

# WEBIO

## User Manual



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# Product Information

## **For customers in the United States and Canada**

This equipment had been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment in to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## **Owner's Record**

The model number, serial number and MAC address is located on the bottom of the device. Record the model number, serial number and MAC address in the space provided below. These numbers are important for user use and configuration of the Product. Refer to these numbers whenever you call upon Key Eleven or authorizes service center regarding this product.

Model No. AFX1110

Serial No. \_\_\_\_\_

MAC Address \_\_\_\_\_

# WebIO Introduction

WebIO is an Internet to power line control (PLC) network server and gateway, providing both local Ethernet and remote Internet control of lamps, appliances and other electrical devices in the home or office. Utilizing X10 PLC technology, WebIO sends signals down existing power lines to control X10 compatible PLC devices. By containing a built-in web server, WebIO allows remote users with Internet access to connect to a WebIO via web browser, giving the remote user control of installed X10 devices.

WebIO is built on the idea that an expensive and complex personal computer is not needed to provide Internet access to an X10 power line control network. Instead, WebIO is a low cost, small self-contained device that provides all the functionality of an Ethernet to X10 gateway that is as easy to install as a home Internet router.

WebIO communicates with X10 modules that support “On”, “Off”, “Query” and other X10 functions. This includes appliance modules, lamp modules, AC receptacles, light switches, dry contact modules, relays and many others readily available devices from suppliers of X10 PLC devices.

## **WebIO TCP/IP Networking**

WebIO provides an RJ45 interface for an Ethernet connection to a local area network. An IP address may be assigned to a WebIO from a DHCP server or a static IP address can be set using the WebIO Setup utility software.

For remote monitoring and control, WebIO requires a routable Internet connection, allowing a user to connect to a WebIO from anywhere in the world via the Internet.

WebIO network access security is provided via user assignable passcode. WebIO configuration settings are protected from unauthorized web access via “*program mode*” switch located on the WebIO back connection panel. Additional security requires user supplied VPN device or other network security systems.

## WebIO Networking

WebIO provides an RJ45 interface for an Ethernet connection to a LAN. An IP address may be assigned from a DHCP server or a static IP can be set using the WebIO Setup utility software.

For remote monitoring and control, WebIO requires a routable Internet connection. This allows a user to connect to a WebIO from anywhere in the world via the Internet.

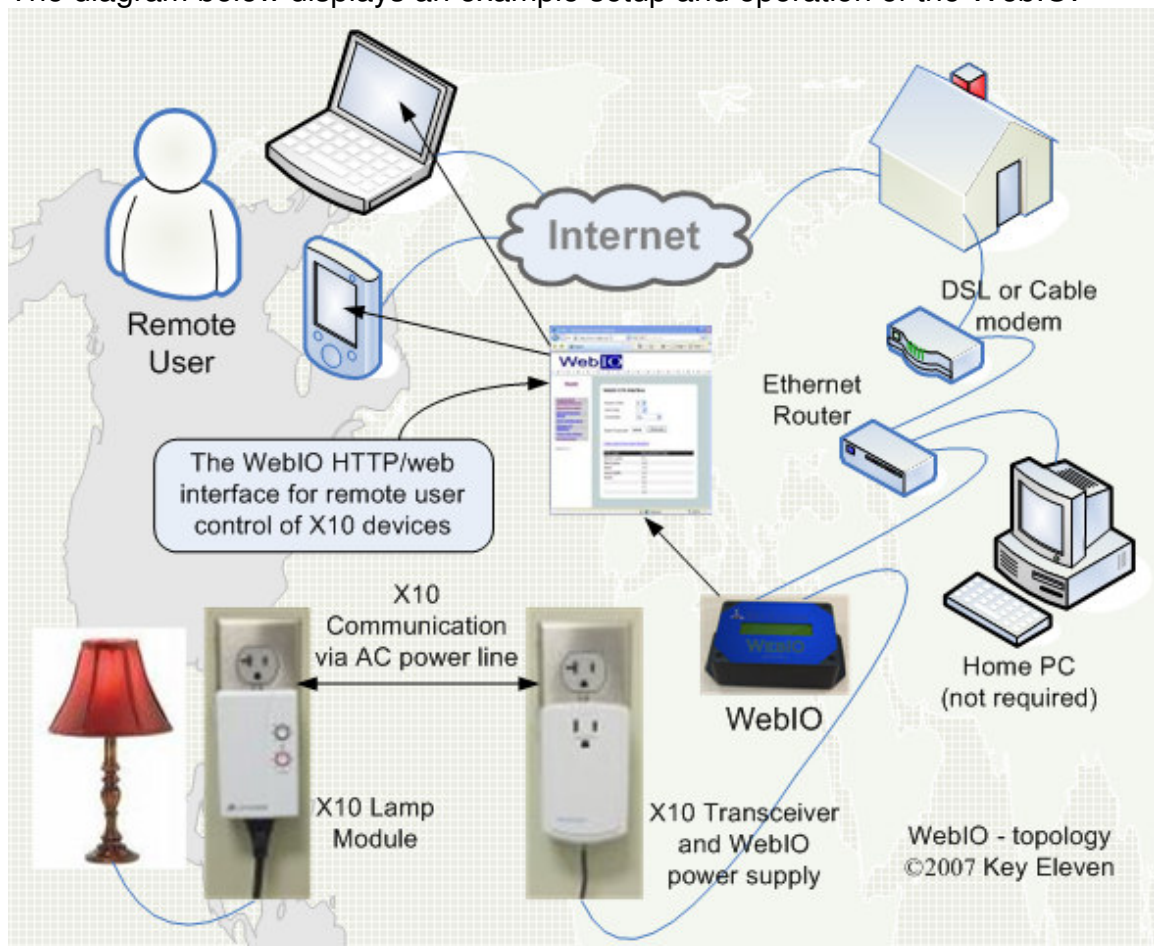
## X10 Modules

X10 modules plug into AC receptacles providing power to the module and controlled devices.

The AC power line provides the path for modules to send and receive control messages. Each X10 module on the AC power line network is addressed with a House code and Unit code combination. There are 16 House codes assigned a letter in the range of A-P. Unit codes are assigned numbers 1-16. X10 modules support different Function codes, such as On, Off, Dim, and State Query.

## WebIO Example Setup

The diagram below displays an example setup and operation of the WebIO:



# WebIO Hardware Setup



Rear View of WebIO

## **Ethernet Connection**

WebIO provides an RJ45 jack for Ethernet connection to your Local Area Network. The left LED of the RJ45 jack will light when the WebIO is correctly connected to an Ethernet LAN.

## **X10 Interface**

WebIO provides an RJ12 6pin modular interface for connection to an X10 transceiver. When used with a Smart Home PowerLinc II™ X10 transceiver, power for WebIO is provided by the PowerLinc II.

When used with the PSC05/TW523 X10 transceivers, which do not supply power, the WebIO barrel connector is used with a 9-12volt dc (center pin positive) power adapter. Also, an internal WebIO jumper (J6) must be moved from the left to the right position (nearest barrel connector) to enable the barrel connector for power. This also disables the RJ12 connector (X10 transceiver connector) as the power source.

WebIO supports multiple X10 power line transceivers:

- The Smart Home PowerLinc II™ serial interface X10 transceiver (with RJ12 6pin modular connector) in TW523 mode. With this transceiver the WebIO also receives power, so no extra power supply is needed.
- The X10 Pro PSC05 (TW523) transceiver. An additional 9-12 Volt DC, center pin positive, power supply is required to power the WebIO. Along with a jumper changed within WebIO.

