



# ESTEEM

INDUSTRIAL WIRELESS SOLUTIONS

**Radius+/195M (TNB)  
High Output Power System  
User's Manual**

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## Overview

The ESTeem Model Radius+/195M (TNB) is a wireless system combining an intelligent, self-monitoring Radius+ amplifier with the ESTeem Model 195M, VHF (150-174 MHz) wireless product. The Radius+/195M (TNB) system will increase the output power of the 195M to 25 Watts for long distance, outdoor applications. The amplifier requires no additional programming for operation but has the ability to monitor forward power, reflected power and internal temperature through either an Ethernet or serial (RS-232) interface.

The ESTeem Radius+/195M (TNB) system can be used to build many types of Wireless Local Area Networks (WLAN). The radio system has multiple serial (RS-232, RS-422 and RS-485), Ethernet and 4/20mA sensor interfaces. The Radius+/195M (TNB) system can be configured for multiple modes of operation depending upon the needs of the wireless and wired network. The following interface configurations are provided as an overview of the basic network types, as all possible network configurations cannot be listed. For further help in selecting the correct network type, please contact Customer Support at 509-735-9092.

### Serial Applications

A Radius+/195M (TNB) system can be configured for point-to-point, multipoint or PLC emulations through software configuration changes. The following are brief descriptions of the Serial Device Interface (SDI) configuration modes.

RS-232 – The ESTeem 195M has two (2) RS-232 data ports. The primary RS-232 port (Port 3) has full hardware handshaking through the request to send (RTS) and clear to send (CTS) lines. Both RS-232 ports are software configurable from 2,400 to 115,000 bps.

RS-422 – The ESTeem 195M has a single RS-422 data port (Port 2). The RS-422 data port is shared on the front panel with the 10/100 Mbps Ethernet interface. The RS-422 interface is typically used for long distances to 4,000 feet at bauds rate software configurable from 2,400 to 115,000 bps.

RS-485 – The 195M radio has a single, two-wire RS-485 data port (Port 1). The RS-485 data port is shared on the front panel with the 4/20mA sensors. The RS-485 interface is typically used for long distances to 4,000 feet at baud rates software configurable from 2,400 to 115,000 bps.

### Ethernet Applications

The ESTeem 195M has a 10/100 Mbps Ethernet interface (Port 2) that is used as both a data port and the primary programming port. When the Ethernet port is used as a data port there are two modes of operation. The primary use will be as a slow speed (12.5 Kbps) Ethernet bridge to remote locations to gather data from remote Ethernet devices. The secondary mode of operation is to configure the Ethernet port as a TCP or UDP Socket and write custom software applications to access the data port.

### Sensor Applications

The ESTeem 195M has four (4) 4/20mA sensor inputs. The sensor inputs can be read out of the Radius+/195M (TNB) system through their ModbusTCP address, a software command or the Model 195M/H/C configuration utility.

Diagrams

The following diagrams show the ESTEem Model 195M to Radius+ interface and details on the front panel.

