



SiFi Solar Solutions

SiFi Solar Access Point

SiFi Solar Powered Wireless Range Extender [®]

Instructions and setup guide.





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Overview

The dream of Wifi has always been to remove the shackles of your desk and bring the internet into your life, but with most wireless routers your life had better not extend outside of your home or business premises. The Solar Powered Wireless Range Extender meshes with your home wireless router and re-broadcasts your wifi wherever you need it, outside, down the street or between buildings. Want to surf in the garden? Broadcast the internet into your garage or outhouse or to your neighbours? This system solves those problems, without any cables or infrastructure and without drawing any power from your home or business premises.



The SiFi Solar Powered Wireless Range Extender is the perfect environmentally friendly solution to your wireless networking problems. It does what it says on the tin, it extends the range of your home wireless network.

* It utilises MIMO dipole technology with twin 9 Decibel , 2.4 Ghz antennas (One internal, one external) to provide excellent wireless signal propagation.

*It is truly universal, compatible with every popular wireless router and has no clunky software, it can be set up using just your web browser and with no expertise in wireless networking, just follow our simple instructions.



*A 30W. solar panel powers an advanced 39Wh Lithium-ion battery pack unique to this product which will comfortably power your range extender for 24 hours on a single charge. A low power (95% efficient) DC-DC convertor is utilised to minimise power drain.

*It is portable, this is not a kit which needs to be permanently mounted with expensive infrastructure, it is a compact unit weighing only a few kilograms and standing on an A-frame. It can be mounted anywhere and brought into your home or garage when you're finished. If the sun hasn't been shining, you can bring it into the house and charge the battery with the mains charger provided, but you'll find this won't be much of a problem. The Solar Powered Wireless Range Extender has been thoroughly tested in Scotland and was found to have more than 80% uptime when run continuously, most of the downtime being during the wee small hours! And it can charge from flat directly from sunlight, which means that if the weather is poor and the battery runs out for a while, the first ray of sunshine will bring it back to life.

*A convenient latching switch means you can switch it off when not in use to save power.

*It will save you 44Kw. of energy in a year, which is the equivalent of 22 kilograms of CO2 not being pumped into the atmosphere. 'nuf said!

Some features: -

*Momentary switch to gauge battery charge

*Compliant with IEEE 802.11b/g/n standards

*Increases the wireless speed up to 12 times faster and extends the coverage up to 5 times further

*Supports WPA, WPA2 security enhanced function (pre-shared key, 802.1x, TKIP, AES...)

*You can configure this access point through the friendly Web user interface with a browser.

*Complies with the IEEE 802.11b/g and IEEE802.11n standards

*Supports Web-based configuration

*Firmware upgradeable via Web browser

*39Wh fully integrated Lithium-Ion battery pack with full PCB protection against overcharge, overdischarge and temperature

*30W, 18V peak photo-voltaic cell

*Rugged design for outdoor deployment

*Adjustable A-frame to change solar panel angle to suit

*Adjustable antenna mount



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Instructions Manual

System Requirements

Computer running XP, Vista or Windows 7

Wireless Card

Web Browser (Internet Explorer 4 or above, Mozilla Firefox, Opera or Safari)

Information Needed From Your Wireless Network

SSID Name (netgear***, BT Homehub***, Linksys*** etc)

Network Key/Password

Encryption Type (WEP, WPA, WPA 2, AES, TKIP etc)

Channel Number (1-11)

All above information is available from your current wireless router – you can access this by typing your default gateway address into your web browser address bar. You can find your gateway address by typing *ipconfig /all* into the *command prompt*. The information is normally also printed on the back of your wireless router along with the login and password. If you're having issues getting this information, try a google search for your router or alternatively email info@sifisolar.co.uk and we can help you find out.

It would be beneficial to type the information into a notepad file for future reference when setting up the solar access point.



Included with your Solar Powered Wireless Range Extender

1* Solar Powered Wireless Range Extender mounted on an A-frame.

2* Legs to adjust height of A-frame.

1* 9Db. Omni-directional WiFi antenna (N-male connection)

1* 12V. mains charger with water resistant plug

1* Set of Allen keys for adjusting the height of antenna Mount.





Physical Setup: -

Step 1 First of all we recommend that you install the A-frame legs provided and adjust the legs on the A-frame such that the solar panel is angled at 45 degrees (optimal for battery charging), it will look like this: -





Step 2 Adjust the angle of the antenna mount on the side of the range extender using the Allen Key provided so that the N-female antenna coupling is pointed straight up (optimal for omnidirectional antenna signal propagation).





Step 3 Install the Omni-directional antenna by screwing it into the N-female antenna coupling on the Wireless range extender.





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Step 4 Switch on the Wireless Range Extender by pressing the red latching switch on top of the Solar Panel





Step 5 You can tell that the wireless range extender is switched on as two LEDs will be visible on the back panel of the Range Extender, a green one and a yellow one. The green one signifies that the power is on whilst the yellow one denotes WLAN connection status, don't worry about this just now, it will be explained later.





Step 6 At this point it is recommended that you plug the 12v. mains charger provided to charge the battery of the Range Extender. The unit will come with 60% battery charge (optimal for storage), enough for many hours use, but it would be desirable for the battery to be fully charged before deployment outside (this will represent approximately 3 hours of charging time).



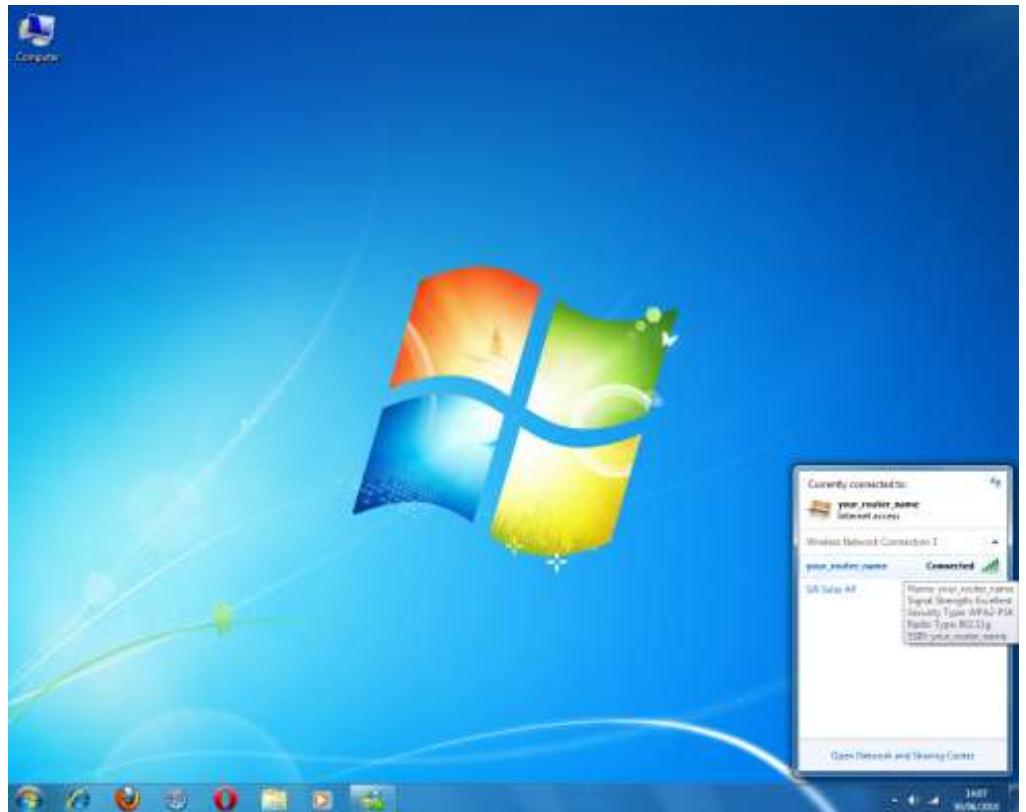
OK, now you're ready to set up the software of your Solar Powered Wireless Range Extender.



Windows 7 / Windows Vista setup.

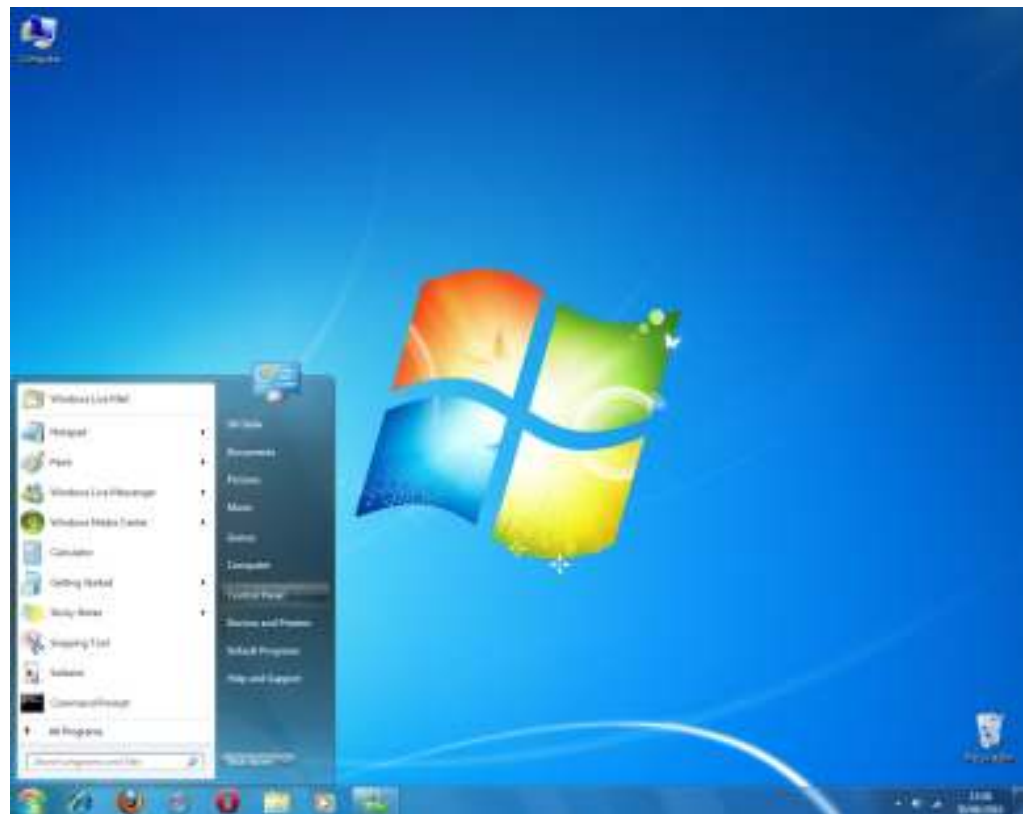
Step 1

Connect to your current wireless router if not already. Click the **Signal Icon** in the bottom right hand corner to do this (picture which looks like steps).



