



MICROCHIP

Ez Web Lynx

Configuration and use of the CCS Ez Web Lynx WiFi network integration device

September 2012

Tuesday, 18 September 12

This webinar introduces the CCS EZ Web Lynx network integration device. The EZ Web Lynx allows you to quickly and easily add network capabilities to hardware products. Several versions of this device are available. This webinar will look at the 3.3V WiFi device, and the associated development kit. I will show how it can be configured and how to create a simple web page that can interact with hardware.

The Ez Web Lynx Device

- **A network interface device**
 - Allows TCP/IP connection for embedded designs
 - Ethernet (5V or 3.3V) or WiFi (3.3V)
- **Executes from an AT command set**
- **Features:**
 - Serial to TCP conversion, Analog I/O, connection with LCD and I2C temperature sensors, E-mail
- **IDE for configuration, development and file downloading**

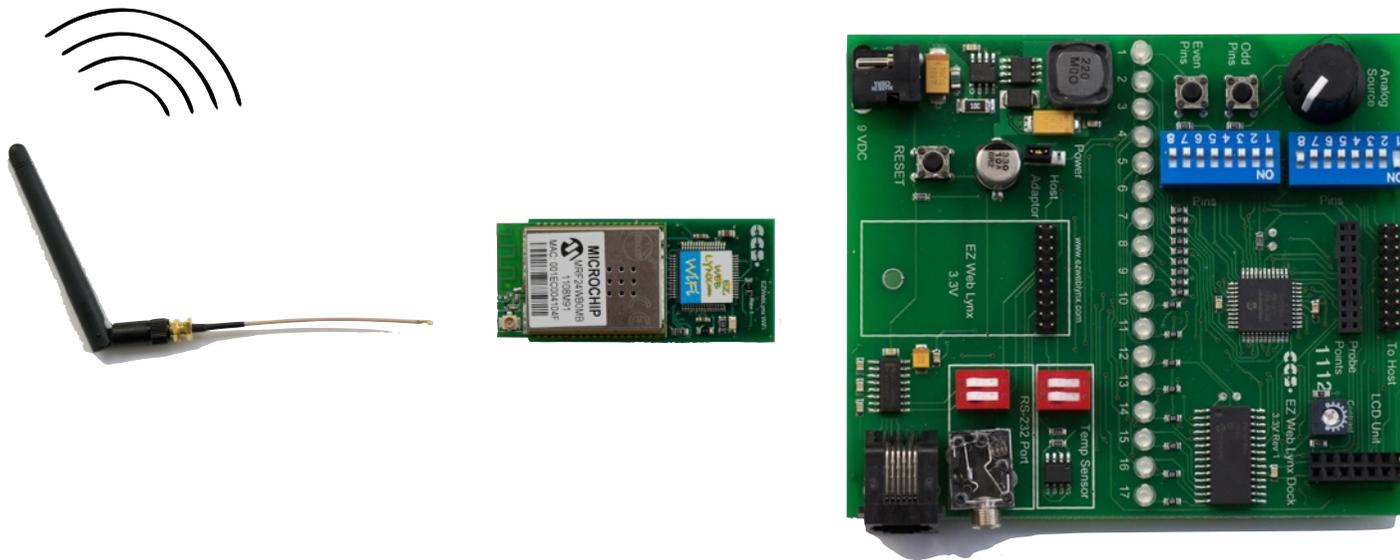
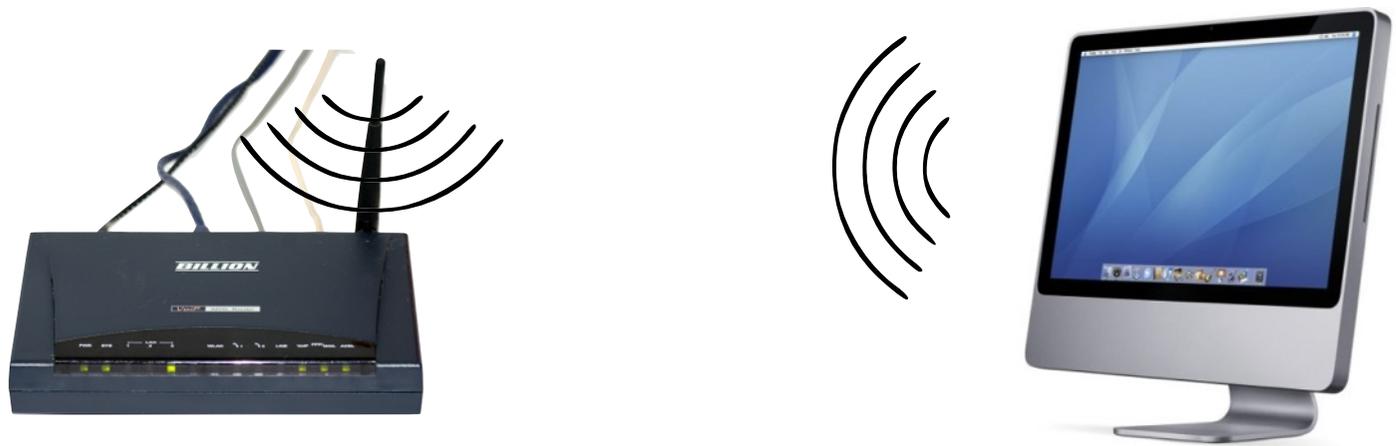
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The EZ Web Lynx allows you to add a TCP/IP network interface to an embedded design. There are three devices available: a 5 or 3.3 V ethernet device, or a 3.3 V WiFi device. They connect to your design via a 14- or 20-pin header.

