



ESTEEM

SECURE WIRELESS NETWORKING

ESTeem User's Manual

Edge 900

Manual Revision 3.1

January 2025

Author: _____ **Date:** _____
Name: Eric Marske
Title: Director of Operations

Approved by: _____ **Date:** _____
Name: Dan Tolley
Title: President

Electronic Systems Technology, Inc.
dba ESTeem Wireless Modems
415 N Roosevelt St; STE B
Kennewick, WA 99336
Phone: 509-735-9092

E-mail: market@esteem.com
Web Site: www.esteem.com

Copyright© 2024 by Electronic Systems Technology, Inc.

All rights reserved. Printed in the United States of America. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of Electronic Systems Technology.

CHAPTER 1 – Introduction

Before You Begin	2
Edge 900 Overview	2
Steps to Programming Edge 900	3

CHAPTER 2 – Selecting Mode of Operation

Modes of Operation Overview	3
Network Diagrams	4

CHAPTER 3 – Installing Software

Install ESTeem Software Suite	6
Discovery Utility	6
Edge 900 Configuration Utility	7
Edge 900 Configuration Utility	7
Basic Tab	8
Serial Tab	9
IP Access List	9
Static ARP	9
Advanced	10
Utilities	10
Using Spectrum Analyzer	11
Modbus Monitoring	12

CHAPTER 4 – Programming Edge 900

Programming Edge 900	13
Step 1 – Find Best Frequency Channel	13
Step 2 – Configure Master & Client Radios	13
Step 3 – Test Radio Link	14
Network Optimization	15
FCC Information	16
Edge 900 Specifications	17
Edge 900 Interface Diagrams	18
Edge 900 Configuration Diagrams	19
Edge 900 Antenna Configurations	20

Chapter 1 - Introduction

BEFORE YOU BEGIN

Thank you and congratulations on your purchase of the ESTeem Edge900 wireless Ethernet radio! This manual was written to help both the first time and advanced users of the Edge900 to configure the wireless radio for your application. If this is your first time configuring the Edge900 and you would like to get going as soon as possible, all product documentation and utilities can be found at the Getting Started page of the ESTeem web site at www.esteem.com/gettingstarted.

The ESTeem Edge900 wireless networking hardware is a sophisticated networking device. To keep the manual useably 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 you are unfamiliar with any of the above networking concepts, you may need to contact your network administrator for assistance.



Figure 1: ESTeem Edge900 Radio

OVERVIEW

The Edge 900 is a wireless (radio) modem operating in the unlicensed 900 MHz ISM band (902-928 MHz). This simple to configure radio is used to network Ethernet or legacy serial devices at distances up to 10 miles using a high security 256-AES encryption. The Edge 900 is designed to provide secure and reliable wireless utilizing 13 discrete channels throughout the 902-928MHz ISM Band.

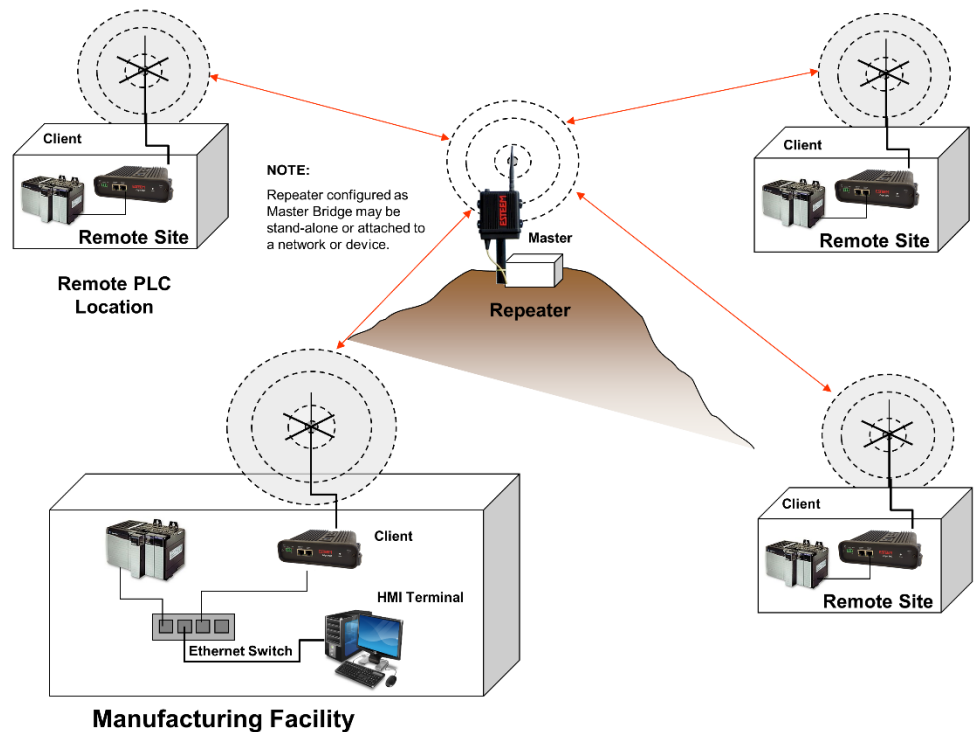


Figure 2: General Example Application

STEPS TO PROGRAMMING EDGE 900

The programming of the Edge 900 radio is completed in three simple phases:

1) Select Mode of Operation

The Edge900 radio will come by default in Client mode. Most of the radios in your system will be in this mode but one must be in Master mode for the clients to connect to. If you are going in the field, you can select Analyzer mode to run the spectrum analyzer and select the best channel for operations. If the radios are being installed, you can select Alignment mode which sets the radios into a point-to-point configuration that rapidly sends packets back and forth and displays the RSSI in the Discover Suite allowing quick and easy antenna alignment.

2) Install Programming Software

The Edge900 Configuration Utility is contained within our ESTeem Software Suite software and can be downloaded for free from our website (www.esteem.com/esteem-utilities/).

3) Program Radios

Once you have selected your Mode of Operation you can configure the other needed settings, Channel, Network ID, and Passphrase. Mode detailed information on these settings can be found further in the manual. Once you have a Master and a Client with matching Channel, Network ID, and Passphrase settings they will start communicating. It is that easy!

Chapter 2 – Selecting Mode of Operation

The Edge 900 Radio will allow programming for any of the 4 modes of operation: Master, Client, Alignment, or Analyzer. Two modes of operation (Master and Client) are used for operating the radio and the Alignment and Analyzer modes are used for setup and troubleshooting. Every network will consist of a single Master with one or more Client radios. The Alignment and Analyzer modes are used in helping to setup and configure the radios. When set up, the network will always be a “hub and spoke” based network with the Master in the center (Hub) and the Client(s) as end points (Spoke). If a repeater is needed in the network the Master will be required to take that position, only the Master can communicate directly with multiple radios.

1) Master

Every Edge 900 radio network needs one radio set to Master to function. The Master is the main point of communication for all Client radios in the network. The Master will have a direct connection to all clients and as such should be the main location in the network unless a repeater is needed. If a repeater is required only the Master mode radio can act as this repeater. Two Master radios cannot communicate over an RF link to each other.

2) Client

The most common mode of operation for the Edge900 radio will be Client. Clients will connect to a Master radio with the same Network ID and Passphrase on the same frequency channel. A Client cannot communicate with another Client radio directly, they must talk through a Master radio.

3) Analyzer

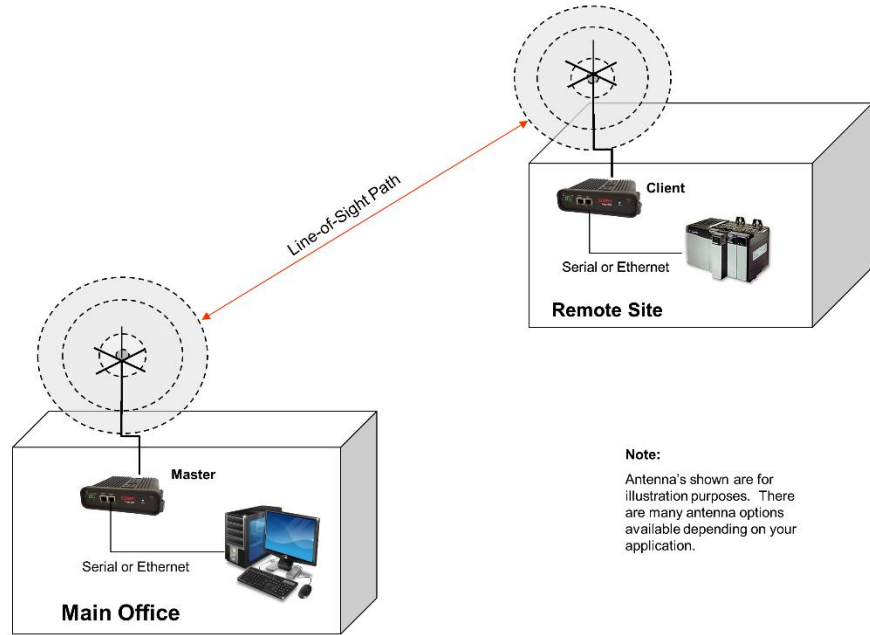
The Analyzer Mode is a powerful tool for setting up your Edge 900 network. It includes most of the basic functions of a Spectrum Analyzer but is isolated to the 902-928 MHz Band. This mode allows you to monitor the received signal levels at the current location of the configured Edge 900 radio. This allows you to see which channel would best suit your network at each location.

4) Alignment

The Alignment Mode is a specialized tool to help maximize the installation of a point-to-point radio system. When 2 radios are in Alignment Mode one radio will constantly report the RSSI from the other radio. This helps with making sure the Client radio's antennas are aligned properly back to the Master radio's antenna.