Step 2

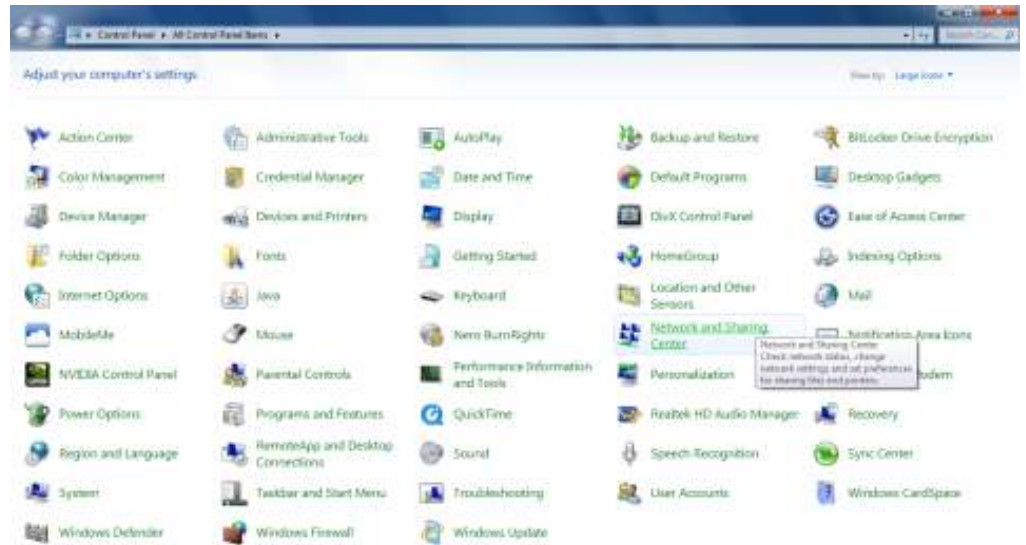
Click on the **Start Menu** (windows icon in bottom left corner), then open **Control Panel**.





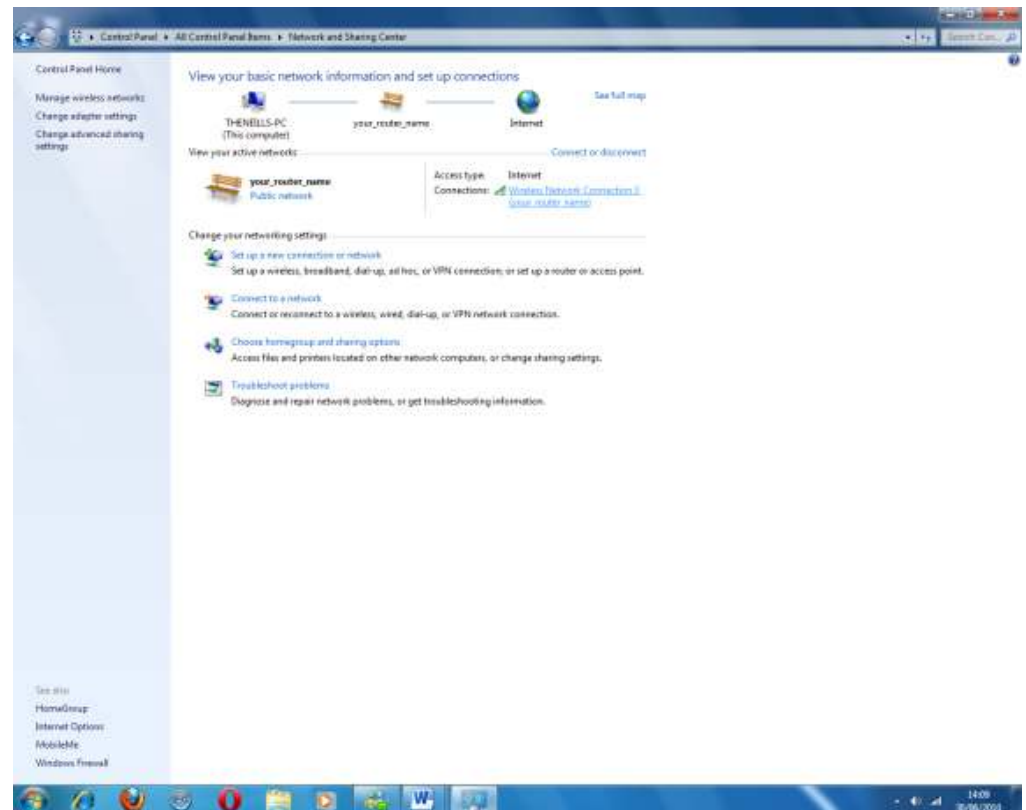
Step 3

Open **Network and Sharing Center** (you can search for this using the search tool in the right hand top corner of the page if it does not appear automatically in your Control Panel).



Step 4

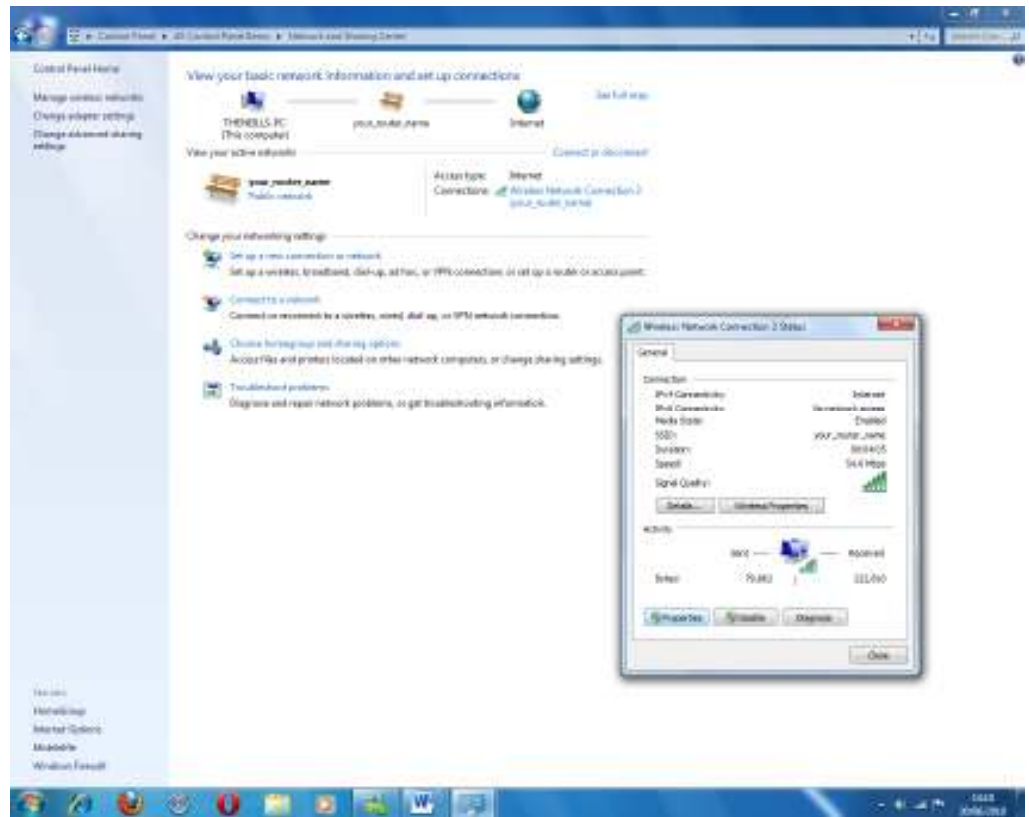
Now click **Wireless Network Connection (*)** *your_router_name* next to Access type Connection.





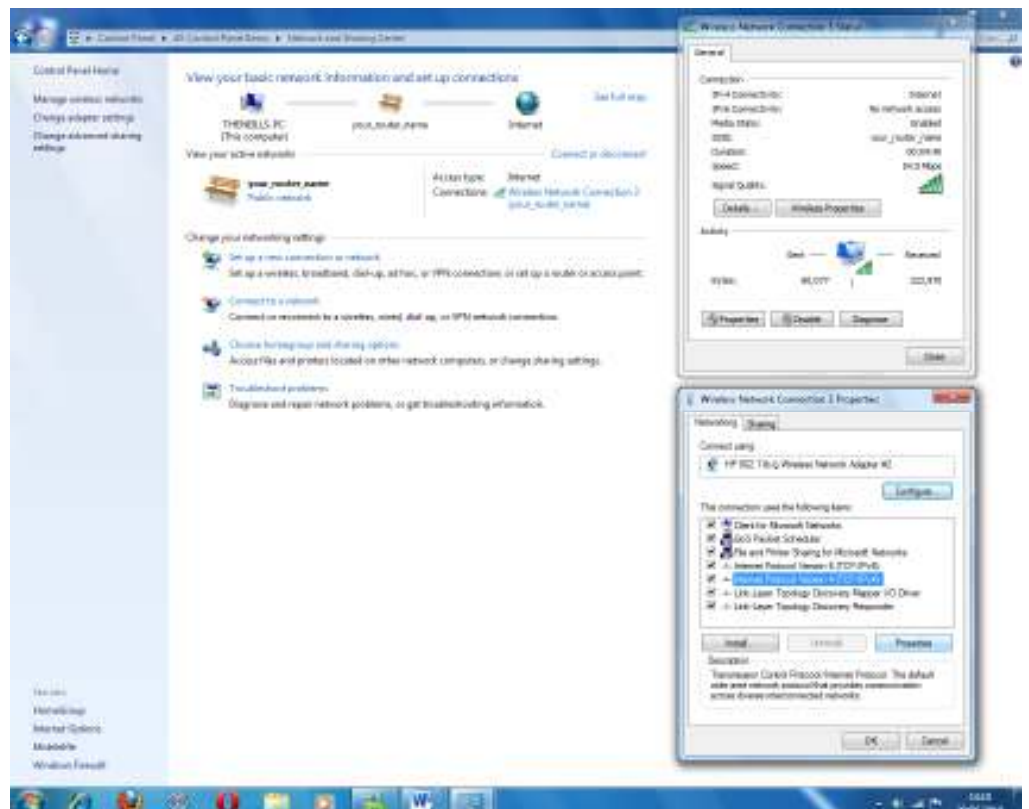
Step 5

Now click *Properties* to open up the next sub-menu.



Step 6

Click *Internet Protocol Version 4 (TCP/IPv4)*.





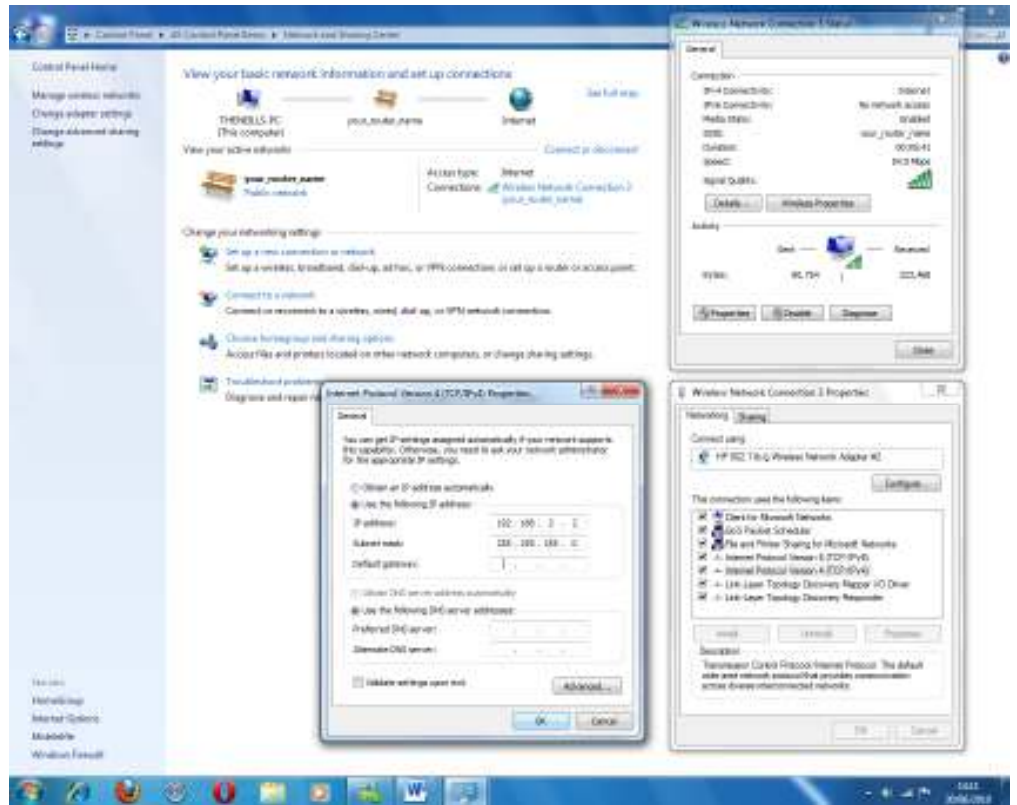
Step 7

Click **Use the following IP address** and enter the following into the **IP address** box...