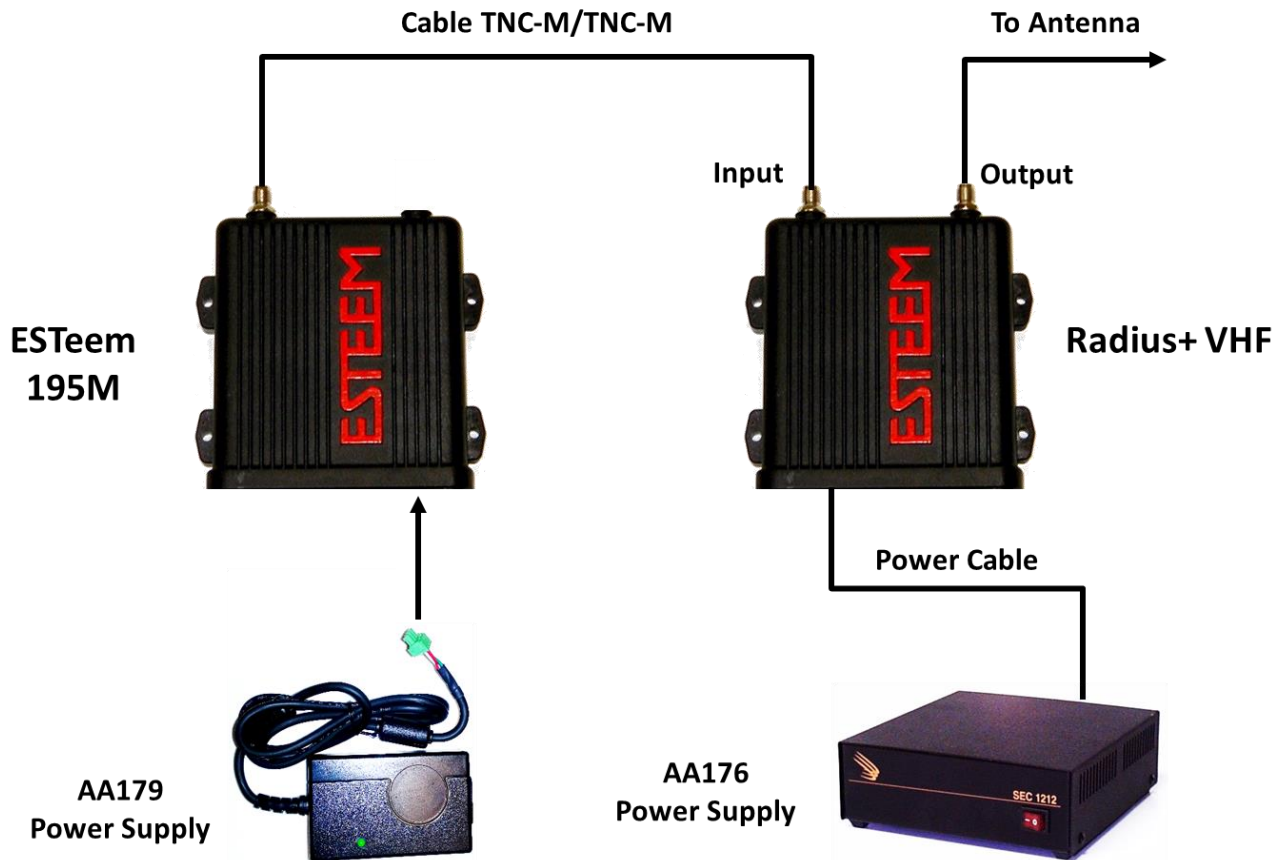
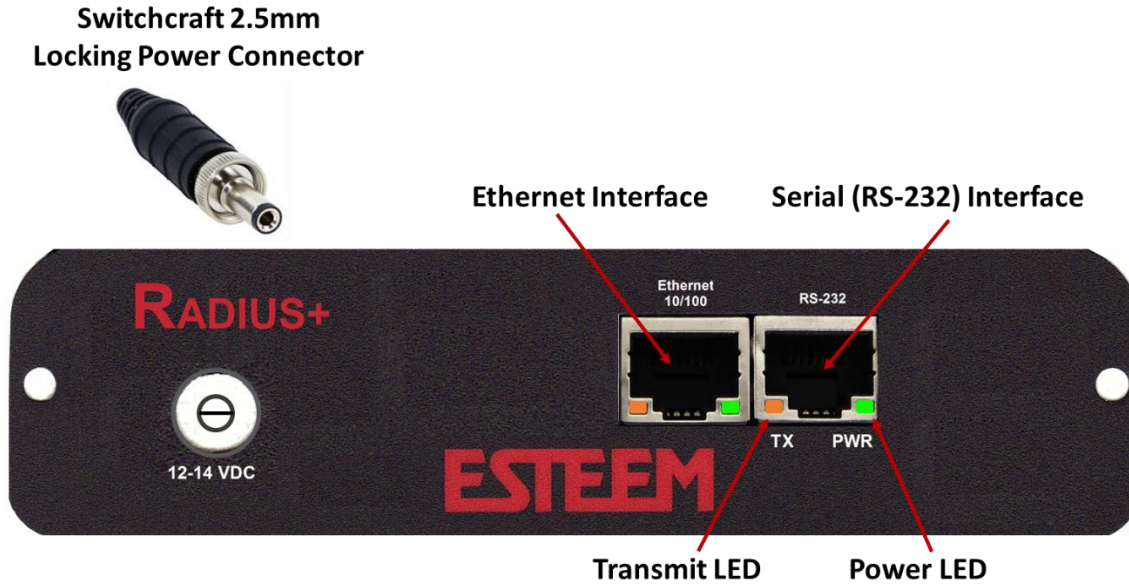


Figure 1: Connection Diagram

Throughout this tutorial “*Technical Tips*” have been added to help in programming and answer some common questions.



