# EtherGate

# EtherPoll

# User's Guide

# Addendum

**This addendum should be used in conjunction with the EtherPoll User's Guide.**

Revised January 27, 2004
Firmware Version 4.6

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# Chapter 1
# Introduction

*This chapter provides an overview of the features and capabilities of the EtherGate and the EtherPoll The differences between the EtherPoll and EtherGate are highlighted.*

The EtherPoll is a SCADA communications serial server that allows multi-drop devices to use Ethernet LAN's. The EtherPoll connects any asynchronous serial device through a LAN and between LAN's via routers. The EtherPoll is designed specifically to support all asynchronous polling protocols, such as Poll Select, Modbus, DNP, etc., but is protocol independent. These protocols are often error corrected, and the EtherPoll allows these protocols to work through routed LANs and over IP protocol networks. The EtherPoll uses the UDP/IP protocol, allowing the necessary data connection over a local LAN and across routed networks.

The EtherPoll functions independently of the device protocol, allowing most 8 bit asynchronous protocols to be used with no configuration changes. **The EtherGate, however, is "protocol aware". Its firmware is specifically written for a given protocol (Current models support the DNP and Modbus families of protocols).**

The EtherPoll can receive data from any Serial device, convert the data to a valid IP packet, and transmit that data over the LAN/WAN. That data is normally broadcast to multiple

EtherPolls. Two EtherPolls may be used in "nailed-up" mode to build a "RS-232 path" through the WAN/LAN.

Most EtherPolls are used with multi-drop SCADA RTUs; although a pair of EtherPolls configured for point-to-point operation may be used by any async serial devices such as alarms, access control devices, and multiplexers.

For easy connection to the LAN, the EtherSeries products support 10BaseT and 100BaseT connections.

NOTE: A similar product, the EtherPath, uses TCP/IP protocol and may be more appropriate for some installations. If the application is not a polled environment, the EtherPath should be investigated.

# EtherPoll and EtherGate Functions

The EtherPoll is usually used in a host-to-multiple remote polled environment.

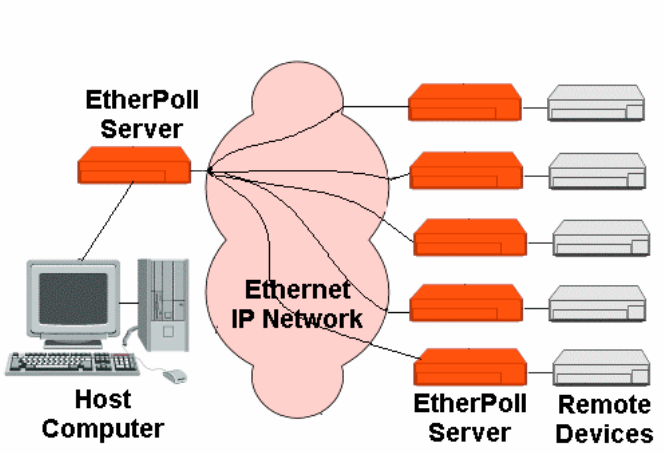


**Figure 1: Normal Mode of Operation**

## Normal Operating Mode (Point-to-Multi-Point)

In this mode, several EtherPolls are used. All are connected to serial RS-232 devices. This is the equivalent to using a multi-drop analog modem network… only it uses ethernet as the medium.

- The "host" EtherPoll will be configured with IP addresses of each “remote” EtherPoll. It is connected to a polling host computer.
- Each “remote” EtherPoll is configured with the IP address of the “host” EtherPoll. These are each connected to a remote terminal unit (RTU).

- Whenever the host computer polls the remotes, a copy of the poll block is sent to each remote in the host Etherpoll's address list.
- The proper remote RTU will respond to the poll through its EtherPoll with a poll response or appropriate data blocks, while other RTUs ignore the poll.

## Point-to-Point Mode

This mode requires one pair of EtherPolls. Each EtherPoll is connected to a serial port device, and to the LAN.

Each EtherPoll has only one IP address in its IP address list (that of the other unit). All data received by the RS-232 port of either EtherPoll is sent to the other EtherPoll and out its RS-232 port.

## Broadcast Mode (Point-to-Multi-Point)

Point-to-multi-point (*broadcast*) operation allows a single EtherPoll to broadcast all incoming data to multiple EtherPolls. Configuration is identical to the normal mode, but since non-polling external devices are used, there is no implicit method to control data being sent back to the host unit. For this reason, it is normally used in "outbound broadcast data only" applications.

## Normal Mode with Backup Polling Host

This mode is also similar to the normal mode, but allows a redundant polling host computer to monitor all data traffic, and take control for fail-safe operation should the master host fail. Configuration changes from normal mode are simple. Each remote EtherPoll would have both the master and backup host EtherPoll IP addresses in its IP address list. The master host

would also have the backup host EtherPoll address in its IP address list.