192.168.2.2

Press **Tab** on your keyboard and the subnet mask (255.255.255.0) will be filled in automatically for you.

Click **OK** and **Close** to exit the previous sub-menus.



Step 8

Disconnect from **your_router_name** (see picture).

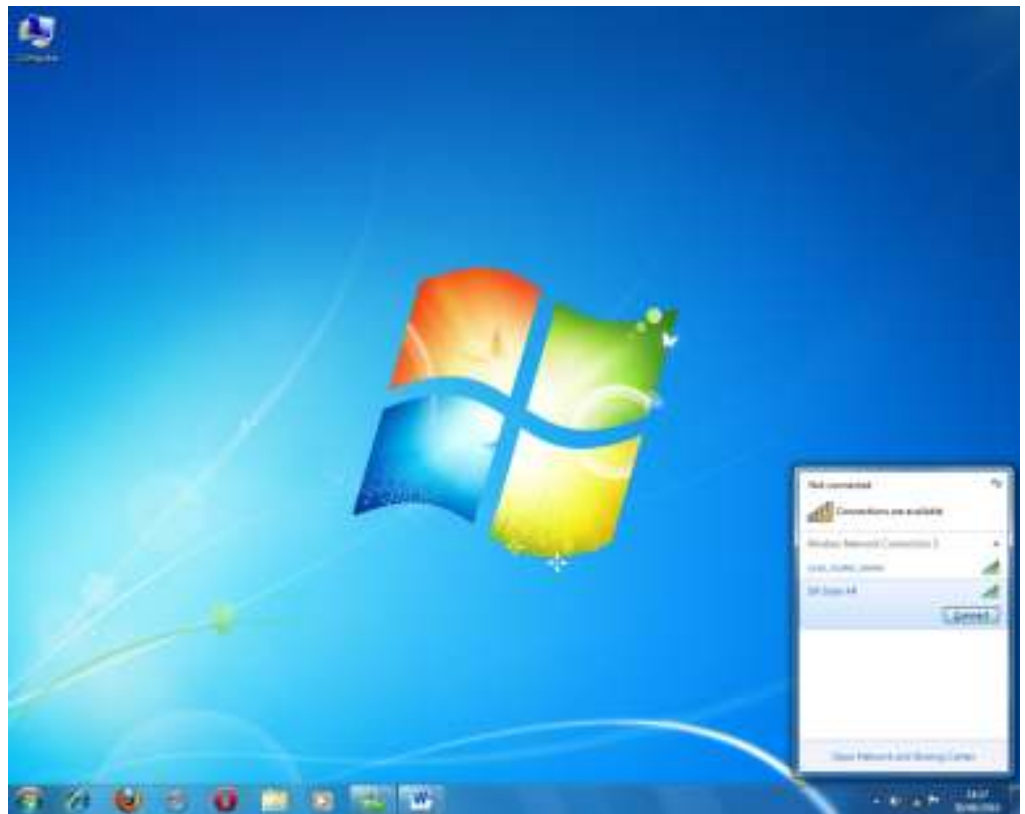




Step 9

Now connect to your solar access point – *Sifi Solar AP* then **Connect**.

Note: Once connected you still will not have an internet connection. Do not worry there are still steps to be completed.



Step 10

Open your browser (*Internet Explorer* or *Firefox* etc).

Type into the address bar at the top of the page

192.168.2.1

This will open the solar access point settings page.





Step 11

Click **Basic Setting** to bring up the **Wireless Settings** page. Click **Mode** and then select **Universal Repeater** from the drop-down menu.



Step 12

Choose your **Main ESSID**—this will be the name that is displayed when searching for your Solar Access Point within your operating system. Match your **Channel Number** with that of **your_router_name**.





Step 13

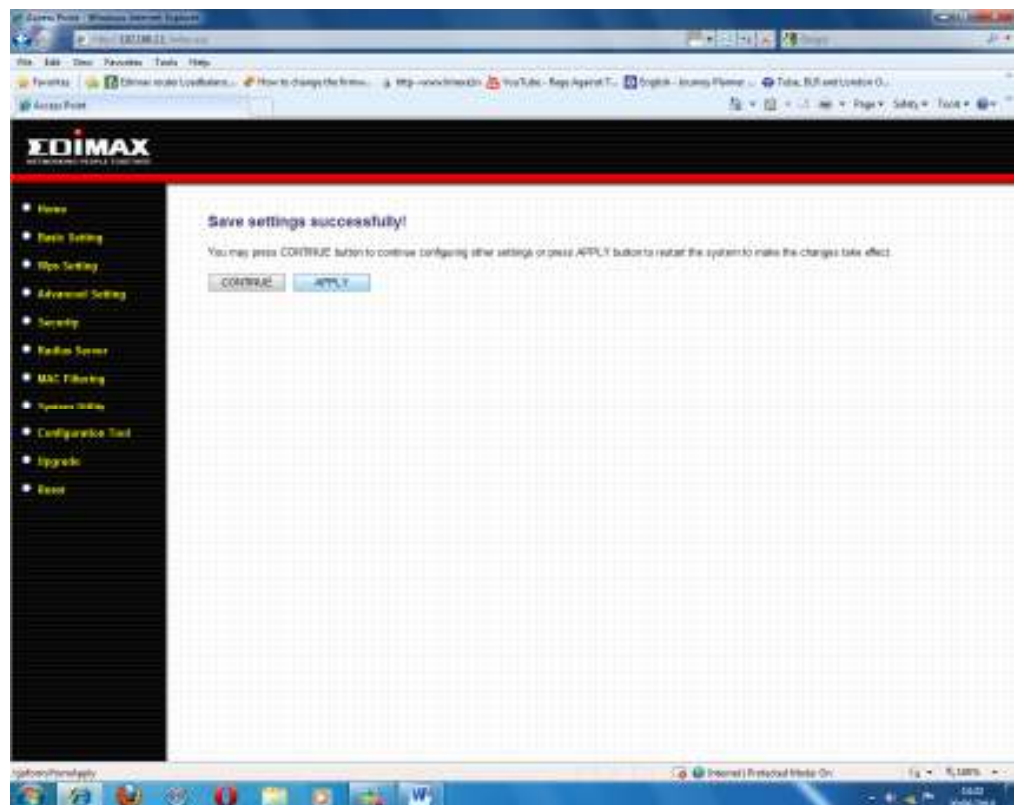
Now click *Site Survey* and find *your_router_name*.

Select it and then click *Connection*, now click *Apply*.



Step 14

Do not click *Apply*– click *Continue* on this screen to proceed with setting up security.





Step 15

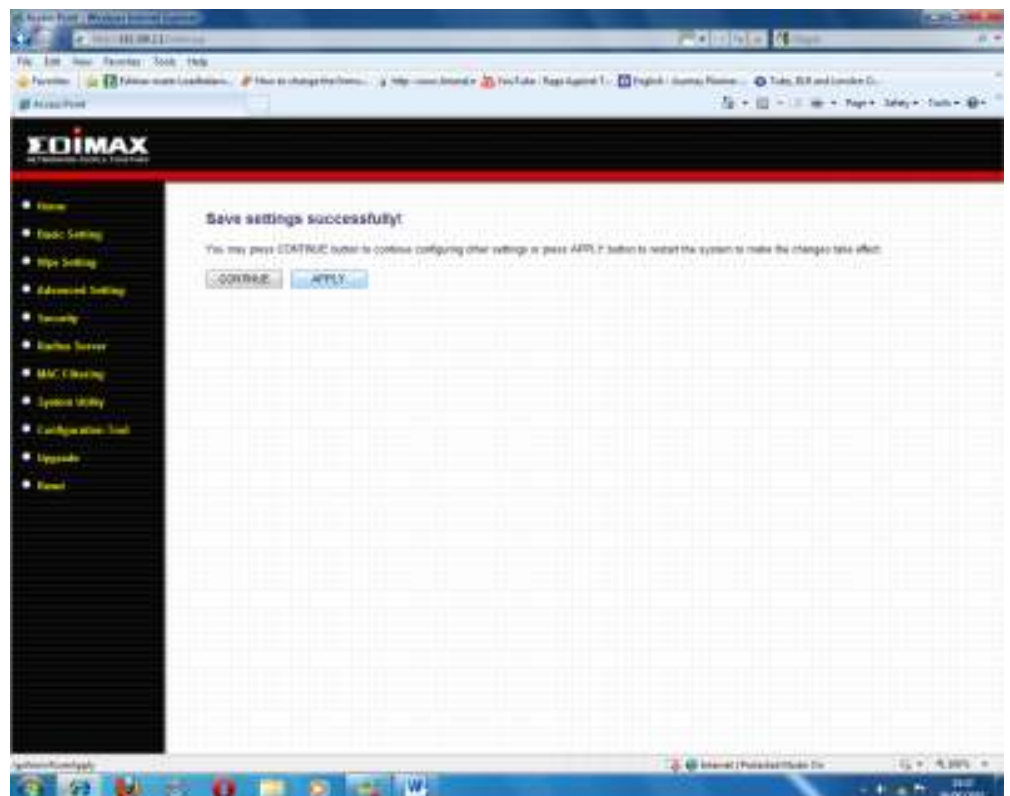
Now you need to input your security settings from *your_router_name*. Enter the appropriate **Encryption**, **WPA Unicast Cypher Suite**, **Key Format** and **Pre-shared Key**. Click **Apply**.



Step 16

This time click **Apply** when moved back to this screen.

DO NOT POWER OFF YOUR SOLAR ACCESS POINT AT THIS STAGE.