- The PL513/PCS04 transmitter. With the PL513, WebIO can transmit X10 signals but not receive message replies from 2-way X10 modules. In addition a separate power supply is required for WebIO.
- The XM10 transceiver for 230VAC power in UK countries. In addition a separate power supply is required for WebIO.

## Program Switch

The Program Switch is located on the rear of a WebIO. This switch is used as a security device to prevent unauthorized remote users from configuring the WebIO. To prevent unauthorized or accidental configuration, it is important to leave this switch in the **Lock** position.

The Program Switch performs the following functions:

1. Restore factory default settings.
2. Allow storage of user configuration.
3. Display current IP address

### 1. Restoring Factory Default Settings

To restore WebIO to factory default settings perform the following tasks:

- a. Remove power.
- b. Switch the Program Switch to the **Program (Prg)** position (away from power barrel connector)
- c. Reapply power. The WebIO boot process will display the message "Factory Default".
- d. Set the switch back to the **Lock** position.

Restoring to factory defaults performs three tasks:

1. Removes the user set static IP address. The factory default is to accept an IP address from a DHCP server.
2. Clears user-set passcode, disabling the use of a passcode until a new passcode is entered.
3. Clears all user defined X10 device labels.

### 2. Allowing Storage of User Configuration

Setting the Program Switch to the **Prg** position while the WebIO is powered allows the user to perform three tasks:

1. Program a static IP address
2. Set a passcode as described later in this manual.
3. Define labels/names for X10 devices

WebIO will save these setting to non-volatile memory for recall even if power is lost and restored.

The function of the Program Switch is also used for security. Remember to set the Program Switch to the normal (**Off/Lock**) position after programming to prevent unauthorized remote users from configuring WebIO.

### 3. Display the Current IP Address

The program switch is also used to display the current IP address of the WebIO. Switching to any position will update the display with the WebIO current IP address. This becomes useful during installation when a DHCP server is used.

#### IMPORTANT:

The function of the Program Switch is also used for security. Remember to set the Program Switch to the normal (**Off/Lock**) position after setup programming to prevent unauthorized remote users from configuring your WebIO.

The Lock position also prevents an accidental **Restore to Factory Defaults** on unintentional power cycle of WebIO.



# WebIO Network Setup

WebIO can operate with either an IP address obtained from a DHCP server, by using the WebIO Setup utility software, or by using a computers operating system's ARP and Ping tools.

## **Setting a WebIO IP Address Using a DHCP Server**

### **Getting an IP Address from a DHCP server**

WebIO will accept an IP from a DHCP server.

Switch the WebIO program switch to display its current IP address on the LCD.

If the WebIO shows an IP address of 0.0.0.0 then an IP address has not been received. It can take many seconds to receive an IP from a DHCP server.

When using DHCP with WebIO, Internet routing to the WebIO may not be practical in the case where WebIO is power cycled (rebooted) and then receives a different IP address than previously assigned. Also Routers may not have the ability to forward to an IP address in the range of the DHCP assigned address. To avoid this problem when using a router with DHCP enabled it is best to use a *static* DHCP service (or Bootp service) where the DHCP server assigns a defined IP address to the WebIO based on the WebIO MAC address.

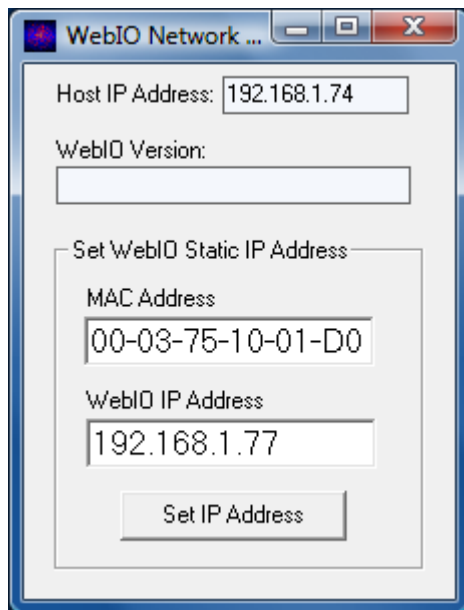
Note: In some rare cases depending on DHCP server used, WebIO may prioritize DHCP over static, regardless of the WebIO Lock switch position. Such that if you assign WebIO a static IP address on a network with a DHCP server, WebIO may accept a new IP address received from the DHCP server. In some rare cases, in using the WebIO static IP function, you may need to not have a DHCP server (not so practical) or have the DHCP server always assign the same IP dependent on MAC address. (Static DHCP/bootp).

## Setting the WebIO IP Address Using the WebIO Setup Software

The WebIO CD-ROM includes an installation program for the WebIO Setup utility software. The installation program and the WebIO Setup utility will work with Windows 9x, 2000, XP, and Vista. The WebIO Setup utility provides for an easy IP address configuration tool.

For installation of the WebIO Setup utility, run “setup.exe” from the WebIO Setup CD-ROM. After installation run the WebIO Setup utility from your Windows Program menu.

The WebIO Setup utility contains the following form:



1. In the **MAC Address** field, enter your unique MAC address found on the bottom of the WebIO.
2. In the **WebIO IP Address** field enter the desired IP address to be assigned to the WebIO.
3. Click the **Set IP Address** button. After a few moments a message will notify success or failure.

On success, WebIO Version field will display the WebIO firmware version.

Note: This Application uses ARP and Ping behind the scenes as described in Appendix A.

For more information on WebIO Setup software, see manual **WebIO Setup**.

To instruct WebIO to store its IP address in Flash memory, see the section “**Using WebIO – Setting an IP address**”.

## Manually Setting the WebIO IP Address Using ARP and Ping

### Setting a Static IP Address (When no DHCP Server is Available)

ARP and Ping can be used to set the WebIO IP address. There must not be a DHCP or BOOTP server on the same network as WebIO when using this method for setting the IP address.

Windows 9x example:

IP for WebIO: 192.168.1.25

MAC for WebIO: 00-03-75-1f-0c-9f

PC's IP address: 192.168.1.150

1. Enter the desired IP address for the MAC address of the WebIO into your PC's ARP table. From a Windows command prompt Enter:

```
arp -s 192.168.1.25 00-03-75-1f-0c-9f 192.168.1.150
```

2. Ping the IP address of the WebIO by entering the following command at a Windows command prompt.

```
ping 192.168.1.25.
```

When received, the WebIO will accept this address.

To instruct WebIO to store its IP address in Flash memory, see the section "**Using WebIO – Setting an IP address**".

For more information on setting an IP address see Appendix A.

