

GC Enhanced Firmware

Revision C
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Disclaimer and Revisions

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Date	Rev.	Author	Comments
03-12-13	A	EDL	Initial Release
01-13-16	B	EDL	Updates for firmware V6.8.0.6
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1. Overview

This document describes the additional functionality supplied by the Grid Connect Enhanced firmware upgrade. It is written as a supplement to the standard embedded device server product's user guide.

The GC Enhanced firmware replaces the standard firmware and provides the following additional features:

- Multiple TCP connections (up to 4) or a mixture of TCP and UDP access to the serial port.
- Serial Multiplexer (Mux) protocol support (adopted from xPico-Wifi for embedded platforms only)
- Web API for web to serial port access (adopted from xPico-Wifi)
- Additional DNS support to allow the configuration of a domain name to address the remote host in place of specifying a fixed IP address.
- Email authentication option with configurable user name and password.
- Email serial triggers expanded to support up to a 6-byte match sequence.
- Email trigger option added using a modem dial command where serial data can be placed in the email body.
- Idle Gap Time option of 3 ms for less delay in data delivery with packing enabled.

Some GC Enhanced firmware limitations:

- Only one serial channel supported

The GC Enhanced firmware is available on a number of different embedded device server (ie xPico and XPort) and external device server platforms (ie NET232+ and NET485). The name EDS will be used throughout this document as a generic term for any of the supported embedded/external device server platforms.

2. Configuration Using Web Manager

You must configure the EDS unit so it can communicate a device's serial data on a network. For example, you must set the communication parameters, the way the unit will respond to serial and network traffic, how it will handle serial packets, and when to open or close a connection.

The unit's configuration is stored in nonvolatile memory and is retained without power. You can change the configuration at any time. The unit performs a reset after you change and store the configuration.

In this chapter, we describe how to configure the EDS using the Web Manager, Grid Connect's browser-based configuration tool. (For information on using Setup Mode, our command line configuration interface, see **Configuration Using Telnet or Serial Port**)

Note: The examples in this section show a typical device. Your device may have slightly different configuration options.

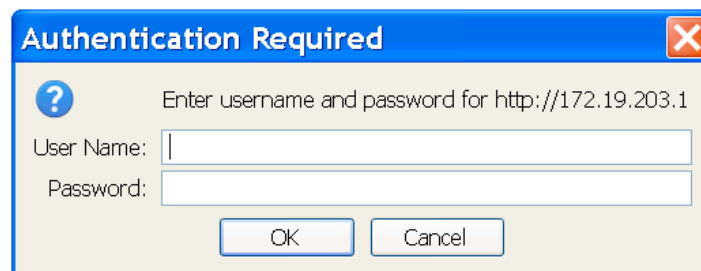
2.1 Accessing the EDS Using DeviceInstaller

1. Run DeviceInstaller and search for the list of available device servers.
2. Click the Search button. The list of available EDS products display.
3. Select the EDS unit by double-clicking its hardware address.
4. In the right pane, click the **Web Configuration** tab.
5. To view the EDS's Web Manager in the current DeviceInstaller window, click the right arrow icon. To open the Web Manager in a web browser, click the External Browser icon.

Note: Alternatively, to open Web Manager, open your web browser and enter the IP address of the EDS directly.

A dialog box appears to prompt for a User Name and Password.

Figure 2-2-1 Web Manager Login Window



6. Perform one of the following:
 - If no Telnet password has been defined (default), leave both fields blank and click OK.
 - If a Telnet password has been defined, leave the username blank, type in the password, and then click OK.

The Device Status page of Web Manager displays.

Figure 2-2 Web Manager

The screenshot shows the Web Manager interface. On the left is a vertical navigation menu with a home icon at the top. The menu items are: Network, Server, Serial Tunnel, Hostlist, Channel 1, Serial Settings, Connection 1, Connection 2, Connection 3,4, Email, Trigger 1, Trigger 2, Trigger 3, Configurable Pins, Apply Settings, and Apply Defaults. The main content area is titled "Device Status" and contains three sections: Product Information, Network Settings, and Line settings. Each section contains a table of configuration details.

Product Information	
Firmware Version:	V6.11.0.11GC
Build Date:	08-Oct-2018

Network Settings	
MAC Address:	00-80-A3-93-AB-F4
Network Mode:	Wired
DHCP HostName:	< None >
IP Address:	172.20.206.44
Default Gateway:	172.20.206.252
DNS Server:	0.0.0.0
MTU:	1400

Line settings	
Line 1:	RS232, 9600, 8, None, 1, None.

WebManager Version: 2.0.0.11GC

7. Navigate between pages by clicking links in the left pane of the Web Manager window.

2.2 Network Configuration

The unit's network values display when you select **Network** from the main menu. The following sections describe the configurable parameters on the Network Settings page.

Figure 2-2-3 Network Settings

Network Settings

Network Mode:

Wired Only

IP Configuration

Obtain IP address automatically

Auto Configuration Methods

BOOTP:

Enable

Disable

DHCP:

Enable

Disable

AutoIP:

Enable

Disable

DHCP Host Name:

Use the following IP configuration:

IP Address:

Subnet Mask:

Default Gateway:

DNS Server:

Backup DNS Server:

0.0.0.0

Ethernet Configuration

Auto Negotiate

Speed:

100 Mbps

10 Mbps

Duplex:

Full

Half

OK

2.2.1 Network Mode

1. Click **Network** from the main menu.
2. Note the following:

Network Mode	Select Wireless Only to enable only the wireless network. Select Wired Only to enable only the Ethernet network connectivity. Select Bridging to enable bridging. For an EDS that does not support Wifi, Wired Only is the only choice.
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1-4

GC Enhanced Firmware User Guide

2.2.2 Automatic IP Address Configuration

An IP address can be assigned automatically. You then enter related network settings.

To assign an IP address automatically:

1. On the main menu, click **Network**.
2. Select **Obtain IP address automatically**.
3. Enter the following (as necessary):

BOOTP	Select Enable to permit the Bootstrap Protocol (BOOTP) server to assign the IP address from a pool of addresses automatically. Enable is the default.
DHCP	Select Enable to permit the Dynamic Host Configuration Protocol (DHCP) to assign a leased IP address to the EDS unit automatically. Enable is the default.
AutoIP	Select Enable to permit the EDS to generate an IP in the 169.254.x.x address range with a Class B subnet. Enable is the default.
DHCP Host Name	Enter the name of the host on the network providing the IP address.

Note: Disabling BOOTP, DHCP, and AutoIP (all three checkboxes) is not advised as the only available IP assignment method will then be ARP or serial port.

4. When you are finished, click the **OK** button.
5. On the main menu, click **Apply Settings**.

2.2.3 Static IP Address Configuration

You can manually assign an IP address to the unit and enter related network settings.

To assign an IP address manually:

1. On the main menu, click **Network**.
2. Select **Use the following IP configuration**.
3. Enter the following (as necessary):

IP Address	If DHCP is not used to assign IP addresses, enter it manually in decimal-dot notation. The IP address must be set to a unique value in the network.
Subnet Mask	A subnet mask defines the number of bits taken from the IP address that are assigned for the host part.
Default Gateway	The gateway address, or router, allows communication to other LAN segments. The gateway address should be the IP address of the router connected to the same LAN segment as the unit. The gateway address must be within the local network.
DNS Server	The DNS server allows the name of a remote machine to be resolved automatically. Enter the IP address of the DNS server. If the device is DHCP enabled, the DHCP server provides the DNS server IP address, which will override this configured value.

Backup DNS Server	The Backup DNS server allows the name of a remote machine to be resolved in cases where the primary DNS server is unavailable. Enter the IP address of the Backup DNS server. If the device is DHCP enabled, the backup DNS server will be used if the primary DNS server supplied by the DHCP server is unavailable or unable to resolve the name.
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4. When you are finished, click the **OK** button.
5. On the main menu, click **Apply Settings**.

2.2.4 Ethernet Configuration

You must specify the speed and direction of data transmission.

To specify how data will be transmitted:

1. On the main menu, click **Network**.
2. Enter the following (as necessary):

Auto Negotiate	<p>With this option, the Ethernet port auto-negotiates the speed and duplex with the hardware endpoint to which it is connected. This is the default.</p> <p>If this option is not selected, complete the fields that become available:</p> <p>Speed: The speed of data transmission. The default setting is 100 Mbps.</p> <p>Duplex: The direction of data transmission. The default setting is Full.</p>
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3. When you are finished, click the **OK** button.
4. On the main menu, click **Apply Settings**.

2.3 Server Configuration

The unit's server values display when you select **Server** from the main menu. The following sections describe the configurable parameters on the Server Settings page.

Figure 2-2-4 Server Settings

Server Settings

Server Configuration

Enhanced Password: ☐ Enable ☒ Disable

Telnet/Web Manager Password:

Retype Password:

Advanced

ARP Cache Timeout (secs):

TCP Keepalive (secs):

Monitor Mode @ Bootup: ☒ Enable ☐ Disable

CPU Performance Mode: ☐ Low ☒ Regular ☐ High

HTTP Server Port:

Config Server Port:

MTU Size:

TCP Re-transmission timeout (ms):

To configure the EDS device server settings:

1. On the main menu, click **Server**.
2. Configure or modify the following fields:

Server Configuration

Enhanced Password	Select whether to enable advanced password: Enable: selecting this option enables advanced password creation, allowing you to create passwords up to 16 bytes in length. Disable: selecting this option disables advanced password creation, allowing you to create basic passwords up to 4 bytes in length.
Telnet/Web Manager Password	Enter the password required for Telnet configuration and Web Manager access. No password or entering a "blank" password entry will disable default password protection.
Retype Password	Re-enter the password required for Telnet configuration and Web Manager access.

Advanced

ARP Cache Timeout (secs)	When the unit communicates with another device on the network, it adds an entry into its ARP table. ARP Cache timeout defines the number of seconds (1-600) before it refreshes this table.
TCP Keepalive (secs)	TCP Keepalive time defines how many seconds the unit waits during an inactive connection before checking its status. If the unit does not receive a response, it drops that connection. Enter a value between 0 and 60 seconds. 0 disables keepalive. The default setting is 45 .
Monitor Mode @ Bootup	Select Disable to disable entry into the monitor mode using the yyy or xx1 key sequence at startup. This field prevents the unit from entering monitor mode by interpreting the stream of characters that are received during the device server's initialization at startup. The default setting is Enable .
CPU Performance Mode	Select the EDS's performance mode. Higher performance settings require more energy. Low is 26 MHz. Regular is 48 MHz; High is 88 MHz. The default is Regular .
HTTP Server Port	This option allows the configuration of the web server port number. The valid range is 1-65535 . The default setting is 80.
Config Server Port	Not a configurable setting for this product.
MTU Size	The Maximum Transmission Unit (MTU) is the largest physical packet size a network can transmit for TCP and UDP. Enter between 512 and 1400 bytes. The default setting is 1400 bytes.
TCP Re-transmission timeout (ms)	The desired TCP re-transmission timeout value. If the ACK is not received for a packet sent from the EDS device, then the unit will retransmit the data. The valid range is 500-4000 msec. The default is 500.

