AC450 Wireless LAN 11ac Band Extender

(IEEE 802.11a/an/ac)

User's Manual

Version: 1.0

(JUNE, 2014)

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Federal Communication Commission Interference Statement

FCC Part 15

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.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of 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:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio technician for help.

■ Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

■ Operations in the 5.15-5.25 & 5.75-5.85 GHz band are restricted to indoor usage only.

FCC Caution

This equipment must be installed and operated in accordance with provided instructions and a minimum 20 cm spacing must be provided between computer mounted antenna and person's body (excluding extremities of hands, wrist and feet) during wireless modes of operation.

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.

Any changes or modifications not expressly approved by the party responsible for compliance could void the authority to operate equipment.

This device is restricted to indoor use when operated in the 5.15-5.25 & 5.75-5.85 GHz frequency range.

Federal Communication Commission (FCC) Radiation Exposure Statement

This equipment complies with FCC radiation exposure set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 20cm (8 inches) during normal operation.

The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

R&TTE Compliance Statement

This equipment complies with all the requirements of DIRECTIVE 1999/5/EC OF THE EUROPEAN PARLIAMENT AND THE COUNCIL of March 9, 1999 on radio equipment and telecommunication terminal Equipment and the mutual recognition of their conformity (R&TTE).

The R&TTE Directive repeals and replaces in the directive 98/13/EEC (Telecommunications Terminal Equipment and Satellite Earth Station Equipment) As of April 8, 2000.

Safety

This equipment is designed with the utmost care for the safety of those who install and use it. However, special attention must be paid to the dangers of electric shock and static electricity when working with electrical equipment. All guidelines of this and of the computer manufacture must therefore be allowed at all times to ensure the safe use of the equipment.

EU Countries Intended for Use

The ETSI version of this device is intended for home and office use in Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom.

The ETSI version of this device is also authorized for use in EFTA member states: Iceland, Liechtenstein, Norway, and Switzerland.

EU Countries Not intended for use

None.

CATALOG

Chapter I: Product Information

1-1 Introduction and safety information

Thank you for purchasing this AC450 Wireless LAN 11ac Band Extender! This cost-effective product is the best choice for *Digital Home / Home Office* users, all network devices can share a single xDSL / cable modem internet connection at 5G 11ac high speed.

With built-in 5GHz radio, this band extender supports IEEE 802.11a/an/ac wireless network capabilities, all wireless-enabled network devices (including PDA, Smart phone, Game console, Tablet, TV, Set Top Box and more!) can connect to this wireless band extender without additional cabling, you can transfer audio / video / file for up to 433Mbps (transfer data rate)!

Other features of this band extender including:

- Supports 5GHz wireless LAN only.
- High wireless access throughput, up to 433Mbps (transfer data rate)!
- Allow multiple users to share a single Internet line.
- Share a single Cable or xDSL internet connection.
- Access private LAN servers from the internet.
- One RJ-45 LAN Fast Ethernet port (10/100M).
- Provides IEEE 802.11a/an/ac wireless LAN capability.
- Support DHCP (Server/Client) for easy IP-address setup.
- Support multiple wireless modes like: Access Point, Client.
- Easy to use Web-based GUI for network configuration and management purposes.
- Auto MDI / MDI-X function for wired Ethernet port.

1-2 Safety Information

In order to keep the safety of users and your properties, please follow the following safety instructions:

1. This band extender is designed for indoor use only; DO NOT place this band extender outdoor.

2. DO NOT put this band extender at or near hot or humid places, like kitchen or bathroom. Also, do not left this band extender in the car in summer.

3. DO NOT plug, unplug & rotation LAN port with force.

4. If you want to place this band extender at high places or hang on the wall, please make sure the band extender is firmly secured. Falling from high places would damage the band extender and its accessories, and warranty will be void.

5. Accessories of this band extender, like antenna, cable and power supply, are danger to small children under 3 years old. They may put the small parts in their nose or month and it could cause serious damage to them. KEEP THIS BAND EXTENDER OUT THE REACH OF CHILDREN!

6. The band extender will become hot when being used for long time (***This is normal and is not a malfunction).*** DO NOT put this band extender on paper, cloth, or other flammable materials.

7. There's no user-serviceable part inside the band extender. If you found that the product is not working properly, please contact your dealer of purchase and ask for help. DO NOT disassemble the producy, warranty will be void.

8. If the product falls into water when it's powered, DO NOT use your hand to pick it up. Switch the electrical power off before you do anything, or contact an experienced technician for help.

9. If you smell something strange, or even see some smoke coming out from the product or power supply, remove the power supply or switch the electrical power off immediately, and call dealer of purchase for help.

1-3 System Requirements

- Internet connection, provided by xDSL or cable modem with a RJ-45 Ethernet port.
- Network devices with wired or 5G wireless network interface card.
- Web browser (*Microsoft Internet Explorer, Google Chrome, Firefox or Safari web browser).*
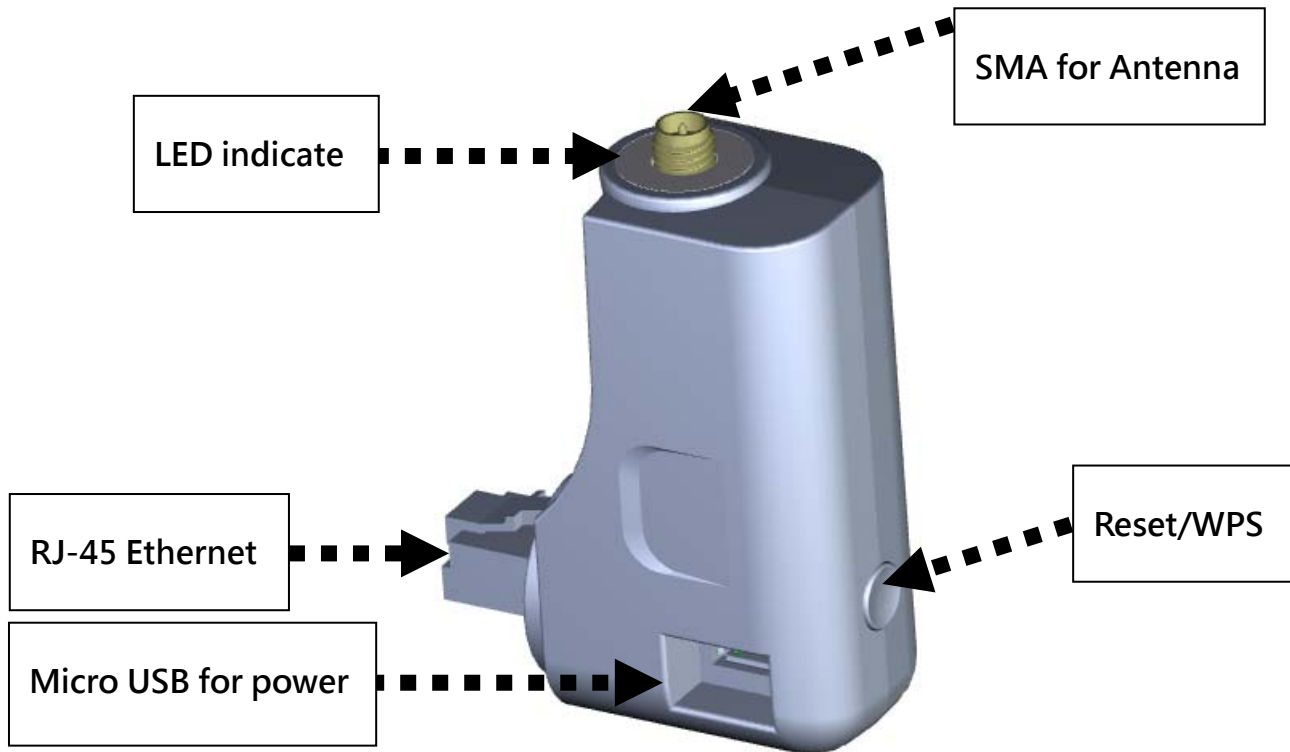- An available USB Port or USB power adapter (Output: DC5V/0.6A)

