



## **ETPORT Installation & User Guide**

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# TABLE OF CONTENTS

<b>1. Introduction</b>	<b>4</b>
1.1. Documentation	4
1.2. Disclosure	4
1.3. Product Description	4
1.4. Features	4
1.5. Connectors	4
1.6. Indicators	5
1.7. Buttons	5
1.8. Default Settings	5
<b>2. Installation</b>	<b>6</b>
2.1. Hardware Installation	6
2.2. With a WattsOn-Mark II	6
2.3. Network Discovery	6
2.4. IP Configuration	7
<b>3. The Web Interface</b>	<b>8</b>
3.1. Accessing the Web Interface	8
3.2. Posting Status	8
3.3. Information Page	8
3.4. Diagnostics Page	9
3.5. Filesystem Page	9
3.6. Network Page	10
3.7. System Page	10
3.8. Changing the Administrator Password	10
3.9. Reading Registers	10
3.10. Posting Data to the Elkor Cloud	10
3.11. Posting Data to your own Web Server (Advanced Feature)	11
3.12. Customizing the Web Posting Format (Advanced Feature)	13

# 1. INTRODUCTION

## 1.1. Documentation

This document was written and released in September 2019 (rev. 1).

## 1.2. Disclosure

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## 1.3. Product Description

The ETPORT module is an internet interface for the Modbus devices. It provides a dynamic AJAX-enabled web-interface to configure the device and to read and display Modbus registers, as well as a general-purpose Modbus/TCP to Modbus RTU bridge. A second Modbus RTU "pass-through" interface is available to optionally allow reading Modbus devices using both Modbus/TCP and Modbus RTU simultaneously.

The ETPORT can send data collected from Modbus devices to a web server via HTTP POST at regular intervals, using a highly configurable template-based format — it can be configured to use XML, JSON, CSV, or any custom format. The ETPORT will store a backlog of data in the event of a network outage to ensure any post information is not lost due to network or server outages.

The ETPORT contains an Elkor JumpBUS interface for easy connections to Elkor WattsOn-Mark II devices without any additional wiring or power supplies.

The ETPORT supports DHCP. A Windows® utility is used to detect and configure the network parameters from a Windows PC. In addition, the web interface allows for full device configuration.

The ETPORT is housed in a plastic enclosure intended for mounting on a DIN rail inside of an electrical panel or enclosure, near the Modbus devices being read.

For developers, custom web pages may be uploaded onto the device to create custom, highly integrated user interfaces for monitoring Modbus devices.

## 1.4. Features

The following bullet points summarize the ETPORT's features:

- Real-Time monitoring via web interface
- Highly customizable data posting via HTTP
- Modbus/TCP to Modbus/RTU Bridge
- Password protection
- Support for HTTP and HTTPS/SSL
- Support for DHCP and static IP addresses
- Upgradable firmware

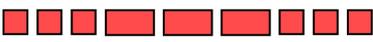
## 1.5. Connectors

Input/Output	
Power	9-32 VDC (100mA max) or 24 VAC (100mA max)
Top-right Connector	Two-wire RS-485 serial connection, to be connected to one or more Modbus RTU slaves
Bottom-left Connector	RJ-45 (8P8C) 10/100mbit half/full duplex Ethernet (auto-sensing) connection
Bottom-right Connector	Two-wire RS-485 serial "pass-through" connection, to be connected to a Modbus RTU Master

## 1.6. Indicators

Name	Location	Color	Description
STATUS	Top-left	Red/Green	Indicates the status of the device's network connectivity; see the following table for a detailed description of possible states.
MB	Top-right	Red/Green	Indicates activity over the RS-485 port; red indicates data a Modbus request (transmitting), green indicates a Modbus response (receiving).
MB PASS	Bottom-right	Red/Green	Indicates activity over the RS-485 passthrough port; red indicates data a Modbus request (receiving), green indicates a Modbus response (transmitting).
Activity	Bottom-left	Green	Green indicates that the Ethernet cable is connected at both ends. Flashing indicates network activity on the Ethernet port.

### 1.6.1. Status Indicator Codes

Code	Description
	Solid green indicates that the device is connected via Ethernet
	95% green, 5% off indicates that the device is connected via Wi-Fi.
	50% green, 50% off indicates that the device is in access-point mode. Connect to the device with a mobile phone or other wireless device to configure a wireless network, or plug in an Ethernet cable.
	One periodic red flash indicates that networking is not working properly. The Modbus Pass-through port may still be used in this state.
	Two periodic red flashes indicates that the last web post has failed. This may be temporary, or indicate a configuration problem with the ETPORT or the server.
	Repeated red flashes indicate that the ETPORT is not functioning. The firmware may be corrupt, or the hardware may be damaged.