Each device has an extensive command set which allows it to interact with your design. It has dedicated features such as analog I/O, serial to TCP conversion, the ability to drive an LCD, read Dallas I2C temperature sensors and send e-mails.

The development kit include a dock board to allow you experiment with the device. It includes everything you need to get started, including an IDE to configure and program the device, as well as design web pages. This IDE runs on Windows hosts, but in this presentation I will be running it in Windows XP, on a virtual machine under Mac OS X.

How it all fits together



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The ★ EZ Web Lynx module is a physically small device. The WiFi version comes with an ★ antenna and cable, which connects simply. A 14- or 20-pin connector underneath the device allows you to connect it to your hardware design. In this webinar, I will use the ★ docking station that is shipped as part of the development kit. The EZ Web Lynx can be configured to connect to a ★ wireless access point, and so your hardware can be made to communicate to ★ any machine on the network via ★ standard protocols.

Configuring the WiFi

- **Device uses default settings**
 - Make initial connection to change these
- **Make first connection by:**
 - Changing you access point settings to match device
 - Default settings may not be acceptable
 - Using the serial interface on the dock; or
 - Requires DB9 connector or adapter
 - Force device into ad-hoc (peer-to-peer) mode
 - Easiest to implement

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The EZ Web Lynx needs to be configured before it can communicate with your access point. But, you need to make an initial connection to configure it. You have several ways of doing this.

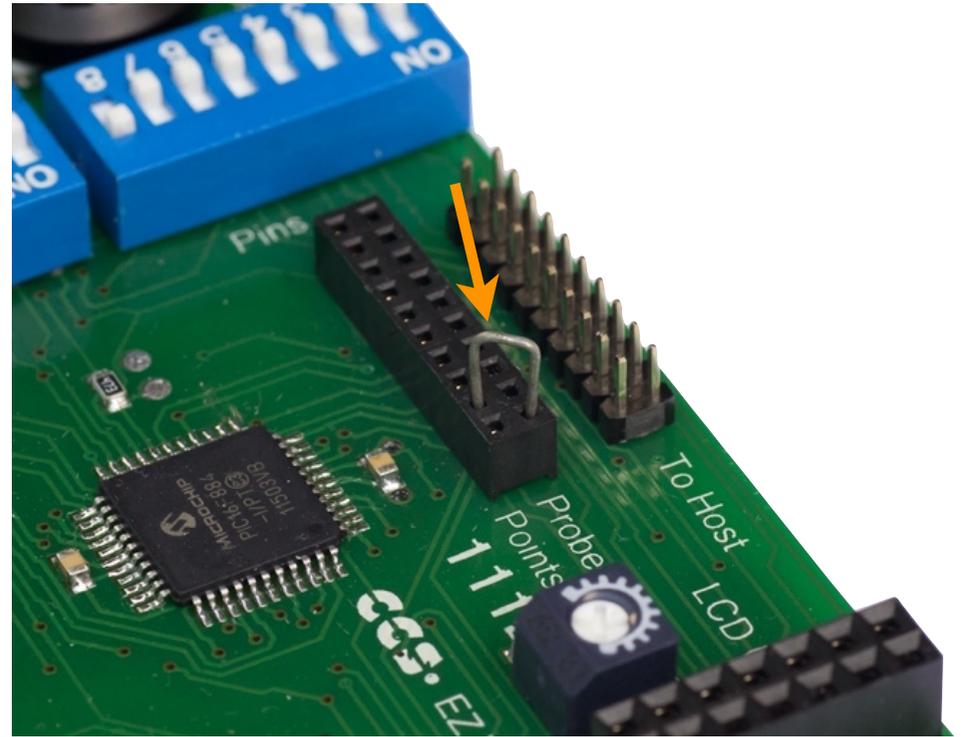
You can change the settings of your access point to match those of the EZ Web device, but this may not be convenient. It means that you will loose your existing wireless connections and you will need to disable the WiFi security for this to take place, which is not ideal.

Alternatively, you can connect via a serial connection using the interface on the dock board or your hardware. The supplied cable uses a DB9 connector so you may need an adaptor with modern hosts. This method does require a number of settings to be specified once you have a connection, using hyperterminal or an equivalent program.

The easiest means of making the initial connection is to force the EZ Web Lynx into Ad-hoc mode and then connect to it, peer-to-peer, from your host WiFi. This is how I shall proceed in the following slides.

