BiPAC 8920NX(L)-600

Dual-lines VDSL2/ADSL2+
Wireless 600Mbps 3G/4G LTE (VPN)
Firewall Router

User Manual

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Chapter 1: Introduction

Introduction to your Router

The Billion BiPAC 8920NXL-600, a multi service VDSL2 Dual-lines (30a) Router over comparable single-port model. It features fibre-ready triple-WAN VDSL2 supports backward compatibility to ADSL2+ for a longer reach distance, an all-in-one advanced device including a 802.11n access point support wireless speed of up to 600Mbps, Gigabit Ethernet, connections to 3G/4G LTE. Being IPv6-capable, the BiPAC 8920NXL-600 VDSL2 router supports super-fast fibre connections via a Gigabit Ethernet WAN port. It also has one USB port, hosting a 3G/4G LTE modem connecting to the 3G/4G LTE network for Internet access as well as acting as a print server or a NAS (Network Attached Storage) device with DLNA (Digital Living Network Alliance) and FTP (File Transfer Protocol) access.

With an array of advanced features, the Billion BiPAC 8920NXL-600 delivers a future-proof solution for VDSL2 connections, superfast FTTC and ultra-speed FTTH (Fibre-To-The-Home) network deployment and services.

Flexible Deployment Options

The BiPAC 8920NXL-600 provides users with flexible, scalable deployment options optimized to both reduce costs and provide the longest possible lifespan for the investment. The BiPAC 8920NXL-600 integrates dual WAN options; a VDSL2/ADSL2+ interface and a second 10/100/1000 Ethernet WAN interface which can be used for broadband connectivity to any other Ethernet broadband device. Operators can now deploy one device to support current and future network migration.

Maximum wireless performance

With an integrated 802.11n Wireless Access Point, the router delivers ultra-fast wireless speeds of up to 600Mbp and multiple SSIDs on 2.4GHZ frequency band. The Wireless Protected Access (WPA-PSK/WPA2-PSK) and Wireless Encryption Protocol (WEP) features enhance the level of transmission security and access control over wireless LAN. The router also supports the Wi-Fi Protected Setup (WPS) standard, allowing users to establish a secure wireless network by simply pushing a button. If your network requires wider coverage, the built-in Wireless Distribution System (WDS) repeater function allows you to expand your wireless network without the need for any external wires or cables.

3G/LTE mobility and Always-on Connectivity

With 3G/4G LTE-based Internet connection (requires an additional 3G/4G LTE USB modem plugged into the built-in USB port), user can access internet through 3G/4G LTE, whether you are seated at your desk or taking a cross-country trip. The auto fail-over feature ensures optimum connectivity and minimum interruption by quickly and smoothly connecting to a 3G/4G LTE network in the event that you ADSL/Fibre/Cable line fails. The BiPAC 8920NXL-600 will then automatically reconnect to the xDSL/Fibre/Cable connection when it is restored, reducing connection costs. These features are perfect for office situations when a constant and smooth WAN connection is critical.

Experience Gigabit

The BiPAC 8920NXL-600 has five Gigabit LAN ports and port #5 can be configured as an Ethernet WAN port. This EWAN offers another broadband connectivity option for connecting to a cable, DSL,

fibre modem. The BiPAC8920NXL-600 again offers users convenience and optimal network performance with data rates reaching up to 1Gbps.

Secure VPN Connections

The Billion routers support all currently popular secure VPNs, including embedded IPSec VPN, PPTP, L2TP, GRE, which satisfies different users' needs, allowing users to establish encrypted private connections over the Internet with your optimum VPN options. You can access your corporate Intranet and transmit sensitive data between branch offices and remote sites anytime; even when you are out of office, thus enhancing productivity.

IPv6 supported

Internet Protocol version 6 (IPv6) is a version of the Internet Protocol that is designed to succeed IPv4. IPv6 has a vastly larger address space than IPv4. This results from the use of a 128-bit address, whereas IPv4 uses only 32 bits. The new address space thus supports 2^{128} (about 3.4×10^{38}) addresses. This expansion provides flexibility in allocating addresses and routing traffic and eliminates the primary need for network address translation (NAT), which gained widespread deployment as an effort to alleviate IPv4 address exhaustion.

IPv6 also implements new features that simplify aspects of address assignment (stateless address autoconfiguration) and network renumbering (prefix and router announcements) when changing Internet connectivity providers. The IPv6 subnet size has been standardized by fixing the size of the host identifier portion of an address to 64 bits to facilitate an automatic mechanism for forming the host identifier from Link Layer media addressing information (MAC address).

Network security is integrated into the design of the IPv6 architecture. Internet Protocol Security (IPsec) was originally developed for IPv6, but found widespread optional deployment first in IPv4 (into which it was back-engineered). The IPv6 specifications mandate IPsec implementation as a fundamental interoperability requirement.

Virtual AP

A "Virtual Access Point" is a logical entity that exists within a physical Access Point (AP). When a single physical AP supports multiple "Virtual APs", each Virtual AP appears to stations (STAs) to be an independent physical AP, even though only a single physical AP is present. For example, multiple Virtual APs might exist within a single physical AP, each advertising a distinct SSID and capability set. Alternatively, multiple Virtual APs might advertise the same SSID but a different capability set – allowing access to be provided via Web Portal, WEP, and WPA simultaneously. Where APs are shared by multiple providers, Virtual APs provide each provider with separate authentication and accounting data for their users, as well as diagnostic information, without sharing sensitive management traffic or data between providers. You can enable the virtual AP.

Web Based GUI

It supports web based GUI for configuration and management. It is user-friendly and comes with online help. It also supports remote management capability for remote users to configure and manage this product.

Firmware Upgradeable

Device can be upgraded to the latest firmware through the WEB based GUI.

Features

- Compliant with all ADSL2+/VDSL2 standards
- IPv6 ready (IPv4/IPv6 dual stack)
- Triple WAN approach – VDSL2/ADSL2+, 3G/4G LTE mobile connection, and Ethernet WAN for Broadband Connectivity
- 5-port Gigabit Ethernet switch
- 1-port (Port#5) Gigabit Ethernet WAN (EWAN) port for broadband connectivity.
- Compliant with IEEE 802.11a/b/g/n standards
- Ultimate wireless speed up to 600Mbps
- WPS (Wi-Fi Protected Setup) for easy setup
- Wireless security with WPA-PSK/WPA2-PSK
- Supports WDS repeater function
- Multiple wireless SSIDs with wireless guest access and client isolation
- USB port for print server, NAS, DLNA media server, and 3G/4G LTE USB modem
- SNR adjustments to achieve highest sync speeds
- Monitoring of individual LAN/WAN traffic
- Universal Plug and Play (UPnP) Compliance
- QoS for traffic prioritization and bandwidth management
- 16 Secured IPSec VPN tunnels with powerful DES/ 3DES/ AES (BiPAC 8920NX-600 only)
- PPTP VPN with Pap/ Chap/ MS-CHAPv2 authentication (BiPAC 8920NX-600 only)
- Pure L2TP and L2TP over IPSec (BiPAC 8920NX-600 only)
- GRE tunnel (BiPAC 8920NX-600 only)
- SOHO firewall security
- Auto failover and failback
- Supports IPTV application*2
- Ease of use with quick installation wizard (EZSO)
- Broadcom chipset for better stability
- Ideal for Home and SOHO users

VDSL2/ADSL2+ Compliance

- Compliant with xDSL Standard

- ITU-T G.993.2 (VDSL2)
- ITU-T G.998.4 (G.inp)
- ITU-T G.993.5 (G.vector)
- ITU-T G.992.5 (G.dmt.bis plus, Annex M)

(ADSL2+ Annex M, available for BiPAC 8920NXL-600 A model only)

- ITU-T G.992.3 (G.dmt.bis, Annex M, ADSL2

Annex M, available for BiPAC 8920NXL-600 A model only)

- Full-rate ANSI T1.413 Issue 2
- ITU-T G.992.1 (G.dmt)
- ITU-T G.992.2 (G.lite)
- ITU-T G.994.1 (G.hs)

• Supports VDSL2 band plan: 997 and 998

• ADSL/2/2+ fallback modes

• Supports ADSL and VDSL bonding up to 17a profile.

• ITU-T G.998.1, and G.998.2 (ADSL/VDSL2 lines bonded)

• Supports VDSL2 profiles: 8a, 8b, 8c, 8d, 12a, 12b, 17a and 30a in single line mode

• Supports ATM and PTM modes

Network Protocols and Features

• IPv4 or IPv4 / IPv6 Dual Stack

• NAT, static (v4/v6) routing and RIP-1 / 2

• IPv6 Stateless / Stateful Address Auto-configuration

• IPv6 Router Advertisement

• IPv6 over PPP

• DHCPv6

• IP Tunnel IPv6 in IPv4(6RD)

• IP Tunnel IPv4 in IPv6(DS-Lite)

• Universal Plug and Play (UPnP) Compliant

• Dynamic Domain Name System (DDNS)

• Virtual Server, DMZ

• SNTP, DNS relay, IGMP snooping and IGMP proxy for video service

• MLD snooping and MLD proxy for video service

• Management based-on IP protocol, port number and address

• Support port-based Interface Grouping (VLAN)

Firewall

• Built-in NAT Firewall

• Stateful Packet Inspection (SPI)

• DoS attack prevention

• Packet Filtering (v4/v6) - port, source IP address, destination IP address

• MAC Filter

- URL Content Filtering (v4/v6) – string or domain name detection in URL string
- Remote access control for web base access
- Packet filtering (v4/v6) - port, source IP address, destination IP address, MAC address
- URL content filtering (v4/v6) - string or domain name detection in URL string
- MAC filtering
- Password protection for system management

Quality of Service Control

- Supports the DiffServ approach
- Traffic prioritization and bandwidth management based-on IPv4/IPv6 protocol, port number and address

ATM and PPP Protocols

- ATM Adaptation Layer Type 5 (AAL5)
- Multiple Protocol over ALL5 (RFC 268, formerly RFC 1483)
- Bridged or routed Ethernet encapsulation
- VC and LLC based multiplexing
- PPP over Ethernet (PPPoE)
- PPP over ATM (RFC 2364)
- Classical IP over ATM (RFC 1577)
- MAC Encapsulated Routing (RFC 1483 MER)
- OAM F4 / F5

IPTV Applications*2

- IGMP Snooping and IGMP Proxy
- MLD Snooping and MLD Proxy
- Interface Grouping (VLAN)
- Quality of Service (QoS)
- VLAN MUX support

Wireless LAN

- Compliant with IEEE 802.11 a/ b/ g/ n standards
- 2.4 GHz frequency range
- Up to 600 Mbps wireless operation rate
- 64 / 128 bits WEP supported for encryption
- WPS (Wi-Fi Protected Setup) for easy setup
- Supports WPS v2

- Wireless Security with WPA-PSK / WPA2-PSK support
- Multiple wireless SSIDs with wireless guest access and client isolation
- WDS repeater function support
- Wireless LAN Schedule control

USB Application Server

- 3G/4G LTE dongle support
- Storage: FTP server, Samba server，DLNA
- Printer Server

Virtual Private Network (VPN) (BiPAC 8920NX-600 only)

- 16 IPSec VPN tunnels
- IKE key management
- DES, 3DES and AES encryption for IPSec
- L2TP over IPSec
- Pap/ Chap/ MS-CHAPv2 authentication for PPTP
- IPSec pass-through
- GRE tunnel

Management

- Easy Sign-on (EZSO)
- Web-based GUI for remote and local management (IPv4/IPv6)
- Firmware upgrades and configuration data upload and download via web-based GUI
- Embedded Telnet server for remote and local management
- Supports DHCP server / client / relay
- Supports SNMP v1,v2, MIB-I and MIB-II
- TR-069*1 supports remote management
- Available Syslog
- Mail alert for WAN IP changed
- Auto failover and fallback
- Push Service for diagnostics and debug usage

NOTE:	1. On request for Telco / ISP projects 2. IPTV application may require subscription to IPTV services from a Telco / ISP. 3. Specifications on this datasheet are subject to change without prior notice.

Hardware Specifications

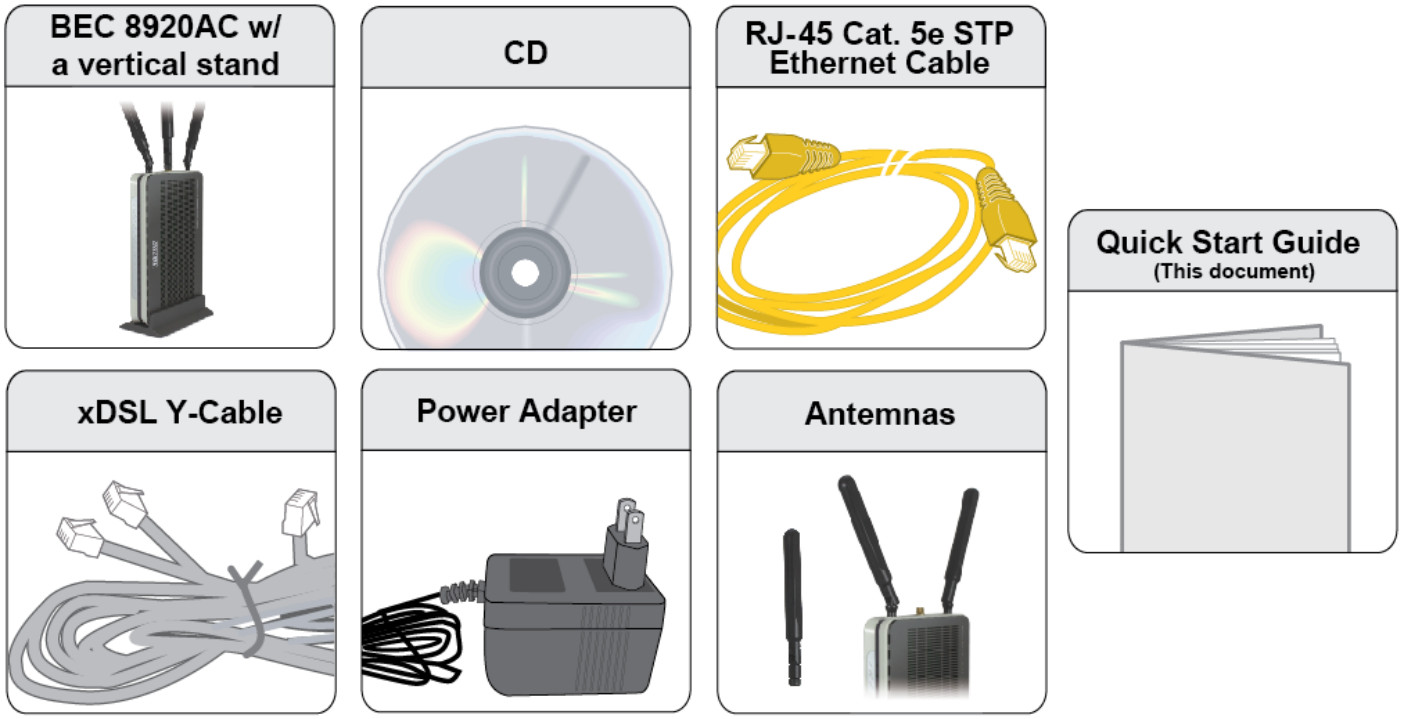
Physical Interface

- WLAN: 5 internal antennas
- DSL: VDSL port
- USB 2.0: 1-port USB 2.0 interface for storage service and printer server, FTP, DLNA and 3G/4G LTE modem
- Ethernet: 5-port 10 / 100 / 1000Mbps auto-crossover (MDI / MDI-X) Switch
- EWAN: 1 Gigabit Ethernet port (port#5) connecting directly to Fiber/ xDSL/ Cable modem, also serving as a Ethernet port#5 when not in EWAN use
- Wireless on/off and WPS push button
- Power jack
- Power switch
- Factory default reset button

Chapter 2: Installing the Router

Package Contents

- ✓ **BiPAC 8920NX(L)-600 Dual Lines VDSL2/ADSL2+ Wireless 600Mbps 3G/4G LTE (VPN) Firewall Router**
- ✓ **This Quick Start Guide**
- ✓ **CD containing User Manual**
- ✓ **RJ-45 Cat. 5e STP Ethernet Cable**
- ✓ **RJ-11 xDSL/ telephone Cable**
- ✓ **Vertical Stand**
- ✓ **Two detachable Wi-Fi Antennas**
- ✓ **Power adaptor**
- ✓ **Splitter/ Micro-filter (Optional)**



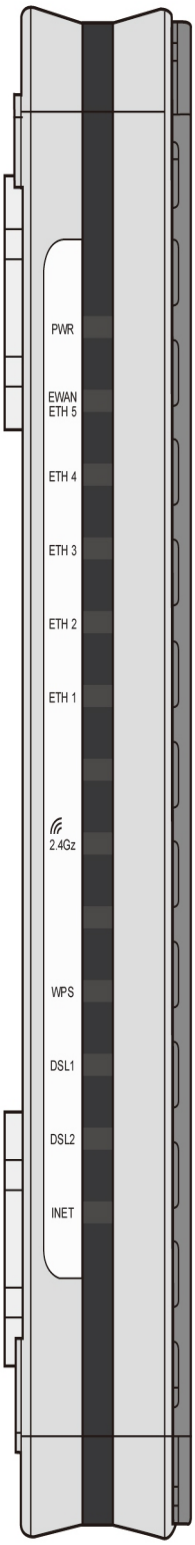
Important note for using this router

 **Warning**	1. Do not use the router in high humidity or high temperatures. 2. Do not use the same power source for the router as other equipment. 3. Do not open or repair the case yourself. If the router is too hot, turn off the power immediately and have it repaired at a qualified service center. 4. Avoid using this product and all accessories outdoors.

 **Attention**	1. Place the router on a stable surface. 2. Only use the power adapter that comes with the package. Using a different voltage rating power adapter may damage the router.

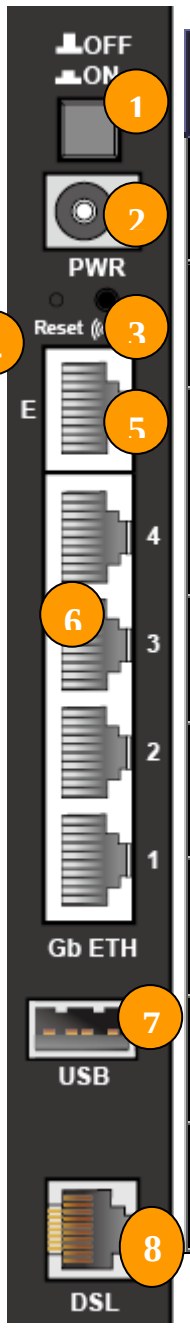
Device Description

The Front LEDs



LED	Status	Meaning
Power	Red	Boot failure or in emergency mode
	Green	System ready
Gigabit Ethernet Port 5/EWAN	Green	Connected to an Gigabit Ethernet device or to a broadband connection device.
	Orange	Connect to an 10/100Mbps Ethernet device
	Blinking	Data being transmitted / received
Gigabit Ethernet Port 1-4	Green	Successfully connected to a 1000Mbos LAN device
	Orange	Successfully connected to a 10/100Mbos LAN device
	Blinking	Data being transmitted / received
USB	Green	USB connection established
Wireless	Green	Wireless connection established
	Blinking	Data being transmitted / received
WPS	Green	Wireless device(s) being connected successfully via WPS mode
	Blinking	WPS configuration being in progress
	Off	WPS is off
DSL 1 /2	Green	Successfully connected to an VDSL DSLAM (Line Synced)
	Green Blinking	VDSL synchronizing or waiting for VDSL synchronizing
	Orange	Successfully connected to an ADSL DSLAM (Line Synced)
	Orange blinking	ADSL synchronizing or waiting for VDSL synchronizing
	Off	DSL cable unplugged
Internet	Green	IP connected and traffic is passing through the device
	Blinking	Data being transmitted / received
	Red	BiPAC 8920NXL-600 fails to obtain and IP.
	Off	BiPAC 8920NXL-600 is either in bridged mode or WAN/DSL connection is not ready

The Rear Ports



Port		Meaning
1	**ON/OFF**	Power ON / OFF switch.
2	**PWR**	Connect the supplied power adapter to this jack.
3	**WPS /Wireless on/off button**	By controlling the pressing time, users can achieve two different effects: **(1) WPS:** Press &hold the button for **less than 6 seconds** to trigger WPS function. **(2) Wireless ON/OFF button**: Press & hold the button for **more than 6 seconds** to On/Off the wireless.
4	**Reset**	Push and hold the reset button for five (5) seconds to restore to its factory default settings (this is used when you cannot login to the router, e.g. forgot your password)
5	**E (Gb EWAN)**	Connect to Fiber/ Cable/ xDSL Modem with a RJ-45 cable, for broadband connectivity. **Note: LAN 5 automatically becomes an EWAN port when EWAN internet interface is being selected in the GUI**
6	**GB LAN Ethernet (1-5)**	Connect PCs, Laptops or any other office/home LAN devices with the supplied RJ-45 Ethernet cable (Cat-5 or Cat-5e) to any of the five LAN ports. **Note: Port 5 is a LAN / WAN Configurable Port.**
7	**USB**	Connect with a 3G or 4G/LTE USB adaptor/dongle for mobile connectivity.
8	**DSL**	Connect the device to an ADSL/VDSL telephone jack or splitter using a RJ-11 telephone cable / Y-Cable for xDSL Dual-lines

Cabling

One of the most common causes of problems is bad cabling or DSL line(s). Make sure that all connected devices are turned on. On the front panel of your router is a bank of LEDs. Verify that the LAN Link and DSL line LEDs are all lit. If they are not, verify if you are using the proper cables. If the error persists, you may have a hardware problem. In this case, you should contact technical support.

Make sure you have a line filter with all devices (e.g. telephones, fax machines, analogue modems) connected to the same telephone line and the wall socket (unless you are using a Central Splitter or Central Filter installed by a qualified and licensed electrician), and ensure that all line filters are correctly installed and the right way around. Missing line filters or line filters installed the wrong way around can cause problems with your DSL connection, including causing frequent disconnections. If you have a back-to-base alarm system you should contact your security provider for a technician to make any necessary changes.

Chapter 3: Basic Installation

The router can be configured through your web browser. A web browser is included as a standard application in the following operating systems: Linux, Mac OS / Windows 10/8/Vista/7/XP, etc. The product provides an easy and user-friendly interface for configuration.

Please check your PC network components. The TCP/IP protocol stack and Ethernet network adapter must be installed. If not, please refer to your Windows-related or other operating system manuals.

There are ways to connect the router, either through an external repeater hub or connect directly to your PCs. However, make sure that your PCs have an Ethernet interface installed properly prior to connecting the router device. You ought to configure your PCs to obtain an IP address through a DHCP server or a fixed IP address that must be in the same subnet as the router. The default IP address of the router is 192.168.1.254 and the subnet mask is 255.255.255.0 (i.e. any attached PC must be in the same subnet, and have an IP address in the range of 192.168.1.1 to 192.168.1.253). The best and easiest way is to configure the PC to get an IP address automatically from the router using DHCP. If you encounter any problem accessing the router web interface it is advisable to uninstall your firewall program on your PCs, as they can cause problems accessing the IP address of the router. Users should make their own decisions on what is best to protect their network.

Please follow the following steps to configure your PC network environment.

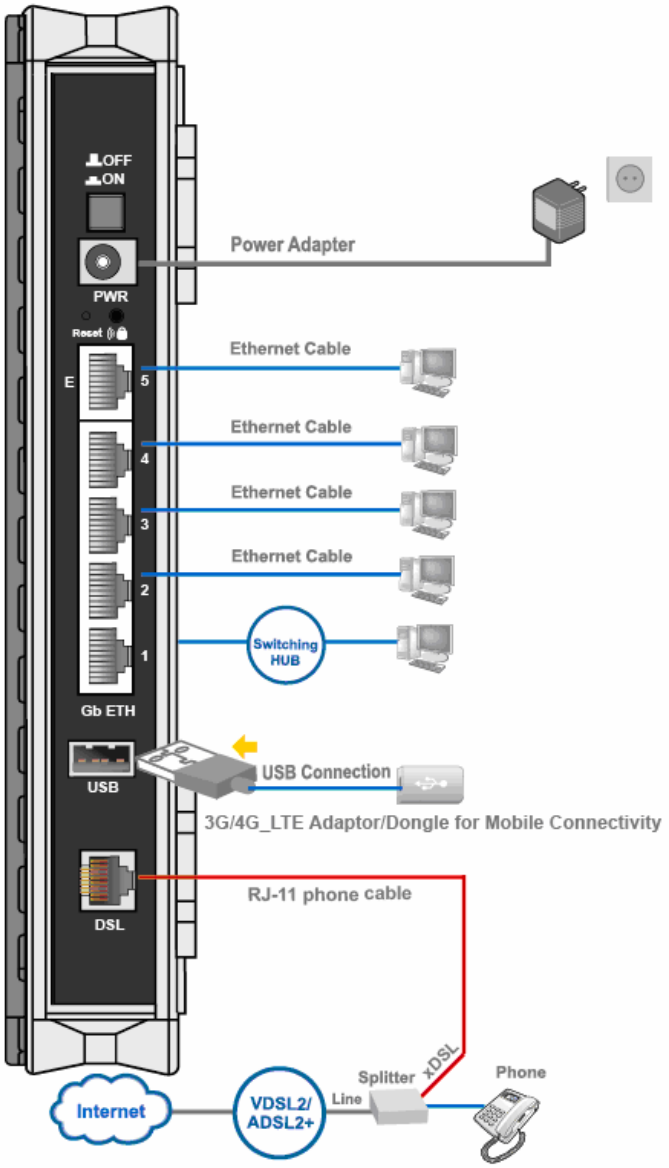
Any TCP/IP capable workstation can be used to communicate with or through this router. To configure other types of workstations, please consult your manufacturer documentation.

Connecting Your Router

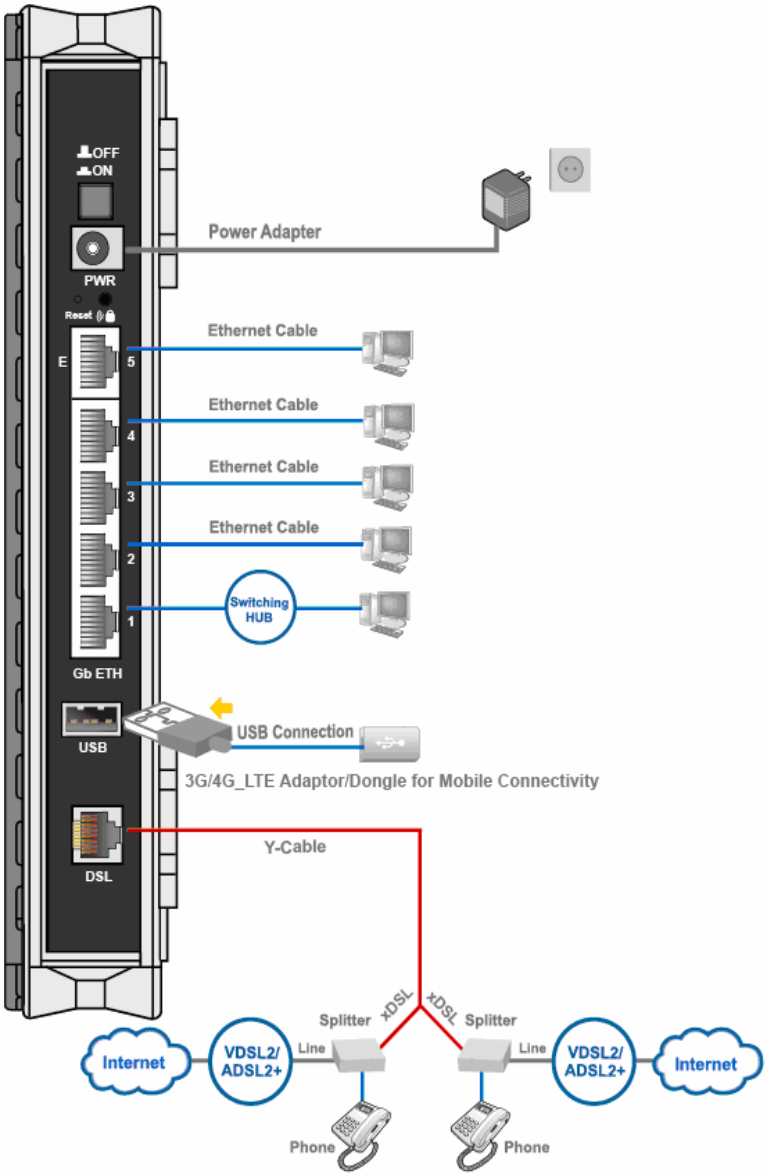
Users can connect the ADSL2+ router as the following.

DSL Router mode:

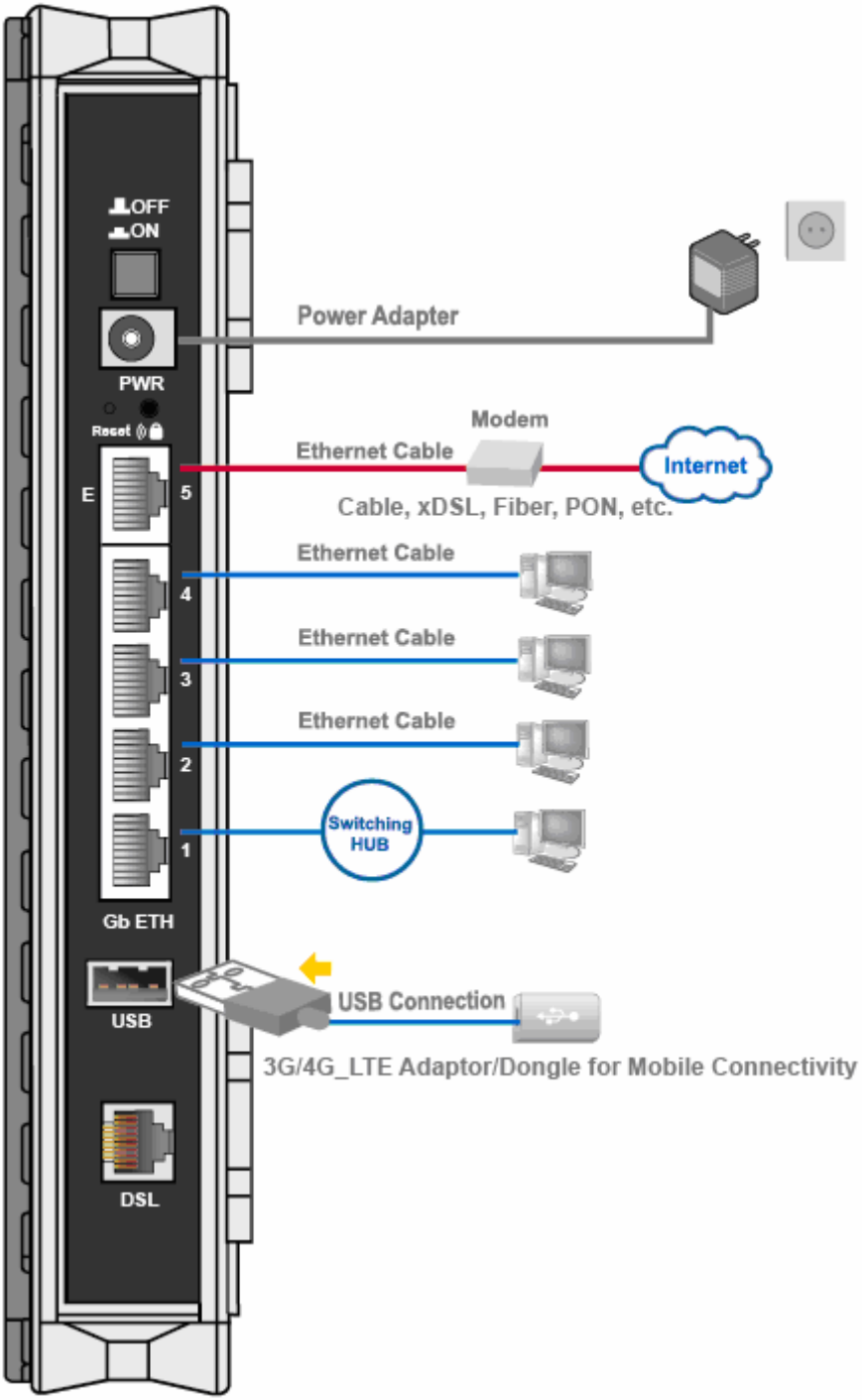
- Single Pair-



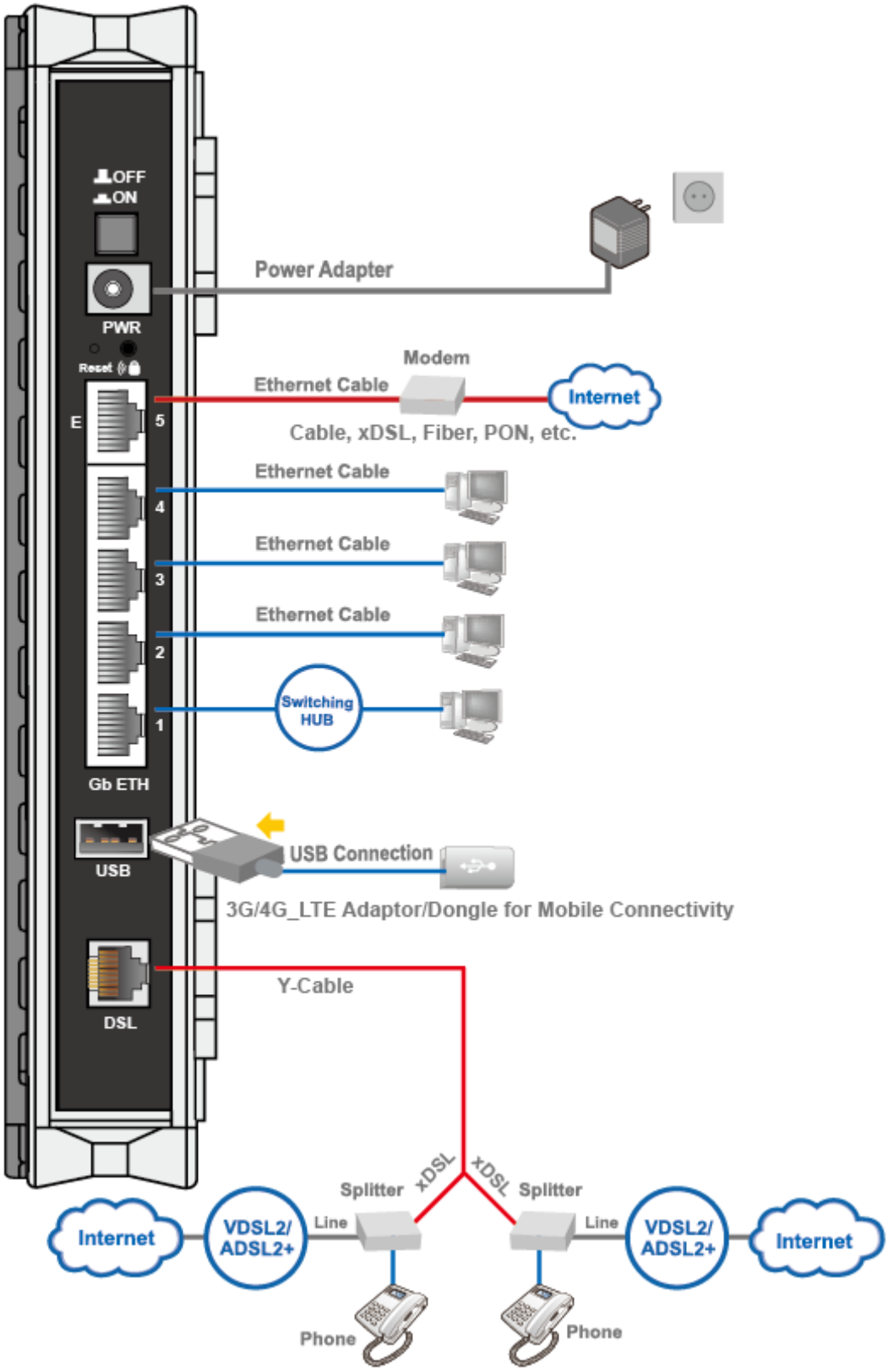
- Two Lines (bonded)



Broadband Connection



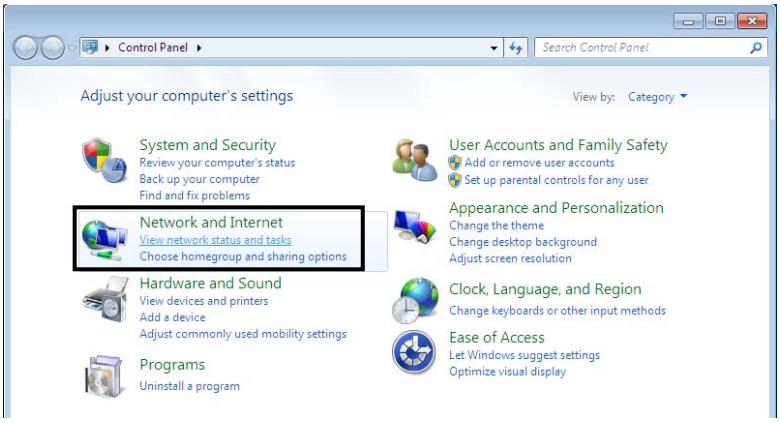
Automatic WAN Failover



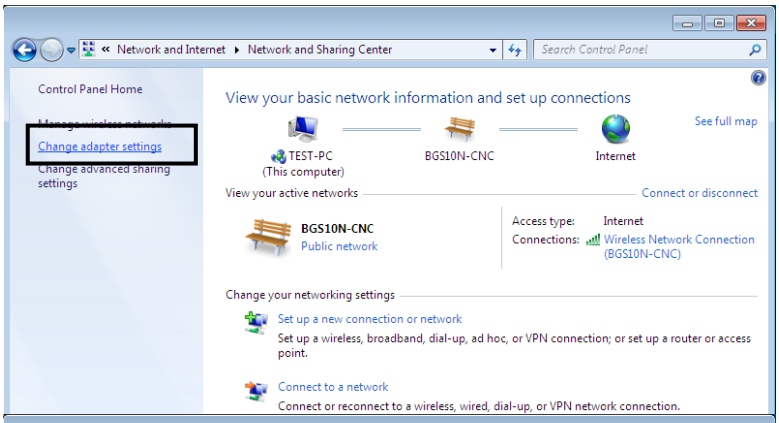
Network Configuration

Configuring a PC in Windows 7/ 8

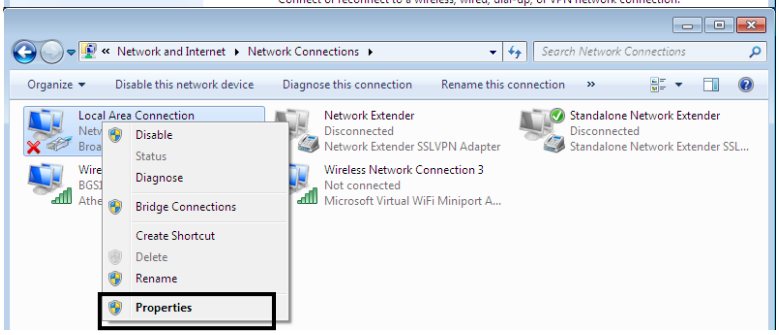
1. Go to **Start**. Click on **Control Panel**.
   Then click on **Network and Internet**.



