

ESTEEM

Wireless Modems

ESTeem MODEL 195Ed USER'S MANUAL

Manual Revision 1.0
June 2008



Electronic Systems Technology, Inc.

ESTeem MODEL 195Ed USER'S MANUAL

Manual Revision 1.0

Firmware Version 302.8.102 and above

June 2008

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BEFORE YOU BEGIN

Thank you and congratulations on your purchase of the ESTEem Model 195Ed Wireless Ethernet Radio Modem! This manual was written to help both the first time and advanced user of the 195Ed configure the radio modem for your application. If this your first time configuring the 195Ed and you would like to get going as soon as possible, we recommend using the *195Ed Quick Start Guide* provided with the modem. A copy of the guide is listed in the appendix of this manual for your reference.



The ESTEem 195Ed is a very versatile wireless Ethernet networking device. To keep the manual usably short, many of the application descriptions and programming details assume the user has a good working knowledge of the following network concepts:

- General Ethernet networking and the configuration of LAN topologies
- Common Ethernet terminology and acronyms
- TCP/IP network protocol structure and how to configure TCP/IP networks and subnets
- How to identify and set the TCP/IP address on your computer
- Have administrator privileges to the computer and network you are configuring
- If using routing protocols, you must be able to identify and configure the network routers, gateways and firewalls
- You must be familiar with using web browser software such as Internet Explorer, Netscape or Mozilla

If you are unfamiliar with any of the above networking concepts, you may need to contact your network administrator for assistance.

MODEL 195Ed OVERVIEW

The ESTEem Model 195Ed is a wireless LAN transceiver that can be used to build a Wireless Local Area Network (WLAN) for line-of-sight distances to 13 miles for fixed base and 5 miles for mobile applications. The 195Ed can provide RF data rates up to 54 Mbps and can have a serial port for legacy RS-232 devices. The Model 195Ed is a very sophisticated networking device that can be configured for multiple modes of operation depending upon the needs of the wireless and wired LAN system. The following configuration modes are provided as an overview of the basic network types, as all possible network configurations can not be listed. For further help in selecting the correct network type, please contact Customer Support at 509-735-9092.

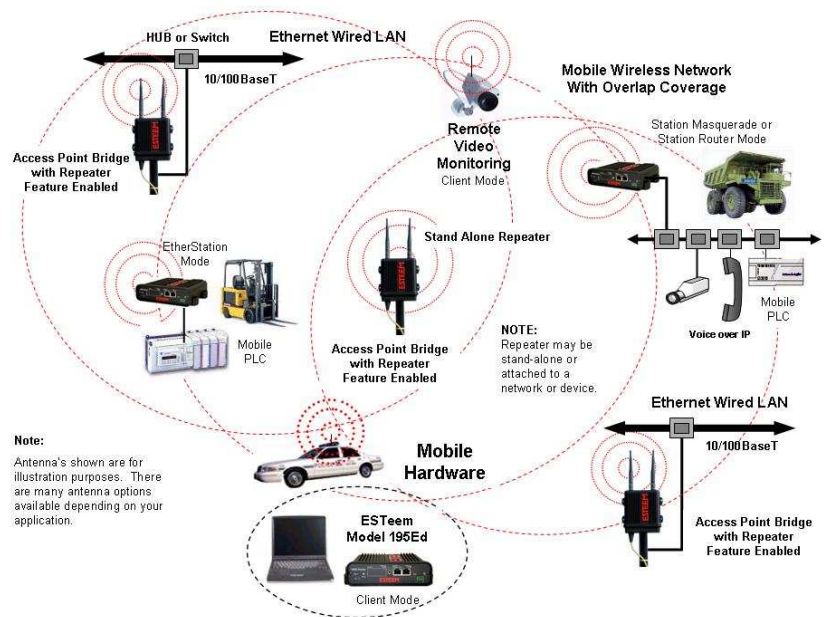


Figure 1- Access Point Bridge Diagram

MODEL 195Ed CONFIGURATION MODES

The Model 195Ed can be configured for multiple modes of operation without any changes to the hardware:

Access Point Modes

1. **Access Point Bridge Mode.** When the Model 195Ed is configured as an Access Point it will provide a wireless bridge from a hardwired Local Area Network (LAN) to other Model 195Ed modems in client modes. Multiple Access Point Bridge modems can be physically connected to the same network (LAN) or through a radio link using the Access Point Repeater mode to provide overlapping, seamless Ethernet communication for mobile devices. The ESTeem Model 195Ed in Access Point Bridge mode will pass all network traffic between connected devices including global network broadcasts. See Figure 1.

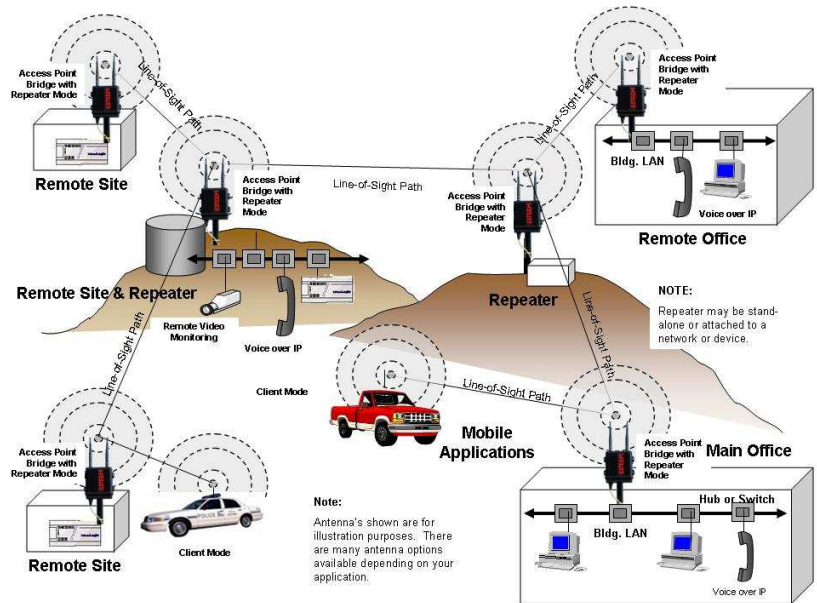


Figure 2 – Repeater Mode Diagram

2. **Access Point Router Mode.** In this mode the ESTeem Model 195Ed will function as a router between the wired Ethernet network, connect to the 195Ed's Ethernet port, and the wireless network of other 195Ed's in repeater peer mode. As in all standard router configurations, the wireless and wired Ethernet networks will need to be on separate subnets. To communicate from the wired Ethernet network to devices on the wireless network, a separate router (or the Model 195Ed configured as a router) is required. The 195Ed in Access Point Router mode will pass network traffic for connected devices but will block global network broadcasts from the wired network. This mode of operation should be used instead of the Access Point Bridge mode when a separation between networks is required or the ESTeem is connected to larger LAN Networks that will continuously send global network broadcasts (Figure 2).

3. **Access Point Masquerade Mode.** The Access Point Masquerade mode is a special use of the Access Point mode where the Model 195Ed will connect multiple clients into a single static IP address on a wired network. Data requests from the wireless network will be processed through the Access Point Masquerade 195Ed, but any request from the wired Ethernet network to devices on the wireless network will be rejected similar to the operation of a "firewall". The 195Ed will hide all the IP addresses connected on the wireless link. You should use this mode of operation if Model 195Ed is connected directly to the Internet with a static IP address

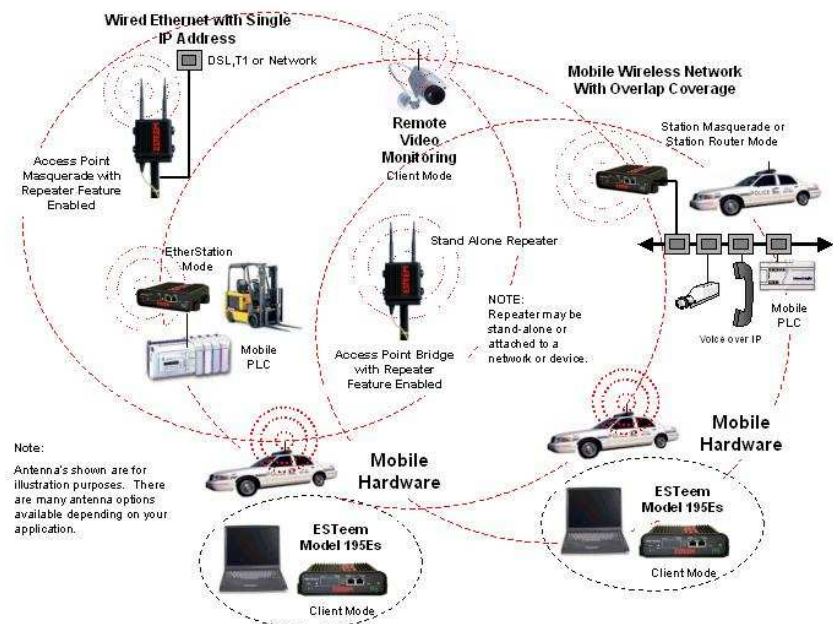


Figure 3- Access Point Masquerade Diagram

(DSL, T1, etc.) and you want the wireless clients to access the information through the Model 195Ed (Figure 3). This mode should also be used for attaching the Model 195Ed to a network where few IP addresses are available or a firewall for the wireless clients is required.