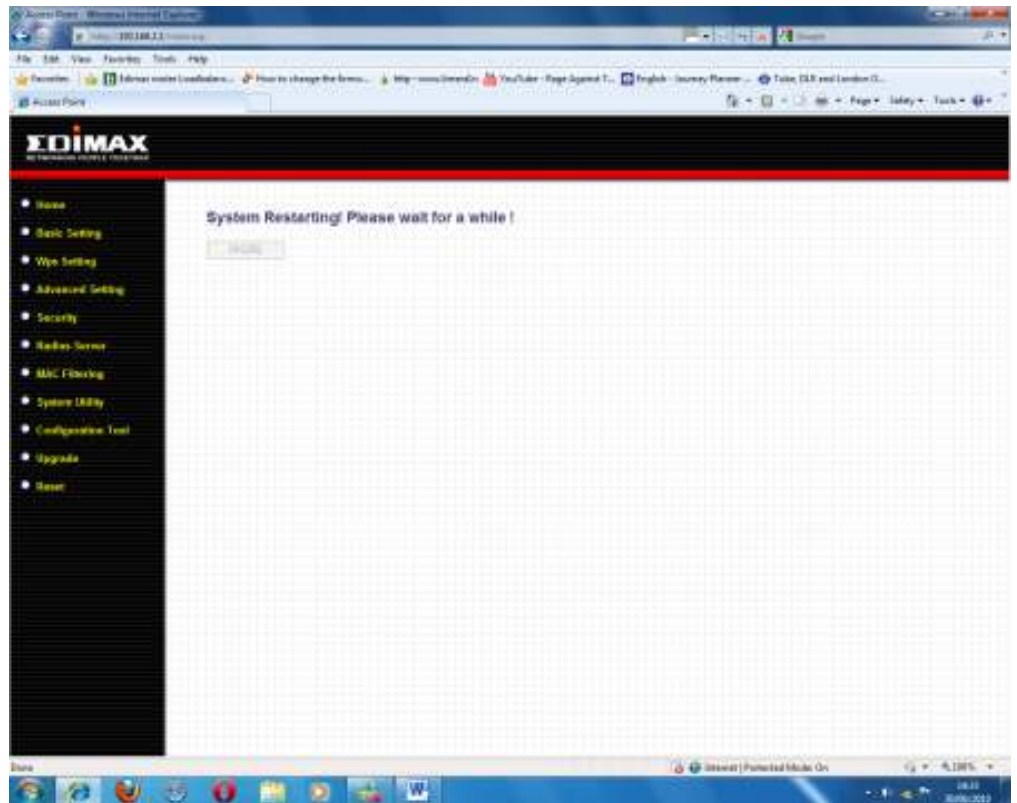




Step 17

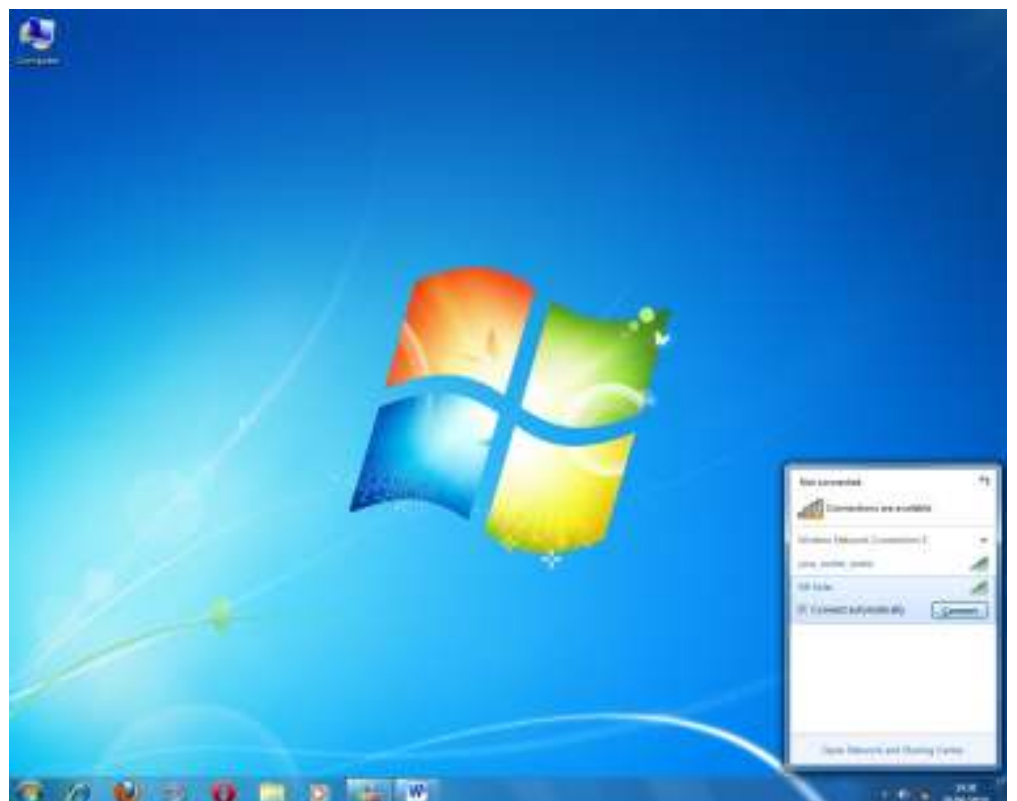
The system will now restart.
It is of upmost importance
that you wait for the process
to finish.

**DO NOT UNDER ANY
CIRCUMSTANCES POWER
OFF YOUR SYSTEM AT
THIS STAGE AS YOUR
SOLAR ACCESS POINT
MAY SUFFER A SERIOUS
MALFUNCTION.**



Step 18

You will now need to
reconnect to the Solar
Access Point. Click the
signal icon at the bottom
right of the page and select
Sifi Solar.

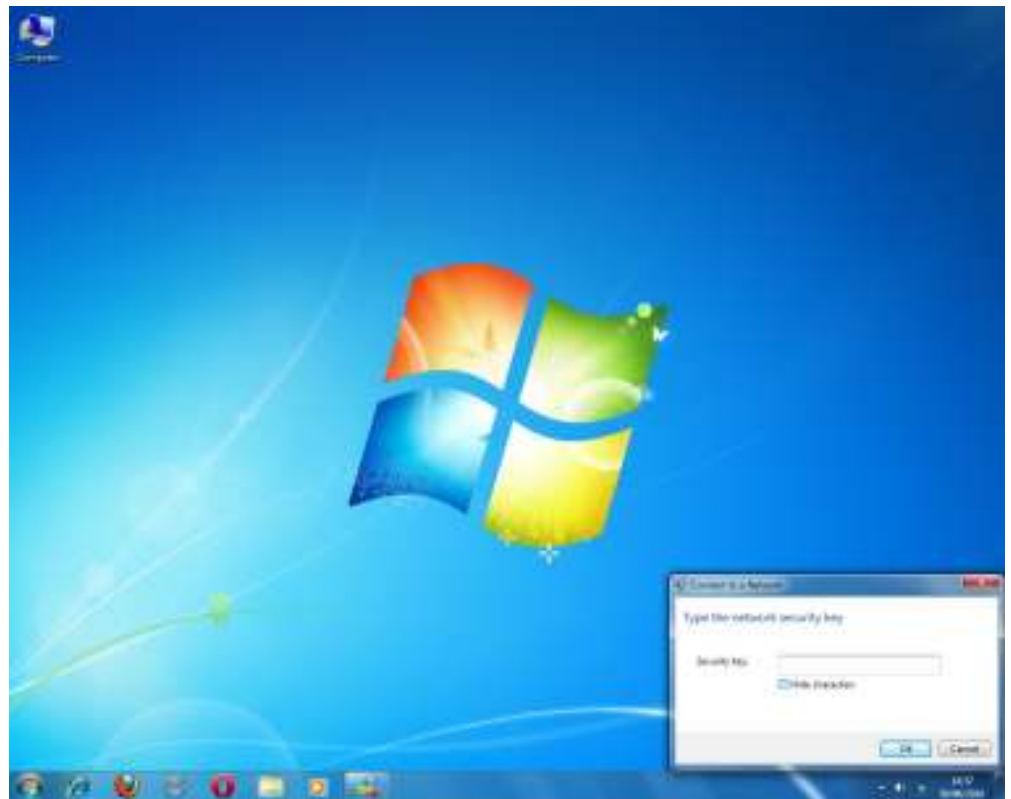




Step 19

You will now be prompted to enter your **Network Key** which you entered into the Solar Access Point settings in Step 15.

Enter your **Network Key** and click **OK**.

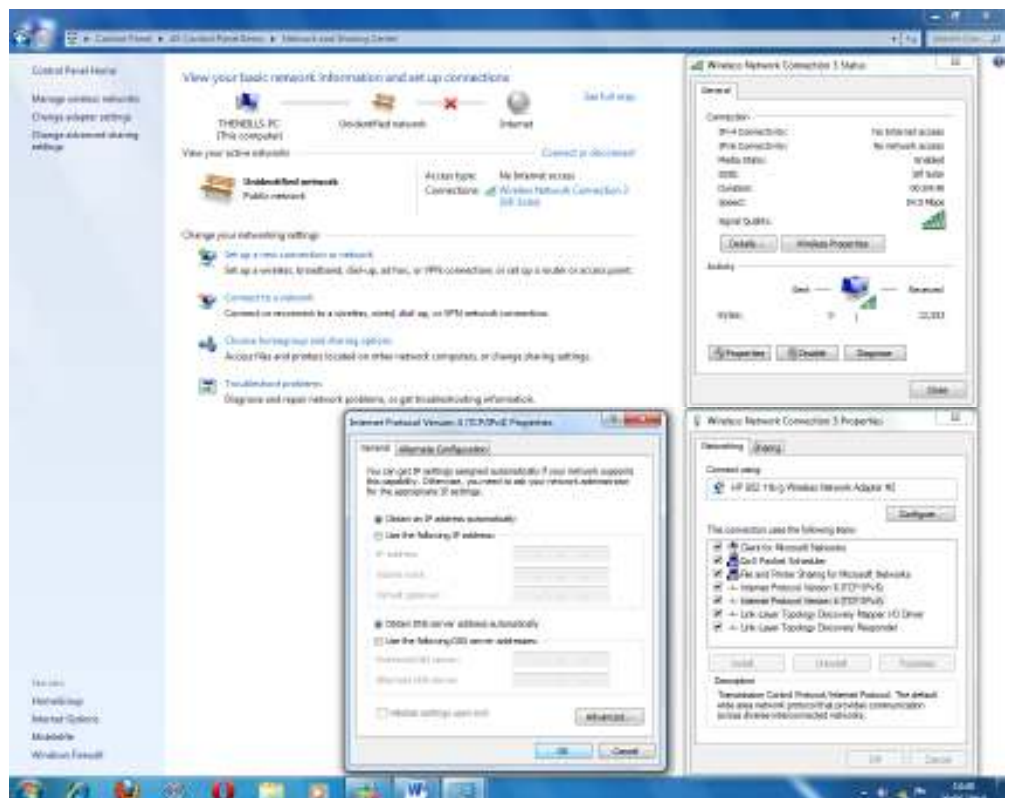


Step 20

You will have to change your IP address back to gain internet access. Do this by following **Step 2** through to **Step 6**. These steps will get you back to this page (see picture).

This time select **Obtain an IP address automatically**

Click **OK** and **Close**.