2. When the **Network and Sharing Center** window pops up, select and click on **Change adapter settings** on the left window panel.

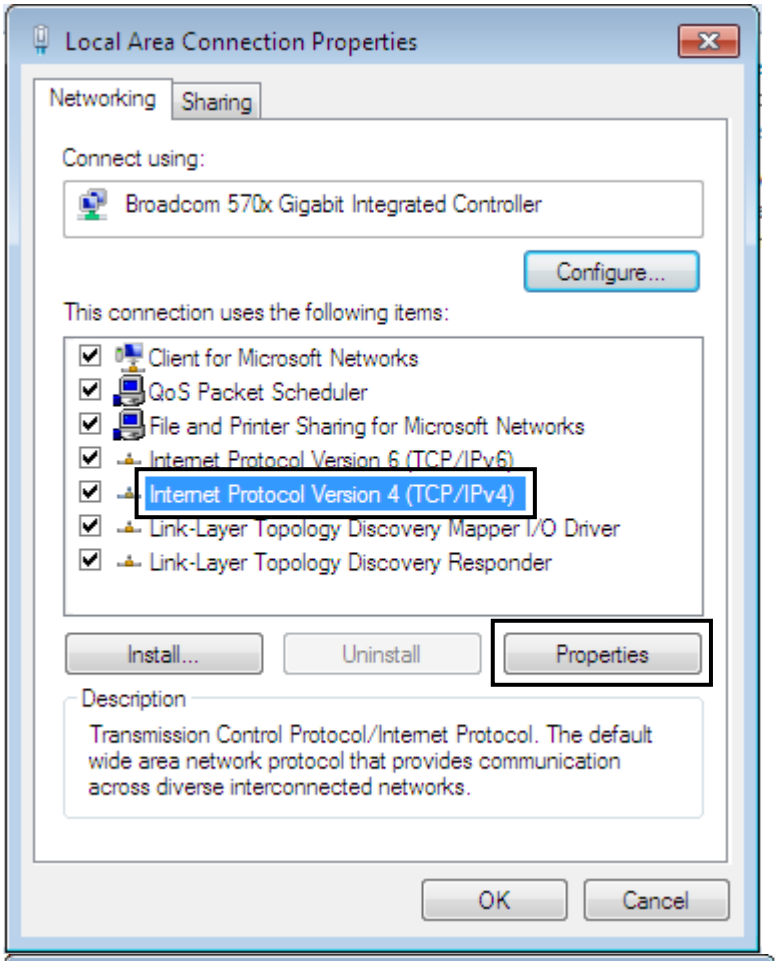


3. Select the **Local Area Connection**, and right click the icon to select **Properties**.



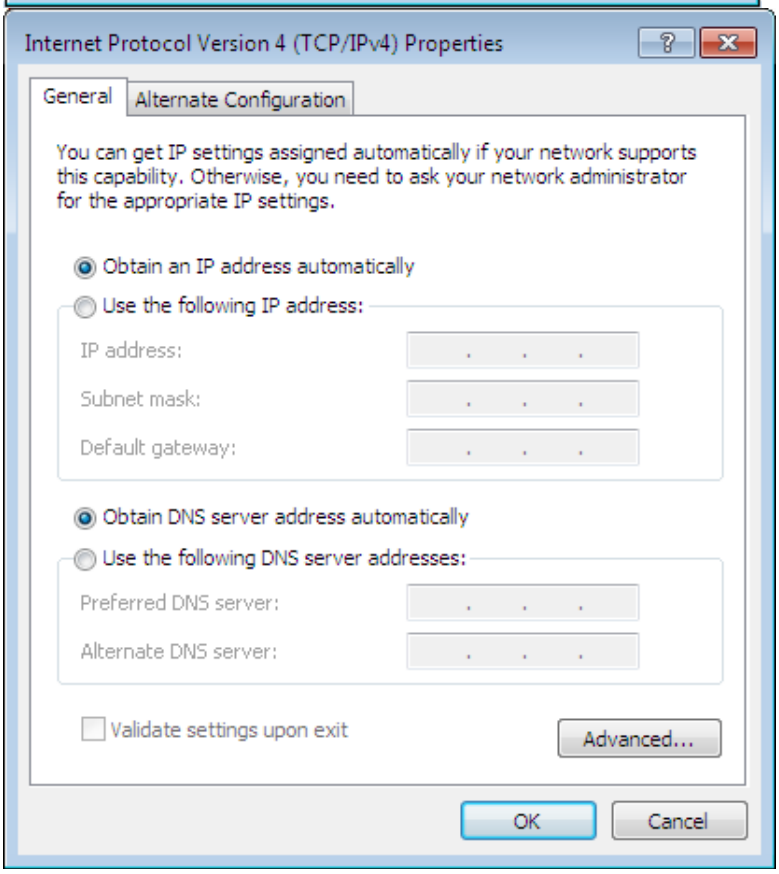
IPv4:

4. Select **Internet Protocol Version 4 (TCP/IPv4)** then click **Properties**



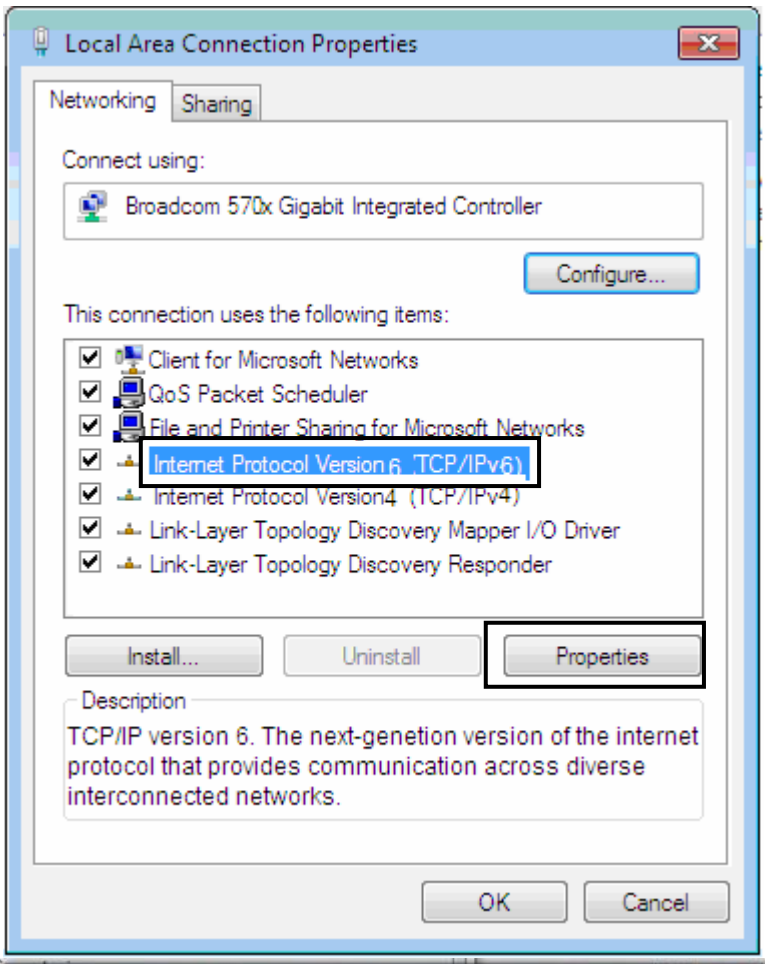
5. In the **TCP/IPv4 properties** window, select the **Obtain an IP address automatically** and **Obtain DNS Server address automatically** radio buttons. Then click **OK** to exit the setting.

6. Click **OK** again in the **Local Area Connection Properties** window to apply the new configuration.



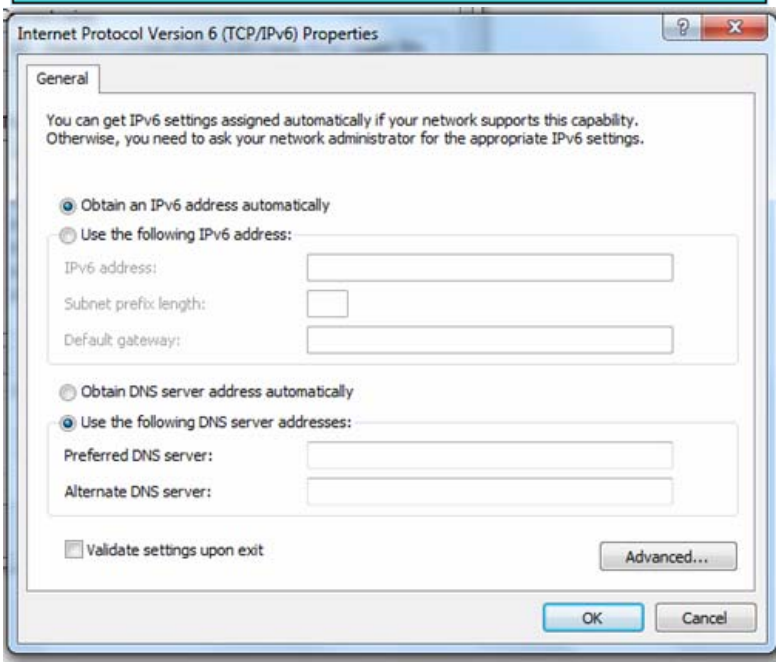
IPv6:

4. Select **Internet Protocol Version 6 (TCP/IPv6)** then click **Properties**



5. In the **TCP/IPv6 properties** window, select the **Obtain an IPv6 address automatically** and **Obtain DNS Server address automatically** radio buttons. Then click **OK** to exit the setting.

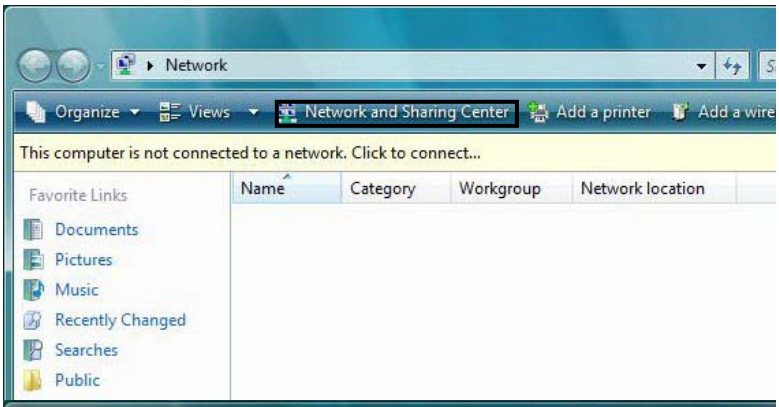
6. Click **OK** again in the **Local Area Connection Properties** window to apply the new configuration.



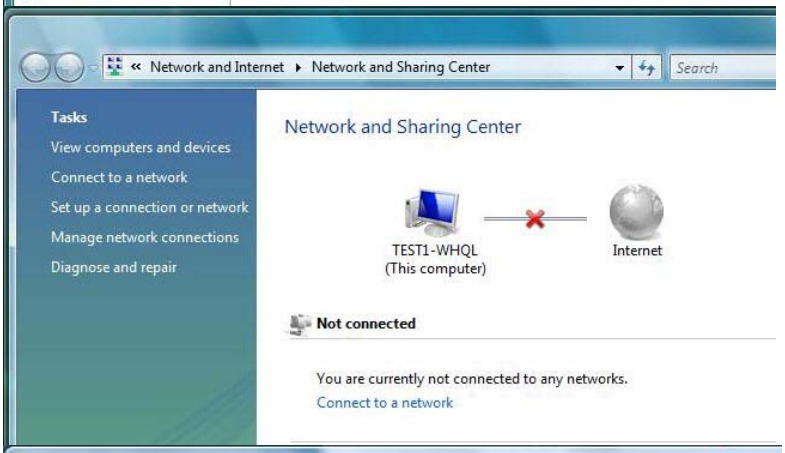
Configuring a PC in Windows Vista

1. Go to **Start**. Click on **Network**.

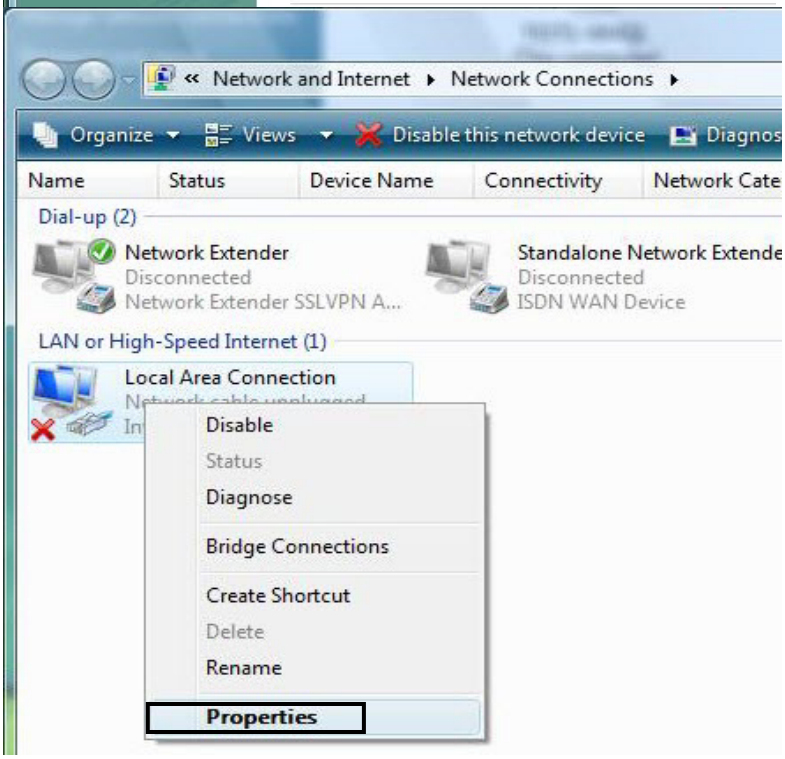
2. Then click on **Network and Sharing Center** at the top bar.



3. When the **Network and Sharing Center** window pops up, select and click on **Manage network connections** on the left window pane.

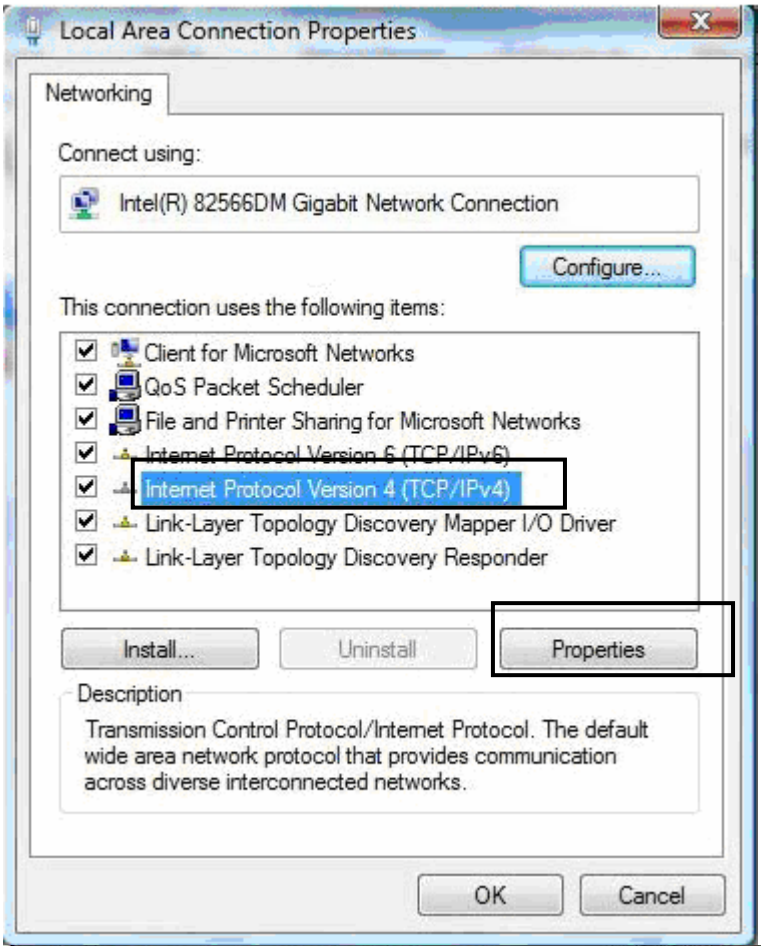


4. Select the **Local Area Connection**, and right click the icon to select **Properties**.



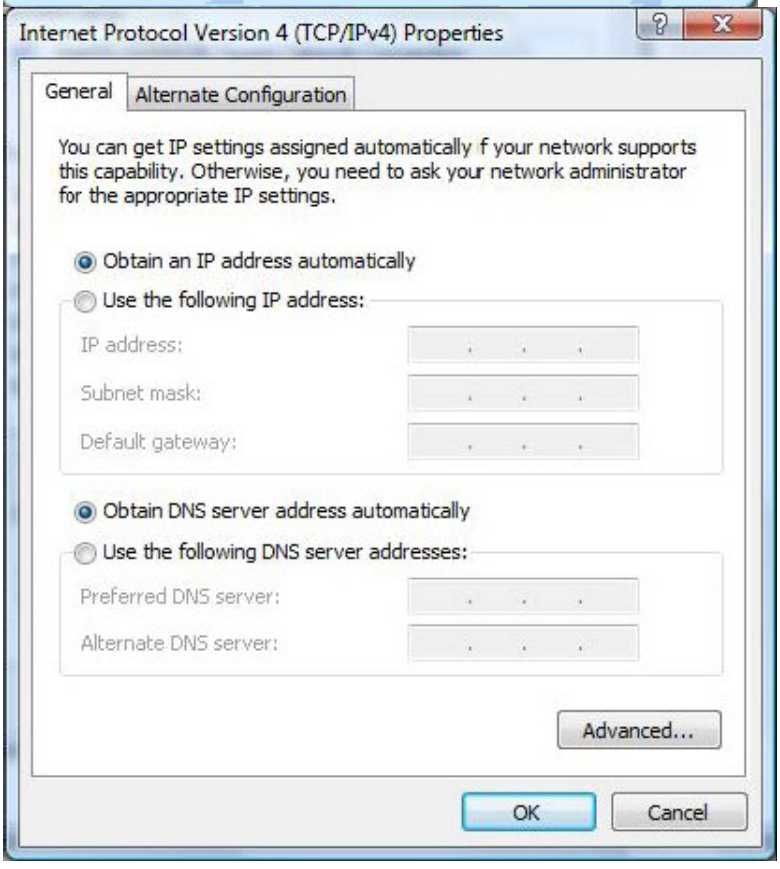
IPv4:

5. Select **Internet Protocol Version 4 (TCP/IPv4)** then click **Properties**.



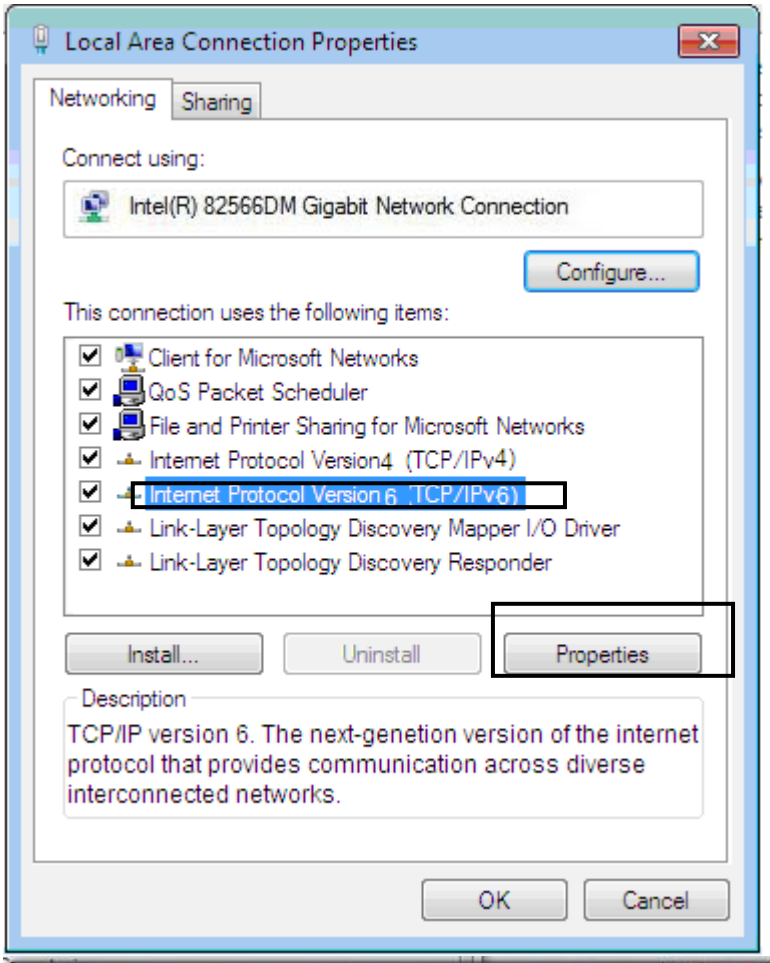
6. In the **TCP/IPv4 properties** window, select the Obtain an **IP address automatically** and **Obtain DNS Server address automatically** radio buttons. Then click **OK** to exit the setting.

7. Click **OK** again in the **Local Area Connection Properties** window to apply the new configuration.



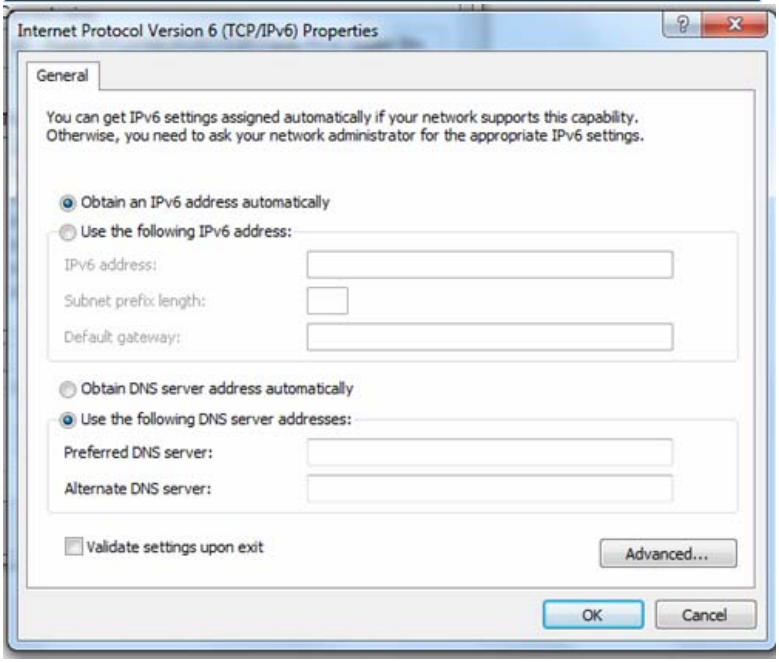
IPv6:

8. Select **Internet Protocol Version 6 (TCP/IPv6)** then click **Properties**.



9. In the **TCP/IPv6 properties** window, select the Obtain an **IPv6 address automatically** and **Obtain DNS Server address automatically** radio buttons. Then click **OK** to exit the setting.

10. Click **OK** again in the **Local Area Connection Properties** window to apply the new configuration.

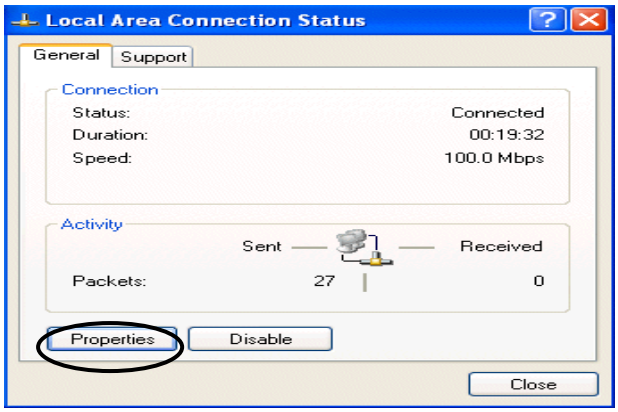


Configuring a PC in Windows XP

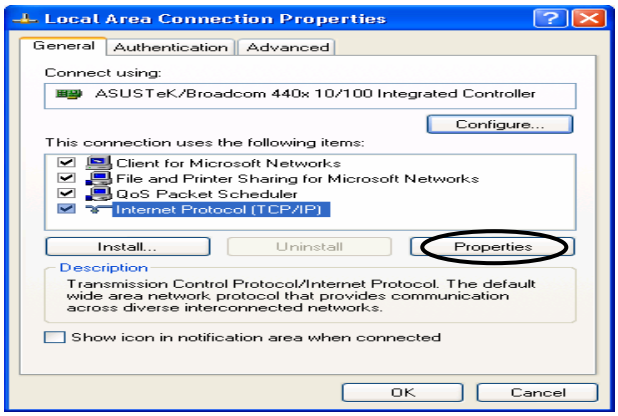
IPv4:

1. Go to **Start / Control Panel (in Classic View)**. In the Control Panel, double-click on **Network Connections**
2. Double-click **Local Area Connection**.

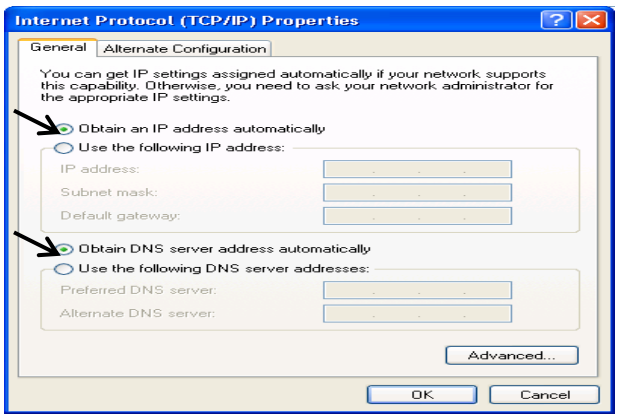
3. In the **Local Area Connection Status** window, click **Properties**.



4. Select **Internet Protocol (TCP/IP)** and click **Properties**.

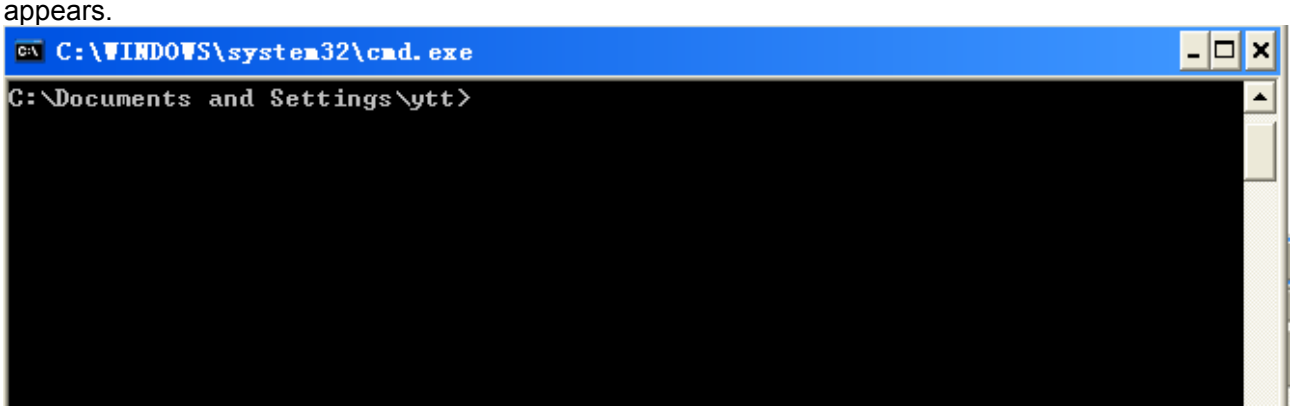


5. Select the **Obtain an IP address automatically** and the **Obtain DNS server address automatically** radio buttons.
6. Click **OK** to finish the configuration.

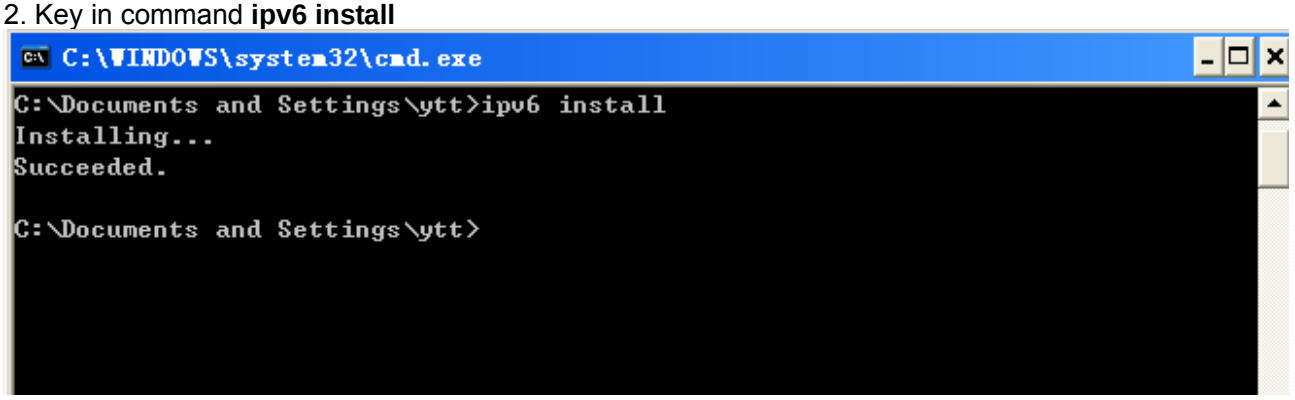


IPv6:

IPv6 is supported by Windows XP, but you should install it first.
Act as shown below:
1. On the desktop, Click Start > Run, type cmd, then press Enter key in the keyboard, the following screen appears.



2. Key in command **ipv6 install**



Configuration is OK now, you can test whether it works ok.

Factory Default Settings

Before configuring your router, you need to know the following default settings.

Web Interface (Username and Password)

Three user levels are provided by this router, namely **Administrator**, **Remote** and **Local** respectively. See Access Control .

Administrator

- Username: admin
- Password: admin

Local

- Username: user
- Password: user

Remote

- Username: support
- Password: support

 Attention	If you have forgotten the username and/or password of the router, you can restore the device to its default setting by pressing the ***Reset Button*** more than ***5*** seconds.

Device LAN IPv4 settings

- IPv4 Address: 192.168.1.254
- Subnet Mask: 255.255.255.0

Device LAN IPv6 settings

- IPv6 Address / prefix: Default is a link-local address and is different from each other as MAC address is different from one to one. For example: fe80:0000:0000:0000:0204:edff:fe01:0001 / 64, the prefix initiates by fe80::

DHCP server for IPv4

- DHCP server is enabled.
- Start IP Address: 192.168.1.254
- IP pool counts: 100

LAN and WAN Port Addresses

The parameters of LAN and WAN ports are pre-set in the factory. The default values are shown in the table.