Each remote EtherPoll sends its data to both the master and backup polling host. If the master host fails, the backup host should be programmed to take over the polling function. It would sense a failure by noting that master host polls are absent.

## Other Features

### UDP/IP Protocol

The EtherPoll uses the UDP/IP protocol. This is much more efficient for a polling system than TCP/IP. Since most polled SCADA systems use protocols that are error corrected, the transport (EtherPoll IP network) doesn't need to provide an additional layer of error correction overhead.

### Protocol Independent

The EtherPoll works well with any byte oriented asynchronous SCADA protocol. It does not require getting "into" the protocol blocks.

### Protocol Conversion

The RS-232 device at the client end and the device at the server end of a link do not have to use the same communications parameters on the RS232 link (speed, parity, flow control). The EtherPolls will convert the data to the correct parameters at each end. This is not SCADA protocol conversion, simply serial speed and parity.

### Upgradeable Firmware

Firmware upgrades are downloadable to the EtherPoll. The utility program required for this, and the actual firmware upgrades, are available from your dealer or the DCB web site.

# EtherPoll & EtherGate Differences

## Overview

The EtherGate operates similarly to the EtherPoll and may be used in a mixed environment with the EtherPoll. An installation might use a single EtherGate at the host computer and multiple EtherPolls at the remote RTU devices. Or, EtherGate devices may be used at each node.

## Functional Differences

### EtherPoll

The EtherPoll is configured with a list of IP addresses corresponding to the remote devices (RTUs or host computer). Each time a block of data is received from the serial port, that block is transmitted individually to each IP address in the list using UDP packets. For example, if there are 16 addresses in the list, the packet is sent 16 times. Since the bandwidth of Ethernet is quite large in relation to that of the serial device (10 or 100 Mbps vs 9.6 Kbps), this extra data does not normally cause a problem. The EtherPoll will only accept data packets (incoming from the Ethernet port) from devices having an entry in its address list.

### EtherGate

The EtherGate is configured also with a list of IP addresses corresponding to the remote devices (RTUs or host computer) AND with the DNP or Modbus protocol address corresponding each one. Each time a block of data is received from the serial port, that block is transmitted using UDP packets ONLY to the IP address in the address list corresponding to the DNP or

Modbus address embedded in the block. For example, if there are 16 addresses in the list, the packet is only sent **one time** to the remote device that matches the address internal to the data block. This operation requires the EtherGate to be "protocol aware", and know where the address is located in all incoming data blocks. Like the EtherPoll, the EtherGate only accepts incoming data from remote devices with an IP address in its address list. It will also ignore any data blocks destined for DNP or Modbus addresses that are not in its address list. These error packets are listed on a display screen.

The EtherGate may be used in any of the standard EtherPoll applications (which use DNP or Modbus protocols)… point-to-point, point-to-multi-point, or multi-point broadcast. However, it is best deployed as the host end of a point-to-multi-point system along with EtherPolls at the remote RTU locations. The EtherGate may also be used in a redundant host system.

The EtherGate minimizes the Ethernet bandwidth requirement. It is ideal for bandwidth limited applications such as Ethernet over radio links, satellite networks, or CDPD links.

# Chapter 2
# Installation

*The EtherGate installation is identical to EtherPoll installation.*

# Chapter 3
# Terminal/Telnet Configuration

*Only Terminal/Telnet menus that are unique to the EtherGate are displayed in this section. Please refer to the EtherPoll manual for details of operation and field values.*

## Welcome Screen

EtherGate V4.6

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Device Name: GW0000B0

Physical Location: Head Office

Configuration setup.

[Press any key to continue]

# LAN Configuration

The LAN configuration screen includes additional fields for the DNP/Modbus address list.

```
LOCAL UNIT CONFIGURATION:
 Local Address: 205.166.54.216      Serial NO: 00:09:AA:00:00:B0
 Gateway Address: (NOT SET)         Subnet Mask: 255.255.255.0
 Remote Port: 3000
 IP Fragmentation: ALLOWED
 Ethernet Mode: Auto

SET LOCAL UNIT CONFIGURATION:
 1  Local IP Address
 2  Show Remote DNP/Modbus->IP Addresses
   A  Add Remote DNP/Modbus->IP Address (=> a 12345 192.168.3.10)
   D  Delete Remote DNP/Modbus Address  (=> d 12345)
 3  Gateway IP Address
 4  Subnet Mask
 5  Port Number
 6  IP Fragmentation [0=ALLOWED, 1=NOT ALLOWED]
 7  Ethernet Mode [0=Auto, 1=100Mb-Full, 2=100Mb-Half, 3=10Mb-
Full, 4=10MB-Half]
 0  -- Return to previous menu
```