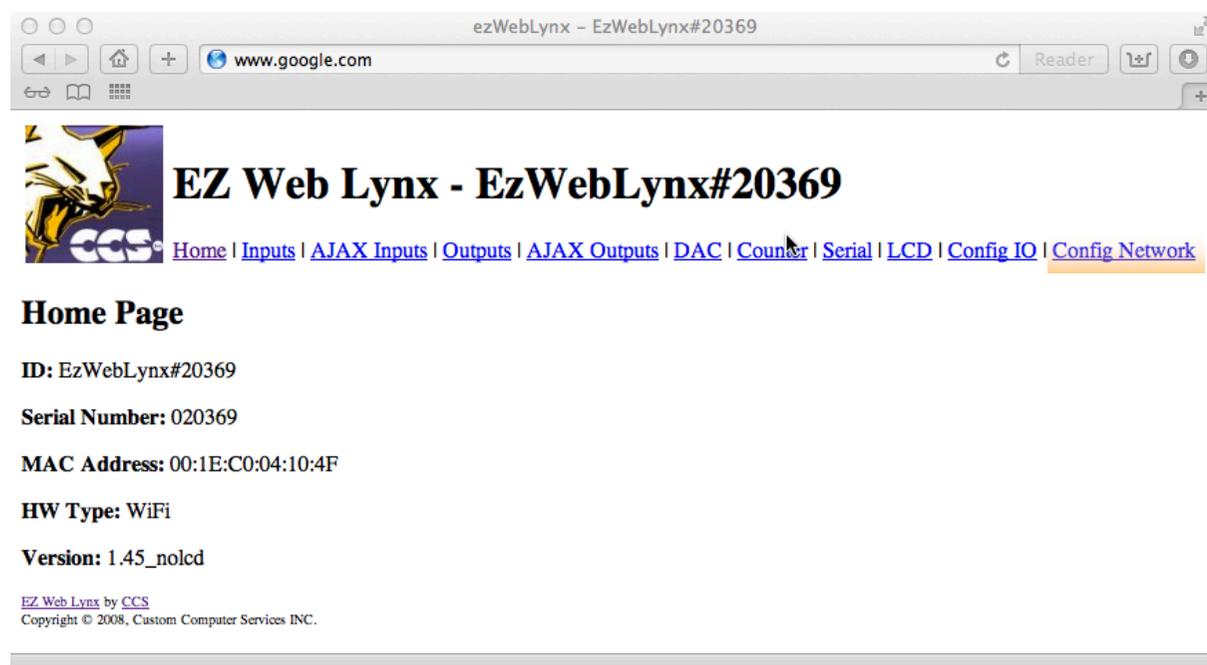
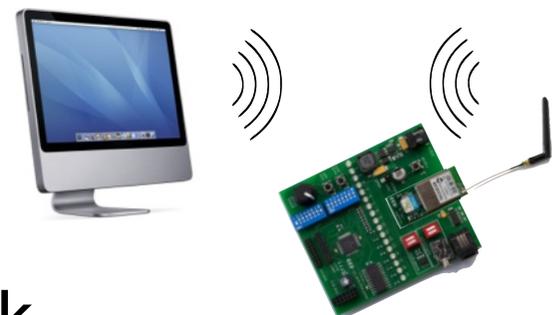
Ad-hoc Mode

- **Ground pin 17**
 - Accessible via the dock Probe Point connections
 - Short pins 17 & 20 as shown
- **Power up in Ad-hoc mode**
 - DHCP and DNS server are enabled
 - No encryption
 - The device is now discoverable



Ad-hoc Mode Connection

- From your host PC connect peer-to-peer (no access point)
 - Deactivate alternative host internet connections
 - Locate and join the EZWEB network