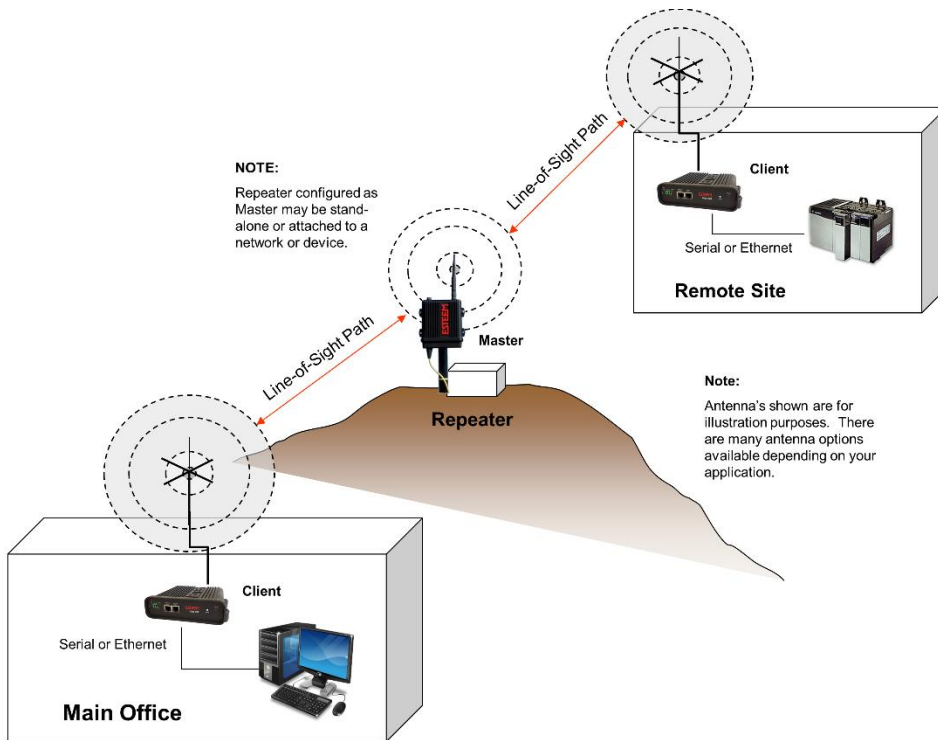
Network Diagrams

The configuration of the Edge 900 is very simple in that there are only two communication modes of operation, as either a Master or Client. Every Edge 900 network will have a single Master with one or more Clients. The following network diagrams cover most applications.



Note:
Antenna's shown are for illustration purposes. There are many antenna options available depending on your application.

Figure 3: Point to Point Example



NOTE:
Repeater configured as Master may be stand-alone or attached to a network or device.

Note:
Antenna's shown are for illustration purposes. There are many antenna options available depending on your application.

Figure 4: Point to Point with Repeater Example

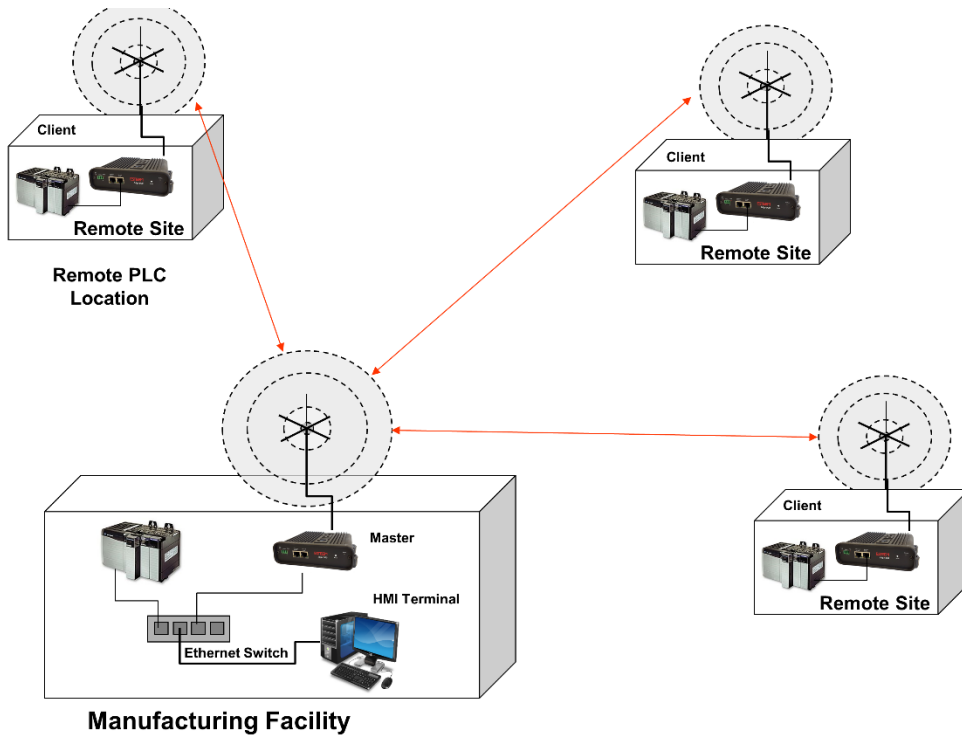


Figure 5: Multipoint Network Example

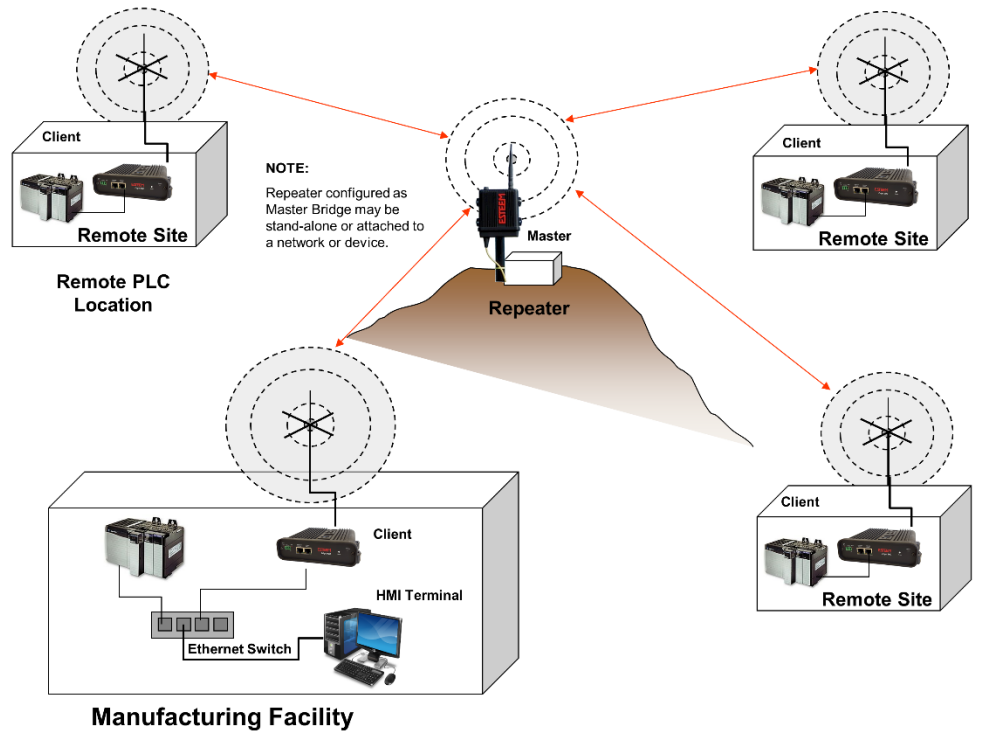


Figure 6: Multipoint Network with Repeater Example

Chapter 3 – Installing Software

ESTeem Discovery Suite

The ESTeem Discovery Suite will allow configuration of the IP address on the Edge 900 radio to match the network regardless of its current IP subnet. The Discovery Utility will also allow access to the Edge 900 Configuration Utility for programming and troubleshooting the wireless network.

Installation

The Software Suite can be downloaded free of charge from the ESTeem web site (<http://www.esteem.com>). The Discovery Utility is a C++ based application compatible with Windows and Linux computer operating systems.

1. Once the above program has been installed, navigate to the location on your computer where the file was installed and open Discovery. You can also use the Start Menu with Windows and find the ESTeem Software Suite folder to easily open any of the Utilities, whichever way the utility is opened Figure 7 will be displayed.
2. Once both the above programs have been installed, save the ESTDiscover.exe file to any location on your computer such as the Desktop. Double click the ESTeem.exe program and Figure 7 will be displayed.
3. Connect the Edge 900 modem to your computer either directly to the Ethernet card or through a Switch using an Ethernet cable. The Ethernet port supports Auto-Negotiation, so either a patch cable or crossover cable will work. Press the *Discover* button.
4. The ESTeem Edge 900 will be displayed (Figure 8). If the ESTeem Edge 900 is not on the same IP subnet as the computer, double click on the IP and/or Netmask and make the necessary changes. Press the *Apply Changes* button when complete.

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 Horizon.



Figure 7: EST Discovery Suite



Figure 8: Radio Discovered

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

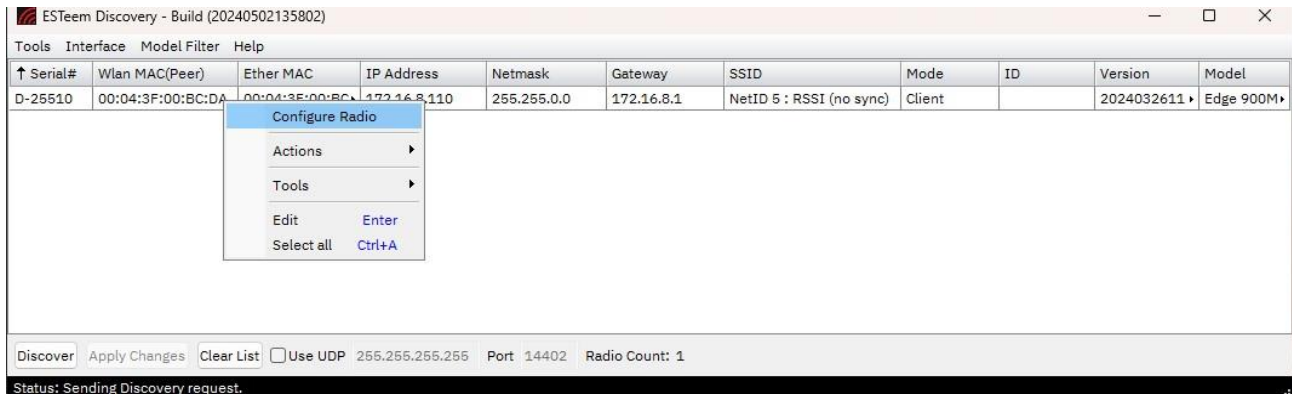


Figure 9: Configure Radio

Edge 900 Configuration Utility

The Edge 900 Configuration Utility will allow programming of the ESTeem Edge900 radio only. There are some features to the Configuration Utility that remain static throughout the configuration of the radio, those are as follows.

Menu Top

IP Address, Password, and Remember Password Button: The IP Address should be set to the radio you are attempting to configure. For the first time configuring a radio the password should be “admin” (without the quotes). If it’s not your first time configuring the radio the password will be the passphrase you set earlier. The Remember Password sets the password currently in the password field to remain there after the Configuration Utility has been closed and reopened.