### Radius+ Front Panel

Figure 2: Front Panel Diagram

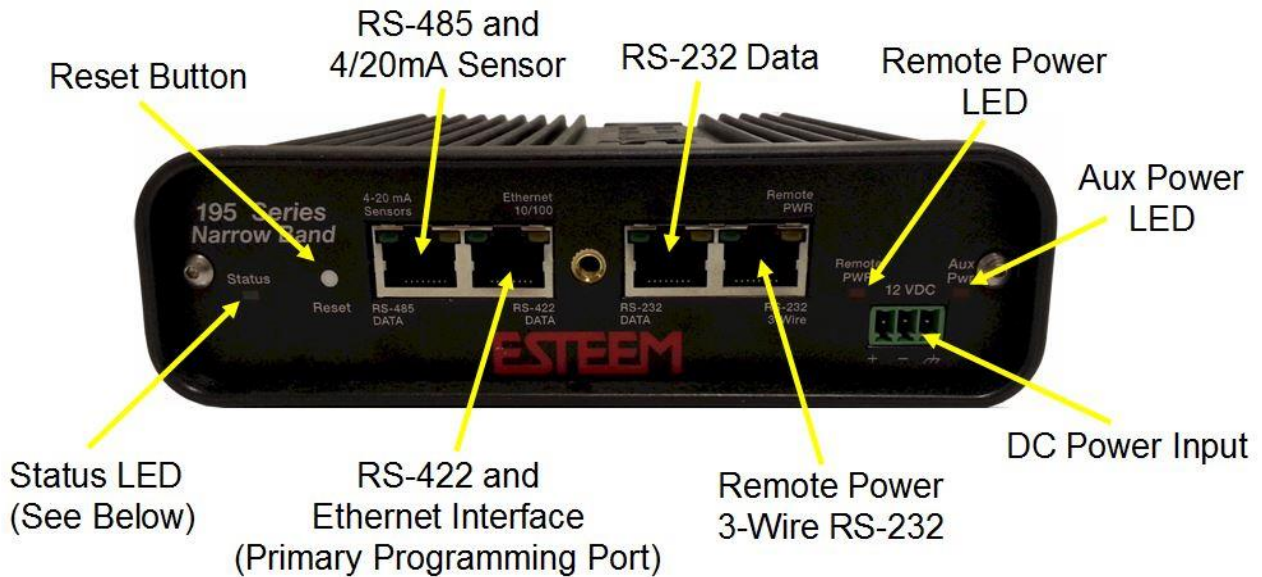


Figure 3: 195M Front Panel

## Programming

The Radius+/195M (TNB) system uses the same ESTeem Narrowband Configuration Utility for configuration and monitoring as the ESTeem Model 195M by itself.

The ESTeem Narrowband Configuration Utility (a component of the ESTeem Discovery Suite) will allow easy access to the configuration, monitoring and diagnostics for the Radius+/195M (TNB) system.

## Installation

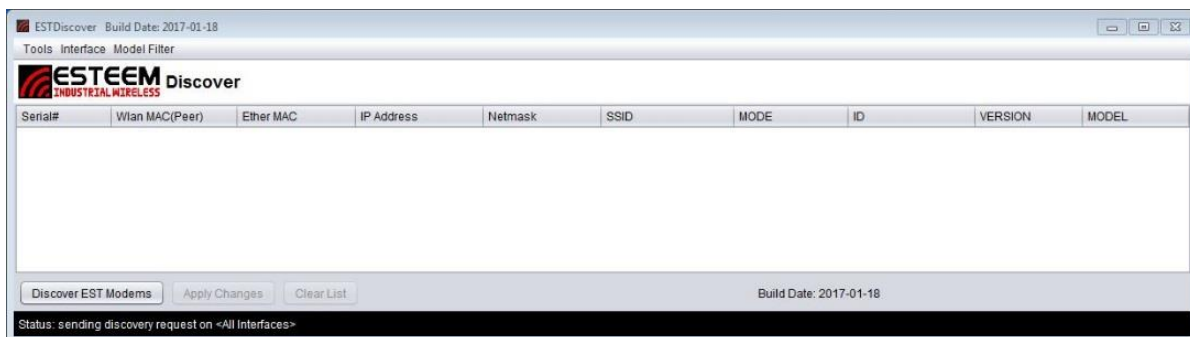
The Discovery Suite can be downloaded from the ESTeem web site (<http://www.esteem.com>) or is available on the Software Resource media that was shipped with the radios.