- When you are finished, click the **OK** button.

2.4 Host List Configuration

The EDS scrolls through the host list until it connects to a device listed in the host list table. After a successful connection, the unit stops trying to connect to any others. If this connection fails, the unit continues to scroll through the table until the next successful connection.

The host list supports a minimum of 1 and a maximum of 12 entries. Each entry contains an IP address and a port number.

Note: The host list is disabled for Manual and Modem Mode. The unit does not accept a data connection from a remote device when the hostlist option is enabled.

To configure the host list:

- 1. On the main menu, click **Hostlist**.

Figure 2-2-5 Hostlist Settings

Hostlist Settings

Retry Settings

Retry Counter: 3 Retry Timeout: 250

Host Information

No.	Host Address	Port	No.	Host Address	Port
1	0.0.0.0	0	2	0.0.0.0	0
3	0.0.0.0	0	4	0.0.0.0	0
5	0.0.0.0	0	6	0.0.0.0	0
7	0.0.0.0	0	8	0.0.0.0	0
9	0.0.0.0	0	10	0.0.0.0	0
11	0.0.0.0	0	12	0.0.0.0	0

OK

- 2. Enter or modify the following fields:

Retry Settings

Retry Counter	Enter the value for the number of times the EDS should attempt to retry connecting to the host list. The default setting is 3 .
Retry Timeout	Enter the duration (in milliseconds) the EDS should abandon attempting a connection to the host list. The default setting is 250 .

Host Information

Host Address	Enter or modify the host's IP address.
Port	Enter the target port number.

- 3. When you are finished, click the **OK** button.
- 4. On the main menu, click **Apply Settings**.

2.5 Channel 1 Configuration

The Channel 1 configuration defines how the serial ports respond to network and serial communication.

2.5.1 Serial Settings

To configure the channel's serial settings:

1. On the main menu, click **Serial Settings** (under **Channel 1**) to display the Serial Settings window.

Figure 2-2-6 Channel Serial Settings

Serial Settings

Channel 1

☐ Disable Serial Port

Port Settings

Protocol: RS232

Flow Control: None

Baud Rate: 9600

Data Bits: 8

Parity: None

Stop Bits: 1

Pack Control

☐ Enable Packing

Idle Gap Time: 12 msec

Match 2 Byte Sequence: ☐ Yes ☒ No

Match Bytes: 0x00 0x00 (Hex)

Send Frame Immediate: ☐ Yes ☒ No

Send Trailing Bytes: ☒ None ☐ One ☐ Two

Flush Mode

Flush Input Buffer

With Active Connect: ☐ Yes ☒ No

With Passive Connect: ☐ Yes ☒ No

At Time of Disconnect: ☐ Yes ☒ No

Flush Output Buffer

With Active Connect: ☐ Yes ☒ No

With Passive Connect: ☐ Yes ☒ No

At Time of Disconnect: ☐ Yes ☒ No

OK

2. In the available fields, enter the following information:

Channel 1

Disable Serial Port	<p>When selected, disables communication through the serial port. The serial port is enabled by default.</p> <p><i>Note: This feature is not available on single port device servers, since it can not be applied to channel 1.</i></p>
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Port Settings

Protocol	From the drop-down menu, select the protocol type for the selected channel. The default setting is RS232 .
Flow Control	Flow control manages data flow between devices in a network to ensure it is processed efficiently. Too much data arriving before a device is prepared to manage it causes lost or retransmitted data. None is the default.
Baud Rate	The unit and attached serial device, such as a modem, must agree on a speed or baud rate to use for the serial connection. Valid baud rates are 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, and 230400 baud. Additionally, 921600 and 460800 baud rates are available when CPU performance is set to High. The default setting is 9600 .
Data Bits	Indicates the number of data bits in a transmitted serial frame. The default setting is 8 .
Parity	Checks for the parity bit. The default setting is None .
Stop Bits	The stop bit follows the data and parity bits in serial communication. It indicates the end of transmission. The default setting is 1 .

Pack Control

Enable Packing	Select to enable packing on the EDS. Two firmware-selectable packing algorithms define how and when packets are sent to the network. The standard algorithm is optimized for applications in which the unit is used in a local environment, allowing for very small delays for single characters, while keeping the packet count low. The alternate packing algorithm minimizes the packet count on the network and is especially useful in applications in a routed Wide Area Network (WAN). Adjusting parameters in this mode can economize the network data stream. Disabled by default.
Idle Gap Time	Select the maximum time for inactivity before serial data is forwarded to the network. The default time is 12 milliseconds.
Match 2 Byte Sequence	Use to indicate the end of a series of data to be sent as one group. The sequence must occur sequentially to indicate end of the data collection to the EDS. The default setting is No .
Match Bytes	Use to indicate the end of a series of data to be sent as one group. Set this value to 00 if specific functions are not needed.
Send Frame Immediate	After the detection of the byte sequence, indicates whether to send the data frame or the entire buffer. Select Yes to send only the data frame. The default setting is No .
Send Trailing Bytes	Select the number of bytes to send after the end-of-sequence match characters. The default setting is None .

Flush Input Buffer (Serial to Network)

With Active Connect	Select Yes to clear the input buffer with a connection that is initiated from the device to the network. The default setting is No .
With Passive Connect	Select Yes to clear the input buffer with a connection initiated from the network to the device. The default setting is No .
At Time of Disconnect	Select Yes to clear the input buffer when the network connection to or from the device is disconnected. The default setting is No .

Flush Output Buffer (Network to Serial)

With Active Connect	Select Yes to clear the output buffer with a connection that is initiated from the device to the network. The default setting is No .
With Passive Connect	Select Yes to clear the output buffer with a connection initiated from the network to the device. The default setting is No .
At Time of Disconnect	Select Yes to clear the output buffer when the network connection to or from the device is disconnected. The default setting is No .

3. When you are finished, click the **OK** button.
4. On the main menu, click **Apply Settings**.

2.5.2 Connection Settings - TCP

The EDS with GC Enhanced firmware supports a maximum of 4 TCP connections. Connection 1 and Connection 2 support TCP server/client modes and UDP. Connection 3,4 supports a passive TCP connection only with the option of allowing data to only pass in the serial to network direction.

1. On the main menu, click **Connection 1**, **Connection 2** or **Connection 3,4**. The Connection Settings window for the channel displays.

Figure 2-2-7 TCP Connection Settings

Connection Settings	
Connection 1	
Connect Protocol Protocol: <input type="text" value="TCP"/>	
Connect Mode	
Passive Connection (server mode): Accept Incoming: <input type="text" value="Yes"/> Password Required: <input type="radio"/> Yes <input checked="" type="radio"/> No Password: <input type="text"/> Modem Escape Sequence Pass Through: <input checked="" type="radio"/> Yes <input type="radio"/> No	Active Connection (client mode): Active Connect: <input type="text" value="None"/> Start Character: 0x <input type="text" value="0D"/> (in Hex) Modem Mode: <input type="text" value="None"/> Show IP Address After RING: <input checked="" type="radio"/> Yes <input type="radio"/> No
Endpoint Configuration: Local Port: <input type="text" value="10001"/> Remote Port: <input type="text" value="0"/> Remote Host: <input type="text"/> <input type="checkbox"/> Auto increment for active connect	
Common Options: Telnet Conn Port Cntrl: <input type="text" value="Disable"/> Terminal Name: <input type="text"/> Connect Response: <input type="text" value="None"/> Use Hostlist: <input type="radio"/> Yes <input checked="" type="radio"/> No LED: <input type="text" value="Blink"/>	
Disconnect Mode On Mdm_Ctrl_In Drop: <input type="radio"/> Yes <input checked="" type="radio"/> No Check EOT(Ctrl-D): <input type="radio"/> Yes <input checked="" type="radio"/> No Hard Disconnect: <input checked="" type="radio"/> Yes <input type="radio"/> No Inactivity Timeout: <input type="text" value="0"/> : <input type="text" value="0"/> (mins : secs)	
<input type="button" value="OK"/>	

Connection Settings	
Connection 3,4	
Connect Protocol Protocol: <input type="text" value="TCP"/>	
Connect Mode	
Passive Connection (server mode only): Accept Incoming: <input type="text" value="No"/> Local Port: <input type="text" value="10003"/> (Two connections) <input type="checkbox"/> Serial to network only	
<input type="button" value="OK"/>	

2. In the available fields, enter or modify the following information:

Connect Protocol

Protocol	From the drop-down menu, select TCP .
-----------------	----------------------------------------------

Connect Mode: Passive Connection (server mode)

Accept Incoming	Select Yes to accept incoming connections. The default setting is Yes . . Otherwise, indicate the connection type from the drop-down list: No: Never accepts external connection requests. With Active Mdm Ctrl In: Accepts external connection requests only when the Modem Control In serial input is asserted.
Password Required	Determines whether a password is required by the TCP connection. The device on the other end of the TCP connection must send the password to authenticate before serial data will be communicated. This field is not available when a Terminal Name is set for Telnet mode. The default setting is No . <i>Note: Connection 3,4 cannot be protected with a password.</i>
Password	If Password Required was set to Yes , enter the authentication password for TCP connections.
Modem Escape Sequence Pass Through	Disable or enable the EDS's ability to pass the modem escape sequence on the TCP connection. The default is Yes (pass the escape sequence).

Connect Mode: Active Connection (client mode)

Active Connect	Select None (default) to disable Active Connect . Otherwise, indicate the connection type from the drop-down list: With Any Character: Attempts to connect when any character is received from the serial port. With Active Mdm Ctrl In: Attempts to connect when the Modem Control In serial input becomes asserted. With Start Character: Attempts to connect when it receives a specific start character from the serial port. The default start character is carriage return. Manual Connection: Attempts to connect when directed by a command string received from the serial port. Auto Start: Automatically connects to the remote host address and port after booting up.
Start Character	If Active Connect is set to With Start Character , enter the start character in this field. The default setting is 0D for carriage return.
Modem Mode	Enables modem emulation mode and indicates the serial response type. The default setting is None , modem emulation disabled.