1-4 Package Contents

Before starting to use this 11ac band extender, please check if there's anything missing in the package, and contact your dealer of purchase to claim for missing items:

    ☐ 11ac Band Extender (1 pcs)
    ☐ Quick Installation Guide (1 pcs)
    ☐ User Manual CD-ROM (1 pcs)

1-5 Familiar with your new 11ac Band Extender

LED indication & Button Function

SMA for Antenna

LED indicate

RJ-45 Ethernet

Micro USB for power

Reset/WPS

LED Indication	Definition	Function	Definition
AP mode (Orange)	**Blinking:** Wireless LAN activity (transferring or receiving data)	RJ-45 Ethernet	**AP mode:** LAN Port **Client mode:** LAN Port
Client mode (Blue)	**Blinking:** Wireless LAN activity (transferring or receiving data)	Micro USB Connector	For 11ac band extender power supply only.
System status (Purple)	**On Solid:** Detect WPS button is pressed and hold for more 3 seconds, Wireless WPS function is enabled. **Blinking:** Detect Reset button is pressed and hold for more 10 seconds. (do restore all settings to factory defaults).	WPS / Reset	**WPS:** Pressed and hold for more 3 seconds to start WPS. **Reset:** Pressed and hold for more 10 seconds, till LED is blinking to do restore all settings to factory defaults.

Chapter II: System and Network Setup

2-1 Build network connection

Please follow the following instructions to setup 11ac band extender:
1. Please connect the USB cable (Micro USB) to the 11ac band extender.
2. Please connect the USB cable (Type-A) to the Router, TV or Set Top Box USB Port to getting the power supply, You can also use USB power adapter to the wall outlet, and then connect USB cable (Type-A) to the "USB Power Jack" to getting the power supply.
3. First time to setting the band extender, please do not plug band extender to the Router's LAN port.
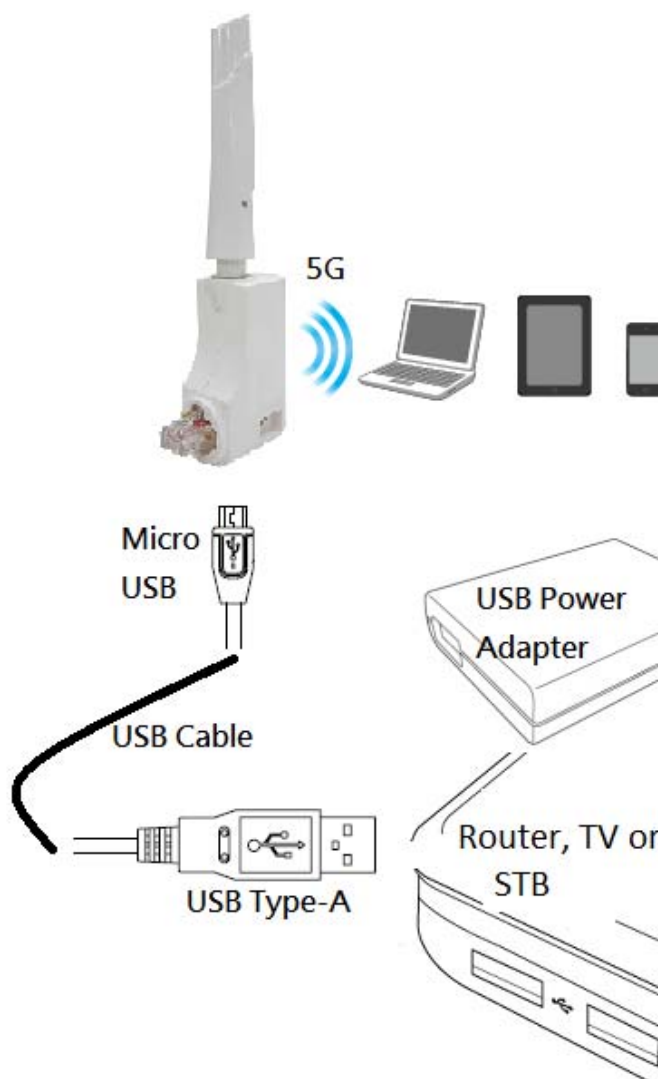
2-2 Network setup

Please use the web browser to configure the 11ac band extender. A computer with Ethernet or 5G wireless LAN connection to the band extender is required for this first time configuration.

1. Site survey by 5G wireless LAN adapter and use Windows Zero Configure, you can find 11ac Band Extender call the "Band Extender_5G_xxxx", please select and connect.
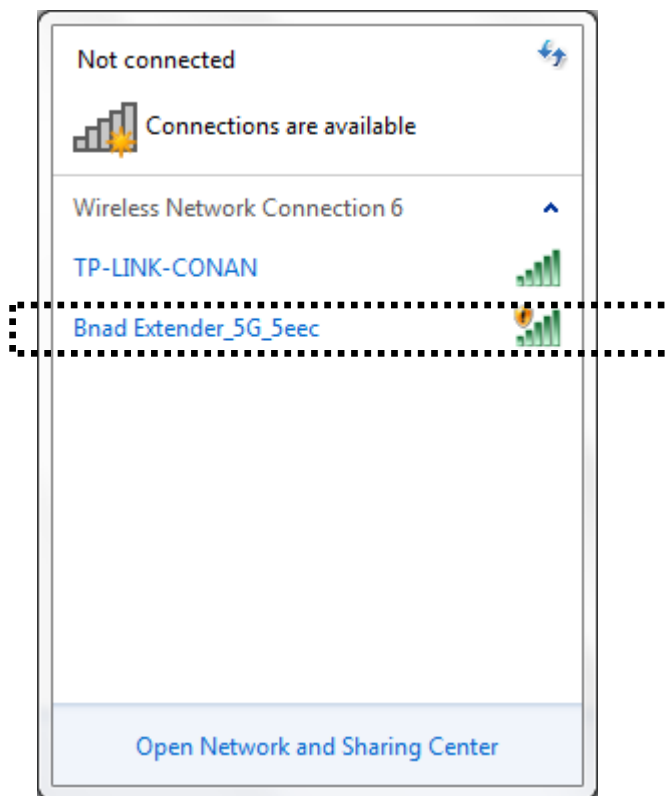
2. Open the web browser and input the IP address of 11ac Band Extender in address bar, and the following message should be shown.

   Default IP: 192.168.2.1
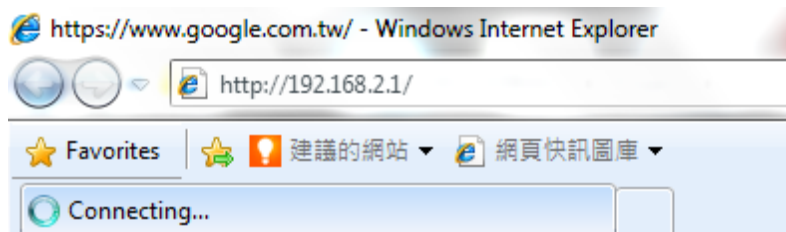
3. Please input user name and password, then click 'OK' to access web management interface of 11ac Band Extender.