1. The Discovery Utility is a Java™ based application compatible with any computer operating system (Window, Linux, etc). The application requires two (2) additional support files to operate:

**Technical Tip:** If your computer is configured for DHCP and not attached to the network, you will need to assign a static IP address to program the Radius+/195M (TNB) system.

**Java** – Downloadable from <http://www.java.com>. The version required will be based upon your operating system. *Note: The installation and updates from Java may try and install additional web browser toolbars. Uncheck the optional installation if they are not desired.*

**WinPcap** – Downloadable from <http://www.winpcap.org/>. The version required will be based upon your operating system.



**Figure 4: ESTeem Discovery Utility**

2. Once both the above programs have been installed, save the ESTeem.exe file to any location on your computer such as the Desktop. Double click the ESTeem.exe program and Figure 2 will be displayed.
3. Connect the Radius+/195M (TNB) system to your computer either directly to the Ethernet card or through a Switch using a CAT-5e Ethernet cable. The Ethernet port supports Auto-Negotiation, so either a patch cable or crossover cable will work. Press the *Discover EST Radios* button. This discovery utility and imbedded ESTeem Narrowband Configuration Utility will be used throughout the remainder of the User's Manual.
4. The ESTeem 195M will be displayed (Figure 5). If the ESTeem is not on the same IP subnet as the computer, double click on the IP, Netmask or Gateway and make the necessary changes. Press the *Apply Changes* button when complete.



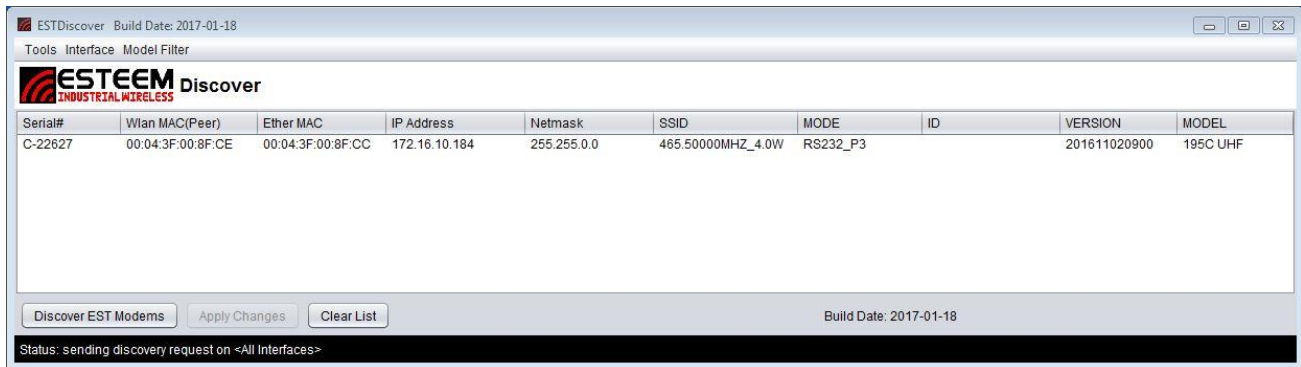


Figure 5: Discovery Found Radio

- If changes were made to the IP address, you will need to press the *Discover EST Radios* button again to show the changes. Right-mouse click on the radio and select *Configure Radio* button to begin programming.