# Routeable Network Setup

To setup WebIO for remote Internet access, WebIO will need to be assigned either an Internet IP address, or more commonly, placed behind a router (LAN side) that has an Internet IP address and is configured to forward via IP port forwarding to the IP address of the WebIO. This method is referred to as “router port forwarding” and “Network Address Translation” (NAT)

## **Router Setup (router port forwarding)**

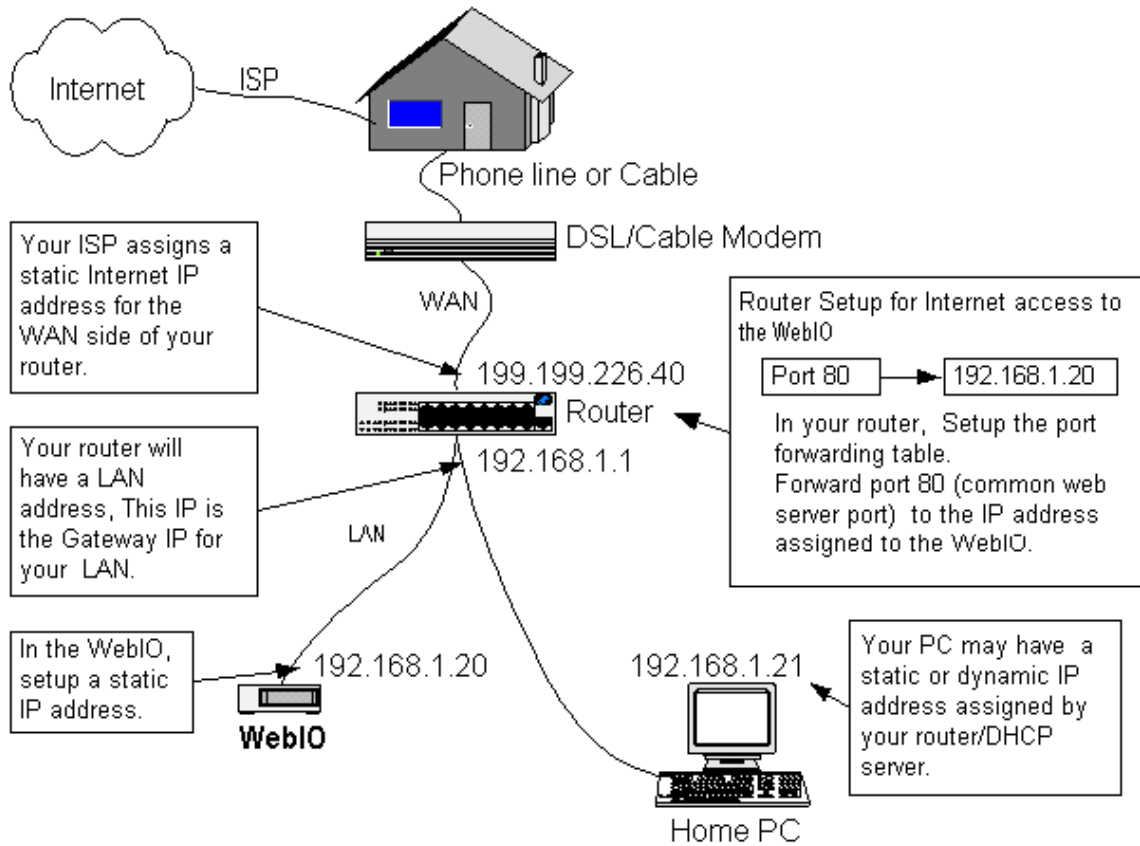
Most routers have a feature that allows a user-configuration for port forwarding. Port forwarding is used to allow an outside request from the Wide Area Network (WAN) side of the router to be routed to a *specific* IP address of a device or computer existing on the *inside* router network, referred to as the Local Area Network (LAN).

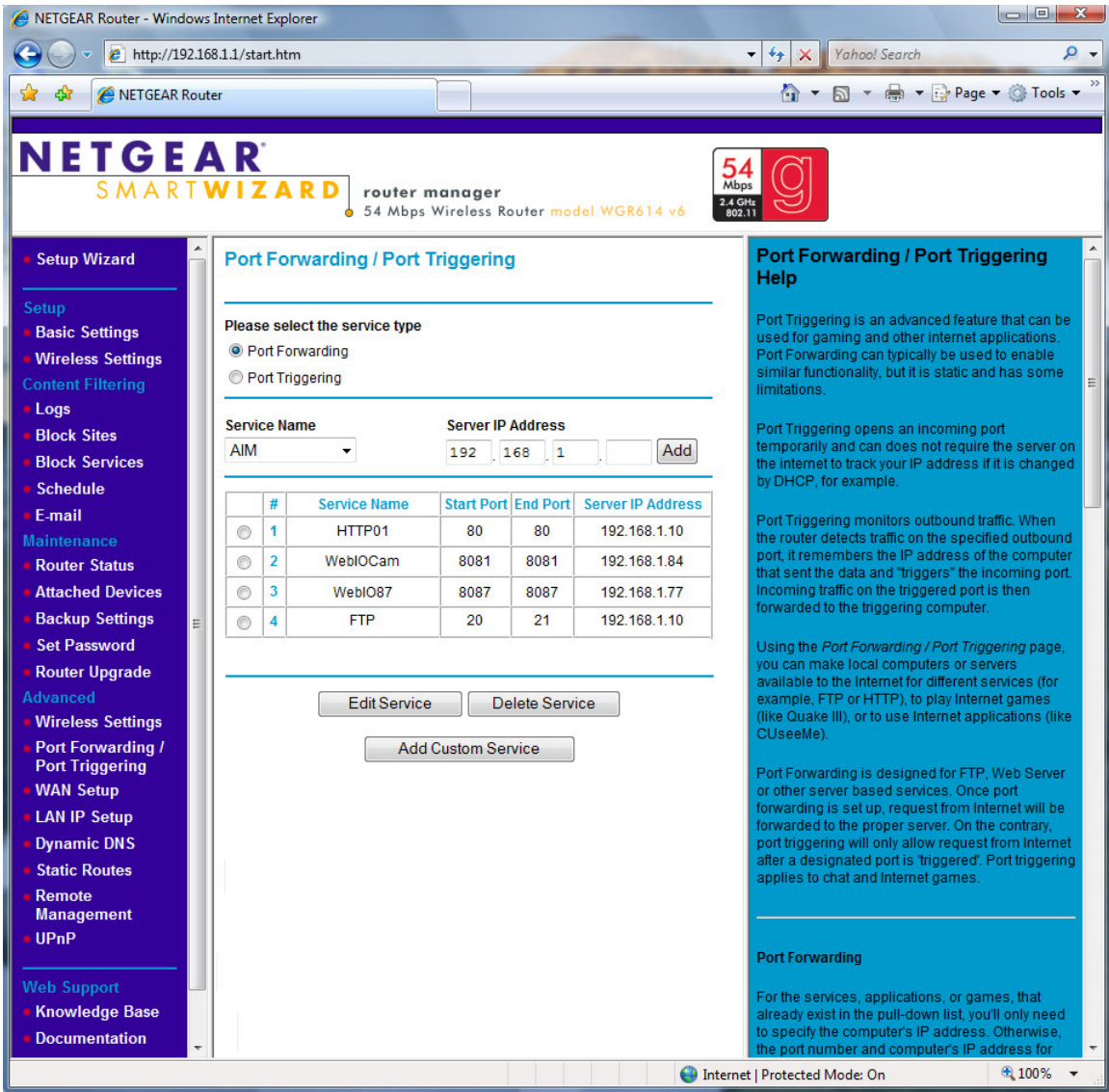
Message requests sent over a TCP/IP network (such as the Internet) use port numbers as a way to specify a specific service on a server. For example, a Web service will listen on port 80 where as an email service on the same server will listen on port 25. This way a message directed to the server using an IP address will specify a port number to direct the message to the appropriate service (web service or e-mail service). As another example, when a web browser asks a web server for a web page, the browser sends a message to the server, referring to its IP address and referring to the web services port number on the server. By default a web browser sends requests to port 80, the default port used by web servers.

When setting up a router to forward a port to the WebIO, using the default of port 80 is suggested. However the WebIO will accept an HTTP connection on any port, allowing for router setup in the case that an existing web server on the LAN side of the router is already assigned to port 80. The WebIO would then need to be assigned to a different port such as 81 or 8080.

