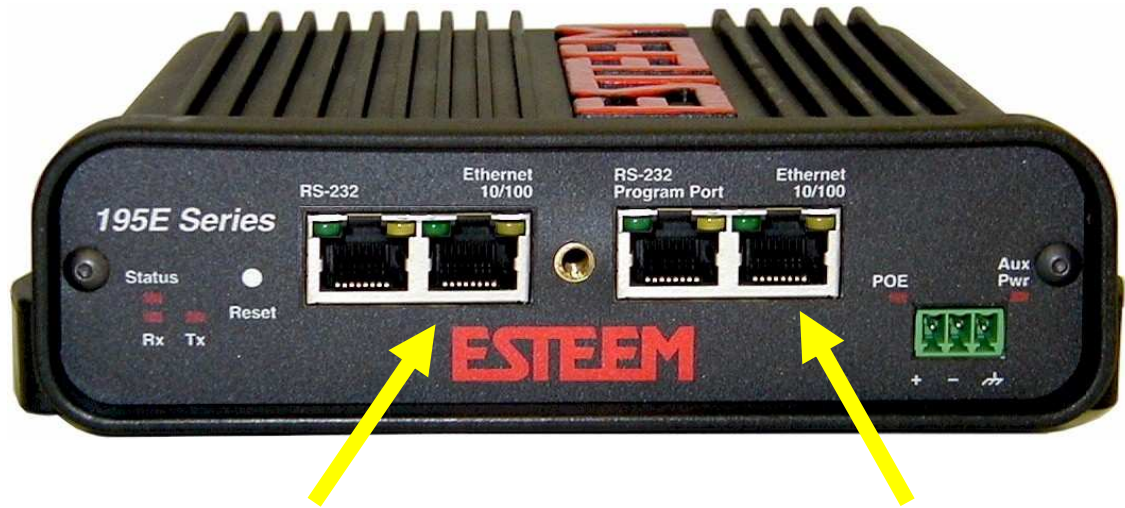


ETHERNET INTERFACE

The ESTeem Model 195Eg's Ethernet Port is a Full and Half-Duplex Auto-negotiation interface supporting both 10 Mbps and 100 Mbps (10/100BaseT). The Ethernet port is compliant with IEEE 802.3af Power Over Ethernet (PoE) to provide both data and power over the same CAT-5E grade Ethernet cable. The port is compatible with TIA/EIA-568B cable configuration (Figure 1).



RJ45 Pin No.	Wire Color	Wire Diagram	10Base-T Signal 100Base-TX Signal
1	White/Orange		Transmit +
2	Orange		Transmit -
3	White/Green		Receive +
4	Blue		Unused
5	White/Blue		Unused
6	Green		Receive -
7	White/Brown		Unused
8	Brown		Unused

RJ45 Pin No.	Wire Color	Wire Diagram	10Base-T Signal 100Base-TX Signal
1	White/Orange		Transmit +
2	Orange		Transmit -
3	White/Green		Receive +
4	Blue		+ Power
5	White/Blue		+ Power
6	Green		Receive -
7	White/Brown		- Power
8	Brown		- Power

Figure 1: Ethernet Pin Layout

A second Ethernet port will be included if the serial option is added to the 195Eg. This second Ethernet port can be used in Bridge Mode (HUB) or as a router.

CONFIGURING DHCP SERVER

The ESTeem 195Eg Ethernet port supports both client and server Dynamic Host Configuration Protocol (DHCP). Figure 2 shows the DHCP host configuration screen that will be shown if DHCP server is selected in the setup screens. Enter the values that match the DHCP configuration for your network.

The screenshot shows the 'Setup' page of the EST195E Web Configuration Manager. The page title is 'EST195E Web Configuration Manager' and the ESTEEM logo is in the top right. A navigation menu includes 'Top', 'Status', 'Log', 'Setup', 'Advanced', 'Backup', 'Restore', 'SoftwareUpdate', 'Reboot', and 'About'. The 'Setup' section is active, and the page is titled 'Setup'. Below the title, there are two lines of text: 'This page configures a DHCP server on the br0 interface.' and 'The following fields are the configuration parameters that the DHCP server will return to DHCP clients.' The configuration fields are as follows:

- Selected Mode of Operation: AP Bridge
- DHCP Services: Server
- DHCP interface: br0
- Enter the local domain name for the network:
- Enter the IP address of the device on your network running as the primary DNS server:
- Enter the IP address of the device on your network running as the secondary DNS server:
- Enter the network netmask:
- Enter the broadcast IP address for the network:
- Enter the starting IP address for the lease block of IP addresses:
- Enter the ending IP address for the lease block of IP addresses:
- Enter the IP address for the default gateway:
- Enter the time period (in seconds) at which the DHCP server will write out leases file:
- Enter the time period (in seconds) that a lease will be issued:

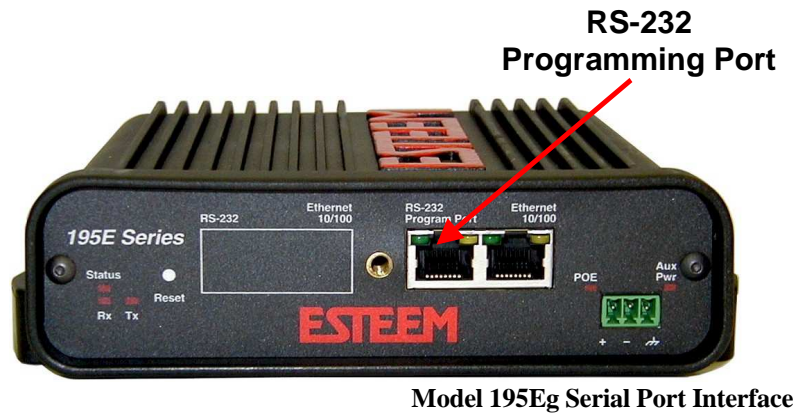
At the bottom of the form, there are 'Previous' and 'Next' buttons. A 'Help' link is also present next to the domain name field.

Figure 2: DHCP Server Configuration

RS-232C PROGRAMMING PORT CONFIGURATION

The ESTeem Model 195Eg has a proprietary RS-232C interface in a RJ-45 connector on the front panel. To interface the 195Eg to the serial port on the computer, you need ESTeem cable AA0621 that combines a standard Ethernet patch cable to a 9-pin Female adapter.

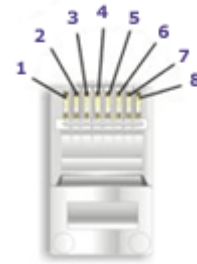
The serial port on the ESTeem Model 192E can be used to access the configuration menu in the ESTeem for system and network configuration. The ESTeem communications port operates at 38,400 bps, No Parity, 8 Data Bits and 1 Stop Bit (38,400,N,8,1). Configure your terminal program to match these settings.



RS-232 PROGRAMMING PORT PIN-OUT TABLE

**ESTeem Model AA0621
RS-232C Port Pin-Out Table**

RJ-45 Pin No.	Function	DB-9 Pin No.
4	Signal Ground (GND)	5
5	Receive Data (RxD)	2
6	Transmit Data (TxD)	3



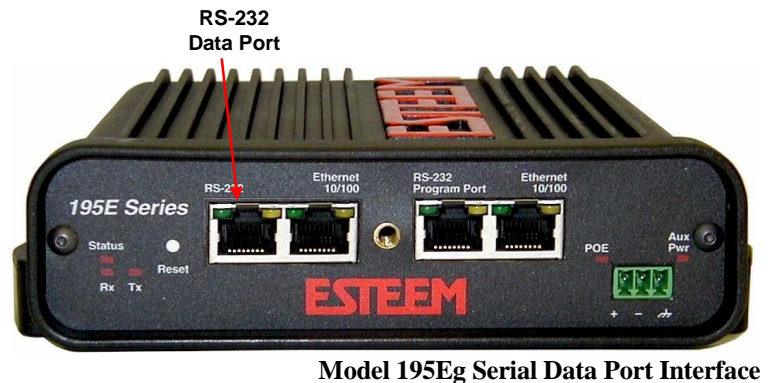
Ethernet Pin-out

RS-232C DATA PORT CONFIGURATION

The ESTeem Model 195Eg has an RS-232C interface in a RJ-45 connector on the front panel that can be installed as an option. To interface the 195Eg to the serial port on the computer, you need serial cable with the following pin-out:

**ESTeem Model AA0621
RS-232C Port Pin-Out Table**

RJ-45 Pin No.	Function	DB-9 Pin No.
1	Data Set Ready (DSR)	6
2	Data Carrier Detect (DCD)	1
3	Data Terminal Ready (DTR)	4
4	Signal Ground (GND)	5
5	Receive Data (RxD)	2
6	Transmit Data (TxD)	3
7	Clear to Sent (CTS)	8
8	Request to Sent (RTS)	7



195Eg FREQUENCY OF OPERATION

In a wireless Ethernet network all of the ESTeem Model 195Eg's must be set to the same radio frequency of operation or channel. Listed on the right is a table showing the channel and corresponding frequency of operation. The frequency of operation is selectable when configuring the mode of operation of the 195Eg (reference Chapter 4). See Figure 1.

Channel Number	Frequency
1	2412 MHz
2	2417 MHz
3	2422 MHz
4	2427 MHz
5	2432 MHz
6	2437 MHz
7	2442 MHz
8	2447 MHz
9	2452 MHz
10	2457 MHz
11	2462 MHz

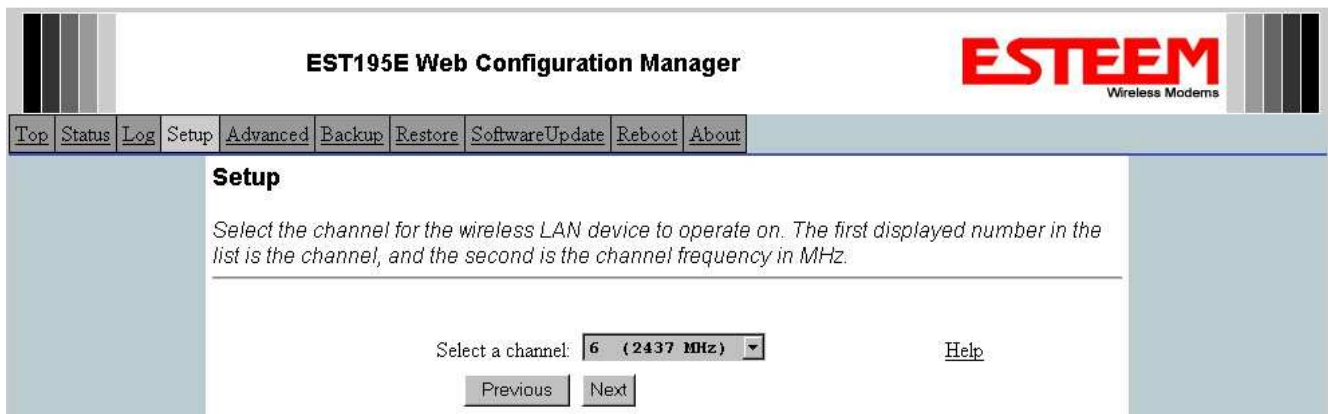


Figure 1: RF Channel Selection

RF COMMUNICATIONS DATA RATE

The RF data rate of the Model 195Eg can be programmed for operation at 1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, or 54 Mbps. The RF data rate can be set for a fixed rate or a specific range that is dynamically scaled by the Model 195Eg from monitoring the received signal quality. The Model 195Eg can communicate with multiple 802.11g devices at different data rates for each device. By selecting all ranges from 1 to 54 Mbps you will be able to communicate with all 802.11g and 802.11b devices regardless of their generation, data rate, and signal quality requirements.

Dynamic scaling means that the Model 195Eg will operate at the highest RF data rate that is programmed into unit. If the received data quality drops below the required minimums for reliable communications the Model 192E will reduce the data rate to the next lowest step to increase signal quality. Conversely if the signal quality increases above the minimums the Model 192E will increase the RF data rate the next highest level.

The ESTeem 195Eg is set at the factory to operate at maximized scaling speed data rates from 1-54 Mbps and should not need adjustment. The RF Data Rate is programmed in the Model 195Eg through the **Advanced Menu>Wireless LAN Settings>Wlan0 Device** and the value for **wlan0_OPRATES:**. In the example shown in Figure 2 the RF Date Rate is programmed to dynamic scale from 1 to 54 Mbps (recommend factory default setting). To set the values for the data rate, check the box next to the listed data rate to enable this rate for operation.

wlan0_OPRATES: 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 5.5 <input checked="" type="checkbox"/> 11 <input checked="" type="checkbox"/> 6 <input checked="" type="checkbox"/> 9 <input type="checkbox"/> 12 <input checked="" type="checkbox"/> 18 <input type="checkbox"/> 24 <input checked="" type="checkbox"/> 36 <input type="checkbox"/> 48 <input type="checkbox"/> 54 <input checked="" type="checkbox"/>	Select the set of data rates that the radio may transmit. These rates are used when transmitting frames to a single peer. Not all peers need to support these rates. If the rates selected are not valid for the radio and/or frequency selection then the rate set will be replaced with the default rate set at radio initialization time.
wlan0_SIFSPAD: <input type="text" value="40"/>	Enter the number of microseconds to add to the default SIFS value (0-100)
wlan0_AP_BCINT: <input type="text" value="100"/>	Enter the number of TUs that a station shall use between beacon frames (1-65535)
wlan0_AP_DTIMINT: <input type="text" value="1"/>	Enter the number of beacon intervals that shall elapse between transmission of beacon frames containing a TIM element whose DTIM count field is 0 (1-255)
wlan0_AP_CFPPERIOD: <input type="text" value="1"/>	Enter the number of DTIM intervals between the start of CFPs (0-255)
wlan0_AP_CFPMAXDURATION: <input type="text" value="100"/>	Enter the maximum duration (in TUs) that may be generated by the PCF. (0-65535)
wlan0_AP_PROBEDELAY: <input type="text" value="100"/>	Enter the delay (in microseconds) to be used prior to transmitting a probe frame during active scanning.
wlan0_AP_CHANNEL: <input type="text" value="9 (2452 MHz)"/>	Enter the channel number when operating in one of Access Point modes
wlan0_AP_BASICRATES: 1 <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> 5.5 <input checked="" type="checkbox"/> 11 <input checked="" type="checkbox"/> 6 <input type="checkbox"/> 9 <input type="checkbox"/> 12 <input type="checkbox"/> 18 <input type="checkbox"/> 24 <input type="checkbox"/> 36 <input type="checkbox"/> 48 <input type="checkbox"/> 54 <input type="checkbox"/>	Select the set of basic rates that the device will use to transmit frames that all stations must hear. The rate set must be a sub-set of rates selected for OPRATES. Note that all possible data rates are presented here. Not all rates are valid for all channels and all radios. If the rate set selected is not valid for the radio, frequency selection, or is not a sub-set of the operational rates then the rate set will be replaced with the default rate set at radio initialization time.