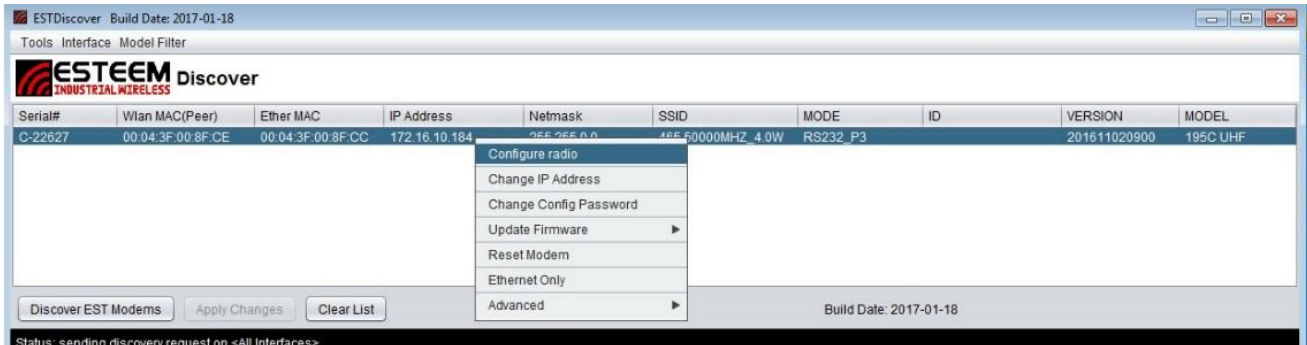


Figure 6: Opening Radio Configuration Software

## 195M Configuration Page

The Configuration Page is the default page entered when the 195M Configuration Utility is opened. If the utility was opened through the Discovery program, the current configuration parameters for the modem will be displayed (Figure 7). If the 195M information is not displayed, press the *Read Config* button to continue.

The majority of the radio's configuration can be entered from the Configuration tab. Setting the modem's address, destination, frequency, port settings and operating mode are all available from this single page. Any changes made on the configuration menu will be saved to the listed 195M when the *Write Config* button is pressed.