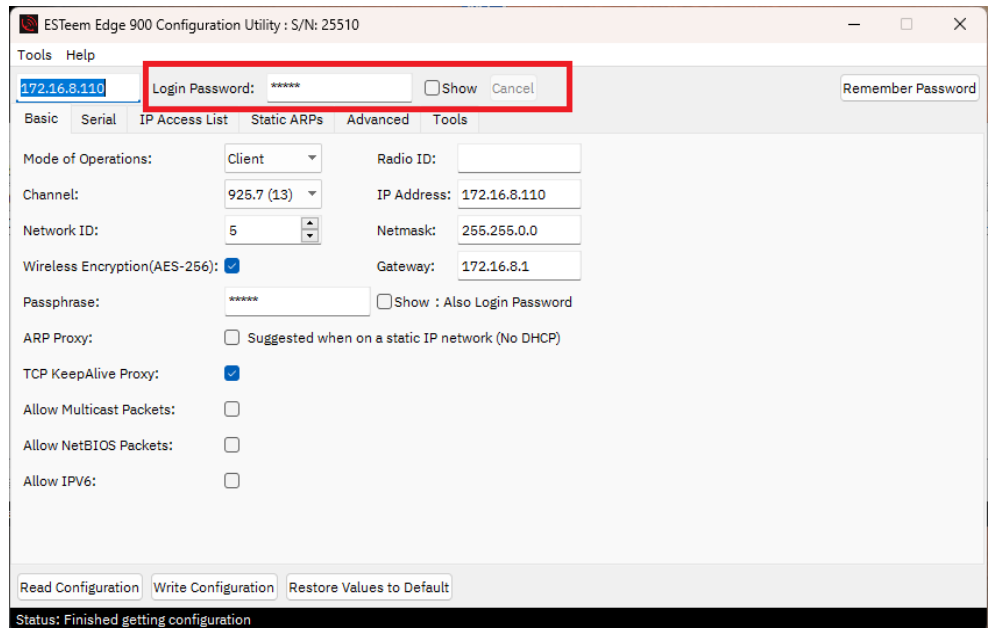


Figure 10: Edge 900 Configuration Utility

Menu Bottom

Read Configuration, Write Configuration, and Restore Values to Default Buttons: The Read Configuration attempts to connect to an Edge900 radio using the IP and Password set at the top of the utility, once connected it then fills in the Utility with the configuration of that radio. The Write Configuration button does the exact opposite, it first connects to the radio using the IP and password at the top of the utility then puts all the settings in the Utility into the radio. If the IP Address or Password is changed in this way you will have to update the utility before continuing. The Restore Values to Default button changes all current settings in the Utility to their factory default settings. This does not set the radio to factory default settings unless Write Configuration is used immediately after.

NOTE: For increased security, the pass phrase for the network must be entered to change the configuration on any Edge 900 radio. By default, this passphrase is not shown and is set to admin (same as Login Password) from the factory.

Basic Tab

Most of the configuration for the Edge 900 will happen here on this first page. Many of the important settings that determine which radios will communicate are set here. Details of the settings available on this page can be found below.

Mode of Operation: This setting will set which mode this radio will operate in. Master, Client, Analyzer, or Alignment.

Channel: This will set the operating frequency of the radio. You can select a number between 1 and 13 or using the arrows raise and lower the operating channel.

Network ID: This will set the Network ID of this radio; this allows radios of the same Network ID to communicate with each other. If 2 radios have different Network IDs they will not communicate. The Network ID can be a number between 0 and 255.

Passphrase: This sets the password that is needed to connect to the radio with the Configuration Utility as well as the password that the radios use to communicate with each other. This passphrase can be at most a 64-character length combination of numbers, letters, or special characters.

Radio ID: This is simply an identifier that helps differentiate between radios. This will only show up on the Discovery and in the Configuration Utility. This Radio ID can be at most 11 characters long.

IP Address: This sets the IP Address of the radio that you are currently configuring. This can be set to any valid IPv4 address.

Netmask: This sets the Netmask of the radio that you are currently configuring. This can be set to any valid IPv4 address.

Gateway: This sets the Gateway of the radio that you are currently configuring. This can be set to any valid IPv4 address.

Wireless Encryption: This option turns on/off the need for a password for RF communication. This setting needs to be the same on all radios that will be communicating with each other.

ARP Proxy: This setting turns on/off the ARP Proxy of the radio. Address Resolution Protocol or ARP packets help “map” out a network. These packets happen often and use up precious RF Bandwidth so the radio will keep track of successful ARP packets and act as a proxy answering ARP requests without passing the packet over the air. If you have a static network that does not have equipment changes it is recommended to leave this setting on. If devices will move around or change IP Addresses often this setting should be disabled.

TCP KeepAlive Proxy: This setting turns on/off the TCP KeepAlive Proxy. PLCs using Ethernet communication send out a “KeepAlive Packet” every few seconds to make sure the other PLCs are there. Enough of these KeepAlive packets and you cannot even get data through. This proxy works identically to the ARP Proxy, after a successful packet the radio will keep track of who answers. Future packets will then be answered by the radio and not passed over the RF.

Allow Multicast Packets: This allows (if enabled) and does not allow (if disabled) multicast packets to pass over the RF. By default, this is disabled and unless the use of these radios requires multicast packets it is recommended to remain disabled.

Allow NetBIOS Packets: This allows (if enabled) and does not allow (if disabled) NetBIOS packets to pass over the RF. By default, this is disabled and unless the use of these radios requires NetBIOS packets it is recommended to remain disabled.

Allow IPv6: This allows (if enabled) and does not allow (if disabled) IPv6 packets to pass over the RF. By default, this is disabled and unless the use of these radios requires IPv6 packets it is recommended to remain disabled.

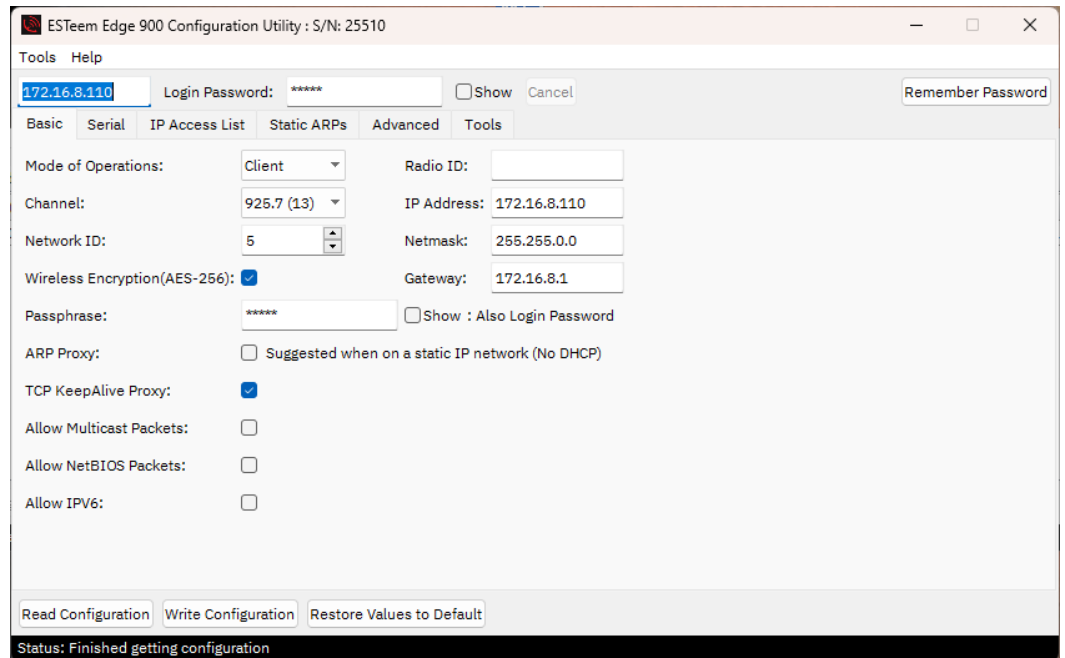


Figure 11: Basic Tab

Serial Tab

This tab will only be needed if you are going to be using the RS-232 Data Port on the radio. This tab allows the enable/disable of the serial port along with its configuration. You can configure the Baud Rate, Parity, Data Bits, and Stop Bits. When setting up the serial port you will have to set the destination IP Addresses of the radios you intend to communicate with, not the serial devices on the other end. You can Add, Remove, and Modify any IP Addresses using the appropriately named buttons on this tab. By default the 224.0.0.1 IP Address is in the list, this is a multicast IP Address and will be sent to everyone connected to this radio.

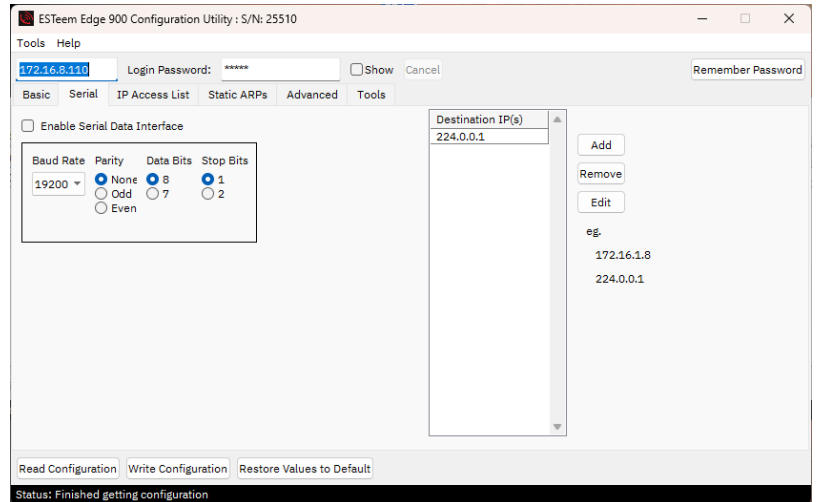


Figure 12: Serial Tab

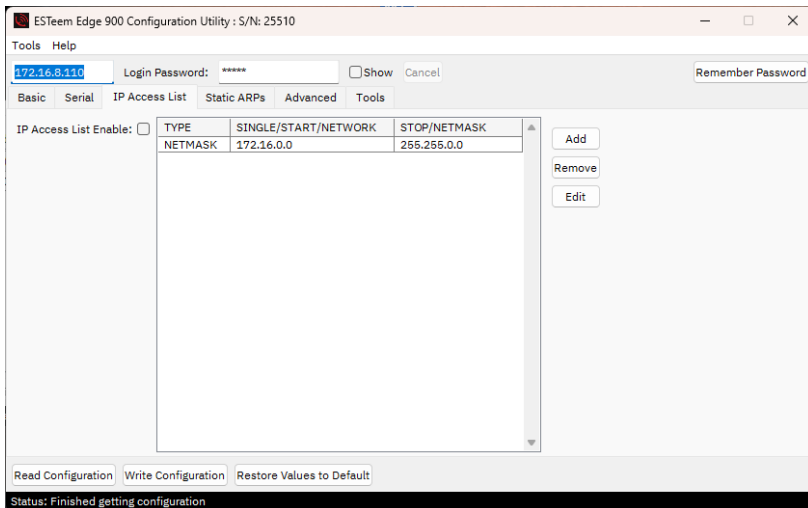


Figure 13: IP Access List

IP Access List Tab

The IP Access List if enabled on this tab will stop all communication from going over the RF if the IP Address of the Source does not match an IP Address found on the IP Access List. By default this setting is enabled and allows traffic within the radio's default Netmask. New addresses can be added, modified, or removed as necessary by using the so-named buttons. There are 3 options when entering IP Addresses into the Access List; Single, Range, and Netmask. The single option is just that, a single IP Address added to the Access List. The Range option allows you to enter a start IP and end IP to create a range of allowed IP Addresses. The Netmask allows you to enter an IP and Netmask of all IP Addresses you want to allow to communicate over the RF.