Figure 2: Advanced Data Rate Selection

RF BASIC RATE

The RF Basic Rate is the synchronization rate used to establish the initial connection between 802.11g and 802.11b communication devices in Mbps. After the initial connection has been established the RF communication rate will be determined by the RF Communication Data Rate established above. Factory default is 1 through 11 Mbps shown in Figure 2 so that the unity will establish communication with the older (slower) 802.11b devices. This lower rate also allows for a quicker reconnect when the ESTeems are configured for EtherStation mode or working in a mobile environment.

The ESTeem 195Eg is set at the factory to operate at all speeds from 1-11 Mbps and should not need adjustment. The RF Basic Rate is programmed in the Model 195Eg through the **Advanced Menu>Wireless LAN Settings>Wlan0 Device** and the value for **wlan0_AP_BASICRATES:**. In the example shown in Figure 2 the RF Date Rate is programmed to dynamic scale from 1 to 11 Mbps (recommend factory default setting). To set the values for the data rate, check the box next to the data rate required.

Note: The Model 195Eg will only communicate with slower speed devices after synchronization if the RF Communication Data shown above has been set to dynamically scale to 1 and 2 Mbps.

In general, do not set the RF Basic Rates above 11Mbps unless specifically instructed by ESTeem Customer Support.

SETTING RF POWER LEVEL

The ESTeem Model 195Eg peak power is adjustable in output power from 250mW to 1 Watt. The output power is adjusted on the **Advanced Menu>Wireless LAN Settings>Wlan0 Device** screen (Figure 3) of the Web Configuration Manager. Select the value and press the *Save Settings* button.

Max (Maximum)	1 Watt
Hi (High)	≈700 mw
Lo (Low)	≈500 mw
Min (Minimum)	≈250 mw

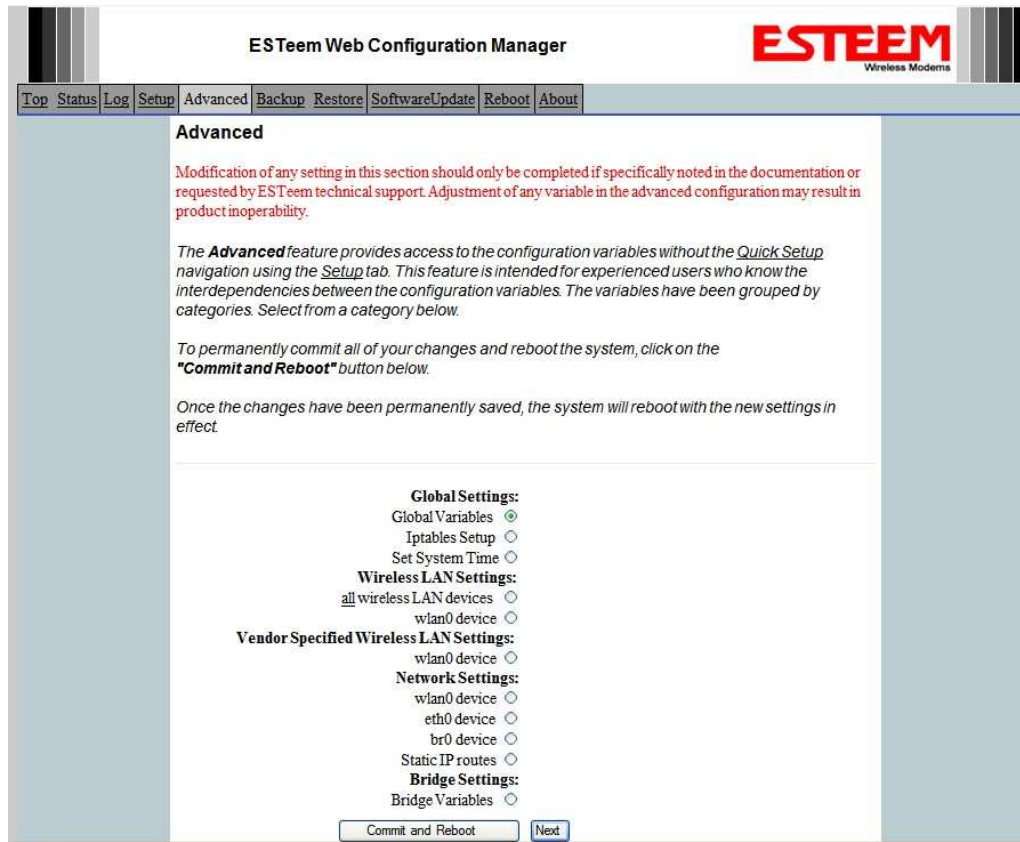


Figure 3: Advanced Global Variables

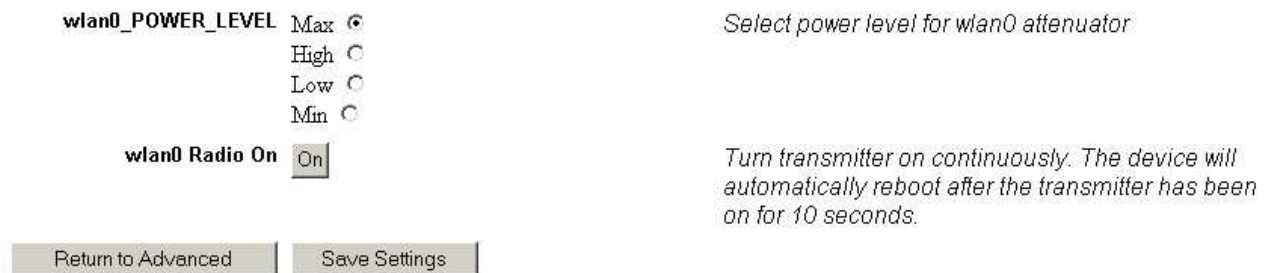


Figure 4: Power Level Settings

AVERAGE RF OUTPUT POWER

The average measurable output power on the ESTeem Model 195Eg will vary from 24dBm to 30dBm depending upon modulation type and RF data rate. The average power is used when entering the output power level in the ESTeem RF Design program. The following table provides that level and modulation type at each data rate:

RF Data Rate (Mbps)	Average Power	Modulation Type
1	30dBm	BPSK
2	30dBm	BPSK
5.5	30dBm	BPSK
6	30dBm	OFDM
9	30dBm	OFDM
11	30dBm	BPSK
12	28dBm	OFDM
18	28dBm	OFDM
24	27dBm	OFDM
36	27dBm	OFDM
48	24dBm	OFDM
54	24dBm	OFDM

OVERVIEW

The security for the ESTeem Model 195Eg, like all network security, must be multi-layered. One level of security is never enough to make sure that data does not end up in the wrong hands. Please review the following security levels and decide what is the most appropriate for your network.

128-BIT WEP

The 128 WEP uses a particular algorithm called RC4 encryption to encode and decode traffic that is based on a 104-bit encryption key and a 24-bit Initialization Vector (IV). RC4 starts with a relatively short encryption key (104 bits) that is expanded into a nearly infinite stream of keys to accompany the stream of packets.

The basic concept of RC4 is good, but the way it's implemented in WEP leaves it open to compromise. The researchers that test the integrity of the system usually focus on one piece of the implementation, the Initialization Vector (IV).

The IV (24 bits) is the algorithm component that's supposed to keep expanded keys from repeating. From the researcher's point of view, a high-volume access point is mathematically guaranteed to reuse the same key stream at least once a day. When this happens, it's called an IV collision this becomes a soft spot to enter the system.

The researchers aren't saying that it's easy to break into the system, or that it's being done on a regular basis, only that it is possible and that administrators should consider ways to reduce the possibility.

WPA

Wi-Fi Protected Access with Preshared Key (WPA PSK)

WPA, which uses 802.1x, was introduced in 2003 to improve on the authentication and encryption features of WEP. All authentication is handled within this access point device. WPA has two significant advantages over WEP:

1. An encryption key differing in every packet. The TKIP (Temporal Key Integrity Protocol) mechanism shares a starting key between devices. Each device then changes their encryption key for every packet. It is extremely difficult for hackers to read messages even if they have intercepted the data.
2. Certificate Authentication (CA) can be used, blocking a hacker posing as a valid user.

Wi-Fi Protected Access with Enterprise Server (WPA Enterprise)

Like WPA PSK, WPA Enterprise uses 802.1x. However, a backend authentication server handles the authentication decision. The most commonly type of authentication server is a RADIUS server. The ESTeem Model 195Eg can be configured to operate with an established RADIUS server on the network.

WPA is server/client relationship from a software driver on a computer's wireless LAN (WLAN) card to an Access Point. The scope of WPA is limited in use to this configuration only. The ESTeem Model 195Eg can support WPA Enterprise and PSK as an Access Point, but the level of security on the Bridging layer is configured separately.

ACCESS CONTROL LIST (ACL)

The ACL is one of the simplest yet most secure methods of network security. The ACL is a configurable MAC filter in the Model 192E that can be set to allow specific MAC address on the wireless network by individual address or address ranges. The same filter can also be set to reject individual MAC addresses or address ranges.

The MAC address is a unique, 6 hexadecimal field address assigned at the manufacturer that can not be changed. The MAC address is traceable through the IEEE governing body to the manufacturer and is the "fingerprint" for all Ethernet devices.

Using a combination of both the WPA or 128-Bit WEP encryption and the ACL filter provide the ESTeem an extremely secure wireless networking layer.

DISABLING BROADCAST PROBES AND HIDING SSID

A simple but very effective way of securing a network is to make the network difficult to find. By disabling broadcast probes and hiding the Service Set Identification (SSID), wireless and network “sniffers” will not be able to find your ESTeem Model 195Eg network. To gain access to the wireless network, you would be required to have the SSID and all security loaded in the WLAN card software prior to entering the network.

PROPRIETARY BRIDGE COMMUNICATION

Although the ESTeem Model 195Eg is compatible with the open communication standards IEEE 802.11g and 802.11b, the repeater communication between the units is a proprietary communication link. No other manufacturer of wireless hardware can access the ESTeem repeater network when bridging between Ethernet networks. This proprietary communication layer, in combination with the other security settings, allows you as the user to reject wireless clients into the network if so desired. When used in conjunction with the Access Control List the 802.11g and 802.11b client access can be removed.

The security level of the bridge communication link is configurable for 64-Bit WEP, 128-Bit WEP or TKIP and is completely independent of the client access level or any other communication link level. For example, an ESTeem Model 195Eg can be configured for WPA Enterprise for client level access, communicate to another ESTeem Model 195Eg using a TKIP bridge link and also communicate 128-Bit WEP to our older ESTeem Model 192E radio modems all running simultaneously.

MASQUERADE MODES

When the ESTeem Model 195Eg is configured in either the Access Point Masquerade or the Client Masquerade modes, the wireless modem functions as a network firewall. If access to the wired network is the greatest concern, place the ESTeem in the Masquerade mode and the wireless network will be completely isolated from the wired Ethernet network.

INCREASING NETWORK SECURITY

The following are a few suggestions to help improve the overall security of your wireless network:

1. Enable the security. If you research all of the articles regarding hackers, they have gotten into the user’s network due to the security not being enabled.
2. Set the ACL filter to include only those MAC address of the wireless Ethernet device being used on the network.
3. Set "Hide SSID" to True. As you take your access point out of the box, broadcast SSID is enabled which means that it will accept *any* SSID. By hiding the SSID configured in the client must match the SSID of the access point.
4. Make sure the keys are not reused in your company, since reuse increases the statistical likelihood that someone can figure the key out and change the default password on your access point or wireless router
5. Change the default SSID of your product. Don't change the SSID to reflect your company's main names, divisions, or products. It just makes you too easy to target.
6. As a network administrator, you should periodically survey your company using a tool like NetStumbler to see if any "rogue" access points pop up within your company without authorization. All of your hard work to "harden" your wireless network could be wasted if a rogue AP was plugged into your network behind the firewall.

7. Many access points allow you to control access based on the MAC address of the NIC attempting to associate with it. If the MAC address of your NIC isn't in the table of the access point, you won't associate with it. And while it's true that there are ways of spoofing a MAC address that's been sniffed out of the air, it takes an additional level of sophistication to spoof a MAC address. The downside of deploying MAC address tables is that if you have a lot of access points, maintaining the tables in each access point could be time consuming. Some higher-end, enterprise-level access points have mechanisms for updating these tables across multiple access points of the same brand.
8. Consider using an additional level of authentication, such as Remote Access Dialin User Service (RADIUS), before you permit an association with your access points. While it's not part of the 802.11b standard, a number of companies are optionally including some provision for RADIUS authentication.
9. If you're deploying a wireless router, think about assigning static IP addresses for your wireless NICs and turn off Dynamic Host Configuration Protocol (DHCP). If you're using a wireless router and have decided to turn off DHCP, also consider changing the IP subnet. Many wireless routers default to the 192.168.1.0 network and use 192.168.1.1 as the default router.
10. Don't buy Access Points or NICs that only support 64-bit WEP.
11. Only purchase Access Points that have flashable firmware. There are a number of security enhancements that are being developed, and you want to be sure that you can upgrade your access point.
12. A simple security technique used by the military is to have the administrator periodically change the key for the system i.e. weekly, monthly, etc.