Show IP Address After RING	Indicates whether to display the remote IP address upon connection when in modem emulation mode. The default setting is Yes .
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Endpoint Configuration

Local Port	Enter the local port number. The default setting is 10001 and 10002 for Connection 1 and Connection 2 respectively. The port numbers can also be set to the same number for all connections especially if they all offer the same services.
Auto increment for active connect	Select to auto-increment the local port number for new outgoing connections. The range of auto-incremented port numbers is 50,000 to 59,999 and loops back to the beginning when the maximum range is reached. Disabled by default.
Remote Port	Enter the remote port number.
Remote Host	Enter the IP address or domain name of the remote device. Using a domain name requires configuration of a DNS server.

Connect Mode: Passive Connection (server mode only)

Accept Incoming	<p>Select Yes to accept incoming connections. The default setting is No . Otherwise, indicate the connection type from the drop-down list:</p> <p>No: Never accepts external connection requests.</p> <p>With Active Mdm Ctrl In: Accepts external connection requests only when the Modem Control In serial input is asserted.</p> <p><i>Note: Connection 3,4 is automatically disabled when Encryption or Password Required is enabled.</i></p>
Local Port	Enter the local port number. The default setting is 10003 for Connection 3,4. The port numbers can also be set to the same number for all connections especially if they all offer the same services.
Serial to network only	<p>Select to disable the network to serial path for Connection 3,4.</p> <p><i>Note: The network to serial path is automatically disabled on the XPort when configured for RS485 – 2 wire serial communication.</i></p>

Common Options

Telnet Com Port Cntrl	Select Enable to permit Out-Of-Band Telnet Com port control commands to and from the EDS unit on the TCP connection. The Telnet Com Port Cntrl feature is used in conjunction with the Com Port Redirector (CPR) utility and the RFC 2217 option. (See the CPR online Help for details.)
Terminal Name	This field is available for configuration only when Telnet Com Port Cntrl is set to Enable . Use the terminal name for the Telnet terminal type. Enter only one name. When this option is enabled, the unit also reacts to the end of record (EOR) and binary options, which can be used for applications such as terminal emulation to IBM hosts.
Connect Response	A single character is transmitted to the serial port when there is a change in connection state. The default setting is None.
Use Hostlist	If this option is set to Yes , the device server scrolls through the host list until it connects to a device listed in the host list table. Once it connects, the unit stops trying to connect to any others. If this connection fails, the unit continues to scroll through the table until it connects to another IP in the host list. The host list is disabled for Manual Mode and for Modem Mode. The unit will not accept a data connection from a remote device when the host list option is enabled.
LED	Select Blink for the status LEDs to blink upon successful TCP connection or Off for no LED output. The default setting is Blink.

Disconnect Mode

On Mdm_Ctrl_In Drop	Set to Yes for the TCP connection for the serial port to disconnect (drop) when Modem Control In transitions from an asserted state to not asserted state. The default setting is No .
Hard Disconnect	When set to Yes , the TCP connection closes even if the remote site does not acknowledge the disconnect request.
Check EOT (Ctrl-D)	Select Yes to drop the connection when Ctrl-D or Hex 04 is detected on the serial input. Both Telnet Com Port Cntrl and Check EOT (Ctrl+ D) must be enabled for Disconnect with EOT to function properly. Ctrl+D is only detected going from the serial port to the network. The default setting is No .
Inactivity Timeout	Use this parameter to set an inactivity timeout. The unit drops the connection if there is no activity on the serial line or TCP connection before the set time expires. Enter time in the format mm:ss, where m is the number of minutes and s is the number of seconds. To disable the inactivity timeout, enter 00:00 .

- When you are finished, click the **OK** button.

- On the main menu, click **Apply Settings**.

2.5.3 Connection Settings - UDP

To configure a channel's UDP settings:

- On the main menu, click **Connection 1** or **Connection 2**. The Connection Settings window for the selected channel displays.
- In the available fields, enter or modify the following information:

Figure 2-8 UDP Connection Settings

The screenshot shows the 'Connection Settings' window for 'Connection 1'. The 'Connect Protocol' is set to 'UDP'. Under 'Datagram Mode', 'Datagram Type' is '00' and 'Accept Incoming' is 'Yes'. Under 'Endpoint Configuration', 'Local Port' is '10001', 'Remote Port' is '0', and 'Remote Host' is empty. There is a checkbox for 'Use Broadcast' which is unchecked. Below this is a 'Device Address Table' with 16 rows (0-15) and 2 columns (No., Dev Addr). Each 'Dev Addr' field contains '0'. An 'OK' button is at the bottom right.

Connect Protocol

Protocol	Select UDP from the drop-down menu. <i>Note: Selecting UDP for both Connection 1 and Connection 2 will disable TCP Connection 3,4.</i>
-----------------	--------------------------------------------------------------------------------------------------------------------------------------------------

Datagram Mode

Datagram Type	Configures the UDP interface mode with the serial device. Enter 01 for a transparent serial interface using directed or broadcast UDP. The default setting is 00 . See 4 UDP Datagram Types for a description of the UDP datagram types.
Accept Incoming	Select Yes to accept incoming UDP datagrams. The default setting is Yes .

Endpoint Configuration

Local Port	Enter the local port number.
Remote Port	Enter the port number of the remote device.
Remote Host	Enter the IP address or domain name of the remote device. Using a domain name requires configuration of a DNS server.
Use Broadcast	Select to broadcast the UDP datagram. Datagrams of type 01 can be sent as a broadcast by enabling this option. The default is not to broadcast. <i>Note: Datagrams are sent as subnet-directed broadcasts.</i>
Device Address Table	This table is not enabled or supported by this firmware.

- When you are finished, click the **OK** button.
- On the main menu, click **Apply Settings**.

2.5.4 Connection Settings – MUX

The Serial Multiplexer (MUX) feature allows the host device to individually control and manage the data communication of the 4 connections available in the Enhanced firmware. For compatibility, the MUX protocol implemented in the Enhanced firmware was adopted from the xPico Wi-Fi Embedded Device Server.

The embedded device server provides a "Mux" Line Protocol for the serial Line to manage and transfer data on multiple connections without requiring custom software on the EDS. A host processor that is connected to the device via the serial Line sees a simple command/response interface. There are no intentional delays required in the normal handshake.

Only Connection 1 can be set for MUX protocol mode and doing so makes Connection 2 and Connection 3,4 options inaccessible. There are no configuration options for the MUX protocol mode because the serial line commands will control all the connection activities. See the xPico Wi-Fi Embedded Device Server User Guide for a full description of the Serial Multiplexer protocol.

Figure 2-8 MUX Connection Page

The screenshot shows a web interface titled "Connection Settings". Under the heading "Connection 1", there is a "Connect Protocol" section with a dropdown menu showing "MUX". Below this is a "Multiplexer Mode" section which is currently empty. At the bottom right of the form is an "OK" button.

2.6 Email Configuration

The unit sends an email to multiple recipients when a specific trigger event occurs. There are three separate triggers, based on any combination of the configurable pins when selected as user I/O functions. Optionally, use up to a six-byte serial string to initiate a trigger. Each trigger is independent of the others. Each condition within an individual trigger must be met before the unit will send the email.

To configure the EDS's email settings:

1. On the main menu, select **Email**. The Email Settings window opens.

Figure 2-9 Email Settings

The screenshot shows the 'Email Settings' window. It has a title bar 'Email Settings'. The main area is divided into sections by horizontal lines. The first section has 'SMTP Server:' followed by a text box, and 'Server Port:' followed by a text box containing '25'. Below these are 'Domain Name:' and 'Unit Name:' text boxes. The second section is titled 'Authentication' and contains 'Username:' and 'Password:' text boxes. The third section is titled 'Recipients' and contains two sets of labels: 'Recipient 1:' followed by 'Email Address:' and a text box, and 'Recipient 2:' followed by 'Email Address:' and a text box. The fourth section is titled 'Modem Dial Trigger' and contains a checkbox labeled 'Enable Modem Dial (ATDT) Trigger' and a 'Message:' text box. An 'OK' button is located at the bottom right of the window.

2. Configure or modify the following fields:

SMTP Server	Enter the IP address or domain name of the mail server.
Server Port	Enter the port number of the email server.
Domain Name	Enter the domain name to be used in the email's <i>From</i> address field (UnitName@DomainName).
Unit Name	Enter the unit name to be used in the email's <i>From</i> address field (UnitName@DomainName). Spaces are not permitted.

Authentication

Username	Enter the Username for the account on the email server.
Password	Enter the password for the account on the email server.

Recipients

Recipient 1: Email Address	Enter the email address designated to receive email notifications.
Recipient 2: Email Address	Enter the email address designated to receive email notifications.

Modem Dial Trigger

Enable Modem Dial (ATDT) Trigger	<p>Select to enable an email trigger when a modem dial command (ATDT) is received on the serial port. The modem dial command will only be recognized when the Connection 1 TCP connection is not active.</p> <p>The ATDT command can be followed by up to 80 characters that will be placed in the body of the email. The ATDT command is terminated with a carriage return.</p> <p>Example: 'ATDT Temperature is 125 degF<cr>'</p> <p><i>Note: Connection 1 must be set for protocol TCP with Active Connect set to None.</i></p>
Message	<p>The subject line of the trigger event email to the specified recipient(s).</p> <p>Example: 'Alarm detected'</p>

3. When you are finished, click the OK button.

4. On the main menu, click Apply Settings.

Trigger Configuration

A trigger event occurs when the unit receives the specified trigger input resulting from a specified combination of conditions on the configurable pins.

Set the configurable pins to Active, Inactive, or None. The configurable pins are disabled if they are all set to None. If both the serial sequence and the configurable pins are disabled, the trigger is disabled.

To configure the EDS's email trigger settings:

1. On the main menu, select **Email - Trigger 1, Trigger 2 or Trigger 3** to configure the desired trigger settings. The Email Trigger Settings page opens.

Figure 2-10 Email Trigger Settings

2. Configure or modify the following fields:

Conditions

Configurable Pins	Select the condition from the drop-down menu for the configurable pins. Repeat for each Trigger Input field.
Enable Serial Trigger Input	Enabling this option causes specified serial communications to count as a trigger input.
Channel	Select the channel prompting the trigger. For the GC Enhanced Firmware, there is only one channel.
Data Size	Select the data size prompting the trigger.
Match Data	Enter the data, which, when it appears in the communication stream, prompts a trigger.