IPv4

LAN Port		WAN Port
IPv4 address	192.168.1.254	The PPPoE function is enabled to automatically get the WAN port configuration from the ISP.
Subnet Mask	255.255.255.0	
DHCP server function	Enabled	
IP addresses for distribution to PCs	100 IP addresses continuing from 192.168.1.100 through 192.168.1.199	

IPv6

LAN Port		WAN Port
IPv6 address/prefix	Default is a link-local address and is different from each other as MAC address is different from one to one. For example : fe80::204:edff:fe01:1/64, the prefix initiates by fe80::	The PPPoE function is enabled to automatically get the WAN port configuration from the ISP.
DHCP server function	Enabled	

Information from your ISP

Before configuring this device, you have to check with your ISP (Internet Service Provider) to find out what kind of service is provided.

Gather the information as illustrated in the following table and keep it for reference.

PPPoE(RFC2516)	VPI/VCI, VC / LLC-based multiplexing, Username, Password, Service Name, and Domain Name System (DNS) IP address (it can be automatically assigned by your ISP when you connect or be set manually).
PPPoA(RFC2364)	VPI/VCI, VC / LLC-based multiplexing, Username, Password and Domain Name System (DNS) IP address (it can be automatically assigned by your ISP when you connect or be set manually).
DHCP Client	VPI/VCI, VC / LLC-based multiplexing, Domain Name System (DNS) IP address (it can be automatically assigned by your ISP when you connect or be set manually).
IPoA(RFC1577)	VPI/VCI, VC / LLC-based multiplexing, IP address, Subnet mask, Gateway address, and Domain Name System (DNS) IP address (it is a fixed IP address).
Pure Bridge	VPI/VCI, VC / LLC-based multiplexing to use Bridged Mode.

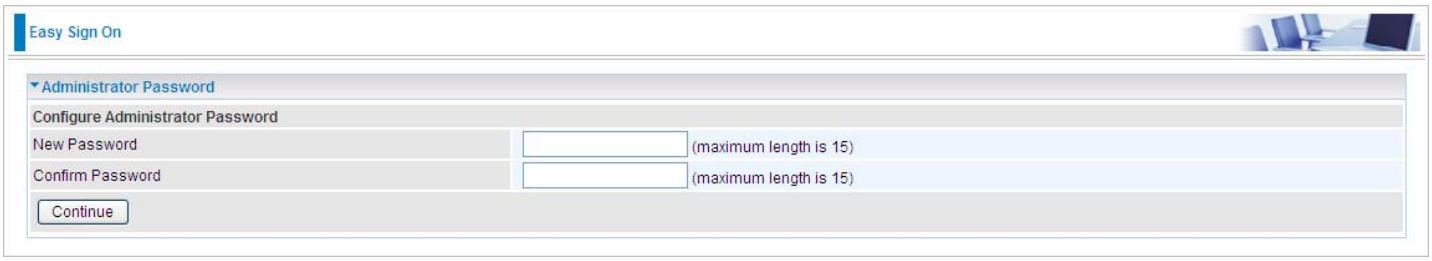
Easy Sign On (EZSO)

This special feature makes it easier for you to configure your router so that you can connect to the internet in a matter of seconds without having to logon to the router GUI for any detail configuration. This configuration method is usually auto initiated if user is to connect to the internet via Billion's router for the first time.

After setting up the router with all the appropriate cables plugged-in, open up your IE browser, the EZSO WEB GUI will automatically pop up and request that you enter some basic information that you have obtained from your ISP. By following the instructions given carefully and through the information you provide, the router will be configured in no time and you will find yourself surfing the internet sooner than you realize.

EZSO window pops up:

Step1: Set the administration password.



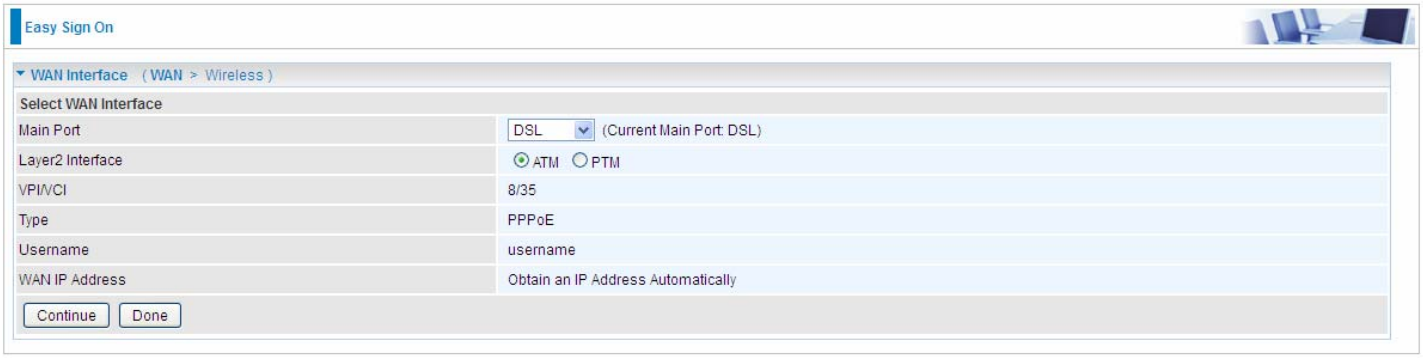
Step 2: Set the Time Zone.

Step 3: Configure the WAN interface.

DSL mode (ADSL mode, please choose ATM; VDSL, please choose PTM)

Here take ADSL for example.

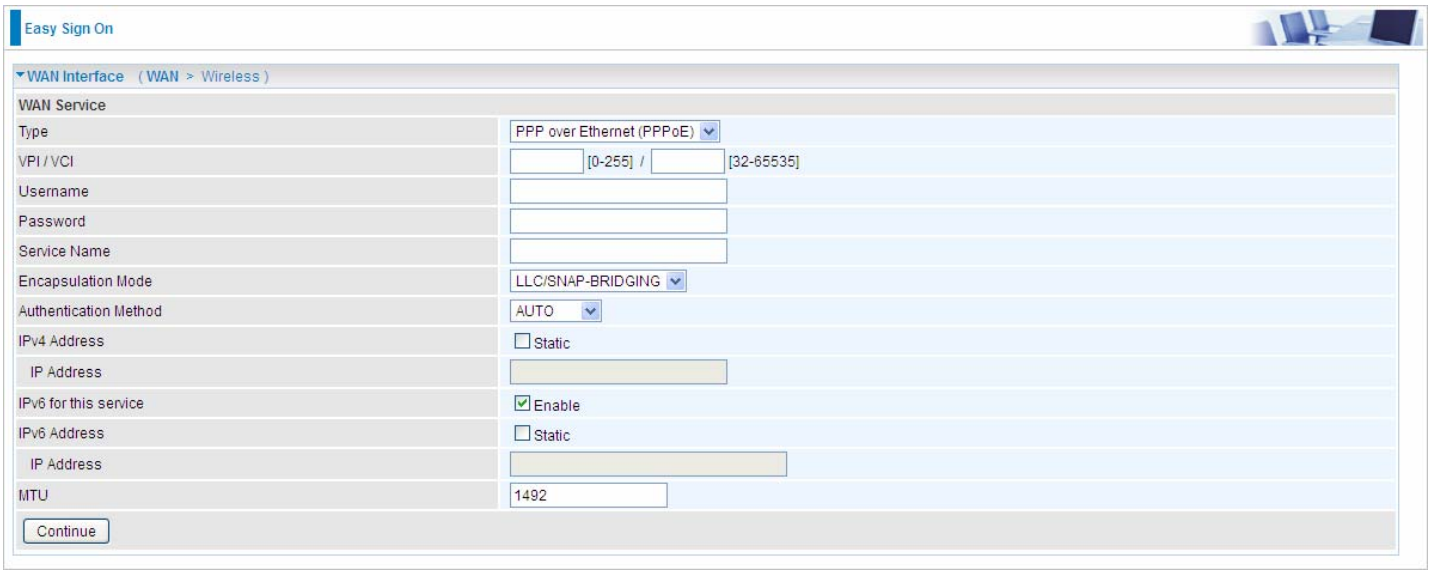
Before configuring with DSL mode, please confirm you have correctly connected the DSL line, and it is now synchronized.



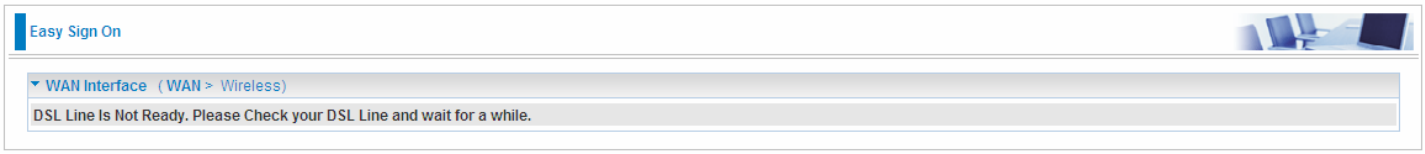
Select DSL, press **Continue** to go on to next step, press “Done” to quit the setting.

1. Enter the username, password from your ISP, for IP and DNS settings; also refer to your ISP.

Here IPv6 service is enabled by default.

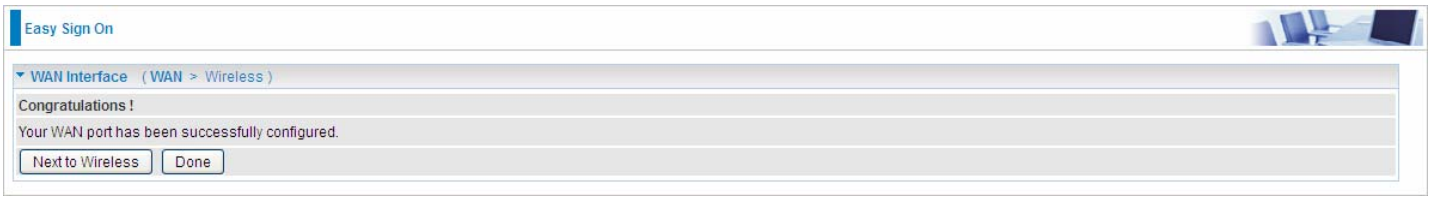


If the DSL line doesn't synchronize, the page will pop up warning of the DSL connection failure.

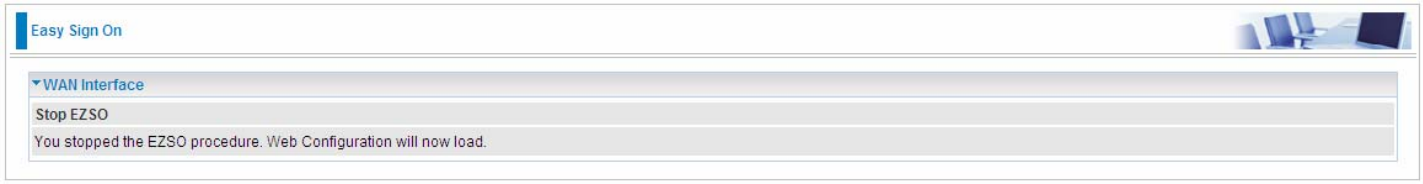


3. Wait while the device is configured (DSL synchronized).

4. WAN port configuration is success and next to wireless, if you want skip wireless setting, click **Done**.

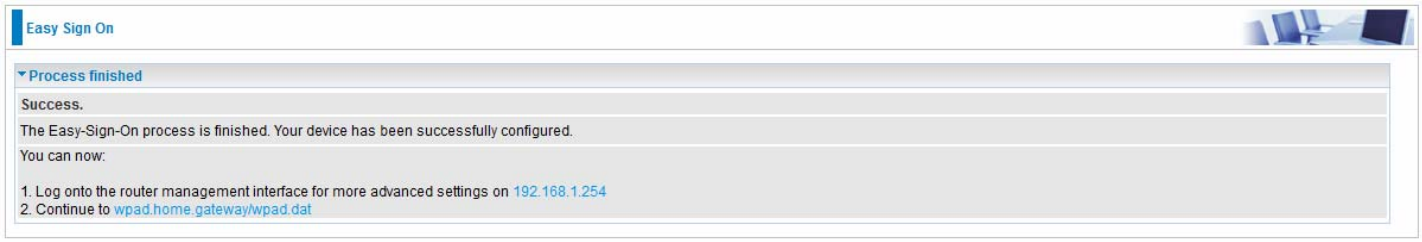


Click **Done**, web configuration will be loaded, you will enter the web configuration page.



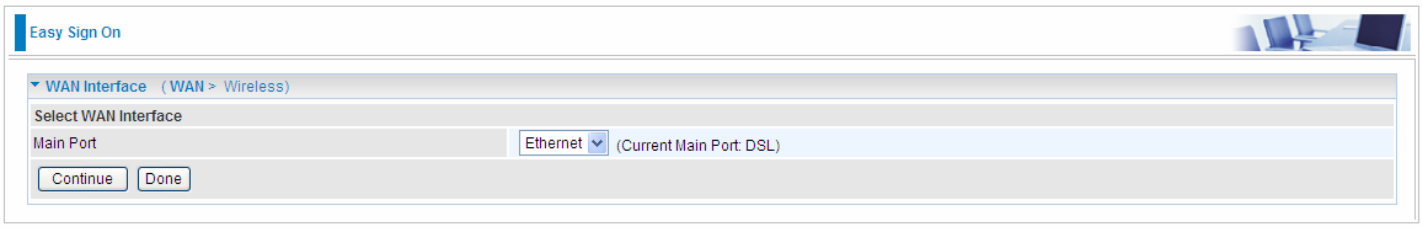
5. After the configuration is successful, click **Next to Wireless** button and you may proceed to configure the Wireless setting. Enable the wireless and set the SSID and encryption Key. (1. Leave it empty to disable the wireless security; 2. Fill in the Key, and the encryption mode will be WPA2-PSK/AES).

6. Success in configuring the EZSO.

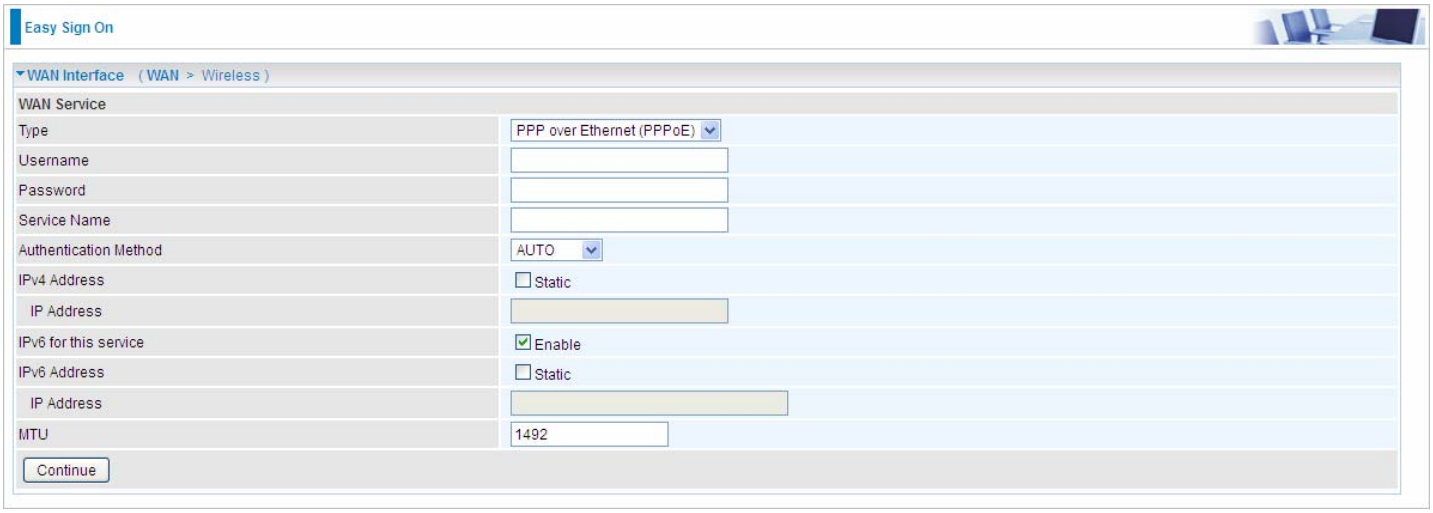


Ethernet mode

1. Select **Ethernet,** press **Continue** to go on to next step.

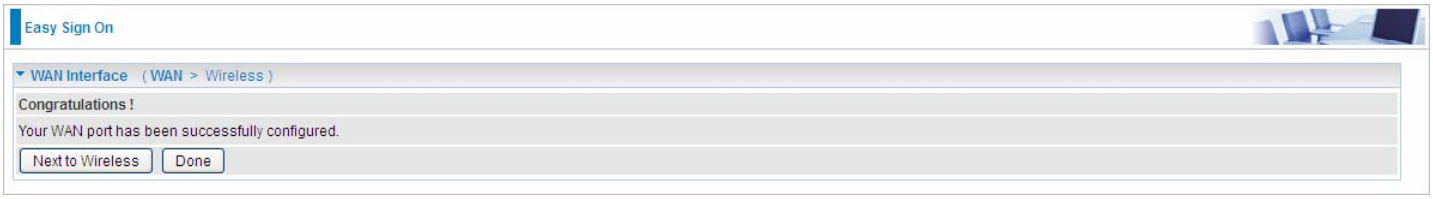


2. Enter the username, password from your ISP, for IP and DNS settings, also refer to your ISP. Here IPv6 service is enabled by default.



3. Wait while the device is configured.

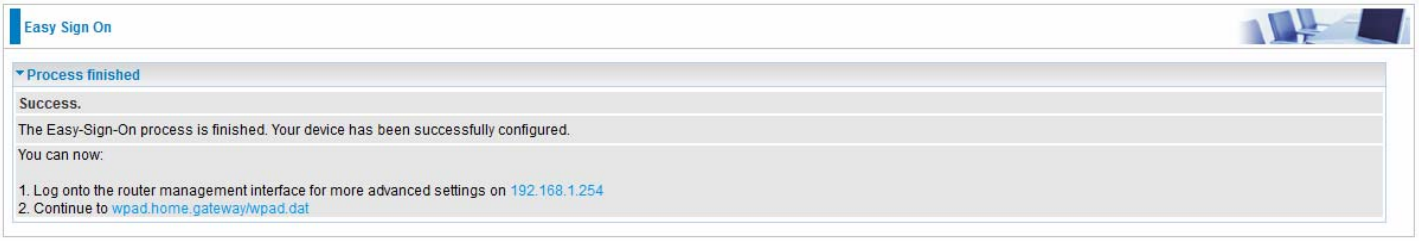
4. WAN port configuration is success.



Click **Done**, web configuration will be loaded, you will enter the web configuration page.

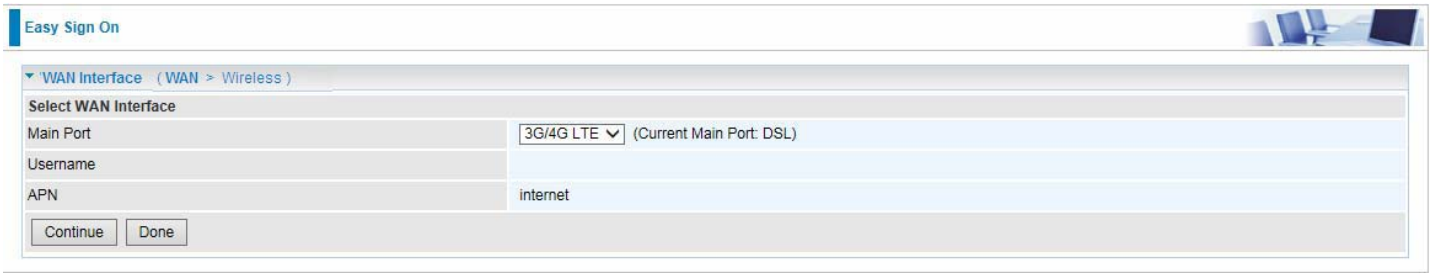
5. After the configuration is successful, click **Next to Wireless** button and you may proceed to configure the Wireless setting. Enable wireless and set the SSID and encryption Key (1. Leave it empty to disable the wireless security; 2. Fill in the Key, and the encryption mode will be WPA2-PSK/AES).

6. Success in configuring the EZSO.

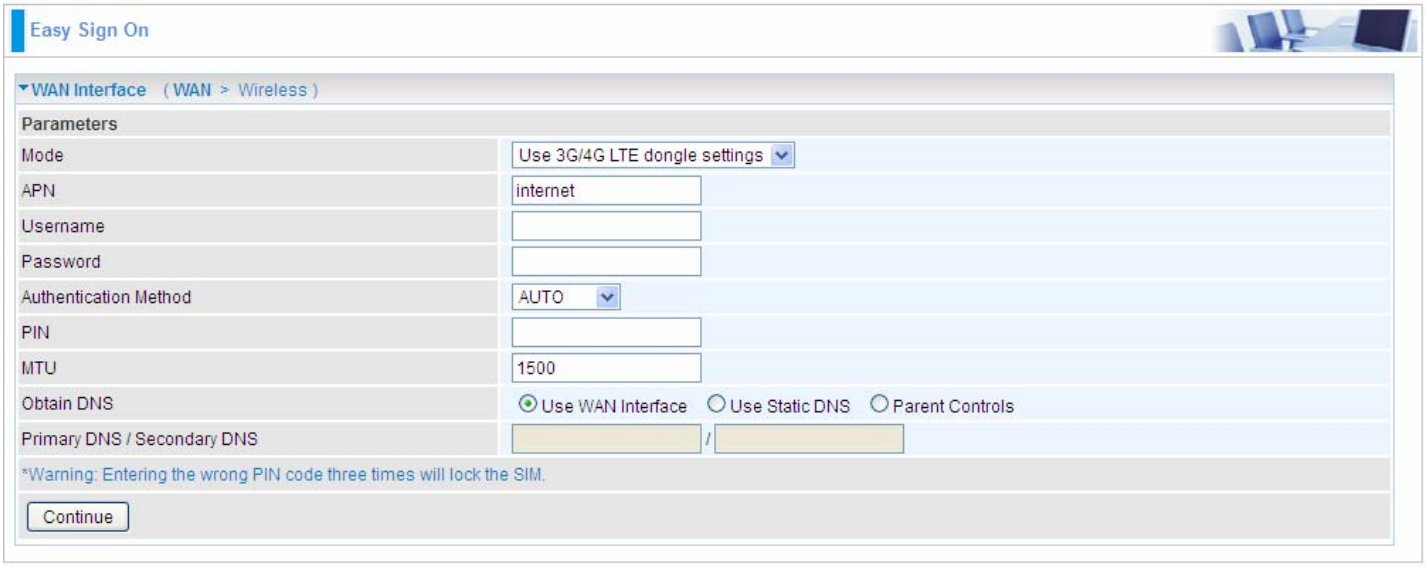


3G/4G LTE

1. Select **3G/4G LTE,** press **Continue** to go on to next step.

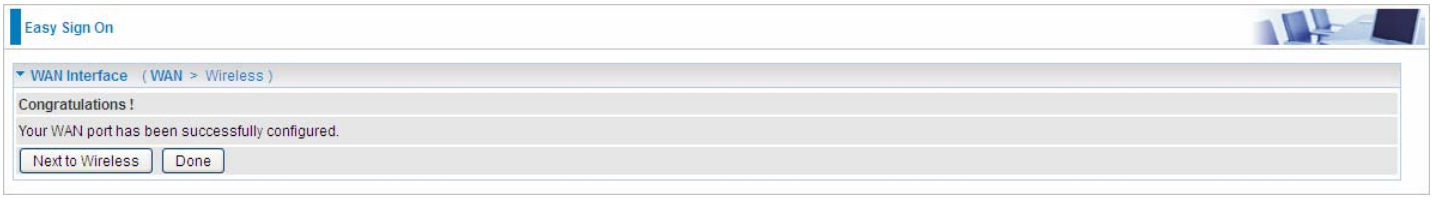


2. Enter the APN, username, password from your ISP, for settings about Authentication method, PIN, etc, also refer to your ISP.

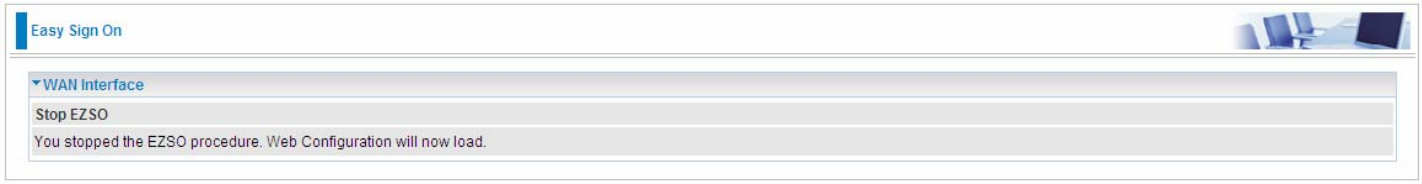


3. Wait while the device is configured.

4. WAN port configuration is success.



Click **Done**, web configuration will be loaded, you will enter the web configuration page.



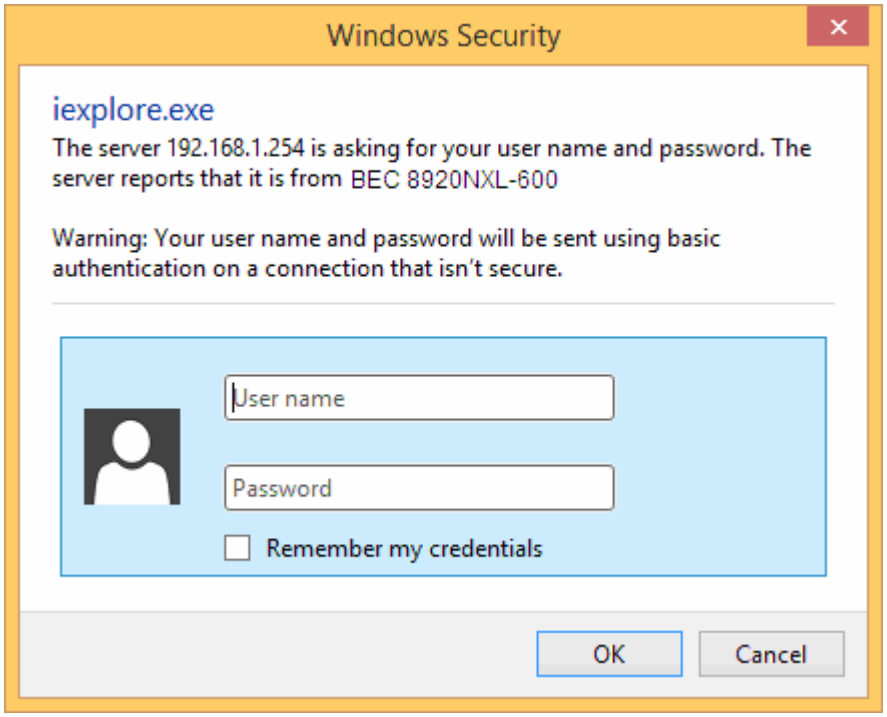
5. After the configuration is successful, click **Next to Wireless** button and you may proceed to configure the Wireless setting. Enable wireless and set the SSID and encryption Key (1. Leave it empty to disable the wireless security; 2. Fill in the Key, and the encryption mode will be WPA2-PSK/AES).

6. Success in configuring the EZSO.

Chapter 4: Configuration

Configuration via Web Interface

Open your web browser; enter the IP address of your router, which by default is 192.168.1.254, and click  or press ‘Enter’ key on the keyboard, a login prompt window will appear. The default root username and password are “admin” and “admin” respectively.



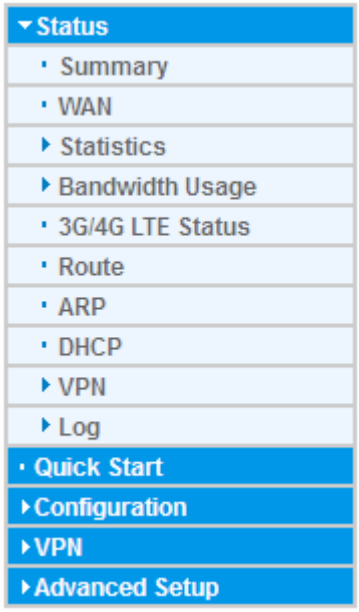
Congratulations! You are now successfully logged in to the VDSL2+ Router!

Once you have logged on to your BiPAC 8920NXL-600 Router via your web browser, you can begin to set it up according to your requirements. On the configuration homepage, the left navigation pane links you directly to the setup pages, which include:

- **Status** (Summary, WAN, Statistics, Bandwidth Usage, 3G/4G LTE Status, Route, ARP, DHCP, Log,)
- **Quick Start** (Quick Start)
- **Configuration** (LAN, Wireless, WAN, System, USB, IP Tunnel, Security, Quality of Service, NAT, Wake On LAN)
- **Advanced Setup** (Routing, DNS, Static ARP, UPnP, Certificate, Multicast, Management, Diagnostics)

Status

This Section gives users an easy access to the information about the working router and access to view the current status of the router. Here **Summary**, **WAN**, **Statistics**, **Bandwidth Usage**, **3G/4G LTE Status**, **Route**, **ARP**, **DHCP ,** and **Log** subsections are included.



Summary

The basic information about the device is provided here (the following is a configured screenshots to let users understand clearly).

Device Information

Model Name: Displays the model name.

Host Name: Displays the name of the router.

System Up-Time: Displays the elapsed time since the device is on.

Date/Time: Displays the current exact date and time. Sync button is to synchronize the Date/Time with your PC time without regard to connecting to internet or not.

Software Version: Firmware version.

LAN IPv4 Address: Displays the LAN IPv4 address.

LAN IPv6 Address: Displays the LAN IPv6 address. Default is a Link-Local address, but when connects to ISP, it will display the Global Address, like above figure.

MAC Address: Displays the MAC address.

DSL PHY and Driver Version: Display DSL PHY and Driver version.

Wireless Driver Version: Displays wireless driver version.

WAN

Line Rate – Upstream (Kbps): Displays Upstream line Rate in Kbps.

Line Rate – Downstream (Kbps): Displays Downstream line Rate in Kbps.

Default Gateway/IPv4 Address: Display Default Gateway and the IPv4 address.

Connection Time: Displays the elapsed time since ADSL connection is up.

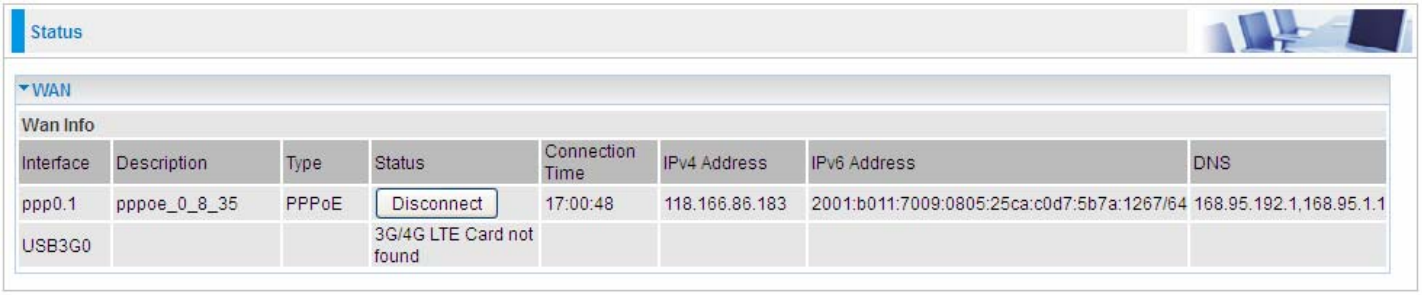
Primary DNS Server: Displays IPV4 address of Primary DNS Server.

Secondary DNS Server: Displays IPV4 address of Secondary DNS Server.

Default IPv6 Gateway/IPv6 Address: Display the IPv6 Gateway and the obtained IPv6 address.

WAN

This table displays the information of the WAN connections, users can turn here for WAN connection information.



Interface: The WAN connection interface.

Description: The description of this connection.

Type: The protocol used by this connection.

Status: To disconnect or connect the link.

Connection Time: The WAN connection time since WAN is up.

IPv4 Address: The WAN IPv4 Address the device obtained.

IPv6 Address: The WAN IPv6 Address the device obtained.

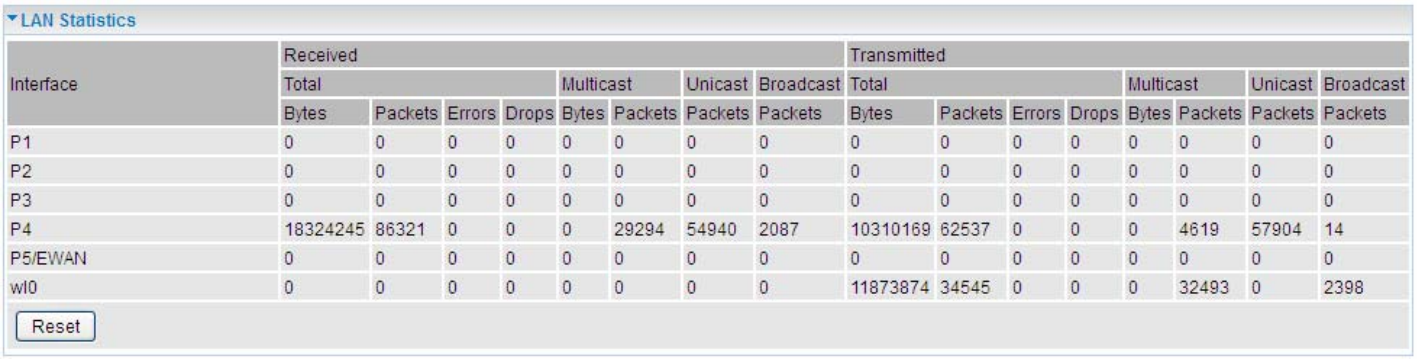
DNS: The DNS address the device obtained.

Statistics

LAN

The table shows the statistics of LAN.

Note: P5 can be configured as EWAN, and when the device is in EWAN profile, there is no P5/EWAN interface as P5 is working as a WAN port.