TESTING COMMUNICATION LINK

After you have configured at least two of the Model 195Eg wireless Ethernet modems for operation, you can verify communication with each the following steps:

Status Light

The quickest source of link status is to view the Status Light on the face of the 195Eg (Figure 1). If the Status light is solid, the Model 195Eg has a connection to another Model 195Eg listed in the Peer Table.

Status LED
Solid Red on Link



Figure 1: Connection Status Light

Status Screen/Peer Table

To view detailed information on the status of the communication link (such as connection speed, signal strength and last update time) you can open the Status Screen from the Web Interface. After press the Status tab at the top of the screen the Status: Summary will be displayed showing the status of all ports and memory in the 195Eg. Under the Wireless Status heading click on the [View Peer Table](#) (Figure 2). The Peer Table will list all other 802.11b or 802.11g wireless activity seen by the 195Eg and how it is classified.

EST195E Web Configuration Manager

Top
Status
Log
Setup
Advanced
Backup
Restore
Software Update
Reboot
About

Status: Peer Table

This page is a summary view of the peer table for WLAN device wlan0. Click on a given MAC address for more details about that peer.

[Return to Status Summary Page](#)

Associated Stations

None

Opposite Modem's Wireless MAC

Receive Signal Strength (dBm)

Last Packet Received

MAC Addr	Signal	LastRx (sec@kbps)	Modem ID
00:04:3f:00:09:66	-36	0@11000	Remote ← Peer Modem ID

Access Points

MAC Addr	Signal	LastRx (sec@kbps)	Enc	SSID
00:02:2d:03:2a:78	-70	0@2000	y	← Other Access Points
00:02:2d:3f:7d:d3	-89	8@2000	y	
00:04:3f:00:09:66	-36	0@11000	y	

Figure 2: Repeater Peer Table

*Note: The data rate displayed is **not necessarily** indicative of the RF data rate between the ESTEems. The rate show in the Repeater Peer table will be the last RF packet, which could consist of either data, repeater beacon or network probes.*

Repeater Peers - The Peer Table will display all connected 195Egs configured to repeat to this ESTeem by their Wireless (WLAN) MAC address.

Received Signal Strength – This is the first of the two numbers listed in the block. This signal strength value is listed in dBm.

Last RX – This is the time of the last received data packet. When monitoring the status menu, it is important to note the time the last transmission was updated so you are not looking at “stale” data.

Current Data Rate – This is the current speed the last data packet received by the Model 195Eg. This may not be the data rate between the radio modems. Note that the speed is listed in kbps, so that 11000 kbps is equal to 11 Mbps.

***Note:** The ESTeem Model 195Eg uses spread spectrum technology that analyzes each data packet for signal strength and data quality (strength vs. noise). The higher your signal, the more background noise you can sustain without causing degradation in the data transfer. This is also true for lower signal strengths with a very low background noise. These values are provided for guidance and if you have any questions about the values in your application, please contact ESTeem Customer Support at 509-735-9092 or e-mail your application to support@esteem.com.*

Modem ID – This is Modem ID for the opposite repeater peer.

The screenshot displays the 'EST195E Web Configuration Manager' interface. At the top, there is a navigation menu with links: Top, Status, Log, Setup, Advanced, Backup, Restore, SoftwareUpdate, Reboot, and About. The main content area is titled 'Status: Peer Info Summary'. Below the title, a message states: 'This page is a summary view of a given WLAN peer. Click on the links below for more details about this peer.' A link 'Return to Peer Table Page' is provided. A section titled 'Detail Links and Summary Data for Peer 00:04:3f:00:09:66' contains several links: View Peer Counters, View Peer Statistics, View Peer Rate Control Information, View Peer Crypto Information, View Peer Last Beacon, and View Peer Last Probe Response.

Figure 3: Peer Summary Table

Viewing RF Data Rates

The value shown on the Peer Status Screen for data rate may not be the actual rate of the RF link. To view the link information, click on the Opposite Modems WLAN MAC address in the Repeater Peer list (Figure 2) and further link status information will be displayed (Figure 3).

Once loaded, click on [View Peer Rate Control Information](#). (Figure 4)

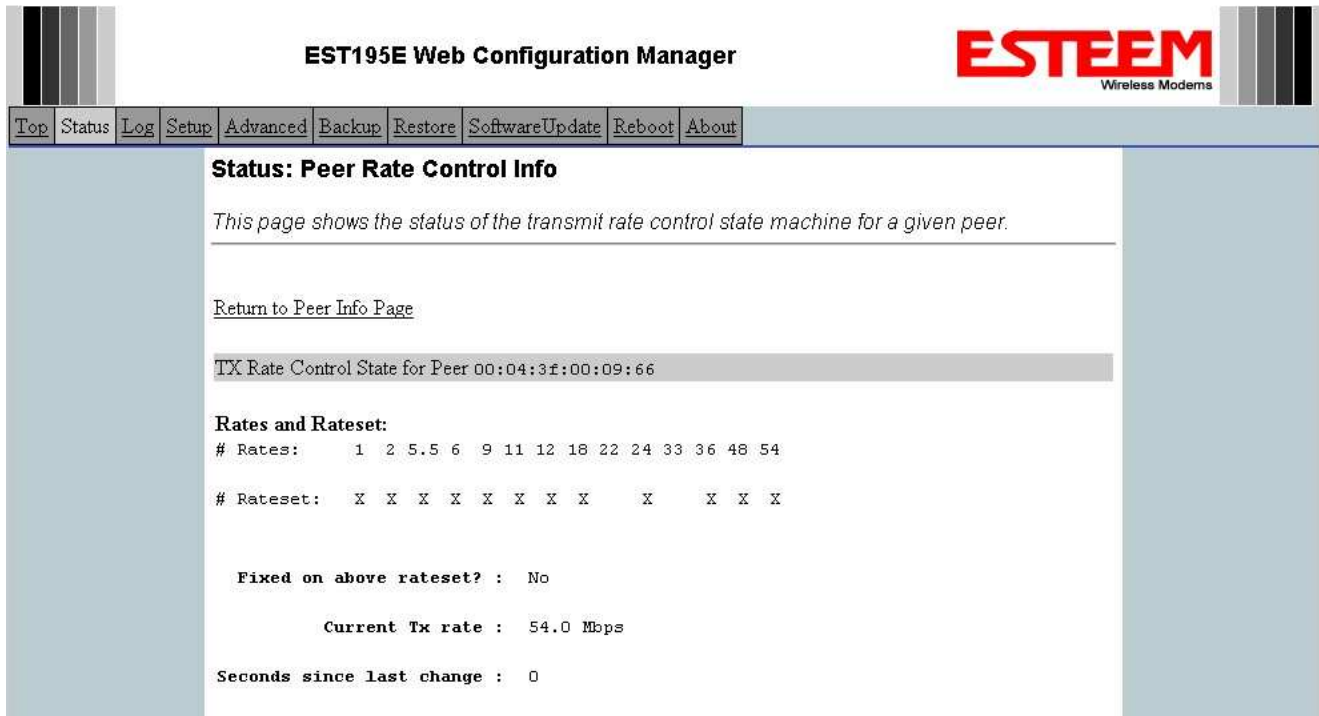


Figure 4: Rate Control Information

The value of the Current TX rate is the RF data rate between the two ESTeem Model 195Eg.

SIGNAL STRENGTH VS DATA RATE

The following chart will show the average signal strength required to maintain a data rate. Please note that the data rates listed here can be greatly effected by overall activity on the radio channel and the total background noise. This values should be used as a guide, but testing after installation is required.

Receive Signal Strength	RF Data Rate
-89 dBm	1 Mbps
-86 dBm	2 Mbps
-85 dBm	5.5 Mbps
-88 dBm	6 Mbps
-87 dBm	9 Mbps
-82 dBm	11 Mbps
-84 dBm	12 Mbps
-82 dBm	18 Mbps
-79 dBm	24 Mbps
-75 dBm	36 Mbps
-70 dBm	48 Mbps
-68 dBm	54 Mbps

Note: The signal strength required for the above data rates are effected by other RF transmitters in the area. A higher signal strength will be required in applications with high background noise.

UPDATING MODEL 192E TO OPERATE WITH 195EG

The ESTeem Model 192E can be used in a Model 195Eg system but does require an update to the firmware. Once the 192E firmware has been updated, all the programming instructions in this User's Manual will be applicable. The following firmware update procedure requires the **ESTeem 192E to first be updated to firmware version 220.19**. Once this has been verified, please proceed.

Local FTP Server

1. Configure an FTP server on the network where the ESTeem Model 192E is connected. Verify that you have anonymous access to the FTP server before proceeding.
2. Download the following files from the ESTeem FTP Site (<ftp://www.esteem.com/192E>).
 - a. 192eupdate.sh
 - b. 192epdrs.sh
 - c. swupdate-192e-230.dev.65.img
 - d. DOS2UNIX.EXE
3. Open the **192eupdate.sh** file using **Wordpad**. Replace **<server-IP>** with the IP of your ftp server. Replace **<version>** with the firmware version (e.g., 230.dev). For example:

```
mkdir /var/update
cd /etc
wget ftp://172.16.252.251/ swupdate-192e-230.dev.65.img
dd if= swupdate-192e-230.dev.65.img of=/dev/ram0
mount /dev/ram0 /var/update
cd /var/update
/sbin/dkflash -v -d -w -o 0x00040000 kernel.img
/sbin/dkflash -v -d -w -o 0x00140000 rootfs.img
/sbin/reboot
```

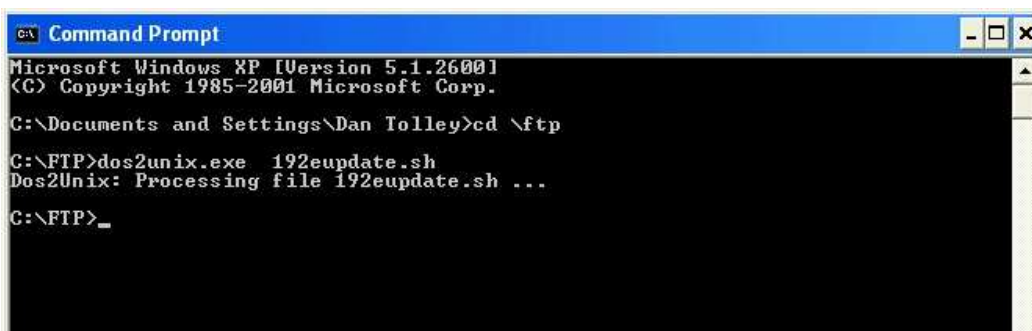
4. Save the amended script file.
5. Open a **Command Prompt**.
 - a. Open the directory where the files have been saved and type the following:

```
C:\<directory>dos2unix.exe 192eupdate.sh
```

You will then see the following string:

```
Dos2Unix: Processing file 192eupdate.sh...
```

Example:



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

C:\Documents and Settings\Dan Tolley>cd \ftp
C:\FTP>dos2unix.exe 192eupdate.sh
Dos2Unix: Processing file 192eupdate.sh ...