4. **Access Point Repeater.** The Access Point Repeater can be used with any of the above Access Point modes. With this repeater feature enabled, the Model 195Ed Access Points do not have to be hardwired together on the same physical LAN to provide seamless Ethernet communication for roaming clients. In addition to greatly extending the Access Point canopy range, the Model 195Ed will also bridge any Ethernet device or Ethernet network connected to the unit over this same wireless Ethernet network. This mode gives the user the features of a point to multi-point bridge network but also allows Model 195Ed in the Client mode to simultaneously roam under the network canopy.
5. **Self-Healing Mesh Network.** If multiple Access Point Repeater routes are configured to the same destination ESTeem, the 195Ed will create a “self-healing” mesh network by automatically re-routing data through alternate paths to reach its destination if the primary path is inoperable. The routing and priority of alternate paths is completely user configurable. See Figure 4.

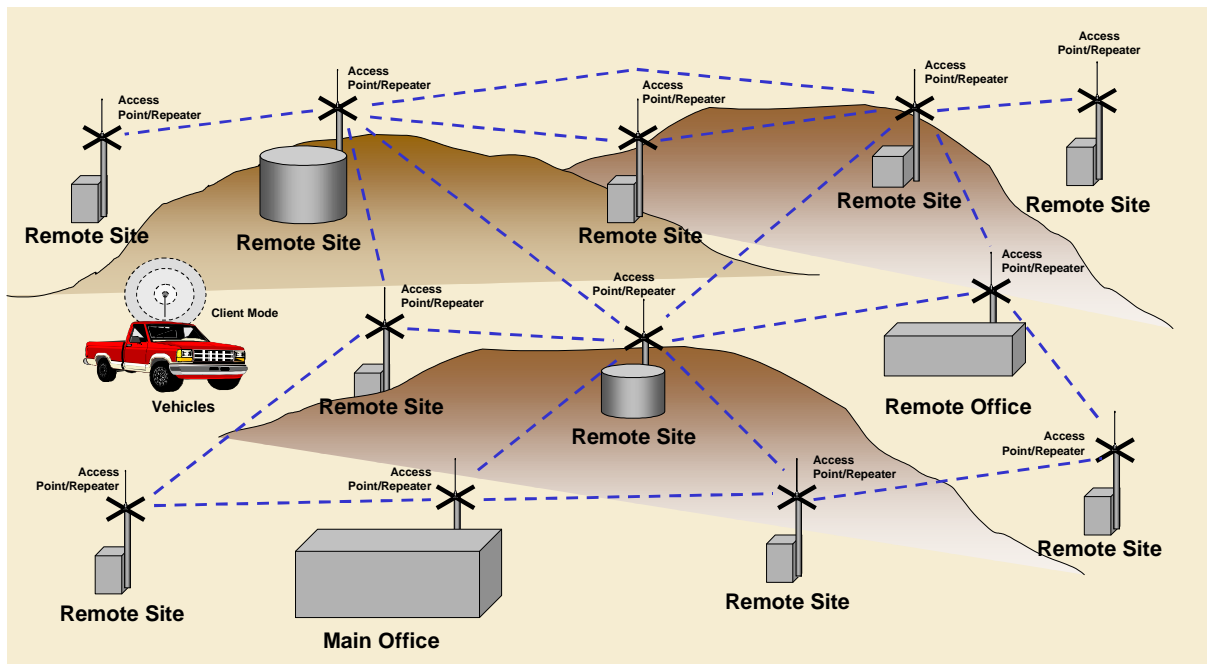


Figure 4 – Mesh Network Diagram

Station (Client) Modes

6. **EtherStation Mode.** When the 195Ed is configured in the EtherStation Mode and attached to a single Ethernet Device, the Model 195Ed will emulate a wireless card in functionality for communication as a mobile client. The 195Ed will seamlessly roam under the radio canopy of Access Point and can provide greatly increased range for mobile Ethernet devices such as vehicles, forklifts, cranes, etc (Figures 1-3).
7. **Station Router Mode.** The Station Router mode will also function as a client, similar to EtherStation, but will allow multiple Ethernet devices to be connected to a single 195Ed (Figure 3). The 195Ed will function as a router between the wireless client mode and the wired Ethernet devices connected to the Ethernet port. Similar in configuration to the Access Point Router mode, the wireless and wired Ethernet networks will need to be on separate subnets. To communicate from wireless network to devices on the wired Station Router network, a separate router (connected to the Ethernet side of the Access Point) is

required. This mode would be used where multiple Ethernet devices will be connected to a single Model 195Ed in a mobile client application and the connected Ethernet devices will need to be accessible from the Access Point's LAN network.

8. **Station Masquerade Mode.** The Station Masquerade Mode is another mode where multiple devices will be connected to a single ESTEem in a mobile or Client application, but unlike the Station Router mode, the Station Masquerade will consolidate all connected Ethernet devices to a single IP address on the network. The devices connected to the Station Masquerade 195Ed will be able to access information from both the wireless and wired LAN, but will be inaccessible the other way similar in application to a firewall. This mode would be used where multiple Ethernet devices will be connected to a single Model 195Ed in a mobile application and the IP addresses for each device will be hidden from the LAN connected to the Access Point. See Figure 3.
9. **Serial Applications.** The ESTEem 195Ed can optionally be installed with an RS-232 data port for serial data applications run over the broadband link (Figure 5). The serial over broadband network can be used in a point-to-point or point-to-multi-point application for networking serial (RS-232c) devices, providing serial connections to legacy hardware in a new Ethernet network or providing for high-bandwidth devices (such as Video or Voice over IP) in an existing serial network. Installing the serial port option also provides a second 10/100 Base-T Ethernet port that can be used to connect a second Ethernet device without requiring a HUB/Switch or can be configured as an external Router port.

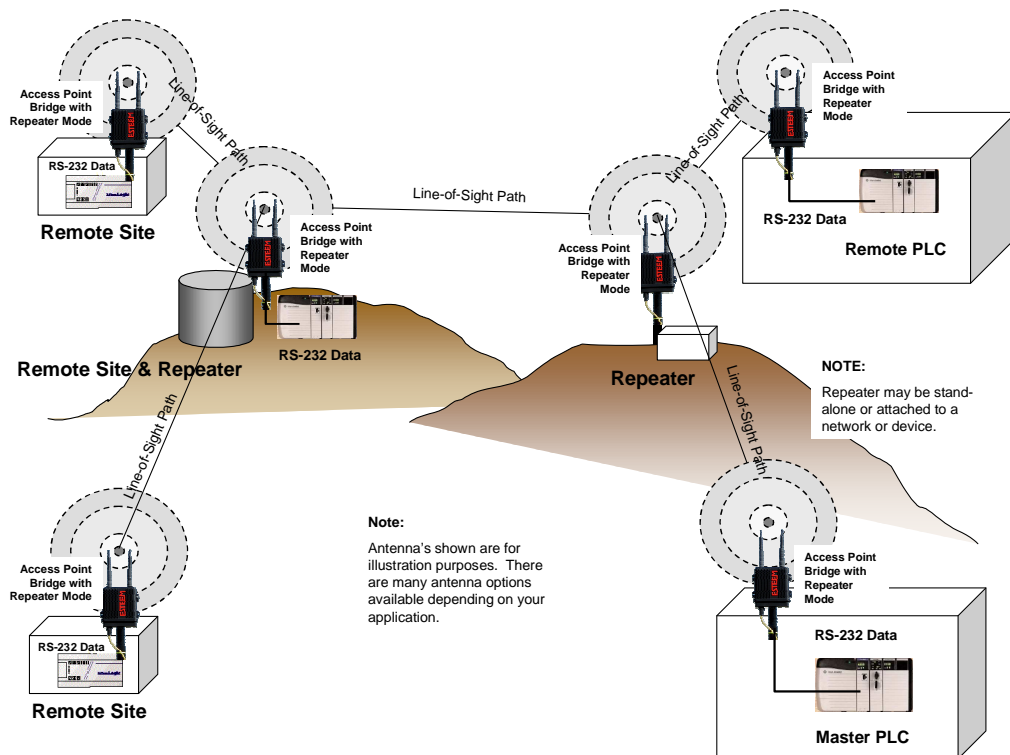


Figure 5 – Multi-point Serial Diagram

To begin setup of your wireless Ethernet network you must first configure the Model 195Ed for the mode desired. Chapter 2 will show several examples of the different modes of operation to help select the correct mode for your application.