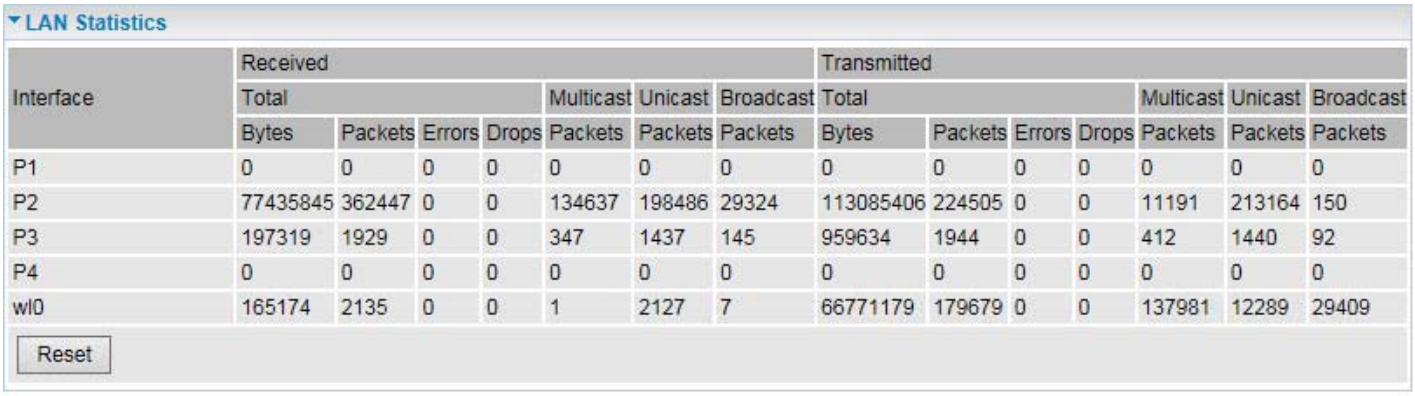


LAN Statistics

Interface	Received								Transmitted							
	Total				Multicast		Unicast	Broadcast	Total				Multicast		Unicast	Broadcast
	Bytes	Packets	Errors	Drops	Bytes	Packets	Packets	Packets	Bytes	Packets	Errors	Drops	Bytes	Packets	Packets	Packets
P1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P4	18324245	86321	0	0	0	29294	54940	2087	10310169	62537	0	0	0	4619	57904	14
P5/EWAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
wl0	0	0	0	0	0	0	0	0	11873874	34545	0	0	0	32493	0	2398

Reset

(DSL)



LAN Statistics

Interface	Received							Transmitted						
	Total				Multicast	Unicast	Broadcast	Total				Multicast	Unicast	Broadcast
	Bytes	Packets	Errors	Drops	Packets	Packets	Packets	Bytes	Packets	Errors	Drops	Packets	Packets	Packets
P1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P2	77435845	362447	0	0	134637	198486	29324	113085406	224505	0	0	11191	213164	150
P3	197319	1929	0	0	347	1437	145	959634	1944	0	0	412	1440	92
P4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
wl0	165174	2135	0	0	1	2127	7	66771179	179679	0	0	137981	12289	29409

Reset

(EWAN)

Interface: List each LAN interface. P1-P5 indicates the LAN interfaces (P5 can be configured as EWAN).

Bytes: Display the total Received and Transmitted traffic statistics in Bytes for each interface.

Packets: Display the total Received and Transmitted traffic statistics in Packets for each interface.

Errors: Display the total statistics of errors arising in Receiving or Transmitting data for each interface.

Drops: Display the total statistics of drops arising in Receiving or Transmitting data for each interface.

Multicast (packets): Display the Received and Transmitted multicast Packets for each interface.

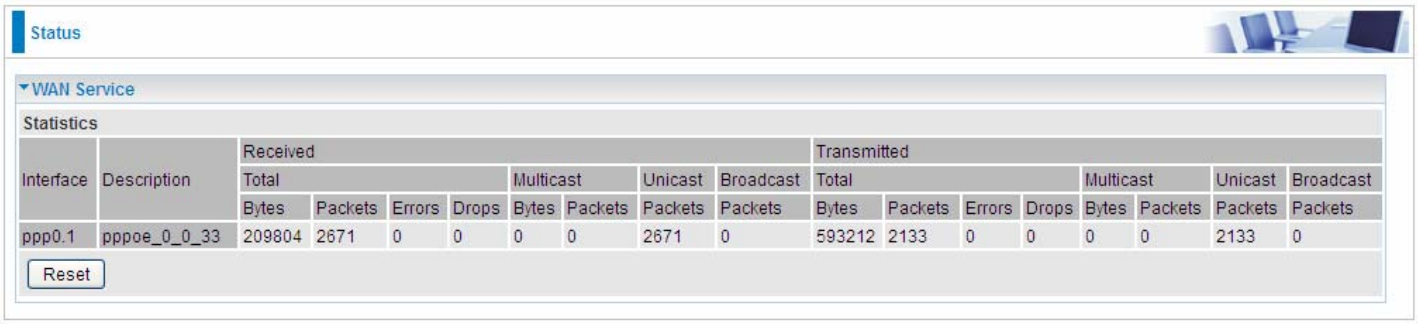
Unicast (packets): Display the Received and Transmitted unicast Packets for each interface.

Broadcast (packets): Display the Received and Transmitted broadcast Packets for each interface.

Reset: Press this button to refresh the statistics.

WAN Service

The table shows the statistics of WAN.



Interface: Display the connection interface.

Description: The description for the connection.

Bytes: Display the Received and Transmitted traffic statistics in Bytes for every WAN interface.

Packets: Display the Received and Transmitted traffic statistics in Packests for every WAN interface.

Errors: Display the statistics of errors arising in Receiving or Transmitting data for every WAN interface.

Drops: Display the statistics of drops arising in Receiving or Transmitting data for every WAN interface.

Multicast (packets): Display the Received and Transmitted multicast Packets for every WAN interface.

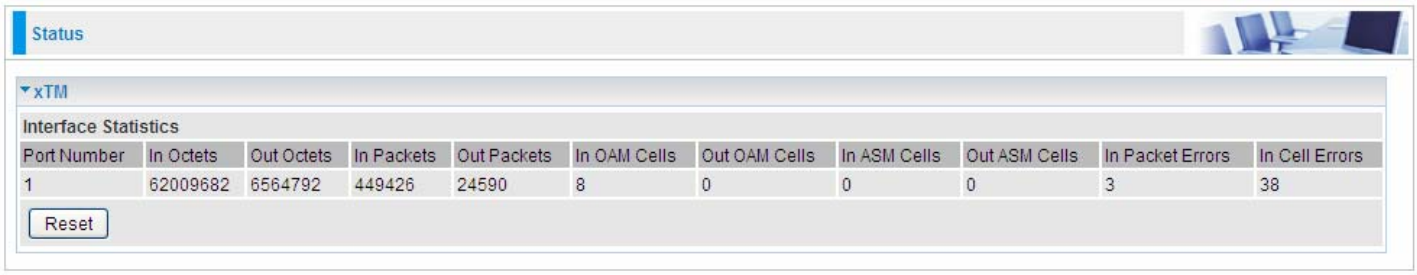
Unicast (packets): Display the Received and Transmitted unicast Packets for every WAN interface.

Broadcast (packets): Display the Received and Transmitted broadcast Packets for every WAN interface.

Reset: Press this button to refresh the statistics.

xTM

The Statistics-xTM screen displays all the xTM statistics



Port Number: Shows number of the port for xTM.

In Octets: Number of received octets over the interface.

Out Octets: Number of transmitted octets over the interface.

In Packets: Number of received packets over the interface.

Out Packets: Number of transmitted packets over the interface.

In OAM Cells: Number of OAM cells received.

Out OAM Cells: Number of OAM cells transmitted.

In ASM Cells: Number of ASM cells received.

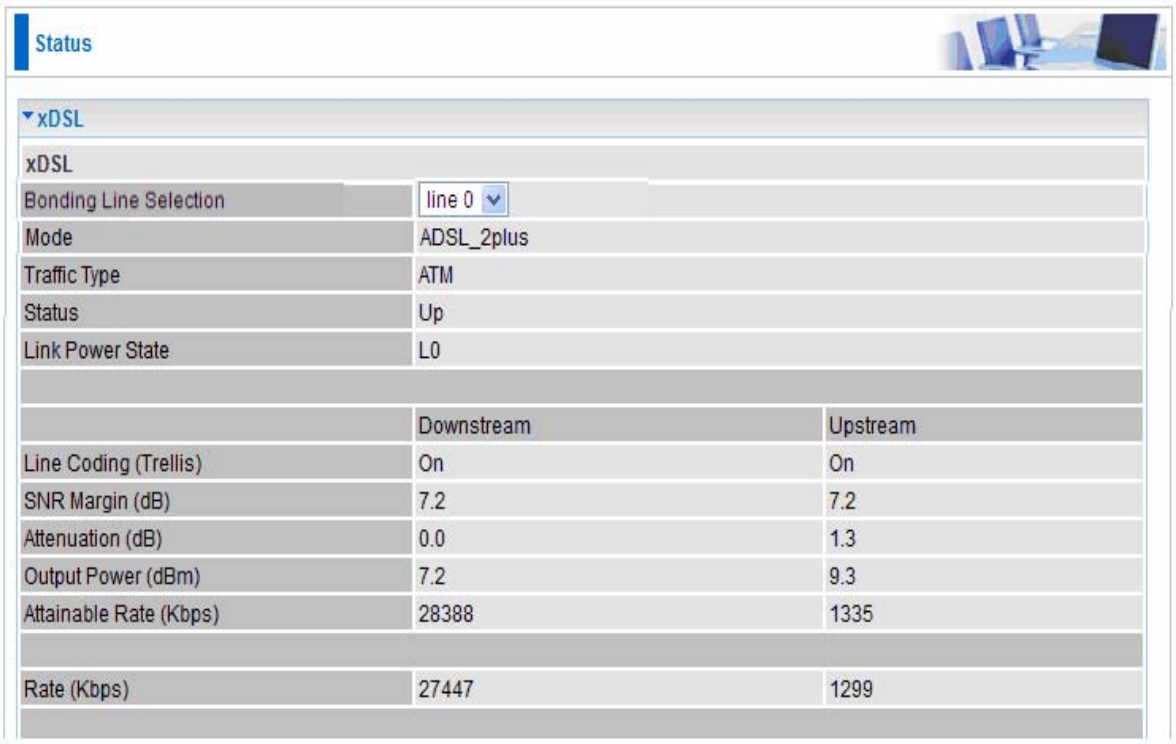
Out ASM Cells: Number of ASM cells transmitted.

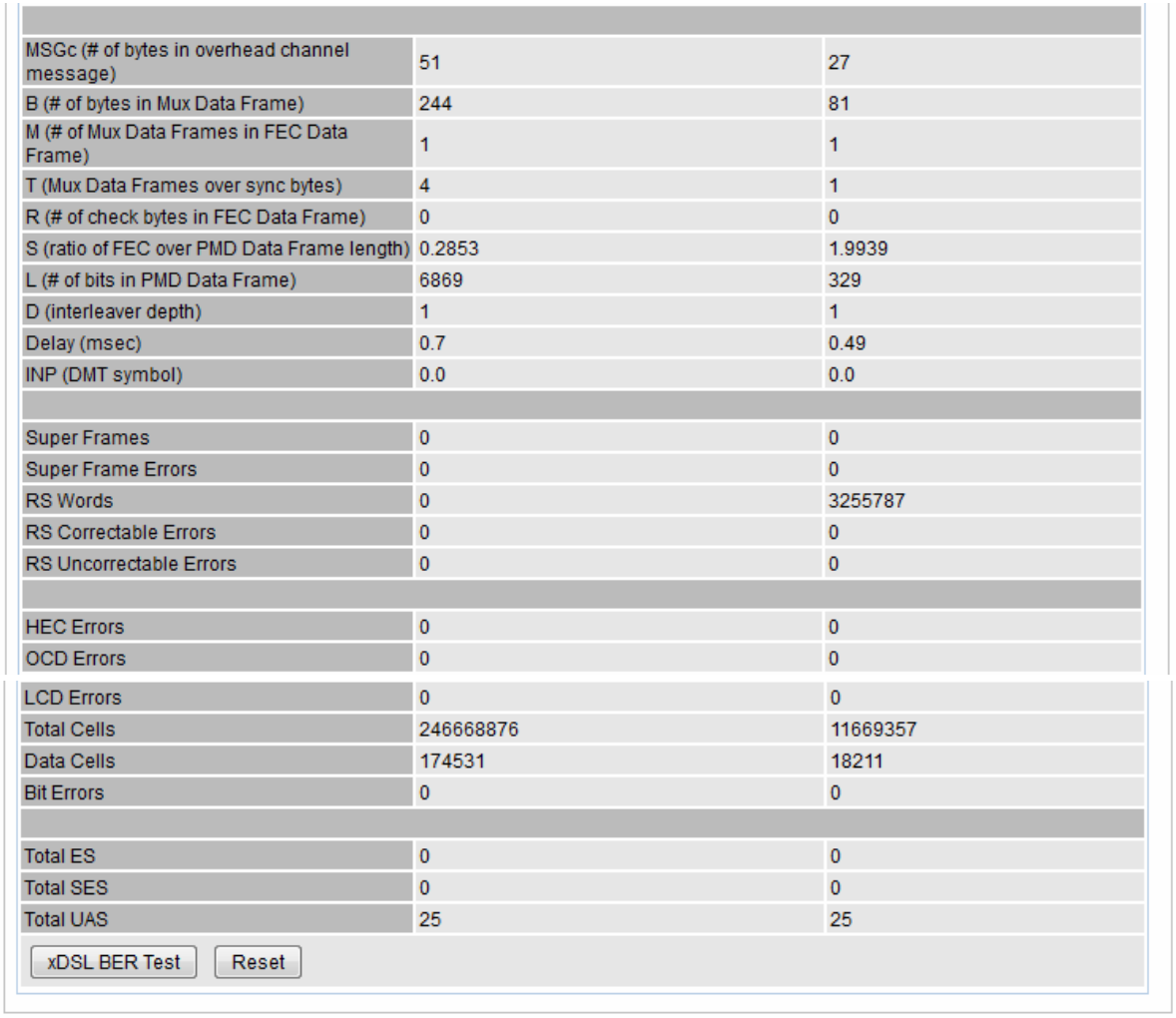
In Packet Errors: Number of received packets with errors.

In Cell Errors: Number of received cells with errors.

Reset: Click to reset the statistics.

xDSL





MSGc (# of bytes in overhead channel message)	51	27
B (# of bytes in Mux Data Frame)	244	81
M (# of Mux Data Frames in FEC Data Frame)	1	1
T (Mux Data Frames over sync bytes)	4	1
R (# of check bytes in FEC Data Frame)	0	0
S (ratio of FEC over PMD Data Frame length)	0.2853	1.9939
L (# of bits in PMD Data Frame)	6869	329
D (interleaver depth)	1	1
Delay (msec)	0.7	0.49
INP (DMT symbol)	0.0	0.0
Super Frames	0	0
Super Frame Errors	0	0
RS Words	0	3255787
RS Correctable Errors	0	0
RS Uncorrectable Errors	0	0
HEC Errors	0	0
OCD Errors	0	0
LCD Errors	0	0
Total Cells	246668876	11669357
Data Cells	174531	18211
Bit Errors	0	0
Total ES	0	0
Total SES	0	0
Total UAS	25	25

xDSL BER Test Reset

Mode: Modulation protocol, including G.dmt, G.lite, T1.413, ADSL2, AnnexL, ADSL2+ and AnnexM.

Traffic Type: Transfer mode, here supports ATM and PTM.

Status: Show the status of DSL link.

Link Power State: Show link output power state.

Line Coding (Trellis): Trellis on/off.

SNR Margin (dB): Show the Signal to Noise Ratio(SNR) margin.

Attenuation (dB): This is estimate of average loop attenuation of signal.

Output Power (dBm): Show the output power.

Attainable Rate (Kbps): The sync rate you would obtain.

Rate (Kbps): Show the downstream and upstream rate in Kbps.

MSGc (#of bytes in overhead channel message): The number of bytes in overhead channel message.

B (# of bytes in Mux Data Frame): The number of bytes in Mux Data frame.

M (# of Mux Data Frames in FEC Data Frame): The number of Mux Data frames in FEC frame.

T (Mux Data Frames over sync bytes): The number of Mux Data frames over all the sync bytes.

R (# of check bytes in FEC Data Frame): The number of check bytes in FEC frame.

S (ratio of FEC over PMD Data Frame length): The ratio of FEC over PMD Data frame length

L (# of bits in PMD Data Frame): The number of bit in PMD Data frame

D (interleaver depth): Show the interleaver depth.

Delay (msec): Show the delay time in msec.

INP (DMT symbol): Show the DMT symbol.

Super Frames: The total number of super frames.

Super Frame Errors: the total number of super frame errors.

RS Words: Total number of Reed-Solomon code errors.

RS Correctable Errors: Total number of RS with correctable errors.

RS Uncorrectable Errors: Total number of RS words with uncorrectable errors.

HEC Errors: Total number of Header Error Checksum errors.

OCD Errors: Total number of out-of-cell Delineation errors.

LCD Errors: Total number of Loss of Cell Delineation.

Total Cells: Total number of cells.

Data Cells: Total number of data cells.

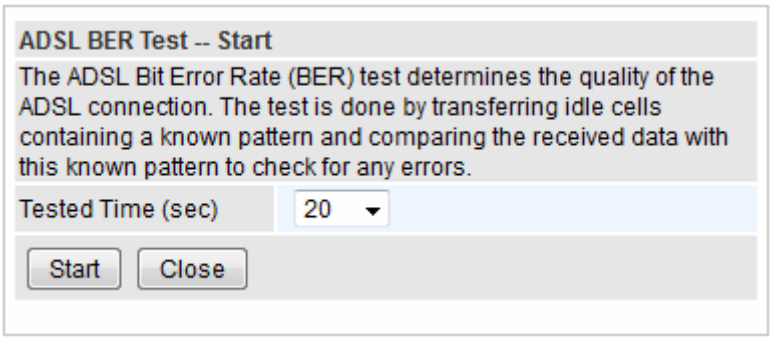
Bit Errors: Total number of bit errors.

Total ES: Total Number of Errored Seconds.

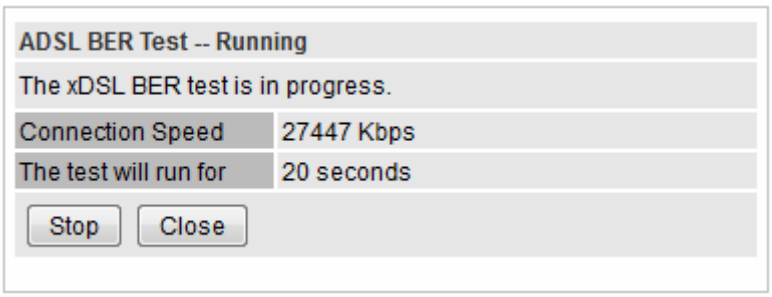
Total SES: Total Number of Severely Errored Seconds.

Total UAS: Total Number of Unavailable Seconds.

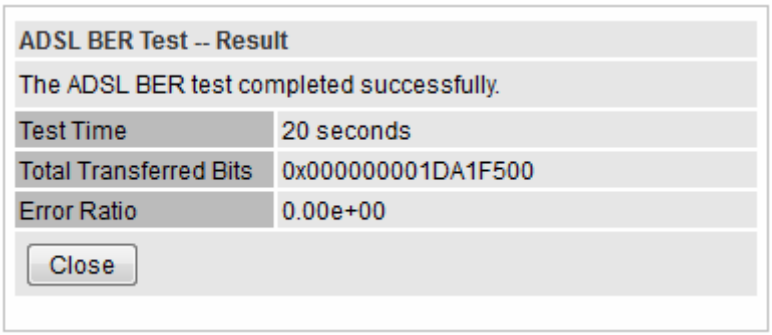
xDSL BER Test: Click this button to start a bit Error Rate Test. The ADSL Bit Error Rate (BER) test determines the quality of the ADSL connection. The test is done by transferring idle cells containing a known pattern and comparing the received data with this known pattern to check for any errors.



Select the Tested Time(sec), press **Start** to start test.



When it is OK, the following test result window will appear. You can view the quality of ADSL connection. Here the connection is OK.



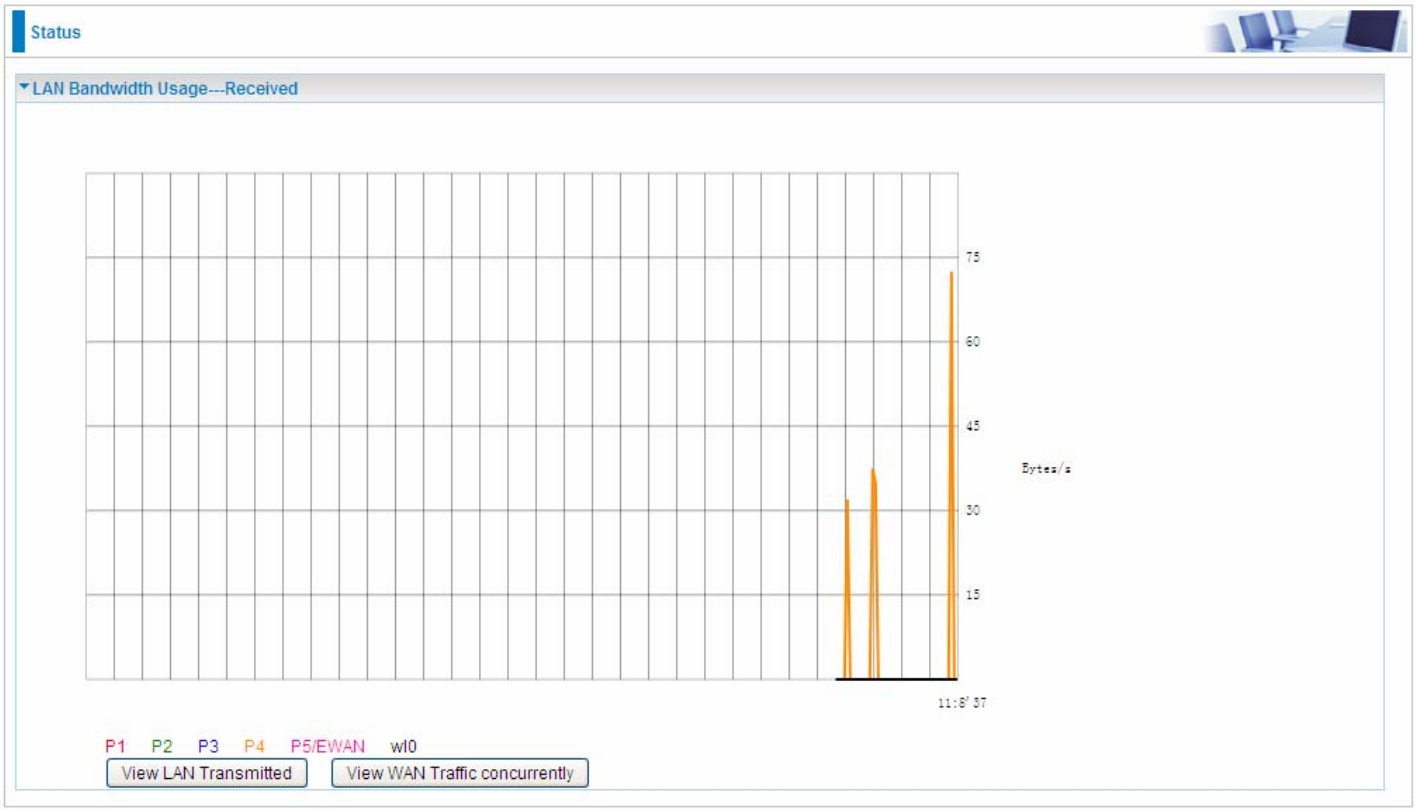
Reset: Click this button to reset the statistics.

Bandwidth Usage

Bandwidth Usage provides users direct view of bandwidth usage with simple diagram. Bandwidth usage shows the use of the bandwidth from two angles: Transmitted and Received, giving users a clear idea of the usage.

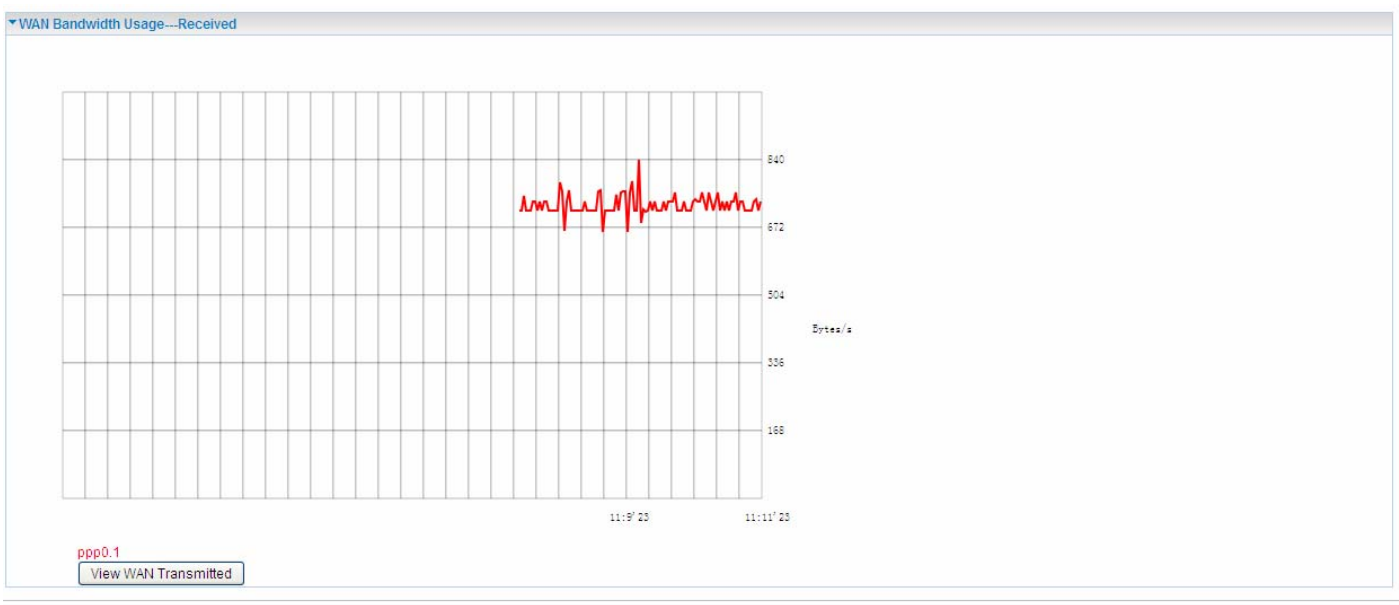
LAN

Note: P5 can be configured as EWAN, and when the device is in EWAN profile, there is no P5/EWAN interface as P5 is working as a WAN port.

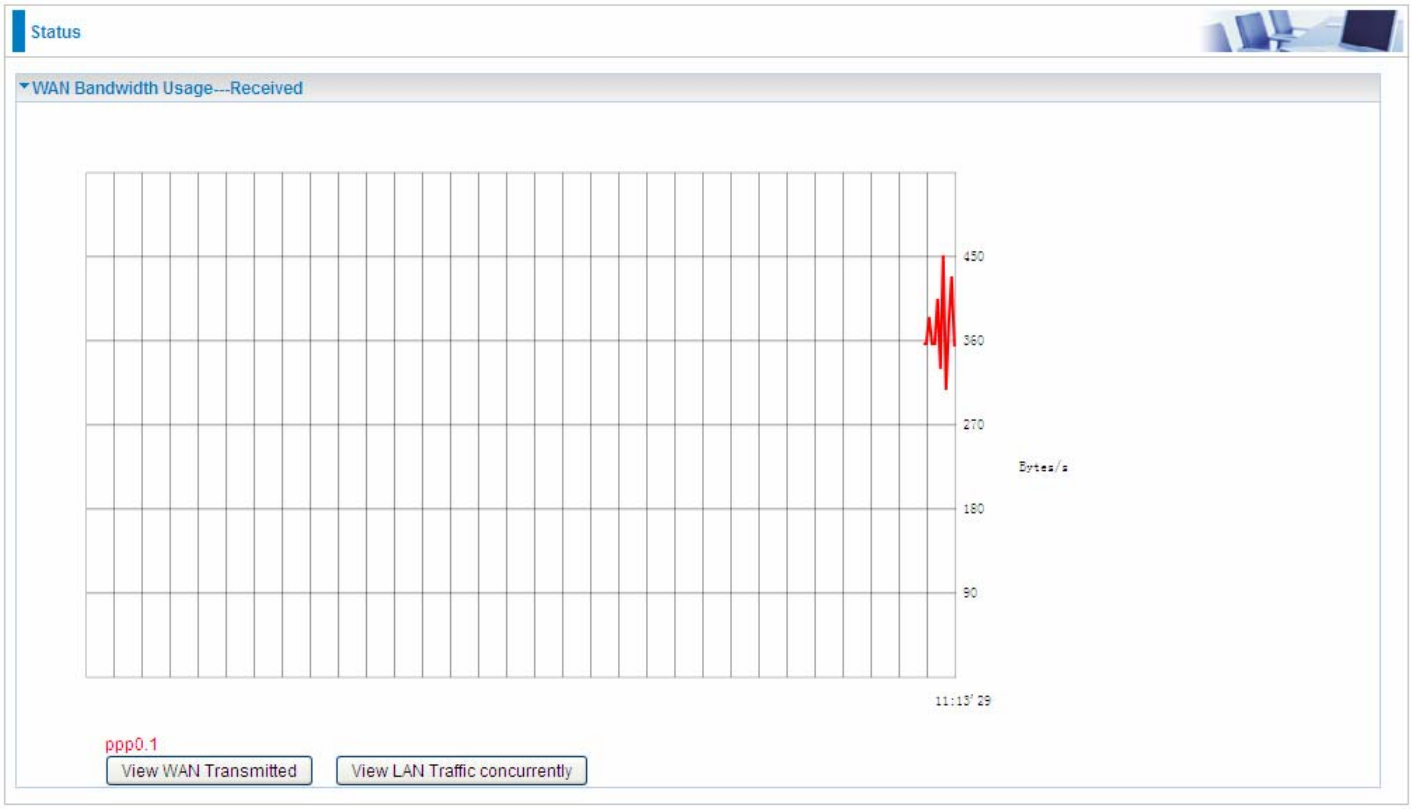


Press **View LAN Transmitted** button to change the diagram to the statistics of the LAN Transmitted Bytes. (**Note:** P4 means Ethernet port #4, and the traffic information of the port #4 is identified with orange, the same color with P4 in the diagram; other ports all take the same mechanism.)

When you press **View WAN Traffic concurrently** button, the WAN Bandwidth Usage pops up so that users can view the WAN traffic concurrently.



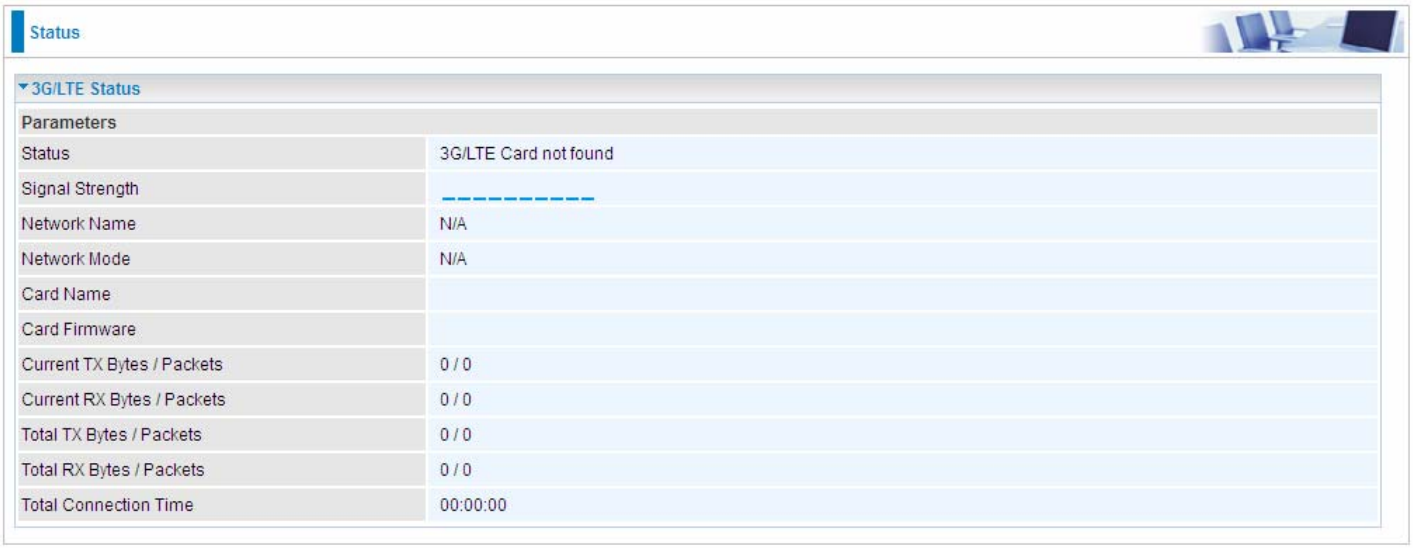
WAN Service



Press **View WAN Transmitted** button to change the diagram to the statistics of the WAN Transmitted Bytes.

Press **View LAN Traffic concurrently** button to directly switch to the LAN Bandwidth Usage page to view the LAN traffic concurrently.

3G/4G LTE Status



Status: The current status of the 3G/4G LTE connection.

Signal Strength: The signal strength bar and dBm value indicates the current 3G/4G-LTE signal strength. The front panel 3G/4G LTE Signal Strength LED indicates the signal strength as well.

Network Name: The name of the 3G/4G LTE network the router is connecting to.

Network Mode: The current operation mode for 3G/4G LTE module, it depends on service provider and card's limitation, GSM or UMTS.

Card Name: Given a name for the embedded 3G/4G LTE module.

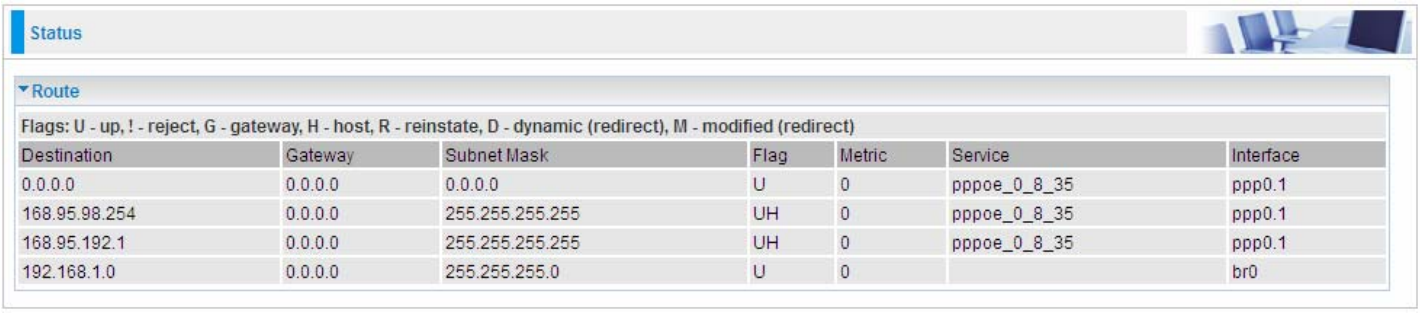
Card Firmware: Current used FW in the 3G/4G LTE module.