C:\FTP>_
```

Figure 5: DOS Command Display

- Using an Internet Explorer or other web browser, open the internal WebPage of the local ESTeem192E you wish to upgrade. A hardwired Ethernet connection to the modem is required.
- Configure the 192E in the **Ethernet Only** mode, make changes permanent and reboot.
- Choose **Run Script**
- When prompted for the script URL input the following command string and submit:

ftp://<IP Address of FTP Server>/192epdrs.sh>

Example: ftp:// 172.16.1.1/192epdrs.sh

- The modem will download and execute the firmware update. After the log file is displayed, configure the 192E in the **Access Point** mode, make changes permanent and reboot.
- Choose **Run Script**
- When prompted for the script URL input the following command string and submit:

ftp://<IP Address of FTP Server>/192eupdate.sh>

Example: ftp:// 172.16.1.1/192eupdate.sh

- While the script is running, the 192E will not respond and the browser will time out. **Close** the browser window to refresh the path the 192E.
- Please wait approximately 5 minutes before opening a new Internet Explorer browser to access the internal WebPages. Enter the IP address of the local ESTeem 192E to access the updated unit. The ESTeem 192E can now be reconfigured for use. Please refer to the **ESTeem 195Eg Owner's Manual** for details. If you do not have one, please download from the ESTeem FTP site at the following:

ftp://ftp.esteem.com/195Eg/AA107G Manual 195Eg.

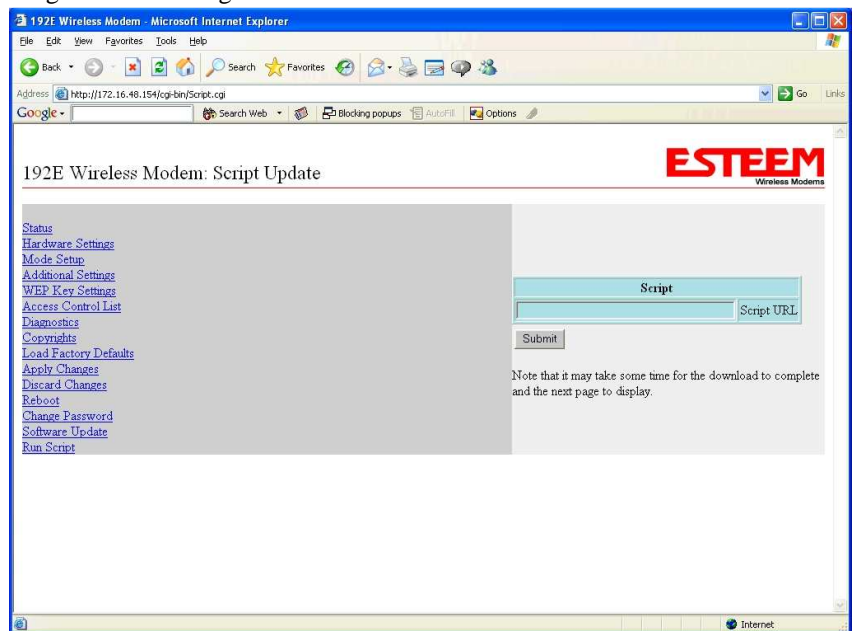


Figure 6: Script Input

LONG RANGE POINT TO POINT APPLICATIONS

The factory configuration on the 195Eg is optimized for distances up to 10 miles. If your application has an RF link with a range greater than 10 miles, you will need to set the maximum range value on both ESTeem 195Eg's on this communication link. To access the Maximum Distance value select **Advanced** from the top Menu then **Wireless LAN Settings>wlan0 device** and press the **Next** button (Figure 7).

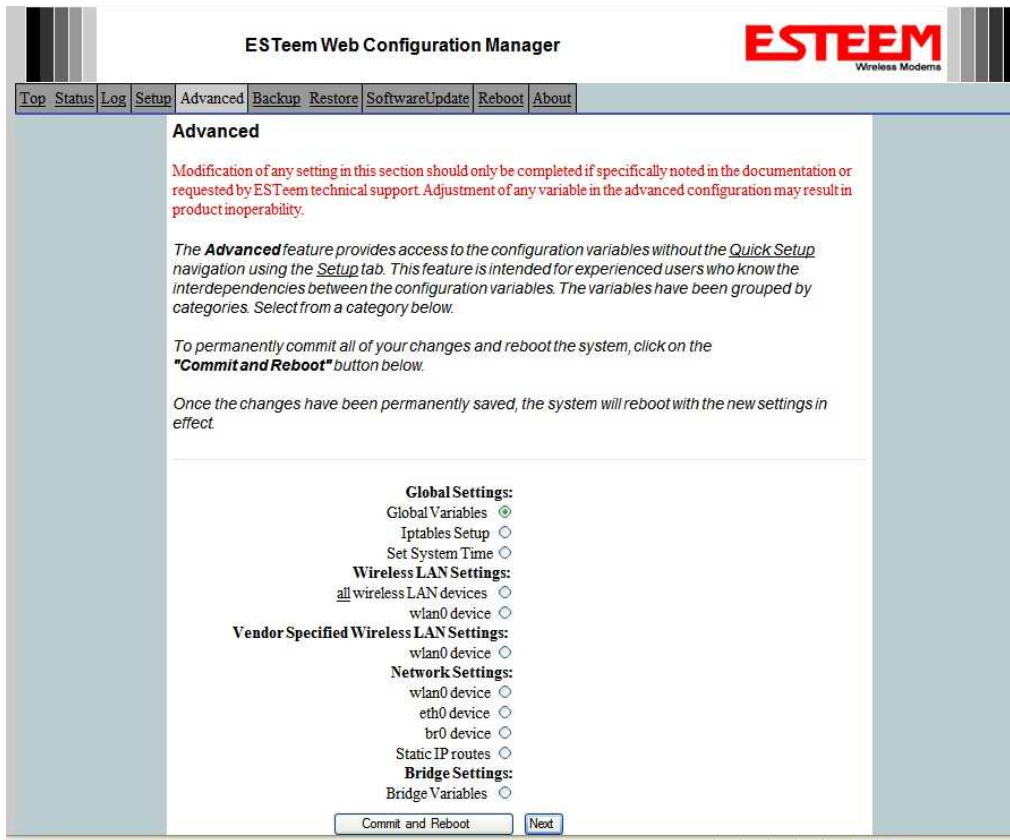


Figure 7: Advanced Features Screen

Scroll down the menu list until you find the Maximum Distance variable (Figure 8). Enter the maximum distance of the connection in miles. At the bottom of the screen press **Return to Advanced** button and then **Commit and Reboot** button (Figure 7) to save the information.



Figure 8: Maximum Distance Value Entry

TROUBLESHOOTING TIPS

General (Applicable to All Modes of Operation)

Where do I find the latest firmware version number? – We have the latest version number of the Model 195Eg firmware listed on the ESTeem Web site (www.esteem.com) under the Model 195Eg product page.

How and when do I update the Model 195Eg firmware? – You should only update the Model 195Eg firmware if you are having a specific problem and it is recommended that you do so by ESTeem Customer Support personnel. All the update instructions and files are located on the ESTeem FTP site at the following address:

<ftp://www.esteem.com/195EG>

Do all firmware versions have to be the same to communicate between the Model 195Eg? – It is not necessary for all the firmware versions to be the same revision to communication, but the later version may have added features that the other versions will not recognize.

What characters are valid for WEP Key entry? – Only the Hexadecimal characters 0-9 and A-F are valid for key entry.

What ESTeem Utility version is required to program the Model 195Eg? – The ESTeem Utility program is not required to program the Model 195Eg. The 195Eg can be programmed using any Terminal Emulation program (such as Windows HyperTerminal) and any web browser program.

What is the speed and duplex configuration on the Model 195Eg? – The Model 195Eg is an auto-negotiation full/half-duplex 10/100 Base-T interface. Either a cross-over or patch cable is supported.

Access Point Mode

Wireless LAN cards are not connecting – Verify that the wireless LAN cards are set to Infrastructure Mode, have a matching SSID (or ESSIS) set the same as the Model 195Eg and that all encryption codes are the same.

My Wireless LAN card shows a solid connection, but I can not pass any data – Verify the encryption and the ACL setting on the Model 195Eg match the wireless LAN card.

Access Point Repeater Mode

How long does it take to re-establish the Wireless Ethernet Network? – If a communication link is lost and the Wireless Network needs to re-establish the repeater routes, the time can take up to 30 seconds.

Should the AP Repeater Mode be used on mobile equipment? – The AP Repeater mode should be used on equipment that will not change the Repeater Route as it moves. For example, if a mobile device such as a crane can communicate directly to another ESTeem and will not lose the link in its travel, the AP Repeater Mode could be used. If the device requires two ESTeem Model 195Eg's (Base and Repeater) to maintain communication across its complete travel, the Station Modes should be used on the mobile device. The problem will be in the time that the mobile ESTeem will take to transfer between the two sites. In Access Point Repeater mode the transfer can take up to 30 seconds, while the EtherStation mode will transfer without a packet loss.

Does WEP have to be used? – The WEP does not have to be enabled for the modems to communicate, but all modems must be configured the same way.

Correct configuration, but cannot establish communications. – In addition to the network configuration, all 195Eg modems configured in the AP mode must share the same SSID and be on the same frequency channel. The most likely cause of the error is the WLAN MAC address is not configured in **both** 195Eg's repeater tables. If only one side is configured, everything will appear to be correct but no communication will function.

EtherStation

How do I access the Model 195Eg web page in EtherStation Mode? The Model 195Eg does not have an active web browser when configured in EtherStation mode. You must access the ESTeem with the ESTeem Discovery Program or through the RS-232 port after configuration in this mode. To monitor the link status, you can use the EtherStation Status program.

What IP address do I configure the ESTeem in EtherStation mode? – The Model 192E will not have an IP address in EtherStation mode.

I can not link my device into the wireless network – Verify that the MAC address of the device is **exactly** the same as configured in the Model 195Eg. The MAC address must have colons between the values.

Can I connect my Model 195Eg in EtherStation mode to a HUB or Ethernet Switch? – No. The modem must be connected directly to the Ethernet device for which it is programmed. In EtherStation mode the Model 195Eg can only service ONE Ethernet device.

TROUBLESHOOTING TIPS

General (Applicable to All Modes of Operation)

Where do I find the latest firmware version number? – We have the latest version number of the Model 195Eg firmware listed on the ESTeem Web site (www.esteem.com) under the Model 195Eg product page.

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Does WEP have to be used? – The WEP does not have to be enabled for the modems to communicate, but all modems must be configured the same way.

Correct configuration, but cannot establish communications. – In addition to the network configuration, all 195Eg modems configured in the AP mode must share the same SSID and be on the same frequency channel. The most likely cause of the error

is the WLAN MAC address is not configured in **both** 195Eg's repeater tables. If only one side is configured, everything will appear to be correct but no communication will function.

EtherStation

How do I access the Model 195Eg web page in EtherStation Mode? The Model 195Eg does not have an active web browser when configured in EtherStation mode. You must access the ESTeem with the ESTeem Discovery Program or through the RS-232 port after configuration in this mode. To monitor the link status, you can use the EtherStation Status program.