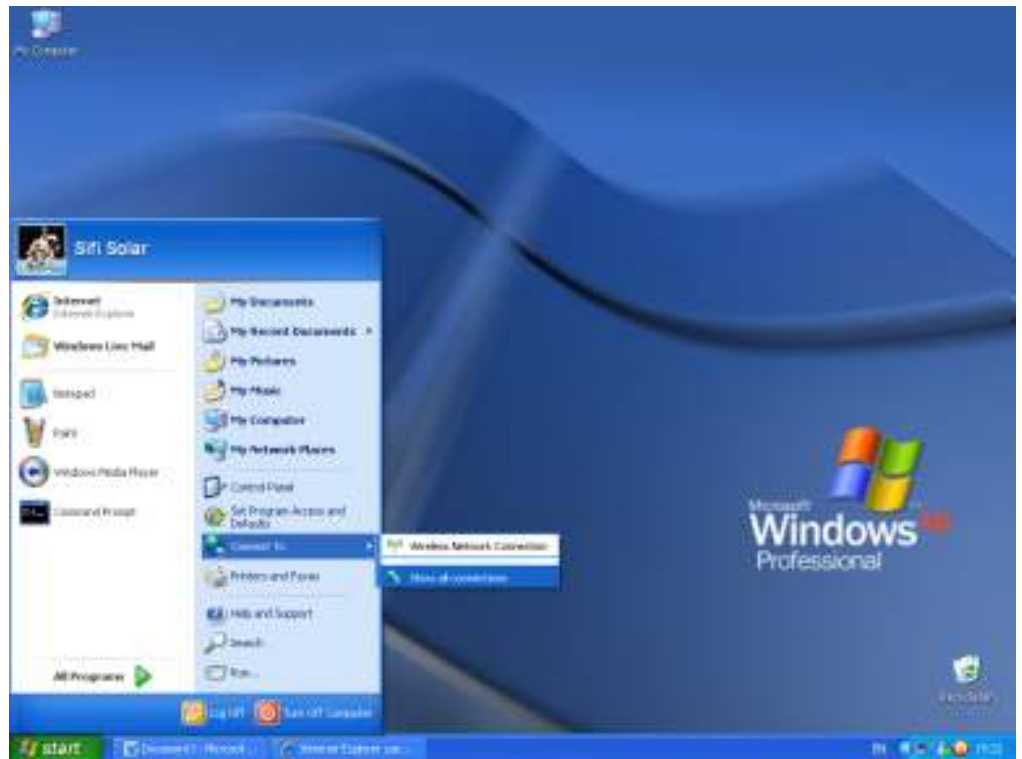


Windows XP setup

Step 1

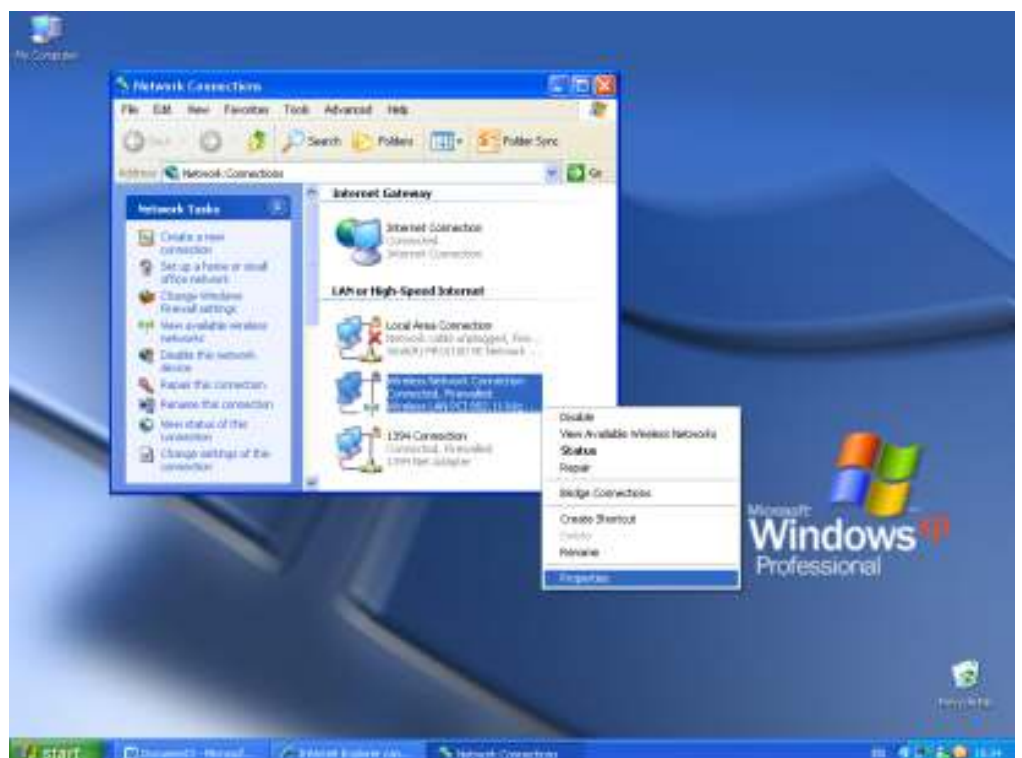
Click on the **Start Menu**, **Connect To** and then **Show All Connections**.

If these options are not available you can also access your connections by clicking **Start Menu, Control Panel, Network Connections**.



Step 2

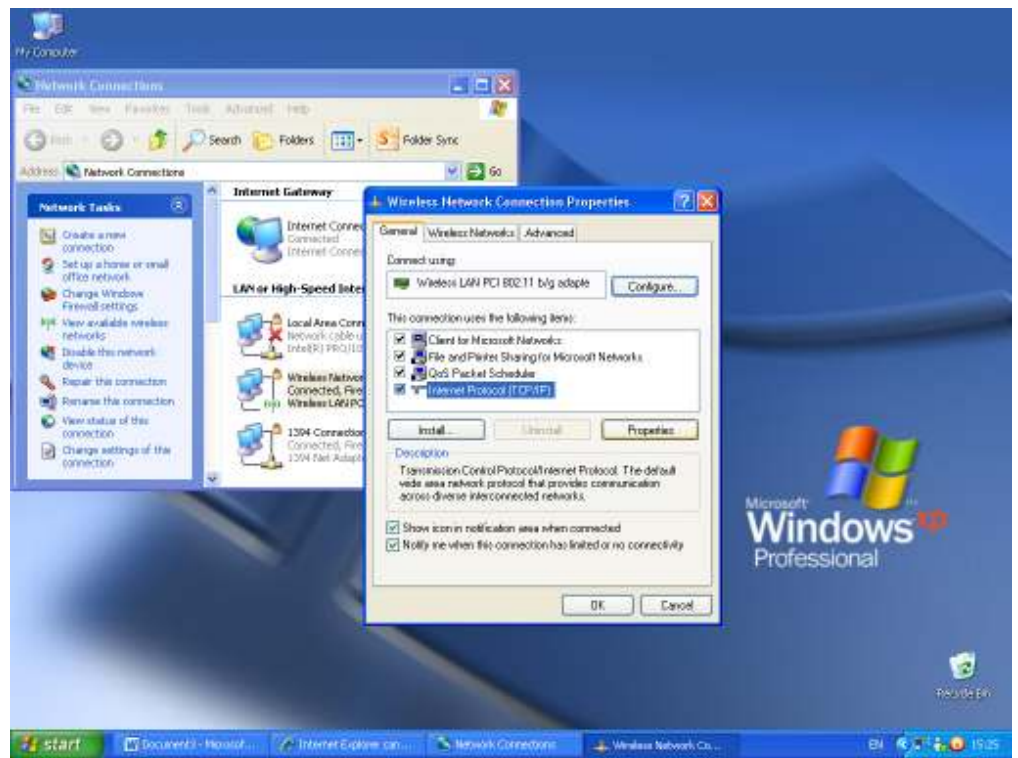
Right click on **Wireless Network Connections** then open **Properties**.





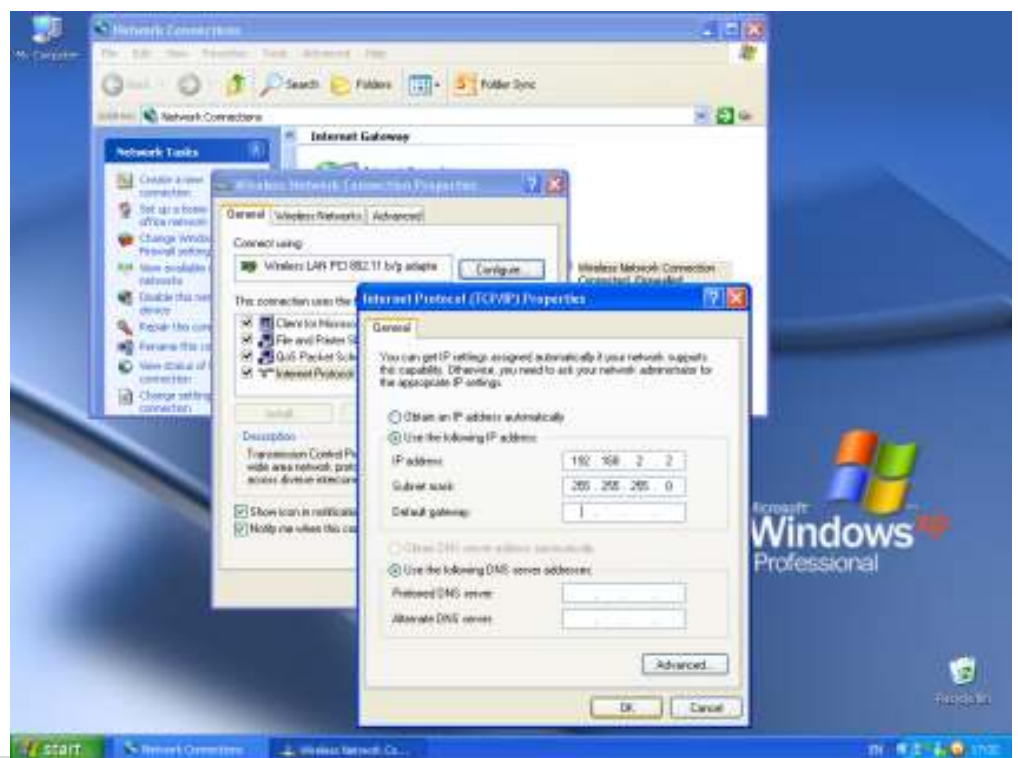
Step 3

Now click on **Internet Protocol (TCP/IP)**, then click **Properties**. This will open up another sub-menu.



Step 4

Click **Use the following IP address** then click on the box for **IP address**. Enter into the box **192.168.2.2** then click **TAB** on your keyboard and it will automatically fill the next box for you (**255.255.255.0**). Click **OK** then **Close** on the previous sub-menu.