Static ARPs

The Static ARP table will allow direct association of an IP Address and MAC address in the Edge 900 radio. If the Static ARP table is configured, the Edge 900 will reply to the network's Address Resolution Protocol (ARP) requests for that MAC address and not send over the wireless network. This can increase network throughput by removing the network ARP requests for devices that rarely change in a fixed TCP/IP network.

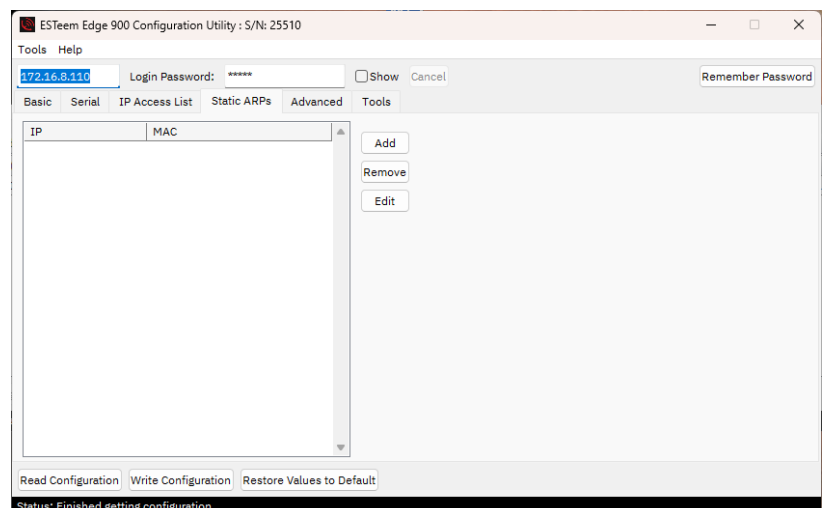


Figure 14: Static ARP Table

Advanced Tab

The Advanced tab has many settings that are automatically adjusted based on the Mode of Operation set on the basic tab. These settings should not be changed unless informed by ESTeem Customer Support. Changing these settings could have a negative effect on the operation of the radio.

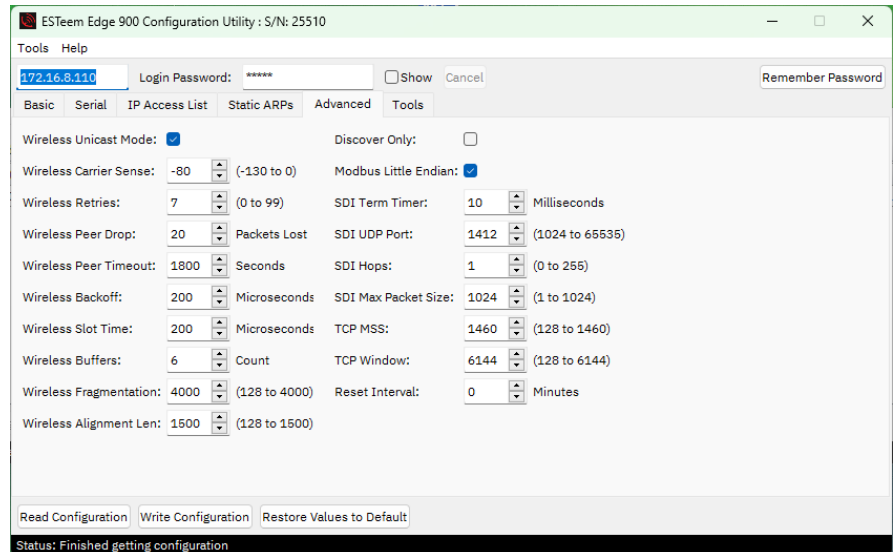


Figure 15: Advanced Tab

Tools Tab

The Tools tab has many helpful utilities for maintaining and configuring the radios. The first options on this page are for configuration security. The Edge900 Configuration Utility can save a copy of the settings of an Edge900 radio to a file on your computer. If the Enable Configuration Security option is enabled this configuration file will be encrypted. If it's disabled it is saved in plain text. The password needed to encrypt and decrypt the file can be manually configured here under Configuration Password, by default all of this is enabled and it uses the passphrase from the basic tab as the password. The other options on this page are as follows;

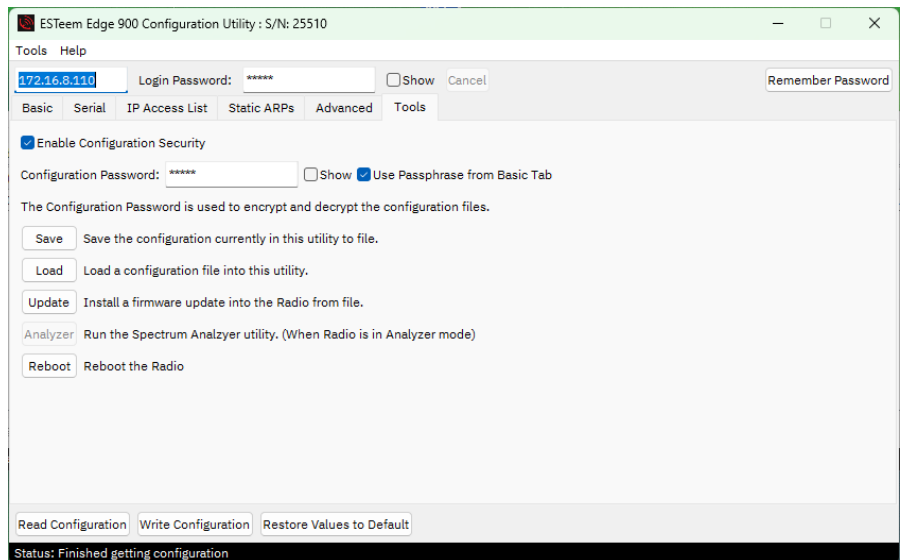


Figure 16: Tools Tab

Save: This button saves a copy of the configuration of this radio to a file on your computer. A window will pop up asking you to save the file to a selected location.

Load: This opens a window asking for the location of a config file saved using the above button. When the file is selected all the settings on the previous tabs (Basic, Serial, IP Access List, and Advanced) will be changed to match that of the file. Don't forget to Put the Configuration into the radio using the Put Config afterwards.

Update: This allows you to update the firmware of the radio using an ESTeem supplied image file.

Analyzer: This opens the Edge900 Analyzer program. If the radio is not in Analyzer mode, it will not respond to requests from this Analyzer program.

Reboot: This Reboot button sends a reboot command to the radio. This is as if you powered down then back up the radio.

Cancel Button: If the radio you are attempting to communicate with has stopped responding, you can use this button to force the utility to stop attempting to Read/Write the Configuration or stop an Update of the firmware.

Spectrum Analyzer

The Spectrum Analyzer built into the Edge900 is a very helpful and simple tool that can be used before setup to help determine the best operation frequency and during operation to help troubleshoot problems like other wireless signals operating on or near the frequency the radios are configured for. The Spectrum Analyzer window is a 10x10 grid that displays Frequency across the X Axis and Signal Strength across the Y axis. The Frequency display can be adjusted with the Center Frequency and Span options at the bottom of the analyzer, by default each grid square is 3MHz wide. The Signal Strength Y axis cannot be adjusted with the top of the window being 0 dB and the bottom being -100 dB each grid square is 10dB wide. The Analyzer can be customized with the following settings.

IP Address: This should be set to that of the Edge900 in Analyzer mode you are using to sweep.

Center Frequency: This will set the center frequency of the analyzer. You can select the different channels of the Edge900 with the drop-down arrow or type in a specific number.

Span: This sets the total width of the analyzer, by default a span of 30MHz is set which makes each of the 10 column segments 3MHz wide. For a more focused view of lower the span to “zoom in” on a specific section of frequency.

RBW: This sets the RBW of the analyzer and is recommended to stay set at AUTO.

Trace Det & Trace Avg: This sets the Trace Det and Trace Avg and is recommended to stay at Average and 2 respectively.

Ext Attenuator: If external attenuation is being used currently, the program can compensate for that and display the actual signal strength by changing this setting to match the attenuation being used.

Enable Sweep: This button turns on and off the sweeping of the frequency. If the span or frequency is changed the enable sweep will need to be turned off and on again to see those changes.

Center to Marker: If a marker has been set on the analyzer this button will move the center frequency to that of the marker.

Marker: Checking this box then clicking on the analyzer window will place a marker that can be dragged around with the mouse. This helps identify a specific frequency and signal strength. Once the marker is placed in the upper right and corner of the window it will display the frequency and signal strength at that marker point.

Marker Delta: The Marker Delta works with the Marker in that 2 points can be placed on the analyzer. Once the Marker is placed and a Marker Delta is placed the Delta will display the difference in frequency and signal strength between the Marker and the Delta.

Display Line: This puts a line that runs the whole span of the analyzer and displays the signal strength of that line on the right side of the window. This can also be dragged up and down in the window.

Peak Hold: If this is selected instead of constantly updating the current signal strength of the whole analyzer it will instead only display the strongest signal detected at a specific frequency and hold that display.

Channel Markers & (Frequency): By default, Channel Markers is enabled showing yellow lines that are the different operating channels of the Edge900 radio. If Channel Markers (Frequency) is selected it will also display the operating frequency at the top of the window.