## 1.7. Buttons

Name	Location	Action	Description
RESET	Top	Hold for 10 seconds	to restore factory default settings for the device.

## 1.8. Default Settings

Ethernet	
IP Address	Automatically obtained via DHCP if available;
Subnet Mask	Automatically configured via AutoIP if DHCP is unavailable
Default Gateway	
Passwords	
Username	admin
Password (default)	admin
RS-485/Modbus	
Serial mode	Modbus/RTU
Baud rate	9600
Parity	None
Data bits	8
Stop bits	1

## 2. INSTALLATION

### 2.1. Hardware Installation

#### 2.1.1. With general Modbus RTU devices

1. Connect RS-485 wires to the D+ / D- terminal on the top RS-485 port of the ETPORT, as well as to the D+ / D- terminal on the slave device
2. Connect the Ethernet cable to the bottom RJ-45 (8P8C) jack.
3. Connect a DC power supply (9-32 VDC) to the +/- power terminals.

#### 2.2. With a WattsOn-Mark II

A more convenient connection method is available with WattsOn-Mark II devices that reduces the number of cables required, and shares a single power supply.

1. Connect the JumpBUS connector to the JumpBus ports of the ETPORT and the WattsOn-Mark II, as described below.
2. Connect the Ethernet cable to the bottom RJ-45 (8P8C) jack.
3. Connect a DC power supply to **either** the WattsOn-Mark II or the ETPORT, **not both**. Both devices will share a single power supply.



### 2.3. Network Discovery

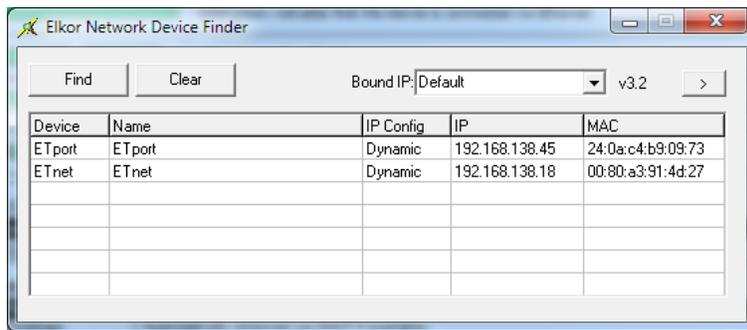
By default, the ETPORT is configured to automatically obtain its IP address via DHCP if available, and with AutoIP otherwise. If you are the network administrator, you may be able to determine the device's IP address by consulting your router's user interface. Otherwise, you can use the Elkor Network Device Finder utility available for the Windows operating system.

#### 2.3.1. Network Discovery with the Elkor Network Device Finder

The Elkor Network Device Finder is a stand-alone program that runs on Microsoft Windows operating systems to assist in discovering any ETPORT devices on the local area network when their IP addresses are not known. You can download the utility from Elkor's website, at <http://www.elkor.net/bin/finder.exe>.

To run the utility, simply double-click on the downloaded executable. The executable is “portable” – it does not require an installer, making it easy to take with you on a USB key or similar device if it must be used in a field location that does not have full internet access.

The utility will automatically search for any Elkor devices present on the network. If the device does not show up within a few seconds, you can have the program send subsequent broadcasts by clicking the *Find* button.



## 2.4. IP Configuration

If access to the ETPORT’s web interface is available, it is recommended to configure its IP address by using a web browser (see section 3, Configuration). Otherwise if access using default IP address settings is not available (for example, because there is no DHCP server), you will first need to change it using the Elkor Network Device Finder utility.