When using a port other than 80, you will need to specify the port number on the browser's URL using “:” {and port number}. For example to specify port 8081 at IP address 24.119.179.20, enter: `http://24.119.179.20:8081`. Or when using a domain name, enter: `http://www.keyeleven.com:8081`

Below is a network topology diagram that outlines router port forwarding:





Above is a screenshot of a NetGear router Port Forwarding configuration. Note entry #3 for WebIO on Port 8087 forward to LAN IP address 192.168.1.77.

# Using WebIO

## **WebIO Functions**

WebIO includes an embedded web server, for providing a simple interface to the user via web browser. This allows for simple operation with no additional software required to be installed on the user's PC. The simple web pages of WebIO even allow for operation from a mobile Smartphone or similar devices that provide a web browser.

When using a Smartphone with a web browser it become advantageous that WebIO uses HTML frames allowing the small phone screen size to focus on a single frame rather than the full web page.

### **The WebIO web interface provides for:**

- Controlling X10 devices by label/name
- Sending specific X10 commands
- Query of an X10 device state
- Setting an LCD message
- Setting a Static IP address
- Setting a User Passcode
- Editing X10 device labels
- Reading WebIO temperature

The following sections describe the functions of WebIO.

## Controlling X10 Labeled Devices

The WebIO web interface provides two methods for controlling X10 Devices. The [Control X10 Labeled Devices](#) page (shown below) allows for easy control of X10 On/Off commands for predefined X10 devices.



The [Control X10 Labeled Devices](#) page (above) shows a table of predefined X10 Devices. The **On** and **Off** columns contain links for setting the On/Off state of the device in the selected table row.

When a WebIO passcode is set/enabled, the On/Off links will not trigger X10 commands until the correct passcode is entered in to the **Enter Passcode** field and the **Unlock** button is clicked. After the passcode has been submitted the [Clear passcode when finished](#) link must be selected to re-lock the WebIO from X10 operations.



The **Set dim level of last device set on** up and down arrow buttons are used to adjust the dim level of a lamp module that supports X10 dim commands. Only the last lamp module set on or off will be affected by the dim commands.

The [Control X10 Labeled Devices](#) web page interface is designed for convenience to the user for operating several X10 commands with ease. This is accomplished by using X10 labels, on/off links and a single passcode unlock process.

It is important for the user to understand that the unlock process sets WebIO into an unlocked state allowing anyone access to sending X10 commands. This is due to WebIO not having a capability of tracking secure HTTPS sessions with users as is common with full featured Internet web servers. So it becomes important to clear the passcode when finished with using the [Control X10 Labeled Devices](#) interface to **re-lock** WebIO from X10 command use.

Also, WebIO will enter locked mode whenever an incorrect passcode is entered and a passcode is set/enabled.

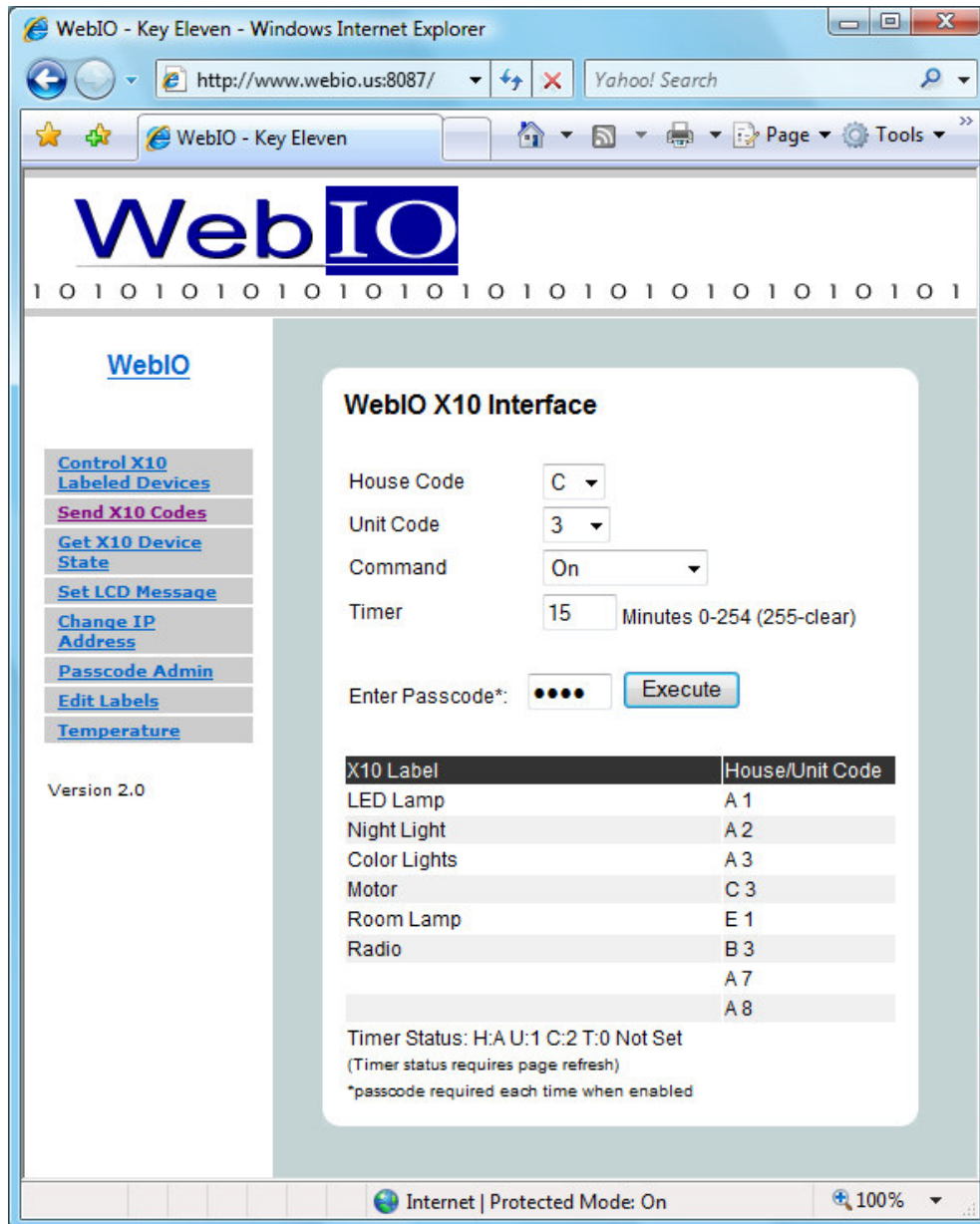
Also note that [The Send X10 Commands](#) web page interface does not set WebIO into an **unlocked** state but instead requires the correct passcode to be entered with every X10 command function when passcode is set/enabled.

**IMPORTANT:**

When using the [Control X10 Labeled Devices](#) interface and a WebIO passcode is set/enabled. The [Clear passcode when finished](#) link must be selected to **re-lock** WebIO from unauthorized use of X10 command functions.

## Send X10 Commands

Another method for controlling X10 devices is to use the [Send X10 Codes](#) web page. This page allows for manually selecting X10 device House code, Unit code, and the Command to be sent. In addition a timer can be set for when the operation should occur.



To execute an X10 function, select House code, Unit code and Command from the drop list boxes then set an optional timer and enter Passcode (if enabled) and click the **Execute** button.

A table of labeled X10 devices is provided for convenience along with timer status.

WebIO includes support for most of the X10 protocol commands.