What IP address do I configure the ESTeem in EtherStation mode? – The Model 192E will not have an IP address in EtherStation mode.

I can not link my device into the wireless network – Verify that the MAC address of the device is **exactly** the same as configured in the Model 195Eg. The MAC address must have colons between the values.

Can I connect my Model 195Eg in EtherStation mode to a HUB or Ethernet Switch? – No. The modem must be connected directly to the Ethernet device for which it is programmed. In EtherStation mode the Model 195Eg can only service ONE Ethernet device.

ESTEEM DISCOVERY UTILITY

The ESTeem Discovery Utility will allow you to configure the IP address on the Model 195Eg to match your network regardless of its current IP subnet. This utility will also allow you to update the software in the 195Eg and open the web configuration for that wireless modem.

Installation

To install the Discovery Utility on your computer, inserting the Resource Disk in your CD drive.

Note: *The ESTeem Resource Disk is stand-alone copy of the ESTeem Web site (Figure 1). Navigation of the Resource Disk is as simple as using your web browser. All technical documentation, User's Manuals and the ESTeem Utility Program is available on the disk.*

1. Place the ESTeem Utility CD in your CD-ROM drive. The CD will auto load the ESTeem main page

Note: *If the page does not auto load, open your web browser and set your address line to D:\index.html (Where D: is the drive letter for your CD-ROM drive).*

2. From the Main Page select ESTeem Utilities and click on ESTeem Discovery Utility (Figure 2).

Note: *This program is saved in a compressed file format. Microsoft Windows XP® will open the file directly, but other operating systems will require a common compression program such as WinZip available for download at <http://www.winzip.com>*



Figure 1: ESTeem Resource Main Page

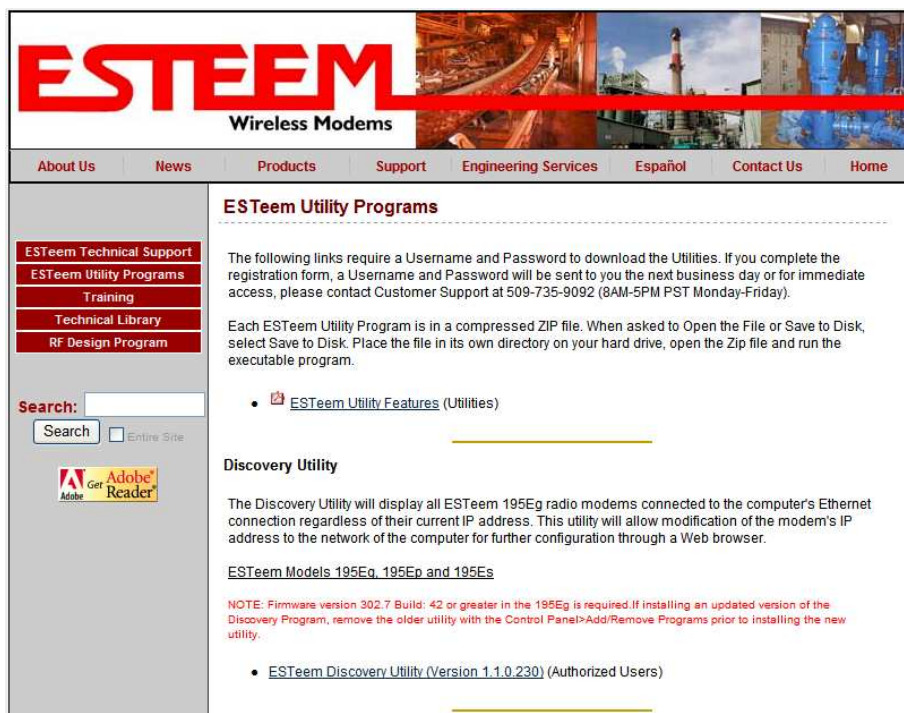


Figure 2: Discovery Utility Download

3. Double click on the 195EDiscoverySetup.exe file listed in the window to install the program.
4. Connect the Model 195Eg to your computer either direct to the Ethernet card or through a HUB/Switch using a CAT-5e Ethernet cable. The Ethernet port on the 195Eg supports Auto-Negotiation so either a patch cable or crossover cable will work. Open the ESTeem Discovery Program and press the **Discover Modems** button. The Model 195Eg will be displayed in the program by the Ethernet MAC address and Current IP Address (Figure 3).

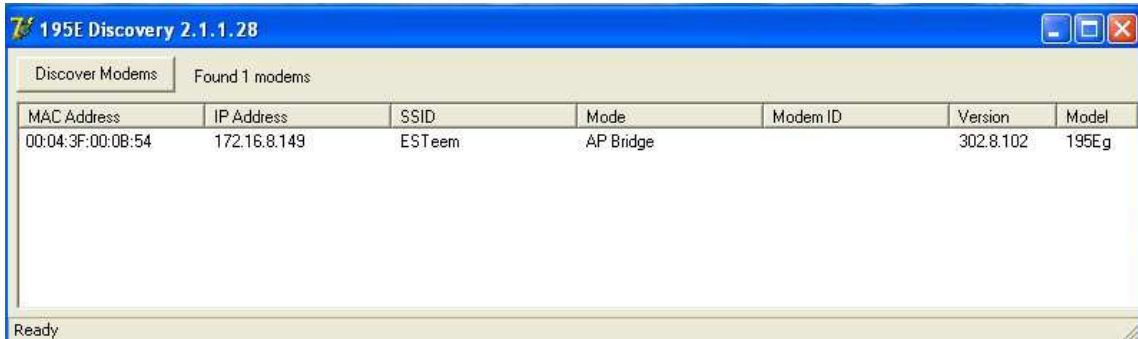


Figure 3: Discovery Program Main Page

Note: The SSID, Mode of Operation and Modem ID will be adjusted through the web configuration manager..

5. Double-click on the 195Eg you want to program and the *Configure IP Address* window will be displayed (Figure 4). Enter an IP address and Subnet Mask for the 195Eg that matches your network subnet and press the **OK** button to save this to the ESTeem. You will receive notification that the Configuration was Successful and the 195Eg will reboot. Proceed to ESTeem Setup in Chapter 4.



Figure 4: Change IP Address Window

Firmware Updates

To update firmware on any ESTeem Model 195 that is shown on the Discovery program, “right-mouse” click on the 195’s MAC address and select **Update** from the menu (Figure 5). Once you locate the update file, select the **Open** button and the 195 will update, validate and then reboot with the updated operating system.

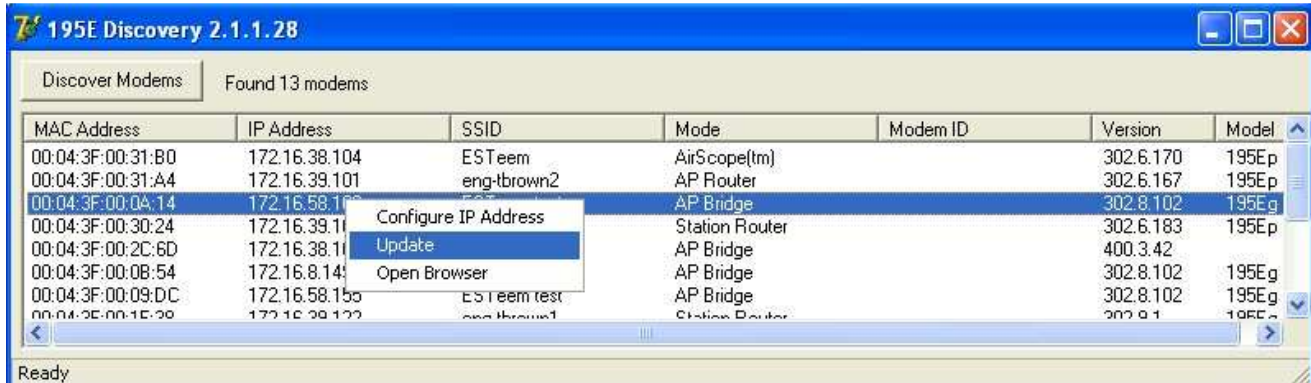


Figure 5: Discovery Features Menu

Opening Web Browser

To quickly open a web browser page to the IP address programmed in the 195 modem, “right-mouse” click on the 195’s MAC address and select **Open Browser** from the menu (Figure 5). If your computer is configured for the same IP subnet at the ESTeem 195 wireless modem, you will be asked to sign in with the Username and Password (Figure 6) and you can begin programming the Model 195 for your application.



Figure 6: ESTeem Web Page Log-on Screen

ETHERSTATION STATUS PROGRAM

When configured for EtherStation mode, the Web Configuration Manger is turned off. To gather information from the 195Eg on Access Point, link status and received signal strength you will need to install the ESTeem 195E Status Utility. The EtherStation Status Utility version 2.0.0.0 or greater provides a new feature where it will automatically program the connected ESTeem 195Eg to match up with the computer running the software. This software requires that the ESTeem 195Eg has software version 302.8.102 or greater installed for this feature to function.

This software program is found on the AA109 Resources Disk or available from the ESTeem web site. To install the utility, please complete the following:

Installation

The ESTeem Discovery Utility will allow you to configure the IP address on the Model 195Eg to match your network. Install the Discovery Utility on your computer by inserting the Resource Disk in your CD drive.

Note: The ESTeem Resource Disk is stand-alone copy of the ESTeem Web site (Figure 1). Navigation of the Resource Disk is as simple as using your web browser. All technical documentation, User's Manuals and the ESTeem Utility Program is available on the disk.

1. Place the ESTeem Utility CD in your CD-ROM drive. The CD will auto load the ESTeem main page

Note: If the page does not auto load, open your web browser and set your address line to D:\index.html (Where D: is the drive letter for your CD-ROM drive).

2. From the Main Page select ESTeem Utilities and click on EtherStation Status Utility

Note: This program is saved in a compressed file format. Microsoft Windows XP® will open the file directly, but other operating systems will require a common compression program such as WinZip available for download at <http://www.winzip.com>

3. Double click on the 195EStatusSetup.exe file listed in the window to install the program.

4. Connect the Model 195Eg to your computer either direct to the Ethernet card or through a HUB/Switch using a CAT-5e Ethernet cable. The Ethernet port on the 195Eg supports Auto-Negotiation so either a patch cable or crossover cable will work. Open the ESTeem Status Program and a status icons will appear in your system tray (Figure 9). When the status menu is opened from the system tray, the status window will be displayed (Figure 7) to show the Access Point MAC address and signal strength. The tray icon and Signal Strength bar will display the colors from Green, Yellow to Red on progressively poorer signal or will show Grey if roaming.

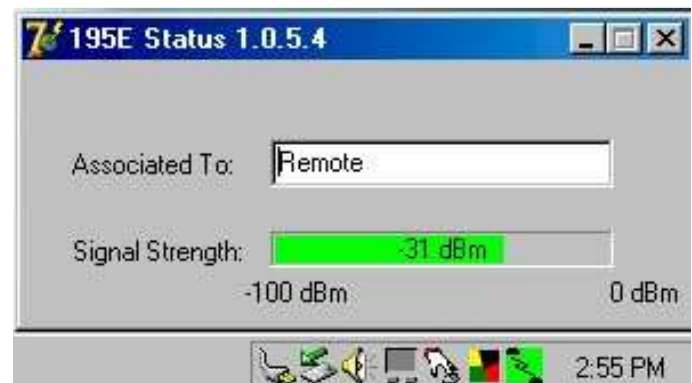


Figure 7: EtherStation Status Program

Note: This Utility will only operate with an ESTeem Model 195Eg in EtherStation mode.

SETTING LOCAL TIME

The ESTeem Model 195Eg will be shipped from the factory with the internal real-time clock set to Pacific Time. To change the clock settings to the local time for accurate log file entries:

1. Select **Advanced** from the top Menu then **Wireless LAN Settings>wlan0 device** and press the **Next** button (Figure 8).
2. Select **Global Settings>Set System Time** from the menu and press the **Next** button to continue.

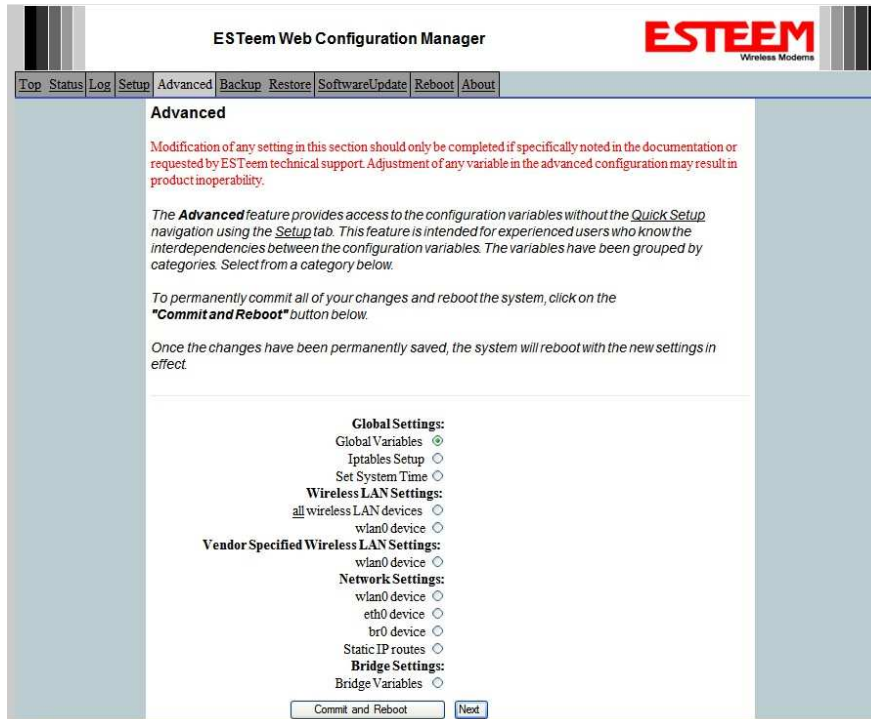


Figure 8: Advanced Features Screen

3. Select the correct date and time from the drop-down menus (Figure 9) and press the **Set System Time** button to save the time to the real time clock.

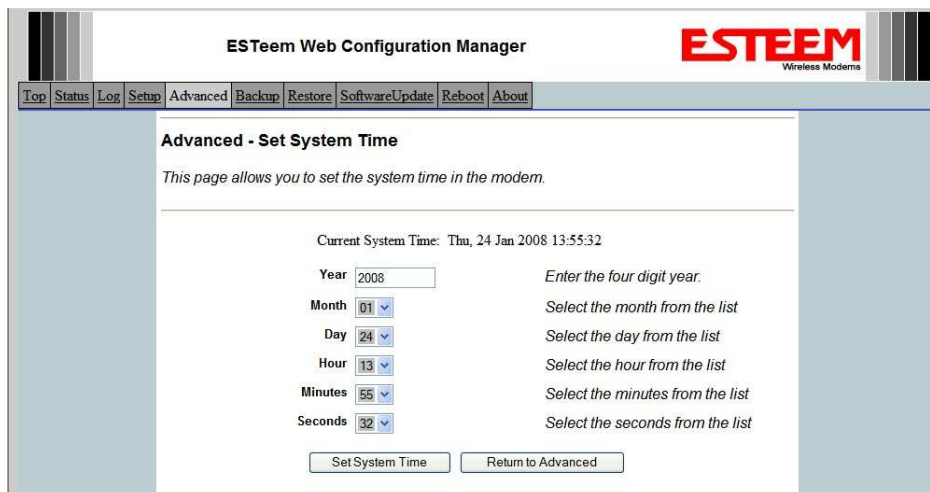


Figure 9: Advanced Features Screen

CONFIGURING TIME SERVER

Enabling NTP time synchronization services on the ESTeem 195Eg will allow to use time services from upstream services to keep the time on the system accurate.

To allow time synchronization, the Model 195Eg must be configured with the NTP Daemon enabled and the appropriate IP address of the upstream network NTP server.

1. Select **Advanced** from the menu items and **Global Variables** (Figure 10).

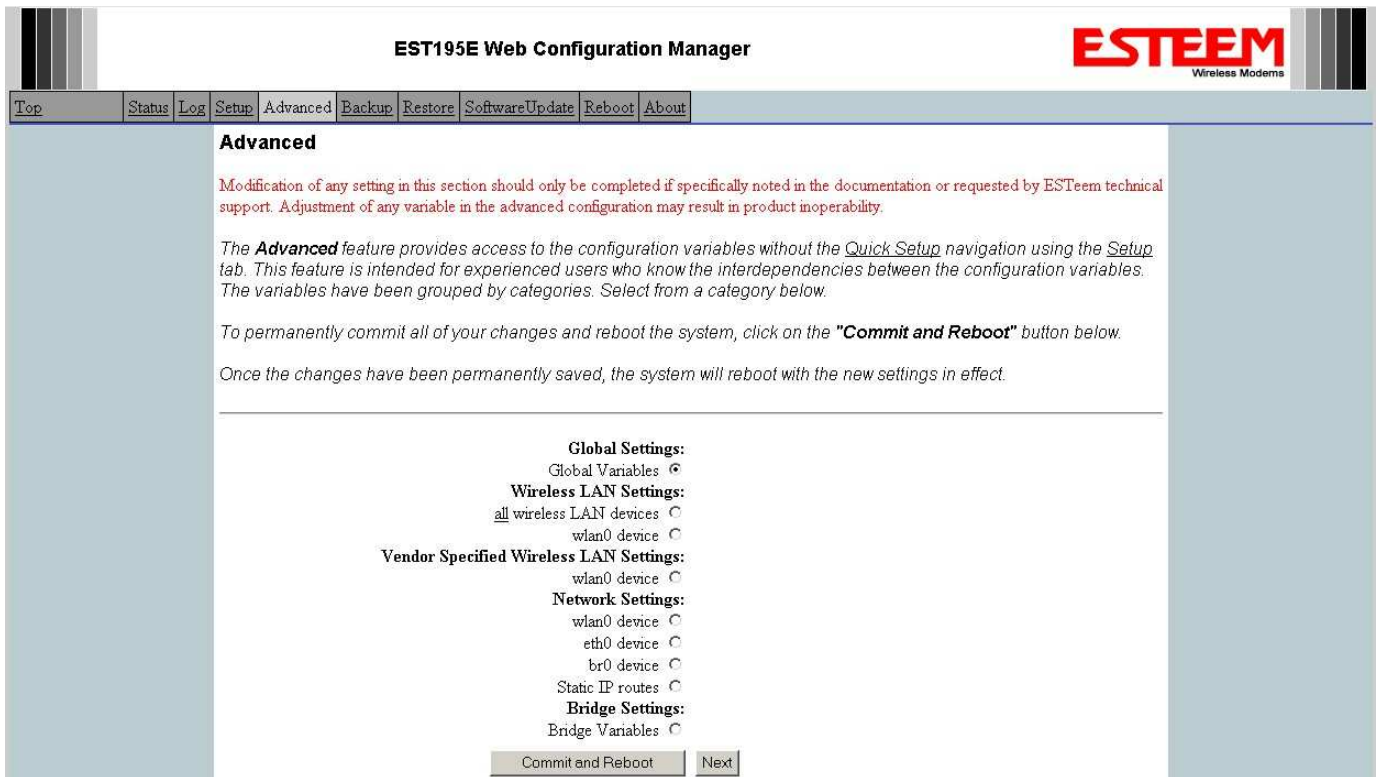


Figure 10: Advanced Settings Menu