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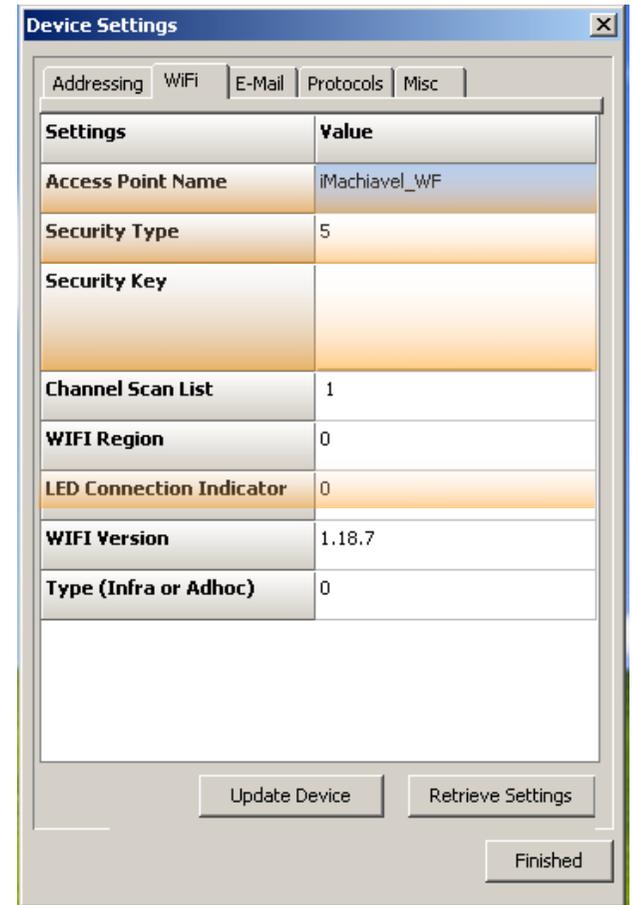
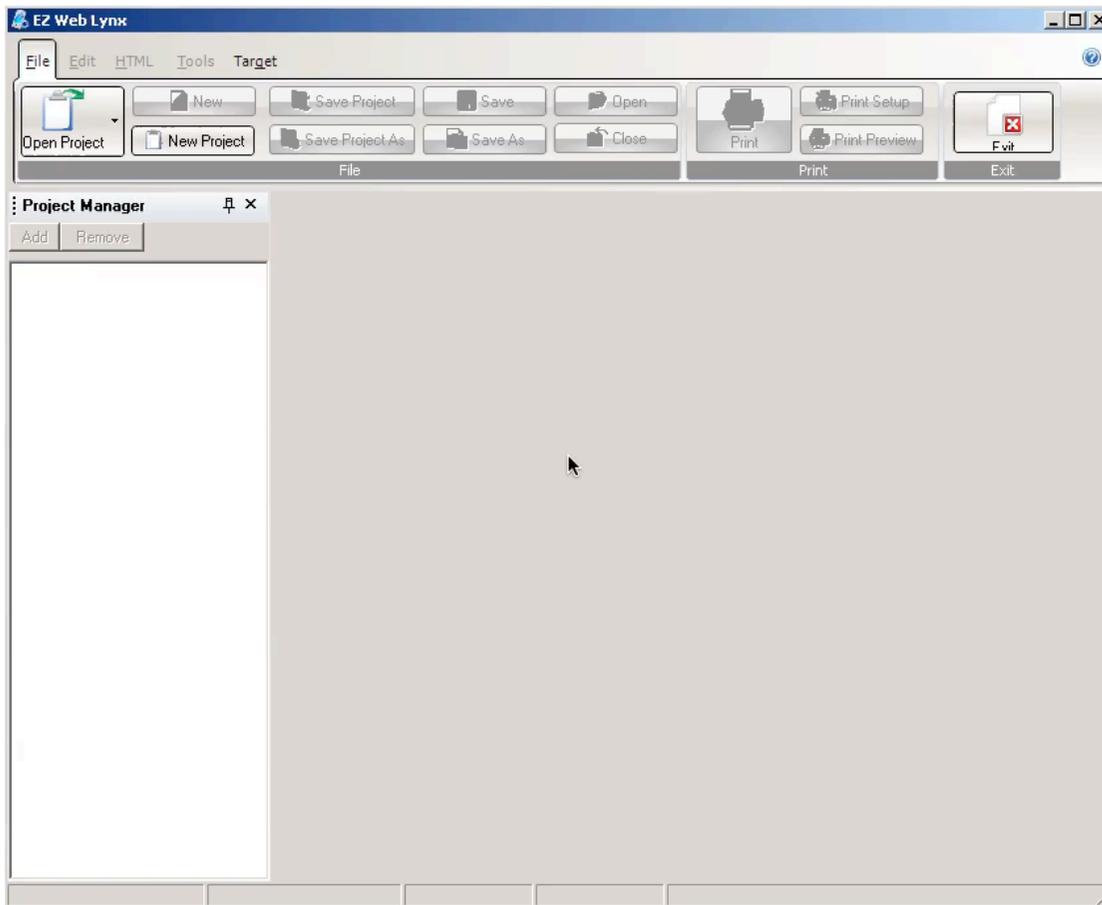
From your host PC, disconnect any existing network connections so traffic will be directed to the EZ Web Lynx. As my virtual Windows uses my ★ Mac's network settings, I will disable my ethernet connection in the OS X network control panel, turn on WiFi networking, and select EZWEB from the list of found devices. Following this, or a similar procedure, you should now be connected to the device.

Since the EZ Web Lynx has a running DNS server, if you ★ open your favourite web browser and enter any URL, you will access the main page stored on the device. I entered Google's URL in my Mac web browser and was taken to the EZ Web Lynx factory default page.

Now that you are connected, there are several ways to configure the device so that it can communicate with your access point in infrastructure mode. You can use the ★ Config Network tab on default web page to change the device's network settings, you can also use the provided UDP tool to send any of the AT commands to a UDP server on the device, but on the following slide, I will show how to use the IDE to setup the network configuration.