**WebIO supports sending the following X10 commands**

- **On** – Used to turn on a device
- **Off** – Used to turn off a device
- **Dim** – Used to Dim a lamp module
- **Bright** – Used to Brighten a lamp module
- **All Units Off** – Used to turn all modules off of same House Code
- **All Lights On** – Used to turn all lights on of same House Code
- **All Lights Off** – Used to turn all lights off of same House Code
- **Status Request** (Query 2-way device), including receiving On/Off messages

The following X10 commands are not supported by WebIO.

**WebIO does not support the following X10 commands:**

- Pre-Set Dim High
- Pre-Set Dime Low
- Extended Data

WebIO adds additional non-X10-protocol commands.

**WebIO adds the following X10 functions**

- **On-Wait-Off** – Where *wait* is 4 seconds
- **Off-Wait-On** – Where *wait* is 4 seconds

### Toggle Commands

The WebIO Toggle action is: (on-wait-off) or (off-wait-on) with a 4 second wait state.

This feature is particularly useful for remotely rebooting Network Routers and other equipment where remote or local access to WebIO will be briefly interrupted.

For Example; In case of remotely rebooting a TCP/IP Network Router of which WebIO is connected, and the Router is connected to an X10 Appliance module: A WebIO toggle “off/on” command sent to the Routers X10 module, will power off the router, causing WebIO to be inaccessible via TCP/IP network. Then to complete the toggle command, WebIO waits 4 seconds and sends an “on”

command providing power back to the Router and access to WebIO after the Router has booted and become operational again.

The Toggle feature is new to WebIO version 1.0.30. WebIO version is displayed on the LCD as it is powered up.

Note: X10 is not necessarily practical for controlling and maintaining a secure and reliable environment for network equipment.

## Timer

The WebIO X10 command timer is new to version 2.0. This feature allows a command to be executed at a later time.

Time is configurable in minutes from **1-254**. A value of **0** is used to execute a command immediately. A value of 255 is used to cancel/clear an existing timer configuration. When using timer value of 255 to clear the timer, the House, Unit and Command values in the drop down boxes have no effect.

Only one timer exists such that only one X10 command can be configured to be sent on the configured time.

When a timer is set, WebIO can still be used to execute other X10 commands with a timer value of **0**. If a timer value other than **0** is used, the current timer configuration will be replaced by the new configuration.

The timer's time is only accurate to better than +/-2% of set time, such that a timer set for 60 minutes may occur up to 1 minute and 12 seconds early or late. Time is effected by WebIO temperature and time can be delayed slightly when used to execute other X10 commands or functions.

When a timer is set, its status can be viewed at the bottom of the [Send X10 Codes](#) page. To get an updated minutes remaining status, a page refresh is required. A message of **Not Set** is displayed if the timer is not currently set or has completed.

The timer status is reported as H:{House code} U:{Unit code} C:{Command}  
T:{minutes remaining}.

*Note: It is not recommended to use the timer function for critical applications, as X10 is not guaranteed to be reliable such that a person is not in a position to supervise the X10 action. Also the timer configuration can be lost due to WebIO losing and regaining power (power cycle). WebIO does not store the timer configuration in non-volatile memory as WebIO does not have a date-time clock to know the amount of time passed on power outage. Also WebIO has a watchdog feature that can cause auto reboot if a problem occurs, though this should be a very rare event.*

## Passcode

When a WebIO passcode is set/enabled, the passcode must be entered into the **Enter Passcode** field before clicking the **Execute** button. If no passcode or the incorrect passcode is entered, the WebIO will not execute the selected X10 function. Unlike the [Control X10 Labeled Devices](#) page, the passcode must be entered for each command sent.

When no passcode is set/enabled, then this field can be left blank.

WebIO does not report when the incorrect passcode has been entered. This provides additional security, not allowing an unauthorized user to “discover” the correct passcode using trial and error.

Also note that [The Send X10 Commands](#) web page interface does not set WebIO into an **unlocked** state but instead requires the correct passcode to be entered with every X10 command function when passcode is set/enabled.

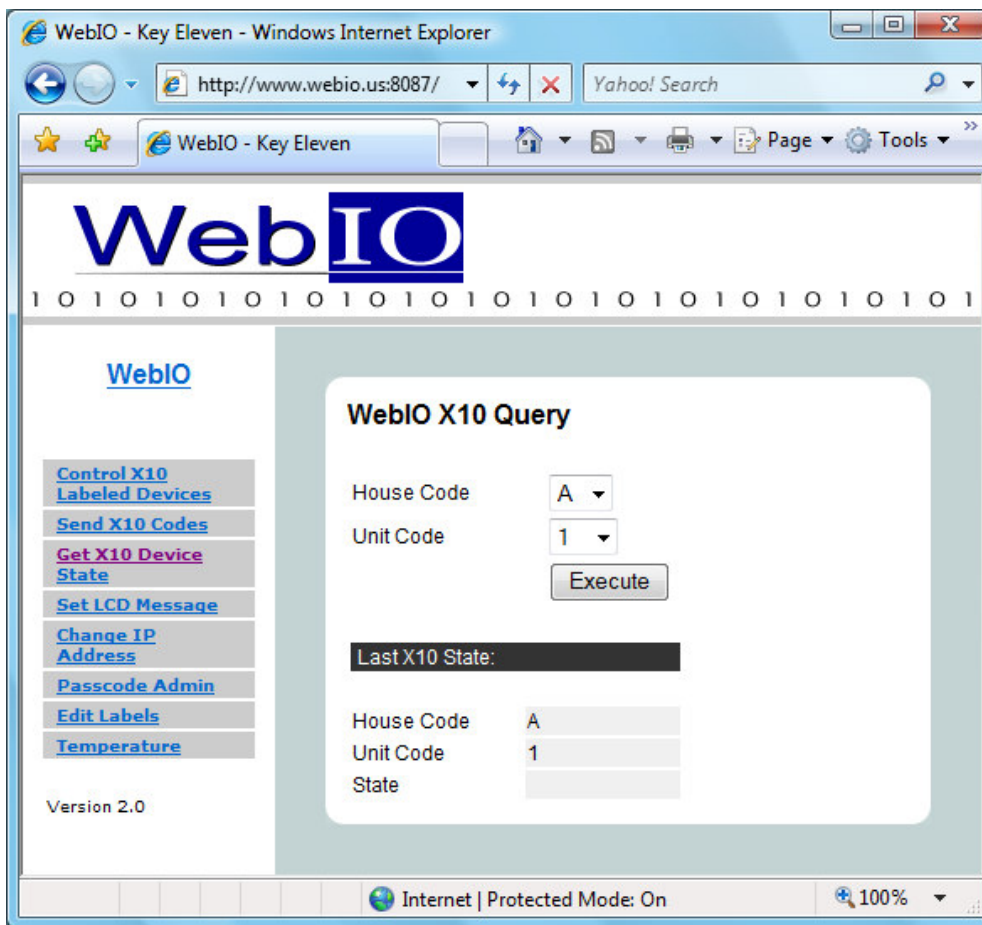
## Get X10 Device State

This feature provides for “asking” an X10 device for its state being “on” or “off” by using the X10 **Status Request** command. This feature is useful for validating that a device is in the expected state after sending an X10 command.

Get X10 device state feature is only supported by X10 devices that can reply to the **Status Request** command (often referred to as 2-way X10 devices). This feature also requires that WebIO be used with a “2-way” X10 Transceiver such as the Powerline or PSC05/TW523.

Note: Some X10 2-way devices seem to be more reliable at receiving commands than they are at replying to status requests.

WebIO will report a reply from a status request/query as either **on** or **off**. If no status reply is received within 4 seconds. WebIO will report with a **No Response** message.



