'Low' for low threshold ranging (590 to 850), and enter 'High' for high threshold ranging (850 to 1300). The optimum value is 850 milliamps.
- **Rx Power:** The receive level. Enter 'Low' for low threshold ranging (300 to 600), and enter 'High' for high threshold ranging (600 to 1000).
- **Tx Link:** Transmit Link. If it is triggered on and optical circuit becomes open, SNMP alert trap will be sent.
- **Rx Link:** Receive Link. If it is triggered on and no data is coming to Gigalink from the corresponding remote terminal, SNMP alert trap will be sent.
- **PLL, and Synthesizer:** If the 'PLL' or 'Synthesizer' is not locked, one of the Gigalink terminal's fundamental frequency generating device is operating improperly. If these parameters are triggered on, and an SNMP alert trap will be sent.

The '**Defaults**' button sets all the default triggers and threshold values. After getting default values, one still needs to press 'Apply' button to write the values to Gigalink.

The '**Action**' menu contains the following commands:

The **‘Refresh’** option sends a broadcast with its own MAC address and with a command in its data to request the content of the EEPROM image and A/D Converter values. All connected Gigalink(s) reply with the data requested along with their MAC address. Gigamon can receive replies from up to 8 Gigalink terminals and refreshes its data discarding any old data of the current session if there is any unless any data was saved through the menu option “Save Gigalink Info As” from ‘File’ menu before current ‘Refresh’ action. After receiving the reply(s) the refresh command will open the “Refreshed Gigalink Information” dialog box.