Current Received (RX) /Transmitted (TX) Bytes: Current Rx/TX (receive/transmit) packets in Byte

Total Received (RX) /Transmitted (TX) Bytes: The total Rx/TX (receive/transmit) packets in Byte

Total Connection Time: The total of 3G/4G LTE dongle connection time since the 3G/4G LTE is up and running

Route



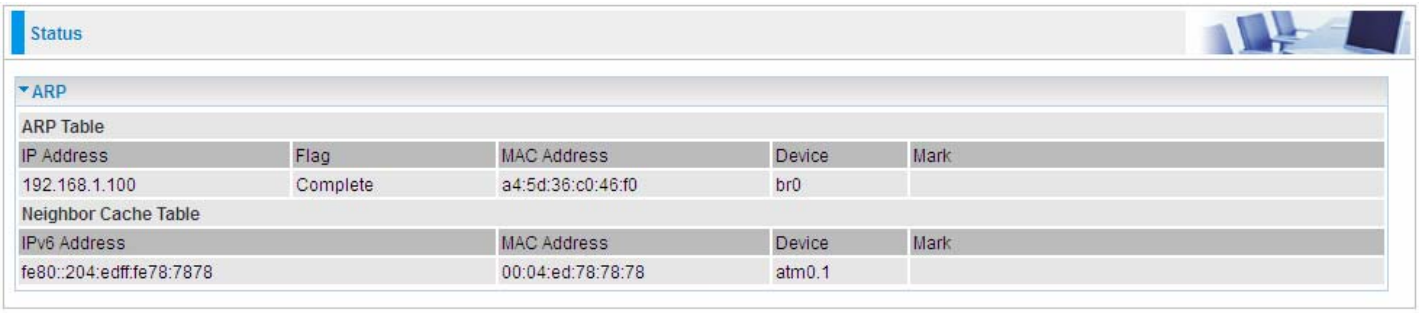
Destination: The IP address of destination network.
Gateway: The IP address of the gateway this route uses.
Subnet Mask: The destination subnet mask.
Flag: Show the status of the route.

- **U:** Show the route is activated or enabled.
- **H (host):** destination is host not the subnet.
- **G:** Show that the outside gateway is needed to forward packets in this route.
- **R:** Show that the route is reinstated from dynamic routing.
- **D:** Show that the route is dynamically installed by daemon or redirecting.
- **M:** Show the route is modified from routing daemon or redirect.

Metric: Display the number of hops counted as the Metric of the route.
Service: Display the service that this route uses.
Interface: Display the existing interface this route uses.

ARP

This section displays the router's ARP (Address Resolution Protocol) Table, which shows the mapping of Internet (IP) addresses to Ethernet (MAC) addresses. This is useful as a quick way of determining the MAC address of the network interface of your PCs to use with the router's ***Security – MAC Filtering*** function. Here IPv6 Neighbor Table, listed with IPv6 address-MAC mapping, is supported.



ARP table

IP Address: Shows the IP Address of the device that the MAC address maps to.

Flag: Shows the current status of the ARP entries.

- Complete: the route resolving is processing well.
- M(Marked as permanent entry): the route is permanent.
- P (publish entry): publish this route item.

MAC Address: Shows the MAC address that is corresponded to the IP address of the device it is mapped to.

Device: here refers to the physical interface, it is a concept to identify Clients from LAN or WAN. For example, the Clients in LAN, here displays "br0".

Mark: Show clearly the SSID (WLAN) the device is in.

Neighbor Cache Table

IPv6 address: Shows the IPv6 Address of the device that the MAC address maps to.

MAC Address: Shows the MAC address that is corresponded to the IPv6 address of the device it is mapped to.

Device: here refers to the physical interface, it is a concept to identify Clients from LAN or WAN. For example, the Clients in LAN, here displays "br0".

Mark: Show clearly the SSID (WLAN) the device is in.

DHCP

The DHCP Table lists the DHCP lease information for all IP addresses assigned by the DHCP server in the device.

Host Name: The Host Name of DHCP client.

MAC Address: The MAC Address of internal DHCP client host.

IP Address: The IP address which is assigned to the host with this MAC address.

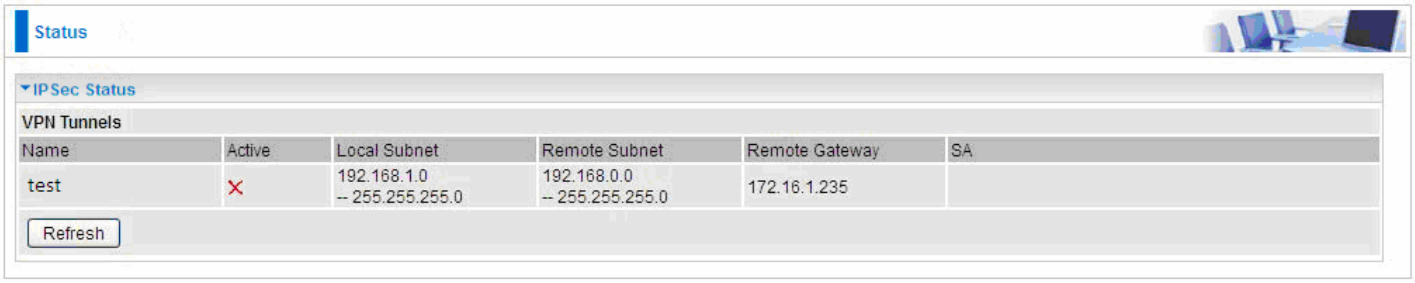
Expires in: Show the remaining time after registration.

Mark: Show clearly the SSID (WLAN) the device is in.

VPN (BiPAC 8920NX-600 only)

VPN status viewing section provides users IPSec, PPTP, L2TP, and GRE VPN status.

IPSec



Name: The IPSec connection name.

Active: Display the connection status.

Local Subnet: Display the local network.

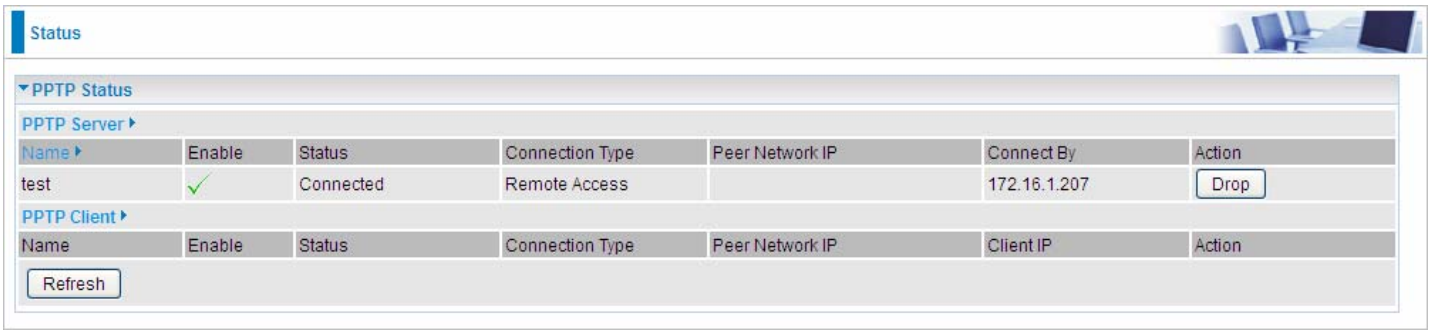
Remote Subnet: Display the remote network.

Remote Gateway: The remote gateway address.

SA: The Security Association for this IPSec entry.

Refresh: Click this button to refresh the tunnel status.

PPTP



PPTP Server

Name: The PPTP connection name.

Enable: Display the connection status with icons.

Status: The connection status.

Connection Type: Remote Access or LAN to LAN.

Peer Network IP: Display the remote network and subnet mask in LAN to LAN PPTP connection.

Connected By: Display the IP of remote connected client.

Action: Act to the connection. Click Drop button to disconnect the tunnel connection.

PPTP Client

Name: The PPTP connection name.

Enable: Display the connection status with icons.

Status: The connection status.

Connection Type: Remote Access or LAN to LAN.

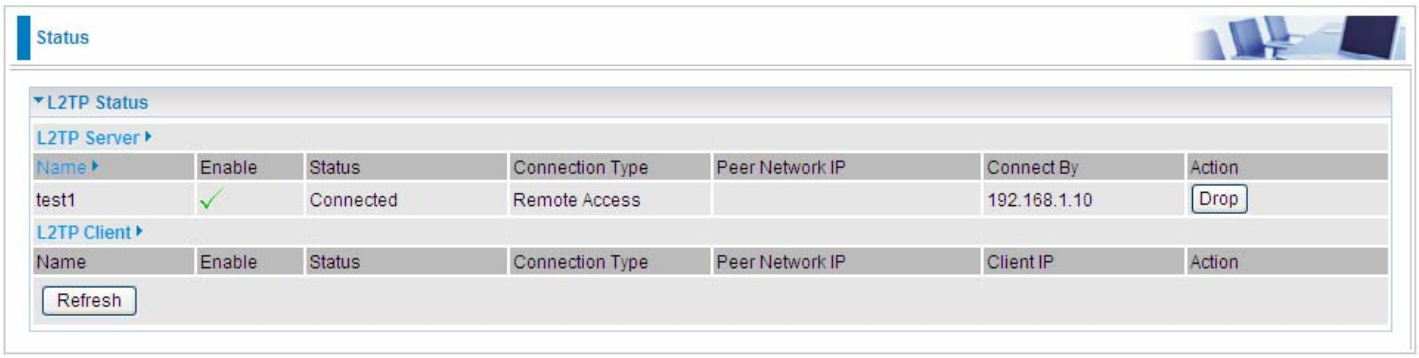
Peer Network IP: Display the remote network and subnet mask in LAN to LAN PPTP connection.

Client: Assigned IP by PPTP server.

Action: Act to the connection. Click Drop button to disconnect the tunnel connection.

Refresh: Click this button to refresh the connection status.

L2TP



L2TP Server

Name: The L2TP connection name.

Enable: Display the connection status with icons.

Status: The connection status.

Connection Type: Remote Access or LAN to LAN.

Peer Network IP: Display the remote network and subnet mask in LAN to LAN L2TP connection.

Connected By: Display the IP of remote connected client.

Action: Act to the connection. Click Drop button to disconnect the tunnel connection.

L2TP Client

Name: The L2TP connection name.

Enable: Display the connection status with icons.

Status: The connection status.

Connection Type: Remote Access or LAN to LAN.

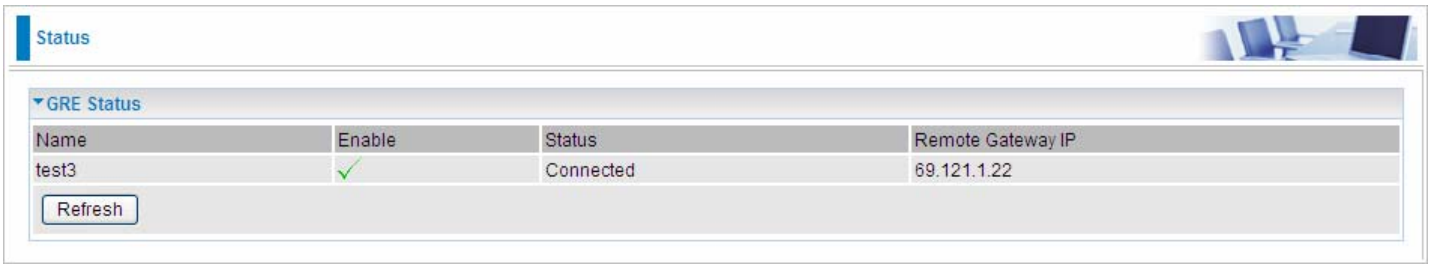
Peer Network IP: Display the remote network and subnet mask in LAN to LAN L2TP connection.

Client: Assigned IP by L2TP server.

Action: Act to the connection. Click Drop button to disconnect the tunnel connection.

Refresh: Click this button to refresh the connection status.

GRE



Name: The GRE connection name.

Enable: Display the connection status with icons.

Status: The connection status, connected or disable.

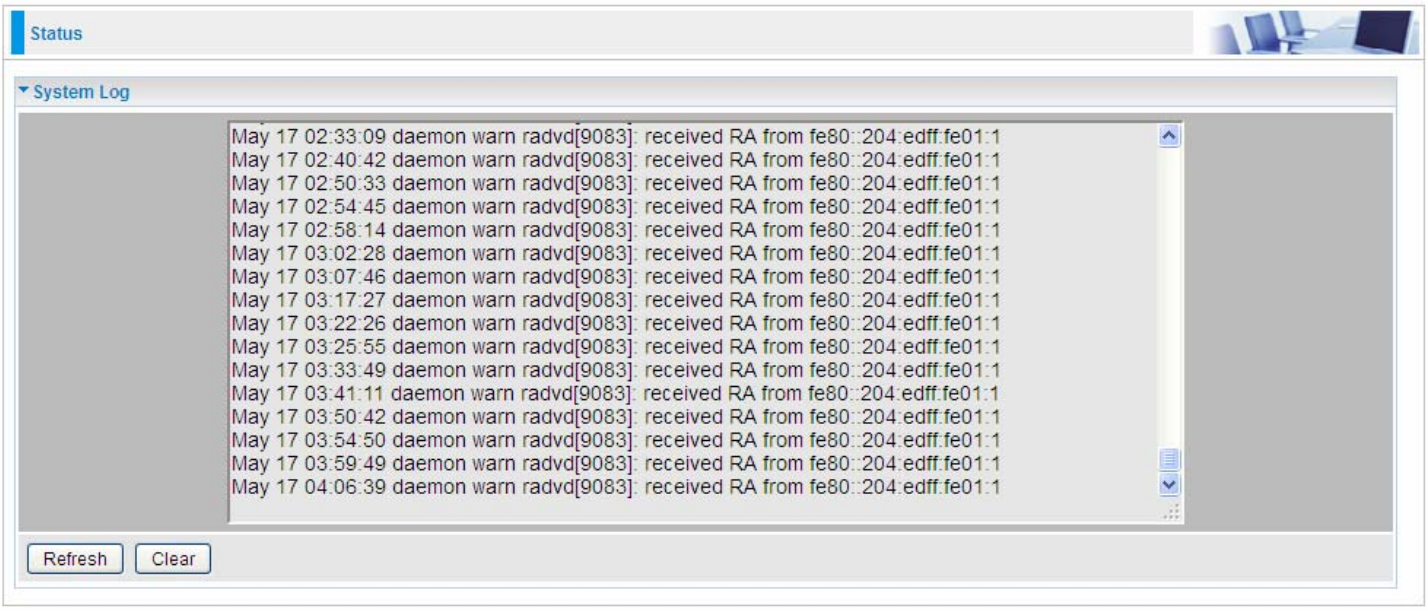
Remote Gateway: The IP of remote gateway.

Refresh: Click this button to refresh the connection status.

Log

System Log

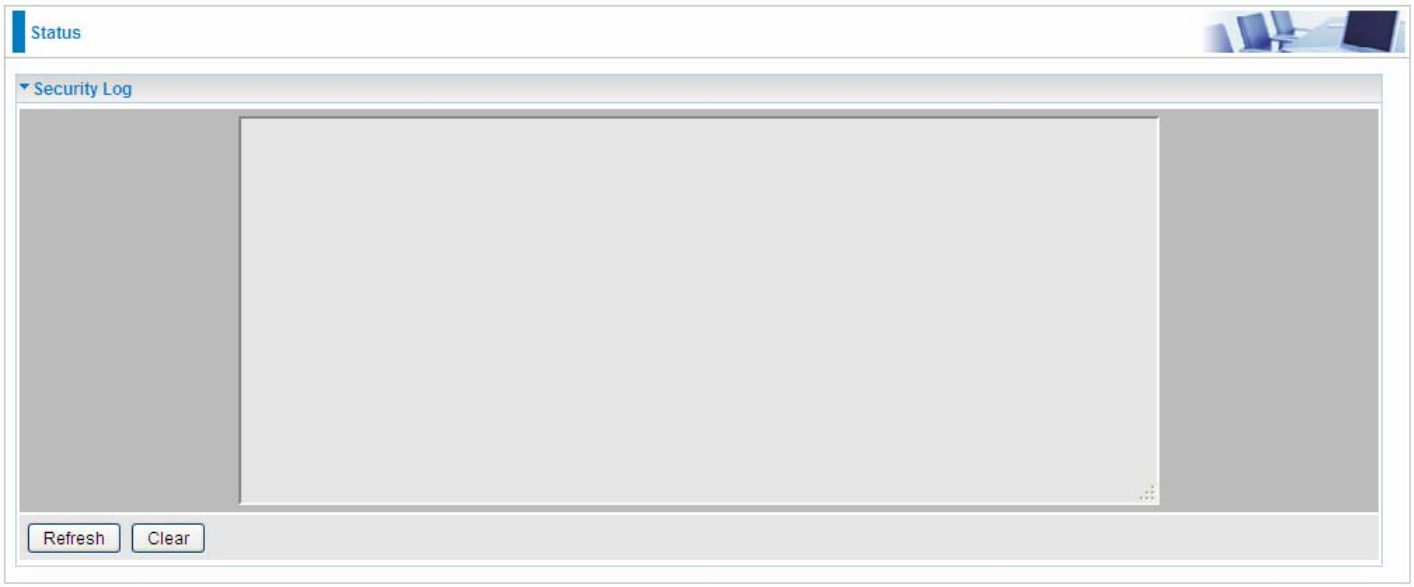
Display system logs accumulated up to the present time. You can trace historical information with this function. And the log policy can be configured in Configure Log section.



Refresh: Click to update the system log.
Clear: Click to clear the current log from the screen.

Security Log

Security log displays the message logged about security, like filter messages and some firewall message. You can turn to IP Filtering Outgoing, IP Filtering Incoming, URL Filter to determine if you want to log this information. Also you can turn to Configure Log section below to determine the level to log the message. You can use this to track potential threats to your system and network.



Refresh: Click to update the security log.

Clear: Click to clear the current log from the screen.

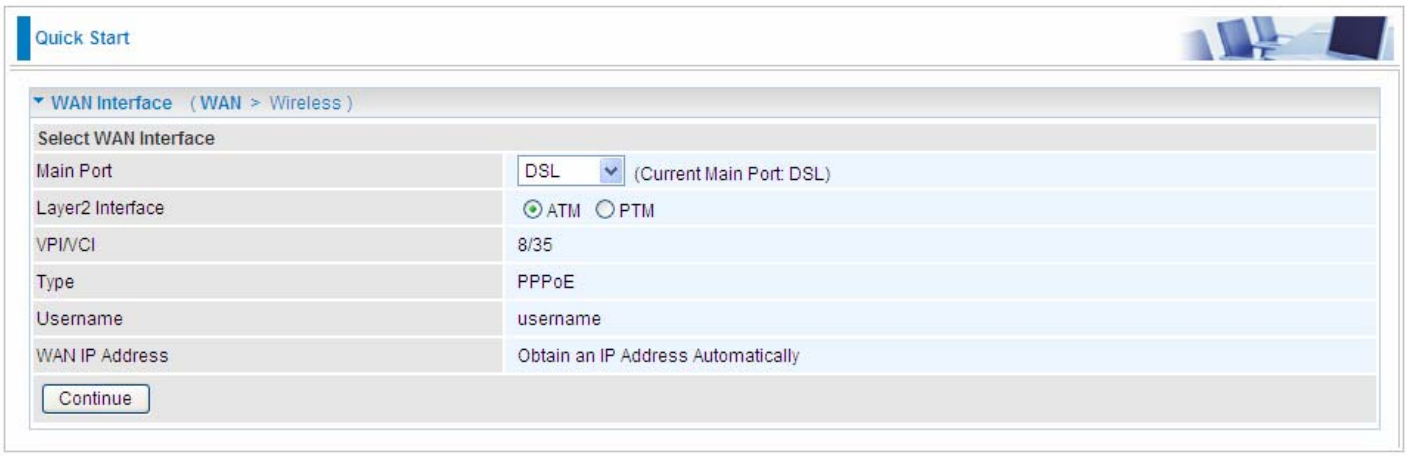
Quick Start

Quick Start

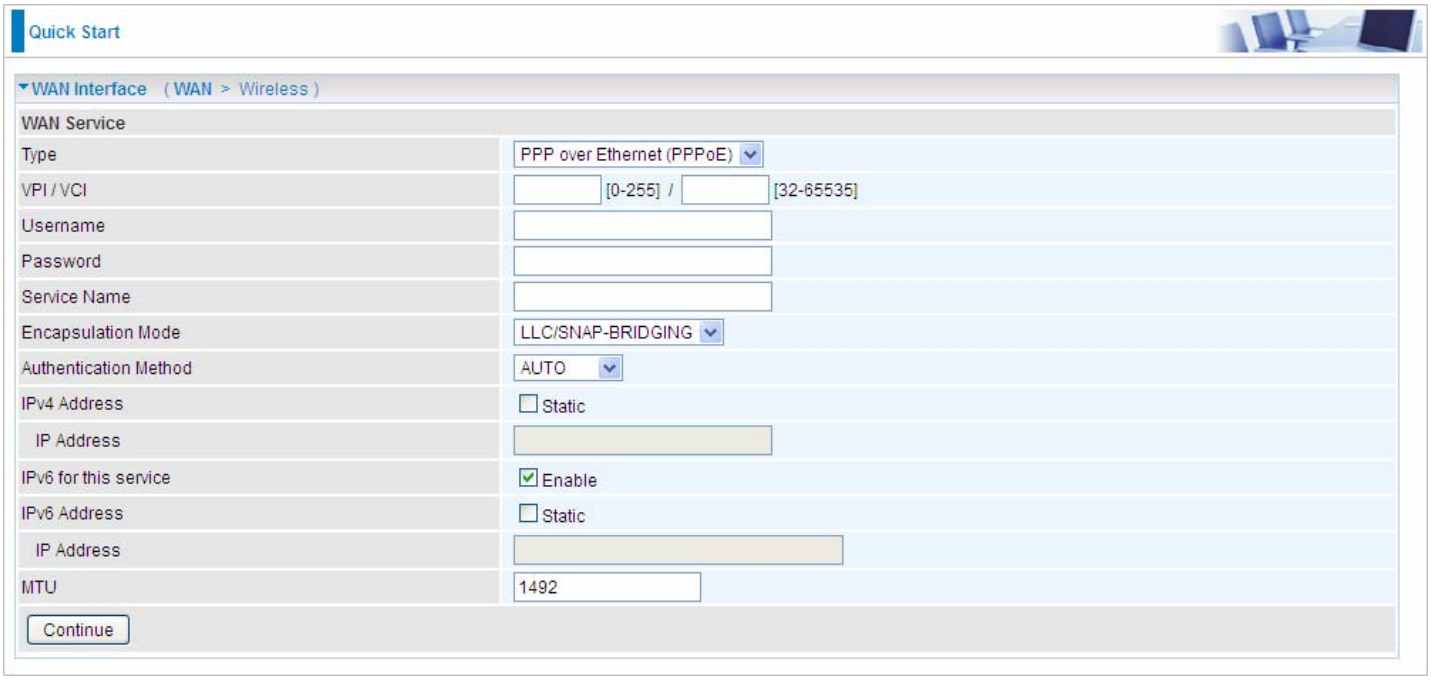
This part allows you to quickly configure and connect your router to internet.

DSL mode (ADSL mode, please choose ATM; VDSL, please choose PTM)

Here take ADSL for example.



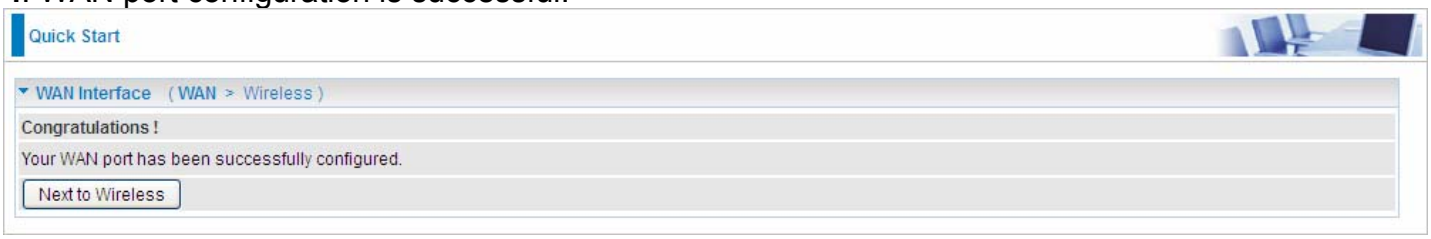
Select DSL, press **Continue** to go on to next step. Enter the username, password from your ISP, for IP and DNS settings; also refer to your ISP. Here IPv6 service is enabled by default.



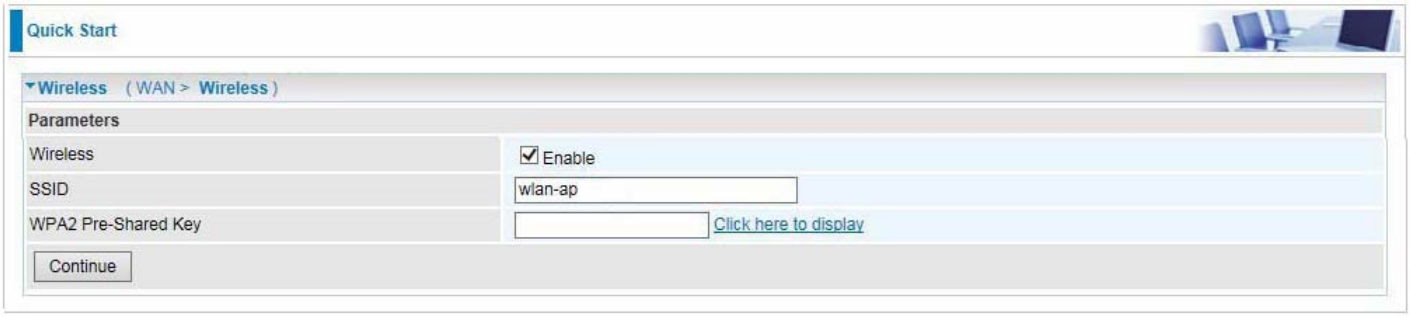
If the DSL line is not synchronized, the page will pop up warning of the DSL connection failure.

3. Wait while the device is configured.

4. WAN port configuration is successful.



5. After the configuration is successful, click **Next to Wireless** button and you may proceed to configure the Wireless setting. Enable the wireless and set the SSID and encryption Key (1. Leave it empty to disable the wireless security; 2. Fill in the Key, and the encryption mode will be WPA2-PSK/AES).

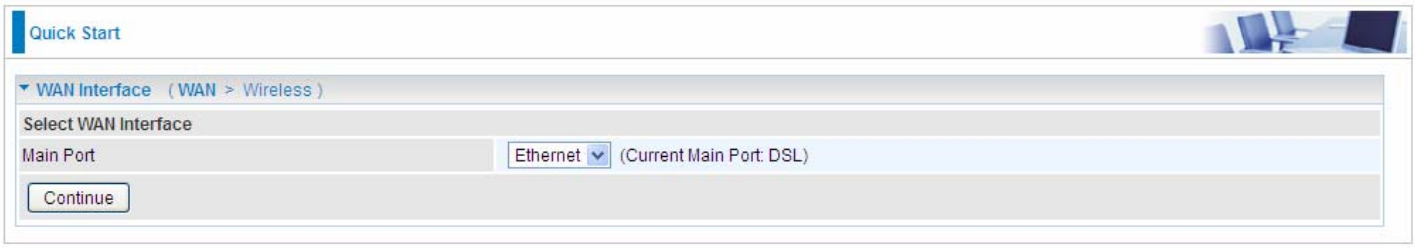


6. Success.

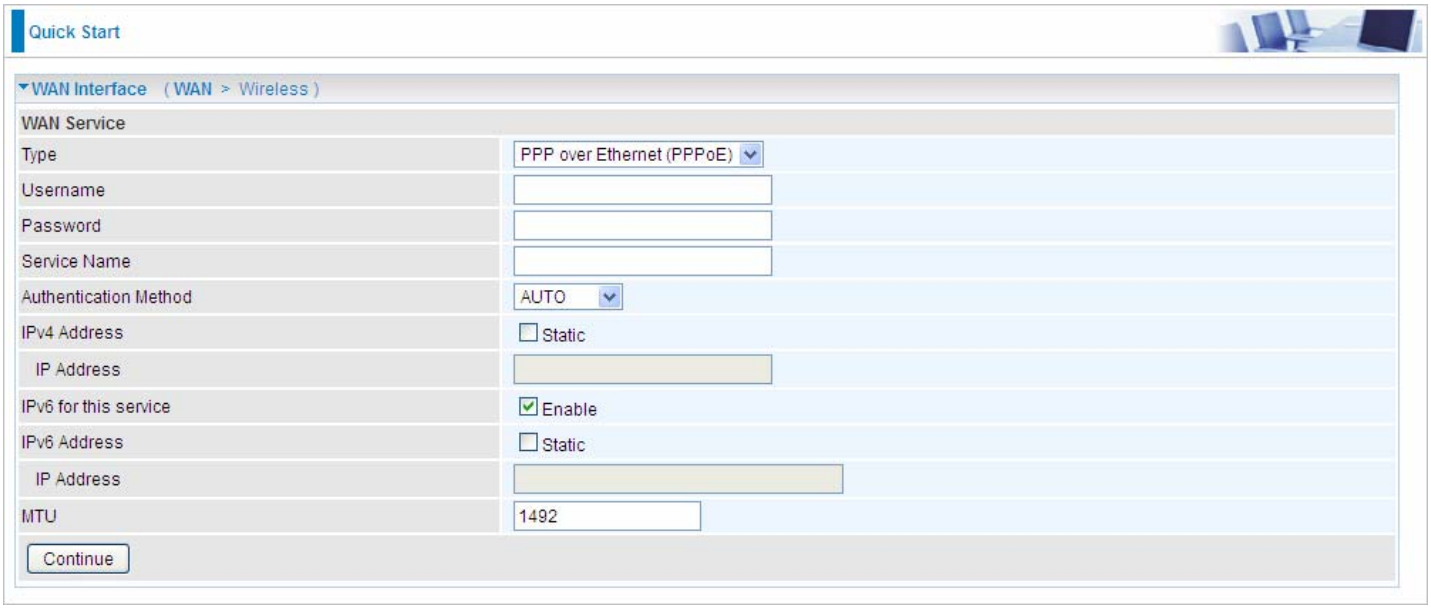
Go back to **Status** > **Summary** for more information.

Ethernet mode

1. Select **Ethernet,** press **Continue** to go on to next step.



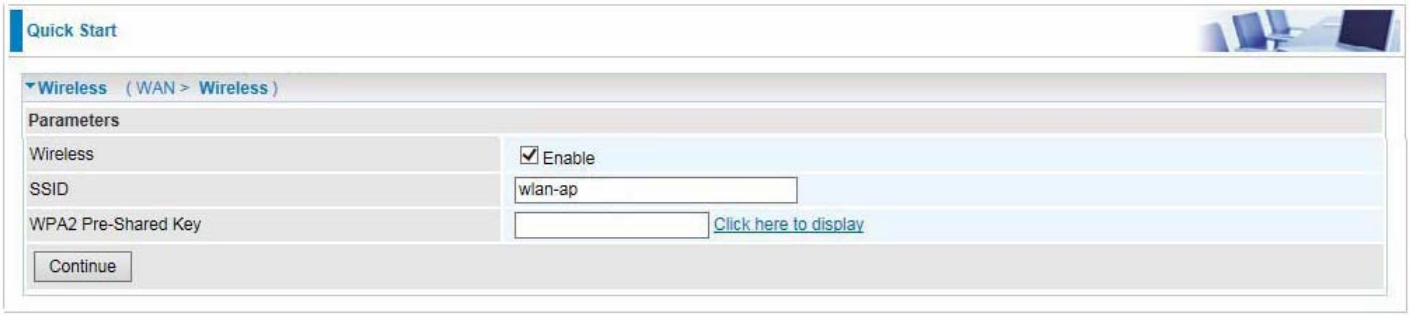
2. Enter the username, password from your ISP, for IP and DNS settings; also refer to your ISP. Here IPv6 service is enabled by default.



3. Wait while the device is configured.

4. WAN port configuration is successful.

5. After the configuration is successful, click **Next to Wireless** button and you may proceed to configure the Wireless setting. Enable the wireless and set the SSID and encryption Key (1. Leave it empty to disable the wireless security; 2. Fill in the Key, and the encryption mode will be WPA2-PSK/AES). For detail setting, please go to the Wireless part in this Manual.



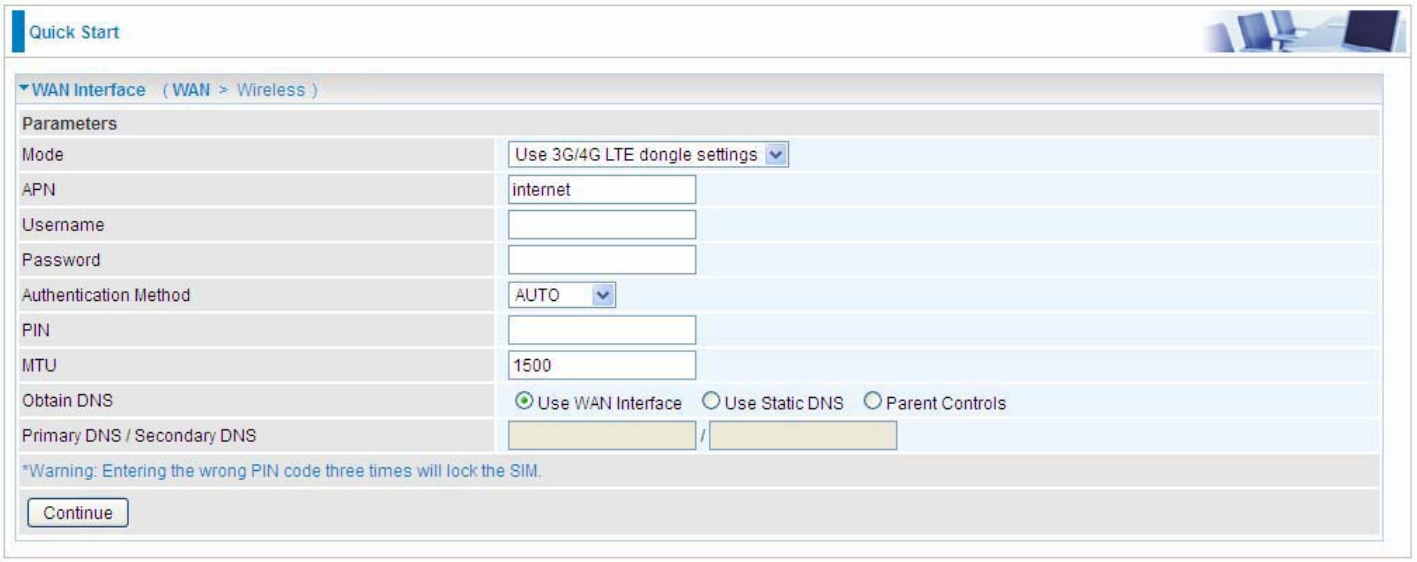
6. Success.