Above is the [Get X10 Device State](#) interface

## Set LCD Message

The [Set LCD Message](#) page provides an interface for displaying messages on the WebIO LCD display. The LCD will display 2 lines of 16 characters.

To display a message, enter the message into the **Line 1** and **Line 2** text boxes, then press the **Execute** button.



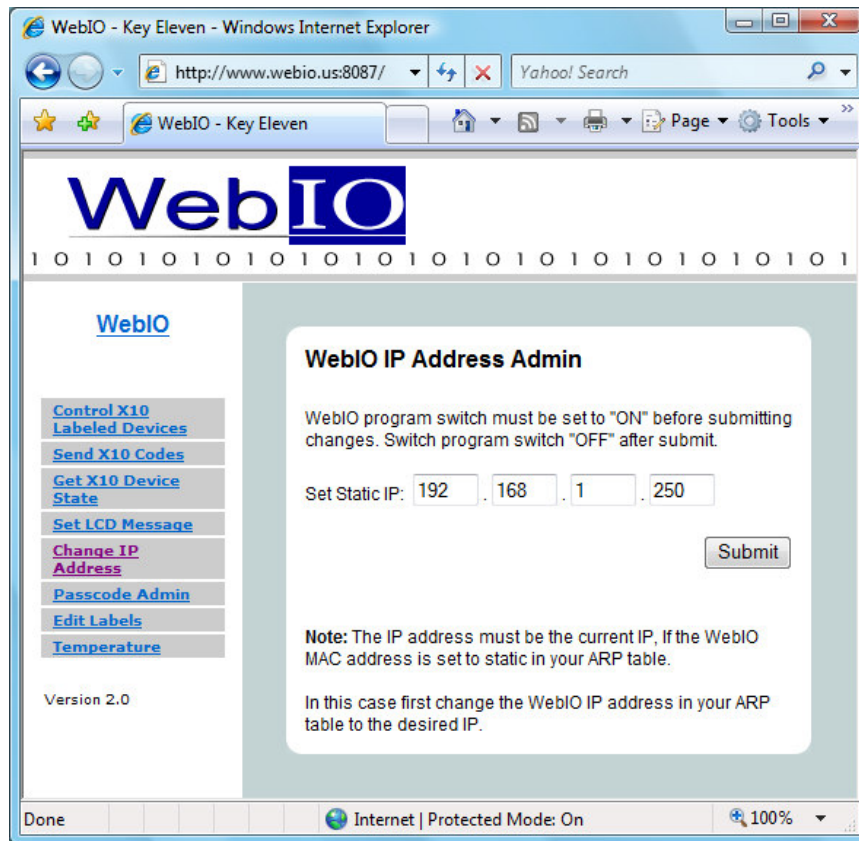
## Setting IP Address

The WebIO, [Change IP Address](#) page provides an interface for saving an IP address to the WebIO non-volatile memory.

WebIO can be configured to remember a static IP address, even when power is cycled. This is useful when a DHCP server is not available to assign the WebIO a dynamic IP address or specific static IP address, or you do not want to manually assign an address each time the WebIO is power cycled. Another use for assigning a static IP address is when a router or other software process needs to know the WebIO assigned IP address for routing messages or connecting to it.

To save an IP address:

1. Move the WebIO Program Switch to the **program** position.
2. From a browser go to the WebIO [Change IP Address](#) page, enter the IP and submit the page. Note the LCD message displaying the new static IP.
3. Switch the Program Switch back to the **Off** position to prevent remote programming and prevent the restoration to factory defaults on reboot.



Note: If you used ARP to set an IP address for the WebIO, the WebIO IP Admin page may only accept the same IP as in your PC's ARP table. To assign a different IP address to WebIO, first clear your ARP table using **arp -a**. Then display your ARP table use **arp -d** {IP address to delete}, to remove an IP



address before using the above procedure to save a different IP address in WebIO.

## Setting a User Passcode

A WebIO can be configured with a passcode for preventing unauthorized control of X10 devices. When a passcode is set both the [Control X10 Labeled Devices](#) and the [Send X10 Code](#) web pages will require the **passcode** field to contain the correct passcode to send an X10 command. When the passcode is incorrect WebIO gives no indication of invalid passcode and no indication that it did not perform the X10 command. This provides additional security, not allowing an unauthorized user to “discover” the correct passcode using trial and error. To verify a device state, use the [Get X10 Device State](#) web page for supported X10 2-way devices.

The WebIO, [Passcode Admin](#) page provides an interface for saving a passcode to the WebIO non-volatile memory.

### Setting a WebIO Passcode:

1. Move the WebIO Program Switch to the **program** position (toward the X10 transceiver connection)
2. From a browser go to the WebIO [Passcode Admin](#) page, enter a 4 character alphanumeric (case sensitive) (plus ASCII non-white-space symbols) passcode and submit the page. Note the LCD message displaying acceptance or failure of the new passcode. WebIO will only use the first four characters when a passcode of more than 4 characters are entered.
3. Switch the Program Switch back to the **Off** position to prevent remote programming and prevent the restoration to factory defaults on reboot.

When a passcode is set, WebIO will display the passcode on the LCD for 2 seconds on its boot process (when power is applied).

Note that a combination of 4 alphanumeric characters plus symbols provides for over 71 million combinations.

To remove a passcode WebIO must be restored to factory defaults. See the section titled “**Restoring Factory Default Settings**”



Above: WebIO interface for setting a passcode

## WebIO Security

The WebIO passcode provides a minimum amount of security. All WebIO information including the passcode sent from a users web browser to the WebIO web server is not encrypted, this means that it is possible for someone with the right tools and knowledge could discover your passcode. For this reason it is not suggested that a WebIO open to the Internet (Internet routable) be used for critical applications such as controlling a thermostat.

Even though WebIO doesn't provide high Internet security, there are methods for adding high security that are beyond the scope of this manual.

Two examples of a secure WebIO setup:

1. A Virtual Private Network (VPN) can be setup that provides an encrypted tunnel over the Internet between a remote user's computer or LAN and a local router of which the WebIO is hiding behind.
2. WebIO can be hidden behind a secure web server, which relays remote messages to the WebIO.

## Edit Device Labels

WebIO provides for the naming of X10 devices. Rather than memorizing devices by X10 Address, a friendly name can be assigned to a **House Code** and **Unit Code** and its associated **On** and **Off** functions. Eight X10 devices can be named on the WebIO web interface.