Note:: All of the conditions must match for the EDS to send an email notification.

Message Properties

Message	The subject line of the trigger event email to the specified recipient(s).
Priority	The priority level for the email.
Min. Notification Interval	The minimum time allowed between individual triggers. If a trigger event occurs within the minimum interval since the last trigger, it is ignored.
Re-notification Interval	The time interval in which a new email message is sent to the

	recipient(s) when a single trigger event remains active.
--	----------------------------------------------------------

3. When you are finished, click the OK button.
4. On the main menu, click **Apply Settings**.

2.7 Configurable Pin Settings

There are up to eleven configurable hardware pins on the EDS unit. For each pin, configure the pin function, communication direction, and activity level. For more information, see the GPIO Interface section of the user manual for your specific product.

To configure the EDS's Configurable Pins:

1. On the main menu, click **Configurable Pins**. The Configurable Pins page opens.

Figure 2-11 Configurable Pin Settings

CP	Function	Direction	Trigger Input	Active Level
1	General Purpose I/O	<input checked="" type="radio"/> Input <input type="radio"/> Output	<input type="checkbox"/>	<input checked="" type="radio"/> Low <input type="radio"/> High
2	General Purpose I/O	<input checked="" type="radio"/> Input <input type="radio"/> Output	<input type="checkbox"/>	<input checked="" type="radio"/> Low <input type="radio"/> High
3	General Purpose I/O	<input checked="" type="radio"/> Input <input type="radio"/> Output	<input type="checkbox"/>	<input checked="" type="radio"/> Low <input type="radio"/> High
4	General Purpose I/O	<input checked="" type="radio"/> Input <input type="radio"/> Output	<input type="checkbox"/>	<input checked="" type="radio"/> Low <input type="radio"/> High
5	General Purpose I/O	<input checked="" type="radio"/> Input <input type="radio"/> Output	<input type="checkbox"/>	<input checked="" type="radio"/> Low <input type="radio"/> High
6	General Purpose I/O	<input checked="" type="radio"/> Input <input type="radio"/> Output	<input type="checkbox"/>	<input checked="" type="radio"/> Low <input type="radio"/> High
7	General Purpose I/O	<input checked="" type="radio"/> Input <input type="radio"/> Output	<input type="checkbox"/>	<input checked="" type="radio"/> Low <input type="radio"/> High
8	General Purpose I/O	<input checked="" type="radio"/> Input <input type="radio"/> Output	<input type="checkbox"/>	<input checked="" type="radio"/> Low <input type="radio"/> High

OK

2. Configure or modify the following fields for each pin:

Function	From the drop-down list, select the purpose of the specified pin. See Configurable Pin Functions for a description of each available function.
Direction	Select whether the pin inputs or outputs.
Trigger Input	Select whether the GPIO input signal is to be used as a trigger condition for email.

Active Level	Select the signal active level (Low or High).
---------------------	---------------------------------------------------------------

Configurable Pin Functions

General Purpose I/O	Monitors input using the 77F0 port or controls output by the 77F0 port.
Modem Ctrl Channel 1 In	For DTE device configuration this would be the DCD control line.
Modem Ctrl Channel 1 Out	For DTE device configuration this would be the DTR control line.
RS485 Tx Enable	RS485 transceiver enable output.
RS485 Select Channel 1	Optional control signal that enables toggling between RS232 and RS485 on OEM hardware design.
RS485 2-Wire Channel 1	Optional control signal that enables toggling between RS485 2-wire and 4-wire mode on OEM hardware design.
Serial Channel 1 Status LED	Indicates channel 1 status and extended diagnostics.

3. When you are finished, click the **OK** button.
4. On the main menu, click **Apply Settings**.

2.8 Apply Settings

1. To save and apply the configuration changes to the device server, click the **Apply Settings** button.

*Note: Clicking **OK** on each page does not change the configuration on the device. Clicking the **OK** button tells the EDS what changes to use; the **Apply Settings** button makes the changes permanent and reboots the EDS.*

2.9 Apply Defaults

1. Click the **Apply Defaults** button to set the device server back to the default settings. For details see [Default Settings \(Option 7\)](#).
2. Click **Yes** to set factory settings, or click **No** to cancel.

3. Configuration Using Telnet or Serial Port

You must configure the unit so that it can communicate on a network with your serial device. The unit's configuration is stored in nonvolatile memory and is retained without power. You can change the configuration at any time. The unit performs a reset after the configuration has been changed and stored.

3.1.1 Using the Serial Port

If you want to initially configure the unit through a serial connection, follow these steps:

1. Connect a console terminal or PC running a terminal emulation program to your unit's serial port. The power-on setup mode serial port settings are 9600 baud, 8 bits, no parity, 1 stop bit, no flow control.
2. To enter Setup Mode, reset the unit by cycling the unit's power (power off and back on). The setup mode self-test will begin and will run for about 5 seconds. **You have 5 seconds** to enter three lowercase **x** characters (**xxx**).

*Note: The easiest way to enter Setup Mode is to hold down the **x** key at the terminal (or emulation) while turning the power off and on.*

3. At this point, the screen display is the same as when you use a Telnet connection. To continue with a serial port login, skip ahead to *Telnet and Serial Port Messages*.

3.1.2 Using a Telnet Connection

To configure the unit over the network, establish a Telnet connection to port 9999.

Note: If you use the Telnet Configuration tab on Device Installer OR a serial port login to establish the connection, skip steps 1 and 2.

1. From the Windows Start menu, click **Run** and type the following command, where x.x.x.x is the IP address and 9999 is the unit's fixed network configuration port number.

```
telnet x.x.x.x 9999
```

Note: Be sure to include a space between the IP address and 9999.

2. Click **OK**.

3.1.3 Telnet and Serial Port Messages

At this point, the telnet and serial port messages are the same.

3. The window displays:

```
MAC address 0080A3934000
Software version V6.8.0.2 (120628) XPICO  (Yours may be different)
Press Enter for Setup Mode
```

4. To enter the Setup Mode, **you must press Enter within 5 seconds**. The configuration settings will appear.
5. Select an option on the menu by entering the number of the option in the **Your choice ?** field and pressing **Enter**.
6. To enter a value for a parameter, type the value and press **Enter**, or to confirm a current value, just press **Enter**.
7. When you are finished, save the new configurations (option **9**). The unit will reboot.

*** basic parameters
Hardware: Ethernet TPI
IP addr - 0.0.0.0/DHCP/BOOTP/AutoIP, no gateway set
DNS Server not set
Backup DNS Server not set
DHCP device name : not set
DHCP FQDN option: Disabled

*** Security
SNMP is enabled
SNMP Community Name: public
Telnet Setup is enabled
TFTP Download is enabled
Port 77FEh is enabled
77FEh Access Mode is Read & Write
Web Server is enabled
Web Setup is enabled
Web API is enabled
ECHO is disabled
Encryption is disabled
Enhanced Password is disabled
Port 77F0h is enabled

*** Channel 1
- Serial Settings
Baudrate 9600, I/F Mode 4C, Flow 00
Flush Mode : 00

- Connection 1
Port 10001
Connect Mode : C0
Send '+++' in Modem Mode enabled
Show IP addr after 'RING' enabled
Auto increment source port disabled
Remote Host : --- none ---, Port 00000
Disconn Mode : 00

- Connection 2
Port 10002
Connect Mode : 00
Send '+++' in Modem Mode enabled
Show IP addr after 'RING' enabled
Auto increment source port disabled
Remote Host : --- none ---, Port 00000
Disconn Mode : 00

- Connection 3,4
Port 10003
Connect Mode : 00

*** Expert
TCP Keepalive : 45s
ARP cache timeout: 600s
CPU performance: Regular
Monitor Mode @ bootup : enabled
HTTP Port Number : 80
SMTP Port Number : 25
MTU Size: 1400

TCP Re-transmission timeout: 500 ms
Alternate MAC: disabled
Ethernet connection type: auto-negotiate

*** E-mail

Mail server: --- none ---
SMTP User : , Password not set!
Unit :
Domain :
Recipient 1:
Recipient 2:

- Modem Dial Trigger
Serial modem dial trigger: disabled
Message :

- Trigger 1
Serial trigger input: disabled
Channel: 1
Match: 00,00
Trigger input1: X
Trigger input2: X
Trigger input3: X
Message :
Priority: L
Min. notification interval: 1 s
Re-notification interval : 0 s

- Trigger 2
Serial trigger input: disabled
Channel: 1
Match: 00,00
Trigger input1: X
Trigger input2: X
Trigger input3: X
Message :
Priority: L
Min. notification interval: 1 s
Re-notification interval : 0 s

- Trigger 3
Serial trigger input: disabled
Channel: 1
Match: 00,00
Trigger input1: X
Trigger input2: X
Trigger input3: X
Message :
Priority: L
Min. notification interval: 1 s
Re-notification interval : 0 s

Change Setup:
0 Server
1 Channel 1
3 E-mail
5 Expert
6 Security
7 Defaults

```
8 Exit without save
9 Save and exit          Your choice ?
```

Figure 3-3-1 Setup Mode Window

3.2 Server Configuration (Network Configuration)

These are the unit's basic network parameters. The following parameters are displayed when you select **Server**(Option 0).

```
IP Address : (000) .(000) .(000) .(000)
Set Gateway IP Address (N) ?
Netmask: Number of Bits for Host Part (0=default) (0)
Set DNS Server IP addr (N) ?

Set Backup DNS Server IP addr (N) ?
Change Telnet/Web Manager password (N) ?
Change DHCP device name (not set) ? (N) ?
Enable DHCP FQDN option : (N) ?
```

3.2.1 IP Address

If DHCP is not used to assign IP addresses, enter the IP address manually. The IP address must be set to a unique value in the network. Enter each octet and press **Enter** between each section. The current value displays in parentheses.

If DHCP is used, the third octet of the IP address sets the BootP/DHCP/AutoIP options. The following table shows the bits you can manually configure to force the EDS to disable AutoIP, DHCP, or BootP. To disable an option, set the appropriate bit.

Options	Bit
AutoIP	0
DHCP	1
BootP	2

For example, if the third octet is 0.0.5.0, the AutoIP and BootP options are disabled; only DHCP is enabled. (The value 5 results from adding the binary equivalents of 0 and 2.) This is the most common setting when using DHCP.