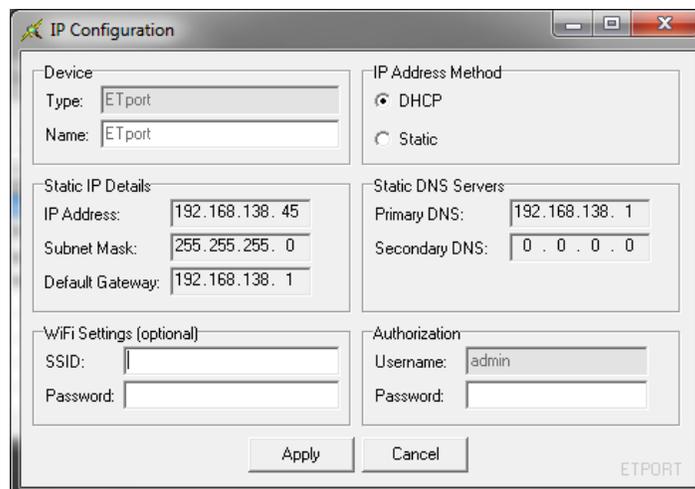
Once you have found the ETPORT with the Elkor Network Device Finder (see the previous subsection), you can double-click on it to enter the IP address configuration dialog box.

You can choose to either use a static IP configuration (i.e. one that you provide manually), or the Dynamic Host Configuration Protocol (DHCP, a router or other device on the network automatically assigns the device an IP configuration when it starts up). By default, the ETPORT uses DHCP. If it has been configured to use a static IP configuration, you can set it back to DHCP by clicking the *DHCP* radio button and clicking *Apply*.

To enter a static IP configuration, click the *Static* radio button, and the other fields will be available for editing. You can enter an IP address, subnet mask, default gateway, primary and secondary DNS servers. If you are unsure as to how to configure IP address settings, consult your network administrator.

The default gateway, primary and secondary DNS server IP addresses are either supplied by your internet service provider, or the same as the address of the device you use to connect to the network (i.e. your router). The secondary DNS server is optional, and may be left blank.

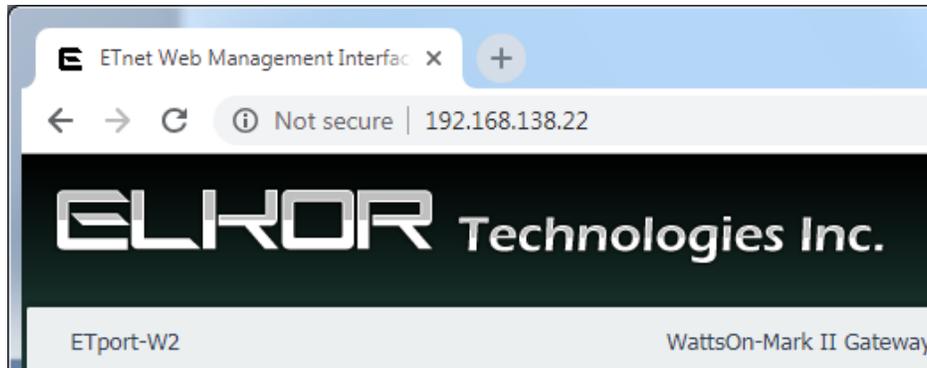
A valid username (always “admin” for the ETport) and password (default: “admin”) are required to apply the changes.



## 3. THE WEB INTERFACE

### 3.1. Accessing the Web Interface

To access the web interface for the ETPORT, open a web browser and direct it to the device's IP address. (To discover the device's IP address for the first time, refer to **Section 2.3, Network Discovery, p.6**). We recommend using Mozilla Firefox or Google Chrome to access the web interface, but other standards-compliant web browsers should work fine.



**Figure 1. Accessing the Web Interface**

The web interface provides a number of status indicators and configuration features.

**Note — Default Password:** By default, the configuration pages are protected with a password. The first time you access the web interface, the default username and password will be *admin* and *admin*. This password can be changed, if desired; see **3.8, Changing the Administrator Password** (p. 10).

The left-hand side of the web interface contains the different configuration pages available. They are divided into two sections, Connected Devices, which contains features related to the attached devices, and Gateway, which contains features that pertain to the Ethernet/Wi-Fi gateway itself. The center of the interface shows the current configuration/status page – Information, by default.