   Default User name: admin
   Default Password: 1234
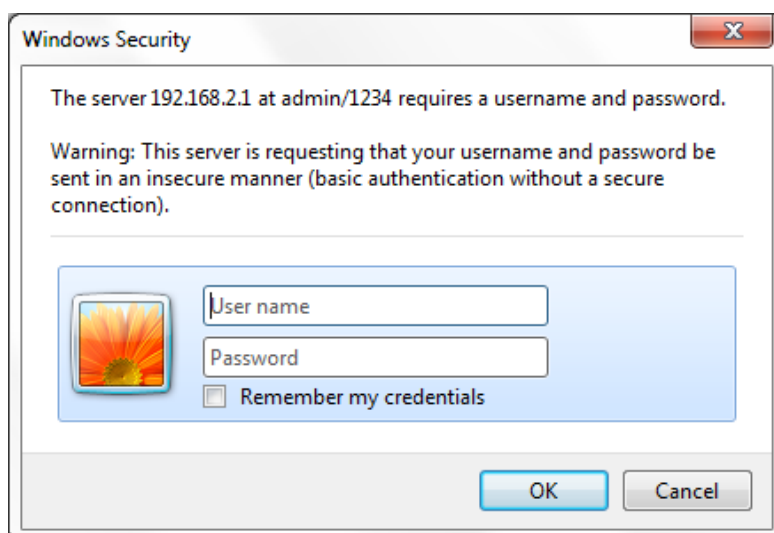
4. First time configure the 11ac Band Extender will auto into setup wizard, please click "Next".

Welcome to Setup Wizard.

The Wizard will guide you the through following steps. Begin by clicking on Next.
1. Operation Mode Setting
2. Wireless Basic Function Setting
3. Wireless Security Setting

Next>>

5. Select operation mode: you can select AP mode or Client mode by your application environment, then click "Next".
(for example: AP mode)

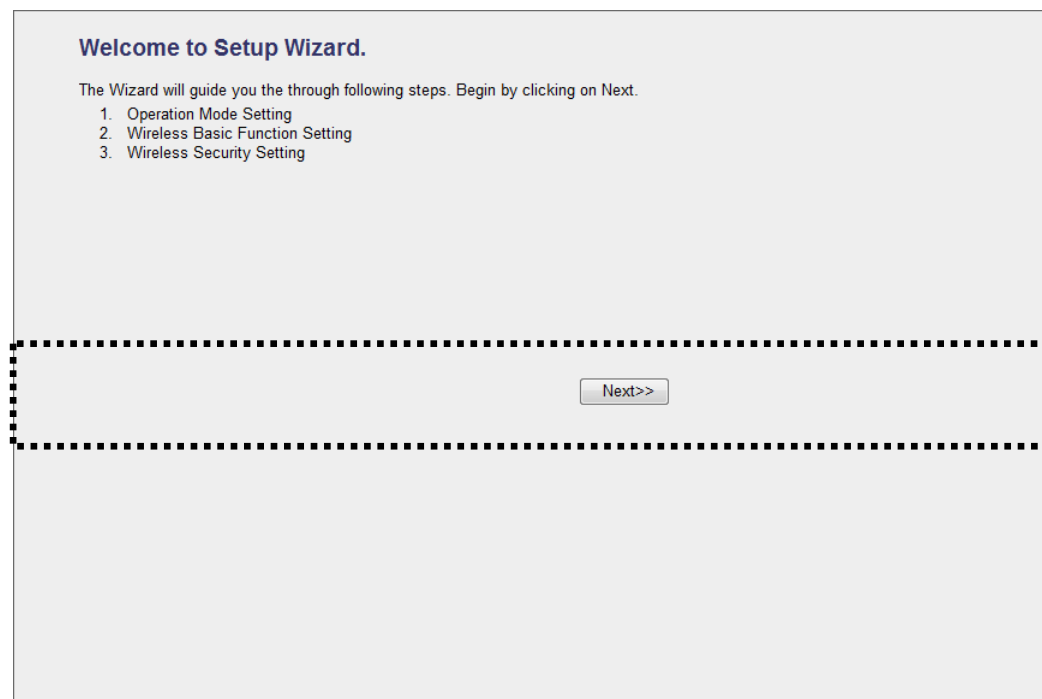**Current Operation Mode: Access Point**

○ Access Point Mode:

Select this mode is you have a traditional 2.4G single band WiFi router and you want to upgrade it to 11ac dualband wireless connection and share to multiple wireless client devices such like your mobile phone, tablet, notebook..and so on. You can connect this device to RJ-45 Ethernet port of your existing Router.
(In this mode, Ethernet port configure become to the LAN port.)

○ Client Mode:

Select this mode, can let your networking device have wireless capability; it will become your networking device's wireless network card. You can connect this device to RJ-45 Ethernet port of your existing Internet TV or Set Top Box or DVD player or Game Console device.
(In this mode, Ethernet port configure become to the LAN port.)

Cancel   <<Back   Next>>

6. Wireless Basic Function Setting, click "Next"' when you finish.

Wireless Basic Function Setting

This page allows you to define ESSID, and Channel for the wireless connection.
These parameters are used for the wireless stations to connect to the Access Point.

Wireless Band:	5 GHz (A+N+AC)
Wireless Network Name(SSID):	Bnad Extender_5G_5eec
Channel Width:	80MHz
Data Rate:	Auto
Channel Number:	Auto

[Cancel] [<<Back] [Next>>]

7. Wireless Security Setting, click "Finished"' when you finish.

Wireless Security Setting

This page allows you setup the wireless security. Turn on WEP or WPA by using
Encryption Keys could prevent any unauthorized access to your wireless network.

Encryption: NONE

[Cancel] [<<Back] [Finished]

8. Change Setting Successfully, please press "Reboot Now" to restart the 11ac Band Extender to make the changes take effect.

Add the URL to your bookmark (my favorite list) **Default: "Save"** (we recommend you to save it for quick access to the Web setting page next time)

Change setting successfully!

Your changes have been saved. The router must be rebooted for the changes to take effect.
You can reboot now, or you can continue to make other changes and reboot later.

Add the URL to your bookmark(my favorite list) Save ▾
(we recommend you to save it for quick access to the Web setting page next time)
(Supports IE and Firefox only. Please add the access key to the bookmark manually if you use other browsers)

[Reboot Now]   [Reboot Later]

Add a Favorite

⭐ **Add a Favorite**
Add this webpage as a favorite. To access your favorites, visit the Favorites Center.