Configuration

- Open the EzWebLynx application
- Connect using default IP 192.168.100.210



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While still connected in ad-hoc mode, open the EZ Web Lynx IDE. Select the ★ Target menu item and click Select Device. Either select the device from the list on the left if it appears or use the default IP address 192.168.100.210. Click the Change Settings button to open the device settings. The settings you need to adjust for the network configuration will be in the Addressing and WiFi tabs.

You will need to confirm the settings that are appropriate for your wireless access point. Here are the settings you will most likely need to change.

In the ★ Addressing panel, you will probably need to ★ enable DHCP. Remember this is how the EZ Web Lynx will communicate once we use infrastructure mode. Enter 1 in the Value field next to this setting. This corresponds to the AT command DHCP.

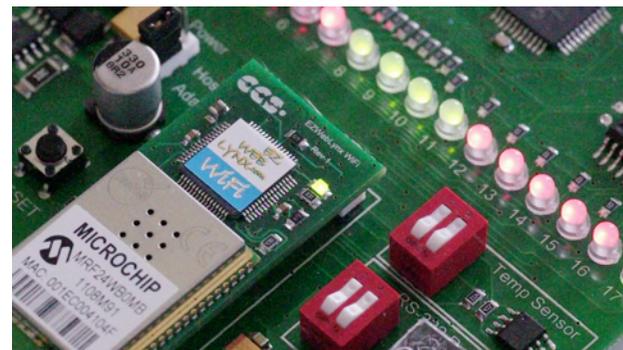
In the ★ WiFi tab, enter the ★ name of your access point, or it's SSID. Check the security used by your access point. Mine uses WPA2 and I use a phrase to generate the key, so I would need to ★ enter 6* for the Security Type, then enter the ★ pass phrase for the Security Key. The device will calculate the key from the pass phrase and store this for future use. If you reload the device settings, they will indicate a Security type of 5, which is WPA2 with PSK, and the calculated *key* will be shown in the Security Key field. These settings correspond to the AT commands WIFI_ASSID, WIFI_SECURITY and WIFI_KEY.

Check the EZ Web Lynx Users guide for more information on these settings and what the values represent.

(* Future versions of the IDE will provide a drop down list of options.)

Access point Connection

- Remove the Ad-hoc jumper and reset
- Device should connect to your access point
- Find the device's IP address:
 - Use the IDE to select a device
 - Use an IP scanner
 - Use a broadcast ping (x.x.x.255)
- In your web browser, open the IP address



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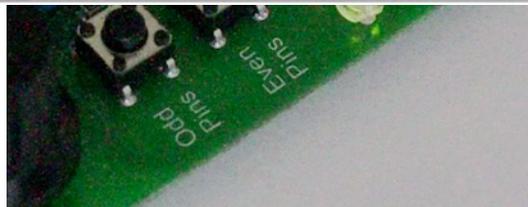
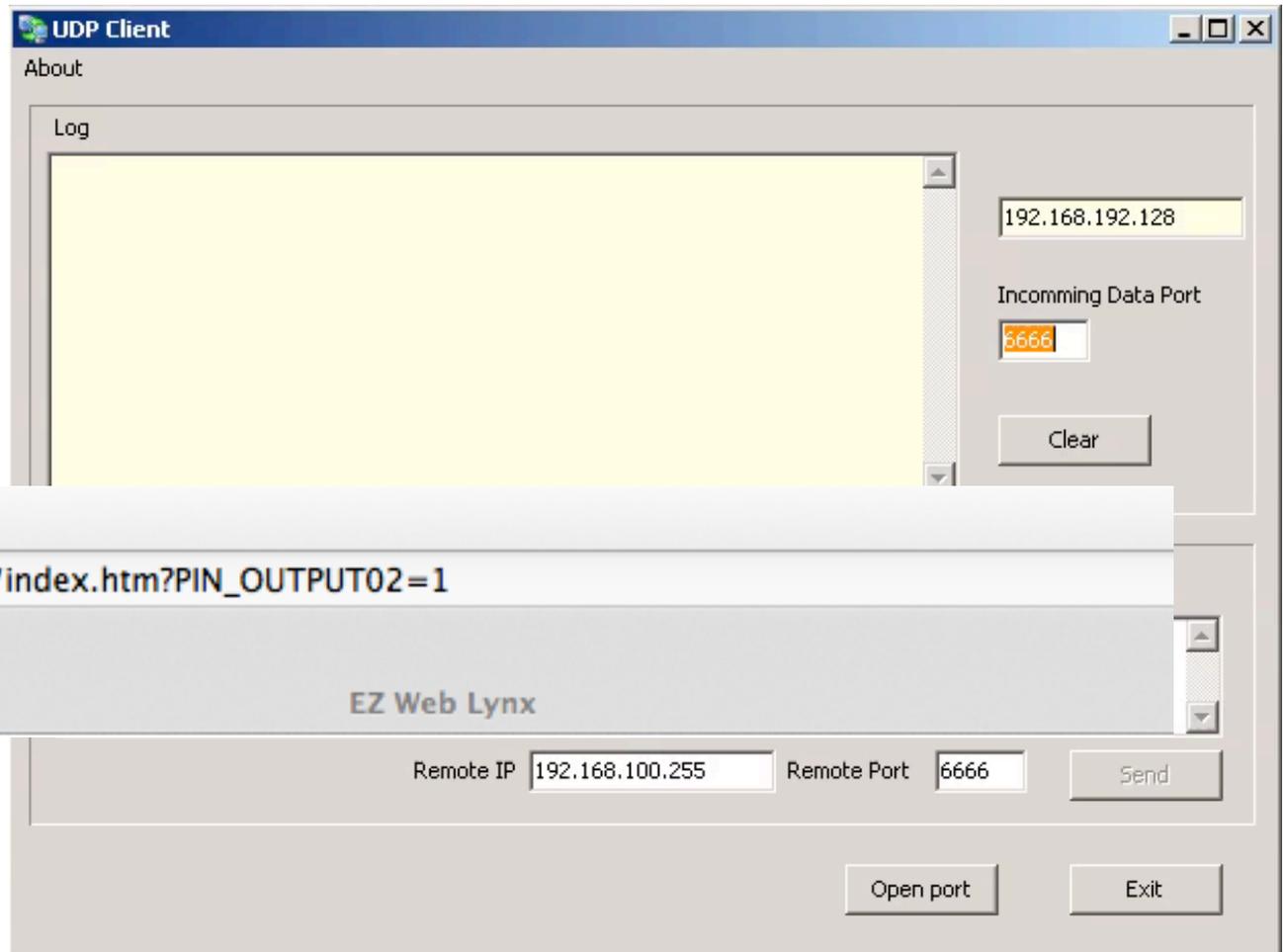
With the EZ Web Lynx device configured, you can now have it connect to your WiFi access point.