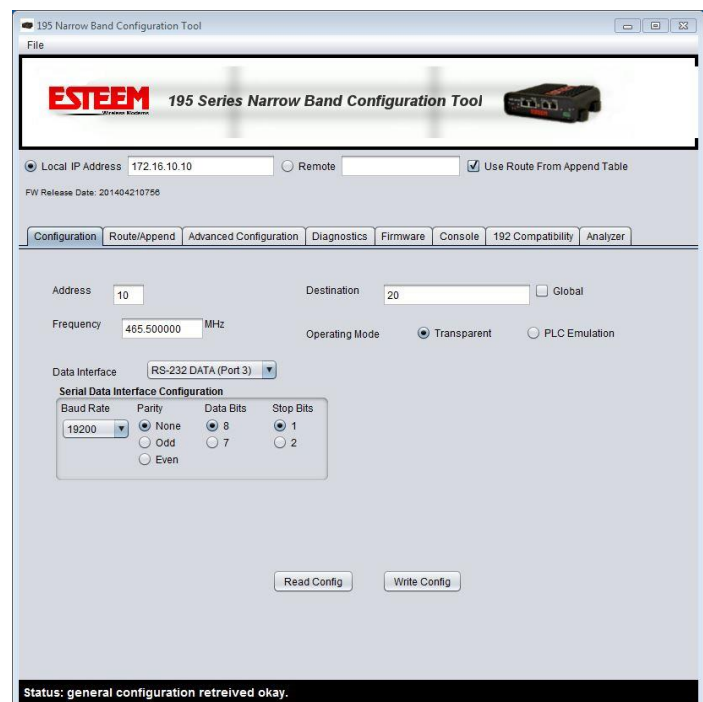
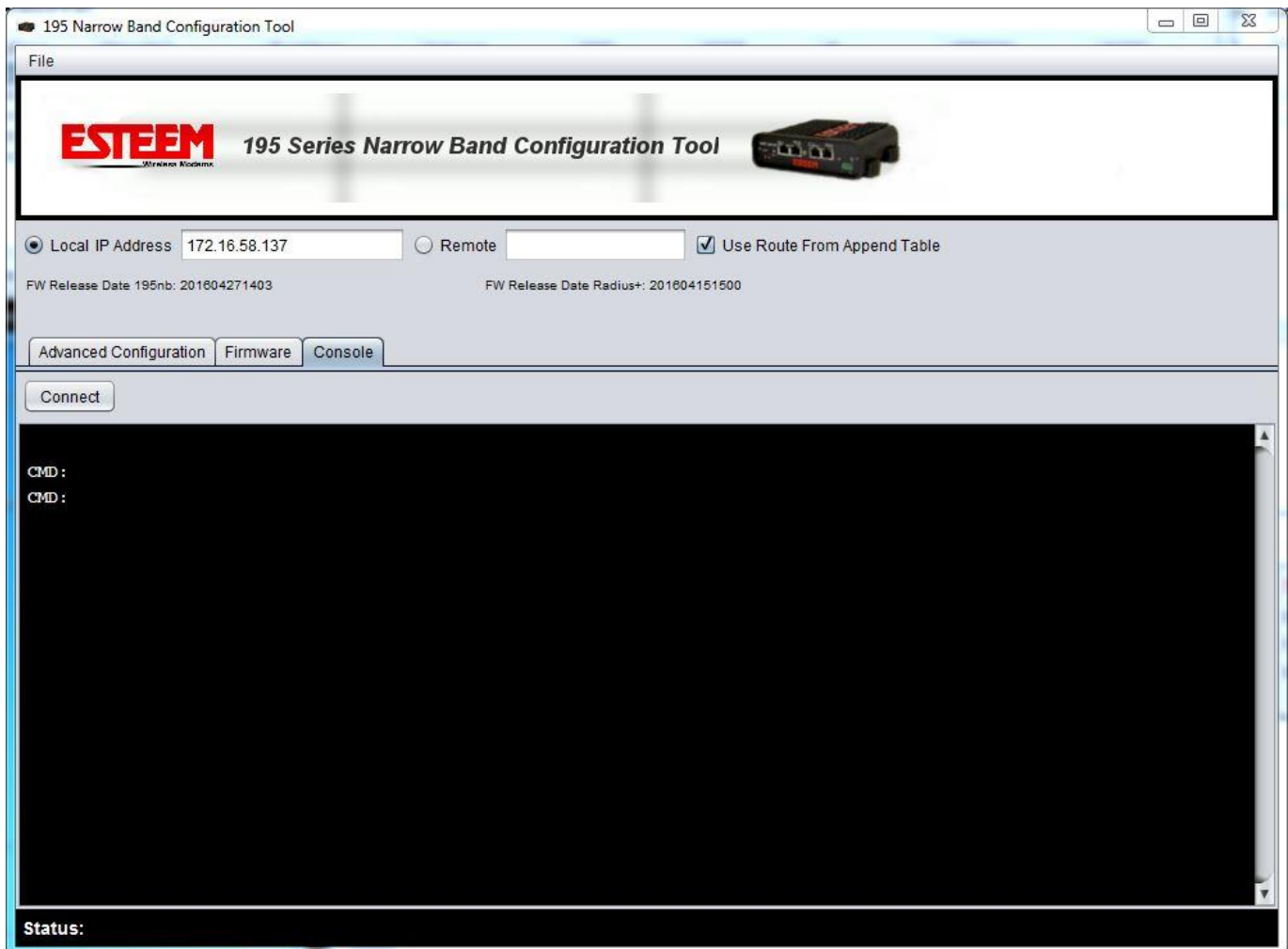


Figure 7: Configuration Tab

### Using Utility Program

The ESTeem Narrowband Configuration Utility will open on a Radius+ amplifier to the command console menu (Figure 8). This direct interface to the Radius+ will display status information such as the forward and reflected power ratio and allow modification of the software commands.



**Figure 8: Utility Console**

### Firmware Updates

The Radius+ amplifier can update the firmware through the utility if new features for updates are added in the future. Select the to the Firmware tab and press *Update Firmware* button to complete. If the firmware version is up to date the message in Figure 9 will be displayed.