Name: 11AC Upgrader Web Control Panel

Create in: ⭐ Favorites ▾   [New Folder]

[Add]   [Cancel]

9. When you see this message, the 11ac Band Extender will be ready with new settings within 20 seconds.
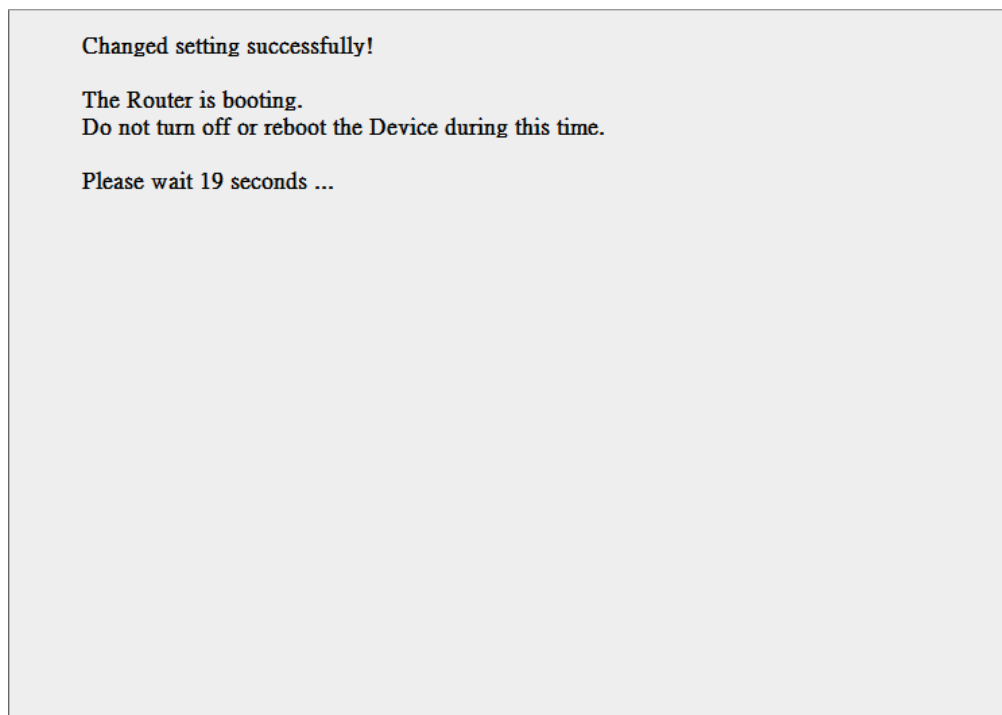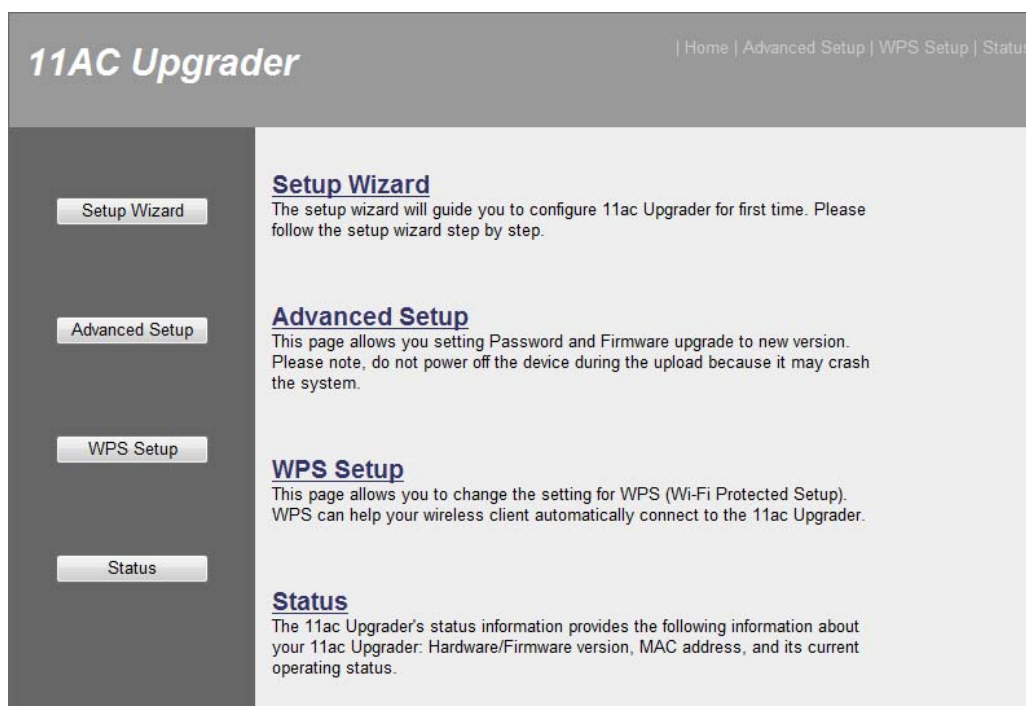
Changed setting successfully!

The Router is booting.
Do not turn off or reboot the Device during this time.

Please wait 19 seconds ...

10. When you will re-configure the 11ac Band Extender, you can find your favorite list. Select "11AC Upgrader Web Control Panel" into Web management page.

11AC Upgrader

| Home | Advanced Setup | WPS Setup | Status

Setup Wizard

Setup Wizard
The setup wizard will guide you to configure 11ac Upgrader for first time. Please follow the setup wizard step by step.

Advanced Setup

Advanced Setup
This page allows you setting Password and Firmware upgrade to new version. Please note, do not power off the device during the upload because it may crash the system.

WPS Setup

WPS Setup
This page allows you to change the setting for WPS (Wi-Fi Protected Setup). WPS can help your wireless client automatically connect to the 11ac Upgrader.

Status

Status
The 11ac Upgrader's status information provides the following information about your 11ac Upgrader: Hardware/Firmware version, MAC address, and its current operating status.

11. Please insert the 11ac band extender into an available LAN port of your traditional 2.4G WiFi router.
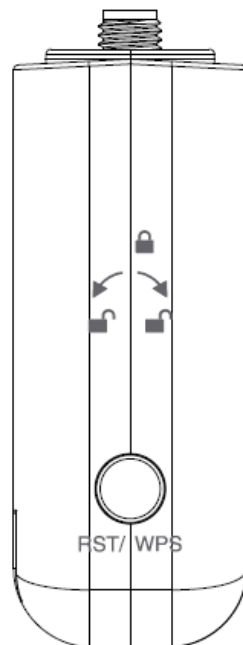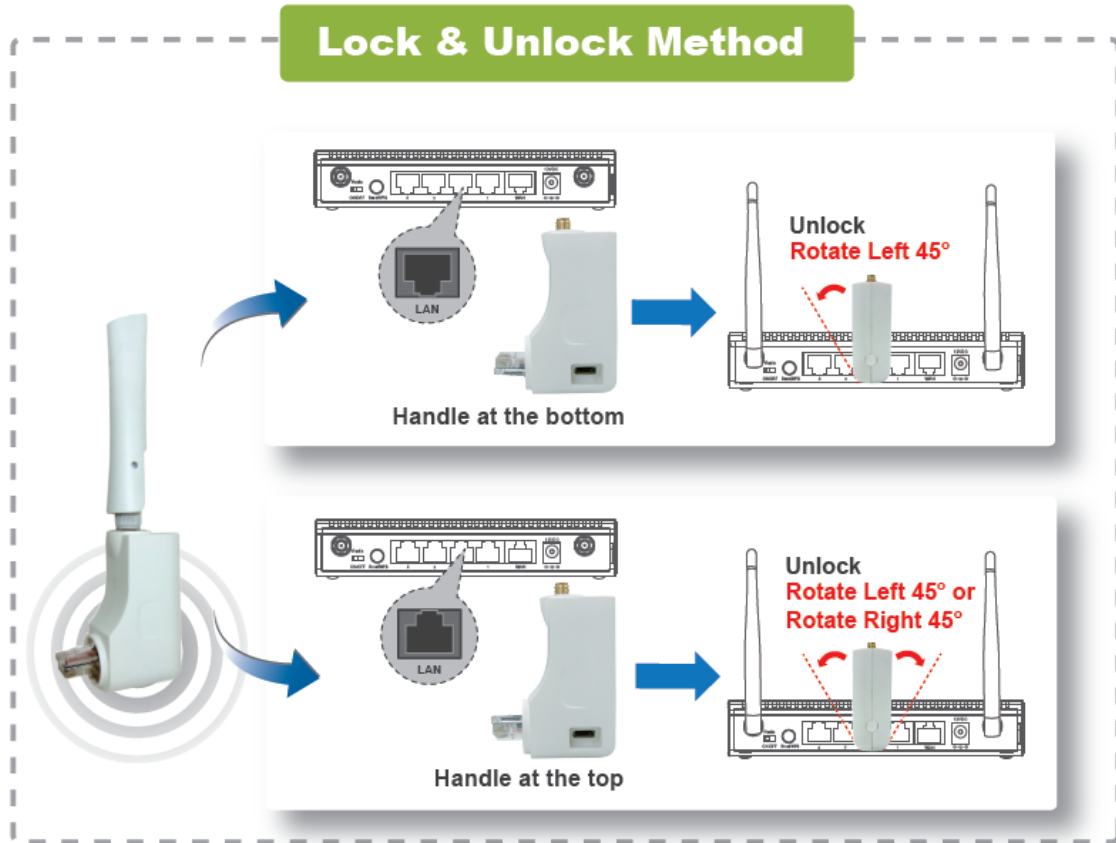   (** Do not use force to plug or unplug the 11ac band extender.)