### “Refreshed Gigalink Information Screen”

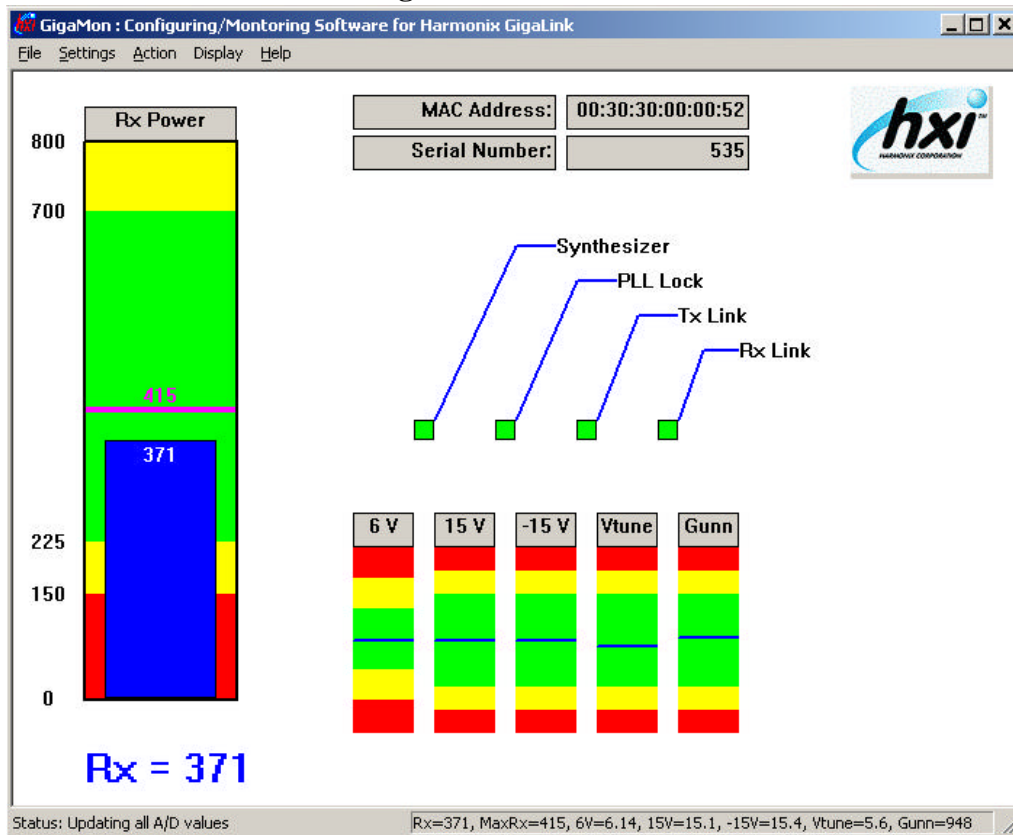


The **“Refreshed Gigalink Information”** dialog screen is divided into 3 sections. The upper left group shows Gigalink factory set, read-only parameters. The group “SNMP Network Parameters” at the lower left shows the values used for SNMP connection/configuration and can be changed by menu option ‘Settings’->’SNMP’->’Network’. The group “SNMP Threshold Parameters” on the right shows each parameter, its values, which define threshold condition and whether it is enabled or not.

The Refreshed Gigalink Information dialog box contains the parameter values for all the Gigalink terminals that replied during 'Refresh' action, but displays values only for one Gigalink at a time. If a different MAC address is chosen from the "MAC Address Combo List", the parameter values for that MAC Address will be displayed in a read-only format. After 'Refresh' Gigamon displays the first Gigalink detected (topmost entry in MAC combo list) as the currently selected Gigalink. To change parameter values for a Gigalink terminal that is not "Currently Selected", use the "Select Gigalink" command.

The 'Run' command from the 'Align' submenu of 'Action' menu starts the 'Runmode' where Gigamon continually polls the currently selected Gigalink terminal and displays the current A/D converter values and receive level until 'Action->Align->Stop' is chosen. During "Runmode", the window updates the values of Rx Power and other A/D Converter values every 20 milliseconds.

### Align Run-Mode Screen





During radio terminal alignment the blue receive level indicator will vary with actual receive level. A magenta, horizontal, line is displayed on the top of the blue receive level rectangle indicates the highest/maximum, achieved level. A numeric value for the maximum receive level is displayed adjacent to the magenta line. The blue inner rectangle represents the current value with the current Rx Power's numeric value shown below the rectangle in a large font to facilitate alignment with higher visibility.

**'Stop'** option form 'Align' submenu of 'Action' menu stops the 'Runmode' described above.



## 4 Terminal Maintenance and Troubleshooting

### Maintenance

Under normal operating conditions, installed Gigalink radio terminals require no maintenance other than periodic inspections and a comparison of current monitored parameters to those recorded during installation.

Under high dust or pollution conditions, it may be necessary to periodically clean the terminal radomes. Cleaning the radome is most easily accomplished by using a dry rag or cloth and ordinary glass cleaner. During the cleaning process care should be taken to minimize blocking the transmission path as link loss or high BER may occur.

### Troubleshooting

| Indicator and Status    |                  |          |         |           | Possible Cause of Malfunction     | Recommended Corrective Action                |
|-------------------------|------------------|----------|---------|-----------|-----------------------------------|--|
| Receive Level Indicator | Synthesizer Lock | PLL Lock | TX Link | RX Link   |                                   |  |
| > 450                   | Green            | Green    | Green   | Green     | Normal operation                  | No Action Necessary                          |
| < 450                   | Green            | Green    | Green   | Red/Green | Misalignment of Terminals         | Improve alignment                            |
|                         |                  |          |         |           | Remote Terminal not powered up    | Verify Power to Remote Terminal              |
|                         |                  |          |         |           | Remote Terminal not Looped Back   | Verify Loopback of remote terminal           |
|                         |                  |          |         |           | Fiber Crossed at Remote Terminal  | Swap Fiber Cables at Remote Terminal         |
|                         |                  |          |         |           | Rain Event Beyond Expectations    | Improved Alignment might help                |
|                         |                  |          |         |           | Obstruction to RF Path            | Visually Inspect Path for Obstruction        |
|                         |                  |          |         |           | Terminal Alignment changed        | Inspect physical alignment of both terminals |
| <450                    | Green            | Green    | Red     | Red/Green | No optical signal at Data In port | Check fiber optic connection                 |
|                         |                  |          |         |           | Wrong Fiber Polarity              | Check or change polarity of fiber            |
|                         |                  |          |         |           | Network Switch Port Inactive      | Check that connected device is active        |
|                         |                  |          |         |           | Broken Fiber at Data In Port      | Check fiber for damage                       |
|                         |                  |          |         |           | Wrong Fiber type                  | Verify that transceiver is single or         |