3.2.2 Set Gateway IP Address

The gateway address, or router, allows communication to other LAN segments. The gateway address should be the IP address of the router connected to the same LAN segment as the unit. The gateway address must be within the local network. The default is **N** (No), meaning the gateway address has not been set. To set the gateway address, type **Y** and enter the address.

3.2.3 Netmask: Number of Bits for Host Part

A netmask defines the number of bits taken from the IP address that are assigned for the host section.

Note: Class A: 24 bits; Class B: 16 bits; Class C: 8 bits.

The unit prompts for the number of host bits to be entered, then calculates the netmask, which is displayed in standard decimal-dot notation when the saved parameters display (for example, 255.255.255.0).

Table 1 - Standard IP Network Netmasks

Network Class	Host Bits	Netmask
A	24	255.0.0.0
B	16	255.255.0.0
C	8	255.255.255.0

Table 2 - Netmask Examples

Netmask	Host Bits
255.255.255.252	2
255.255.255.248	3
255.255.255.240	4
255.255.255.224	5
255.255.255.192	6
255.255.255.128	7
255.255.255.0	8
255.255.254.0	9
255.255.252.0	10
255.255.248.0	11
...	...
255.255.0.0	16
...	...
255.128.0.0	23
255.0.0.0	24

3.2.4 Set DNS Server IP Address

The DNS server allows the name of a remote machine to be resolved automatically. The default is N (No), indicating the DNS server address has not been set. To set the DNS server address, type Y. At the prompt, enter the DNS server address. If the device is DHCP enabled, the DHCP server provides the DNS server IP address, which will override this configured value.

3.2.5 Set Backup DNS Server IP address

The Backup DNS server allows the name of a remote machine to be resolved automatically in cases where the primary DNS server is unavailable. The default is N (No), indicating the Backup DNS server address has not been set. To set the Backup DNS server address, type Y. At the prompt, enter the backup DNS server address. If the device is DHCP enabled, the backup DNS server will be used if the primary DNS server supplied by the DHCP server is unavailable or unable to resolve the name.

3.2.6 Change Telnet/Web Manager password

Setting the Telnet/Web Manager password prevents unauthorized access of the setup menu via a Telnet connection to port 9999 or through Web pages. The password is limited to 4 characters. An enhanced password setting of 16 characters is available under Security Settings for Telnet access only.

Note: No password is required to access the Setup Mode window via a serial connection.

3.2.7 DHCP Naming

If a DHCP server has automatically assigned the IP address and network settings, you can discover the unit by using the Device Installer network search feature.

There are 3 methods for assigning DHCP names to these products.

1) **Default DHCP name.** If you do not change the DHCP name, and you are using an IP of 0.0.0.0, then the DHCP name will default to CXXXXXX (XXXXXX is the last 6 digits of the MAC address shown on the label on the bottom/side of the unit). For example, if the MAC address is 00-20-4A-12-34-56, then the default DHCP name is C123456.

2) **Custom DHCP name.** You can create your own DHCP name on these products. If you are using an IP address of 0.0.0.0, then the last option in "Server configuration" will be "Change DHCP device name". The "Change DHCP device name" option will allow you to change the DHCP name to an alpha-numeric name.

```
Change DHCP device name (not set) ? (N) Y
Enter new DHCP device name : LTX
```

3) **Numeric DHCP name.** You are able to change the DHCP name by specifying the last octet of the IP address. When you use this method, the DHCP name will be LTXYY where YY is what you chose for the last octet of the IP address. If the IP address you specify is 0.0.0.12, then the DHCP name will be LTX12. This method will only work with 2 digit numbers (0-99).

3.3 Channel 1 Configuration (Serial Port and Connection Parameters)

This section describes how to setup the serial port and connections. The EDS with GC Enhanced firmware supports a maximum of 4 TCP connections. Connection 1 and Connection 2 support TCP server/client modes and UDP. Connection 3,4 supports a passive TCP connection only.

The following parameters are displayed when you select **Channel 1** (Option 1).

```
- Serial Settings
Baudrate (9600) ?
I/F Mode (4C) ?
Flow (00) ?
FlushMode (00) ?
SendChar 1 (00) ?
SendChar 2 (00) ?

- Connection 1
Port No (10001) ?
ConnectMode (C0) ?
Send '+++' in Modem Mode (Y) ?
Show IP addr after 'RING' (Y) ?
Auto increment source port (N) ?
Remote Host :
Remote Port (0) ?
DisConnMode (00) ?
DisConnTime (00:00) ?:

- Connection 2
Port No (10002) ?
ConnectMode (00) ?
Send '+++' in Modem Mode (Y) ?
Show IP addr after 'RING' (Y) ?
Auto increment source port (N) ?
Remote Host :
Remote Port (0) ?
DisConnMode (00) ?
DisConnTime (00:00) ?:

- Connection 3,4 (TCP accept only)
Port No (10003) ?
ConnectMode (00) ?
```

Serial Settings

3.3.1 Baudrate

The unit and attached serial device, such as a modem, must agree on a speed or baud rate to use for the serial connection. Valid baud rates are 300, 600, 1200, 2400, 4800, 9600 (default), 19200, 38400, 57600, 115200, and 230400 bits per second. Some EDS support high-performance baud rates of 460800 and 921600 bps. See *Expert Settings* on page 3-43.

3.3.2 I/F (Interface) Mode

The Interface (I/F) Mode is a bit-coded byte that you enter in hexadecimal notation.

Table 3 - Interface Mode Options

I/F Mode Option	7	6	5	4	3	2	1	0
RS-232C ⁽¹⁾							0	0
RS-422/485							0	1
RS-485 2-wire							1	1
7 Bit					1	0		
8 Bit					1	1		
No Parity			0	0				
Even Parity			1	1				
Odd Parity			0	1				
1 Stop bit	0	1						
2 Stop bit ⁽¹⁾	1	1						

(1) 2 stop bits are implemented by software. This might have influence on performance.

The following table demonstrates how to build some common Interface Mode settings:

Table 4 - Common Interface Mode Settings

Common I/F Mode Setting	Binary	Hex
RS-232C, 8-bit, No Parity, 1 stop bit	0100 1100	4C
RS-232C, 7-bit, Even Parity, 1 stop bit	0111 1000	78

3.3.3 Flow

Flow control sets the local handshaking method for stopping serial input/output.

Table 5 - Flow Control Options

Flow Control Option	Hex
No flow control	00
XON/XOFF flow control	01
Hardware handshake with RTS/CTS lines (see note)	02
XON/XOFF pass characters to host	05

*Note: RTS and CTS control lines are not enabled at the factory. See **Error! Reference source not found.** on page **Error! Bookmark not defined.**. You must use the web manager to configure the hardware handshake signals.*

3.3.4 Flush Mode (Buffer Flushing)

Using this parameter, you can control line handling and network buffers with connection startup and disconnect. You can also select between two different packing algorithms.

Table 6 - Flush Mode Options

Function	7	6	5	4	3	2	1	0
Input Buffer (Serial to Network)								
Clear with a connection that is initiated from the device to the network				1				
Clear with a connection initiated from the network to the device			1					
Clear when the network connection to or from the device is disconnected		1						
Output Buffer (Network to Serial)								
Clear with a connection that is initiated from the device to the network								1
Clear with a connection initiated from the network to the device							1	
Clear when the network connection to or from the device is disconnected						1		
Alternate Packing Algorithm (Pack Control)								
Enable	1							

3.3.5 Pack Control

Two firmware-selectable packing algorithms define how and when packets are sent to the network. The standard algorithm is optimized for applications in which the unit is used in a local environment, allowing for very small delays for single characters while keeping the packet count low. The alternate packing algorithm minimizes the packet count on the network and is especially useful in applications in a routed Wide Area Network (WAN). Adjusting parameters in this mode can economize the network data stream.

Pack control settings are enabled in **Flush Mode**. Set this value to **00** if specific functions are not needed.

Table 7 - Pack Control Options

Option	7	6	5	4	3	2	1	0
Packing Interval								
Interval: 12ms							0	0
Interval: 52ms							0	1
Interval: 250ms							1	0
Interval: 3ms							1	1
Trailing Characters								
None					0	0		
One					0	1		
Two					1	0		
Send Characters								
2-Byte Send Character Sequence				1				
Send Immediately After Send chars			1					

Packing Interval: Packing Interval defines how long the unit should wait before sending accumulated characters. This wait period is between successive network segments containing data. For alternate packing, the default interval is 12 ms.

Trailing Characters: In some applications, CRC, Checksum, or other trailing characters follow the end-of-sequence character; this option helps to adapt frame transmission to the frame boundary.

Send Characters: If 2-Byte Send Character Sequence is enabled, the unit interprets the sendchars as a 2-byte sequence; if not set, they are interpreted independently.

If **Send Immediately After Send Characters** is not set, any characters already in the serial buffer are included in the transmission after a "transmit" condition is found. If set, the unit sends immediately after recognizing the transmit condition (sendchar or timeout).

Note: A transmission might occur if status information needs to be exchanged or an acknowledgment needs to be sent.

3.3.6 Send Characters

You can enter up to two characters in hexadecimal representation in the parameters "sendchar." If a character received on the serial line matches one of these characters, it is sent immediately, along with any awaiting characters, to the TCP connection. This minimizes the response time for specific protocol characters on the serial line (for example, ETX, EOT, etc.). Setting the first sendchar to **00** disables the recognition of the characters. Alternatively, the two characters can be interpreted as a sequence (see [Error! Reference source not found.](#) on page [Error! Bookmark not defined.](#)).

Connection Settings

3.3.7 Port Number

The setting represents the source port number in TCP connections. It is the number used to identify the channel for remotely initiating connections. [Default setting for Port 1 is 10001](#). Range: 1-65535 except for the following reserved port numbers:

Table 8 - Reserved Ports

Port Numbers	Reserved for
1 – 1024	Reserved (well known ports)
9999	Telnet setup
10001	Default Setting
14000-14009	Reserved for Comm Port Redirector
30704	Reserved (77F0h)
30718	Reserved (77FEh)

Warning: We recommend that you not use the reserved port numbers for this setting as incorrect operation may result.

The port number is the local port for receiving TCP connections and UDP packets. The port number also functions as the TCP/UDP source port number for outgoing packets. Packets sent to the unit with this port number are received to this channel.

3.3.8 Connect Mode

Connect Mode defines how the unit makes a connection, and how it reacts to incoming connections over the network. Enter Connect Mode options in hexadecimal notation.

Note: If you do not want to convert the binary numbers to hexadecimal yourself, look up the values in the Tech Notes guide.