   Please use your computer to connect to any website on Internet, or start any Internet application and see if they're working properly.

   For instructions of advanced settings and wireless network setup, please refer to user manual in supplied CD-ROM.
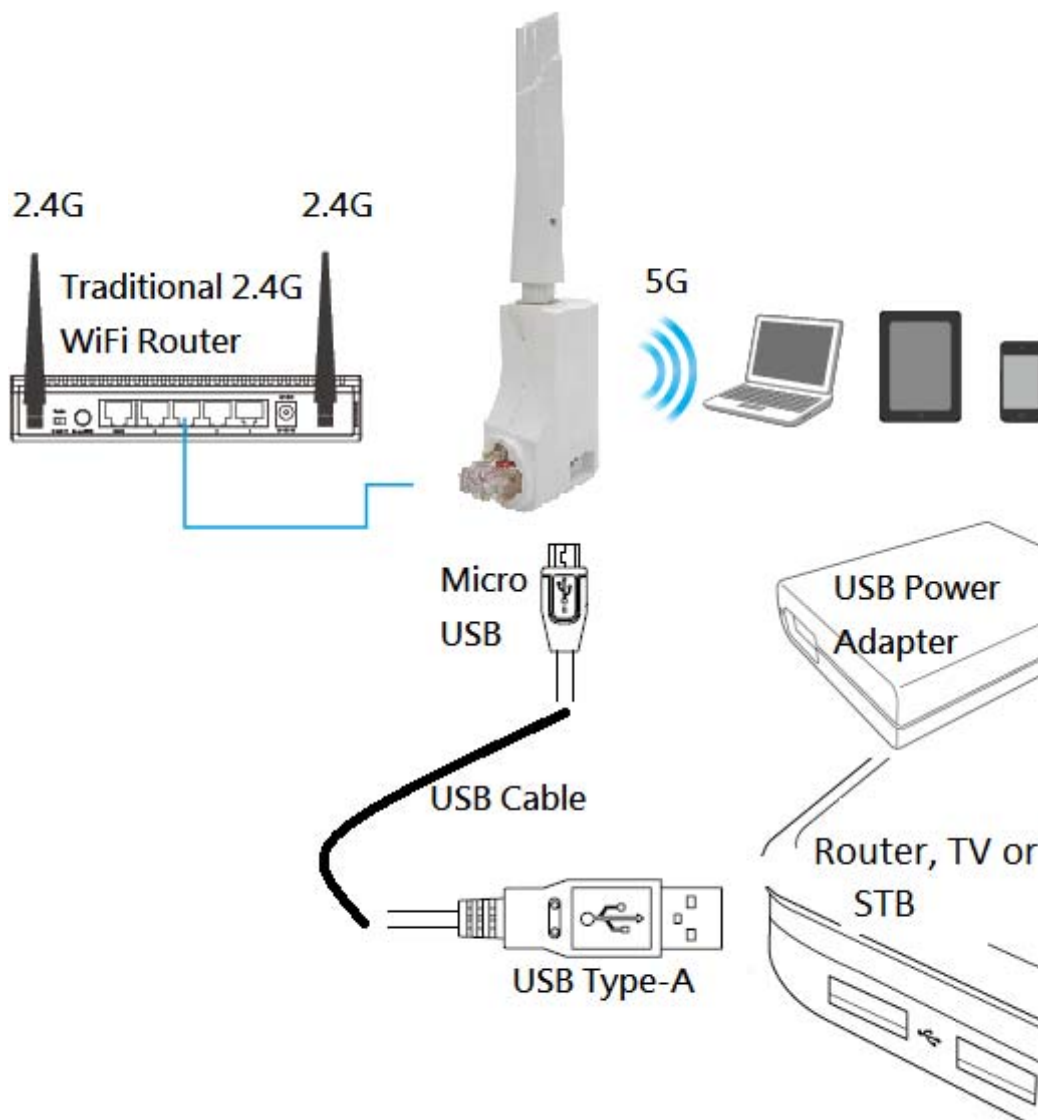
12. Lock & Unlock method for 11ac band extender as left drawing shown, Please do not use force to plug, unplug or rotation the 11ac band extender.