2. Press the next button and Figure 11 will be displayed. At the bottom of the page are the NTP server configurations.
3. The NTP daemon is enabled by selecting YES for **NTP ENABLE** (Figure 11). When enabled, the NTP daemon will use time services from upstream services to keep the time on this system accurate.

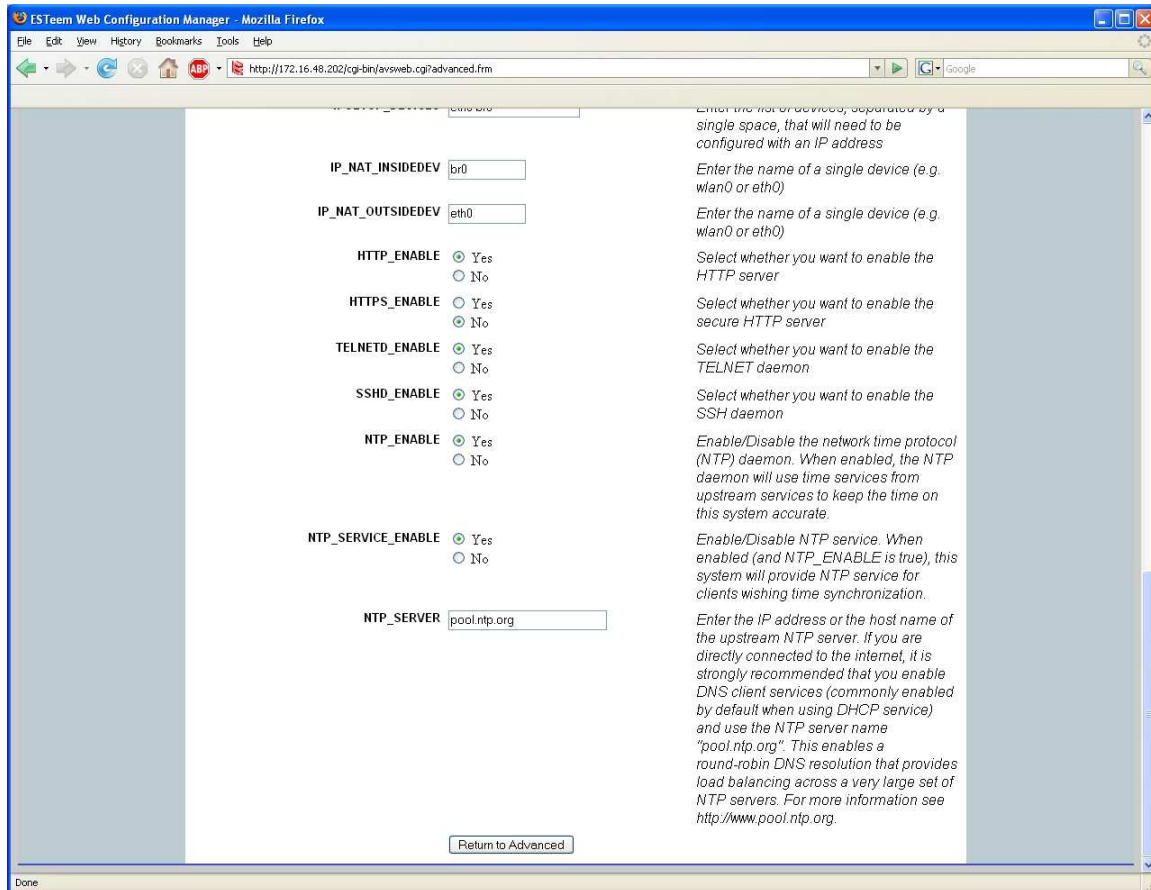


Figure 11: NTP Settings

4. Next, the **NTP SERVICE ENABLE** should be configured to “YES,” if you want to allow the system to provide NTP service for clients wishing time synchronization (Figure 11).
5. The final step in configuring NTP services is to enter the IP address or the host name of the upstream NTP server.

- Once configuration is complete, press the “Return to Advanced” button.

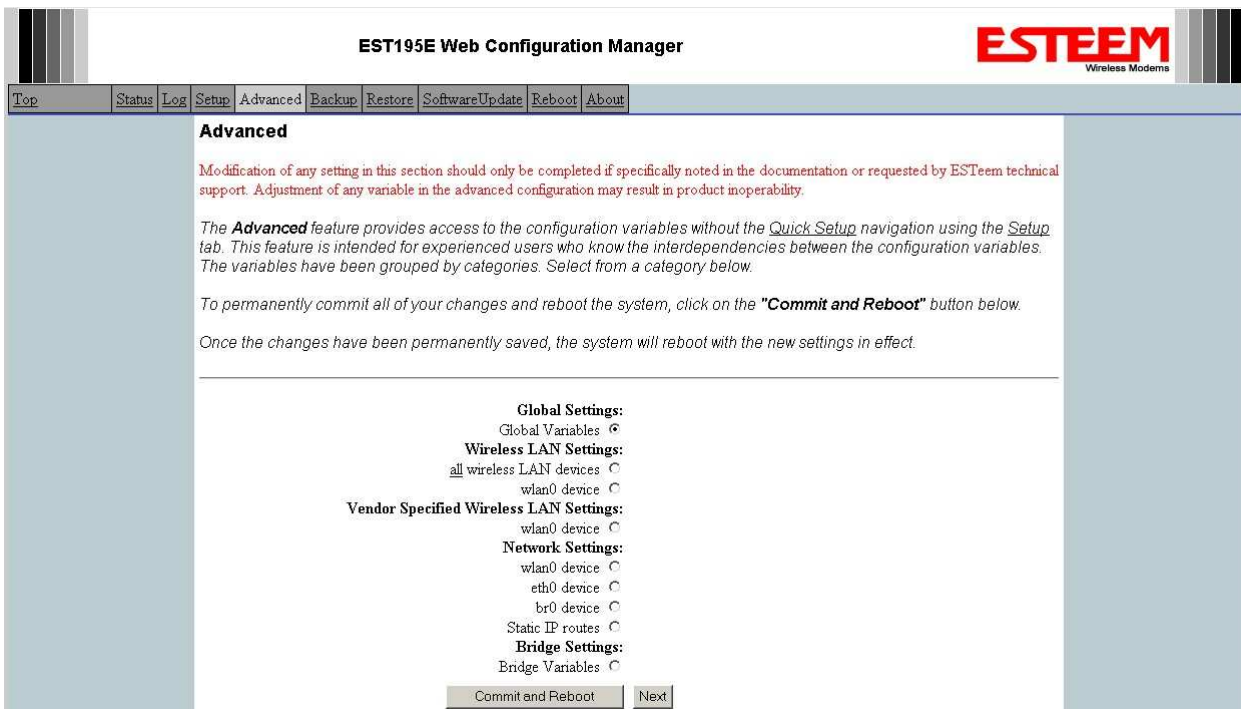


Figure 12: Advanced Settings Menu

- To complete the configuration, select “Commit and Reboot.” The ESTeem 195Eg will now commit the configuration changes and reboot. (Figure 12)

Before You Begin

- The ESTEem Model 195Eg wireless Ethernet radio modem is compatible with many different applications. The most common application is to bridge two or more Ethernet devices or networks. This guide will demonstrate the basic configuration and testing of a pair of 195Eg's. For a more detailed information, please see the ESTEem Model 195Eg User's Manual.
- This guide assumes you have a working knowledge of Ethernet networking, TCP/IP protocol and how to identify and set the TCP/IP address on your computer.
- The 195Eg can be configured using any current web browser software such as Internet Explorer, Netscape or Mozilla.
- The following procedure will provide an initial communication link between two or more Model 195's for testing purposes. All the example commands listed in this guide can be adjusted to fit your communication network. Please consult the ESTEem Model 195Eg User's Manual for more details.

Unpack Contents

Each node in your ESTEem Model 195Eg's network may have different hardware components based upon the final installation location (i.e Outdoor, Indoor, Point-to-point or Muti-Point). Antenna types, cable lengths, power supplies may be different, but the following items will be required for basic setup:

Model 195Eg



AA109 Resource Disk



Antenna
(AA01S Displayed)



(2) Ethernet Cables

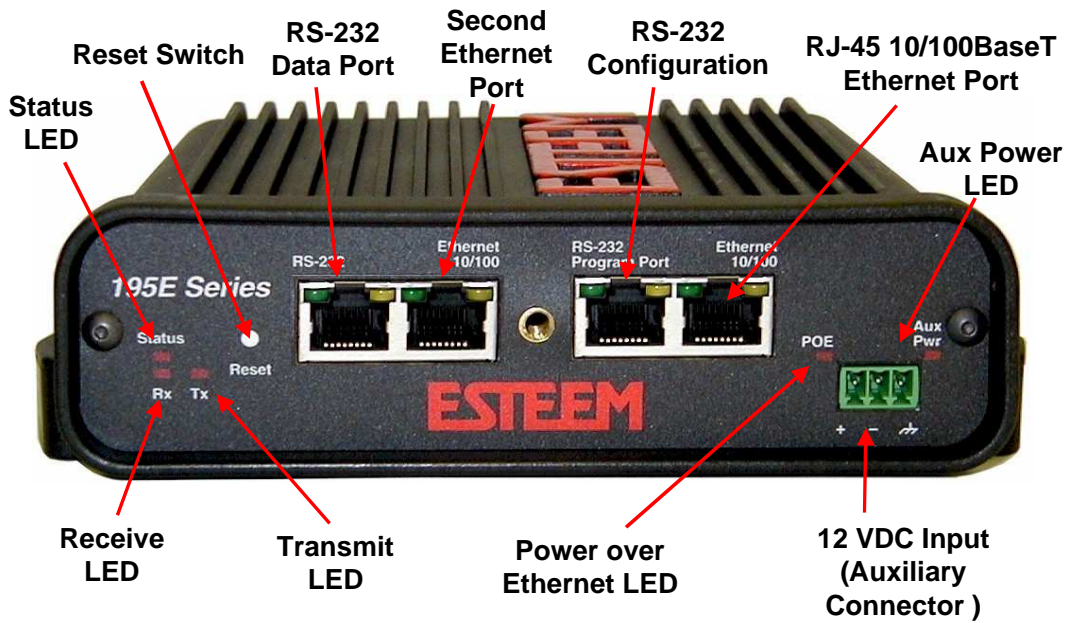


Power Supply
(AA175 Displayed)



Note: Your accessory model numbers may vary from the above, but you will need to locate each of above items to continue configuration.

Front Panel Overview (RS-232 Data Port and Second Ethernet Port Optional)



Antenna Overview



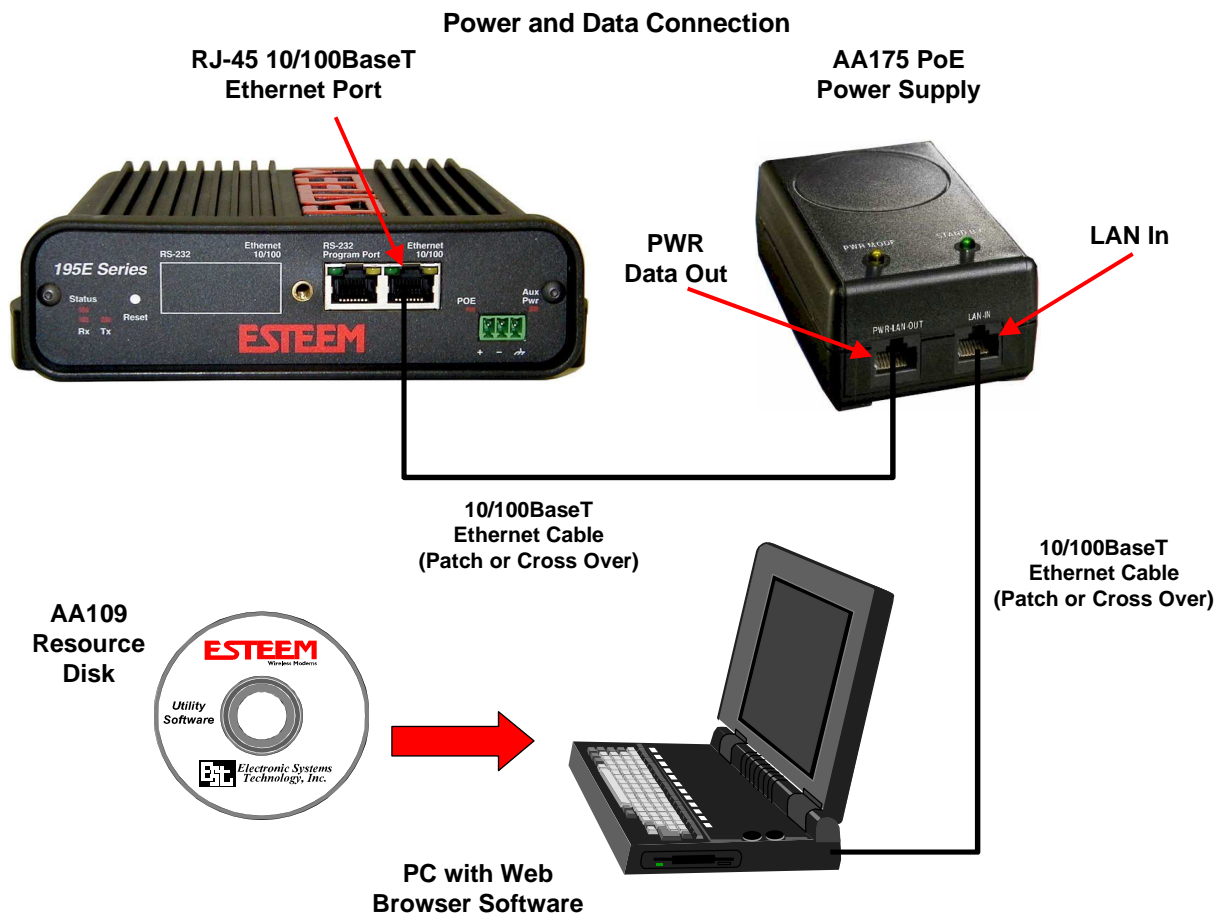
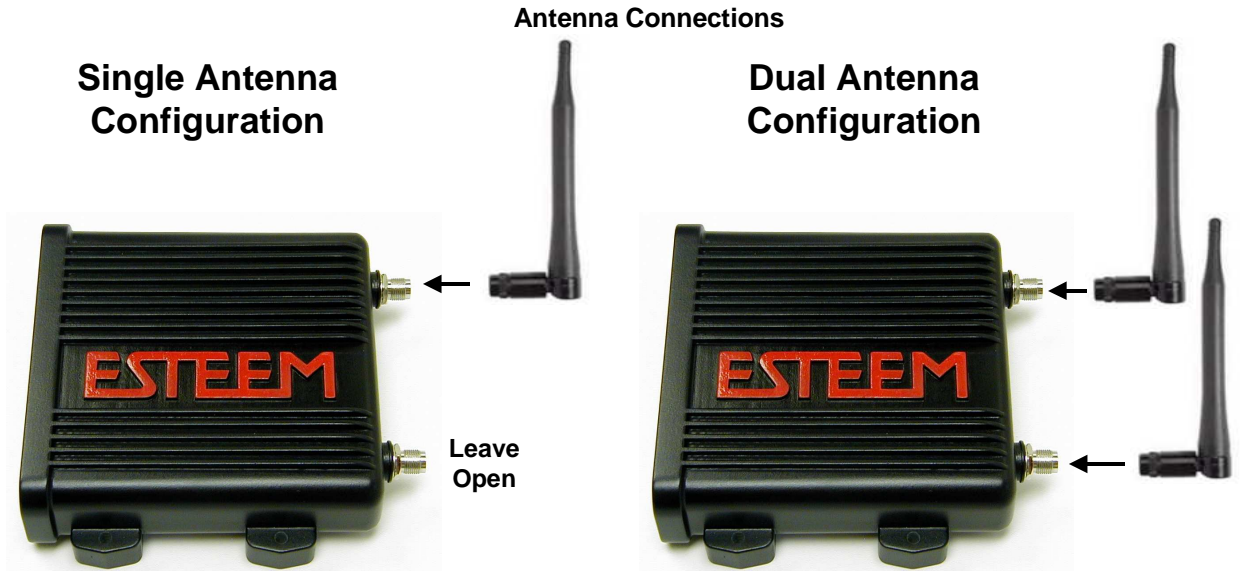
**Antenna Port A
(Single Receive Antenna)**

**Antenna Port B
(Dual Receive Antennas)**

**Antenna Connectors
(TNC Female-RP)**

Begin Programming

1. Assemble the ESTeem Model 195Eg using the following:



2. The Model 195Eg will link to other Model 195Eg's on the network via the WLAN Media Access Control (MAC) address found on the bottom of the case. This MAC address is six hexadecimal digits separated by colons and is configured at the factory. Every MAC address in the world is unique and can not be changed. Complete the following chart to aid in your configuration:

Name	Serial Number	IP Address	Ethernet MAC	WLAN MAC
Example Modem 1	E-14001	172.16.8.101	00:04:3f:00:01:01	00:04:3f:00:01:02

3. Configuration of the Model 195Eg is completed through the product's internal web server. To access this configuration page, you will need to enter the 195Eg's IP address in your web browser. The IP address set at the factory is Class B (i.e. 172.16.x.x) address and is printed on the Quality Assurance sheet sent with each 195Eg. If the factory default address matches your network configuration, please proceed to **Using Setup**, otherwise continue to step 4.
4. **Install the ESTeem Discovery Utility.** The ESTeem Discovery Utility will allow you to configure the IP address on the Model 195Eg to match your network. Install the Discovery Utility on your computer by inserting the Resource Disk in your CD drive.
Note: The ESTeem Resource Disk is stand-alone copy of the ESTeem Web site (Figure 1). Navigation of the Resource Disk is as simple as using your web browser. All technical documentation, User's Manuals and the ESTeem Utility Program is available on the disk.

Place the ESTeem Utility CD in your CD-ROM drive. The CD will auto load the ESTeem main page

Note: If the page does not auto load, open your web browser and set your address line to D:\index.html (Where D: is the drive letter for your CD-ROM drive).



Figure 1 –ESTeem Resource Disk Main Page

From the Support Menu select ESTeem Utilities and click on ESTeem Discovery Utility.

Note: This program is saved in a compressed file format. Microsoft Windows XP® will open the file directly, but other operating systems will require a common compression program such as WinZip available for download at <http://www.winzip.com>

Double click on the 195EdiscoverySetup.exe file listed in the window to install the program.

5. **Set IP Address on the 195Eg.** Connect the Model 195Eg to your computer either direct to the Ethernet card or through a HUB/Switch using a CAT-5e Ethernet cable. The Ethernet port on the 195Eg supports Auto-Negotiation so either a patch cable or crossover cable will work. Open the ESTeem Discovery Program and press the Discover Modems button. The Model 195Eg will be displayed in the program by the Ethernet MAC address and Current IP Address (Figure 3). **Note:** The SSID and Mode of Operation will be adjusted later in the configuration.



Figure 2- ESTeem Utility Download

Double-click on the 195Eg you wish to program and the *Configure IP Address* window will be displayed (Figure 4). Enter an IP address and Subnet Mask for the 195Eg that matches your network subnet and press the OK button to save this to the ESTeem. You will receive notification that the Configuration was Successful and the 195Eg will reboot. Proceed to ESTeem Setup to continue configuration.



Figure 3 – Discovery Program Main Page

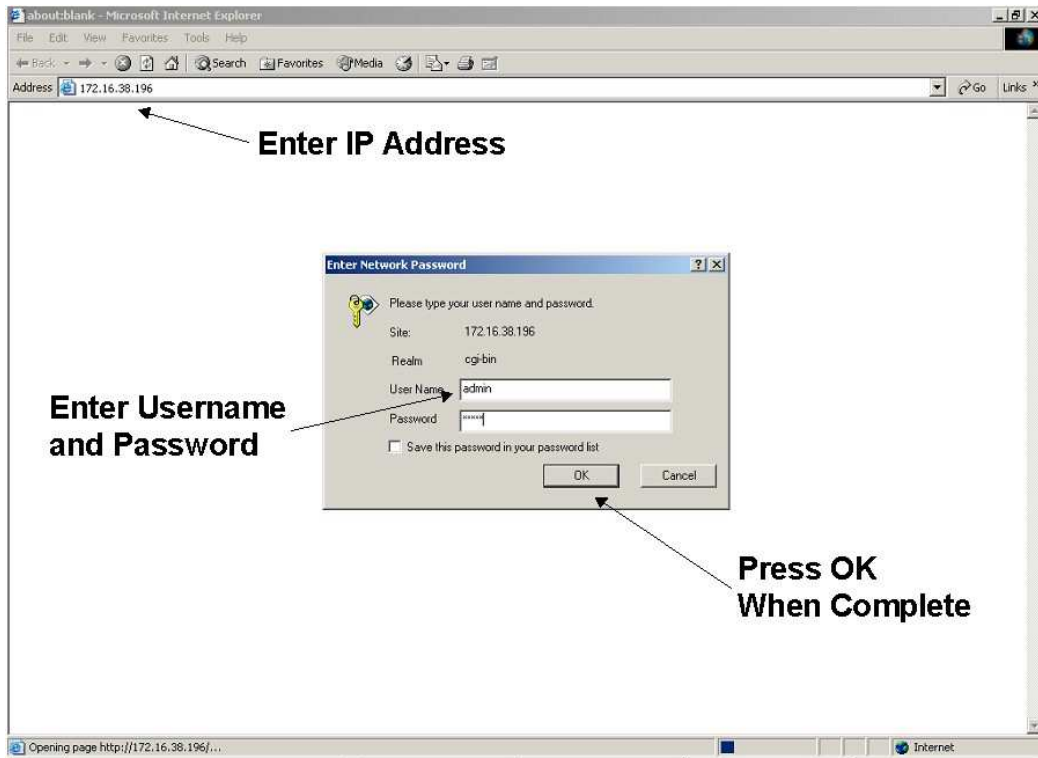
Setup Programming

You should now be ready to configure the Model 195Eg through your web browser. Open the web browser program and enter the IP address of the ESTeem in the address line and press enter.



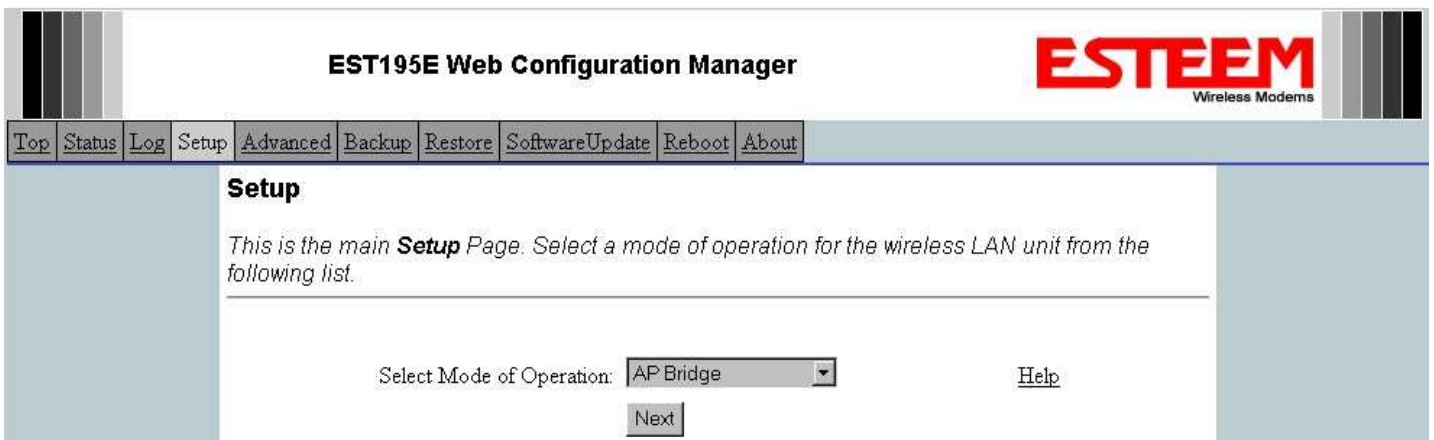
Figure 4 – Change IP Address Window

1. When prompted, enter **admin** for both the username and password and press the **OK** button.
2. Select **Setup** on the top menu.



Step 1 – Sign-In Screen

3. Press the drop-down menu and select **AP Bridge** and press the **Next** button.



Step 3 – Select AP Bridge

4. Set the DHCP services to OFF and press the *Next* button.

The screenshot shows the 'Setup' page of the EST195E Web Configuration Manager. The page title is 'EST195E Web Configuration Manager' and the ESTEEM logo is in the top right. A navigation bar at the top contains links: Top, Status, Log, Setup, Advanced, Backup, Restore, SoftwareUpdate, Reboot, About. The main content area is titled 'Setup' and contains the following text: 'Select whether you wish to use DHCP client services or whether you wish configure a DHCP server. Selecting "None" will take you through a manual setup of IP addresses as opposed to using DHCP services.' Below this text, it says 'Selected mode of operation: AP Bridge'. Underneath, 'DHCP services on the bridge interface:' is followed by three radio button options: 'None' (which is selected), 'Client', and 'Server'. There is a 'Help' link to the right of these options. At the bottom of the configuration area are 'Previous' and 'Next' buttons.

Step 4 – Turn DHCP Off

5. Verify the IP address and netmask for the 195Eg (listed as **bridge** device) are correct press the *Next* button.