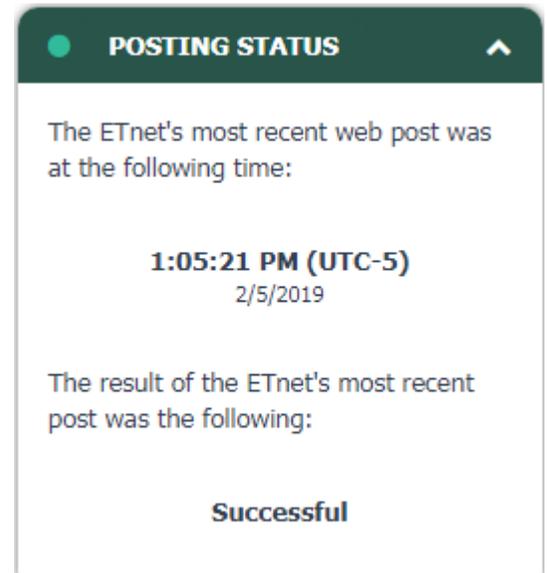
### 3.2. Posting Status

Below the Connection Status box is the Posting Status box. If the Web Posting feature is enabled, this box shows the status of the most recent web post that has been made since the device was powered on. It will display the time of the most recent post attempt, in the local time zone of your computer. It will also display whether or not the most recent post was successful or not, including (if applicable) the HTTP error code that was returned from the server. Any connection problems are shown in the top-right corner of the box.

For details on configuring the web posting feature, as well as getting a more detailed status response, see **3.11, Posting Data** (p. 11).

### 3.3. Information Page

By default, the web interface displays general information, including information about the device's firmware, and its current networking settings. The format differs slightly depending on the device model.



GATEWAY INFORMATION	
Name:	WattsOn-Mark II Gateway
Device Name:	ETport-W2
Uptime:	01:38:46
Firmware Version:	0.83
Firmware Release Date:	Jan 3 2019 10:37:14
Operating System:	Platform v3.1.2e1 / Kernel V8.2.0

NETWORKING INFORMATION	
Interface:	Ethernet
MAC Address:	24:0a:c4:17:cf:2b
IP Address:	192.168.138.22 (DHCP)
Subnet Mask:	255.255.255.0 (DHCP)
Default Gateway:	192.168.138.1 (DHCP)
Primary DNS:	192.168.138.1 (DHCP)
Secondary DNS:	0.0.0.0 (DHCP)

### 3.4. Diagnostics Page

Click "Diagnostics" to view the diagnostics page. On this page, you can view several internal details about the device, including RAM details, and the processes that are currently running. Generally you will not need to check the diagnostics page unless there is a problem.

### 3.5. Filesystem Page

Click "Filesystem" to view the filesystem page. On this page, you can view, download, edit and upload files that are stored on the device's flash file system.

To view or download a file using the browser

1. Click "Filesystem" on the left-hand side of the web interface to access the filesystem configuration page.
2. In the Web File Explorer box, click on the name of the file you wish to view.
3. Clicking on a file will either cause its contents will either be shown in the browser (if it is a text file), or the browser will ask you if you wish to download the file to your computer.
4. If you wish to download a text file rather than view it, you can use your browser's "Save Page" function, which varies slightly depending on your browser:
  - a. In recent versions of Mozilla Firefox, click on the Firefox button, and then click "Save Page As"
  - b. In recent versions of Google Chrome, click on the wrench button, and then click "Save page as"
  - c. In recent versions of Microsoft Internet Explorer, click on the gear button (tools), click on the File menu, and then click on "Save as"
  - d. For other browsers, consult that browser's documentation for details on how to save a page.

#### 3.5.1. To delete a file or directory using the browser

1. Click "Filesystem" on the left-hand side of the web interface to access the filesystem configuration page.
2. In the Web File Explorer box, click on the red "X" next to the name of the file or directory you wish to delete.
3. If you are deleting a directory, it must be empty before you can delete it. Delete all of the files in the directory before deleting the directory itself.

#### 3.5.2. To upload a file using the browser

1. Click "Filesystem" on the left-hand side of the web interface to access the filesystem configuration page.
2. In the Web File Explorer box, click the *Upload* button under the Operations heading.
3. Click on the *Browse* button (*Choose File* on Google Chrome) to select a file on your computer to upload.
4. Click on the *Upload* button.
5. Your file or directory will appear in the directory tree shown above.

### 3.6. Network Page

The network page allows you to configure how the device gets its IP address, and lets you set the hostname and domain. The device supports automatic acquisition of an IP address using DHCP, as well as setting a static IP. The process for doing so is described below:

#### 3.6.1. To set the IP address statically

1. Click "Network" on the left-hand side of the web interface to access the network configuration page.
2. Click in the *Static (Set Manually)* checkbox under the IP Configuration heading.
3. Enter the IP information. The values that are currently in use will be present in the text fields by default.
4. Click the *Submit* button to save your changes. The device will reboot and then reload the web interface automatically.
  - a. If the device acquires its IP address automatically using DHCP, it is possible that your router will assign a different IP address to the device after a reboot, and you will need to enter that IP Address manually in your browser to return to the web interface. For details on discovering the device's IP address, see **Section** Error! Reference source not found., Error! Reference source not found..