MODEL 195Ed ACCESS POINT BRIDGE DIAGRAMS

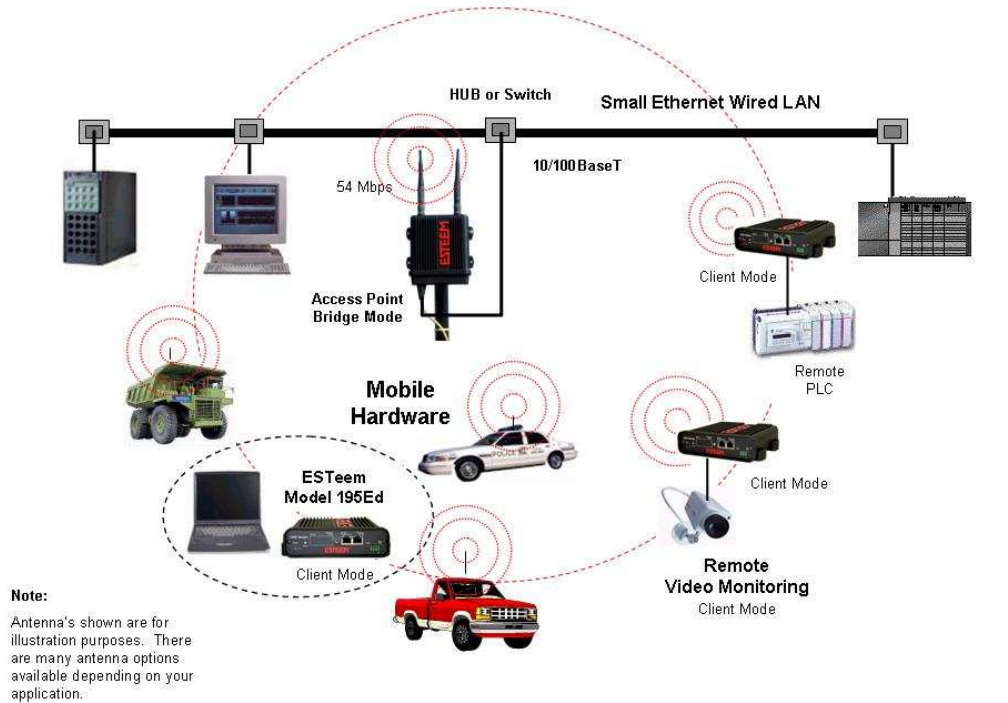


Figure 1: Single Access Point Bridge Diagram

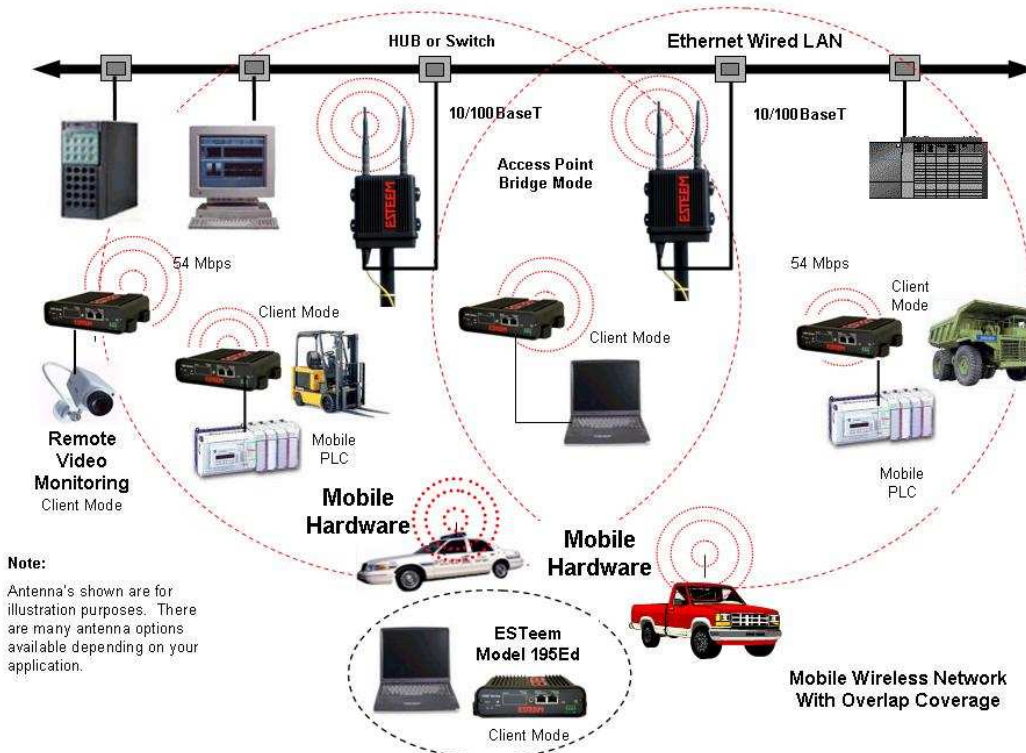


Figure 2: Multiple Access Point Bridge (Overlapping Coverage) Diagram

MODEL 195Ed ACCESS POINT ROUTER DIAGRAM

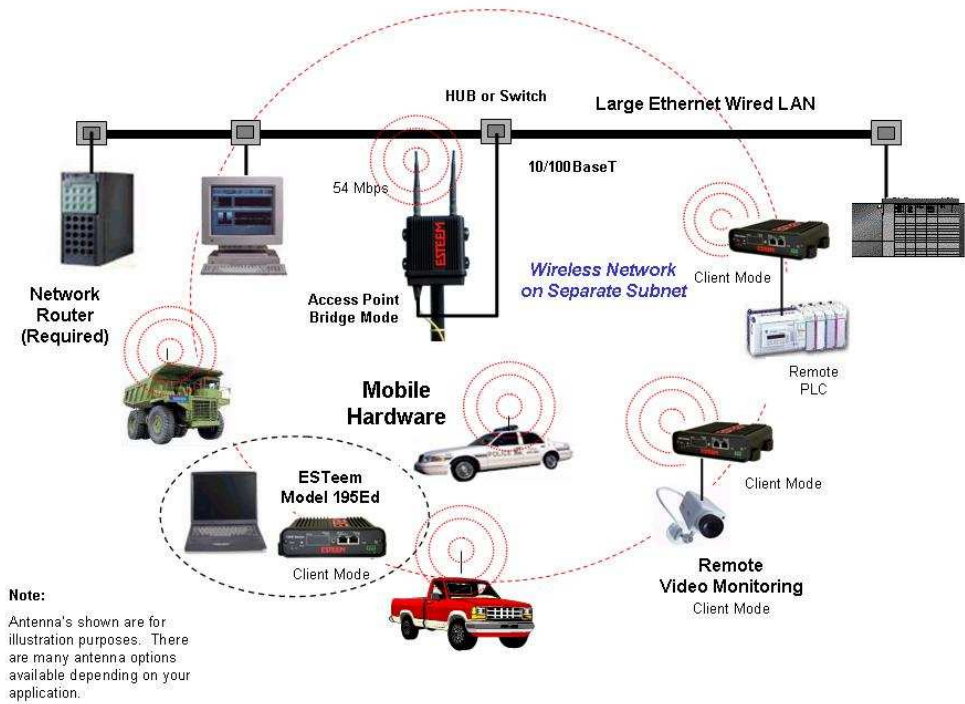


Figure 3: Access Point Router Diagram

MODEL 195Ed ACCESS POINT MASQUERADE DIAGRAM

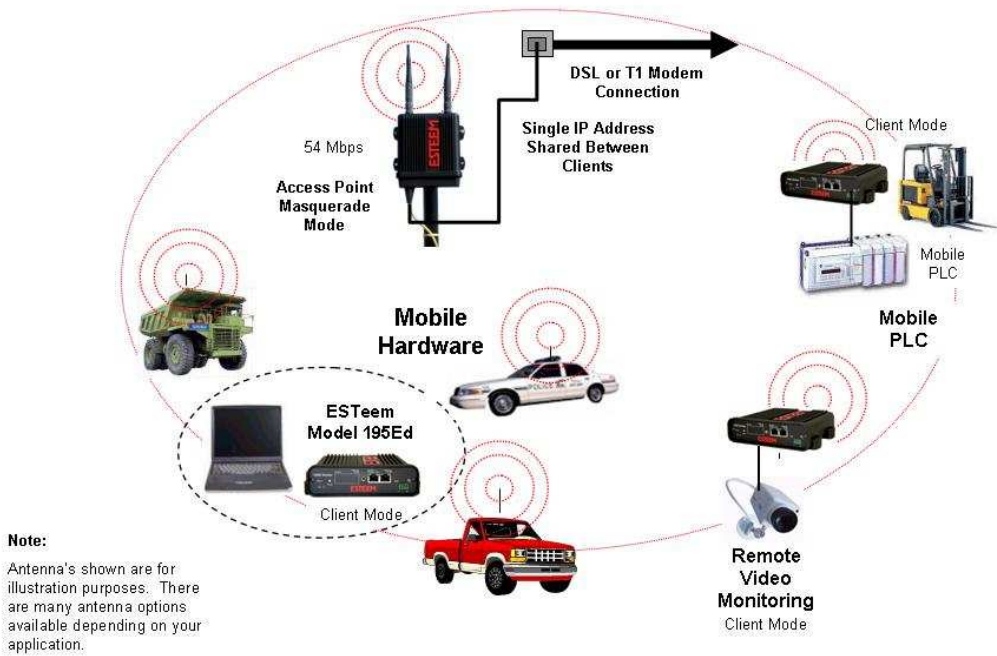


Figure 4: Access Point Masquerade Diagram

MODEL 195Ed ACCESS POINT REPEATER AND CLIENT CONFIGURATION DIAGRAMS

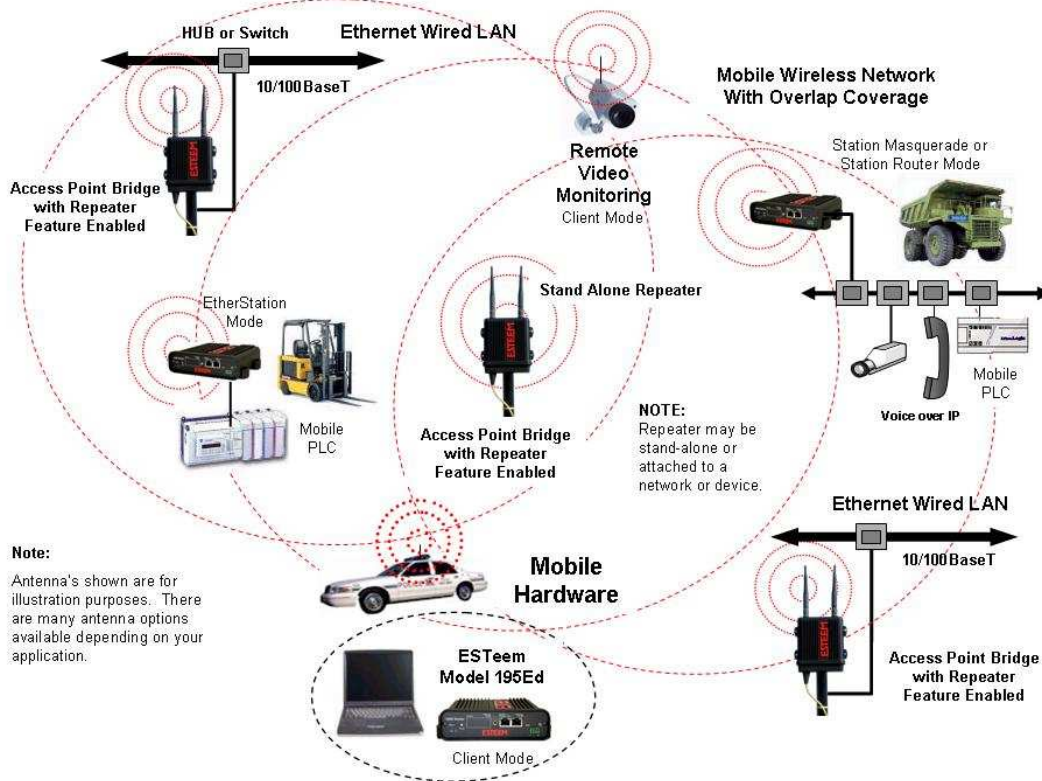


Figure 5: Access Point Bridge Repeater with Clients Diagram

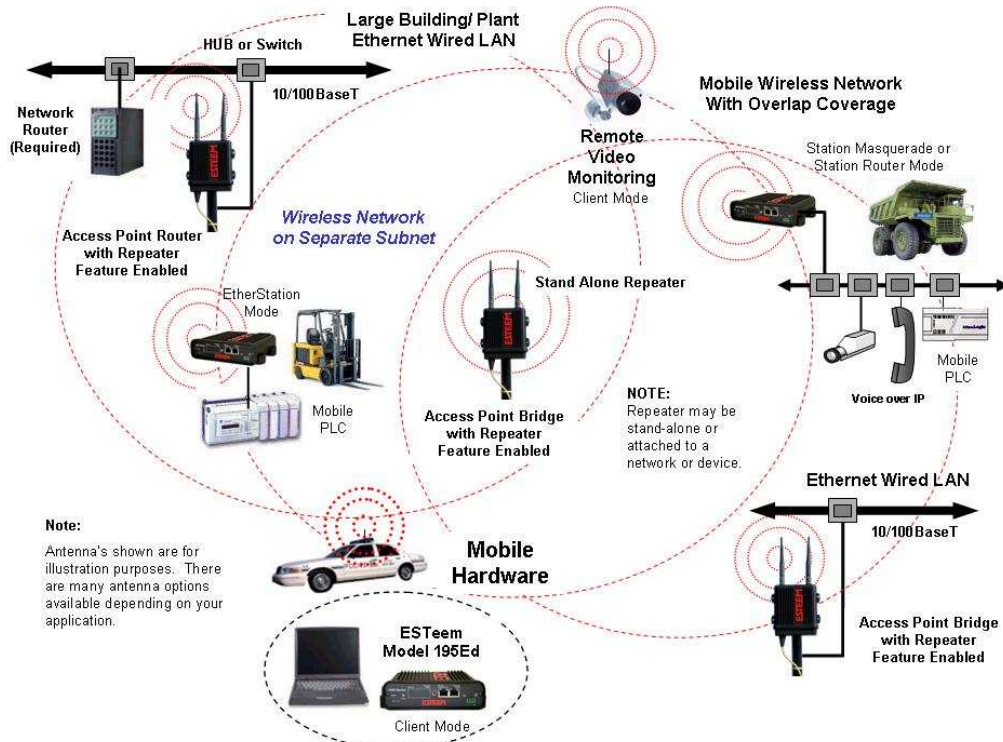


Figure 6: Access Point Router Repeater with Clients Diagram

MODEL 195Ed ACCESS POINT REPEATER AND CLIENT CONFIGURATION DIAGRAMS (Cont.)