Go back to **Status** > **Summary** for more information

3G/4G LTE

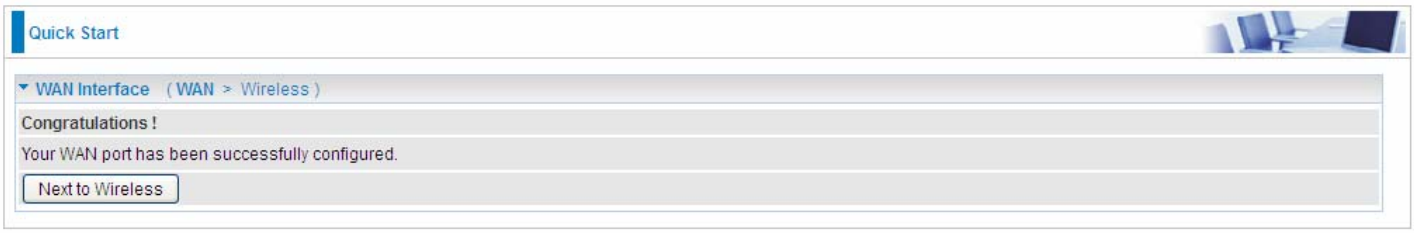
1. Select **3G/4G LTE,** press **Continue** to go on to next step.

2. Select the 3G mode, and enter the APN, username, password from your ISP; and check with your ISP with the authentication method setting.

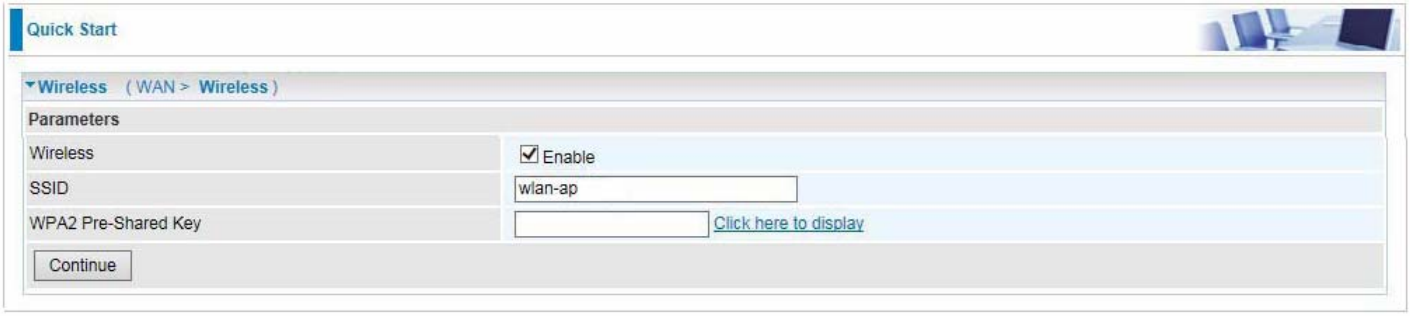


3. Wait while the device is configured.

4. WAN port configuration is successful.



5. After the configuration is successful, click **Next to Wireless** button and you may proceed to configure the Wireless setting. Enable the wireless and set the SSID and encryption Key (1. Leave it empty to disable the wireless security; 2. Fill in the Key, and the encryption mode will be WPA2-PSK/AES). For detail setting, please go to the Wireless part in this Manual.



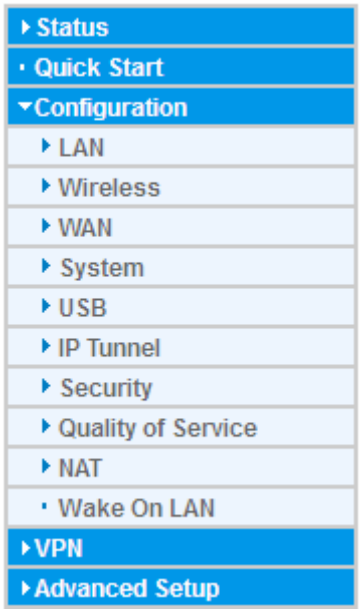
6. Success.

Go back to **Status** > **Summary** for more information.

Configuration

When you click this item, the column will expand to display the sub-items that will allow you to further configure your router.

LAN, **Wireless**, **WAN**, **System**, **USB**, **IP Tunnel**, **Security**, **Quality of Service**, **NAT** and **Wake On LAN**.

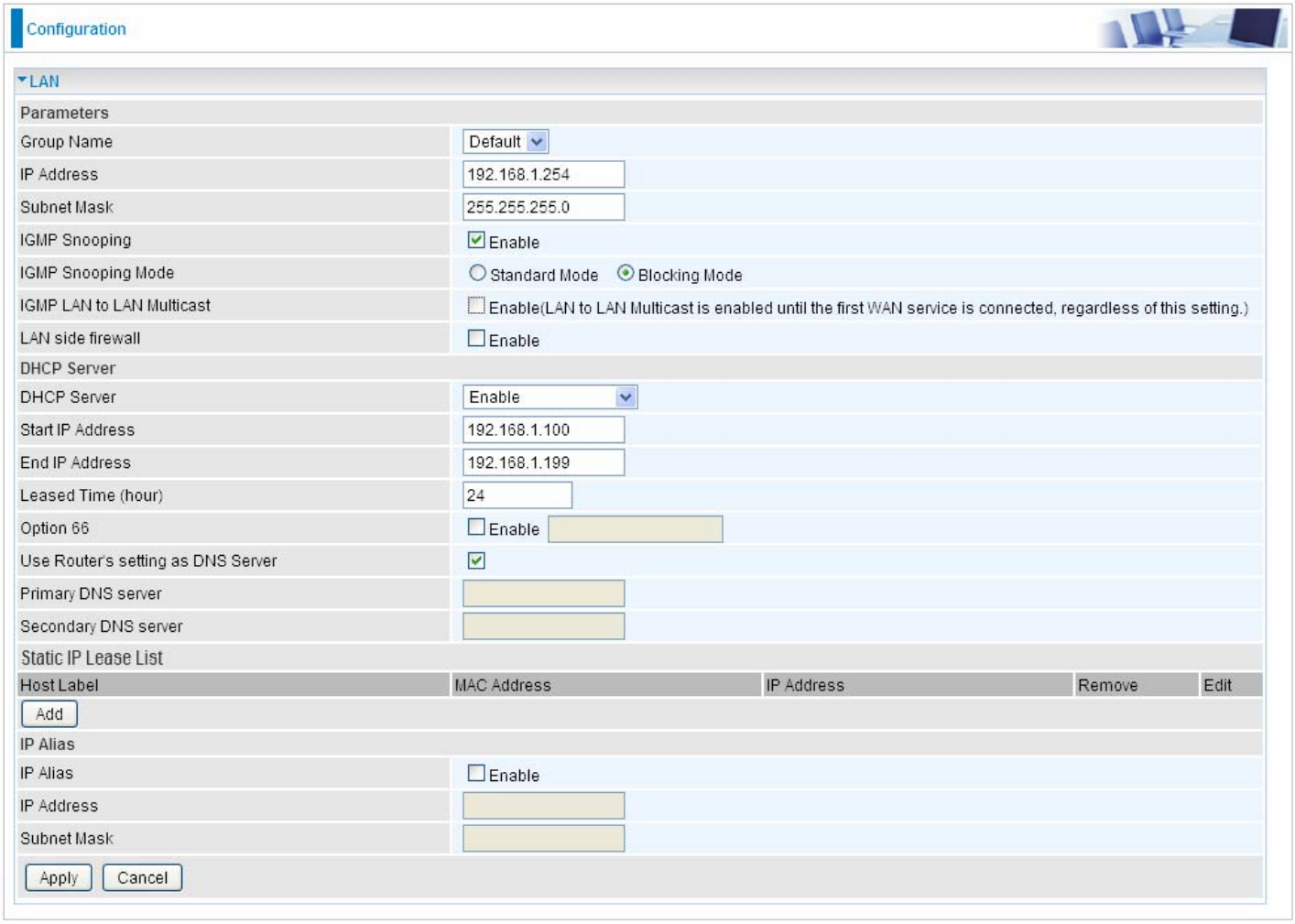


The function of each configuration sub-item is described in the following sections.

LAN - Local Area Network

A Local Area Network (LAN) is a shared communication system network where many computers are connected. This type of network is area defined and is usually limited to a confined region within a building.

Ethernet



Parameters

Group Name: This refers to the group you set in **Interface Grouping** section; you can set the parameters for the specific group. Select the group via the drop-down box. For more information please refer to Interface Grouping of this manual.

IP address: the IP address of the router. Default is 192.168.1.254.

Subnet Mask: the default Subnet mask on the router.

IGMP Snooping: Enable or disable the IGMP Snooping function. Without IGMP snooping, multicast traffic is treated in the same manner as broadcast traffic - that is, it is forwarded to all ports. With IGMP snooping, multicast traffic of a group is only forwarded to ports that have members of that group."

When enabled, you will see two modes:

- **Standard Mode:** In standard mode, multicast traffic will flood to all bridge ports when no client subscribes to a multicast group.
- **Blocking Mode:** In blocking mode, the multicast data will be blocked when there are no client subscribes to a multicast group, it won't flood to the bridge ports.

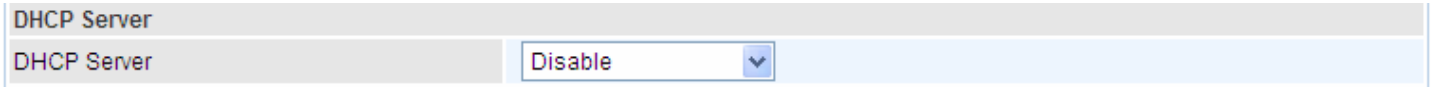
IGMP LAN to LAN Multicast: Check to determine whether to support LAN to LAN (Intra LAN) Multicast. If user want to have a multicast data source on LAN side and he wants to get IGMP snooping enabled, then this LAN-to-LAN multicast feature should be enabled.

LAN side firewall: Enable to drop all traffic from the specified LAN group interface. After activating it, all incoming packets by default will be dropped, and the user on the specified LAN group interface can't access CPE anymore. But, you can still access the internet service. If user wants to manage the CPE, please turn to IP Filtering Incoming to add the allowing rules. **Note** that all incoming packets by default will be dropped if the LAN side firewall is enabled and user cannot manage this CPE from the specified LAN group.

DHCP Server

You can disable or enable the DHCP (Dynamic Host Configuration Protocol) server or enable the router's DHCP relay functions. The DHCP protocol allows your router to dynamically assign IP addresses to PCs on your network if they are configured to obtain IP addresses automatically.

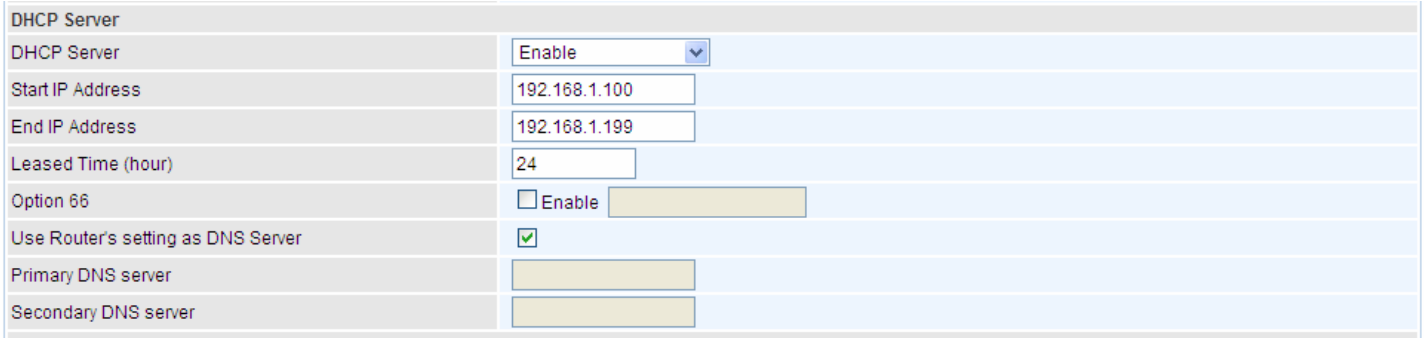
ⓘ Disable



Disable the DHCP Server function.

ⓘ Enable

Enable the DHCP function, enter the information wanted. Here as default.



Start IP Address: The start IP address of the range the DHCP Server used to assign to the Clients.

End IP Address: The end IP address f the range the DHCP Server used to assign to the Clients.

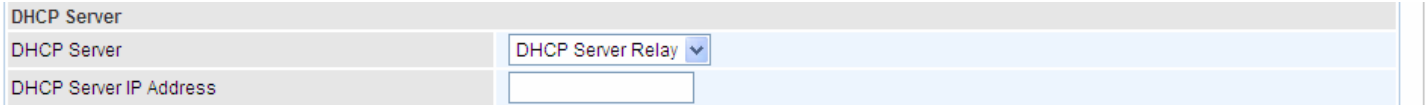
Leased Time (hour): The leased time for each DHCP Client.

Option 66: Click Enable to activate DHCP option 66 for some special devices, like IPTV Set Box. The devices can get firmware or some special service from the TFTP server. User needs to set the IP or hostname of the TFTP server.

User Router's setting as DNS server: Select whether to enable use router's setting as DNS server, if enabled, the PCs on the LAN side obtain the router's setting as DNS server. If disabled, please specify exactly the primary/secondary DNS server.

Primary/Secondary DNS server: Specify your primary/secondary DNS server for your LAN devices.

ⓘ DHCP Server Relay

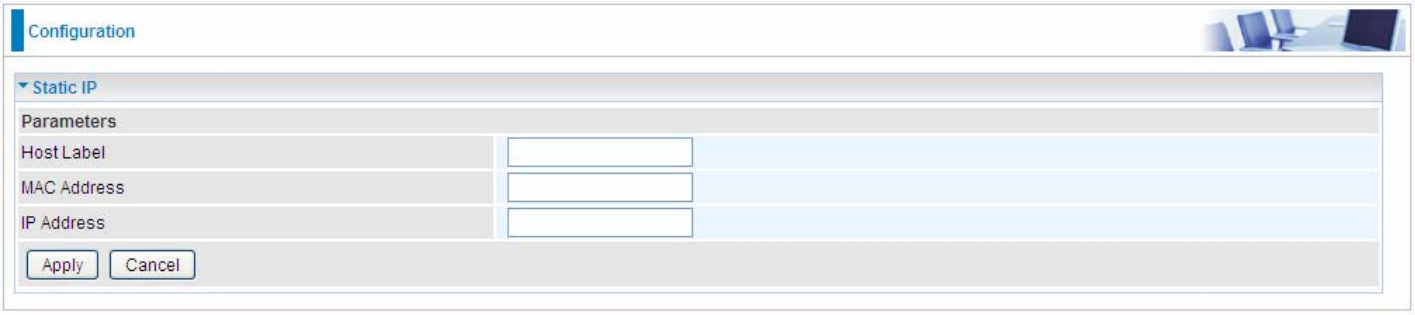


DHCP Server IP Address: Please enter the DHCP Server IP address.

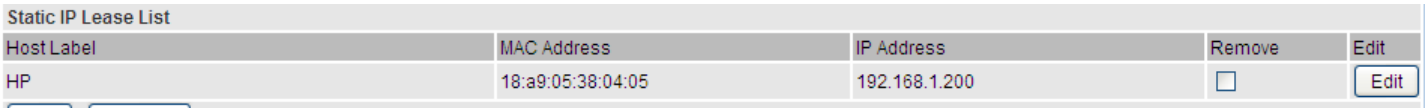
Static IP Lease List

The specified IP will be assigned to the corresponding MAC Address listed in the following table when DHCP Server assigns IP Addresses to Clients.

Press **Add** to the Static IP List.

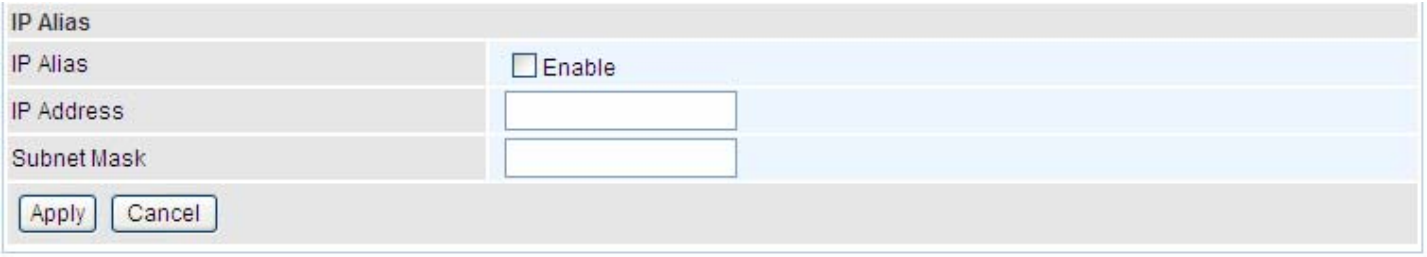


Enter the MAC Address, IP Address, and then click Apply to confirm your settings. But the IP assigned should be outside the range of 192.168.1.100-192.168.1.199.



IP Alias

This function allows the creation of multiple virtual IP interfaces on this router. It helps to connect two or more local networks to the ISP or remote node.



IP Alias: Check whether to enable this function.

IP Address: Specify an IP address on this virtual interface.

Subnet Mask: Specify a subnet mask on this virtual interface.

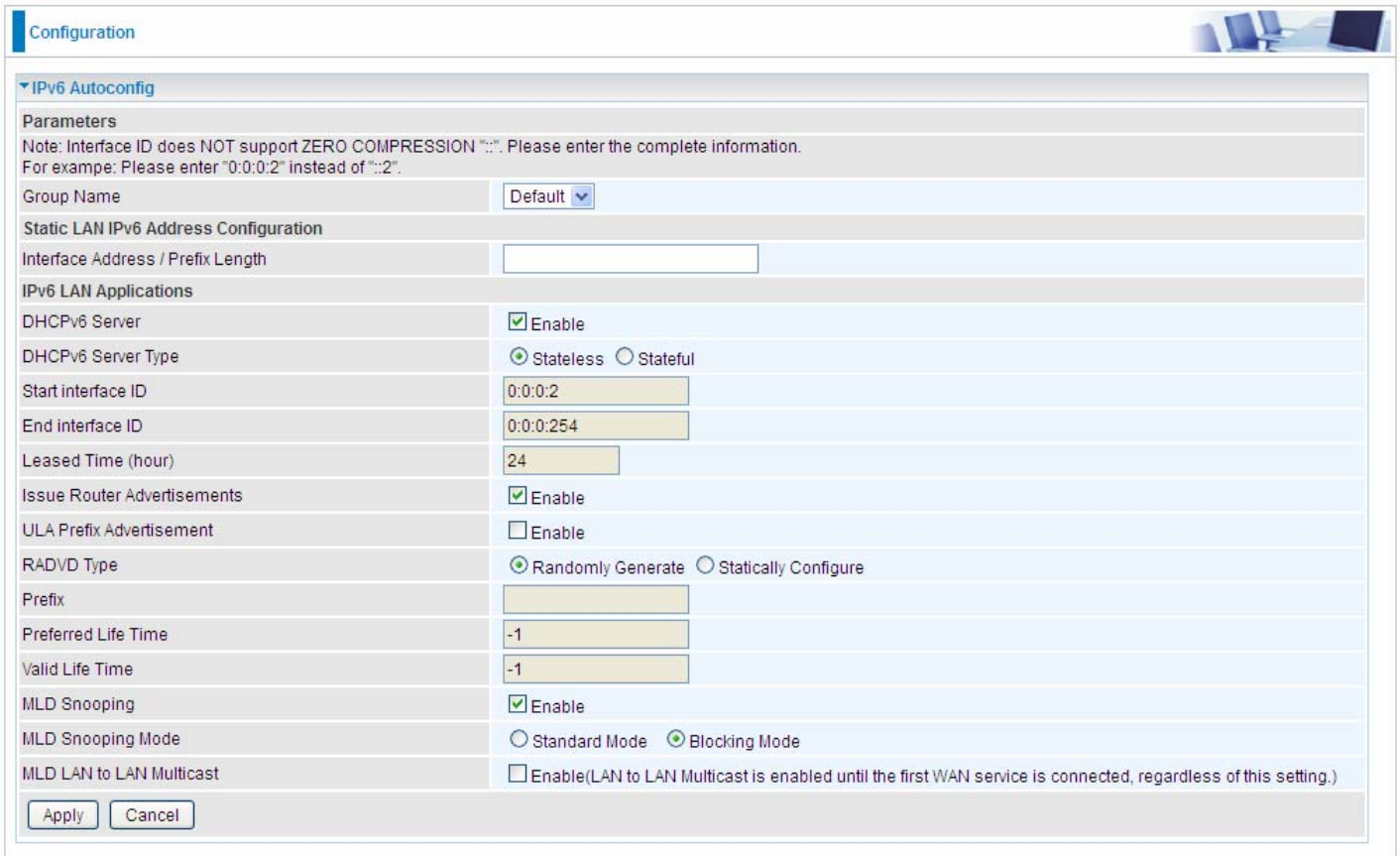
Click **Apply** to apply your settings.

IPv6 Autoconfig

The IPv6 address composes of two parts, the prefix and the interface ID.

There are two ways to dynamically configure IPv6 address on hosts. One is “stateful” configuration, for example using DHCPv6 (which resembles its counterpart DHCP in IPv4.) In the stateful auto-configuration model, hosts obtain interface addresses and/or configuration information and parameters from a DHCPv6 server. The Server maintains a database that keeps track of which addresses have been assigned to which hosts.

The second way is “stateless” configuration. Stateless auto-configuration requires no manual configuration of hosts, minimal (if any) configuration of routers, and no additional servers. The stateless mechanism allows a host to generate its own addresses using a combination of locally available information (MAC address) and information (prefix) advertised by routers. Routers advertise prefixes that identify the subnet(s) associated with a link, while hosts generate an "interface identifier" that uniquely identifies an interface on a subnet. An address is formed by combining the two. When using stateless configuration, you needn’t configure anything on the client.



Group Name: Here group refers to the group you set in **Interface Grouping** section, you can set the parameters for the specific group. Select the group by the drop-down box. For more information please refer to **Interface Grouping** of this manual.

Static LAN IPv6 Address Configuration

Interface Address / Prefix Length: Enter the static LAN IPv6 address.

IPv6 LAN application

DHCPv6 Server: Check whether to enable DHCPv6 server.

DHCPv6 Server Type: Select Stateless or Stateful. When DHCPv6 is enabled, this parameter is available. **Stateless:** If selected, the PCs in LAN are configured through RA mode, thus, the PCs in LAN are configured through RA mode, to obtain the prefix message and generate an address using a combination of locally available information (MAC address) and information (prefix) advertised by routers, but they can obtain such information like DNS from DHCPv6 Server. **Stateful:** if selected, the PCs in LAN will be configured like in IPv4 mode, thus obtain addresses and DNS information from DHCPv6 server.

Start interface ID: Enter the start interface ID. The IPv6 address composed of two parts, thus, the prefix and the interface ID. Interface is like the Host ID compared to IPv4.

End interface ID: Enter the end interface ID.

Note: Interface ID does NOT support ZERO COMPRESSION "::". Please enter the complete information.
For example: Please enter "0:0:0:2" instead of "::2".

Leased Time (hour): The leased time, similar to leased time in DHCPv4, is a time limit assigned to clients, when expires, the assigned ID will be recycled and reassigned.

Issue Router Advertisement: Check whether to enable issue Router Advertisement feature. It is to send Router Advertisement messages periodically.

ULA Prefix Advertisement: Enable this parameter to include the ipv6 ULA address in the RA messages. ULA, unique local address, is an IPv6 address in the block fc00::/7. It is approximately the IPv6 counterpart of the IPv4 private address. They are not routable in the global IPv6 Internet.

RADVD Type: The way that ULA prefix is generated.

- Randomly Generated
- Statically Configured: select to set manually in the following parameters.

Prefix: Set the prefix manually.

Preferred Life Time: The ULA prefix life time. When the time is over, the ULA prefix is invalid any more, -1 means no limit.

Valid Life Time: It is a time threshold, when the time is over, clients should obtain new IPv6 address from the router through RA; -1 means to be limitless.

MLD snooping: Similar to IGMP snooping, listens in on the MLD conversation between hosts and routers by processing MLD packets sent in a multicast network, and it analyzes all MLD packets between hosts and the connected multicast routers in the network. Without MLD snooping, multicast traffic is treated in the same manner as broadcast traffic - that is, it is forwarded to all ports. With MLD snooping, multicast traffic of a group is only forwarded to ports that have members of that group.

- **Standard Mode:** In standard mode, multicast traffic will flood to all bridge ports when no client subscribes to a multicast group.
- **Blocking Mode:** In blocking mode, the multicast data will be blocked when there is no client subscribes to a multicast group, it won't flood to the bridge ports.

MLD LAN to LAN Multicast: Check to determine whether to support LAN to LAN (Intra LAN) Multicast. If user want to have a multicast data source on LAN side and he want to get MLD snooping enabled, then this LAN-to-LAN multicast feature should be enabled

Stateless and Stateful IPv6 address Configuration

Stateless: Two methods can be carried.

ⓘ With DHCPv6 disabled, but Issue Router Advertisement Enabled

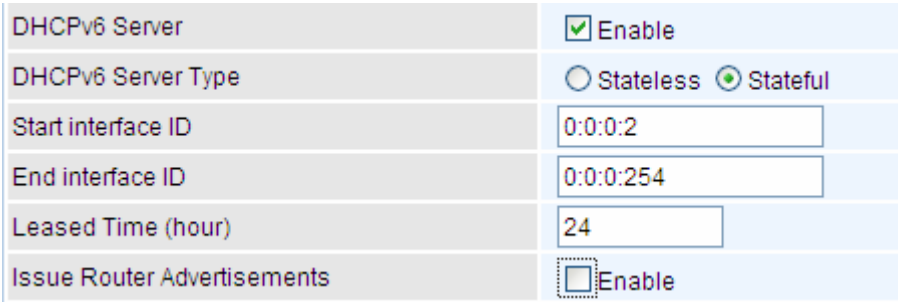
With this method, the PCs in LAN are configured through RA mode, thus, the PCs in LAN are configured through RA mode, to obtain the prefix message and generate an address using a combination of locally available information (MAC address) and information (prefix) advertised by routers.

ⓘ With both DHCPv6 and Issue Router Advertisement Enabled

With this method, the PCs' addresses in LAN are configured like above method, but they can obtain such information like DNS from DHCPv6 Server.

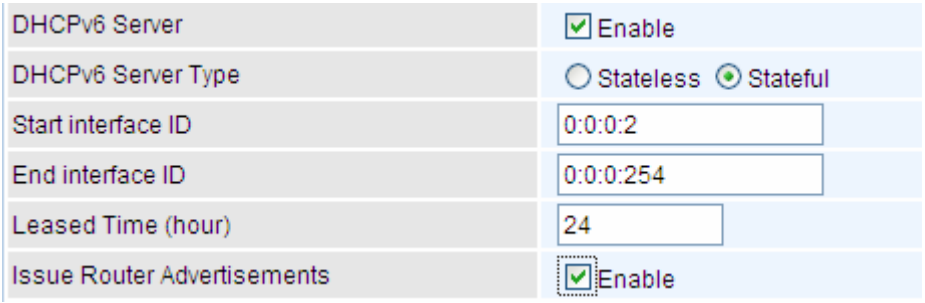
Stateful: two methods can be adopted.

ⓘ With only DHCPv6 enabled



With this method, the PCs' addresses are configured the same as in IPv4, that is addresses are assigned by DHCPv6 server.

ⓘ With both DHCPv6 and Issue Router Advertisement Enabled



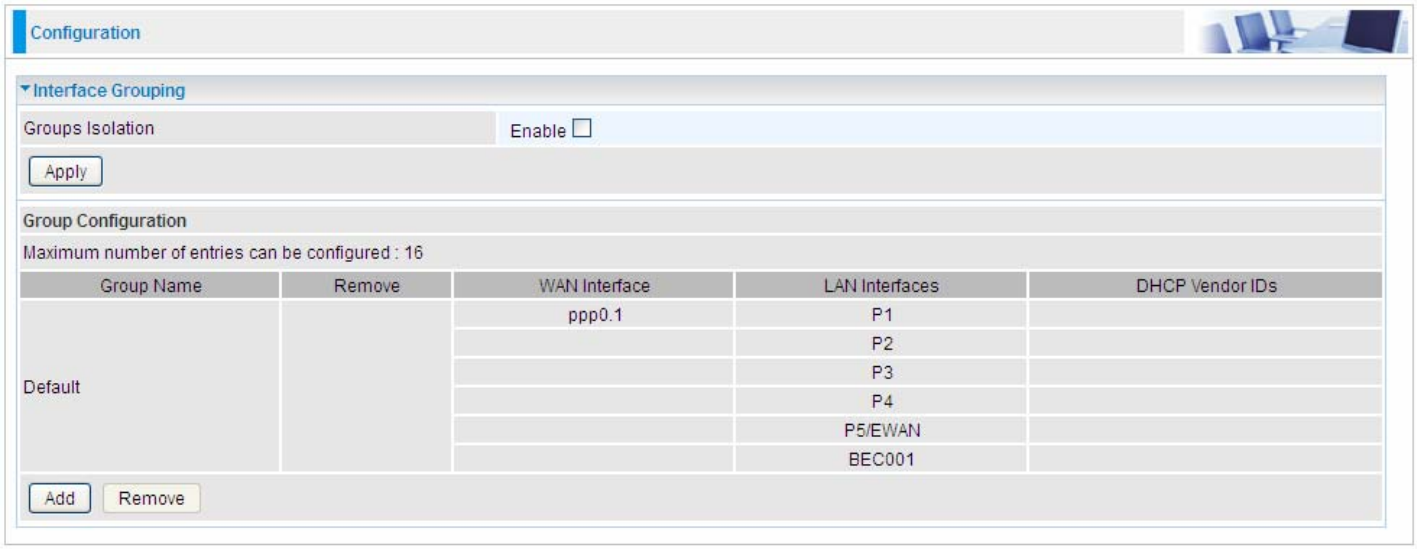
With this method, the PCs' addresses are configured the same like above, and the address information in RA packets will be neglected.

Interface Grouping

Interface grouping is a function to group interfaces, known as VLAN. A Virtual LAN, commonly known as a VLAN, is a group of hosts with the common set of requirements that communicate as if they were attached to the same broadcast domain, regardless of the physical location. A VLAN has the same attributes as a physical LAN, but it allows for end stations to be grouped together even if they are not located on the same network switch.

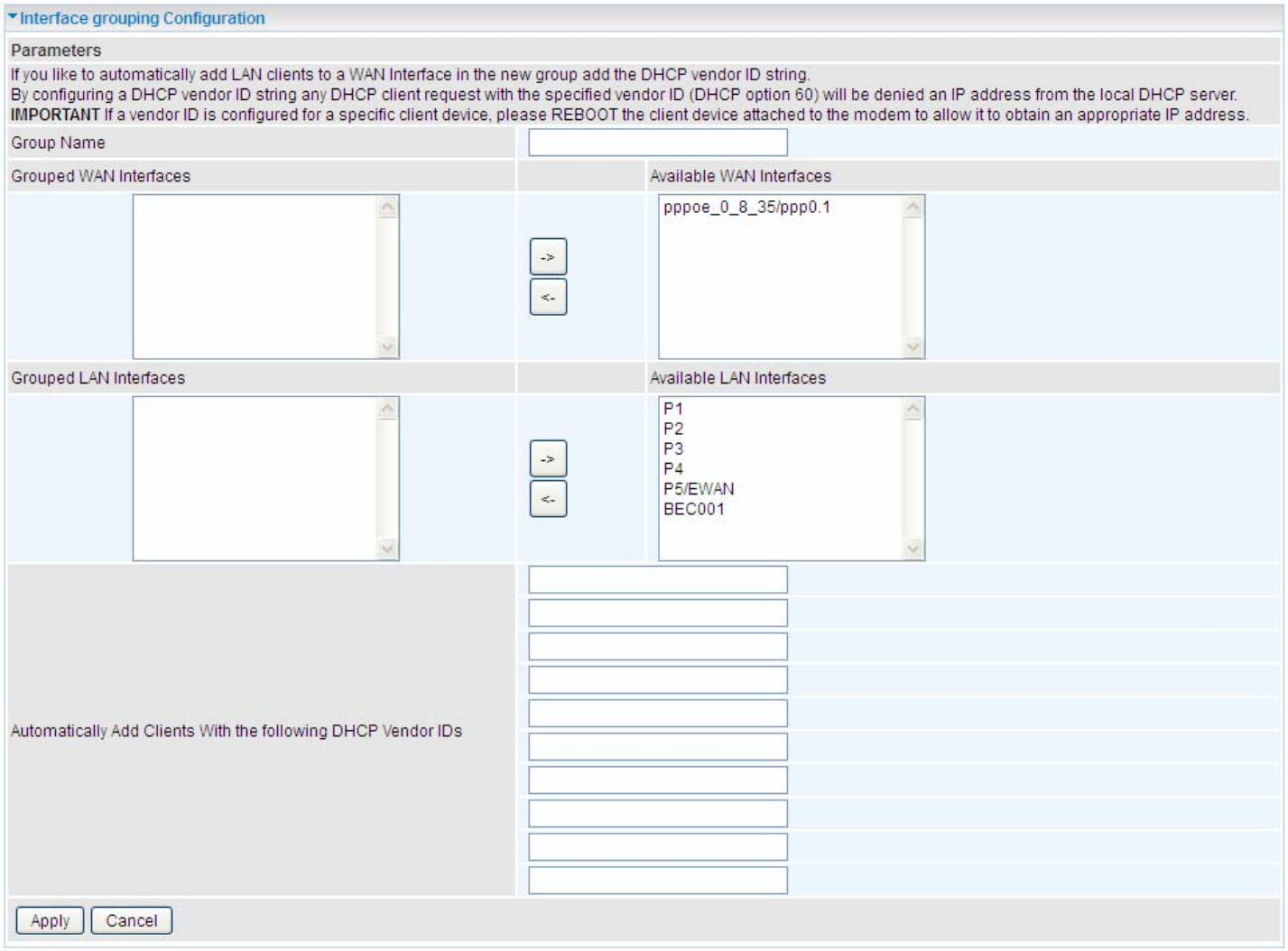
Each group will perform as an independent network. To support this feature, you must create mapping groups with appropriate LAN and WAN interfaces using the Add button.

(Please **Note:** P5 can be configured as EWAN, and when the device is in EWAN profile, there is no P5/EWAN interface as P5 is working as a WAN port.)



Groups Isolation: If enabled, devices in one group are not able to access those in the other group.

Click **Add** to add groups.



Group Name: Type a group name.