The screenshot shows the 'Setup' page of the EST195E Web Configuration Manager. The page title is 'EST195E Web Configuration Manager' and the ESTEEM logo is in the top right. A navigation bar at the top contains links: Top, Status, Log, Setup, Advanced, Backup, Restore, SoftwareUpdate, Reboot, About. The main content area is titled 'Setup' and contains the following text: 'Enter values for the following fields to set up the default route and DNS settings'. Below this text, it says 'Mode of operation: AP Bridge'. Underneath, 'Enter default route IP address:' is followed by a text input field containing '172.16.2.1' and a 'Help' link. Below that, 'Use DNS client services?' is followed by two radio button options: 'Yes' and 'No' (which is selected), with a 'Help' link to the right. Below that, 'Enter DNS domain:' is followed by a text input field and a 'Help' link. Below that, 'Enter primary DNS server IP address:' is followed by a text input field and a 'Help' link. Below that, 'Enter secondary DNS server IP address:' is followed by a text input field and a 'Help' link. At the bottom of the configuration area are 'Previous' and 'Next' buttons.

Step 5 – Verify IP Address

6. Enter in the Gateway address in the default route IP address block and any DNS information for the server. If this is not know or on a network without a Gateway, leave these items at factory default.

EST195E Web Configuration Manager

Wireless Modems

Top Status Log Setup **Advanced** Backup Restore SoftwareUpdate Reboot About

Setup

Enter values for the following fields to set up the default route and DNS settings.

Mode of operation: AP Bridge

Enter default route IP address: [Help](#)

Use DNS client services? Yes No [Help](#)

Enter DNS domain: [Help](#)

Enter primary DNS server IP address: [Help](#)

Enter secondary DNS server IP address: [Help](#)

Step 6 – Enter Gateway Address

7. All 195Eg modems in the network must be have the exact same Service Set Identification (SSID). The default SSID is **ESTeem** and we will use this for demonstration. Enter the SSID as listed above and turn off the wireless security features by selecting the NO radial. Press the *Next* button to continue.

Note: It is recommended that security be used in all wireless applications. This procedure will forgo the security configuration for brevity. Please see the example applications and the security appendix for further information.

EST195E Web Configuration Manager

Wireless Modems

Top Status Log Setup **Advanced** Backup Restore SoftwareUpdate Reboot About

Setup

In the following fields, select whether you want wireless security features turned on and enter the service set identifier (SSID) that will be common to all wireless LAN devices.

Selected mode of operation: AP Bridge

Turn on wireless security features? Yes No [Help](#)

Enter the SSID: [Help](#)

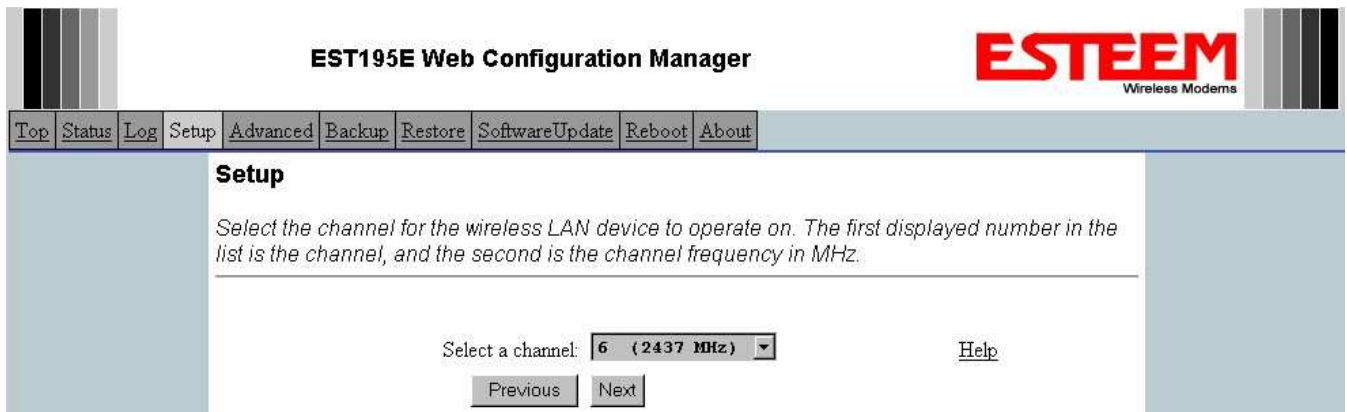
Step 7 – Enter SSID

8. A warning that wireless security is not enabled will be displayed. Press the *Next* button to continue.

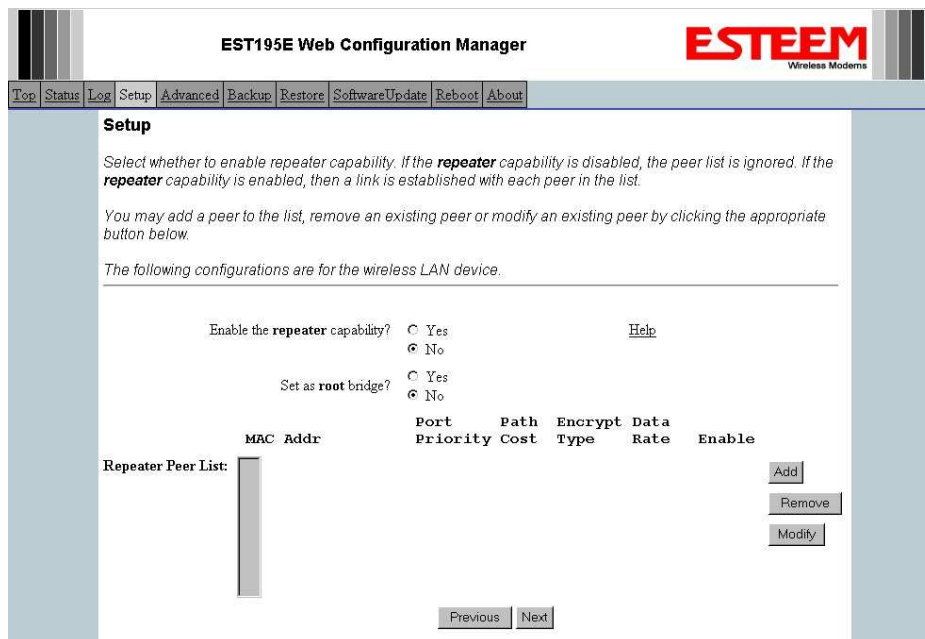


Step 8 – Security Warning Screen

9. All Model 195Egs on the network must be on the same radio channel, representing a particular frequency. If a particular channel has not been assigned for use, leave the 195Eg at a default value of 6 and press the *Next* button.





Step 10 – Set Radio Channel



10. Configure the repeater peer list by selecting Enable the repeater capability radial to YES (Above). Press the *Add* button to the right of the repeater peer table and, using the chart created in the **Begin Programming** section of this guide, enter the Wireless MAC (WLAN MAC) address of the opposite 195Eg (the 195Eg this unit you are programming will communicate with) in the Peer 1 – MAC Addr field (right). Leave the Priority and Cost settings at the default values and change the Enable Link radial to Enable and press the *Create Repeater Peer* button. Press the *Next* button.

Example Addresses				
Name	Serial Number	IP Address	Ethernet MAC	WLAN MAC
195Eg We Are Programming	E-14096	172.16.48.189	00:04:3f:00:01:01	00:04:3f:00:01:02
Opposite 195Eg We Will Create Wireless Link	E-14034	172.16.38.114	00:04:3F:00:0B:00	00:04:3F:00:11:02

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Setup - Add a Repeater Peer

To add a new repeater peer for the first wireless LAN interface, enter the MAC address, the port priority, the port cost, the key type, the key and the rate set and click the "Create Repeater Peer" button.

Enter the MAC address:

Enter the port path cost:

Select the encryption type:

None

WEP 64-bit

WEP 128-bit

TKIP

Enter the encryption key:

Select link data rate:

Dynamic ▲
 1 Mbps
 2 Mbps
 5.5 Mbps
 6 Mbps
 9 Mbps ▼

Enable link: Enable
 Disable

Enter the 48-bit MAC address of the repeater peer.

Enter the bridge port path cost for this link. (1-65535)

Select the repeater link encryption method. Note: the encryption method and key setting must be the same on both repeater peers.

Enter the encryption key as a sequence of hexadecimal bytes (e.g. 0a:0b:1c:2d:3e). Key length: None=0 bytes, WEP64=5 bytes, WEP128=13bytes, TKIP=32 bytes.

Allow dynamic rate selection or select a specific data rate for this link to use. It is recommended, but not required, that the rate selections be the same on both peers.

Enable or disable the repeater peer link. Enable must be selected for the repeaters to communicate.

Return to Repeater Setup
Create Repeater Peer

Step 10 – Configure Peer Table

11. Press the *Commit Changes* button and the modem will save all the changes made and reboot. The reboot time is approximately 1 minute to be ready for operation.
12. Complete all steps in this **Setup Programming** section for the other Model 195Eg's you will be testing before moving on the Testing Communication section.

Testing Communication Link

After you have configured at least two of the Model 195Eg wireless Ethernet modems for operation, you can verify communication with each the following steps:

Status Light – The quickest source of link status is to view the Status Light on the face of the 195Eg. If the Status light is solid, the Model 195Eg has a connection to another Model 195Eg listed in the Peer Table.

Status Screen/Peer Table – To view further information on the status of the communication link (such as connection speed, signal strength and last update time) you can open the Status Screen from the Web Interface. After press the Status tab at the top of the screen the Status: Summary will be displayed showing the status of all ports and memory in the 195Eg. Under the Wireless Status heading click on the [View Peer Table](#) (Figure 5). The Peer Table will list all other 802.11b or 802.11g wireless activity seen by the 195Eg and how it is classified.



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Status: Peer Table

This page is a summary view of the peer table for WLAN device wlan0. Click on a given MAC address for more details about that peer.

Return to Status Summary Page **Opposite Modem's Wireless MAC**

Associated Stations		Receive Signal Strength (dBm)	
None			

Repeater Peers **Last Packet Received**

MAC Addr	Signal	LastRx (sec@kbps)	Modem ID
00:04:3f:00:09:66	-36	0@11000	Remote ← Peer Modem ID

Access Points **Other Access Points**

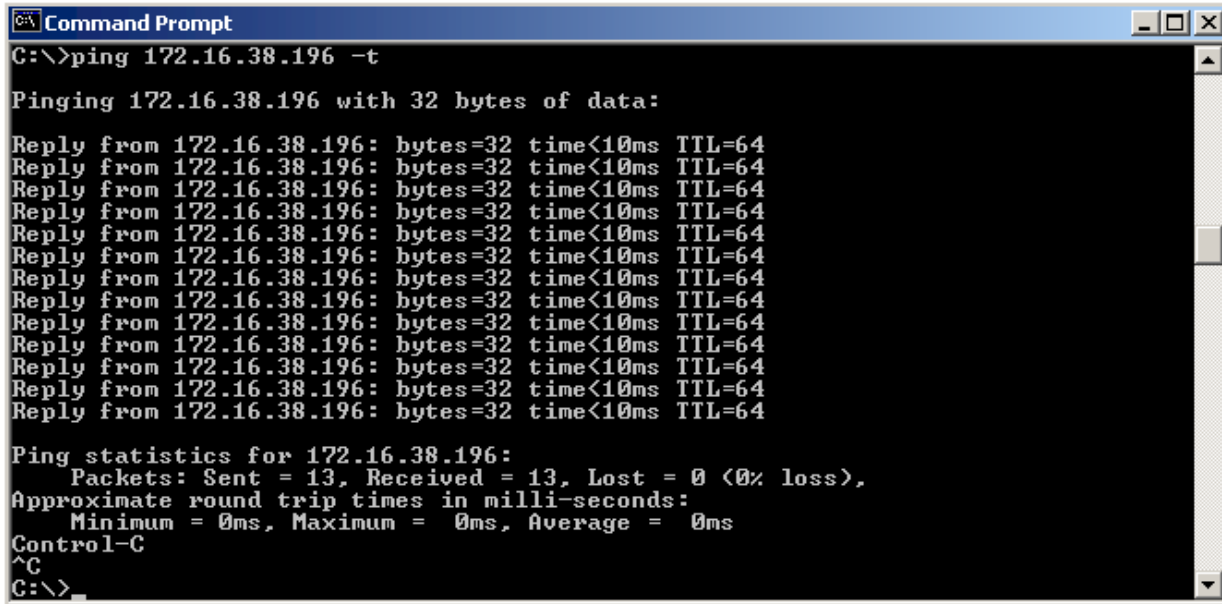
MAC Addr	Signal	LastRx (sec@kbps)	Enc	SSID
00:02:2d:03:2a:78	-70	0@2000	y	
00:02:2d:3f:7d:d3	-89	8@2000	y	
00:04:3f:00:09:66	-36	0@11000	y	ESTeem

Figure 5 – Repeater Peer Table

Find the opposite 195Eg in the Repeater Peers list and information such as signal strength (in dBm) and time/speed of last data packet will be displayed.

Note: The data rate displayed is not necessarily indicative of the RF data rate between the ESTeems. The rate show in the Repeater Peer table will be the last RF packet, which could consist of either data, repeater beacon or network probes. For a detailed analysis on the data rate, please consult the ESTeem User's manual.

Ping Testing – The easiest method for testing the efficiency of data flow between the ESTeems is to conduct a Ping test to the opposite modem’s IP address. This will test all links in the Ethernet bridge.