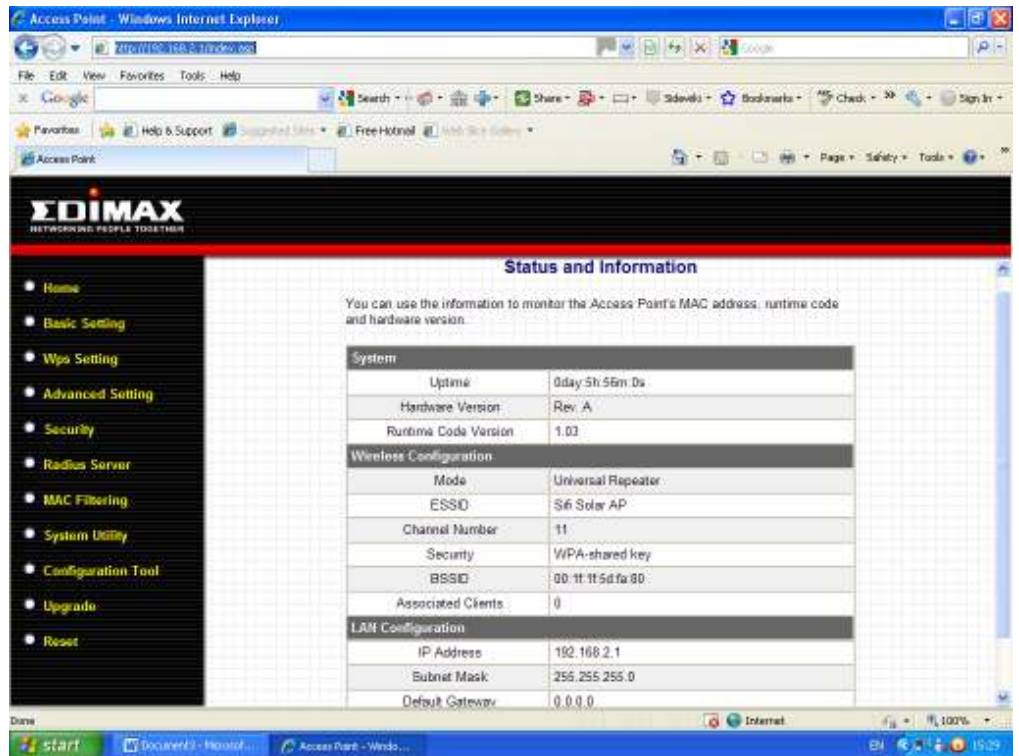


Step 5

Open *Internet Explorer*. Type the following into the address bar

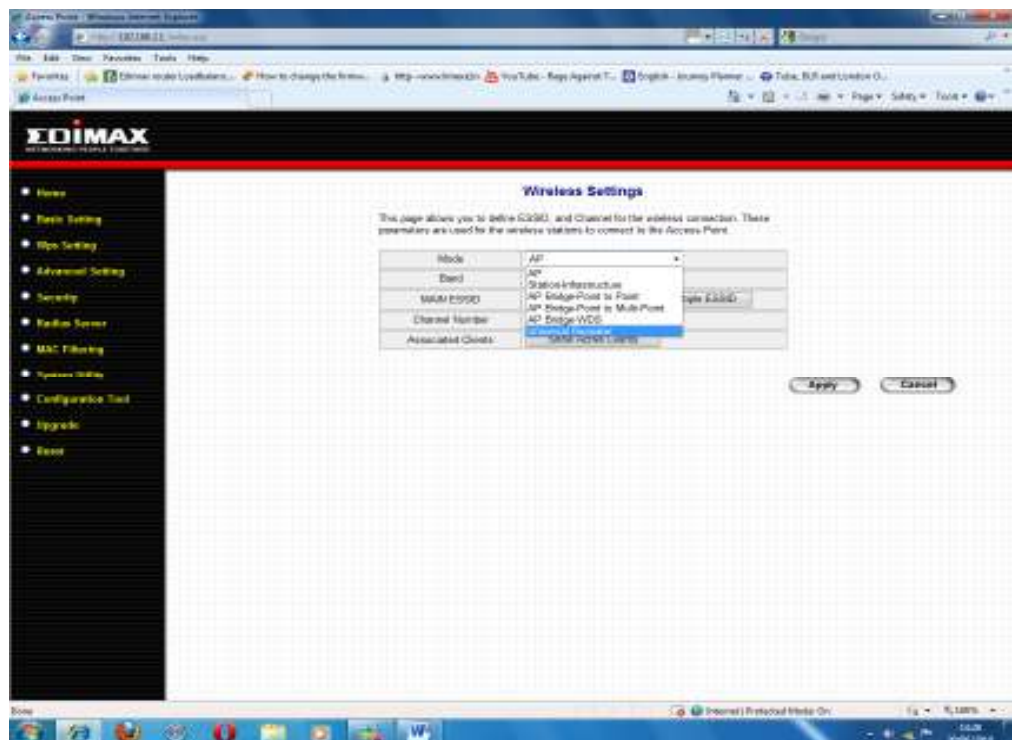
192.168.2.1

and hit *Enter*. This will bring up the Access point settings page.



Step 6

Click *Basic Setting* to bring up the *Wireless Settings* page. Click *Mode* and then select *Universal Repeater* from the drop-down menu.





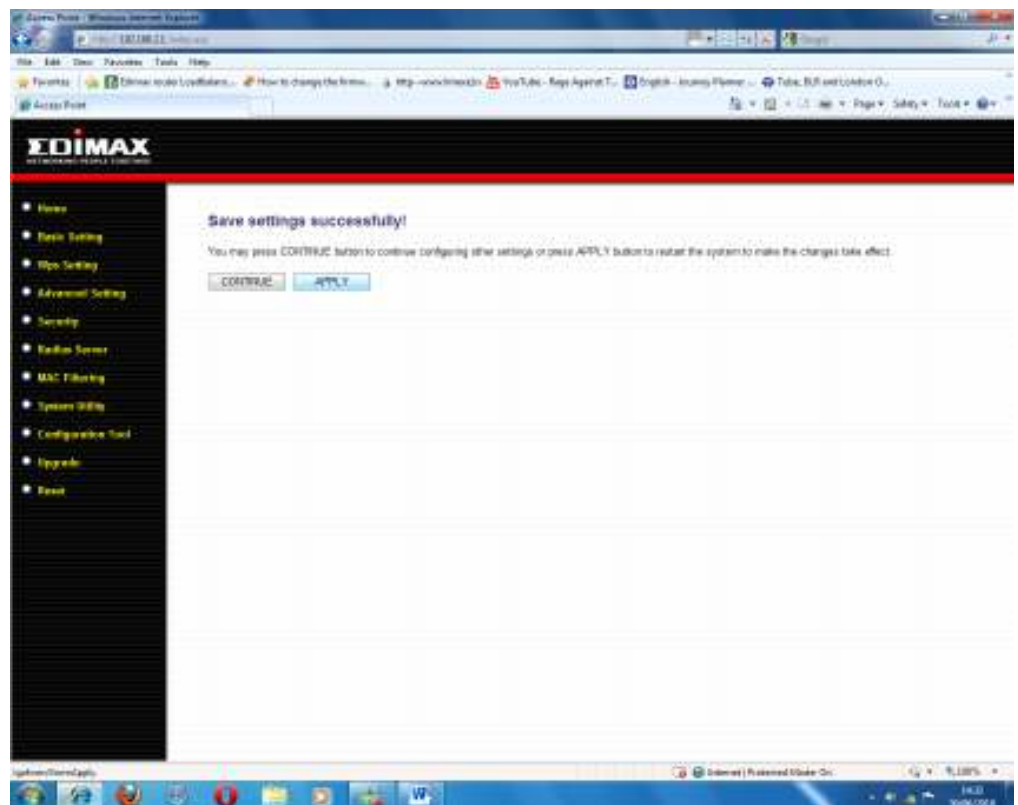
Step 7

Choose your **Main ESSID** – this will be the name that is displayed when searching for your Solar Access Point within your operating system. Match your **Channel Number** with that of **your_router_name**. It is essential the Channel Number matches that of your_router_name.



Step 8

Now click **Site Survey** and find **your_router_name**. Select it and then click **Connection**, now click **Continue**.





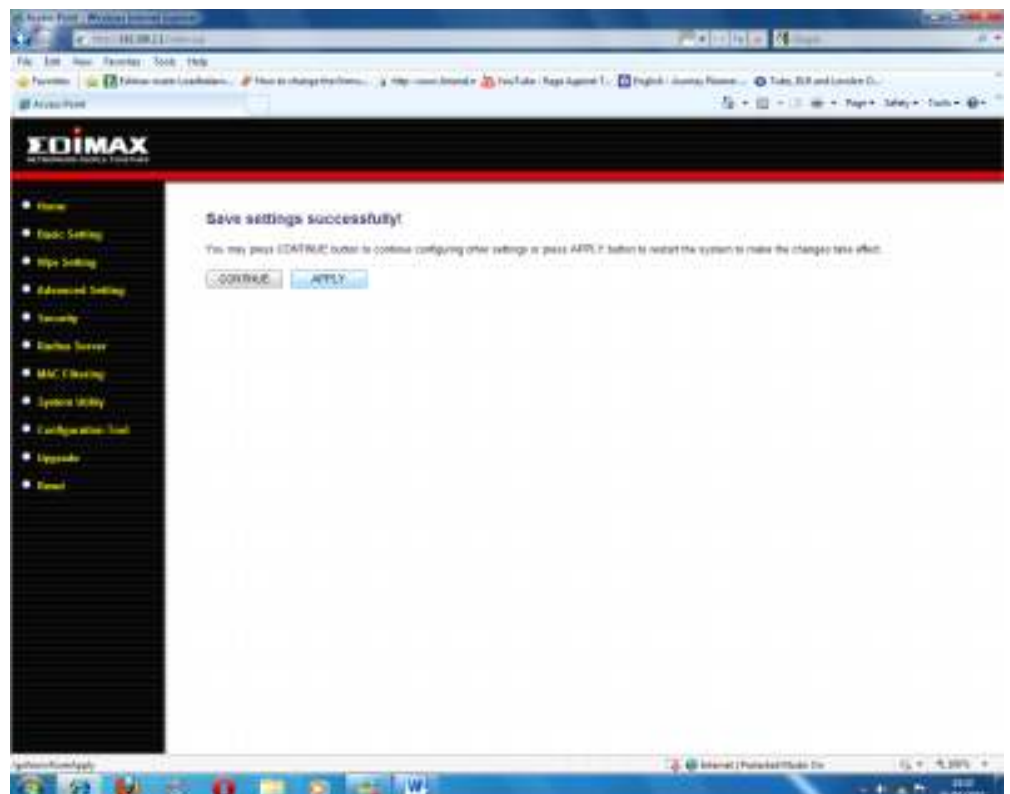
Step 9

Do not click **Apply** – click **Continue** on this screen to proceed with setting up security.



Step 10

Now you need to input your security settings from ***your_router_name***. Enter the appropriate ***Encryption***, ***WPA Unicast Cypher Suite***, ***Key Format*** and ***Pre-shared Key***. Click **Apply**.



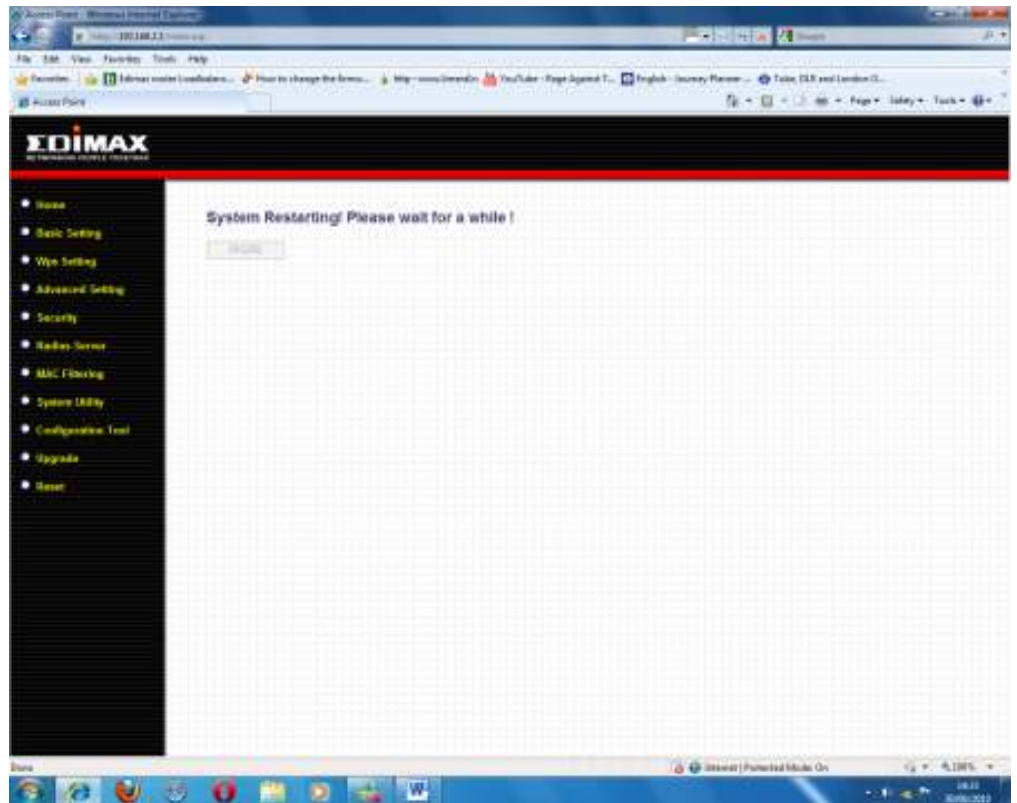


Step 11

This time click *Apply* when moved back to this screen.