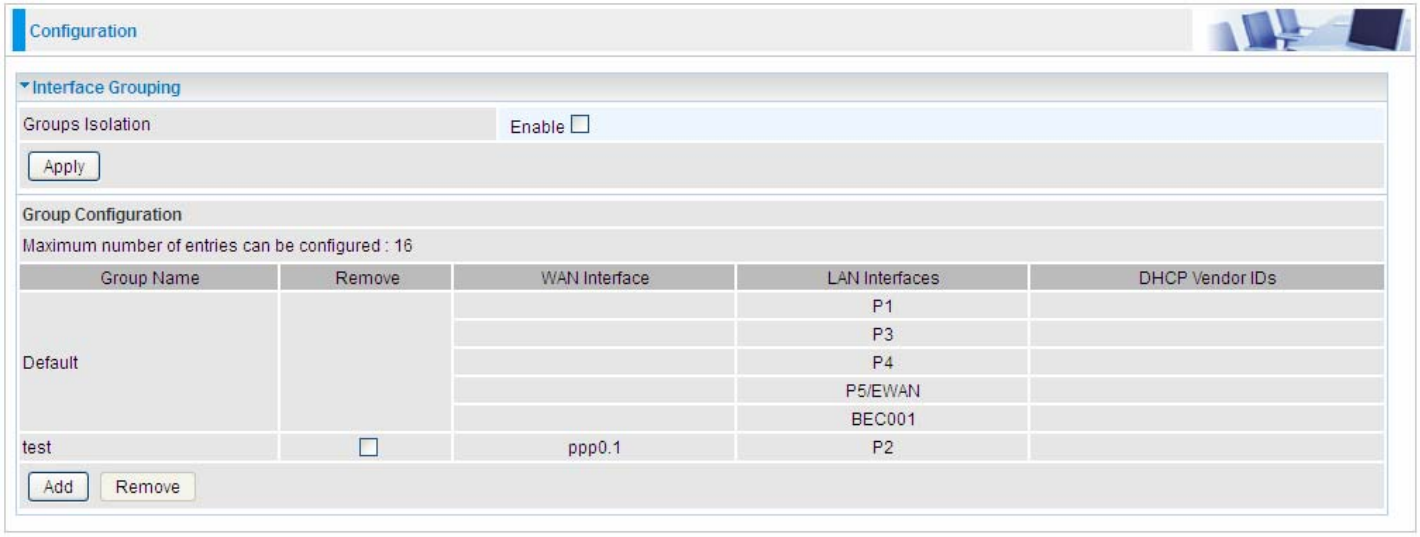
Grouped WAN Interfaces: Select from the box the WAN interface you want to applied in the group.

Grouped LAN Interfaces: Select the LAN interfaces you want to group as a single group from ***Available LAN Interfaces***.

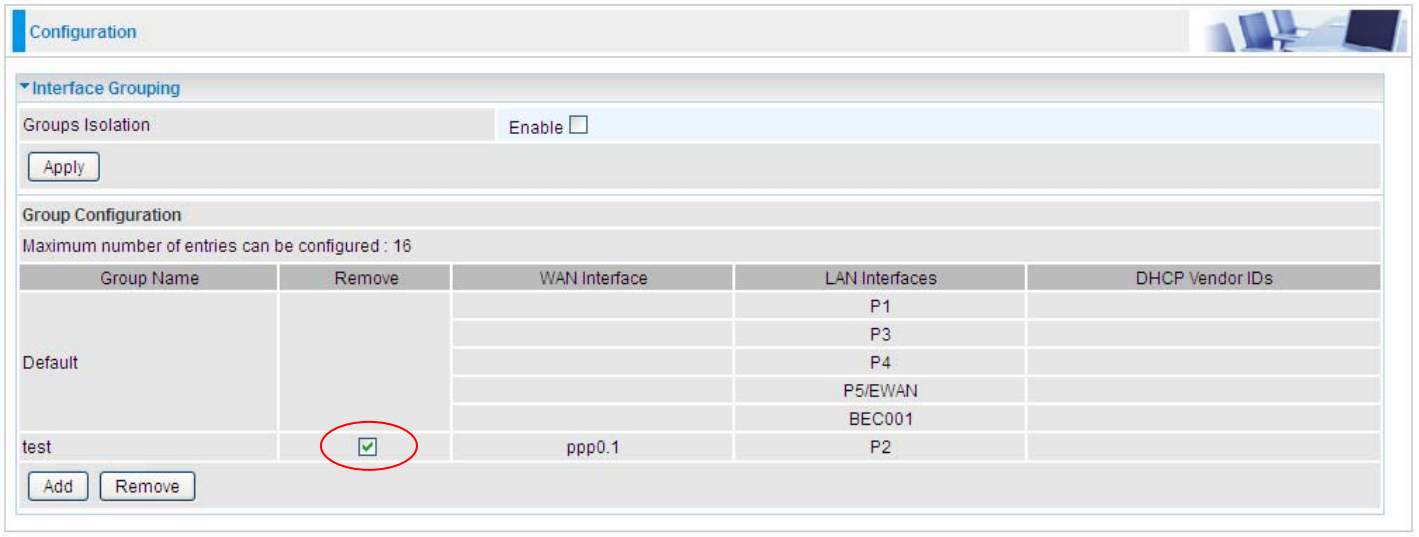
Automatically Add Clients with following DHCP Vendor IDs: Enter the DHCP Vendor IDs for which you want the Clients automatically added into the group. DHCP vendor ID (DHCP 60) is an Authentication for DHCP Messages.

Click **Apply** to confirm your settings and your added group will be listed in the Interface Grouping table below.

In group "test", P2 and PPP0.1 are grouped in one group, they have their only network , see **LAN**.



If you want to remove the group, check the box as the following and press **Remove**.



Note: If you like to automatically add LAN clients to a WAN Interface in the new group add the DHCP vendor ID string.

By configuring a DHCP vendor ID string any DHCP client request with the specified vendor ID (DHCP option 60) will be denied an IP address from the local DHCP server.

If a vendor ID is configured for a specific client device, please REBOOT the client device attached to the modem to allow it to obtain an appropriate IP address.

Each LAN interface can only be added into one group and one WAN interface can only be used in one group.

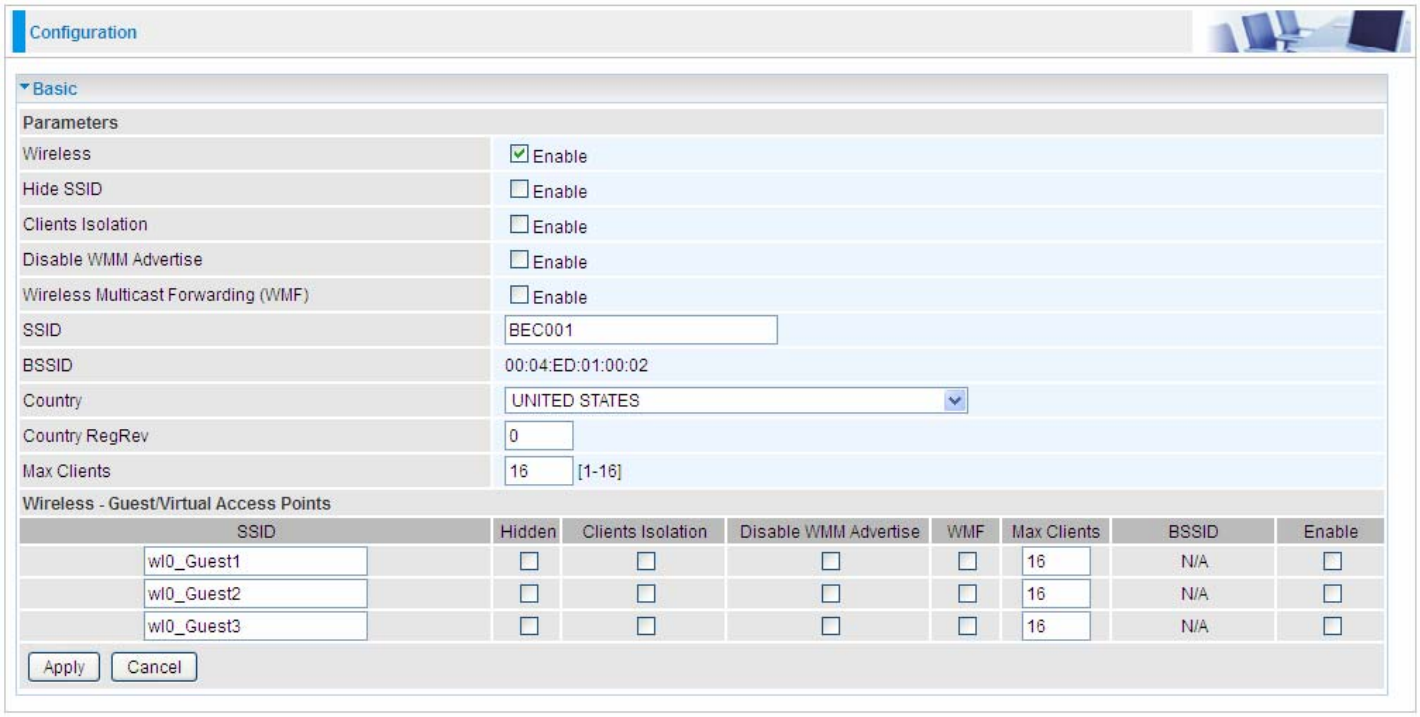
Wireless

This section introduces the wireless LAN and some basic configurations.

Wireless LANs can be as complex as a number of computers with wireless LAN cards communicating through access points which bridge network traffic to the wired LAN. It allows multiple wireless users in 2.4G radio band to surf the Internet, checking e-mail, watching video, listening to music over the Internet concurrently.

Basic

It let you determine whether to enable Wireless function and set the basic parameters of an AP and the Virtual APs.



Wireless: Default setting is set to Enable. If you do not have any wireless devices, check the checkbox again to unselect.

Hide SSID: It is function in which transmits its SSID to the air so that when wireless client searches for a network, router can then be discovered and recognized. Check the checkbox to determine whether you want to hide SSID.

Clients Isolation: if you enabled this function, then each of your wireless clients will not be able to communicate with each other.

Disable WMM Advertise: Stop the router from 'advertising' its Wireless Multimedia (WMM) functionality, which provides basic quality of service for time-sensitive applications (e.g. VoIP, Video).

Check to disable or enable this function.

Wireless multicast Forwarding (WMF): check to enable or disable wireless multicast forwarding.

SSID: The SSID is the unique name of a wireless access point (AP) to be distinguished from another. For security purpose, change the default o a unique ID name to the AP already built-in to the router's wireless interface. It is case sensitive and must not excess 32 characters. Make sure your wireless clients have exactly the SSID as the device, in order to get connected to your network.

Note: SSID is case sensitive and must not exceed 32 characters.

BSSID: Basic Set Service Identifier, it is a local managed IEEE MAC address, and is 48 bits value.

Country: Different countries have different wireless band resources, so you can select the appropriate Country according to your location.

Country RegRev: The regulatory revision number, together with the country set in the above **country** field to uniquely mark a specific location. For example, US/3.

Max Clients: enter the number of max clients the wireless network can supports,1-16.

Guest/virtual Access Points: A "Virtual Access Point" is a logical entity that exists within a physical Access Point (AP). When a single physical AP supports multiple "Virtual APs", each Virtual AP appears to stations (STAs) to be an independent physical AP, even though only a single physical AP

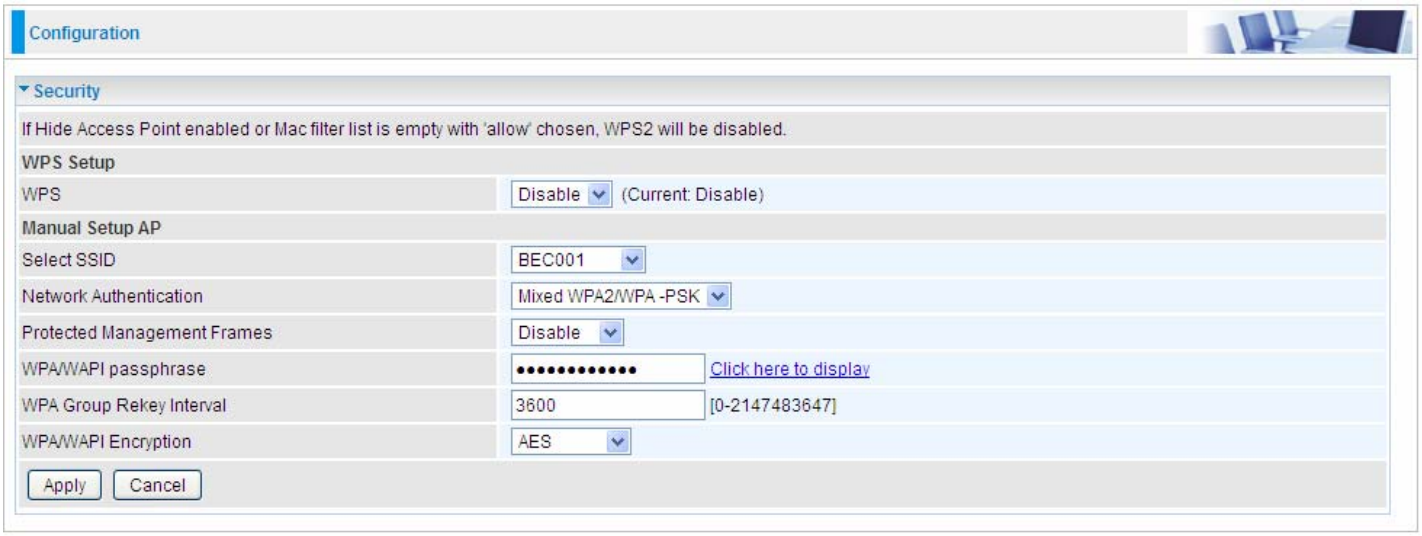
is present. For example, multiple Virtual APs might exist within a single physical AP, each advertising a distinct SSID and capability set. Alternatively, multiple Virtual APs might advertise the same SSID but a different capability set – allowing access to be provided via Web Portal, WEP, and WPA simultaneously. Where APs are shared by multiple providers, Virtual APs provide each provider with separate authentication and accounting data for their users, as well as diagnostic information, without sharing sensitive management traffic or data between providers. You can enable the virtual AP.

Here you can enable some Virtual APs according to the request. And the other parameters of virtual APs are the same to the above.

Click **Apply** to apply your settings.

Security

Wireless security prevents unauthorized access or damage to computers using wireless network.



Note：

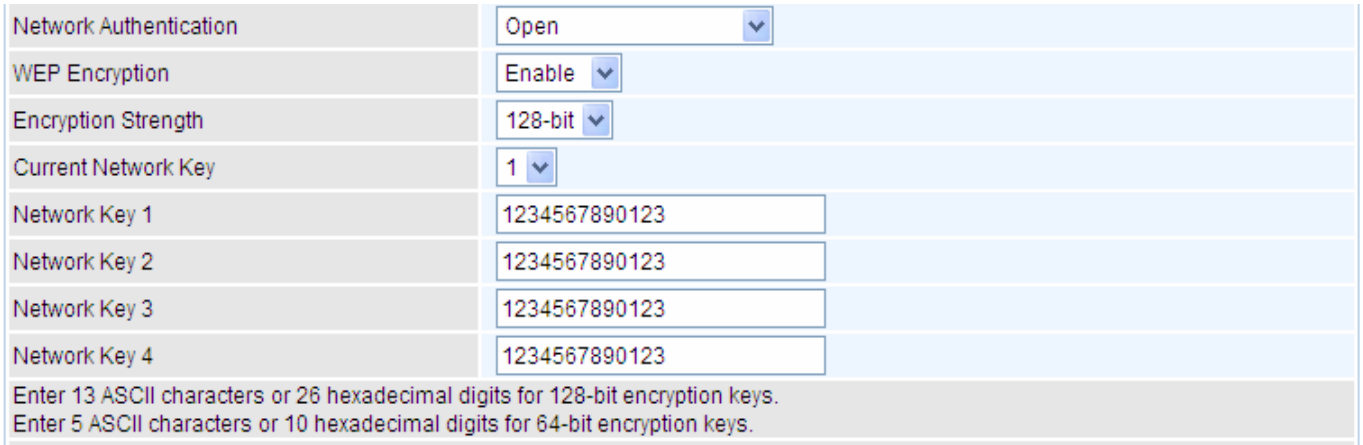
The WPS feature will also be unavailable when the security setting is not WPA2 or OPEN. So, if you manually set the wireless security setting, you should give notice to it, but you can find prompt indicating configuration.

Manual Setup AP

Select SSID: select the SSID you want these settings apply to.

Network Authentication

ⓘ **Open**



WEP Encryption: Select to enable or disable WEP Encryption. Here select Enable.

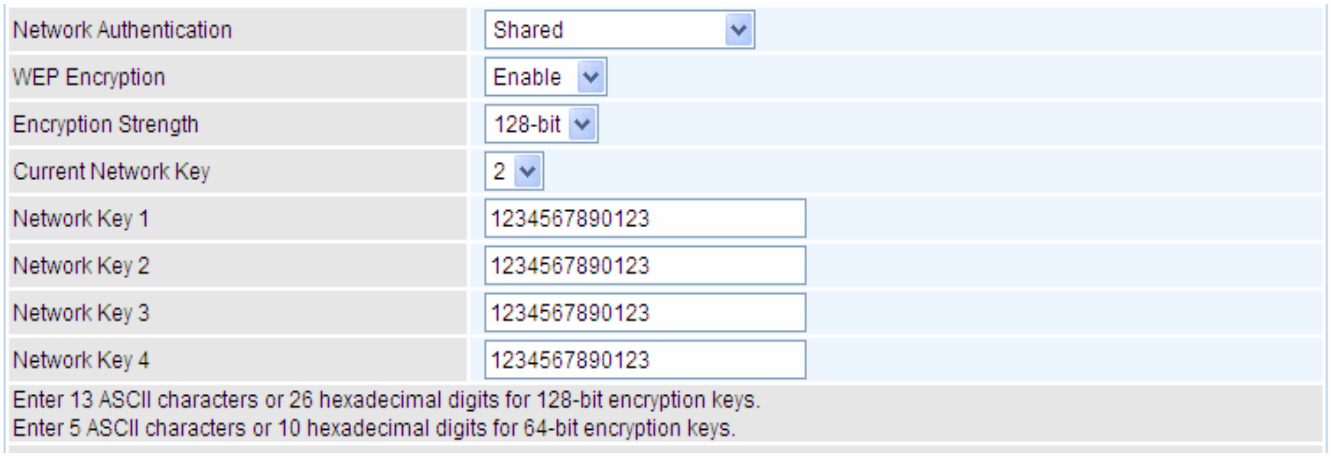
Encryption Strength: Select the strength, 128-bit or 64-bit.

Current Network Key: Select the one to be the current network key. Please refer to key 1- 4 below.

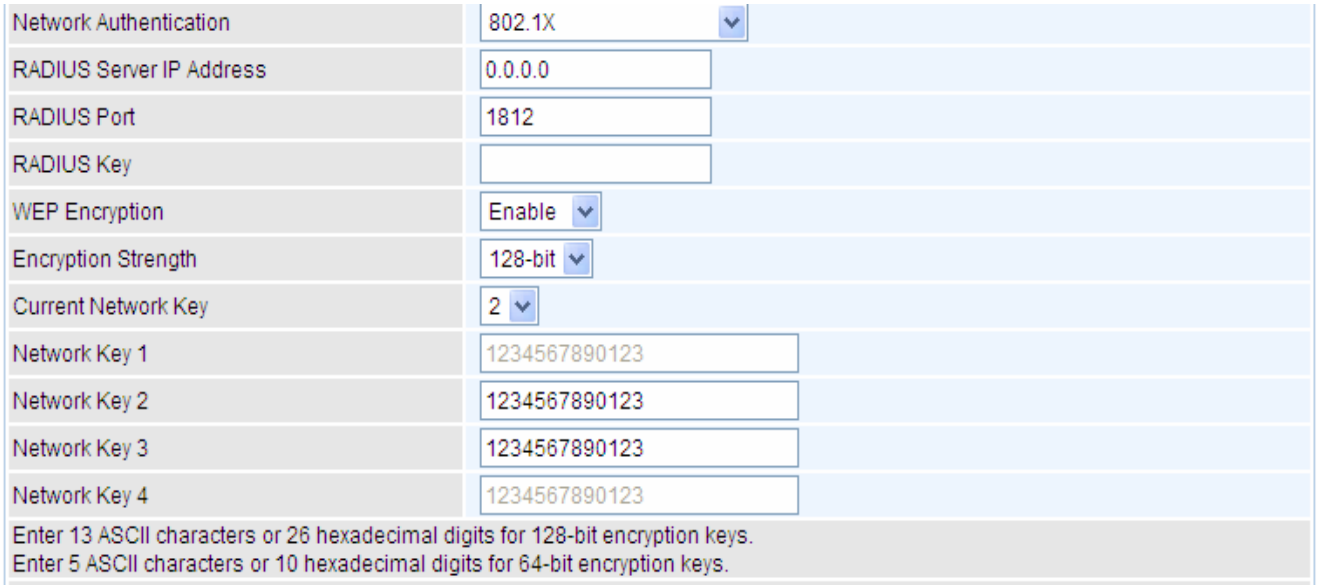
Network Key (1- 4): Enter 13 ASCII characters or 26 hexadecimal digits for 128-bit encryption keys. Enter 5 ASCII characters or 10 hexadecimal digits for 64-bit encryption keys.

ⓘ Shared

This is similar to network authentication ‘Open’. But here the WEP Encryption must be enabled.



ⓘ 802.1x



RADIUS Server IP Address: RADIUS(Remote Authentication Dial In User Service), Enter the IP address of RADIUS authentication server.

RADIUS Port: Enter the port number of RADIUS authentication server here.

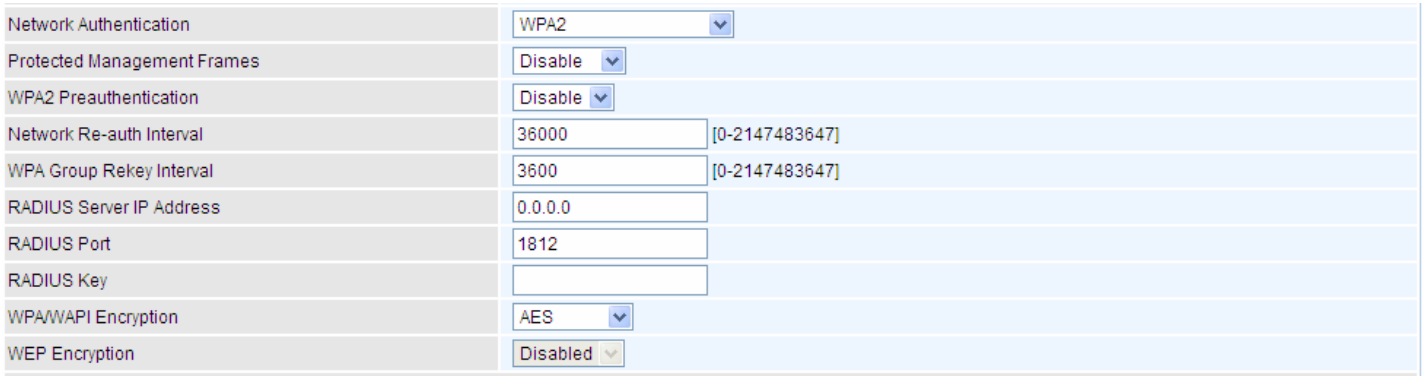
RADIUS Key: Enter the password of RADIUS authentication server.

WEP Encryption: Select to enable or disable WEP Encryption. Here select Enable.

Current Network Key: Select the one to be the current network key. Please refer to key 2- 3 below.

Network Key (1- 4): Enter 13 ASCII characters or 26 hexadecimal digits for 128-bit encryption keys. Enter 5 ASCII characters or 10 hexadecimal digits for 64-bit encryption keys.

ⓘ WPA2



Protected Management Frame: Select whether to enable protected management frame mechanism. By default, it is disabled. If enabled, the network adapter of the attempting wireless client should also support this feature.

WPA2 Preauthentication: When a wireless client wants to handoff to another AP, with preauthentication, it can perform 802.1X authentication to the new AP, and when handoff happens, this mode will help reduce the association time.

Network Re-auth Interval: the interval for network Re-authentication. This is in seconds.

WPA Group ReKey Internal: The period of renewal time for changing the security key automatically between wireless client and Access Point (AP). This is in seconds.

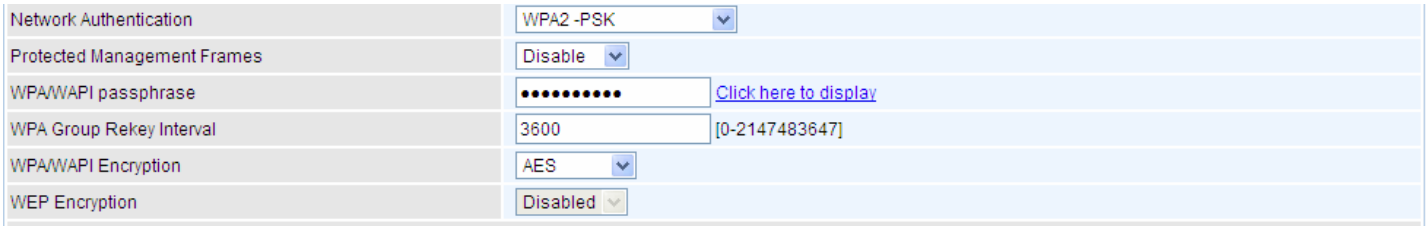
RADIUS Server IP Address: RADIUS(Remote Authentication Dial In User Service), Enter the IP address of RADIUS authentication server. This is in seconds.

RADIUS Port: Enter the port number of RADIUS authentication server here.

RADIUS Key: Enter the password of RADIUS authentication server.

WPA/WAPI Encryption: There are two Algorithms, AES (Advanced Encryption Standard) and TKIP(Temporal Key Integrity Protocol) which help to protect the wireless communication.

ⓘ WPA2-PSK



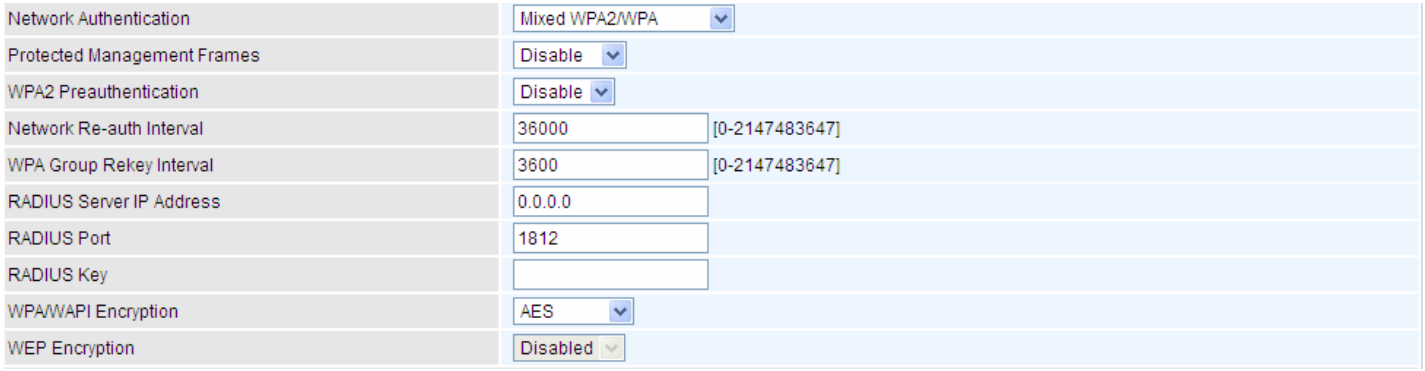
Protected Management Frame: Select whether to enable protected management frame mechanism. By default, it is disabled. If enabled, the network adapter of the attempting wireless client should also support this feature.

WPA/WAPI passphrase: Enter the WPA.WAPI passphrase; you can **click here to display** to view it.

WPA Group ReKey Internal: The period of renewal time for changing the security key automatically between wireless client and Access Point (AP). This is in seconds.

WPA/WAPI Encryption: There are two Algorithms, AES (Advanced Encryption Standard) and TKIP(Temporal Key Integrity Protocol) which help to protect the wireless communication.

ⓘ Mixed WPA2/WPA



Protected Management Frame: Select whether to enable protected management frame mechanism. By default, it is disabled. If enabled, the network adapter of the attempting wireless client should also support this feature.

WPA2 Preauthentication: When a wireless client wants to handoff to another AP, with preauthentication, it can perform 802.1X authentications to the new AP, and when handoff happens, this mode will help reduce the association time used.

Network Re-auth Interval: the interval for network Re-authentication. The unit is second.

WPA Group ReKey Internal: The period of renewal time for changing the security key automatically between wireless client and Access Point (AP). This is in seconds.

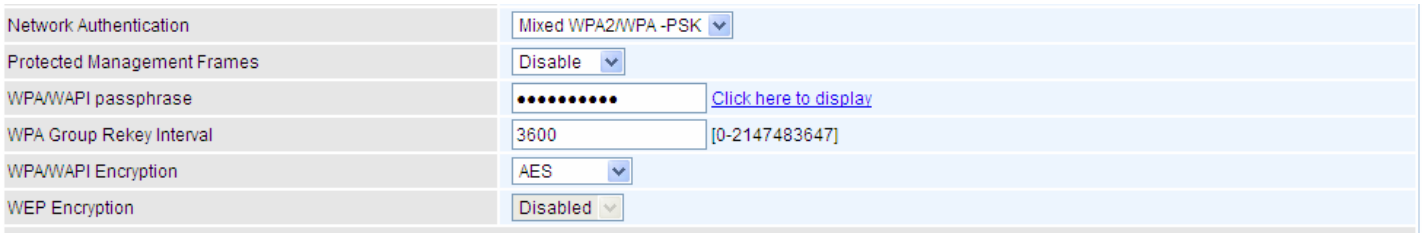
RADIUS Server IP Address: RADIUS(Remote Authentication Dial In User Service), Enter the IP address of RADIUS authentication server.

RADIUS Port: Enter the port number of RADIUS authentication server here.

RADIUS Key: Enter the password of RADIUS authentication server.

WPA/WAPI Encryption: There are two Algorithms, AES (Advanced Encryption Standard) and TKIP(Temporal Key Integrity Protocol) which help to protect the wireless communication.

ⓘ Mixed WPA2/WPA-PSk



Protected Management Frame: Select whether to enable protected management frame mechanism. By default, it is disabled. If enabled, the network adapter of the attempting wireless client should also support this feature.

WPA/WAPI passphrase: enter the WPA.WAPI passphrase, you can **click here to display** to view it.

WPA Group ReKey Internal: The period of renewal time for changing the security key automatically between wireless client and Access Point (AP). The unit is second.

WPA/WAPI Encryption: There are two Algorithms, AES (Advanced Encryption Standard) and TKIP(Temporal Key Integrity Protocol) which help to protect the wireless communication.

WPS Setup

WPS (Wi-Fi Protected Setup) feature is a standard protocol created by Wi-Fi Alliance. WPS is used to exchange the AP setting with Station and configure Ap settings. This feature greatly simplifies the steps needed to create a Wi-Fi network for a residential or an office setting. The commonly known **PIN method** is supported to configure WPS.

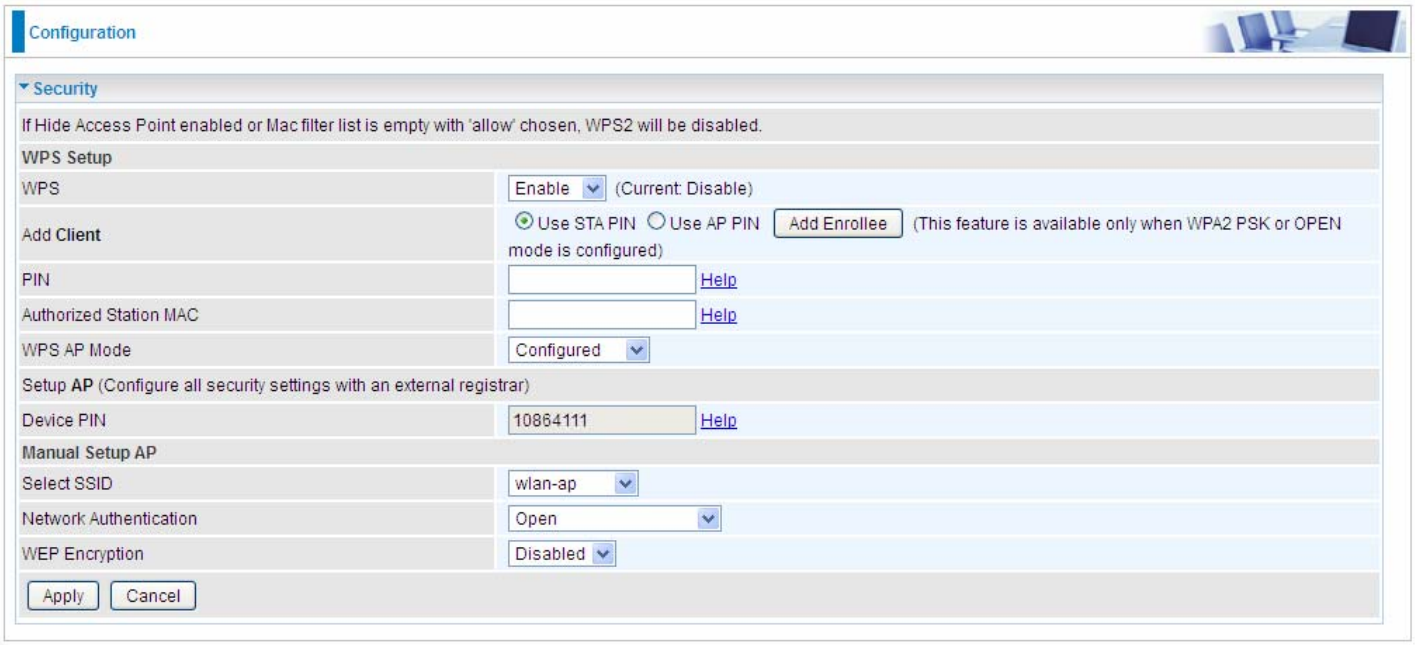
WPS: Select enable to enable WPS function. Please note that WPS can only be available when WPA2-PSK or OPEN mode is configured.

Note:

1) WPS feature is only available when in WPA2 or OPEN mode in security settings.

2) Here wireless can be configured as **Registrar** and **Enrollee** mode respectively. When AP is configured as Registrar, you should select “Configured” in the WPS AP Mode below, and default WPS AP Mode is “Configured”. When AP is configured as Enrollee, the WPS AP Mode below should be changed to “Unconfigured”. Follow the following steps.