Remove the jumper which is grounding pin 17, and reset the device. It should now connect to your access point and you should see the LED on the EZ Web Lynx device flash when there is network activity ★. Restore your host PC's network settings. If you are using DHCP, then the IP address of the device will have been allocated by the DHCP server and we need to find this. You can do this several ways. Try running the IDE, click Select device and see if the device address appears. Alternatively, you can use any local area network IP scanner to see the device IPs connected to your LAN. Or you can simply use a broadcast ping using a dot 255 address, for example 192.168.1.255.

Once you have the IP address of the EZ Web Lynx, try opening this address in your web browser. You should again see the default webpage stored in the device.

Executing Commands

- **Commands sent to the EZ Web Lynx via:**
 - Serial AT
 - UDP
 - HTTP CGI



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Now that we have the device on the network, it's time to get it to do something constructive.

You control the device using an AT command set, which is fully described in the user's guide. There are several ways you pass these to the device.

One is to open the serial communication link to the EZ Web lynx and send the AT commands via hyperterminal, for example.

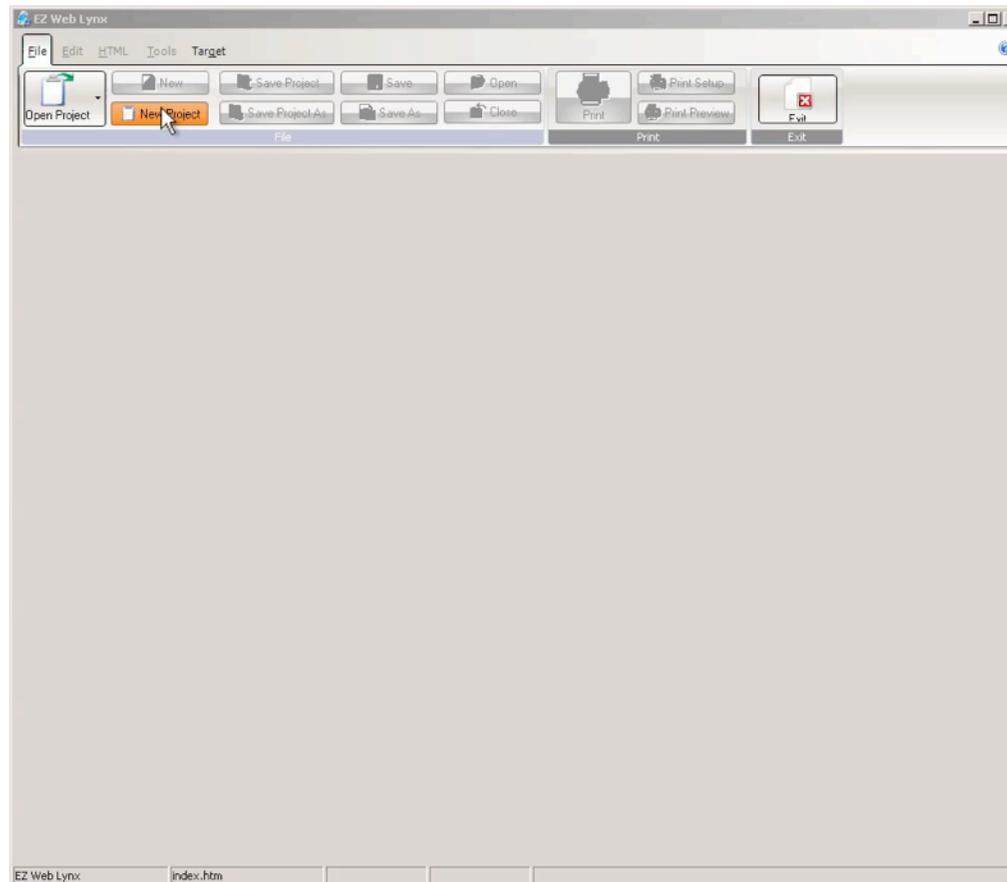
The other is to use the UDP tool supplied with the development kit.