Lock & Unlock Method

Unlock
Rotate Left 45°

Handle at the bottom

Unlock
Rotate Left 45° or
Rotate Right 45°

Handle at the top

RST/ WPS

NOTE: If you can't see the web management interface, and you're being prompted to input user name and password again, it means you didn't input username and password correctly. Please retype user name and password again. If you're certain about the user name and password you type are correct, please go to '4-2 Troubleshooting' to perform a factory reset, to set the password back to default value.
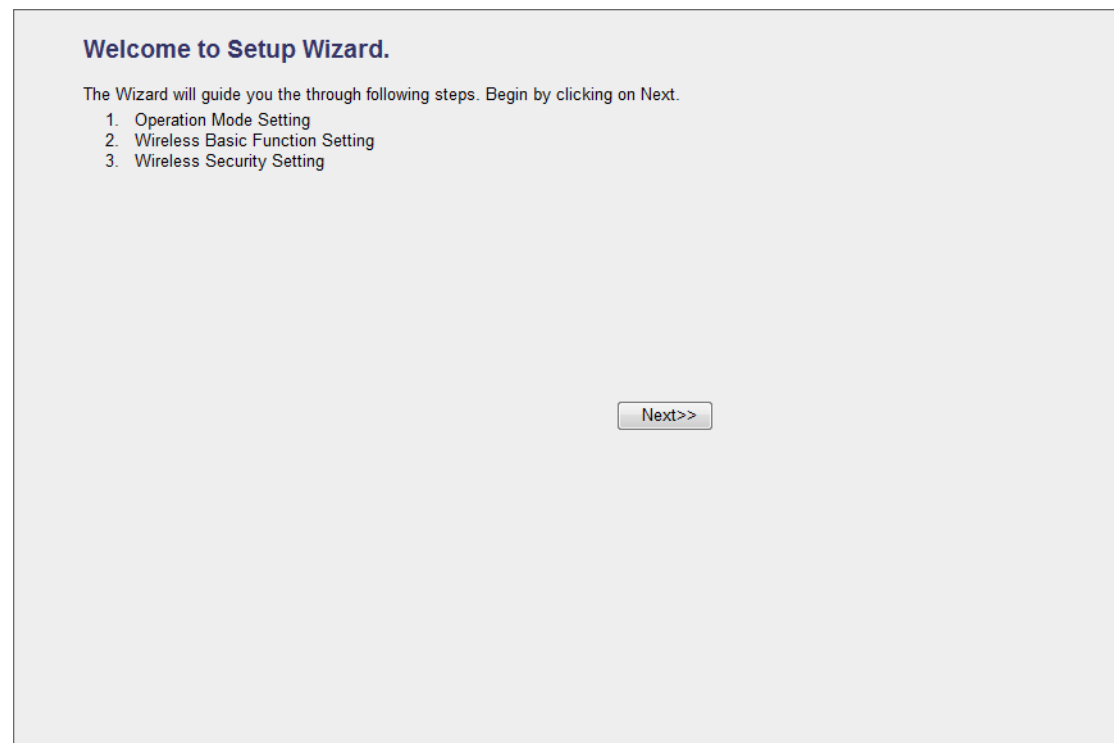
TIP: This page shows the four major setting categories: Setup Wizard, Advanced Setup, WPS Setup and Status. You can find the shortcut which leads to these setting categories at the upper-right corner of every page, and you can jump to another category directly by clicking the link, and don't have to go back to the first page.

Chapter III WEB GUI configuration

3-1 Setup Wizard

The setup wizard will guide you to configure 11ac Band Extender for first time. Please follow the setup wizard step by step.

Welcome to Setup Wizard, please click "Next".

Welcome to Setup Wizard.

The Wizard will guide you the through following steps. Begin by clicking on Next.
1. Operation Mode Setting
2. Wireless Basic Function Setting
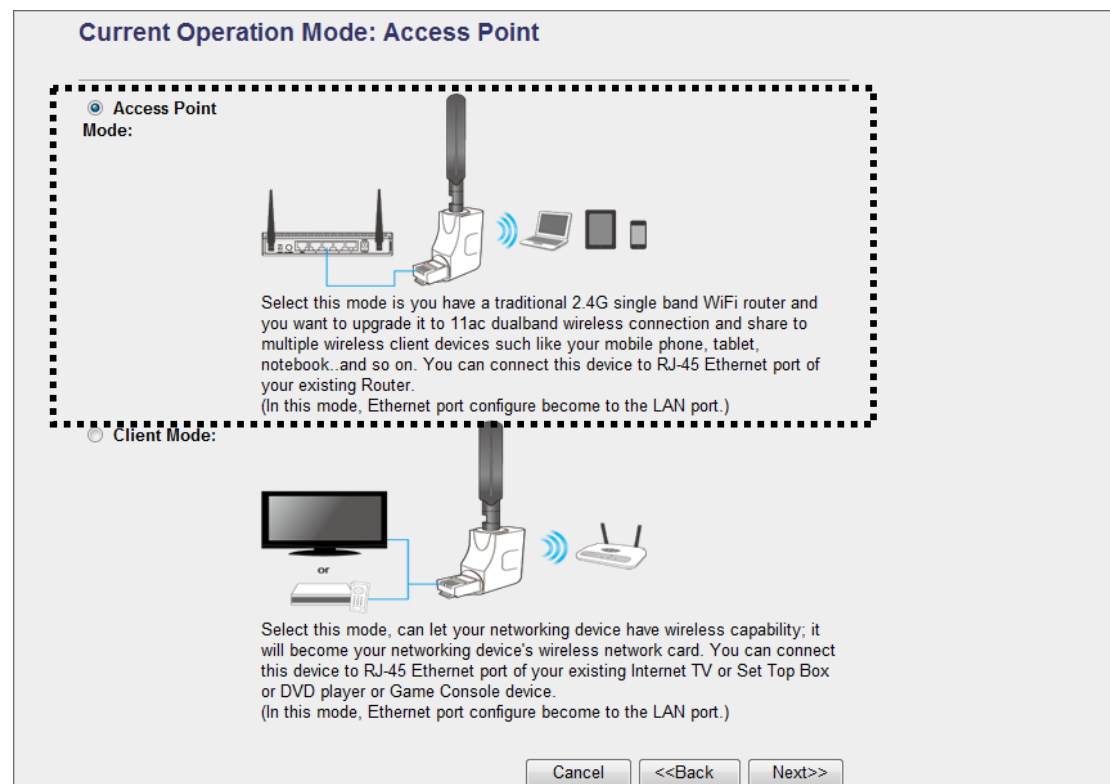3. Wireless Security Setting

Next>>

3-1-1 Access Point mode

Select this mode is you have a traditional 2.4G single band WiFi router and you want to upgrade it to 11ac dualband wireless connection and share to multiple wireless client devices such like your mobile phone,

tablet, notebook..and so on. You can connect this device to RJ-45
Ethernet port of your existing Router.
(In this mode, Ethernet port configure become to the LAN port.)

Select operation mode: Please select "Access Point" mode, then click
"Next".

Wireless Basic Function Setting: You can setting wireless band,
wireless network name (SSID), channel width, data rate and channel
number, then click "Next'" when you finish.

Wireless Security Setting: You can setting encryption for your wireless security, then click "Finished" when you finish.

Change Setting Successfully: Please press "Reboot Now" to restart the Band Extender to make the changes take effect.

Add the URL to your bookmark (my favorite list) **Default: "Save"**
(we recommend you to save it for quick access to the Web setting page next time)
(Supports IE and Firefox only. Please add the access key to the bookmark manually if you use other browsers)

Add a Favorite

Add a Favorite
Add this webpage as a favorite. To access your favorites, visit the Favorites Center.

Name: 11AC Upgrader Web Control Panel

Create in: ⭐ Favorites   [New Folder]

[Add]   [Cancel]

```
Changed setting successfully!

The Router is booting.
Do not turn off or reboot the Device during this time.

Please wait 19 seconds ...
```

3-1-2 Client mode

Select this mode, can let your networking device have wireless capability; it will become your networking device's wireless network card. You can connect this device to RJ-45 Ethernet port of your existing Internet TV or Set Top Box or DVD player or Game Console device.
(In this mode, Ethernet port configure become to the LAN port.)

Select operation mode: Please select "Client" mode, then click "Next".