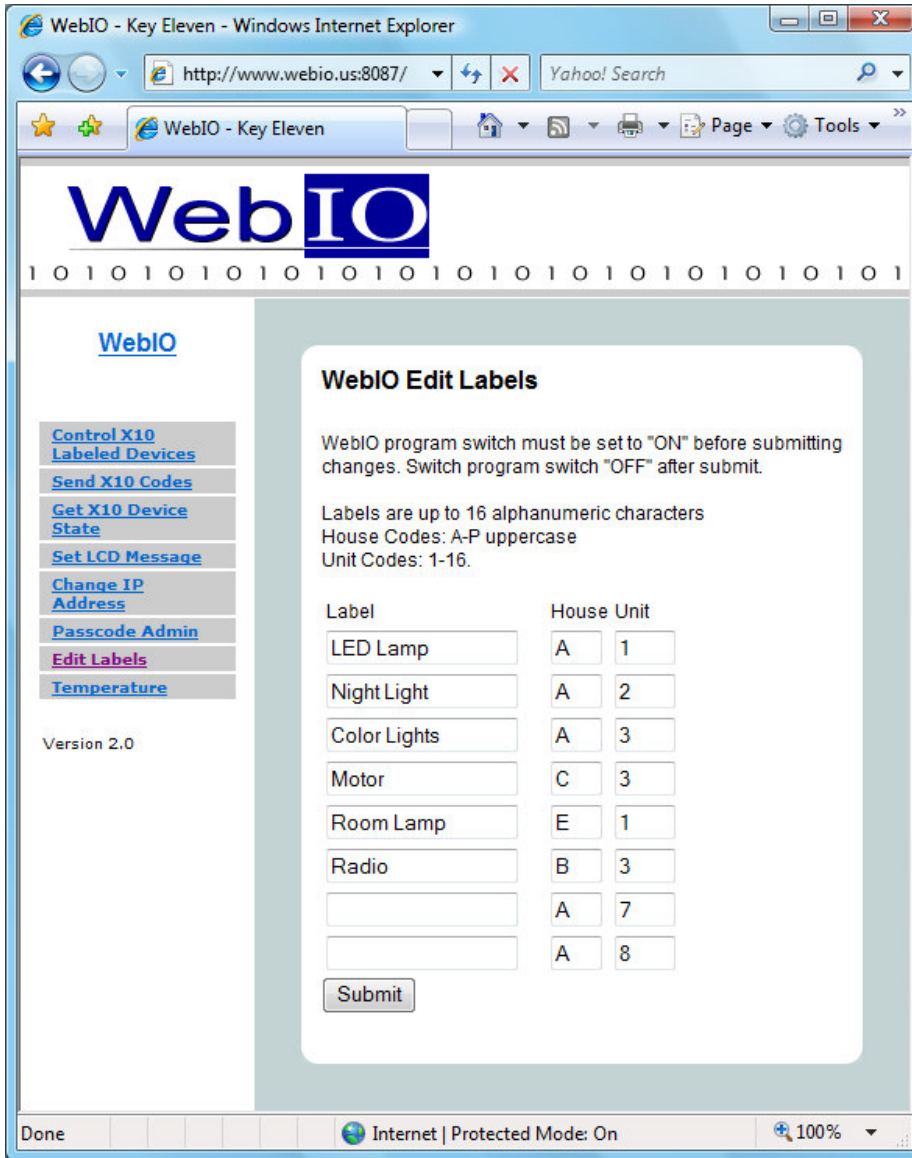
The WebIO, [Edit Labels](#) web page interface provides for assigning names to X10 address to be saved to the WebIO non-volatile memory. Just as with the IP address and Passcode, X10 labels are protected using the WebIO program switch.

### Assigning Device Labels:

1. Move the WebIO Program Switch to the **program** position (toward the X10 transceiver connection)
2. From a browser go to the WebIO [Edit Labels](#) page, for each label, enter **Label** name and its associated **House Code** and **Unit Code**. This same interface can also be used to edit existing labels.
3. When completed, click-select the **Submit** button
4. Verify Labels by navigating to the [Control X10 Labeled Devices](#) page.
5. When satisfied, switch the Program Switch back to the **Off** position to prevent remote programming and prevent the restoration to factory defaults on reboot.

When WebIO is restored to factory defaults, all labels are returned to bank with default House and Unit Codes. See the section titled “**Restoring Factory Default Settings**”

WebIO device labels can also be configured using the WebIO Setup utility software. See **WebIO Setup software manual**.

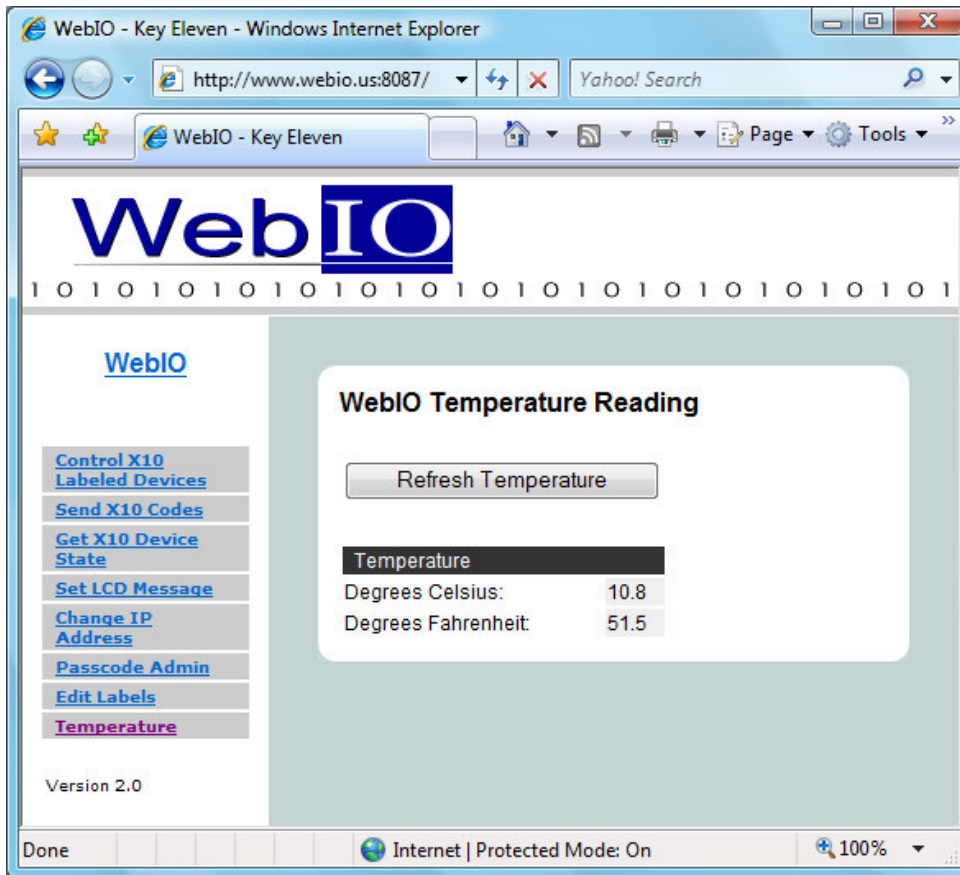


Shown above is the [Edit Labels](#) web page interface.

[Edit Labels](#) as a web page interface is new to WebIO version 2.0 (as displayed on the WebIO LCD during power up).

## Temperature Sensor

WebIO includes an internal temperature sensor and web page interface for reading the temperature in degrees Celsius and Fahrenheit. This sensor provides an approximate evaluation of the room ambient temperature of which WebIO is installed. But due to the sensor being internal to WebIO, temperature readings may be slightly higher or lower than ambient temperature by up to 2 degrees Celsius or more.



The WebIO Temperature interface displays both Degrees Celsius and Fahrenheit. Select the “Refresh Temperature” button to capture a new temperature reading.

Temperature sensor range is from -20C to 50C. (Although WebIO operating temperature range is 0C to 50C). Temperature accuracy is typically better than +/- 5 degrees Celsius. Resolution is displayed in 0.1 degree increments

Note: When WebIO is powered up, allow 5 to 10 minutes for the temperature reading to stabilize. This is due to the sensor being internal to the WebIO enclosure and the temperature reading being compensated for internally generated heat by the WebIO electronics. Once WebIO has “warmed up” Temperature reading will fairly accurately represent ambient room temperature.

Temperature is new to WebIO version 1.3 (as displayed on the WebIO LCD during power up).