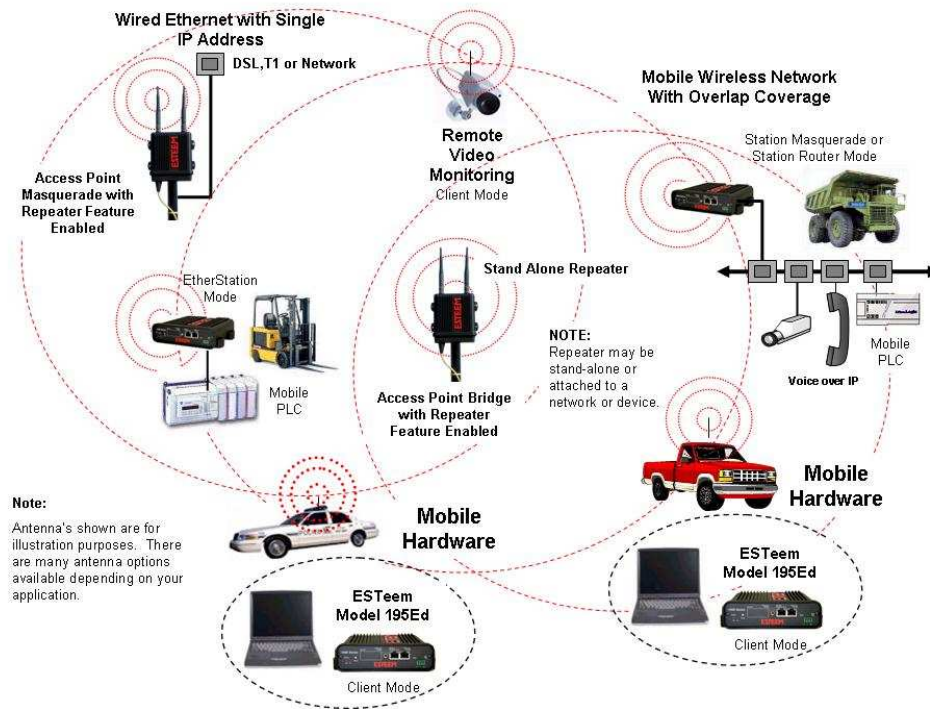


Figure 7: Access Point Masquerade Repeater with Clients Diagram

MODEL 195Ed BUILDING TO BUILDING CONFIGURATION DIAGRAMS

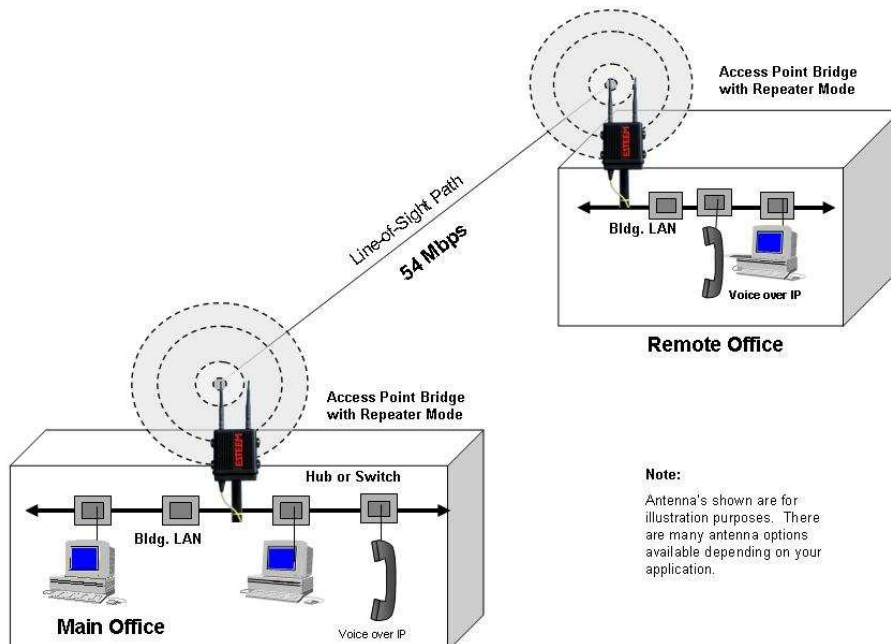


Figure 8: Building to Building Configuration Diagram

MODEL 195Ed BUILDING TO BUILDING CONFIGURATION DIAGRAMS (Cont.)