# Advanced Configuration

```
ADVANCED CONFIGURATION:
 Pin 4 ON to Pin 3 Transmit Delay: 20 ms
 EtherGate Mode: DNP
 Modbus RTU Message Timer: 7 ms

SET ADVANCED CONFIGURATION:
 1  Pin 4 ON to Pin 3 Transmit Delay  [min=5ms, max=500ms]
 2  EtherGate Mode [0=DNP, 1=MODBUS ASCII, 2=MODBUS RTU]
 3  Modbus RTU Message Timer [min=5ms, max=2000ms]
 0  -- Return to previous menu

EXAMPLE: To set Pin 4 ON to Pin 3 transmit delay to 10ms
  => 1 10

Enter Command =>
  => 1 10


Enter Command =>
```

**Transmit Delay.** Transmit Delay is used to allow for slow links between the EtherGate and the device connected to its serial port. These are most often wireless or modem links. This parameter is seldom changed from the default.

**EtherGate Mode.** Select the correct mode.

**Modbus RTU Message Timer.** Modbus RTU uses idle time to frame messages. If no new data arrives within this time period, any data currently buffered is processed as a complete message.

# Chapter 4
# Browser Configuration

*Only screens that are different from the EtherPoll are shown. Web-based Interface*

## Sign-on Screen

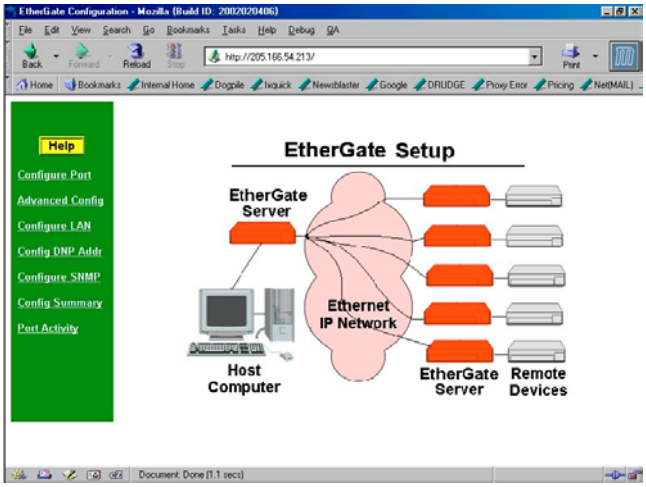


**Figure 2: Sign on Screen**

- Use the menu bar on the left to navigate to the desired screen.
- On-line help is available on each screen.

## Advanced Configuration Screen

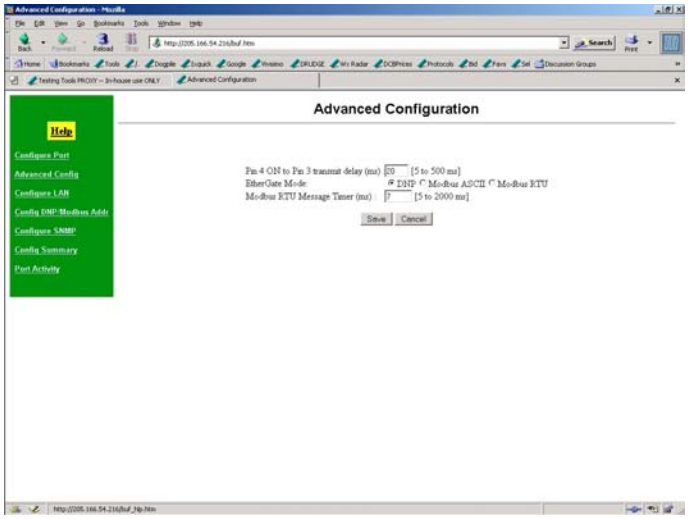


**Figure 3: Advanced Configuration Screen**

Since the EtherGate has knowledge of the DNP/Modbus protocols, only transmit delay timing and the Modbus time-out timer must be configured in the advanced configuration screen.

- The default setting is optimum for a 9600 bps serial port rate.
- This setting is seldom changed, and is most often used with slow intermediate devices (such as a modem or radio pair between the EtherGate and the host computer)
- Modbus RTU uses idle time to frame messages. If no new data arrives within this time period, any data currently buffered is processed as a complete message.