# Appendix A

## WebIO Detailed Manual Network Setup

### **LAN setup with DHCP:**

1. Connect WebIO to a 10/100BT hub or switch. The left green LED of the WebIO RJ45 jack will light when correctly connected.
2. After about 5 seconds the WebIO will indicate its IP address. An IP address of 0.0.0.0 indicates the WebIO had not yet received an IP address for the DHCP server. It can take a minute or more for the WebIO to receive an IP address.
3. Change the position of the Program Switch to update the display with the current IP address. After receiving an IP address, the program switch should be set in the normal (off) position to prevent reset to factory default if rebooted and to lock out unauthorized remote programming.
4. Connect to the WebIO using a web browser. Connect to the URL of the WebIO by manually typing its IP address: `http://{IP address}`  
For example: `http://192.168.1.100`
5. A successful connection will display the main WebIO page.
6. At this time you may choose to set a Static IP (see instructions: Setting Static IP Address). Without a Static IP, upon reboot of the WebIO it may receive a different DHCP assigned IP address.

Note: In some rare cases depending on DHCP server used, WebIO may prioritize DHCP over static, regardless of the WebIO Lock switch position. Such that if you assign WebIO a static IP address on a network with a DHCP server, WebIO may accept a new IP address received from the DHCP server. In some rare cases, in using the WebIO static IP function, you may need to not have a DHCP server (not so practical) or have the DHCP server always assign the same IP dependent on MAC address. (Static DHCP/bootp).



## LAN Setup without DHCP:

1. This setup requires the use of ARP and Ping. A DHCP or BOOTP server must not be present as these will interfere with an ARP command. If either a DHCP or BOOTP server exists, connect the WebIO using a crossover cable to a PC.
2. Connect WebIO to a 10/100BT hub or switch. The left green LED of the WebIO RJ45 jack will light when correctly connected.
3. Use ARP and Ping to assign an IP address to the WebIO. From a PC running Windows, open a command window.
  - a. Obtain your IP address:
    - i. Under Window9x, Enter: `ipconfig`
    - ii. Linux, Enter: `ifconfig`
  - b. Enter the IP address and MAC address of the WebIO into your ARP table: `arp -s {WebIO IP address} {WebIO MAC address} {your PC IP address}`.
    - i. Windows 9x Example:  
`arp -s 192.168.1.101 00-aa-00-62-c6-01 192.168.1.10`
    - ii. Linux Example:  
`arp -s 192.168.1.101 00:aa:00:62:c6:01 192.168.1.10`
  - c. Assign the IP address to the WebIO, Enter: `ping {WebIO IP address}`,
    - i. Example: `ping 192.168.1.100`
  - d. If the ping receives a reply, then the WebIO has received the IP address. If no reply is received, see Troubleshooting - Assigning IP address using ARP and Ping.
4. Verify that the WebIO has received the IP Address (ensure the reply is not from another device). Change the position of the Program Switch to update the display with the current IP address. The Assigned IP address should be displayed.
5. Connect to the WebIO using a web browser. Connect to URL: `http://{IP address}` for example: `http://192.168.1.100`
6. A successful connection will display the main WebIO page.
7. At this time you should assign a Static IP address (see instructions: Setting Static IP Address). Without a Static IP, upon reboot of the WebIO it will look for a DHCP server or default to IP 0.0.0.0.
8. If using a crossover cable, the WebIO can now be plugged into the LAN with no need to power down.

# Appendix B

## **Limited Warranty**

Key Eleven, LLC. Warrants this Product (not including any accessories) against defects in material or workmanship as follows:

**Labor and Parts:** For a period of 60 day from the date of purchase, if this Product is determined to be defective, Key Eleven will repair or replace the Product, at its option, at no charge, or pay the labor charges to any Key Eleven authorized service facility. After the Warranty Period, you must pay for all labor charges.

To obtain warranty service, you must take the Product, or deliver the Product freight prepaid, in either its original packaging or packaging affording an equal degree of protection, to Key Eleven at your expense.

This warranty does not cover customer instruction, installation, set up adjustments or signal reception problems.

This warranty does not cover cosmetic damage or damage due to acts of God, accident, misuse, abuse, negligence, commercial use, or modification of, or to any part of the Product. This warranty does not cover damage due to improper operation or maintenance, connection to improper voltage supply, or attempted repair by anyone other than a facility authorized by Key Eleven to service the Product. This warranty does not cover Products sold AS IS or WITH ALL FAULTS, or consumables (such as fuses or batteries). This warranty is valid only in the United States.

Proof of purchase in the form of a bill of sale or receipted invoice which is evidence that the unit is within the Warranty period must be presented to obtain warranty service.

Repair or replacement as provided under this warranty is the exclusive remedy of the consumer. Key Eleven shall not be liable for any incidental or consequential damages for breach of any express or implied warranty on this product. Except to the extent prohibited by applicable law, any implied warranty of merchantability or fitness for a particular purpose on this product is limited in duration to the duration of this warranty.

In no event shall Key Eleven be liable for special, incidental, consequential or other damages resulting from the possession or use of this product, including without limitation damage to property and, to the extent permitted by law, personal injury, even if Key Eleven knew or should have known of the possibility of such damages.

Some states do not allow the exclusion of limitation of incidental or consequential damages, or allow limitations on how long an implied warranty lasts, so the above limitations or exclusions may not apply to you. In addition, if you enter into a service contract with Key Eleven within 60 days of the date of sale, the limitation on how long an implied warranty lasts does not apply to you. This warranty gives you specific legal rights, and you may have other rights which vary from state to state.

# Appendix C

## Technical Specification

### Technical Features

- Built in web interface for X10 power line control and WebIO configuration
- LCD display for indication of IP address, configuration messages and user messages
- DHCP client for easy Ethernet network installation - Static IP address settings when DHCP is not available
- Supports X10 power line “on”, “off” and “query” commands
- Supports popular X10 power line transceivers (Powerline and TW523)
- No computer required, WebIO is a total power line control system and web server in a box
- Very low cost embedded systems design based on two 8-bit microcontrollers
- No operating system, true micro code for reliable functionality and rapid boot process
- WebIO configuration is secured via a physical “program mode” switch to prevent unauthorized configuration via web interface
- Hardware watchdog for insured uptime

### Specifications

Model Number	AFX1110
Ports	1 RJ45 10 Megabit Ethernet 1 serial ports for PLC transceiver
Storage	EEPROM for configuration storage of IP address and security key
Expansion ports	Internal GPIO lines
Indicators	LCD interface for power, IP address, Communication activity and Gateway status LED Ethernet status indicators
Power Line Controller	Supports the SmartHome X10 PowerLine Also supports the X10 TW523 (requires 9-12VDC power, center tap positive (+) at the 2mm barrel connector)

### Environmental

Dimensions	1-7/16" x5-1/4" x3" (HxWxD)
Unit Weight	6.0 oz.
Enclosure	Plastic enclosure with mounting holes
Power	Input 9-12VDC Power consumption 64mA at 12VDC Sleep mode as low as 34mA, 12VDC

Power Supply (included)	Input: AC120V~ Output: DC12V 250mA
Certifications	WebIO is in compliance with the electromagnetic compatibility requirements defined in FCC Part 15 Subpart B. And Canada ICES-003, Issue 4:2004 Class B.
Operating Temp.	0° to +50°C, (limitations due to LCD display)
Storage Temp.	-10° to +60°C, (limitations due to LCD display)
RoHS	Not RoHS compliant

# Product Information

For more information and software updates, visit the WebIO web site:

<http://www.webio.us>

<http://www.keyeleven.com>

or contact:

Key Eleven  
1322 11<sup>th</sup> Street South  
Moorhead, MN 56560 USA



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