Save Snapshot: This will save a picture of the analyzer window as the button is pressed. A window will pop-up asking where you would like to save the file. Do not forget to give it a proper image format name. (Example: snapshot.PNG)

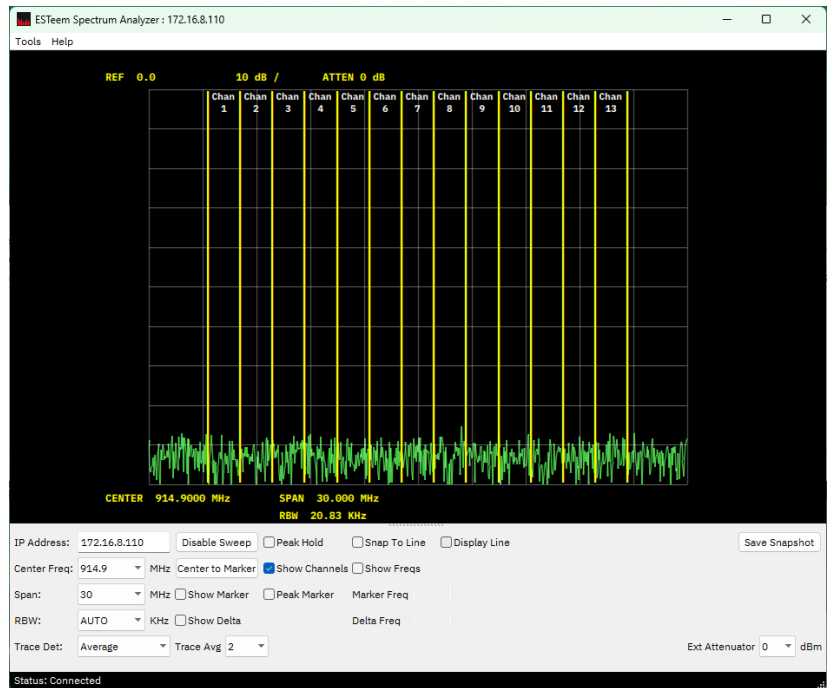


Figure 17: Spectrum Analyzer

Modbus Monitoring

The latest firmware of the ESTeem Edge 900 supports Modbus/TCP protocol for access to multiple operating parameters in the wireless modem and RF network health status. Uptime, link quality indicator and receive signal strength (RSSI) are a few of the registers available through the open Modbus/TCP protocol. This data can be obtained by polling the registers directly or using available utilities.

The following are the Modbus registers supported in the ESTeem Edge 900 on Port 502. Registers are mapped as 32-bit integer type input registers:

These registers apply to firmware version 202403261152 or newer.

Edge 900 Information

Type	Registers	Example	Title
INT	0-1	25510	Serial Number
INT	2-3	1	Number of connections (clients)
INT	4-5	-4700	Instantaneous RSSI (Received Signal Strength Indicator) dBm/100
INT	6-7	9	Instantaneous LQI (Link Quality Indicator)
INT	8-9	1	Instantaneous CRC (Cyclic Redundancy Check)
INT	10-11	-4700	Last Valid RSSI dBm/100
INT	12-13	-4662	Last Valid LQI
INT	14-15	1230	AUX Volts /100
INT	16-17	96	TX Bytes
INT	18-19	3646	TX Bytes
INT	20-21	497	RX Short Packet Count
INT	22-23	1	RX Long Packet Count
INT	24-25	34	TX Packet Count
INT	26-27	0	CRC Error Count
INT	28-29	0	Retry Count
INT	30-31	1	Ethernet Link State (1 = Up, 0 = Down)
INT	32-33	56	Uptime (Seconds)

Chapter 4 – Programming the Edge900 Radio

Step 1 – Find the best channel with the Analyzer Mode

If you have already had an RF Site Survey done and know the best available channels for you setup you can skip to step 2. After powering up and connecting to the radio with the Edge900 Configuration Utility set the Mode of Operation to Analyzer. Then press Write Configuration at the bottom, the radio will reboot in Analyzer Mode.

Step 1.1 – Opening the Analyzer – After the radio is in Analyzer Mode you can access the Analyzer program two different ways.

Through the Discovery Suite – Right-click on the Edge900 radio in Analyzer Mode and under Tools > Select Spectrum Analyzer.

Through the Configuration Utility – On the Tools tab select the Analyzer button to open the Spectrum Analyzer Program.

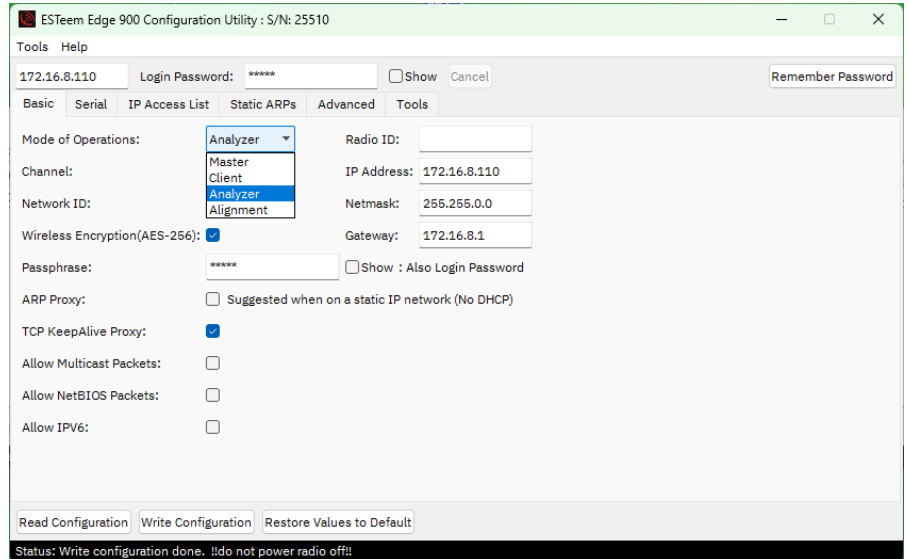


Figure 18: Setting Analyzer Mode

Step 1.2 – Using the Analyzer

– The Edge900 Spectrum Analyzer Program is a very simple but helpful tool for determining the best possible frequency of operation. It is recommended to have Peak Hold and Channel Markers enabled to see overtime communication on specific channels. The center frequency can be changed, span and add external attenuation if required. There is also a display line and channel marker delta. When saving a snapshot do not forget to add the image extension .PNG to the file name so you can view the file as an image later. A more detailed description of the Analyzer can be earlier in this manual.

Step 2 - Configure Master and Client Radios

Edge900 radio networks are made up of one (1) master and any number of client radios. The client radios will connect to a master but not to other clients. When connecting, the client will only connect to a master that shares a Channel, Network ID, and Passphrase. If any of these settings are changed, they will not connect and communicate.

Once all the radios are configured a pre-installation test is always recommended, remember to have the antennas connected and put as much distance between the radios as you can.

Step 3 – Alignment and Installation

Once the radios have been installed, use the receive signal strength readings from the Discovery Program to align the antennas. If you have a point-to-point link you can use the Alignment Mode to align the antennas if as needed. It is not a required step but can help achieve the best results of the radios. To use this mode simply connect to the radios with the Configuration Utility and switch the radio into Alignment mode. The radio will retain its settings on the basic page as you switch between modes of operation. Once the radios have been set to Alignment mode, open the RSSI Monitor in the Discovery Suite to watch a 1 second interval update of the RSSI between these 2 radios. *Tip* Stick to 2 radios at a time, the master, and a single client. Once that client has achieved the best RSSI, set it back to client mode and move to the next client.

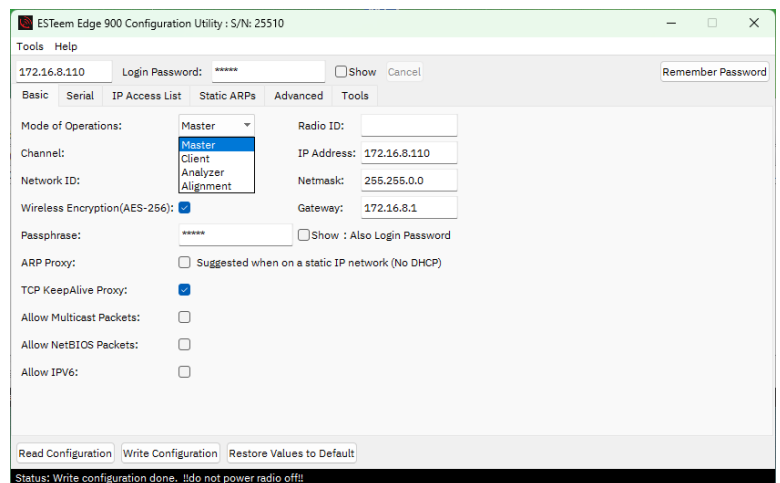
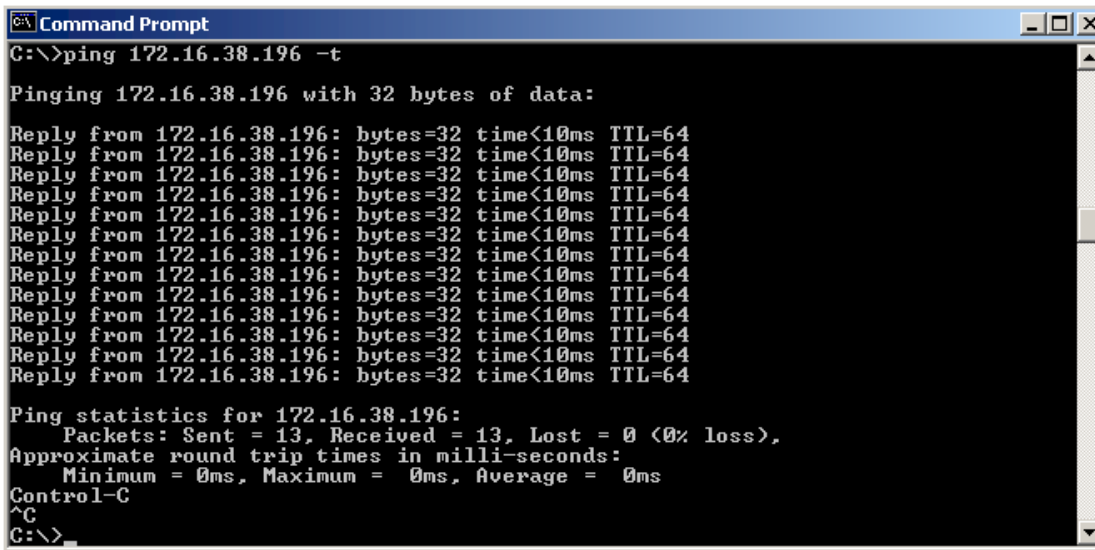


Figure 19: Master or Client Configuration

Testing Wireless Data Links

The easiest method for testing the efficiency of data flow between the Edge 900 radios is to conduct a Ping test to the opposite radio's IP address. An Ethernet Ping utility is available in most TCP/IP computer's operating system and is entered at the command prompt. See operating system documentation or IT support for further detail.



```
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:\>
```

Figure 20: Ping Test

NETWORK OPTIMIZATION

The most common problem experienced using a wireless network is data overload. The Ethernet network attempts to use more bandwidth than the wireless network has available. The Edge 900 has a maximum RF data rate of 1 Mbps that must be shared between multiple remote locations. The limited bandwidth available requires that the radio incorporate multiple tools to mitigate the data overflow and optimize the wireless network for different Ethernet network requirements.