Lastly, you may use HTTP CGI to send these commands.

Let's see how this works using the UDP tool. Say we want to set high digital IO pin number 2 on the EZ Web Lynx. On the dock, this pin is connected to an LED. In the UDP tool, ★ open a connection to the device by entering the IP address which your device is currently using and select Open port. Now, enter the appropriate command remembering to use the AT* prefix, in this case AT*PIN_OUTPUT02=1. After clicking Send, you should see an acknowledgment from the device in the Log window. Now look at the board ★ and you will also see the LED become green, which indicates a high state on the pin.

Let's send the same command embedded into a URL ★. Use the IP address of the device. The default web page is called index.htm. Use the question mark to start the query string which consists of the same command, only without the leading AT*. This is shown in the web browser URL field on this slide. Open this URL and the command is executed.

- **HTML tags allow execution of commands**
 - Program by hand or use the IDE



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Although you can send commands to the EZ Web Lynx in this way, you will most likely want to create web pages which have these commands embedded into them and which will be run whenever the page is requested.

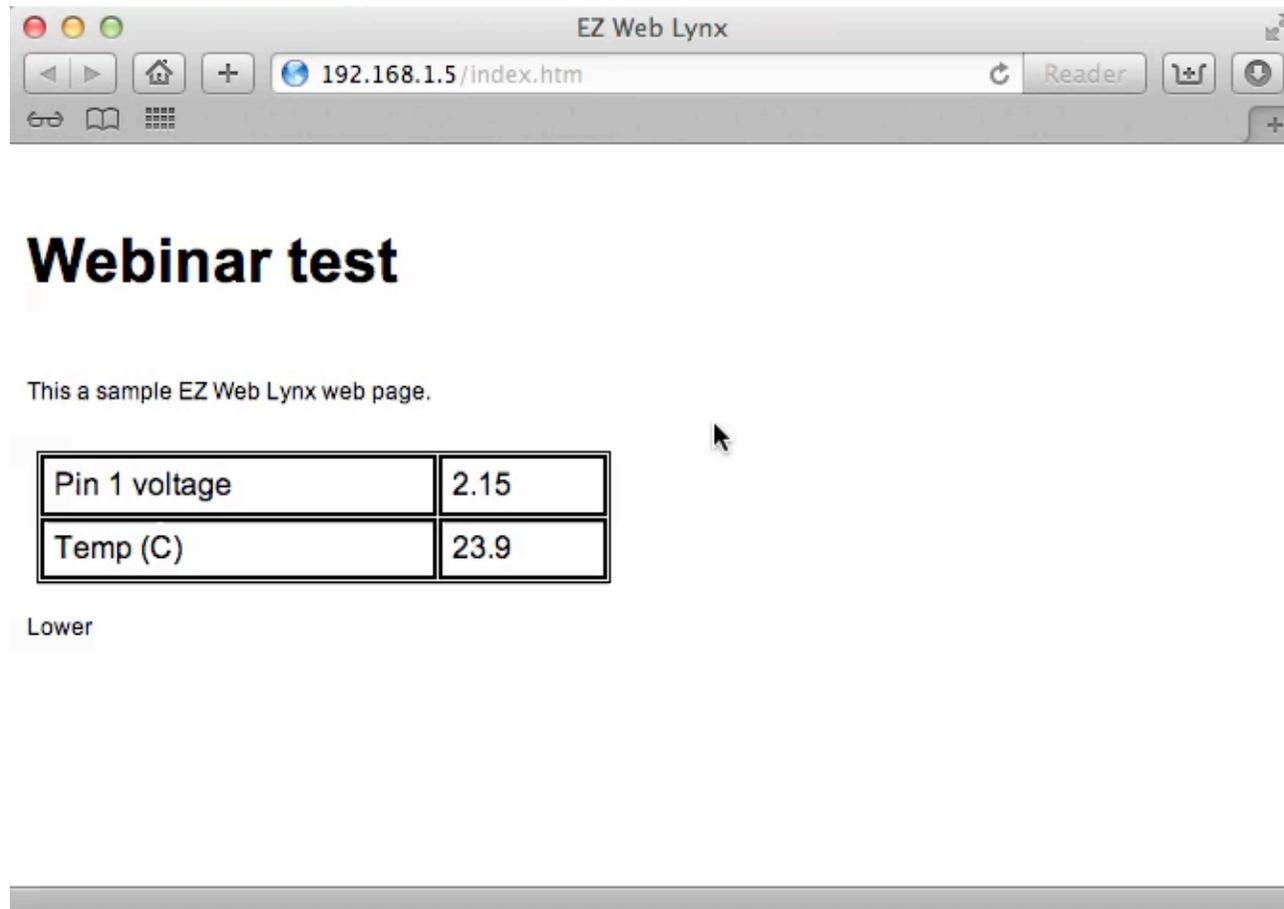
Run the ★ EZ Web Lynx IDE. Create a new project from the File menu.