Select this mode is you have a traditional 2.4G single band WiFi router and you want to upgrade it to 11ac dualband wireless connection and share to multiple wireless client devices such like your mobile phone, tablet, notebook..and so on. You can connect this device to RJ-45 Ethernet port of your existing Router.
(In this mode, Ethernet port configure become to the LAN port.)
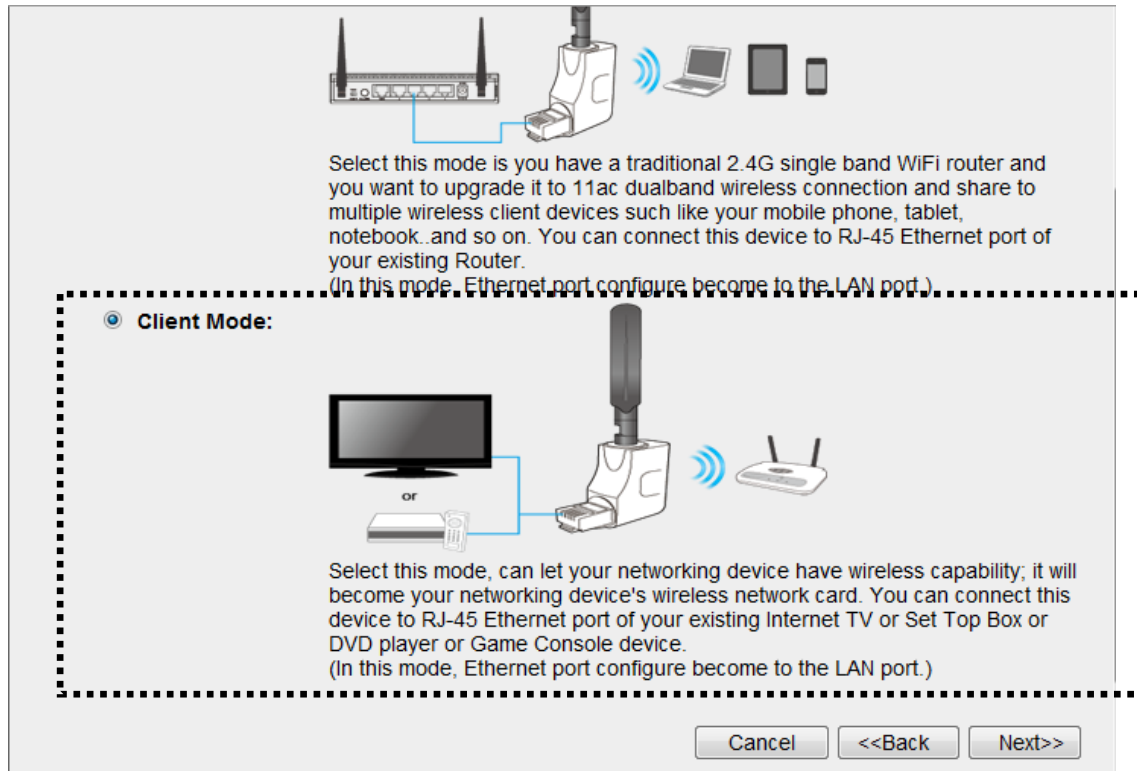
◉ **Client Mode:**

Select this mode, can let your networking device have wireless capability; it will become your networking device's wireless network card. You can connect this device to RJ-45 Ethernet port of your existing Internet TV or Set Top Box or DVD player or Game Console device.
(In this mode, Ethernet port configure become to the LAN port.)

[Cancel] [<<Back] [Next>>]

Wireless Site Survey: Please click "Site Survey" button to find WiFi AP in your area.
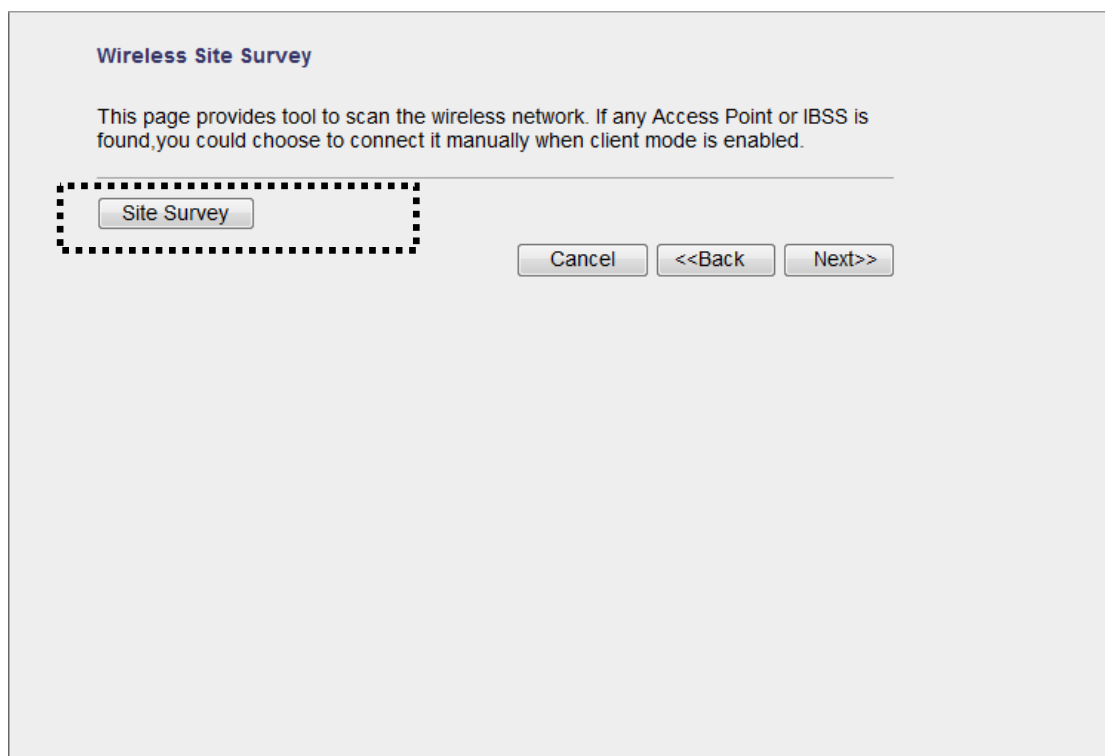
Wireless Site Survey

This page provides tool to scan the wireless network. If any Access Point or IBSS is found,you could choose to connect it manually when client mode is enabled.

[Site Survey]

[Cancel] [<<Back] [Next>>]

This page provides tool to scan the wireless network. If any Access Point or IBSS is found, you could choose to connect it manually. Please select a Root wireless AP and click "Next".

Wireless Site Survey

This page provides tool to scan the wireless network. If any Access Point or IBSS is found,you could choose to connect it manually when client mode is enabled.

[Site Survey]

SSID	BSSID	Channel	Type	Encrypt	Signal	Select
BR6456AC_5G	80:1f:02:f2:6c:e5	48 (A+N+AC)	AP	no	54	○

[Cancel] [<<Back] [Next>>]

Root AP Wireless Security Key: Please setting encryption for the Root AP just you selected, then click "Connect"' when you finish.

Root AP Wireless Security Key

This page allows you setup the wireless security. Turn on WEP or WPA by using Encryption Keys could prevent any unauthorized access to your wireless network.

Encryption: NONE ▼

[Cancel] [<<Back] [Connect]

Connect Successfully: Please press "Reboot Now" to restart the Band Extender to make the changes take effect.

Connect successfully!

Your changes have been saved. The router must be rebooted for the changes to take effect. You can reboot now, or you can continue to make other changes and reboot later.

Add the URL to your bookmark(my favorite list) Save ▾
(we recommend you to save it for quick access to the Web setting page next time)
(Supports IE and Firefox only. Please add the access key to the bookmark manually if you use other browsers)

[Reboot Now]   [Reboot Later]

Add the URL to your bookmark (my favorite list) **Default: "Save"**
(we recommend you to save it for quick access to the Web setting page next time)
(Supports IE and Firefox only. Please add the access key to the bookmark manually if you use other browsers)

Add a Favorite

Add a Favorite
Add this webpage as a favorite. To access your favorites, visit the Favorites Center.