#### 3.6.2. To set the IP address automatically

1. Click "Network" on the left-hand side of the web interface to access the network configuration page.
2. Enter a hostname and/or domain into the corresponding text fields, if desired. (Optional)
3. Click in the *DHCP* checkbox under the IP Configuration heading.
4. Click the *Submit* button to save your changes. The device will reboot and reload the web interface automatically.
  - a. If the device acquires its IP address automatically using DHCP, it is possible that your router will assign a different IP address to the device after a reboot, and you will need to enter that IP Address manually in your browser to return to the web interface. For details on discovering the device's IP address, see **Section** Error! Reference source not found., Error! Reference source not found..

### 3.7. System Page

The system page allows you to reboot the device, restore its settings to the factory default configuration, or change the firmware that is installed.

**Note — Not Recommended:** We do not generally recommend changing the firmware unless absolutely necessary, as a power failure during the process could corrupt the firmware, requiring a special procedure to recover the device. Use with caution.

### 3.8. Changing the Administrator Password

1. Click "System" on the left-hand side of the web interface to access the system configuration page.
2. Type the desired password twice, in each of the two boxes to the right of the *Admin Password* field.
3. Click the *Submit* button.

### 3.9. Reading Registers

To monitor real time sensor data from the meter, access the web interface, and click on *Monitor*. Data will begin to appear after a moment. In the first box, titled Reading Timestamp, a timestamp of when the data was last read is displayed. The timestamp is shown in your local time zone (as determined by your computer's system time).

The second box displays the current real-time parameters that are being measured, including instantaneous voltage, current, and power. The third box displays accumulated energy values. These values accumulate over time.

### 3.10. Posting Data to the Elkor Cloud

You can have your device post to the Elkor Cloud website to easily view graphs of data from any web browser anywhere in the world. A video tutorial on the Elkor Cloud is available at: [https://www.youtube.com/watch?v=iW\\_6Wzvl1jE](https://www.youtube.com/watch?v=iW_6Wzvl1jE).

#### 3.10.1. To configure your device to post to the Elkor Cloud

1. Click "Web Posting" on the left-hand side to access the web posting configuration page.
2. Click the *Change* button next to the *Posting* field.
3. Click the *Preconfigured Profiles* drop-down box, and select *Elkor Cloud*.
4. Check the *Enable Posting* checkbox.

5. Click the *Submit* button.
6. If you have not yet created an Elkor Cloud account, click the *create a new account* link.
7. Click the *Add this device* link to add your device to your Elkor Cloud account. The Elkor Cloud site will prompt you to login if necessary.

### 3.11. Posting Data to your own Web Server (Advanced Feature)

The device can periodically transmit data from the connected WattsOn meter to a local or remote web site. This is done by sending an HTTP POST message to a given URL (website address, such as <http://www.your-server.com/>). This message can be interpreted by server-side scripts, such as those written in PHP, ASP, JSP, CGI, and similar technologies. Such scripts could log the information, upload it to a database, control some other device with the information, and so on.

The format of the HTTP POST is customizable using a template. By default, the device ships with a template that posts in JSON format, but by customizing the template, you could post in any other format, such as XML, CSV, or proprietary formats specific to your company or organization. Details for customizing your template are provided in **3.12, Customizing the Web Posting Format** (Advanced Feature).