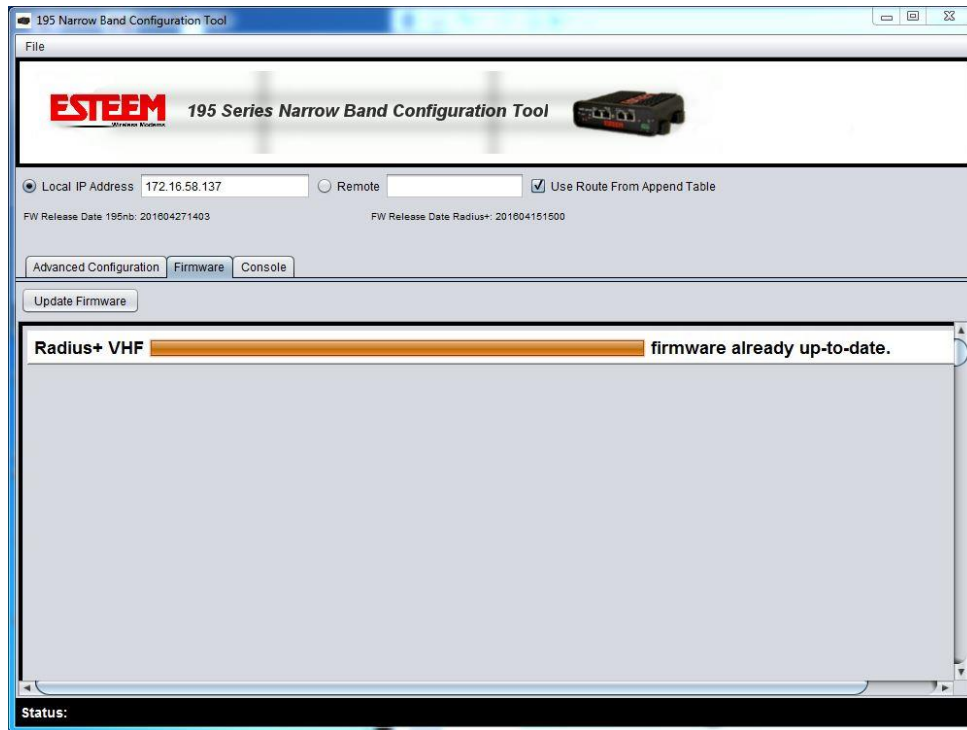


Figure 9: Firmware Update

Advanced Configuration

The Radius+ amplifier will display the status of all software commands if *Read Config* button is pressed (Figure 10).

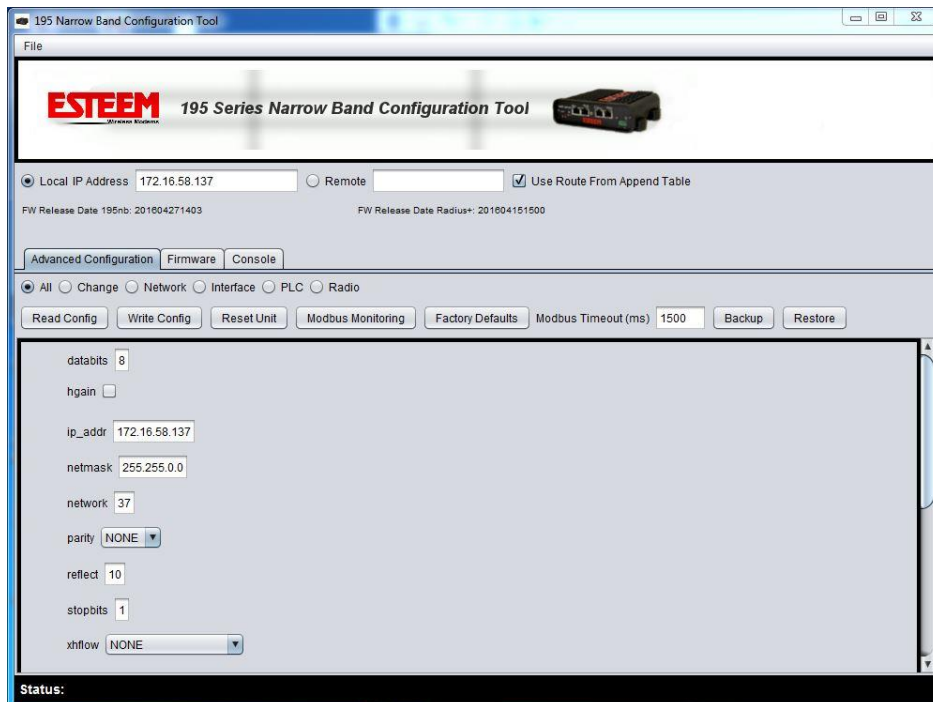


Figure 10: Advanced Configuration

### Operational Monitoring

When the Radius+ amplifier is in normal operation, the console will output the forward and reflected power ratio for every transmission in the following format:

**fwd/rev ratio, 1815.7**  
**fwd/rev ratio, 1210.0**  
**fwd/rev ratio, 930.3**  
**fwd/rev ratio, 1632.6**  
**fwd/rev ratio, 490.5**  
**fwd/rev ratio, 577.0**  
**fwd/rev ratio, 708.2**

The ratio number will change based upon hardware conditions, environmental conditions and overall power output, but the ratio number is not directly related to a percentage or power value. It is best used as a long term indicator of the health of the transmission system. As the number approaches 0 (lower ratio numbers) the higher the reflected power is detected. There is a software command (reflect – see below for full details) that will set a minimum acceptable ratio before the Radius+ stops amplifying the RF energy for self-preservation.

## Software Commands

Listed below in alphabetical order are the definitions of the ESTeem Radius+ software commands. All software commands are entered lowercase.

### ? or help

help	Displays the modem information and sub help menus.
help all	Displays all commands switches and arguments.
help radio	Displays radio commands switches and arguments.
help interface	Displays interface commands switches and arguments.
help setup	Displays setup commands switches and arguments.
help system	Displays system commands switches and arguments.

### cert

This command will display the FCC ID and model number of the amplifier.

### indent (Any alphanumeric input)

The command sets the ID field for the amplifier. This can be set to any alphanumeric value such as site name, location or serial number. This value will be displayed in the Discovery Utility under ID (see figure 6)

### pcbtemp

This command will measure the internal temperature of the Radius+ amplifier. The temperature will be displayed in both Celsius and Fahrenheit.

### reflect (0-2000)

This software command will set the maximum reflection threshold before the amplifier will stop operation. The ratio number will change based upon hardware conditions, environmental conditions and overall power output, but the ratio number is not directly related to a percentage or power value. It is best used as a long term indicator of the health of the transmission system. As the number approaches 0 (lower ration numbers) the higher the reflected power is detected. If the reflect command is set to 0, this feature will be turned off.

Factory default = 0

**Specifications**

Radius Plus/Model 195M (TNB) System VHF Specifications	
<b>Transmitter/Receiver</b>	
Frequency of Operation	150 to 174 MHz
Tx Output Power (Maximum)	25 Watts
Tx Output Impedance	50 ohms
Rx Insertion Loss	0.7dB
FCC ID	ENPRADPVHF
LED Indicators	Power, Transmit, Ethernet Activity / Link
<b>Power Requirements</b>	
Receive	90 mA @ 13.8 VDC
Transmit @ 30 Watts RF Output	4.9A @ 13.8 VDC
External DC Power Input	12 to 14 VDC
External DC Power Supply	AA176
<b>Input/Output Connectors</b>	
Ethernet Port (10/100)	RJ-45 Female
Serial Data Interface (RS-232)	9,600 Baud
External DC Input Power	Switchcraft, 2.5mm ID, 5.5mm OD
<b>Mechanical / Environmental</b>	
Temperature Range	-30° to +60° C
Humidity	95% Non-condensing
Dimensions	1.9 in. H x 6.7 in. W x 6.2 in. L
Weight	1.25 lbs.
Product Warranty	1 Year

**Radio Frequency (RF) Emission Warnings**

**Warning!** To comply with the FCC exposure compliance requirements, a separation distance of at least **3.5 meters** must be maintained between all antennas and all persons. This is based upon a 25Watt power output and 10.15dBi directional antenna.

<b>Part 90 Signal Boosters</b>	<b>THIS IS A 90.219 CLASS A DEVICE</b>
<p><b>WARNING.</b> This is <b>NOT</b> a <b>CONSUMER</b> device. It is designed for installation by <b>FCC LICENSEES</b> and <b>QUALIFIED INSTALLERS</b>. You <b>MUST</b> have an <b>FCC LICENSE</b> or express consent of an FCC Licensee to operate this device. You <b>MUST</b> register Class B signal boosters (as defined in 47 CFR 90.219) online at <b>www.fcc.gov/signal-boosters/registration</b>. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.</p>	