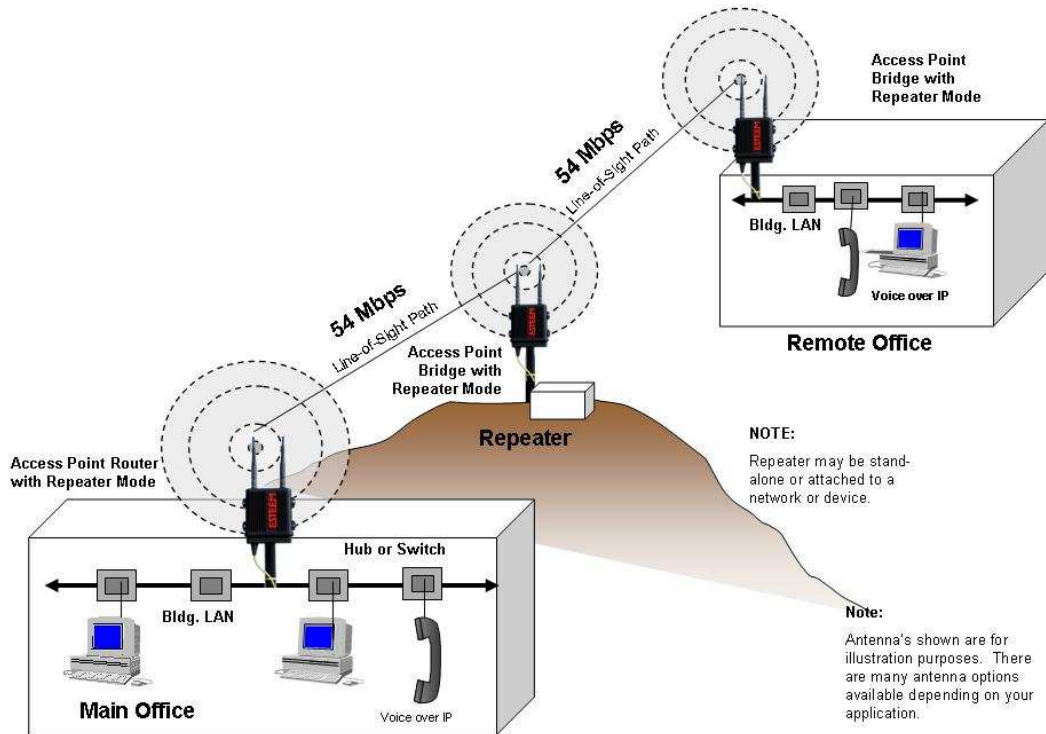


Figure 9: Building to Building with Repeater Diagram

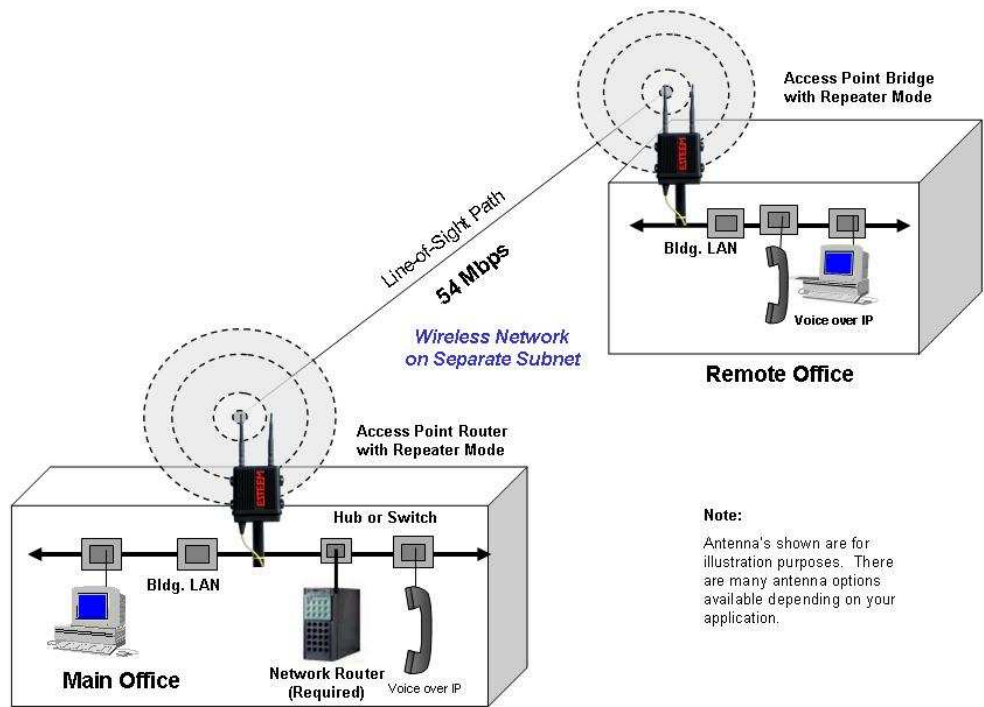


Figure 10: Building to Building Router Diagram

MODEL 195Ed COMPLETE BRIDGE SYSTEM CONFIGURATION DIAGRAMS

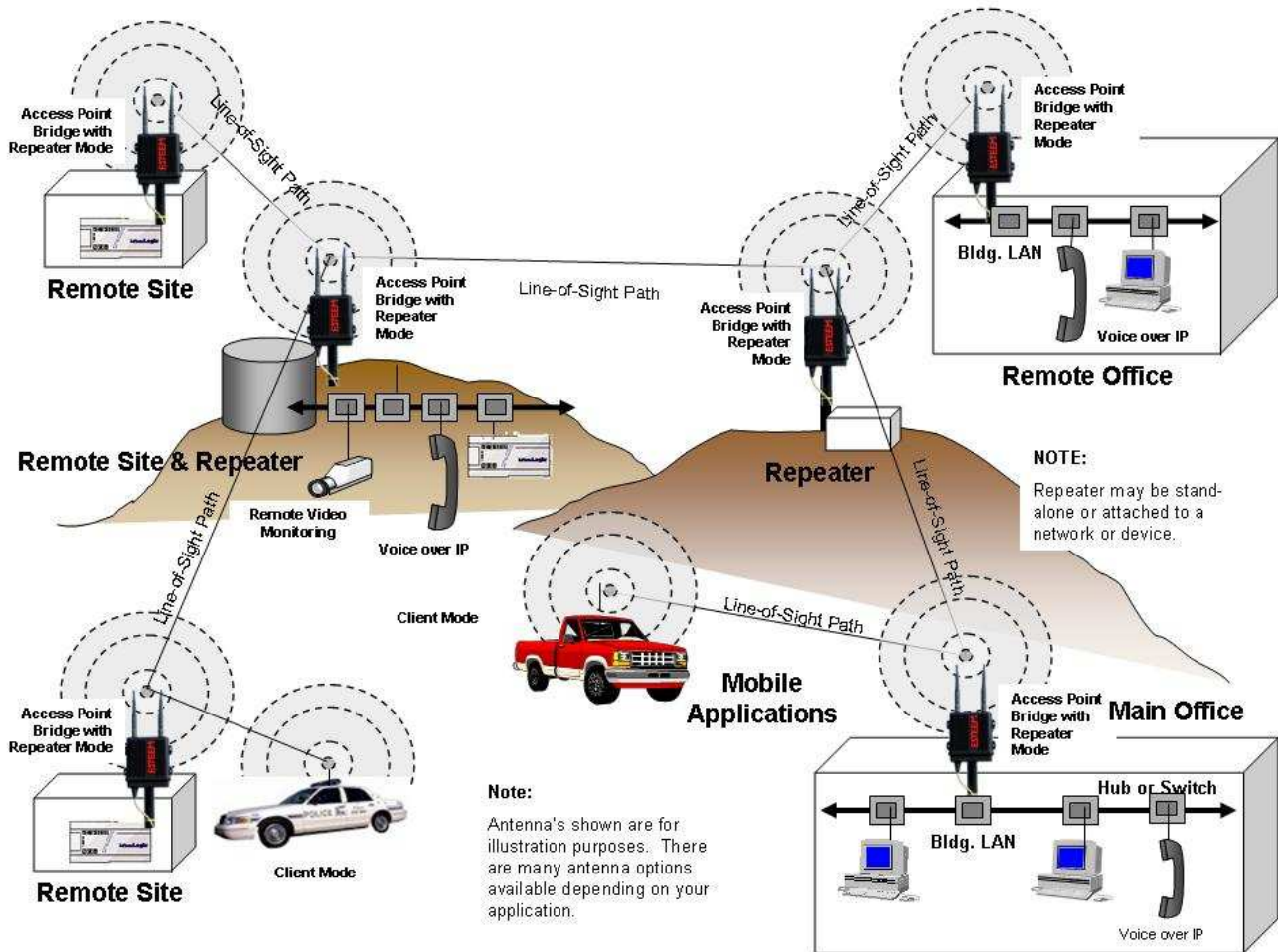


Figure 11: Complete Bridge Network Solutions Diagram

MODEL 195Ed COMPLETE ROUTER SYSTEM CONFIGURATION DIAGRAMS

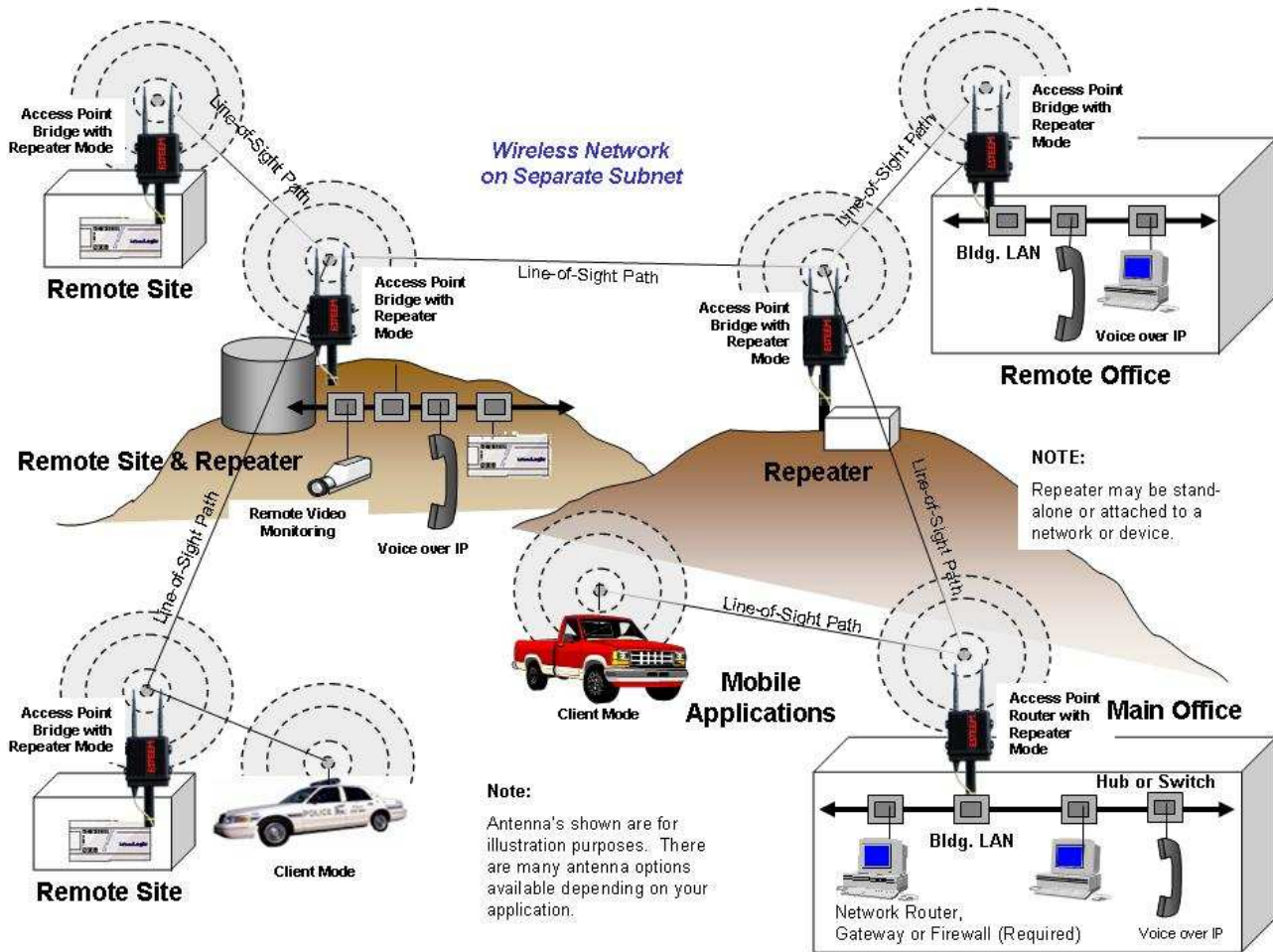


Figure 12: Complete Router Network Solutions Diagram

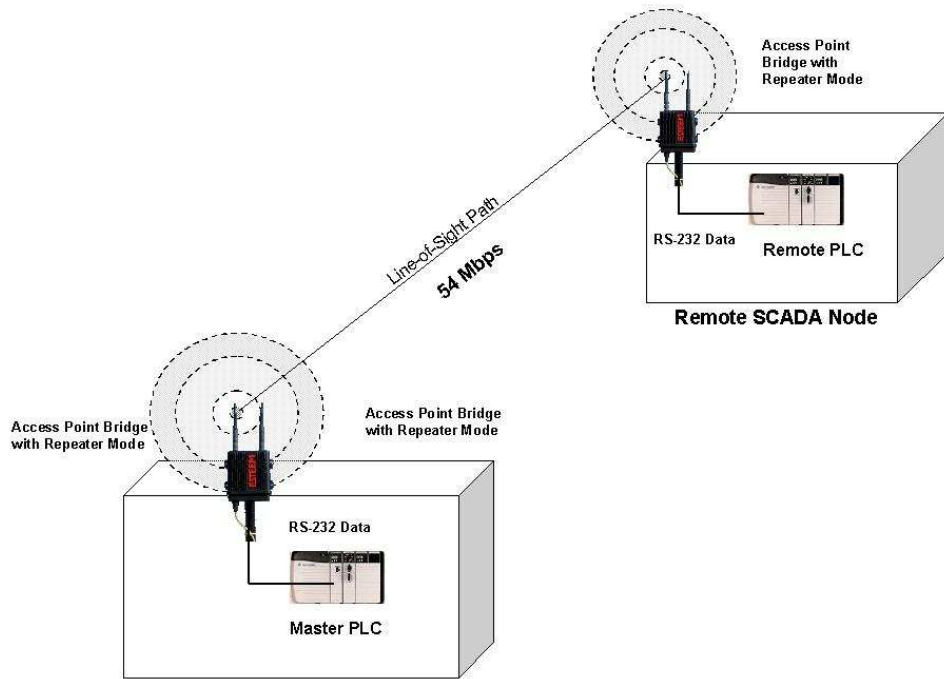


Figure 13: Point to Point Serial Diagram