|           |       |       |           |           |                                    |  |
|-----------|-------|-------|-----------|-----------|------------------------------------|--|
|           |       |       |           |           |                                    | multimode  |
|           |       |       |           |           | High Optical power at Data In Port | Check level with optical power meter                       |
| Any Level | Red   | Green | Red/Green | Red/Green | Synthesizer in unlocked State      | Cycle power to restore lock, schedule replacement terminal |
| Any Level | Green | Red   | Red/Green | Red/Green | PLL in unlocked state              | Cycle power to restore lock, schedule replacement terminal |

## Recommended Troubleshooting Steps

Problem: No Connectivity to local Terminal

Possible Causes: No power  
No connection to management port  
PC Software Corruption

Troubleshooting Steps:

1. Check to see that the power LED is illuminated.
  - a. If not, check the source AC power. If the power source is good, but the LED does not illuminate RMA the unit.
  - b. Did you plug in the power supply to an AC source before you connected to the terminal?
2. Check the connection between the management network, or your PC, and the terminal.
  - a. Can you ping the terminal?
  - b. Do you have the correct address?
  - c. Is the cable bad?
  - d. Does the same equipment and cable work on the remote terminal? If so, RMA the local terminal.
3. Did the Gigamon software load without error messages.
  - a. Have you tried to remove and restore the software?
  - b. Does the same equipment and cable work on the remote terminal. If so, RMA the local terminal?

Problem:

| Receive Level Indicator | Synthesizer Lock | PLL Lock | TX Link | RX Link |
|-------------------------|------------------|----------|---------|---------|
| < 450                   | Green            | Green    | Green   | Green   |

Possible Causes: Misalignment of Terminals (Sidelobe)  
Rain Event Beyond Expectations  
Obstruction to RF Path  
Terminal Alignment changed

Troubleshooting Steps:

1. Connect to remote terminal.
2. Collect Indicator and Status conditions.
3. If Receive Level Indicator < 450 at remote terminal.
  - a. Terminals may be misaligned. Make sure you're not on a sidelobe. Find out if there have been high winds recently or currently.
  - b. Rain Event. What is the current weather? Is there water sheeting the antenna?
  - c. Obstruction in RF Path
4. Show saved configuration file
  - a. If the file shows a difference re-check the terminal alignment.
5. If Synthesizer Lock or PLL Lock at remote terminal.
  - a. Power cycle the remote terminal.
  - b. Replace (RMA) the remote unit, if necessary.
6. If none of the above resolves the issue, RMA both the local and remote terminals.

Problem:

| Receive Level Indicator | Synthesizer Lock | PLL Lock | TX Link | RX Link |
|-------------------------|------------------|----------|---------|---------|
| < 450                   | Green            | Green    | Green   | Red     |

- Possible Causes:
- Remote Terminal not powered up
  - Terminal not Looped Back
  - Misalignment of Terminals (Sidelobe)
  - Fiber Crossed at Remote Terminal
  - Rain Event Beyond Expectations
  - Obstruction to RF Path
  - Terminal Alignment changed

Troubleshooting Steps:

1. Connect to remote terminal.
  - a. Do you get connected? If no, there may be a possible power problem at remote terminal.
  - b. DC power supply started before connection to the terminal? If no, there may be problem with the management cable at remote terminal.