## Port Activity Screen

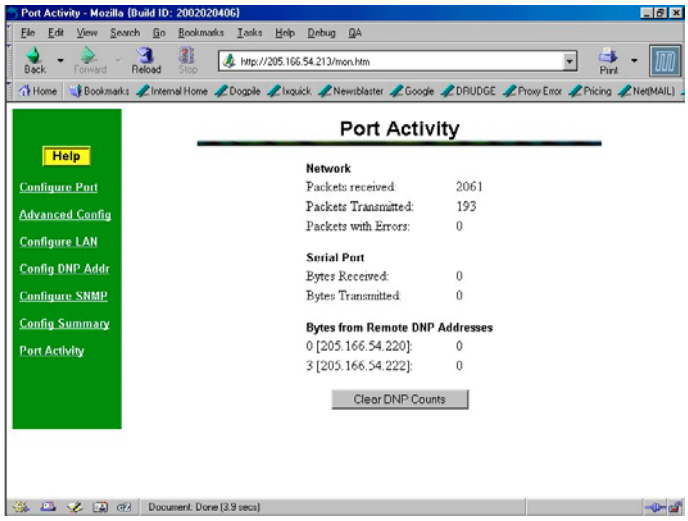


**Figure 4:Port Activity Screen**

This screen displays details about the data currently being transmitted or received, either through the LAN or Serial port. The display is updated every 10 seconds. The EtherGate screen shows the details for each DNP/Modbus address as well as the IP addresses.

The count of bytes from unmapped addresses include bytes from **all** unmapped addresses although the display shows only the last unmapped address heard. This is used for diagnostics.

Polls from unmapped addresses only show the last ten addresses used. This is normally used for diagnostics.

## DNP Address Configuration Screen

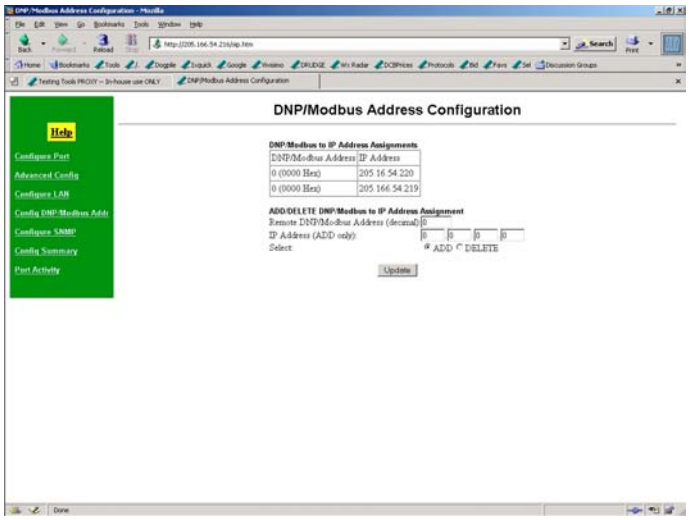


**Figure 5: DNP/Modbus Address Configuration**

Use this screen to configure the remote DNP/Modbus address/IP address table. Individual addresses are added or deleted with this screen. Up to 20 addresses are allowed.

## Configuration Summary Screen

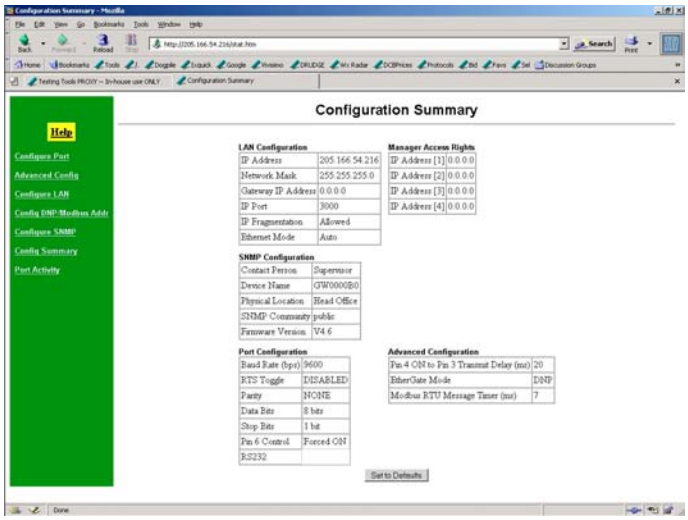


**Figure 6: Configuration Summary**

This screen shows additional DNP/Modbus information not shown on the EtherPoll screen.

# Chapter 5
# Operation

*After configuration, EtherGate operation is similar to EtherPoll operation.*

## Overview

The EtherGate operates similar to the EtherPoll. One major difference is that the EtherPoll broadcasts individual packets to each address in its address list for every block of data received on the serial port. The EtherGate sends the packets ONLY to the intended recipient, as determined by the DNP or Modbus protocol address field.

# Chapter 6
# Troubleshooting

*EtherGate problem diagnosis is identical to EtherPoll troubleshooting.*

If you follow the suggested troubleshooting steps and the EtherPoll still does not function properly, please contact your dealer for further advice.

Additional diagnostics for a non-functional system should include checking counters for individual DNP/Modbus protocol addresses.