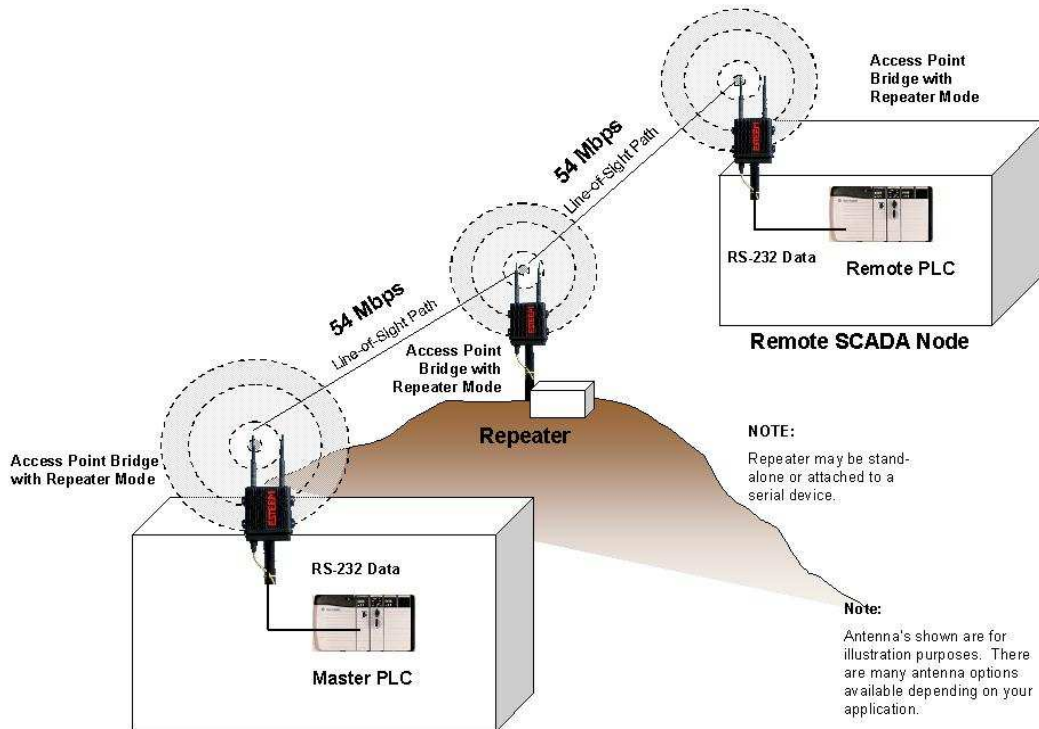


Figure 14: Point to Point With Repeater Serial Diagram

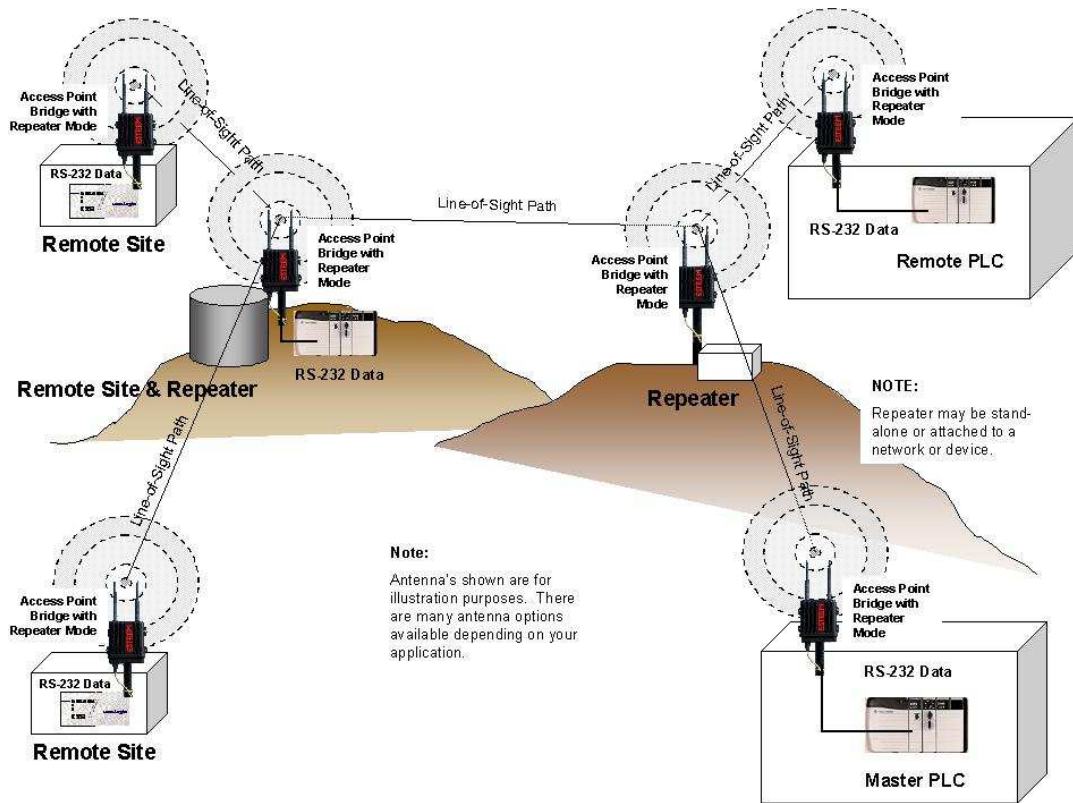


Figure 15: Multi-point Serial Diagram

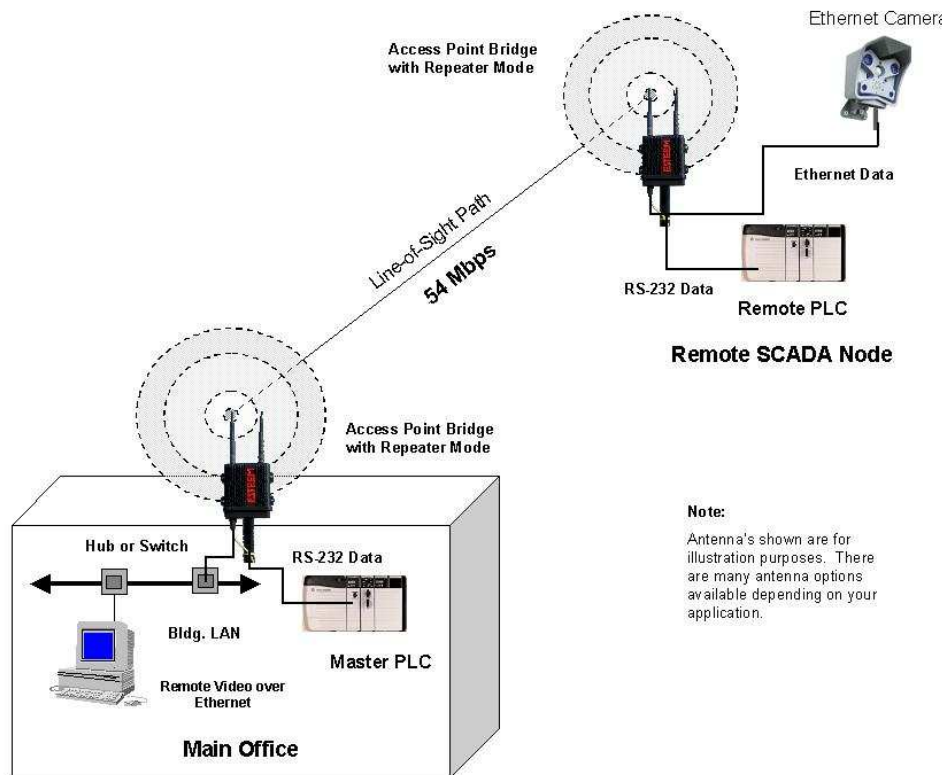


Figure 16: Ethernet and Serial Diagram

OVERVIEW

Most configuration of the ESTeem Model 195Ed is completed using the internal Web interface (discussed in detail in Chapter 4), but to access the modem through a web browser requires first setting the TCP/IP address. The TCP/IP address (IP address) is set at the factory for a static Class B (172.16.xxx.xxx - Mask 255.255.0.0) and listed on the ESTeem documentation. If this IP address does not match your network configuration, you will need to use either the ESTeem 195E Discovery program or the RS-232 interface to set the IP address in the 195Ed.

QUICK START GUIDE

A printed copy of the Model 195Ed Quick Start Guide was provided in the documentation package that arrived with your new ESTeem 195Ed. This guide is an abbreviated step-by-step procedure on configuration of the 195Ed for most Ethernet bridging and Access Point applications. A copy of the Quick Start Guide is provided in Appendix G of this User's Manual for convenience.