Name: 11AC Upgrader Web Control Panel

Create in: ⭐ Favorites ▾   [New Folder]

[Add]   [Cancel]

Changed setting successfully!

The Router is booting.
Do not turn off or reboot the Device during this time.

Please wait 19 seconds ...

3-2 Advanced Setup

This page allows you setting Password and Firmware upgrade to new version. Please note: do not power off the device during the Firmware upgrade because it may crash the system.

Advanced Setup

This page allows you setting Password and Firmware upgrade to new version. Please note, do not power off the device during the upload because it may crash the system.

Password Settings: You can change the User Name and Password required while logging into the Band Extender's web-based management system. By default, the password is 1234. So please assign a password to the Administrator as soon as possible, and store it in a safe place. Passwords can contain 1 to 30 alphanumeric characters, and are case sensitive.

Firmware Upgrade: This tool allows you to upgrade the Band Extender's system firmware. Enter the path and name of the upgrade file and then click the APPLY button below. You will be prompted to confirm the upgrade.

The system will automatically reboot after you finished the firmware upgrade process.

Please note: Do not power off the device during the Firmware upgrade because it may crash the system.

Firmware Upgrade

This tool allows you to upgrade the 11ac Upgrader's system firmware. Enter the path and name of the upgrade file and then click the APPLY button below. You will be prompted to confirm the upgrade.
The system will automatically reboot the system after you finished the firmware upgrade process.

Firmware Version:	1.03
Select File:	[ ] [Browse...]

[APPLY] [CANCEl]

NOTE: Never interrupt the upgrade procedure by closing the web browser or physically disconnect your computer from Band Extender. If the firmware you uploaded is corrupt, the firmware upgrade will fail, and you may have to return this product to the dealer of purchase to ask for help. (Warranty voids if you interrupted the upgrade

3-3 WPS Setup

This page allows you to change the setting for WPS (Wi-Fi Protected Setup). WPS can help your wireless client automatically connect to the Root Access Point.

WPS

This page allows you to change the setting for WPS (Wi-Fi Protected Setup). WPS can help your wireless client automatically connect to the Access Point.

☑ **Enable WPS**

● **WPS Information**

WPS Status :	Configured
PinCode Self :	68782467
SSID :	Bnad Extender_5G_5eec
Authentication Mode :	Disabled
Passphrase Key :	

● **Device Configure**

Config Mode :	Registrar
Configure by Push Button :	Start PBC
Configure by Client PinCode :	Start PIN

3-4 Status

The Band Extender's status information provides the following information about your Band Extender: Hardware/Firmware version, and its current operating mode.

Status

The 11ac Upgrader's status information provides the following information about your 11ac Upgrader: Hardware/Firmware version, MAC address, and its current operating status.

System

Model :	Access Point
Up Time :	0day:0h:9m:17s
Hardware Version :	Rev. A
Boot Code Version :	1.0
Runtime Code Version :	1.03

Device Status: View the current setting status of this device.

Device Status

View the current setting status of this device.

Wireless Configuration

Mode :	Access Point
Band :	5 GHz (A+N+AC)
SSID :	Bnad Extender_5G_5eec
Channel Number :	153
Encryption :	Disabled
MAC Address :	80:1f:02:f9:5e:ec

LAN Configuration

IP Address :	192.168.2.1
Subnet Mask :	255.255.255.0
Default Gataway :	192.168.2.1
MAC Address :	80:1f:02:f9:5e:ec

Chapter IV: Appendix

4-1 Hardware Specification

CPU: REALTEK RTL8881AM

RF: REALTEK RTL8881AM

Flash: 2MB

SDRAM RAM: 8MB (CPU inside)

LAN Port: 10/100M Port x 1

Antenna: External Dipole Antenna x 1 (5G)

Power: DC 5V/0.5A USB port power or 5V/0.6A Switching Power Adapter

Dimension: 60 (L) x 50 (W) x 23 (D) mm (without ANT)

Temperature: Operating: 0~40C

                Storage: -20~60C

Humidity: Operating: 10~90% (Non-Condensing)

           Storage: Max.95% (NonCondensing)

Certification: FCC

4-2 Troubleshooting

If you found the device is working improperly or stop responding to you, don't panic! Before you contact your dealer of purchase for help, please read this troubleshooting first. Some problems can be solved by you within very short time!

Scenario	Solution
Device is not responding to me when I want to access it by web browser	a. Please check the connection of power cord and network cable of this device. All cords and cables should be correctly and firmly inserted to the router. b. If all LEDs on this device are off, please check the status of A/C power adapter, and make sure it's correctly powered. c. You must use the same IP address section which router uses. d. Are you using MAC or IP address filter? Try to connect the device by another computer and see if it works; if not, please restore your device to factory default settings (pressing 'reset' button for over 10 seconds). e. Set your computer to obtain an IP address automatically (DHCP), and see if your computer can get an IP address. f. If you did a firmware upgrade and this happens, contact your dealer of purchase for help. g. If all above solutions don't work, contact the dealer of purchase for help.
Device become hot	a. This is not a malfunction, if you can keep your hand on the device's case. b. If you smell something wrong or see the smoke coming out from device or A/C power adapter, please disconnect the device

	and A/C power adapter from utility power (make sure it's safe before you're doing this!), and call your dealer of purchase for help.

4-3 Glossary

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.Broadbandrouter.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 "Broadbandrouter.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.

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, which 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,
<u>11011001.10110000.1001</u>0000.00000111, and if its network mask is,
11111111.11111111.11110000.00000000
It means the device's network address is
<u>11011001.10110000.1001</u>0000.00000000, and its host ID is,
00000000.00000000.0000<u>0000.00000111</u>. This is a convenient and efficient method for routers to route IP packets to their destination.

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 router'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:

Application	Protocol	Port Number
Telnet	TCP	23
FTP	TCP	21
SMTP	TCP	25
POP3	TCP	110
H.323	TCP	1720
SNMP	UCP	161

SNMP Trap	UDP	162
HTTP	TCP	80
PPTP	TCP	1723
PC Anywhere	TCP	5631
PC Anywhere	UDP	5632

Protocol: A protocol is a set of rules for interaction agreed upon between multiple parties so that when they interface with each other based on such a protocol, the interpretation of their behavior is well defined and can be made objectively, without confusion or misunderstanding.

Router: A router is an intelligent network device that forwards packets between different networks based on network layer address information such as IP addresses.

Subnet Mask: A subnet mask, which may be a part of the TCP/IP information provided by your ISP, is a set of four numbers (e.g. 255.255.255.0) configured like an IP address. It is used to create IP address numbers used only within a particular network (as opposed to valid IP address numbers recognized by the Internet, which must be assigned by InterNIC).

TCP/IP, UDP: Transmission Control Protocol/Internet Protocol (TCP/IP) and Unreliable Datagram Protocol (UDP). TCP/IP is the standard protocol for data transmission over the Internet. Both TCP and UDP are transport layer protocol. TCP performs proper error detection and error recovery, and thus is reliable. UDP on the other hand is not reliable. They both run on top of the IP (Internet Protocol), a network layer protocol.

WAN: Wide Area Network. A network that connects computers located in geographically separate areas (e.g. different buildings, cities, countries). The Internet is a wide area network.

Web-based management Graphical User Interface (GUI): Many devices support a graphical user interface that is based on the web browser. This means the user can use the familiar Netscape or Microsoft Internet Explorer to Control/configure or monitor the device being managed.