Limiting Ethernet Data Traffic

By default, the Edge 900 is configured as a wireless bridge device that will attempt to pass all Ethernet traffic received across the wireless network. If the Edge 900 radios are connected to a busy office or plant network, it is very easy to overload the limited bandwidth of the radio. The following tools help restrict the most common types of Ethernet network management data packets sent over an office or plant network that can easily overload the wireless network:

Enable/Disable Multicast IP – This option will allow the user to select if multicast traffic (from IP addresses starting with 224.X.X.X or 239.X.X.X) to pass over the wireless bridge. Some industrial Ethernet devices communicate using multicast traffic and can easily overload the wireless network. To remove multicast traffic from the wireless network, uncheck the “Enable Multicast IP” box in the Master Bridge configuration. The Remote Bridge will receive this configuration setting from the Master Bridge and does not require any other settings.

Enable Netbios Filter - This option will allow transfer of all Microsoft NetBIOS information to pass across the wireless bridge link of Edge 900 radios. This Microsoft Windows based computer management frames are generally not required in most TCP/IP based networks and only unnecessarily take up wireless bandwidth. To remove NetBIOS traffic and greatly reduce the data load on Ethernet networks connected to Windows based computers, uncheck this box when configuring the Master Bridge.

FCC Information to Users

The equipment has been tested and found to comply with the limits for both the FCC Class B digital device (pursuant to Part 15 of the FCC rules) and Industry Canada (IC) CAN ICES-3 (B)/NMB-3(B).

FCC Statement

Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution: Changes or modifications to this equipment not expressly approved by ESTeem Wireless Modems for compliance could void the user's authority to operate the equipment.

IC Statement

"This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device."

"Cet appareil est conforme avec Industrie Canada exempts de licence standard RSS (s). Son fonctionnement est soumis aux deux conditions suivantes: (1) cet appareil ne doit pas provoquer d'interférences et (2) cet appareil doit accepter toute interférence, y compris celles pouvant causer un mauvais fonctionnement de l'appareil."

Emissions Information

Edge 900 MHz (Model 217ES)

HVIN: 217ES

DTS Spread Spectrum Device

(USA) FCC ID: **ENPEDG217ES**

(Canada) IC No: **2163A-217ES**

Edge 900 MHz Antenna and Cable Configurations

ESTeem offers different types of antennas for both indoor and outdoor configurations. This device has been designed to operate with the antennas listed below, and having a maximum gain of 7 dB. Antennas not included in this list or having a gain greater than 7 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

This radio transmitter ESTeem Edge 900 MHz (HVIN: 217ES) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le present emetteur radio ESTeem HVIN: 216AD a ete approuve par Industrie Canada pour fonctionner avec les types d'antenne enumeres ci-dessous et ayant un gain admissible maximal et l'impedance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est superieur au gain maximal indique, sont strictement interdits pour l'exploitation de l'emetteur.

Warning: Only the tested cable lengths and antennas provided by EST meet the FCC and DOC maximum peak output power requirements. Any other combination of antennas or coax cables is not authorized. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

Transmit/Receive Antenna Port

Part Number: AA20DMEs

- Omni-directional direct mount antenna, 2 dBi gain.
- Indoor and outdoor applications.
- There must be a minimum separation distance of 23 cm. from the antenna to the user. **See Warnings.**

Part Number: AA20Es900

- Omni-directional external pole mount antenna, 7 dBi gain with 3-ft. integral feedline and connector.
- Outdoor applications.
- There must be a minimum separation distance of 23cm. from the antenna to the user. **See Warnings.**

Part Number: AA206Es900

- Directional pole mount antenna, 11 dBi gain with 1.5-ft. integral feedline and connector.
- Point to point and point to multi-point outdoor applications.
- There must be a minimum separation distance of 23 cm. from the antenna to the user. **See Warnings.**



Warnings:

Only pre-made coax cables from the factory used in conjunction with either the AA20Es900 omni-directional and AA203Es900 directional antennas meet all FCC Section 15.247(b) EIRP maximum power requirements.

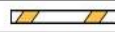







Edge 900 Specifications

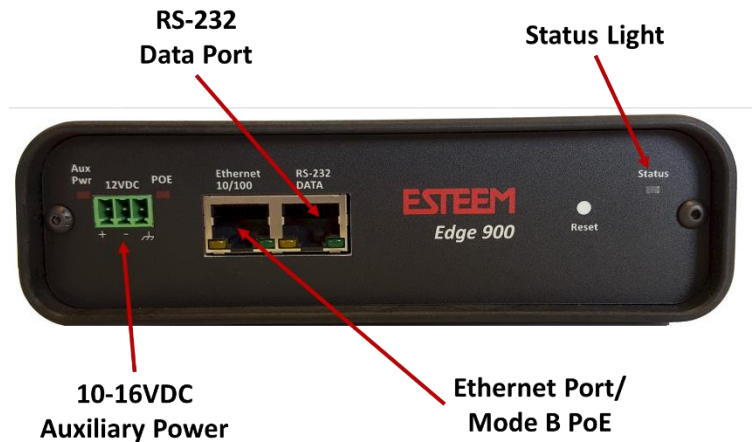
ESTeem Edge 900 Specifications	
Transmitter/Receiver	
Frequency of Operation	902-928 MHz (13 Channels)
RF Data Rate	1 Mbps
Tx Output Power (Software Selectable)	24 dBm
Tx Output Impedance	50 ohms
Rx Sensitivity	-97 dBm
FCC Type Acceptance	ENPEDG217ES
Industry Canada Type Acceptance	2163A-217ES
LED Indicators	Power (On/Off) - Carrier Detect (On/Off) - Transmitter (On/Off) - Receiver (On/Off)
Power Requirements	
Receive	250mA @ 12 VDC
Transmit	800mA @ 12 VDC
PoE Power Supply	(IEEE 802.3af - Mode B) (opt)
External Power Input	10 to 16 VDC @ 1A
Input/Output Connectors	
Ethernet Port 1 (10/100/1000)	RJ-45 Female
RS-232C Comm Port (2,400 to 115.2 K baud)	RJ-45 Female
Antenna Input/Outputs	TNC Reverse Female
External DC Input Power Connector	Mini-Combicon, 3 pin female
Case	
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
Other	
Outdoor Pole Mt. Kit	AA195PM (opt)
PoE Power Supply	AA173 (opt)
Security	AES-256

Edge 900 Interface Diagrams

The ESTeem Edge 900's Ethernet Port is a Full and Half-Duplex Auto-negotiation interface supporting 10Mbps and 100Mbps (10/100BaseT). The Ethernet port is compliant with IEEE 802.3at-2009 Power Over Ethernet Plus (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