Table 9 - Connect Mode Options

Connect Mode Option	7	6	5	4	3	2	1	0
Incoming Connection								
Never accept incoming	0	0	0					
Accept with DTR Active	0	1	0					
Always Accept	1	1	0					
Serial to network only (Connection 3,4)			1					
Response								
Nothing (quiet)				0				
Character response (C=connect, D=disconnect, N=unreachable)				1				
Active Startup								
No active startup					0	0	0	0
With any character					0	0	0	1
With DTR Active					0	0	1	0
With a specific start character					0	0	1	1
Manual connection					0	1	0	0
Autostart					0	1	0	1
Hostlist	0	0	1	0				
Datagram Type								
Directed UDP					1	1	0	0
Modem Mode								
No Echo			0	0		1	1	
Data Echo and Modem Response (Numeric)			0	1		1	1	1
Data Echo and Modem Response (Verbose)			0	1		1	1	0
Modem Response Only (Numeric)			0	0	1	1	1	1
Modem Response Only (Verbose)			0	0	1	1	1	0
Serial Multiplexer (MUX)					1	0	0	1

INCOMING CONNECTION:

- Never Accept Incoming:** Rejects all external connection attempts.
- Accept with DTR Active:** Accept external connection requests only when the DTR input is asserted. Cannot be used with Modem Mode.
- Always Accept:** Accept any incoming connection when a connection is not already established. This is the default setting.

RESPONSE:

- Character Response:** A single character is transmitted to the serial port when there is a change in connection state: C = connected, D = disconnected, N = host unreachable. This option is overridden when the Active Start Modem Mode or Active Start Host List is in effect. Default setting is Nothing (quiet).

ACTIVE STARTUP:

- No Active Startup:** No attempt to initiate a connection under any circumstance. This is the default setting.
- With Any Character:** Attempts to connect when any character is received from the serial port.
- With DTR Active:** Attempts to connect when the DTR input changes from not asserted to asserted.
- With a Specific Start Char:** Attempts to connect when it receives a specific start character from the serial port. The default start character is carriage return.
- Manual Connection:** Attempts to connect when directed by a command string received from the serial port. The first character of the command string must be a C (ASCII 0x43), and the last character must be either a carriage return (ASCII 0x0D) or a line feed (0x0A). No blanks or space characters in the command string. Between the first and last command string characters must be a full or partial destination IP address and may be a destination port number.
- The IP address must be presented in standard dot-decimal notation and may be a partial address, representing the least significant 1, 2 or 3 bytes of the remote IP address. The period is required between each pair of IP address numbers.
- If present, the port number must follow the IP address, must be presented as a decimal number in the range 1-65535 and must be preceded by a forward slash (ASCII 0x2F). The slash separates the IP address and the port number. If the port number is omitted from a command string, the internally stored remote port number is used to start a connection.
- For Active Start options requiring internally stored destination IP address and port number, the unit will not attempt a connection if this information is not configured (all zeros).
- If a partial IP address is presented in a command string, it will be interpreted to be the least significant bytes of the IP address and will use the internally stored remote IP address to provide the most significant bytes of the IP address.
- For example, if the remote IP address already configured in the unit is 129.1.2.3, then an example command string would be C3/7. (This would connect to 129.1.2.3 and port 7.) You may also use a different ending for the connection string. For example, C50.1/23 would connect you to 129.1.50.1 and port 23.

If an IP address does not follow the first command string character (which is “C”), the subsequent character string is interpreted as the host name and domain to be used in DNS lookup. This character string can include a destination port number as well. The port number can be preceded by either a forward slash (/) or a colon (:).

Table 10 – Manual Connection Address Example

Command String	Result if remote IP is 129.1.2.3 and remote port is 1234
C121.2.4.5/1	Complete override; connection is started with host 121.2.4.5, port 1
C5	Connect to 129.1.2.5, port 1234
C28.10/12	Connect to 129.1.28.10, port 12
C0.0.0.0/0	Enter Monitor Mode

Autostart (Automatic Connection):

If **Autostart** is enabled, the unit automatically connects to the remote IP address and remote port specified when the firmware starts.

Hostlist:

If you enable this option, the unit scrolls through the hostlist until it connects to a device listed in the hostlist table. Once it connects, the unit stops trying to connect to any others. If this connection fails, the unit continues to scroll through the table until it is able to connect to another IP in the hostlist.

Hostlist supports a minimum of 1 and a maximum of 12 entries. Each entry contains the IP address and the port number. The host list will be disabled for Manual Mode and for Modem Mode. The unit will not accept a data connection from a remote device when the host list option is enabled.

```
Port No (10001)
ConnectMode (21)
Send '+++ ' in Modem Mode (Y) ?
Auto increment source port (N) ?
```

```
Hostlist :
01. IP : 010.010.010.001   Port : 00023
02. IP : 010.010.010.002   Port : 00023
03. IP : 010.010.010.003   Port : 00023
```

```
Change Hostlist ? (N)
Hostlist Retrycounter      (3)
Hostlist Retrytimeout      (250)
DisConnMode (00)
DisConnTime (00:00) :
```

To use the Hostlist option, follow these steps:

1. Enter a **Connect Mode** of 0x20 (**2X**). The menu shows you a list of current entries already defined in the product.
2. To delete, modify, or add an entry, select **Yes**. If you enter an IP address of 0.0.0.0, that entry and all others after it are deleted.
3. After completing the hostlist, repeat the previous step if necessary to edit the hostlist again.
4. For **Retrycounter**, enter the number of times the unit should try to make a good network connection to a hostlist entry that it has successfully ARPed. The range is 1-15, with the default set to 3.
5. For **Retrytimeout**, enter the number of seconds the unit should wait before failing an attempted connection. The time is stored as units of milliseconds in the range of 1-65535. The default value is 250.

DATAGRAM TYPE:

Directed UDP:

When selecting this option, you will be prompted for the Datagram type. Enter **01** for directed or broadcast UDP. See **4 UDP Datagram Types** for a description of the datagram types.

When the UDP option is in effect, the connection will use UDP datagrams to send and receive data instead of a TCP connection.

MODEM MODE:

In Modem (Emulation) Mode, the unit presents a modem interface to the attached serial device. It accepts **AT**-style modem commands and handles the modem signals correctly.

Normally there is a modem connected to a local PC and a modem connected to a remote machine. A user must dial from the local PC to the remote machine, accumulating phone charges for each connection. Modem Mode allows you to replace modems with NET232s, and to use an Ethernet connection instead of a phone call, without having to change communications applications and make potentially expensive phone calls.

To select Modem Mode, set the Connect Mode to **06** (no echo), **16** (echo with full verbose), or **17** (echo with 1-character response).

Note: If the unit is in Modem Mode and the serial port is idle, the unit can still accept network TCP connections to the serial port if Connect Mode is set to 06 (no echo), 16 (echo with full verbose), or 17 (echo with 1-character response).

Without Echo:	In Modem Mode, echo refers to the echo of all of the characters entered in command mode; it does not mean to echo data that is transferred. Quiet Mode (without echo) refers to the modem not sending an answer to the commands received (or displaying what was typed).
Data Echo & Modem Response	Full Verbose: The unit echoes modem commands and responds to a command with a message string shown in the table below. Numeric Response: The unit echoes modem commands and responds to a command with a numeric response.
Modem Responses Only	Full Verbose: The unit does not echo modem commands and responds to a command with a message string shown in the table below. Numeric Response: The unit does not echo modem commands and responds to a command with a numeric response.

Message	Meaning
OK	Command was executed without error.
CONNECT	A network connection has been established.
DISCONNECT	A network connection has been closed.
RING n.n.n.n.	A remote device, having IP address n.n.n.n, is connecting to this device.

Message	Meaning
OK	Command was executed without error.
CONNECT	A network connection has been established
NO CARRIER	A network connection has been closed.
RING n.n.n.n	A remote device, having IP address n.n.n.n, is connecting to this device.
0	OK
1	Connected
2	Ring
3	No Carrier
4	Error

Received commands must begin with the two-character sequence **AT** and must be terminated with a carriage return character.

Any character sequence received not starting with **AT** will be ignored. The unit will only recognize and process single **AT**-style commands. Compound **AT** commands will be treated as unrecognized commands.

If the **Full Verbose** option is in effect, an unrecognized command string that is otherwise formatted correctly (begins with **AT** and ends with carriage return) will be responded to with the **OK** message and no further action is taken.

If the Numeric Response option is in effect, unrecognized command strings that are otherwise formatted correctly will be responded to with **OK** and no further action is taken.

When an active connection is in effect, the unit will be transferring data and will not process commands received from the serial interface.

When a connection is terminated or lost, the unit will revert to command mode.

When an active connection is in effect, the unit will terminate the connection if the following sequence is received from the attached serial device:

1. No serial data is received for one second.
2. The character sequence +++ is received, with no more than one second between each two characters.
3. No serial data is received for one second after the last + character. At this time the unit will respond affirmatively per the selected echo/response mode.
4. The character string **ATH** is received, terminated with a carriage return. The unit will respond affirmatively per the selected echo/response mode and drop the network connection. The serial interface will revert to accepting command strings.

If the above sequence is not followed, the unit will remain in data transfer mode.

Table 11 – Modem Mode Commands

Modem Mode Command	Function
ATDTx.x.x.x,pppp or ATDTx.x.x.x/pppp	Makes a connection to an IP address (x.x.x.x) and a remote port number (pppp).
ATDTx.x.x.x	Makes a connection to an IP address (x.x.x.x) and the remote port number defined within the unit.
ATDT"hostname.com"	Makes a connection to a host name and domain via DNS. Note: Host name must be preceded with a double-quote (") character.
ATD0.0.0.0	Forces the unit into Monitor Mode if a remote IP address and port number are defined within the unit.
ATD	Forces the unit into Monitor Mode if a remote IP address and port number are not defined within the unit.
ATDx.x.x.x	Makes a connection to an IP address (x.x.x.x) and the remote port number defined within the unit.
ATH	Hangs up the connection (Entered as +++ATH).
ATS0=n	Enables or disables connections from the network going to the serial port. n=0 disables the ability to make a connection from the network to the serial port. n=1-9 enables the ability to make a connection from the network to the serial port. n>1-9 is invalid.
ATEn	Enables or disables character echo and responses. n=0 disables character echo and responses. n=1 enables character echo and responses.
ATVn	Enables 1-character response or full verbose. n=0 enables 1-character response. n=1 enables full verbose.