You can change the default page text and fonts however you like, but let's add a few commands to see the device in action. Select the HTML menu and click to add a table. In the top row I'll add a command to read the analog voltage on pin1. Choose Pin X Analog from the drop down menu of HTML tags and indicate the pin number. On the second row I'll read the temperature sensor which is present on the dock by selecting the READ KEY tag. I understand temperature in degrees Celsius, so I'll choose the TEMPC0 AT command. These two values will be embedded into the web page when we download it from the device later.

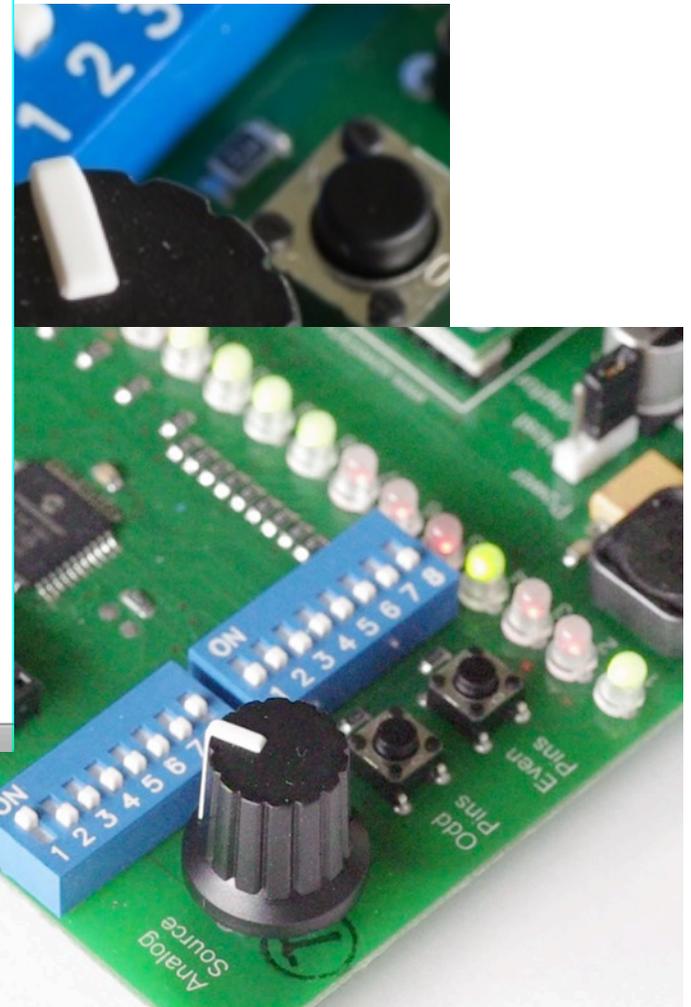
I'll now add some conditional code. Select the IF PIN X tag and read from pin 1, checking to see if it is larger than 2.50. If this condition is true, then I would like the word 'Higher' to appear in the web page, if not, the word 'Lower' should appear, by using the ELSE and ENDIF tags.

Let's now go to the Target menu and create an image to be upload to the device. Then select Upload Project to send the CDS file you have just created to the EZ Web Lynx.

Test the Web Page



meter



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Let's now test the web page we have uploaded. I want to use the potentiometer on the dock board, so I will connect that to pin 1 of the IO by ensuring that ★ switch number 1 next to the pot is switched to the 'ON' position, as shown in the image.

In your favourite web browser, ★ enter the URL for the EZ Web Lynx device. As we did not specify anything different in the IDE, the page will be called index.htm. Notice in the page served by the device, that the table had been completed with the pin1 voltage and the temperature, and the word "Lower" is printed below the table.

★ I'll now adjust the pot... then ★ reload the same page. Notice that the pin1 voltage has increased and that 'Higher' is now printed below the table.

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Using the EZ Web Lynx, you can easily create web pages that interact with your hardware, and allow information to be accessed via TCP/IP. The HTML tags understood by the device allow you to have conditional HTML produced, and give you access to an extensive AT command set. There are many more features available with this device, but hopefully this webinar has given you enough information to explore the possibilities of networking your next product.