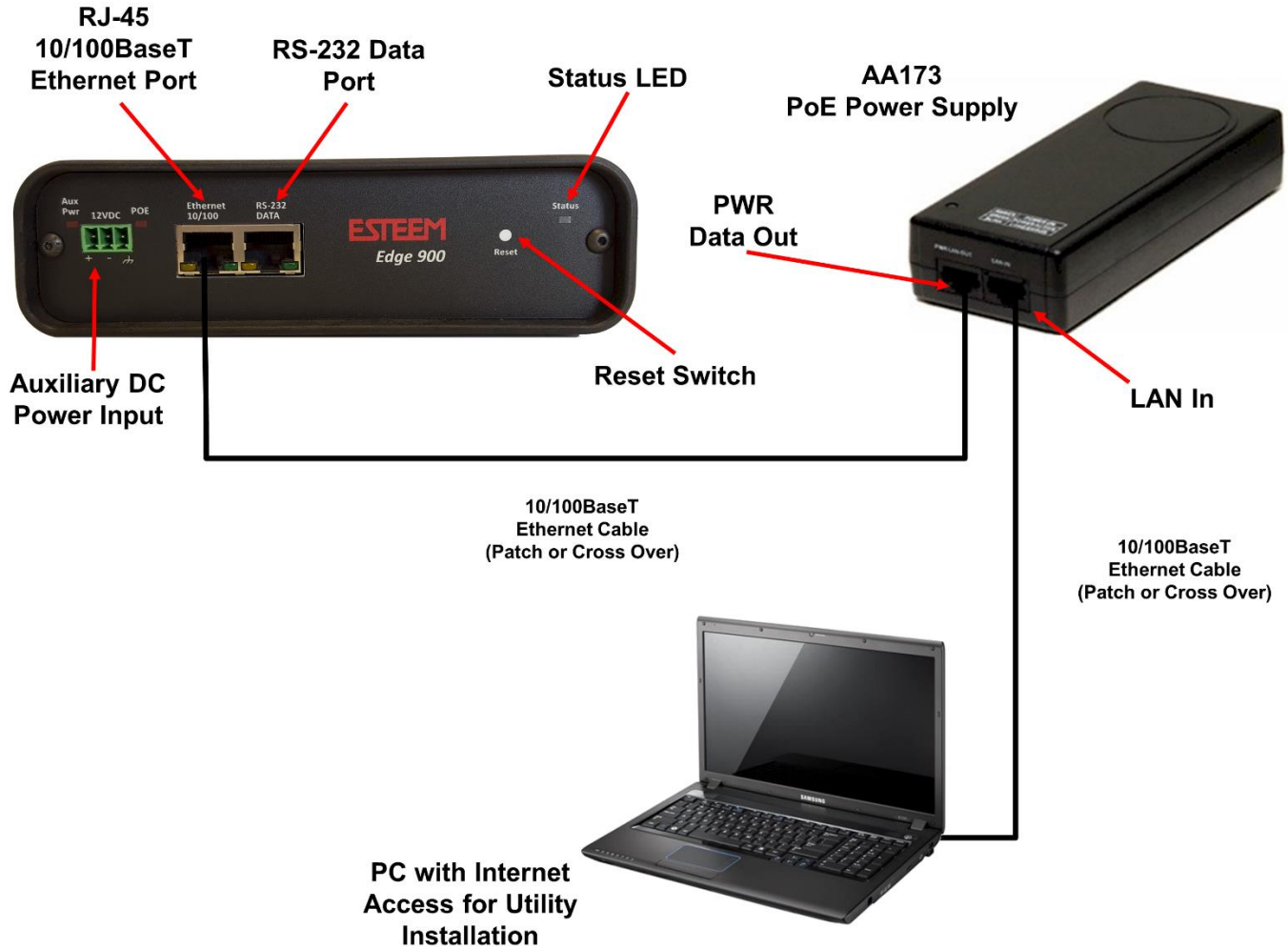


RS-232C Data Port Configuration

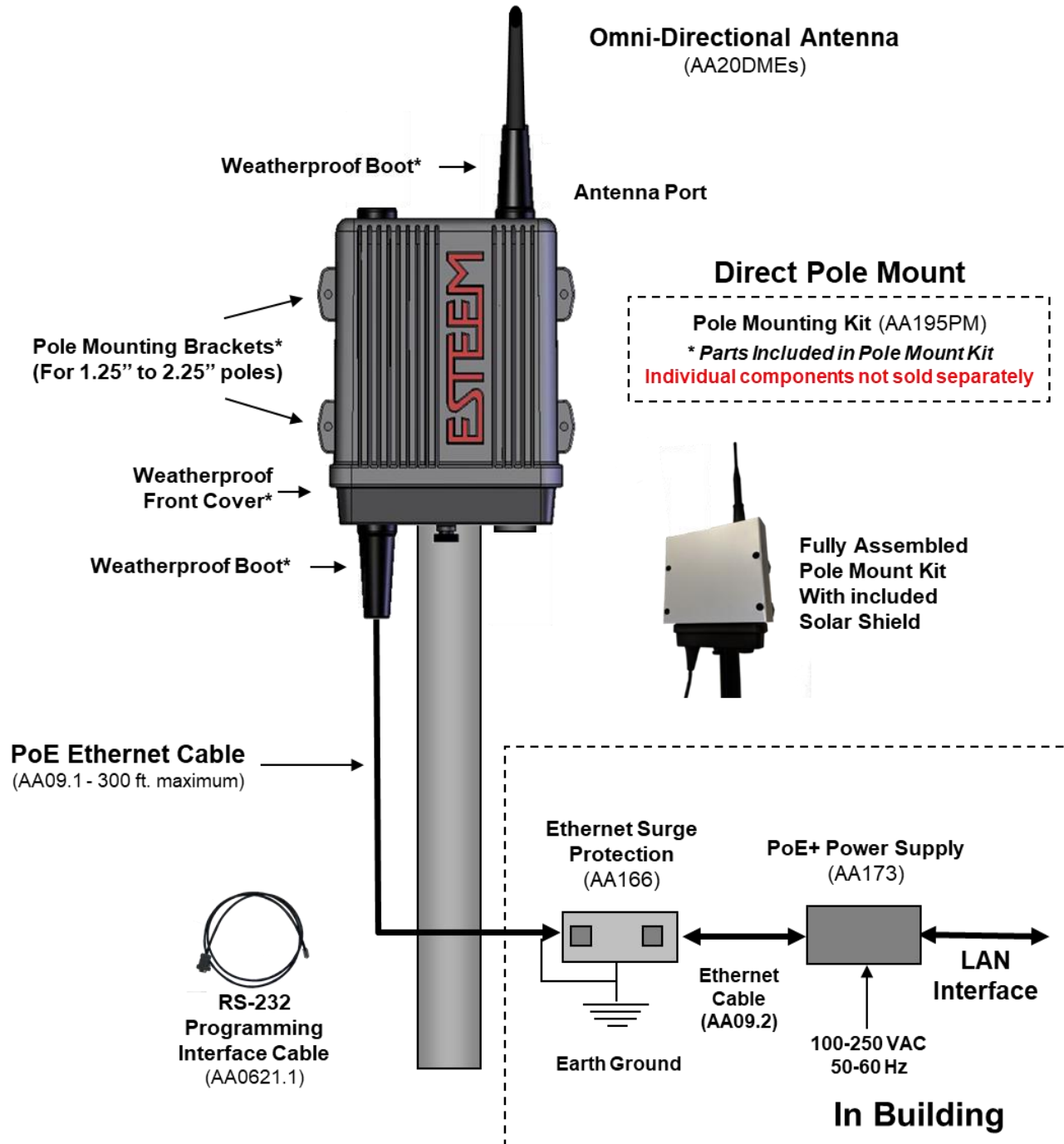
The Edge 900 has an RS-232C data interface in an RJ-45 connector on the front panel. To interface the Edge 900 to the serial port on the computer, you need serial cable with the following pin-out:

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

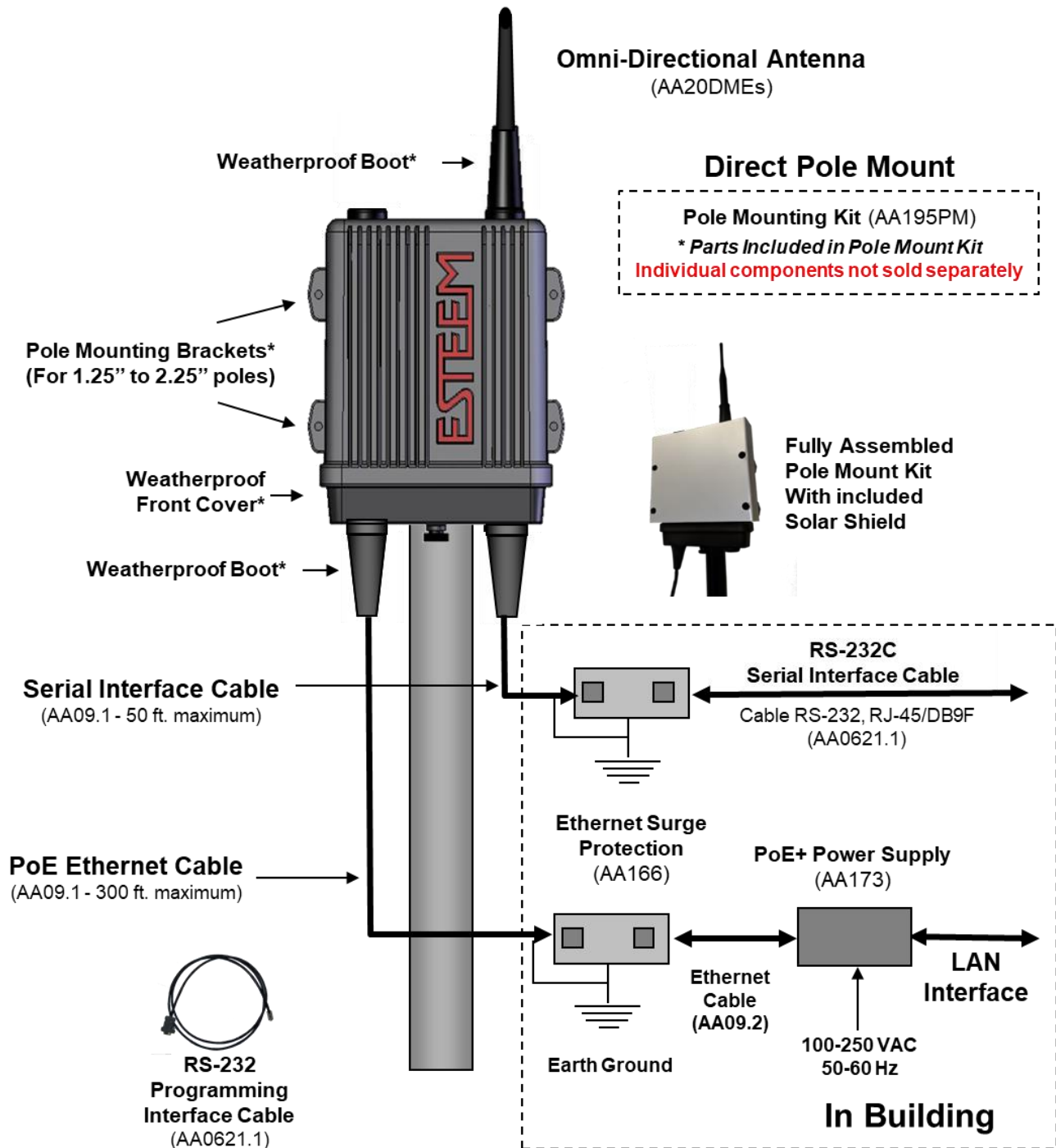
Edge 900 Configuration Layout



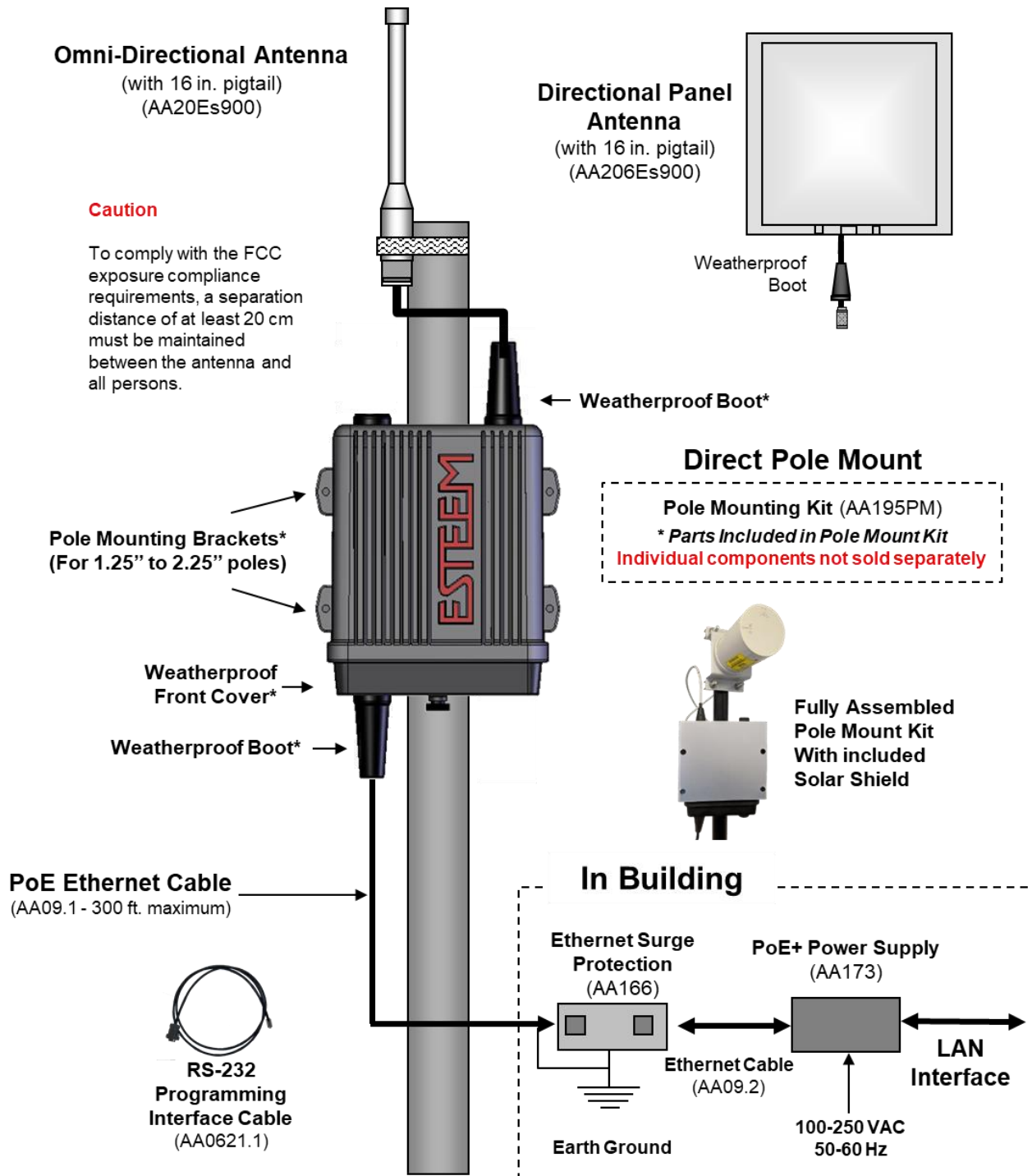
Edge 900 Direct Mount Antennas w/Surge Protection