#### 3.11.1. Examples

Hyper-Text Transfer Protocol (HTTP) is the protocol used on the internet to request web pages and upload information back to them. While the details of the HTTP protocol are beyond the scope of this document, an example POST is shown below.

```
POST /post/ HTTP/1.1
Content-Type: application/json
Content-Length: 1484

payload={
  "device": "ETport-W2-00:11:22:33:44:55",
  "device_firmware_version": "1.00",
  "meter_serial": 50001,
  "meter_firmware_version": 12.00,
  "time": "2012-05-15T18:22Z",
  "live_data": "true",
  "data": {
    "net_total_energy_cumulative_kWh": 26086.6,
    "real_power_ab_total_kW": 2.240,
    "reactive_power_ab_total_kVAR": 0.090,
    "apparent_power_ab_total_kVA": 2.410,
    "power_factor_ab_total_none": 0.929,
    "frequency_instantaneous_Hz": 60.0,
    "real_power_demand_ab_average_kW": 2.2,
    "voltage_a_instantaneous_V": 118.9,
    "voltage_b_instantaneous_V": 116.2,
    "voltage_ab_instantaneous_V": 235.1,
    "current_a_instantaneous_A": 7.100,
    "current_b_instantaneous_A": 13.780,
    "real_power_a_instantaneous_kW": 0.799,
    "real_power_b_instantaneous_kW": 1.442,
    "reactive_power_a_instantaneous_kVAR": 0.145,
    "reactive_power_b_instantaneous_kVAR": -0.055,
    "apparent_power_a_instantaneous_kVA": 0.845,
    "apparent_power_b_instantaneous_kVA": 1.561,
    "power_factor_a_instantaneous_none": 0.945,
    "power_factor_b_instantaneous_none": -0.924,
    "import_energy_a_cumulative_KWh": 11436.0,
    "import_energy_b_cumulative_KWh": 14650.7,
    "ttl_import_energy_ab_total_KWh": 26086.6,
    "export_energy_a_cumulative_KWh": 0.0,
    "export_energy_b_cumulative_KWh": 0.0,
    "ttl_export_energy_ab_total_KWh": 0.0,
    "net_real_energy_a_cumulative_KWh": 11436.0,
    "net_real_energy_b_cumulative_KWh": 14650.7,
    "status": 0
  }
}
```

While the details of server-side scripting are beyond the scope of this document, a sample script written in the PHP scripting language is provided below for reference. The script reads the data from the HTTP POST and appends that data to the end of the log file called "posts.log".

```
<html>
<body>
<?php

    // Place the contents of the HTTP POST into a variable
    $postdata = file_get_contents("php://input");

    // Save the data to a log file
    $handle = fopen("posts.log", "a");
    fwrite($handle, $postdata);
    fclose($handle);

?>
</body>
</html>
```

### 3.11.2. Enabling Web Posting

To configure the web posting, you must access the web interface, and click on the *Web Posting* button on the left-hand side of the page.

1. In the Web Posting box, under the Current Posting Settings heading, click the *Change* button.
2. Check the *Enable Posting* box.
3. Choose how often the device will post its data to the server. To select, for instance, every 15 minutes, enter "15" into the text field, and select "minutes" from the drop-down box. You can enter times in minutes or hours.
4. Enter the URL (web address) of the web server to which posts should be made.

**Note — Trailing Slashes:** If the URL you are entering does not end in a file extension (like .htm or .html), some web servers require that you end it with a trailing slash /. For instance, http://www.your-server.com/data/

5. Click the *Submit* button to save your changes.

If the device previously had web posting disabled, it will immediately make its first post after the settings are applied, and then make subsequent posts after the designated interval. You can test your configuration by clicking the *Post Now* button at the bottom of the Web Posting box.

### 3.11.3. Enabling HTTP Authentication

If your web server requires basic HTTP authentication, you can enable it by entering a username and password.

1. In the Web Posting box, under the HTTP Authentication heading, click the *Change* button.
2. Click the *Enable* check box.
3. Enter the username and password in the text fields
4. Click the *Submit* button to save your changes.

### 3.11.4. Testing the Configuration

You can test your configuration by clicking the *Post Now* button at the bottom of the Web Posting box. The Previous Post Response box will display the HTTP response, if any, of the previous posting attempt. You can use this to help debug connection or formatting problems with the post or posting template.



variables. It is meant to be used as a cross-check against the server's local time, such as to identify buffered data (see the section below).

### **Changing the Default Time Servers** *(Advanced Feature)*

The device supports two protocols for retrieving the time from the internet. It supports the Network Time Protocol (NTP). A list of public timeservers is built-in from which it will attempt to acquire the time. You can change these time servers by modifying the device's configuration file.

1. Click "System" on the left-hand side of the web interface to access the system configuration page.
2. Click the *Advanced Configuration* button.
3. Enter *ntp\_server* in the *Search* field.
4. Up to three NTP servers can be entered in the *Value* column of the table, next to *ntp\_server\_0*, *ntp\_server\_1*, and *ntp\_server\_2*.
5. Click *Save Settings* at the top of the page to save the changes.

#### **3.12.4. Buffering and Failure Handling**

If the device cannot successfully post to the configured web server due to a connection problem, it will store failed posts in its internal memory and retry that post later on. Posts are retried at the same interval that is configured for making new posts. The device has four megabytes of internal storage available for buffered posts, with each post being approximately the size of the posting template.

Buffered posts can be viewed by exploring the `/buffer` directory in the Filesystem; see **3.5, Filesystem Page**.