MODEL 195Ed HARDWARE LAYOUT

Unpack the ESTeem Model 195Ed shipping boxes and locate the items contained below for initial configuration. Take a few minutes to inventory your equipment before you proceed. Report any missing or damaged items to Customer Support (509-735-9092) as soon as possible.

Each node in your ESTeem Model 195Ed'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 195Ed



AA109 Resource Disk



**Antenna
(AA01S Displayed)**



(2) Ethernet Cables



**Power Supply
(AA175 Displayed)**



**Serial Interface Cable
(AA6021.1)**



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

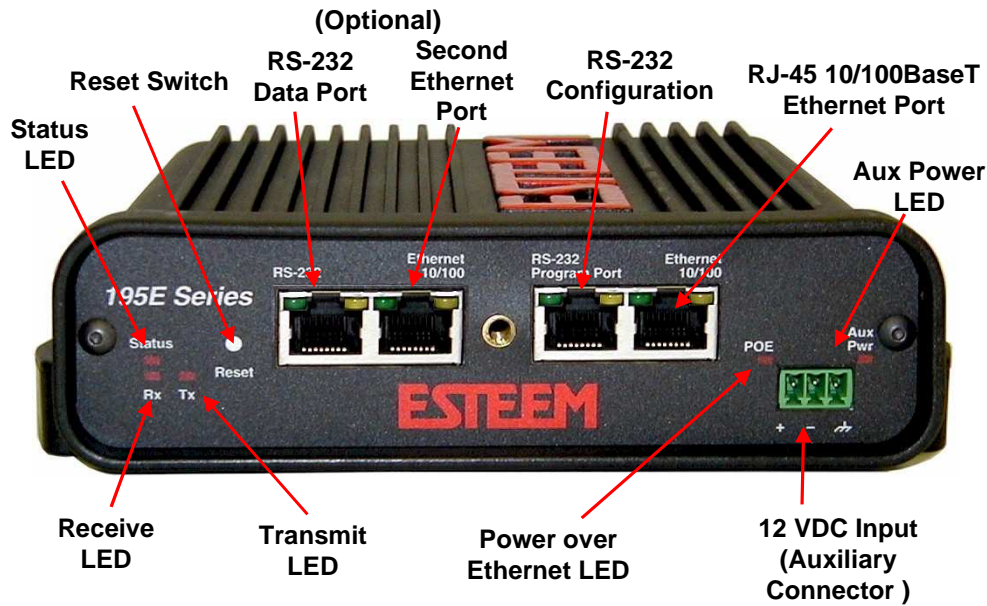


Figure 1: 195Ed Front Panel Overview

Notes:

- *There is no Power On/Off switch on the Model 195Ed.*
- *Attach the programming Cable to the RS-232 Programming Port and the Patch Cable between the Power Supply and Ethernet port.*
- *One word of caution, always attach an antenna to Port A (Figure 2) on the Model 195Ed before power up.*



Antenna Connectors
(TNC Female-RP)

Figure 2: 195Ed Antenna Overview

MODEL 195Ed HARDWARE CONFIGURATION

The following steps should be completed before any modifications are made to the IP address in the ESTeem Model 195Ed:

1. Connect the antenna to the antenna connector on the ESTeem Model 195Ed (Figure 3). For a single antenna use Antenna Port A and connect both if using dual antennas.

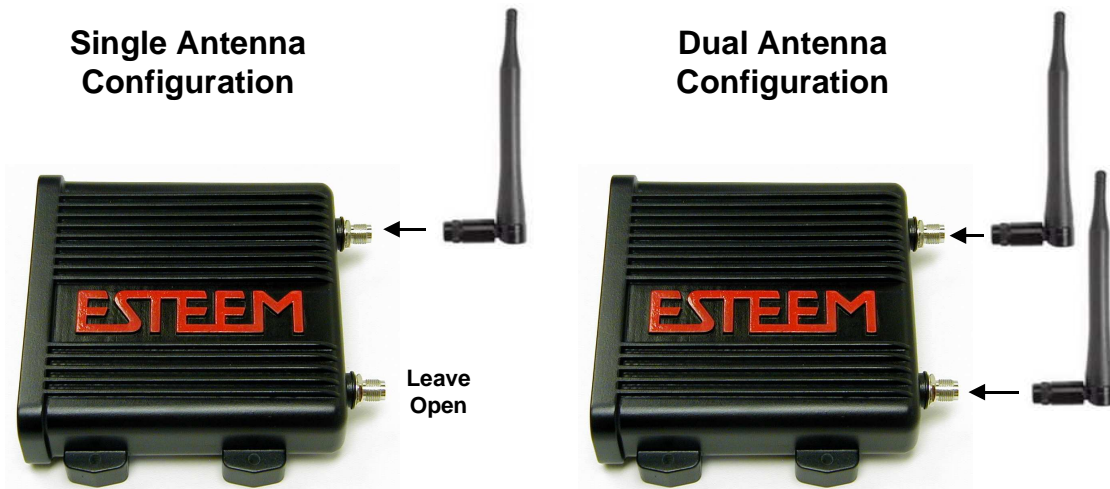
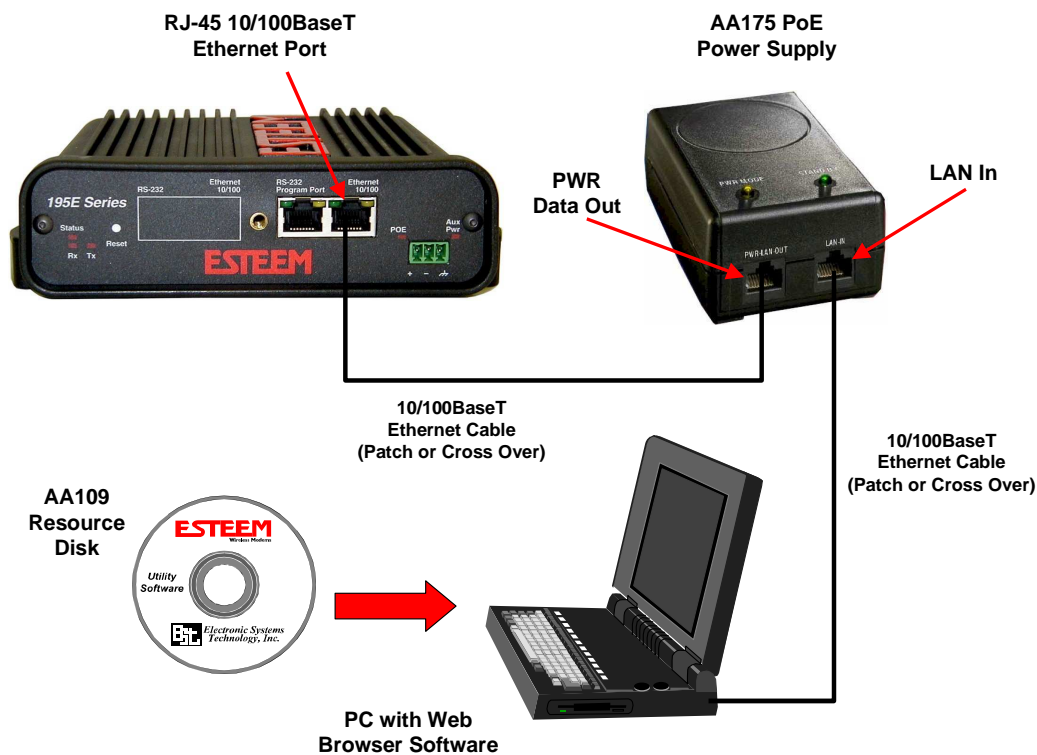


Figure 3: Antenna Configuration Diagram

2. Assemble the 195Ed hardware as shown in Figure 4.



Notes:

- Configure the Model 195Ed prior to mounting.
- Some of the following steps, such as connecting the serial cable, are easier to perform if the ESTeem is accessible.
- Please attach an antenna to the Model 195Ed before power up.
- There is no Power On/Off switch on the Model 195Ed.

Figure 4: Hardware Configuration Diagram

- 3. Complete the following System Configuration Table. The Model 195Ed will link to other Model 195Ed'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 when defining modes of operation and repeater routes.

Modem_ID(Name) /Operating Mode	Serial Number	IP Address	Ethernet MAC	WLAN MAC
Example Modem 1 AP_Bridge	E-14001	172.16.8.101	00:04:3f:00:01:01	00:04:3f:00:01:02

ESTEEM DISCOVERY UTILITY

The ESTeem Discovery Utility will allow you to configure the IP address on the Model 195Ed 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 5). 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 6).



Figure 5: ESTeem Resource Main Page



Figure 6: Discovery Utility Download

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