Note: These AT commands are only recognized as single commands like ATE0 or ATV1; compound commands such as ATE0V1 are not recognized. All other AT commands with Modem Mode set to full verbose acknowledge with an OK, but no action is taken.

SERIAL MULTIPLEXER (MUX) MODE:

The embedded device server provides a "Mux" Line Protocol for the serial Line to manage and transfer data on multiple connections without requiring custom software on the EDS. A host processor that is connected to the device via the serial Line sees a simple command/response interface.

3.3.9 Send the Escape Sequence (+++) in Modem Mode

Disable or enable the ability to send the escape sequence. The default is Y (Yes) (send the escape sequence).

3.3.10 Show IP addr after 'RING'

Disable or enable the EDS's ability to show the IP address after RING in Modem Mode. The default is Y (Yes), to show the IP address.

3.3.11 Auto Increment Source Port

Y (Yes) auto increment the source port. The EDS increments the source port number used with each new active connection

3.3.12 Remote Host

This is the destination IP address or domain name used with an outgoing connection. Using a domain name requires configuration of a DNS server.

Note: This option does not display when Hostlist is enabled from the **ConnectMode** prompt.

3.3.13 Remote Port

The remote TCP port number must be set for the unit to make outgoing connections. This parameter defines the port number on the target host to which a connection is attempted.

To connect an ASCII terminal to a host using the unit for login purposes, use the remote port number 23 (Internet standard port number for Telnet services).

Note: This option does not display when Hostlist is enabled from the **ConnectMode** prompt.

3.3.14 DisConnMode

This setting determines the conditions under which the unit will cause a network connection to terminate.

Note: In *DisConnMode (Disconnect Mode)*, DTR drop either drops the connection or is ignored.

Table 12 - Disconnect Mode Options

Disconnect Mode Option	7	6	5	4	3	2	1	0
Disconnect with DTR drop ⁽⁶⁾	1							
Ignore DTR	0							
Telnet mode and terminal type setup ⁽¹⁾		1						
Channel (port) password ⁽²⁾				1				
Hard disconnect ⁽³⁾					0			
Disable hard disconnect					1			
State LED off with connection ⁽⁴⁾								1
Disconnect with EOT (^D) ⁽⁵⁾			1					

1. The EDS will send the "Terminal Type" upon an outgoing connection.

2. A password is required for a connection to the serial port from the network. Connection 3,4 cannot be password protected.

3. The TCP connection will close even if the remote site does not acknowledge the disconnection.

4. When there is a network connection to or from the serial port, the state LED will turn off instead of blink.

5. When Ctrl+D or Hex 04 is detected, the connection is dropped. Both Telnet mode and Disconnect with EOT must be enabled for Disconnect with EOT to function properly. Ctrl+D will only be detected going from the serial port to the network.

6. When DTR transitions from a high state to a low state, then the network connection to or from the serial port will drop.

3.3.15 Telnet Terminal Type

This parameter appears only if the terminal type option is enabled in Disconnect Mode (see *DisConnMode* on page 3-42 above). If this option is enabled, you can use the terminal name for the Telnet terminal type. Enter only one name.

If the terminal type option is enabled, the unit also reacts to the EOR (end of record) and binary options, which can be used for applications like terminal emulation to IBM hosts.

3.3.16 Channel (Port) Password

This parameter appears only if the channel (port) password option is enabled in Disconnect Mode (see *DisConnMode* on page 3-42). If the option is enabled, you can set a password on the serial port.

3.4 Expert Settings

These parameters should only be changed if you are an expert and definitely know the consequences the changes might have.

```
TCP Keepalive time in s (1s - 65s; 0s=disable): (45)
ARP Cache timeout in s (1s - 600s) : (600) ?
CPU Performance (0=Regular, 1=Low, 2=High): (0) ?
Disable Monitor Mode @ bootup (N) ?
HTTP Port Number : (80) ?
MTU Size (512 - 1400): (1400) ?
TCP Re-transmission Timeout (500 - 4000) (ms): (500) ?
Enable alternate MAC (N) ?
Ethernet connection type: (0) ?
```

3.4.1 TCP Keepalive time in seconds

This option allows you to change how many seconds the unit will wait during a silent connection before attempting to see if the currently connected network device is still on the network. If the unit then gets no response, it will drop that connection.

3.4.2 ARP Cache timeout in seconds

Whenever the unit communicates with another device on the network, it will add an entry into its ARP table. The ARP Cache timeout option allows you to define how many seconds (1-600) the unit will wait before timing out this table.

3.4.3 Enable High Performance

This option applies to some EDS units only. It allows you to increase the CPU performance and utilize the higher baud rates on the serial interface (i.e. 460Kbps and 920Kbps). Increasing CPU performance requires more power and lowers the unit's operating temperature. The standard CPU performance mode supports up to 230400 baud.

Note: If baud rates of 460Kbps or 920Kbps is set and the high performance mode disabled, the operation of the serial channel would be out of the specified error tolerance thereby leading to inconsistent speed settings on the two ends of the serial channel.

3.4.4 Disable Monitor Mode at Bootup

This option allows you to disable the Monitor Mode only during the startup sequence. This prevents all entries into Monitor Mode except thru 'xxx' followed by 'M'. All other Monitor Mode entry sequences, e.g. 'zzz' and 'yyy', are blocked during startup.

3.4.5 HTTP Port Number

This option allows changing the HTTP port number. The valid range is from 1 - 65535. The default value is 80.

3.4.6 MTU Size

The Maximum Transmission Unit (MTU) is the largest physical packet size a network can transmit for TCP and UDP. Enter between 512 and 1400 bytes. The default is 1400 bytes.

3.4.7 TCP Re-transmission

The TCP Re-Transmission Timeout is the interval to wait for acknowledgement of transmitted TCP segments before re-transmitting them. Enter between 500 and 4000 ms. The default is 500 ms.

3.4.8 Enable Alternate MAC

If necessary, enable the alternate MAC address (if specified in the OEM setup record).

3.4.9 Ethernet Connection Type

The EDS allows for the Ethernet speed and duplex to be manually configured. Enter 0 for auto-negotiation (default). To select the speed and duplex, enter one of the following: 2 (10Mbit/half duplex), 3 (10Mbit/full duplex), 4 (100Mbit/half duplex), or 5 (100Mbit/full duplex).

3.5 Security Settings

Note: You can change these settings via Telnet or serial connections only, not on the Web-Manager. We recommend that you set security over the dedicated network or over the serial setup. If you set parameters over the network (Telnet 9999), someone else could capture these settings.

Caution: Disabling both Telnet Setup and Port 77FE will prevent users from accessing the setup menu from the network. Disabling Port 77FE also disables the Web from configuring the device.

```
Disable SNMP (N)
SNMP Community Name (public):
Disable Telnet Setup (N)
Disable TFTP Firmware Update (N)
Disable Port 77FEh (N)
77FEh Access Mode (0=Read & Write, 1=Read Only): (0)
Disable Web Server (N)
Disable Web Setup (N)
Disable Web API (N)
Disable ECHO ports (Y)
Enable Encryption (N)
Enable Enhanced Password (N)
Disable Port 77F0h (N)
```

3.5.1 Disable SNMP

This setting allows you to disable the SNMP protocol on the unit for security reasons.

3.5.2 SNMP Community Name

This option allows you to change the SNMP Community Name on the unit. This allows for ease of management, and possibly some security. If someone tries to violate security but doesn't know what community to connect to, that person will be unable to get the SNMP community information from the unit. The name is a string of 1 to 13 characters plus a null-terminator (14 bytes total). The default setting is **public**.

3.5.3 Disable Telnet Setup

Note: If you choose to disable this option, keep in mind that disabling both Telnet Setup and Port 77FE will prevent users from accessing the setup menu from the network.

This setting defaults to the N (No) option. The Y (Yes) option disables access to this Configuration Menu by Telnet (port 9999). It only allows access locally via the Web pages and the serial port of the unit.

3.5.4 Disable TFTP Firmware Upgrade

This setting defaults to the N (No) option. The Y (Yes) option disables the use of TFTP to perform network firmware upgrades. With this option, firmware upgrades can be downloaded over the serial port using Device Installer's Recover Firmware procedure.

3.5.5 Disable Port 77FE (Hex)

Note: If you choose to disable this option, keep in mind that disabling both Telnet Setup and Port 77FE will prevent users from accessing the setup menu from the network.

Port 77FE is a setting that allows Device Installer, Web-manager, and custom programs to configure the unit remotely. You may want to disable this capability for security purposes.

The default setting is the N (No) option, which enables remote configuration. You can configure the unit by using Device Installer, web pages, Telnet, or serial configuration.

The Y (Yes) option disables remote configuration and web sites.

Note: The Y (Yes) option disables many of the GUI tools for configuring the unit, including the embedded Web-Manager tool.

3.5.6 77FEh Access Mode

Configuring this setting is available if port 77FE is enabled. This option will not be listed if port 77FE is disabled.

Set 0 for Read & Write mode, and 1 for Read Only mode. Default value of this setting is Read-Write(0).

If access mode is Read-only, then read operation can be done through port 77FE, if Read-Write access is selected, then both read and write of data can be done through port 77FE.

3.5.7 Disable Web Server

This setting defaults to the N (option). The Y (Yes) option disables web server.

3.5.8 Disable Web Setup

The Y (Yes) option disables configuration using the Web-Manager. This setting defaults to the N (option).

3.5.9 Disable Web API

The Y (Yes) option disables the Web Application Programming Interface (API) to the serial line. This setting defaults to the N (option).

3.5.10 Disable ECHO Ports

This setting controls whether port 7 echoes characters it receives.

3.5.11 Enable Encryption

Rijndael is the block cipher algorithm chosen by the National Institute of Science and Technology (NIST) as the Advanced Encryption Standard (AES) to be used by the US government. The EDS supports 128-, 192-, and 256-bit encryption key lengths.

Note: Configuring encryption should be done through a local connection to the serial port of the EDS, or via a secured network connection. Initial configuration information, including the encryption key, is sent in clear text over the network.

Note: Only Connection 1 and Connection 2 are available with encryption enabled. Connection 3,4 will be disabled.