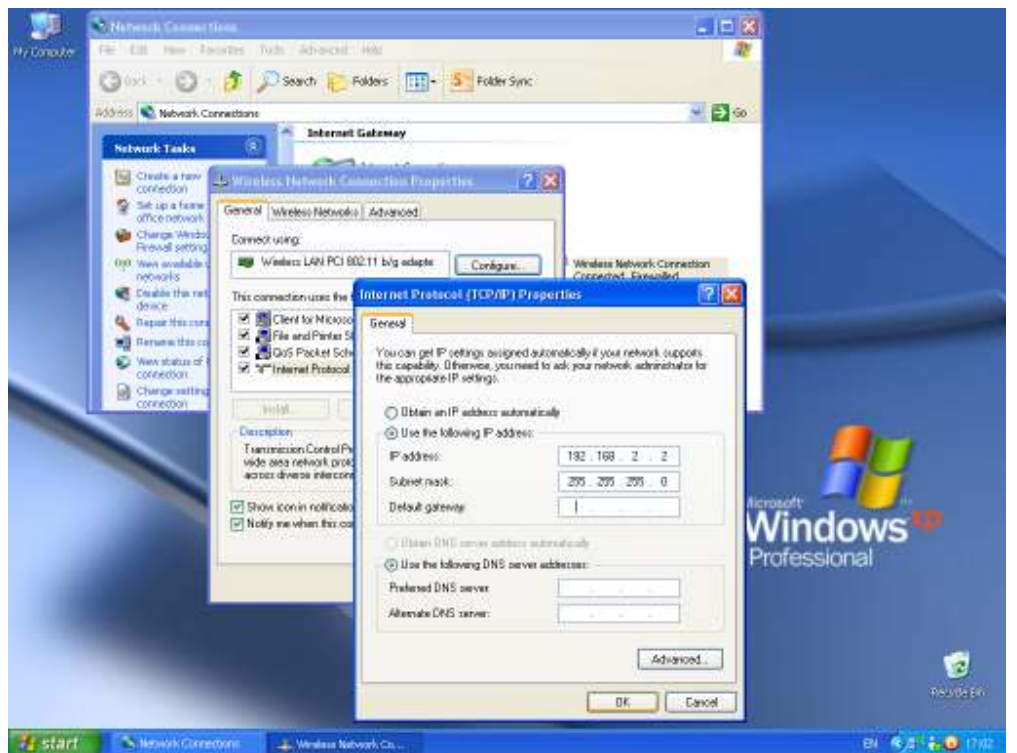
DO NOT POWER OFF YOUR SOLAR ACCESS POINT AT THIS STAGE.

Wait 30 seconds and then click "OK"



Step 12

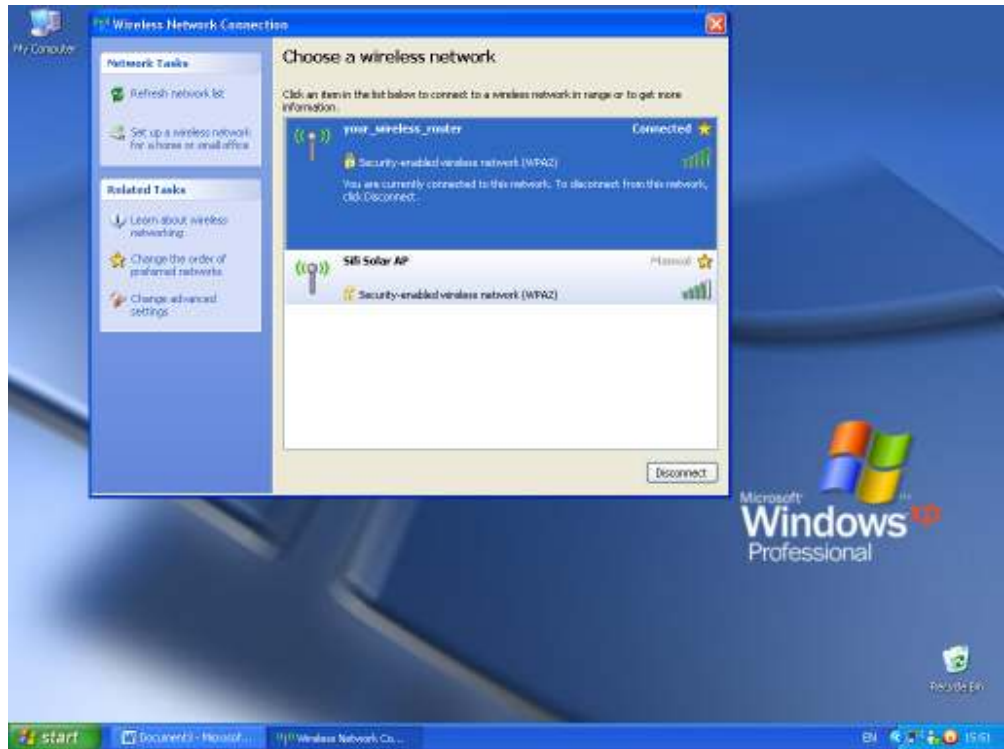
Now go back and follow steps 2-4 . When you are on the *Internet Protocol (TCP/IP)* settings screen, click *Obtain an IP address automatically*. Now click OK





Step 13

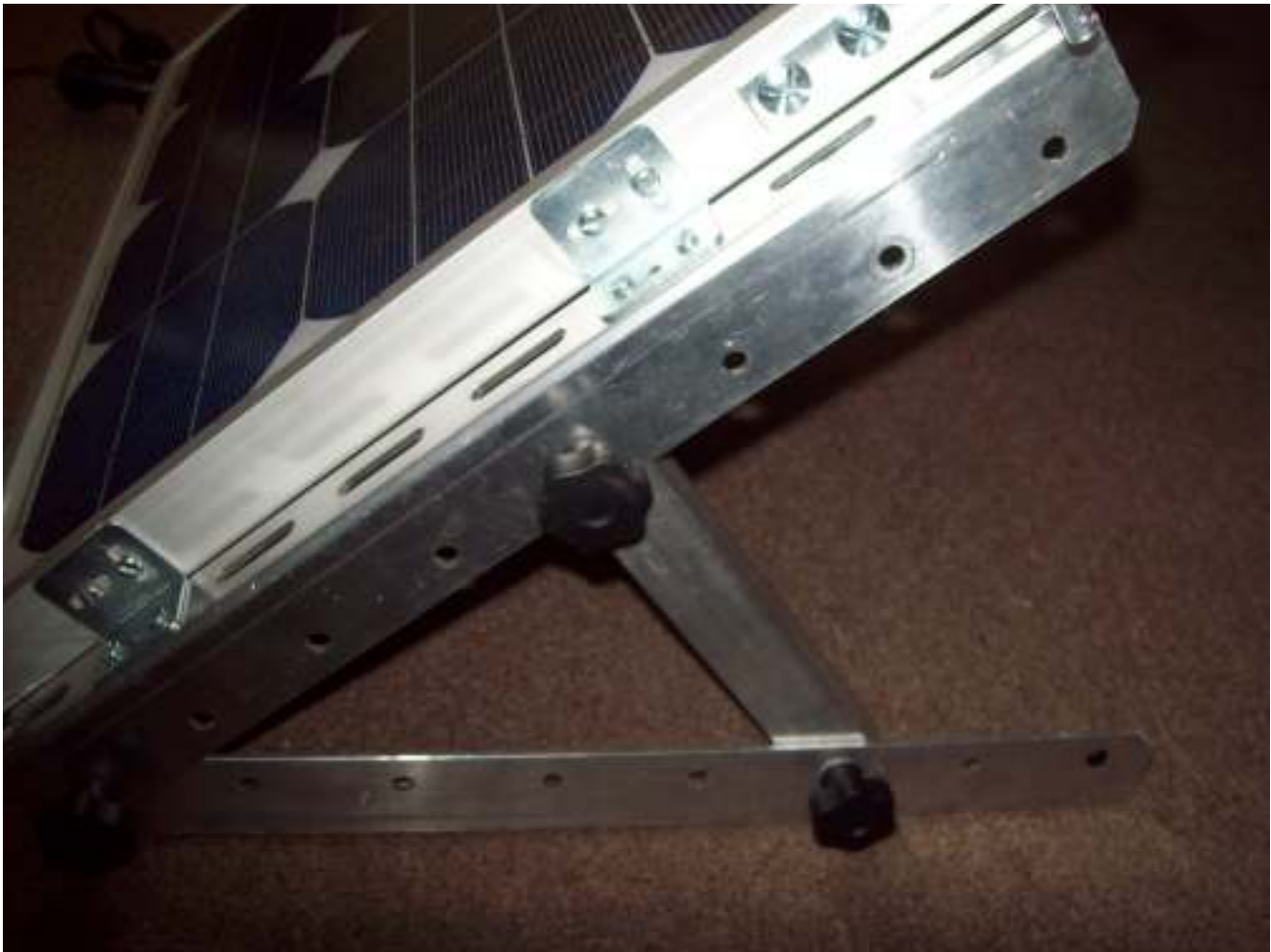
Now open up your *wireless connections* and connect to Sifi Solar. When asked for your network key, enter the same network key as you use for *your_router_name* and it is ready to use.





Outside deployment: -

The Range Extender can be easily deployed outside, you can sit it in your garden using adjustable the A-frame fitted without any bolts and free standing.





Alternatively it can be placed on the roof of a building or the A-frame legs can be reversed and the unit installed on a wall or fence, there are holes available on the A-frame legs for bolts of your choosing or alternatively, cable ties could be used for a less permanent install.



It's really up to you how you deploy it, the Solar Powered Wireless Range Extender isn't a kit which requires an elaborate setup, it weighs only six kilograms and is extremely portable, you can pick it up and pretty much just sit it anywhere you want.



What follows are a few guidelines in order to get the best performance from your Solar Powered Wireless Range Extender.

Sunshine

*Solar panels achieve maximum power output when positioned perpendicular to the sun, obviously the position of the sun changes depending on the season, so we recommend that you position the Solar Panel on it's A-frame at an angle of **45 degrees** for optimum year-round coverage. Indeed, the device has been designed to sit at this angle, with both A-frame and the antenna mount designed to sit at 45 degrees.

*In the northern hemisphere (Europe, North America) it is best to have the solar panel facing **due South**.

*Clearly the Solar Powered Wireless Range Extender needs sunshine to operate, but it can operate on a limited amount of sunshine per day, for example four hours of sunlight per day will keep the range extender operating all day and well into the evening, with the only down-time being during the latter half of the night. To put this into context, the device was tested extensively in Scotland (between 55 and 60 degrees north, on a similiar latitude to Nova Scotia and Moscow), and even *in winter* in Scotland you can expect an average of four hours of sunlight per day. In an area averaging 6-10 hours of sunlight per day you can expect the device to operate continuously. The device will charge in the following conditions: -



Slightly overcast.



Direct Sunlight.



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It **will not** charge in the following conditions: -



Heavily overcast sky.



Night sky (obviously!)

*Of course whilst we can tell you that, in general, the Solar Powered Wireless Range Extender will operate most of the time in most locations, and continuously in locations with better than average sunshine, **we can not make any guarantees regarding the weather.**

If you have several heavily overcast days you will not have continuous operation. Our recommendation is that during periods of poor weather, you switch the device off to conserve power (When not in use). The Solar Powered Wireless Range Extender also comes equipped with a 12v. mains charger, so you have the option to retrieve it and charge the battery from a mains power point if conditions are very poor for an extended length of time. Please bare in mind if you are looking for an outdoor wireless or bridging network to operate outdoors permanently, there are a great deal of companies who will supply this service (Obviously with the associated costs of cable installation and infrastructure). The Solar Powered Wireless Range Extender is a supplement to augment and enhance your wireless network, not a permanent outdoor Wifi installation.



Wireless Radio: -

*The Solar Powered Wireless Range Extender operates using radio waves in a frequency range around 2.4Ghz. Whilst it has MIMO dipole technology (one 9 decibel antenna mounted externally, one antenna mounted internally), it is still subject to the laws of physics regarding radio wave propagation and will not operate effectively if there are too many obstacles or an enormous distance between the Range Extender and your base wireless router.