2. Collect Indicator and Status conditions.
3. If TX Link RED
  - a. No equipment connected to remote terminal.
  - b. Ensure the signal coming from the network equipment is no too hot at remote terminal.
  - c. Damaged cable connector at remote terminal.
  - d. Cables crossed on remote terminal.
  - e. Remote terminal is not looped back
4. If Receive Level Indicator < 450
  - a. Terminals may be misaligned. Make sure you're not on a sidelobe. Find out if there have been high winds recently or currently.
  - b. Rain Event. What is the current weather? Is there water sheeting the antenna?
  - c. Obstruction in RF Path
5. If Synthesizer Lock or PLL Lock
  - a. Power cycle the remote terminal.
  - b. Replace (RMA) the remote unit, if necessary.
6. If none of the above resolves the issue, RMA both the local and remote terminals.

Problem:

| Receive Level Indicator | Synthesizer Lock | PLL Lock | TX Link | RX Link |
|-------------------------|------------------|----------|---------|---------|
| <450                    | Green            | Green    | Red     | Green   |

Possible Causes:

- No optical signal at Data In port
- Fiber Polarity
- Network Switch Port Inactive
- Broken Fiber at Data In Port
- Wrong Fiber type
- High Optical power at Data In Port

Troubleshooting Steps:

1. Ensure equipment connected to local terminal.
  - a. Verify the data rates of the local terminal and the network equipment are the same.
  - b. Veriry the output of the network equipment with a test set or loopback plug.
  - c. Ensure the signal coming from the network equipment is no too hot.
  - d. Ensure cables are connected correctly.
  - e. Ensure the optical cable connectors are undamaged.
2. Loop the Data In/Data Out ports on the local terminal
  - a. If the RX Link indicator is Green, the TX Link should go Green when it is looped back.
  - b. If looping back the ports clears the alarm, use each fiber cable individually to loopback the data ports. This validates the fiber cables are not broken.
  - c. If previous steps fail, replace the unit.
3. If none of the above resolves the issue, RMA the local and terminal.

Problem:

| Receive Level Indicator | Synthesizer Lock | PLL Lock | TX Link | RX Link |
|-------------------------|------------------|----------|---------|---------|
| <450                    | Green            | Green    | Red     | Red     |

Troubleshooting Steps:

1. Utilizing the two previous procedures troubleshoot each alarm independently.

Problem:

| Receive Level Indicator | Synthesizer Lock | PLL Lock | TX Link   | RX Link   |
|-------------------------|------------------|----------|-----------|-----------|
| Any Level               | Red              | Green    | Red/Green | Red/Green |



Troubleshooting Steps:

1. If Synthesizer Lock or PLL Lock
  - a. Power cycle the remote terminal.
  - b. Replace (RMA) the remote unit, if necessary.

Problem:

| Receive Level Indicator | Synthesizer Lock | PLL Lock | TX Link   | RX Link   |
|-------------------------|------------------|----------|-----------|-----------|
| Any Level               | Green            | Red      | Red/Green | Red/Green |

Troubleshooting Steps:

1. If Synthesizer Lock or PLL Lock
  - a. Power cycle the remote terminal.
  - b. Replace (RMA) the remote unit, if necessary.



## 5 Terabeam Technical Assistance

Terabeam has established a technical assistance line to assist customers with issues pertaining to the guidance that is provided in this manual, including troubleshooting, service, repair, and the replacement of parts. Customers calling from within the U.S. should use our toll-free number: 1-866-837-2227. International customers should call the international direct dial code followed by 1-206-357-8000 or contact their customer advocates. In order to provide the most timely and efficient service, Terabeam asks that customers have the following information available when calling for technical support.

- Customer name and contact information (including company name, name of individual placing the call, and telephone number)
- Identification of the product or component believed to be causing problem (including the manufacturer, model, catalog number, and serial number, if known)
- Description of the problem, including the following:
  - Time of occurrence
  - Circumstances under which problem is observed
  - Indication of whether the problem is isolated to a particular component
  - Indication of whether the problem is an isolated incident or an ongoing or recurring problem
  - Indication of whether the problem appears to be related to the equipment or the network, including the identification of any alarms and/or traps that may have been received
- Description of troubleshooting activities performed