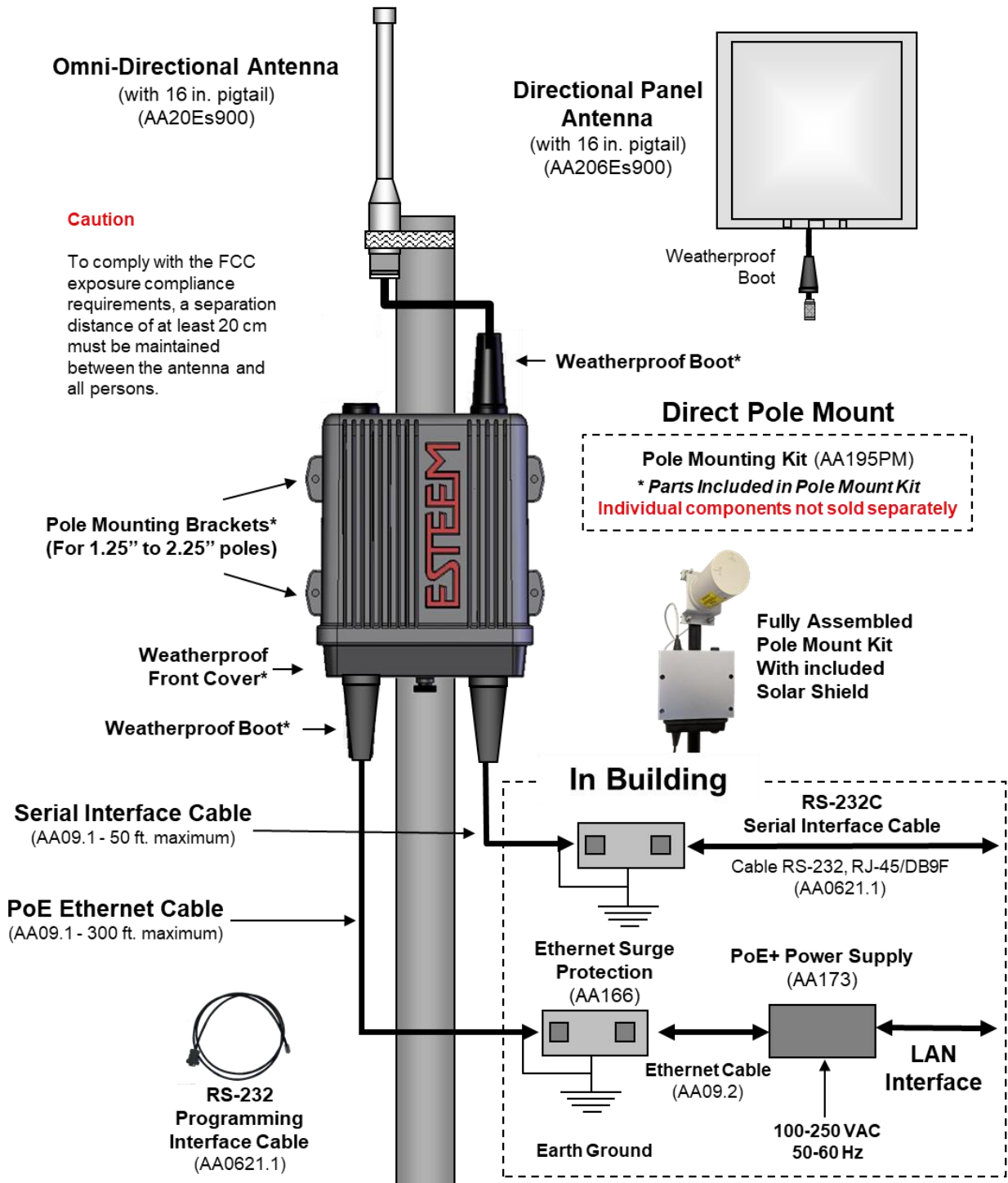
Edge 900 Direct Mount Antennas Serial Port w/Surge Protection



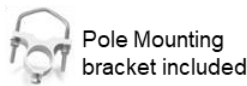
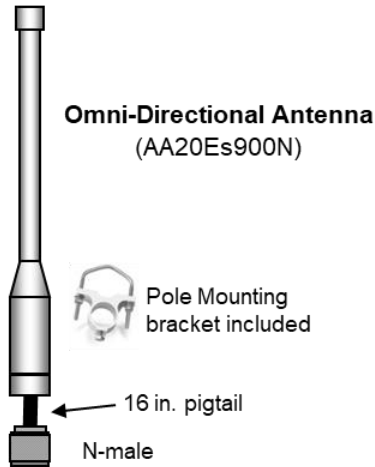
Edge 900 External Mount Antenna w/Surge Protection



Edge 900 External Mount Antenna Serial Port w/Surge Protection

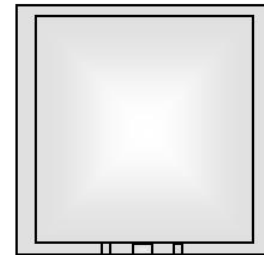


Edge 900 Enclosure Mounting



Caution

To comply with the FCC exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna and all persons.



Directional Panel Antenna
(AA206Es900N)
N-Female Connector

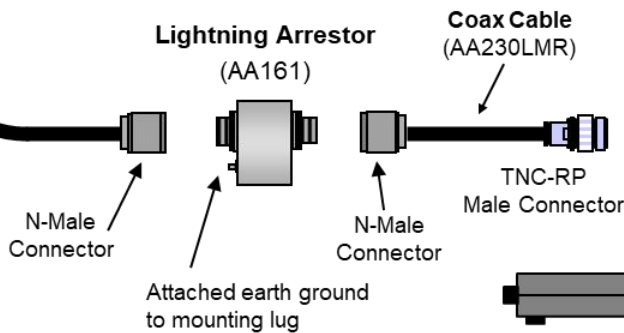
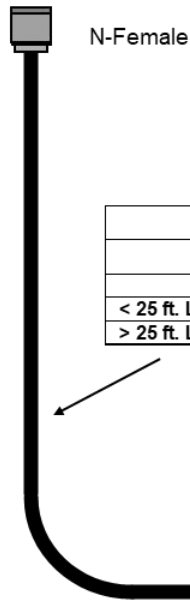
NOTES

1. Vapor wrap all external antenna coax connections with vinyl wrap (AA241).
2. Contact ESTeem for recommendations regarding antenna mounting hardware and installation tips.
3. Ground antenna structure, base and lightning arrester.

Antenna Feedline Recommendations			
		Antenna Part No.	
	Feedline Type	AA20Es900N	AA206Es900N
< 25 ft. Length	RG-8	AA240RG8	AA237
> 25 ft. Length	Heliac	AA240	AA236



**RS-232
Interface Cable**
(AA0621.1)



**12 VDC Power
Recommendations**
Power Supply AA179
Battery Packs
Solar Power



**Ethernet
Interface Cable**

Antenna Specifications

Model:	AA20DMEs
Applications:	Model 195Ed direct case mount
Antenna Type:	Omni-Directional, Sleeve dipole
Frequency:	902 to 928 MHz
Polarization:	Vertical
Impedance:	50 ohms
Gain:	2 dBi (0 dBd)
VSWR:	< 2:1
Power:	10 W
Front To Back Ratio:	n/a
Horizontal Beamwidth:	n/a
Vertical Beamwidth:	60 degrees
Antenna Material:	Polyurethane Plastic Radome
Mounting Hardware:	N/A (Direct Mount)
Antenna Connector:	TNC-R Male
Flexibility:	+/- 20 °
Antenna Envelope:	8.8 in. length by .51 in. width
Temperature:	-20 to +65 C°
Weight:	35 grams

Caution

To comply with the FCC exposure compliance requirements, a separation distance of at least 23 cm must be maintained between

Model No:	AA20Es900
Antenna Type:	Omni Directional, DC Grounded
Applications:	Fixed base
Frequency:	902 to 928 MHz
Polarization:	Vertical
Impedance:	50 ohms
Gain:	7 dBi (5 dBd)
VSWR:	1.5:1 Typical
Front to Back Ratio:	n/a
Horizontal Beamwidth:	n/a
Vertical Beamwidth:	22 degrees @ ½ power
Antenna Material:	Brass radiator, UV inhibited fiberglass enclosed
Mounting Hardware:	Base to Mast, Supplied.
Maximum Power Input:	150 Watts
Wind Survival:	100 mph
Bending Moment:	14.2 ft-lbs. @ 100 mph
Antenna Connector:	TNC-R Male with 36in. pig-tail.
Antenna Envelope:	48 in. L x 1-5/16 in. Dia.
Weight:	1.75 lbs.

Caution

To comply with the FCC exposure compliance requirements, a separation distance of at least 23 cm must be maintained between

Model No:	AA206Es900	Caution To comply with the FCC exposure compliance requirements, a separation distance of at least 23 cm must be maintained between the antenna and all persons.
Antenna Type:	Directional, Panel, DC grounded	
Applications:	Fixed base.	
Frequency:	902 to 928 MHz	
Polarization:	Vertical or Horizontal	
Impedance:	50 ohms	
Gain:	11 dBi	
VSWR:	< 2 Nominal	
Front to Back Ratio:	> 35 dB	
Horizontal Beamwidth:	60 degrees @ ½ power	
Vertical Beamwidth:	40 degrees @ ½ power	
Antenna Material:	White UV protected PVC	
Mounting Hardware:	Heavy duty, elevation and tilt adjustable mounting up to 2.16 in. pipe (included).	
Antenna Connector:	TNC-R Male with 1.5 ft. pigtail with ESTEem weatherproof boot.	
Maximum Power Input:	50 Watts	
Antenna Envelope:	13.7 in. x 13.7 in x 1.38 in. (348x348x35mm)	
Wind Survival:	93 mph (150km/h)	
Weight:	2.78 lbs. (1.26kg)	