The following situation would represent a poor way to deploy the range extender: -



In this situation, the Solar Powered Wireless Range Extender is positioned a large distance from its home router with a large number of obstacles in between (trees and a large number of walls etc). You will find in this situation that whilst the Wireless Range Extender will still work, the download speeds you get when connected to it will be significantly reduced.



A better way: -

Consider the following: -

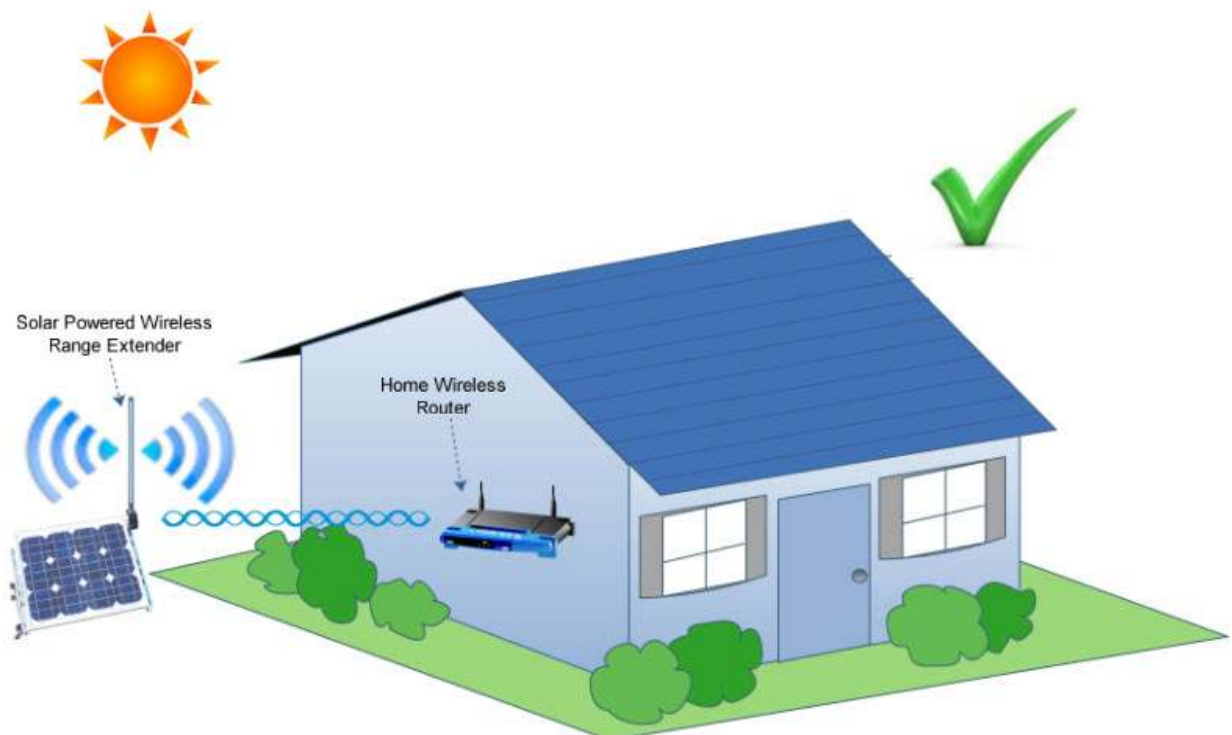


In this situation, the Solar Powered Wireless Range Extender is positioned on the roof of the building. The Range Extender has technology to help it overcome obstacles and as this is located a relatively short distance from the home wireless router you will find there will be very little loss of internet speed when connected to the access point. Also, the Solar Powered Wireless Range



Extender benefits from being positioned at height and will provide improved coverage from an elevated position than it would at ground level.

Another favourable setup would be as follows: -



In this situation, the Solar Powered Wireless Range Extender is positioned outside only a short distance from its home wireless router, you will find this will work effectively. It is worth bearing in mind that the fewer walls between the Home Wireless Router and the Solar Powered Wireless Range Extender, the more effectively it will work. A large house with several thick walls (sandstone for example) between the home router and range extender could potentially reduce the signal quality. However, our tests have shown that the quality of signal received is affected much more by distance than it is by obstacles, i.e. you can expect it to be able to handle walls and trees



provided it's close, but don't expect much if the Range Extender is 100 metres from your wireless router, even in clear line of sight.

It might be tempting to think that you should position the Wireless Range Extender halfway between your home router and the end user (where you're sitting with your laptop), we do not recommend this however and advise that in general you position the Range Extender as close to your home wireless router as possible.

Consider the following: -



You have the option to cascade more than one Solar Powered Wireless Range Extender to boost your outdoor coverage even further, potentially covering enormous outdoor areas.



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Deployment guidelines summary: -

*For best coverage, position the Range Extender as high as possible.

*For best coverage, position the Range Extender as close to your home wireless router as possible.

*For best coverage, avoid having a large number of obstacles between the range extender and your home wireless router.

*For optimum range extender up-time, slant the solar panel at 45 degrees.

*For optimum range extender up-time, point the range extender with the solar panel pointing due south.



Specs: -

Solar Panel: -

Related power - 30W

Voc - 21.24V

Vop - 18V

Shape of cell - Persuo square

Short circuit current (Isc) - 1.83A

Working current (Iop) -1.67A

Output Tolerance - $\pm 5\%$

Temperate coefficient of Isc - $+0.1\%/^{\circ}\text{C}$

Temperate coefficient of Voc - $0.38\%/^{\circ}\text{C}$

Temperate coefficient of power Voc - $0.47\%/^{\circ}\text{C}$

Temperature range - 40°C to $+80^{\circ}\text{C}$

Frame - Anodized aluminum alloy

Guarantee of power 90% with 10 years, 80% with in 25 years

Kind of glass and its thickness: - Low Iron, high transparency tempered glass of 3.2mm

Surface Maximum Load Capacity: - 50m/s(200kg/sq.m)

Allowable Hail Load fall down from 1m height

SLA Battery Voltage 12V

Dimensions (L x W x H) 525*445*35mm

Net Weight 3.5kgs



Battery pack: -

Type – Lithium Ion

Capacity – 39Wh

Charge time (from empty to full) – 370 minutes

Output voltage – 9 volts

Input voltage – 12 volts

Range Extender: -

SoC - Ralink RT2880

Wireless Module - Ralink RT2880 + RT2820

Flash - 4 MB Flash

RAM - 16 MB SDRAM

Antenna - Detachable 1* 3dBi, 1 * 9Dbi Dipole Antenna x 2
(2T2R MIMO Technology)

Output Power - r 11n: 15±1dBm, 11g: 15±1dBm,
11b: 17±1dBm

Power - 12VDC, 1A Single Range Switching
Power Adapter

Dimension - 30(H) x 127(W) x 96(D) mm

Temperature - 10~50 °C

Humidity - 10~90% (Non-Condensing)

Certification - FCC, CE.



Glossary: -

Default Gateway (Access point): Every non-access point IP device needs to configure a default gateway's IP address. When the device sends out an IP packet, if the destination is not on the same network, the device has to send the packet to its default gateway, which will then send it out towards the destination.

DHCP: Dynamic Host Configuration Protocol. This protocol automatically gives every computer on your home network an IP address.

DNS Server IP Address: DNS stands for Domain Name System, which allows Internet servers to have a domain name (such as `www.Broadbandaccess point.com`) and one or more IP addresses (such as `192.34.45.8`). A DNS server keeps a database of Internet servers and their respective domain names and IP addresses, so that when a domain name is requested (as in typing "`Broadbandaccess point.com`" into your Internet browser), the user is sent to the proper IP address. The DNS server IP address used by the computers on your home network is the location of the DNS server your ISP has assigned to you.

DSL Modem: DSL stands for Digital Subscriber Line. A DSL modem uses your existing phone lines to transmit data at high speeds.

Ethernet: A standard for computer networks. Ethernet networks are connected by special cables and hubs, and move data around at up to 10/100 million bits per second (Mbps).

Idle Timeout: Idle Timeout is designed so that after there is no traffic to the Internet for a pre-configured amount of time, the connection will automatically be disconnected.

IP Address and Network (Subnet) Mask: IP stands for Internet Protocol. An IP address consists of a series of four numbers separated by periods, that identifies a single, unique Internet computer host in an IP network. Example: `192.168.2.1`. It consists of 2 portions: the IP network address, and the host identifier.

The IP address is a 32-bit binary pattern, which can be represented as four cascaded decimal numbers separated by ".": `aaa.aaa.aaa.aaa`, where each "aaa" can be anything from 000 to 255, or as four cascaded binary numbers separated by ".":

`bbbbbbbb.bbbbbbbb.bbbbbbbb.bbbbbbbb`, where each "b" can either be 0 or 1.

A network mask is also a 32-bit binary pattern, and consists of consecutive leading 1's

followed by consecutive trailing 0's, such as

`11111111.11111111.11111111.00000000`. Therefore sometimes a network mask can also be described simply as "x" number of leading 1's.

When both are represented side by side in their binary forms, all bits in the IP address that correspond to 1's in the network mask become part of the IP network address, and



the remaining bits correspond to the host ID.

For example, if the IP address for a device is, in its binary form, 11011001.10110000.10010000.00000111, and if its network mask is, 11111111.11111111.11110000.00000000

It means the device's network address is 11011001.10110000.10010000.00000000, and its host ID is, 00000000.00000000.00000000.00000111. This is a convenient and efficient method for access points to route IP packets to their destination.

ISP Gateway Address: (see ISP for definition). The ISP Gateway Address is an IP address for the Internet access point located at the ISP's office.

ISP: Internet Service Provider. An ISP is a business that provides connectivity to the Internet for individuals and other businesses or organizations.

LAN: Local Area Network. A LAN is a group of computers and devices connected together in a relatively small area (such as a house or an office). Your home network is considered a LAN.

MAC Address: MAC stands for Media Access Control. A MAC address is the hardware address of a device connected to a network. The MAC address is a unique identifier for a device with an Ethernet interface. It is comprised of two parts: 3 bytes of data that corresponds to the Manufacturer ID (unique for each manufacturer), plus 3 bytes that are often used as the product's serial number.

NAT: Network Address Translation. This process allows all of the computers on your home network to use one IP address. Using the broadband access point's NAT capability, you can access the Internet from any computer on your home network without having to purchase more IP addresses from your ISP.

Port: Network Clients (LAN PC) uses port numbers to distinguish one network application/protocol over another. Below is a list of common applications and protocol/port numbers:



Safety issues: -

The SiFi Solar Powered Wireless Range Extender conforms to EU regulations regarding radio wave operation, a few guidelines for use are as follows.

*Make sure there are more than 20 centimetres between where the range extender is deployed and where end-user will be based.

*There are no user serviceable parts on the Solar Powered Wireless Range Extender. **DO NOT OPEN THE BACK COVER.** Your warranty will be invalidated if you do so and there is a risk of electrical shock and/or shorting the battery pack.

*The Solar Powered Wireless Range Extender weighs around 6 kilograms, if it were to fall from height there is a risk of injury. Please insure that it is safely secured wherever it is deployed.



SIFI Solar Solutions

SIFI Solar Access Point

Technical support: -

This manual is intended as a quick setup guide for use as a universal wireless repeater. The Solar Powered Wireless Range Extender has other user configurable features. For more information, please contact info@sifisolar.co.uk

For technical support, we offer a live MSN chat service with one of our technical representatives, please email info@sifisolar.co.uk with details of your problem and your MSN ID.

If you would like one of engineers to phone you regarding technical issues, please also include your telephone number in any correspondence.

For regularly updated information regarding your Solar Powered Wireless Range Extender, visit <http://www.sifisolar.co.uk>