```
Command Prompt
C:\>ping 172.16.38.196 -t

Pinging 172.16.38.196 with 32 bytes of data:

Reply from 172.16.38.196: bytes=32 time<10ms TTL=64
Reply from 172.16.38.196: bytes=32 time<10ms TTL=64
Reply from 172.16.38.196: bytes=32 time<10ms TTL=64
Reply from 172.16.38.196: bytes=32 time<10ms TTL=64
Reply from 172.16.38.196: bytes=32 time<10ms TTL=64
Reply from 172.16.38.196: bytes=32 time<10ms TTL=64
Reply from 172.16.38.196: bytes=32 time<10ms TTL=64
Reply from 172.16.38.196: bytes=32 time<10ms TTL=64
Reply from 172.16.38.196: bytes=32 time<10ms TTL=64
Reply from 172.16.38.196: bytes=32 time<10ms TTL=64
Reply from 172.16.38.196: bytes=32 time<10ms TTL=64
Reply from 172.16.38.196: bytes=32 time<10ms TTL=64
Reply from 172.16.38.196: bytes=32 time<10ms TTL=64

Ping statistics for 172.16.38.196:
    Packets: Sent = 13, Received = 13, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
Control-C
^C
C:\>
```

Technical Support

User’s Manual and Technical Documentation

<http://www.esteem.com>

E-Mail Support

Support@esteem.com

Phone Support (8AM to 5PM PST Monday-Friday)

509-735-9092