To configure AES encryption on the EDS:

1. When prompted to enable encryption, select Y.
2. When prompted, enter the encryption key length. The EDS supports 128-, 192-, and 256-bit encryption key lengths.
3. When prompted to change keys, select Y.
4. At the Enter Keys prompt, enter your encryption key. The encryption keys are entered in hexadecimal. The hexadecimal values are echoed as asterisks to prevent onlookers from seeing the key. Hexadecimal values are 0-9 and A-F.
 - For a 128-bit key length, enter 32 hexadecimal characters.
 - For a 192-bit key length, enter 48 hexadecimal characters.
 - For a 256-bit key length, enter 64 hexadecimal characters

5. Continue pressing Enter until you return to the Change Setup menu.
6. From the Change Setup menu, select option 9 to save and exit.

Encryption only applies to the port(s) selected for data tunneling (default 10001), regardless of whether you are using TCP or UDP.

Generally, one of two situations applies:

- Encrypted EDS-to-EDS communication. Be sure to configure both EDS devices with the same encryption key.
- Third-party application to EDS-encrypted communication: EDS uses standard AES encryption protocols. To communicate successfully, products and applications on the peer side must use the same protocols and the same encryption key as the EDS.
- Lantronix Secure Com Port Redirector provides an encrypted connection from Windows-based applications to the EDS. Information about SCPR is at <http://www.lantronix.com/device-networking/utilities-tools/scpr.html>

3.5.12 Enable Enhanced Password

This setting defaults to the N (option), which allows you to set a 4-character password that protects the Configuration Menu via Telnet and Web pages. The Y (Yes) option allows you to set an extended security password of 16-characters for protecting Telnet and web page access.

3.5.13 Disable Port 77F0 (Hex)

Port 77F0 is a service endpoint that allows application software to query or set the EDS configurable pins over TCP or UDP when they are functioning as General Purpose I/O (GPIO). You may want to disable this capability for security purposes. The default setting is the N (No) option, which enables GPIO control. The Y (Yes) option disables the GPIO control interface.

3.6 Defaults

Select 7 to reset the unit's Channel 1 configuration, E-mail settings, and Expert settings to the default settings. The server configurations (IP address information) remain unchanged. The configurable pins' settings also remain unchanged. The specific settings that this option changes are listed below:

Channel 1 Configuration Defaults

Baudrate	9600
I/F Mode	4C (1 stop bit, no parity, 8 bit, RS-232C)
Flow	00
Port number	10001
Connect Mode	C0 (always accept incoming connection; no active connection startup)
Send '+++' in Modem Mode	Enabled
Show IP addr after 'RING'	Enabled
Auto increment source port	Disable
Hostlist retry counter	3
Hostlist retry timeout	250 (msec)
Start character for serial channel 1	0x0D (CR)
All other parameters	0

Expert Settings Defaults

TCP Keepalive time in s	45
ARP Cache timeout in s	600
CPU Performance	0 (Regular)

Disable Monitor Mode @ bootup	No
RS485 tx enable	active low
HTTP Port Number (1-65535)	80
SMTP Port Number (1-65535)	25
MTU Size (512 – 1400)	0 (resulting in an operational value of 1400)
Alternate MAC	Disabled (for OEM use only)
Ethernet Connection Type	0 (auto-negotiate)
Security Settings Defaults	
Disable SNMP	No
SNMP community name	public
Disable Telnet setup	No
Disable TFTP Firmware Update	No
Disable Port 77FEh	No
77FEh Access Mode	0 (Read & Write)
Disable Web Server	No
Disable Web Setup	No
Disable Web API	No
Disable ECHO ports	Yes
Enable Encryption	No
Enable Enhanced Password	No
Disable Port 77F0h	No

3.7 Exit Configuration Mode

- Select **8** to exit the configuration mode without saving any changes or rebooting.
- Select **9** to save all changes and reboot the device. All values are stored in nonvolatile memory.

4. UDP Datagram Types

The UDP datagram type dictates the serial data format and interface with the EDS when transporting serial data using UDP.

4.1 UDP Datagram Type 0 (and Type 4)

The Datagram Type 0 serial message format allows the IP address and exact data contents of the UDP packet to be communicated. The format of the serial message for Datagram Type 0 is as follows:

<STX><IP1><IP2><IP3><IP4><Len Hi><Len Lo><Data>...<Data>

This format applies to serial data sent to and received from the device server. The message format is the same in both directions. The serial message sent by the unit when receiving a UDP packet will contain the Source IP address, data length and data bytes. The serial message expected by the unit will contain the Destination IP address, data length and data bytes for the UDP packet that is to be transmitted.

If the first byte received from the serial port is not an STX then the device server firmware flushes all serial input for 100ms. If bytes are not received within 100ms of each other then the message times out and the firmware starts looking for a new message with STX. If there are other errors such as an invalid length (len = 0 or len > Maximum MTU Size, default 1400) then the message is ignored and the firmware starts looking for a new message with STX.

The following rules apply in the serial -> UDP path:

1. the destination IP address always comes from the serial stream header
2. if the IP address in the header is all 0's, the UDP packet is broadcast
3. the destination and source port number in the UDP packet is always set to the configured local port in setup
4. the header is stripped off and only the <Data> bytes are sent in the UDP packet's data

Datagram Type 4 is similar to Type 0 with some application specific data added. Using Datagram Type 4 is the same as 0 except that when receiving a UDP packet the last three bytes of the sender's MAC address are added to the UDP packet data so that the transmitted serial data will appear like the following:

<STX><IP1><IP2><IP3><IP4><Len Hi><Len Lo><Mac4><Mac5><Mac6><Data>...<Data>

4.2 UDP Datagram Type 1 (and Type 5)

This datagram type transparently sends data between the serial port and network UDP packets so there is no special serial format. Receiving a maximum number of bytes for a UDP packet (MTU Size, default 1400) or a time gap in the serial input stream of 3, 15 (default), 50 or 250 ms, dependent on Pack Control setting, causes the collected serial data to be wrapped in a UDP packet and sent on the network. Setting Pack Control for Matching Send characters can also be used to trigger sending the serial data over UDP.

The following rules apply in the serial -> UDP path:

1. the destination IP address and port number of the outgoing UDP packet are set to the Remote IP address and port number in setup
2. if the Remote IP address is set to the broadcast IP address for the subnet or in newer firmware versions if the broadcast option is selected then the UDP packet will be broadcast on the network
3. if the Remote IP address and port number in setup are 0 then the destination IP address and port number, respectively, of the outgoing UDP packet are set to the source IP address and port number of the last received UDP packet
4. if the destination IP address or port number are still 0 after trying to apply rules 1 to 3, then the UDP packet is not sent

Rule 3 above makes it possible to dynamically send a serial response to the network device that sent the last received UDP packet.

Datagram type 1 also provides a method for accessing configuration settings via the serial interface. If you send the following string, "\$#CsEtUp", to the device server serial port in UDP mode, Datagram Type 1, then the device server will reply with 240 characters representing each byte of setup record 0 in hex format (plus a trailing <CR>). You can also immediately follow the "\$#CsEtUp" string with 240 characters to write to setup record 0. The device server will reset itself after the write is performed.

Datagram Type 5 is similar to Type 1 with some customer specific data added except that it can only be used for sending data. Using Datagram Type 5 is the same as 1 except that the last three bytes of the sender's MAC address are added to the UDP packet data like Datagram Type 4. Datagram Type 5 does not allow UDP data to be received.

4.3 UDP Datagram Type 2 (and Type 8)

The Datagram Type 2 serial message format allows the IP address, port number and exact data contents of the UDP packet to be communicated. The format of the serial message for Datagram Type 2 is as follows:

<STX><IP1><IP2><IP3><IP4><PH><PL><LRC1><LH><LL><D1><D2>...<Dn><LRC2>

- * STX : = 02
- * IP1...IP4 : send to ip-addr. 4Bytes
- * PH/PL : send to port number Hi/LoByte
- * LRC1 : LRC over ip-addr. and port number
- * LH/LL : length of data Hi/LoByte
- * D1...Dn : databytes (501 bytes max)
- * LRC2 : LRC over length and databytes

Each serial message must be received in this format or it will be ignored. The message format is the same in both directions. The serial message sent by the unit when receiving a UDP packet will contain the Source IP address, Source Port number, data length and data bytes. The serial message expected by the unit will contain the Destination IP address, Destination Port number, data length and data bytes for the UDP packet that is to be transmitted. If the destination IP address is all 0's (0.0.0.0) then the UDP packet will be broadcast to the subnet.

The LRC calculation is done at the byte level. The LRC is a byte with an initial value of 0 and is calculated by XORing it with all the applicable bytes of the header or data. LRC1 is an XOR of IP1-4, PH and PL. LRC2 is an XOR of LH, LL and D1-n.

If the first byte received from the serial port is not an STX then the firmware flushes all serial input for 100ms. If bytes are not received within 100ms of each other, then the message times out and the firmware starts looking for a new message with STX. If there are other errors such as a bad LRC or too many data bytes then the message is ignored and the firmware starts looking for a new message with STX.

Datagram Type 8 is similar to Type 2 except that the LRC bytes have been removed. The format of the serial message for Datagram Type 8 is as follows:

<STX><IP1><IP2><IP3><IP4><PH><PL><LH><LL><D1><D2>...<Dn>

4.4 UDP Datagram Type 12

Datagram Type 12 is similar to Type 8 (above) except that the destination for transmitted UDP data is specified using a domain name instead of an IP address. The format of the serial message for Datagram Type 12 is as follows:

<STX><N1>...<Nn><Null><PH><PL><LH><LL><D1><D2>...<Dn>

- * STX : = 02
- * N1...Nn : send to domain name via DNS lookup. nChars
- * <Null> : = 00
- * PH/PL : send to port number Hi/LoByte
- * LH/LL : length of data Hi/LoByte
- * D1...Dn : databytes (501 bytes max)

Incoming UDP packets are communicated using the Datagram Type 8 serial message format.

5. Web API (Web to Serial)

The web server of the Enhanced firmware has a function called Web API that allows you to monitor and control the EDS and attached devices via HTTP calls to specific URLs. For the Web to Serial feature, the relevant URL is /action/status. This lets you directly send and receive data from the serial ports with an HTTP transaction, for example from Javascript. For compatibility, the Web API implemented in the Enhanced firmware was adopted from the xPico Wi-Fi Embedded Device Server. See the Lantronix Developer Wiki for more information about the Web to Serial API.

6. Technical Support

If you are experiencing a problem, please read the user manual and other technical documents available for the product. If you are unable to solve the problem, please contact technical support.

Visit our support page: <https://www.gridconnect.com/pages/support>

Grid Connect technical support: (630) 245-1445.

Our phone lines are open from 8:00AM - 4:30 PM Central Time Monday through Friday excluding holidays.