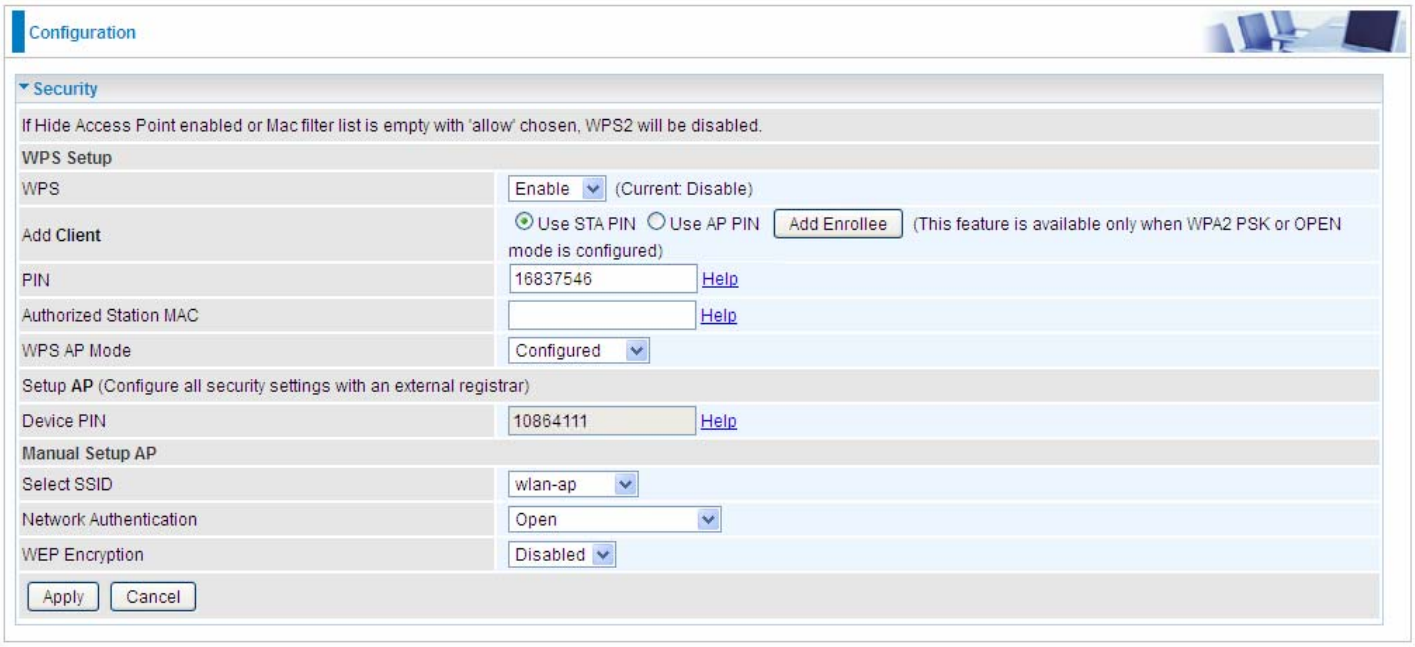
Change the SSID to “wlap-ap” for examples on WPS usage. The SSID change is only for example, users can change to whatever desired in wireless Basic configuration section.



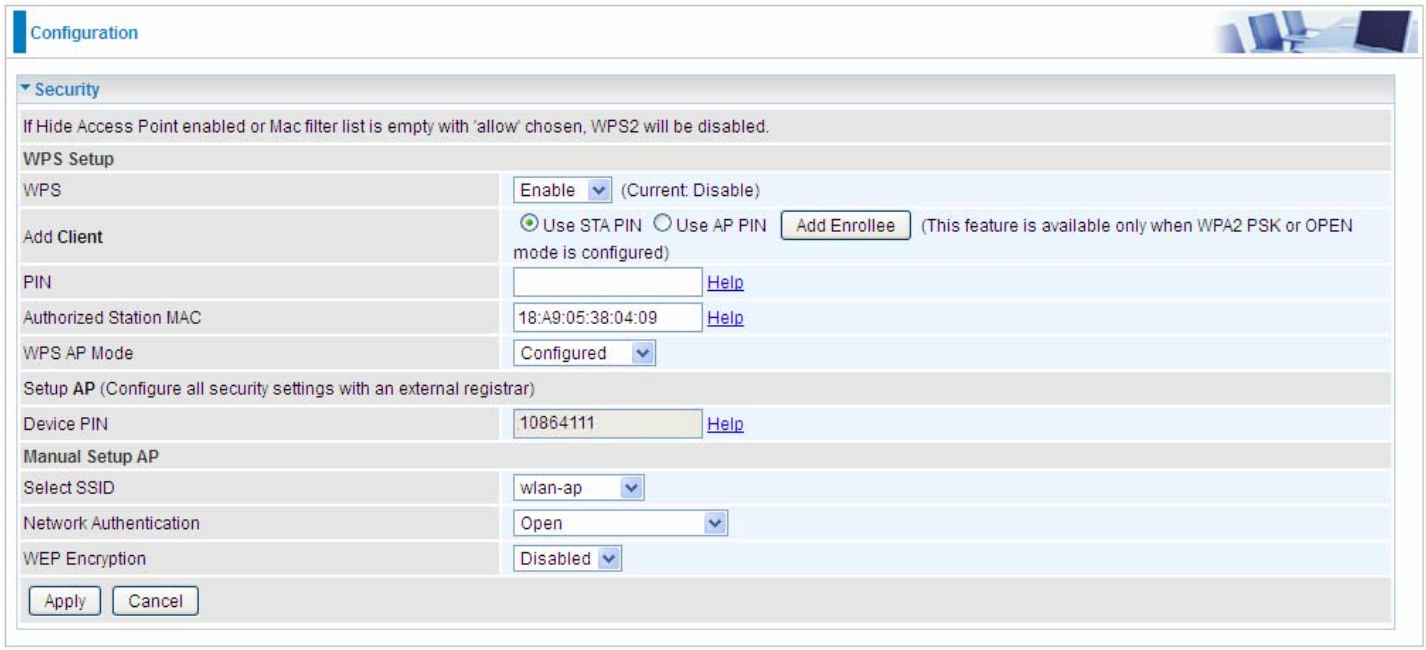
Configure AP as Registrar

Add Enrollee with PIN method

1. Select radio button "***Use STA PIN***".
2. Input PIN from Enrollee Station (16837546 in this example), Or else users can **alternatively** enter the authorized station MAC ***Help:*** it is to help users to understand the concept and correct operation.
3. Click Add Enrolee.



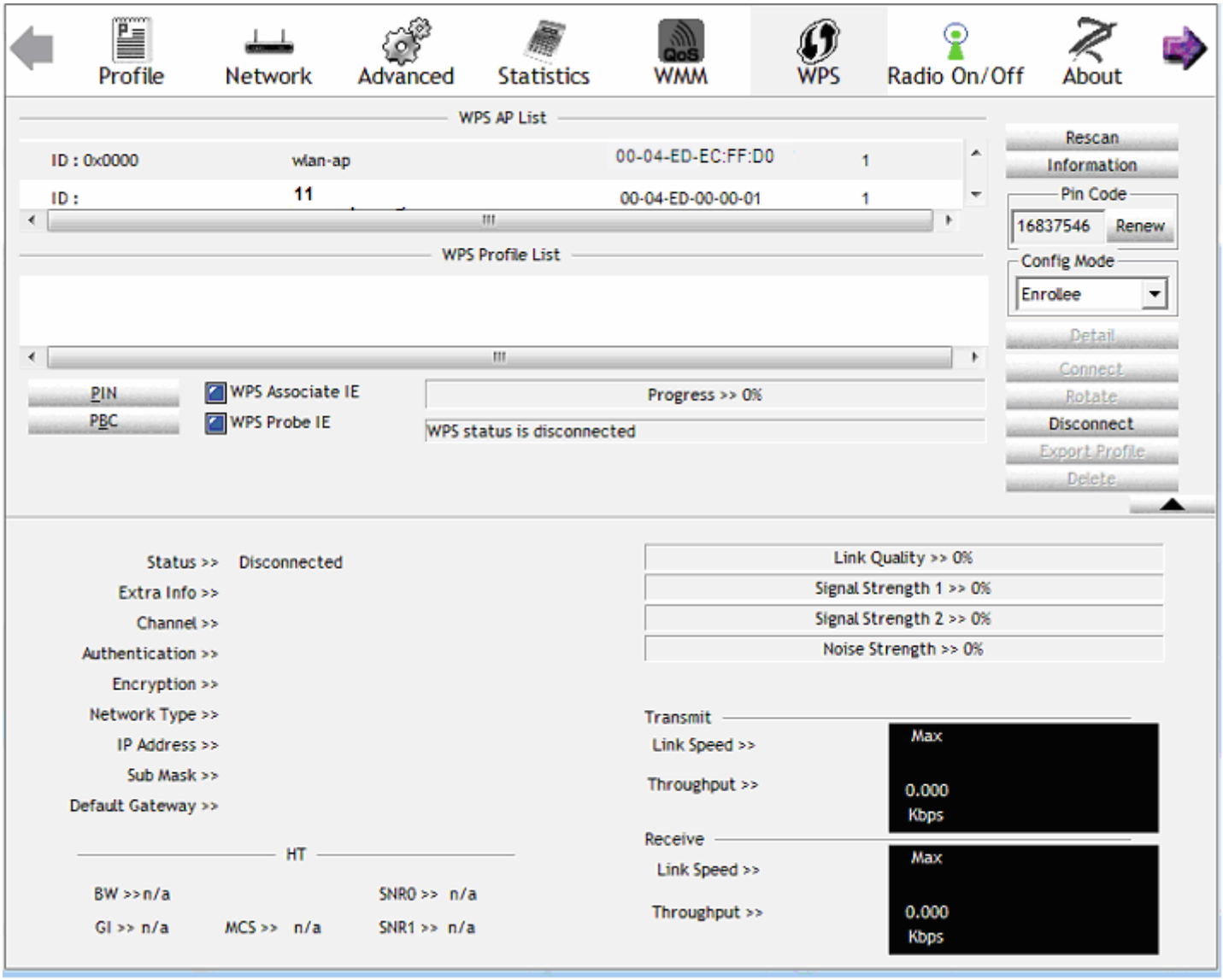
(Station PIN)



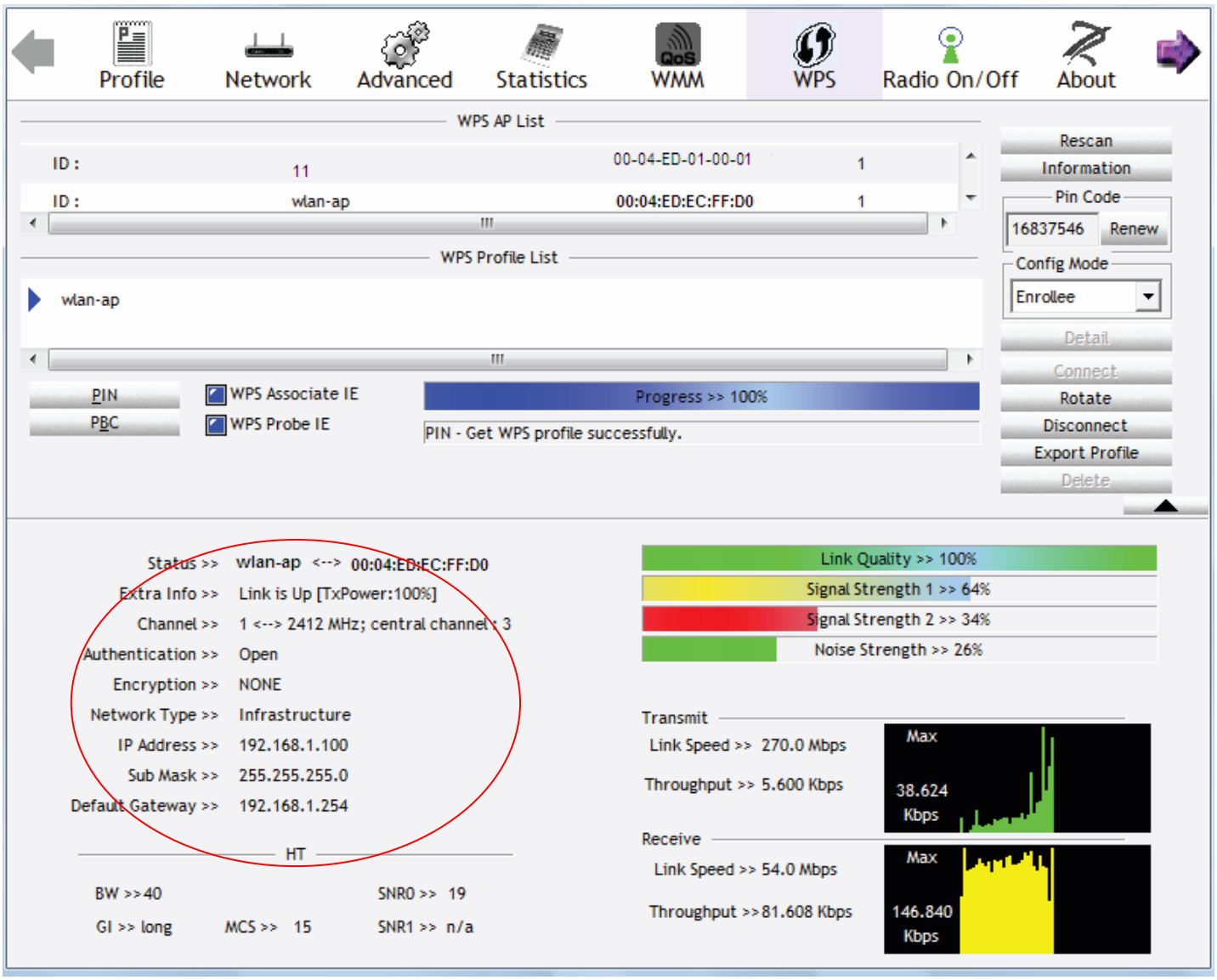
(Station MAC)

Note: Users can **alternatively** input PIN from Enrollee Station or enter the authorized station MAC.

4. Operate Station to start WPS Adding Enrollee. Launch the wireless client's WPS utility (eg.Ralink Utility). Set the Config Mode as Enrollee, press the WPS button on the top bar, select the AP (eg. wlan-ap) from the WPS AP List column. Then press the PIN button located on the middle left of the page to run the scan.



4. The client's SSID and security settings will now be configured to match the SSID and security settings of the registrar.



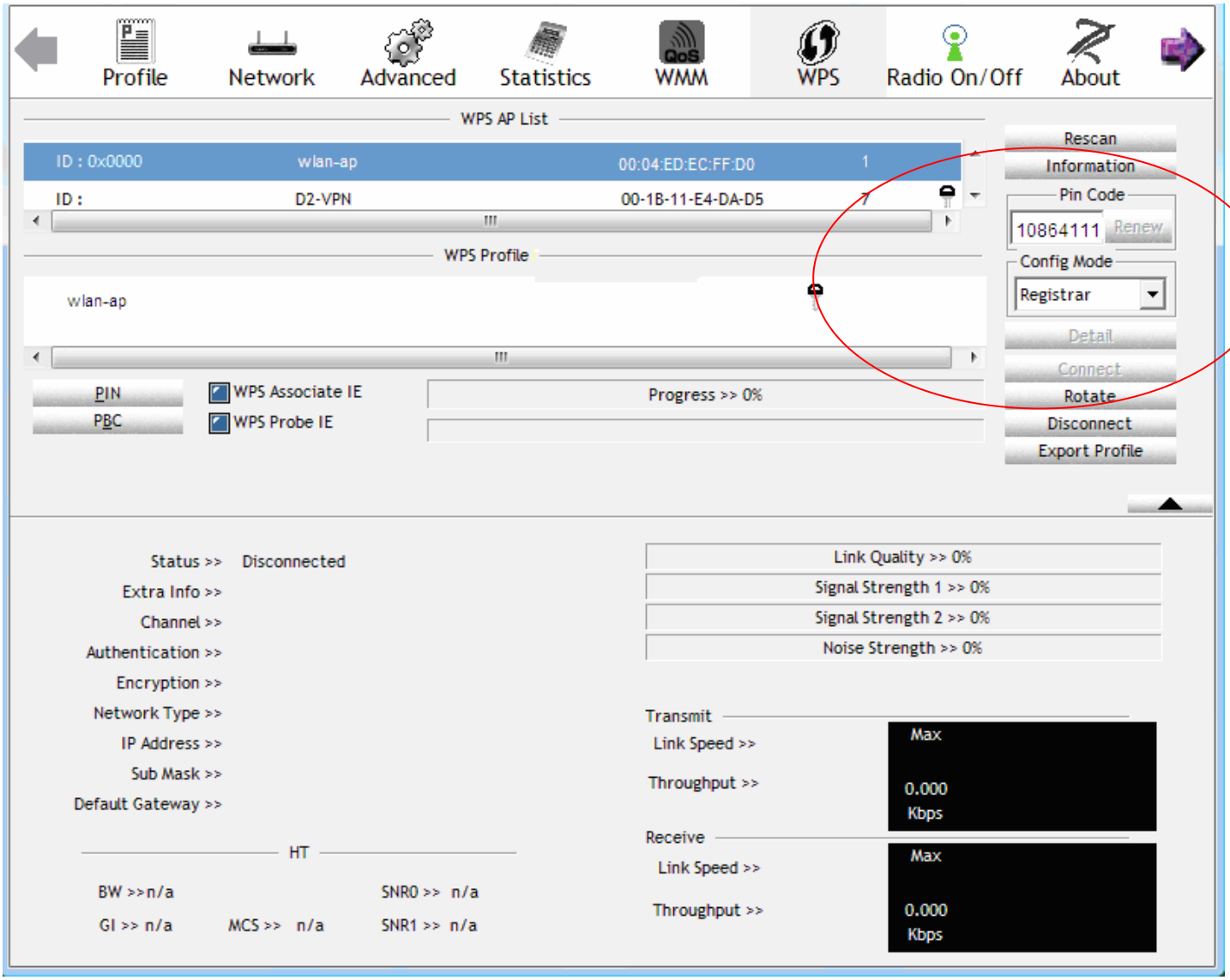
You can check the message in the red ellipse with the security parameters you set, here we all use the default.

Configure AP as Enrollee

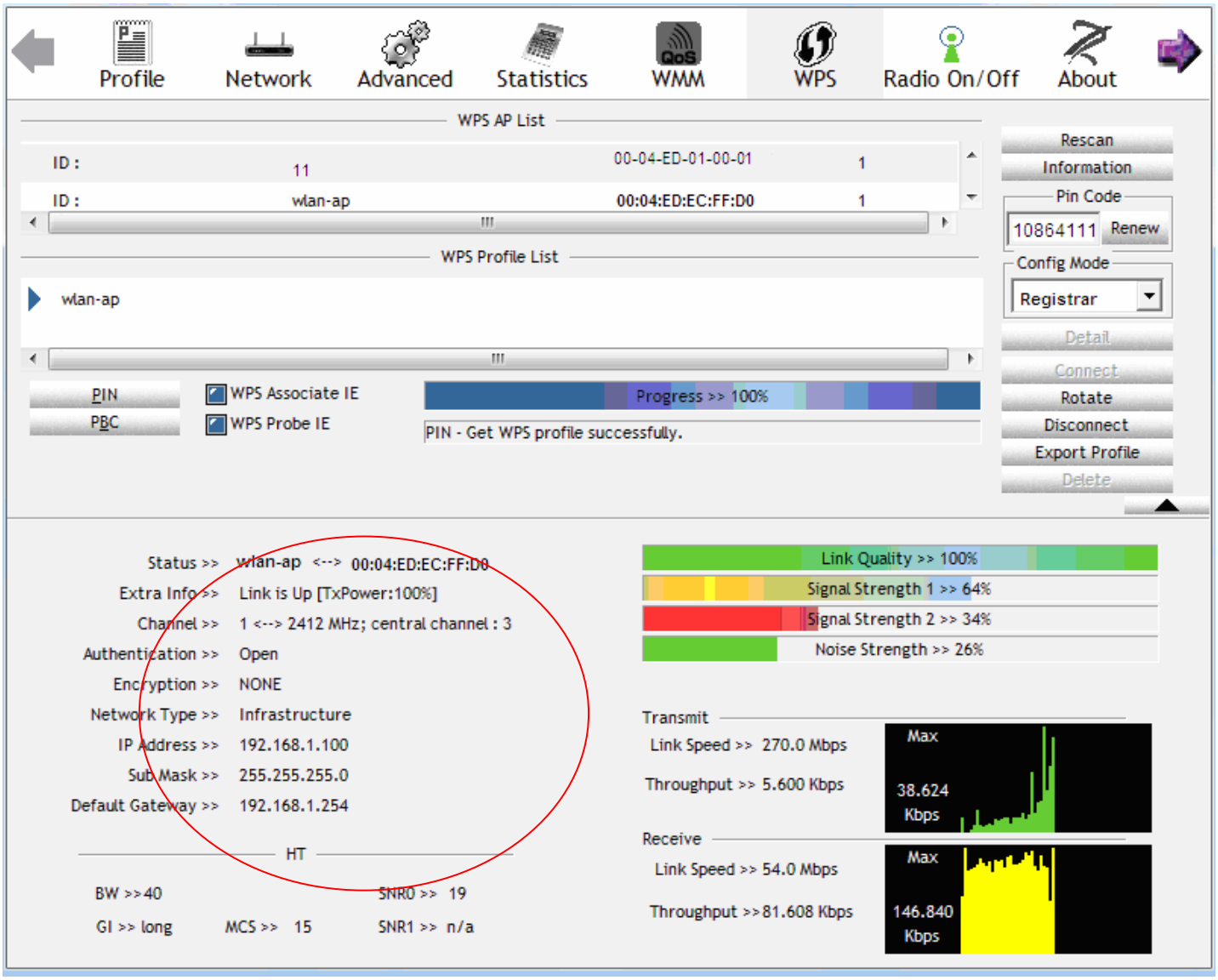
Add Registrar with PIN Method

1. Set AP to “***Unconfigured Mode***”.

2. Launch the wireless client's WPS utility (eg. Ralink Utility). Set the Config Mode as **Registrar**. Enter the **PIN** number (10864111 (device) for example) in the PIN Code column then choose the correct AP (eg. wlan-ap) from the WPS AP List section before pressing the PIN button to run the scan.



3. The router's (AP's) SSID and security setting will now be configured to match the SSID and security setting of the registrar.



4. Do Web Page refresh after ER complete AP Configuration to check the new parameters setting.

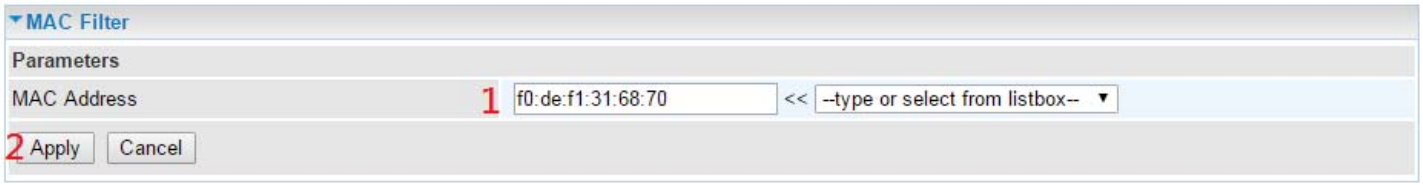
MAC Filter

Select SSID: select the SSID you want this filter applies to.

MAC Restrict Mode:

- **Disable:** disable the MAC Filter function.
- **Allow**: allow the hosts with the following listed MACs to access the wireless network.
- **Deny**: deny the hosts with the following listed MACs to access the wireless network.

Click **Add** to add the MACs.



MAC Address: enter the MAC address(es). The format of MAC address could be: xx:xx:xx:xx:xx:xx or xx-xx-xx-xx-xx-xx.

Click **Apply** to apply your settings and the item will be listed below.

To delete entries , check the remove checkbox and press **Remove** to delete it.

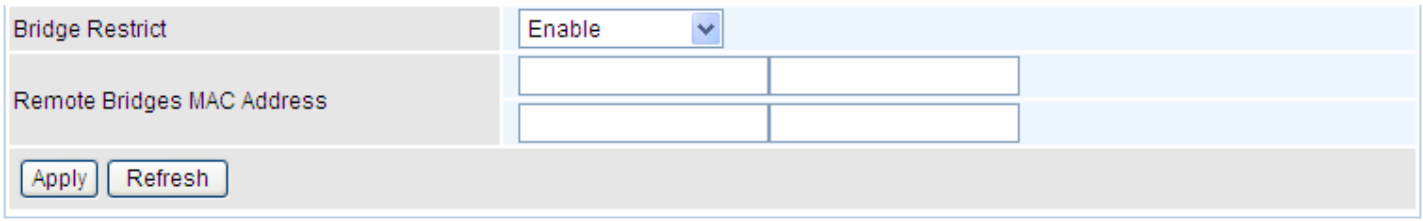
To make changes, click **Edit** of a MAC address to reconfigure the MAC as needed.

Wireless Bridge

WDS (wireless distributed system) is a wireless access point mode that enables wireless link and communication with other access points. It's easy to install, simply define the peer's MAC address of the connected AP. WDS takes advantage of cost saving and flexibility with no extra wireless client device required to bridge between two access points and extending an existing wired or wireless infrastructure network to create a larger network.

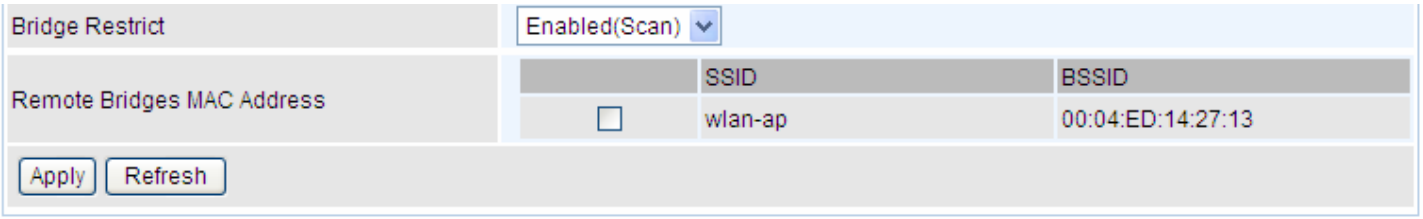
Bridge Restrict: Set to enable or disable the WDS function.

ⓘ **Enable:** to enable wireless bridge restriction. Only those specified in the Remote MAC Address the gateway can communicate with.



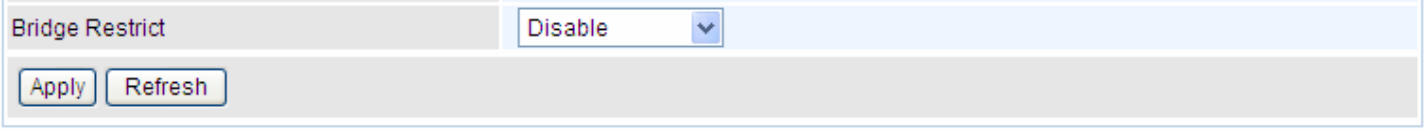
Remote Bridge MAC Address: enter the remote bridge MAC addresses. Here up to 4 bridge MAC addresses are supported.

ⓘ **Enabled (Scan):** to enable wireless bridge restriction. Only those scanned by the gateway can communicate.



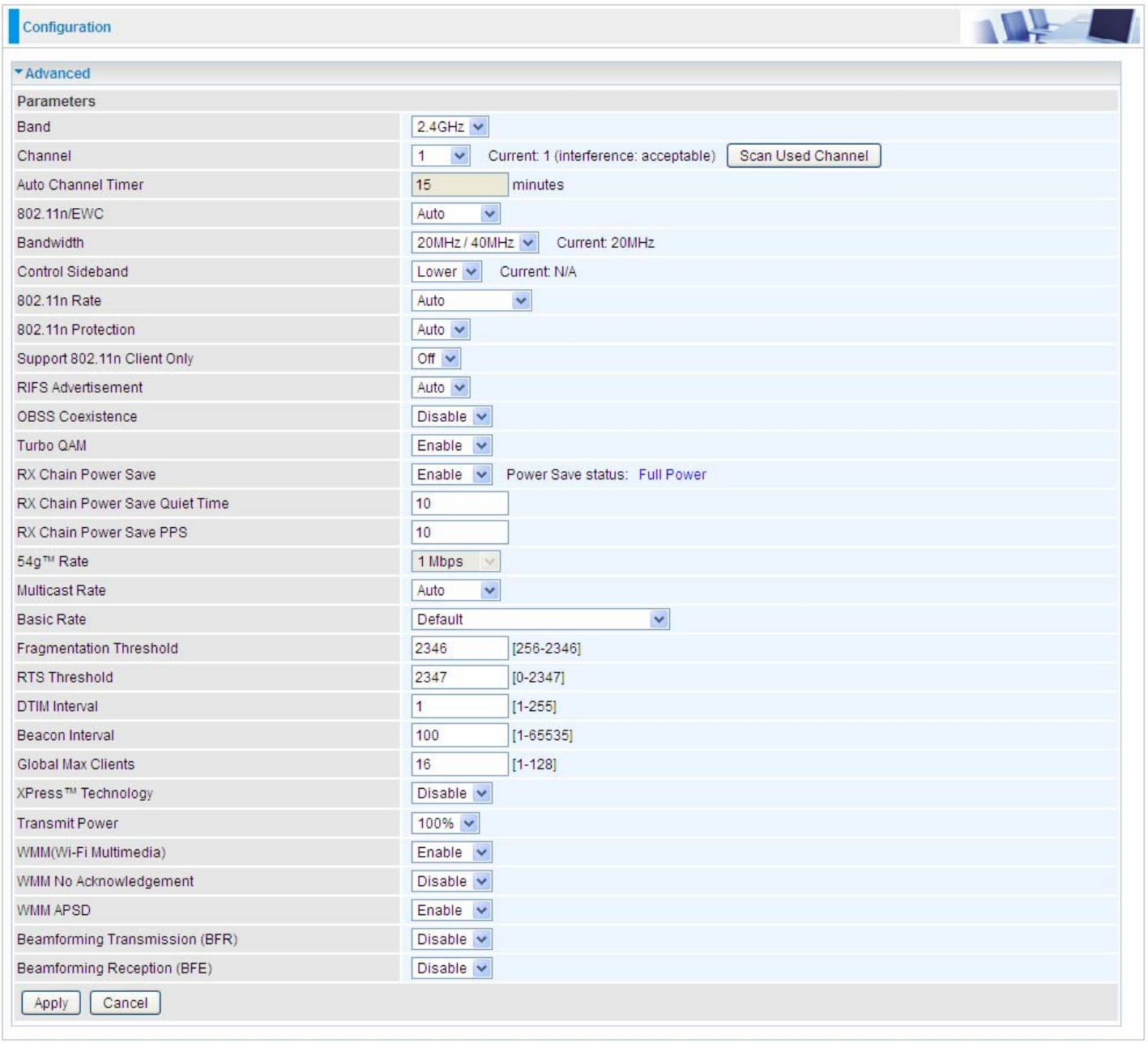
Remote Bridge MAC Address: select the remote bridge MAC addresses.

ⓘ **Disable:** Does not restrict the gateway communicating with bridges that have their MAC address listed, but it is still open to communicate with all bridges that are in the same network.



Click **Apply** to apply your settings.

Advanced



Band: In the 2.4 GHz radio frequency.

Channel: Choose a channel to use. Here is a list of available channels or select Auto mode instead.

Scan Used Channel: Press the button to scan and list all channels being used.

Auto Channel Timer (min): Available when Auto Channel is selected. The auto channel times length it takes to scan in minutes.

802.11n/EWC: select to auto enable or disable 802.11n.

Bandwidth: The higher the bandwidth the better the performance will be but greater interference with other wireless devices. Select **20MHz** for lessen radio interference.

Control Sideband: only available for 40MHz. It allows you to select upper sideband or lower sideband. Sideband refers to the frequency band either above (**upper sideband**) or below (**lower sideband**) the carrier frequency, within which fall the spectral components produced by modulation of a carrier wave.

802.11n Rate: This allows you to select the fixed transmission rate or auto.

802.11n Protection: turn off for maximize throughput.

Support 802.11n Client Only: turn on the option to only provide wireless access to the clients

operating at 802.11n speeds.

RIFS Advertisement: Reduced Inter-frame Spacing (RIFS) is an 802.11n feature that also improves performance by reducing the amount of dead time required between OFDM transmissions. Select Off to disable this function or auto to enable this function.

OBSS Coexistence: coexistence (or not) between 20 MHZ and 40 MHZ overlapping basic service sets (OBSS) in wireless local area networks.

Turbo QAM

RX Chain Power Save: Enabling this feature turns off one of the Receive chains, going from 2x2 to 2x1 to save power.

RX Chain Power Save Quiet Time: The number of seconds the traffic must be below the PPS value before the Rx Chain Power Save feature activates itself.

RX Chain Power Save PPS: The maximum number of packets per seconds that can be processed by the WLAN interface for duration of Quiet Time, described above, before the Rx Chain Power Save feature activates itself.

54g™ Rate: Available after changing **802.11n Rate** to "Use 54g Rate" in **802.11n Rate**. It is used to limit 11n speed to a specific rate, e.g. 1M, 6M, 12M, 24M, 48M, etc.

Multicast Rate: Setting for multicast packets transmission rate.

Basic Rate: Setting for basic transmission rate. It is not a specific kind of rate, it is a series of rates supported. When set to Default, the router can transmit with all kinds of standardized rates.

Fragmentation Threshold: A threshold (in bytes) whether the packets will be fragmented and at what size. Packets succeeding the fragmentation threshold of 802.11n WLAN will be split into smaller units suitable for circuit size. While the packets smaller than fragmentation threshold will not be fragmented. Default is 2346, setting the fragmentation too low may result in poor performance.

RTS Threshold: Request to Send (RTS) threshold specifies the packet size, when exceeds the size, the RTS/CTS will be triggered. The default setting of 2347(max length) will disable the RTS.

DTIM Interval: Delivery Traffic Indication Message (DTIM). The entry range is a value between 1 and 255. A DTIM is countdown variable that informs clients of the next window for listening to broadcast and multicast messages. When the AP has buffered broadcast or multicast messages for associated clients, it sends the next DTIM with a DTIM interval value. AP clients hear the beacons and awaken to receive the broadcast and multicast messages. The default is 1.

Beacon Interval: The amount of time between beacon transmissions in is milliseconds. The default is 100ms and the acceptable is 1- 65535. The beacon transmissions identify the presence of an access point.

Global Max Clients: Here you have the option of setting the limit of the number of clients who can connect to your wireless network.

XPress™ Technology: It has been designed to improve the wireless network efficiency. Default is disabled.

Transmit Power: select the transmitting power of your wireless signal.

WMM (Wi-Fi Multimedia): you can choose to enable or disable this function which allows for priority of certain data over wireless network.

WMM No Acknowledgement: Refers to the acknowledge policy at the MAC level. Enabling WMM No Acknowledgement can result in more efficient throughput but higher error rates in noisy Radio Frequency (RF) environment.

WMM APSD: Automatic Power Save Delivery. Enable this to save power.

Beamforming Transmission (BFR) / Beamforming Reception (BFE): Enable to increase wireless speed by focusing and concentrating transmitted (send) and/or receive signals with a wireless client instead of broadcast signals in all directions. **Note**: Both router and client wireless must support beamforming technology.

Station Info

Here you can view information about the wireless clients.

MAC Address: The MAC address of the wireless clients.

Associated: List all the stations that are associated with the Access Point. If a station is idle for too long, it is removed from this list

Authorized: List those devices with authorized access**.**

SSID: Show the current SSID of the client.

Interface: To show which interface the wireless client is connected to.

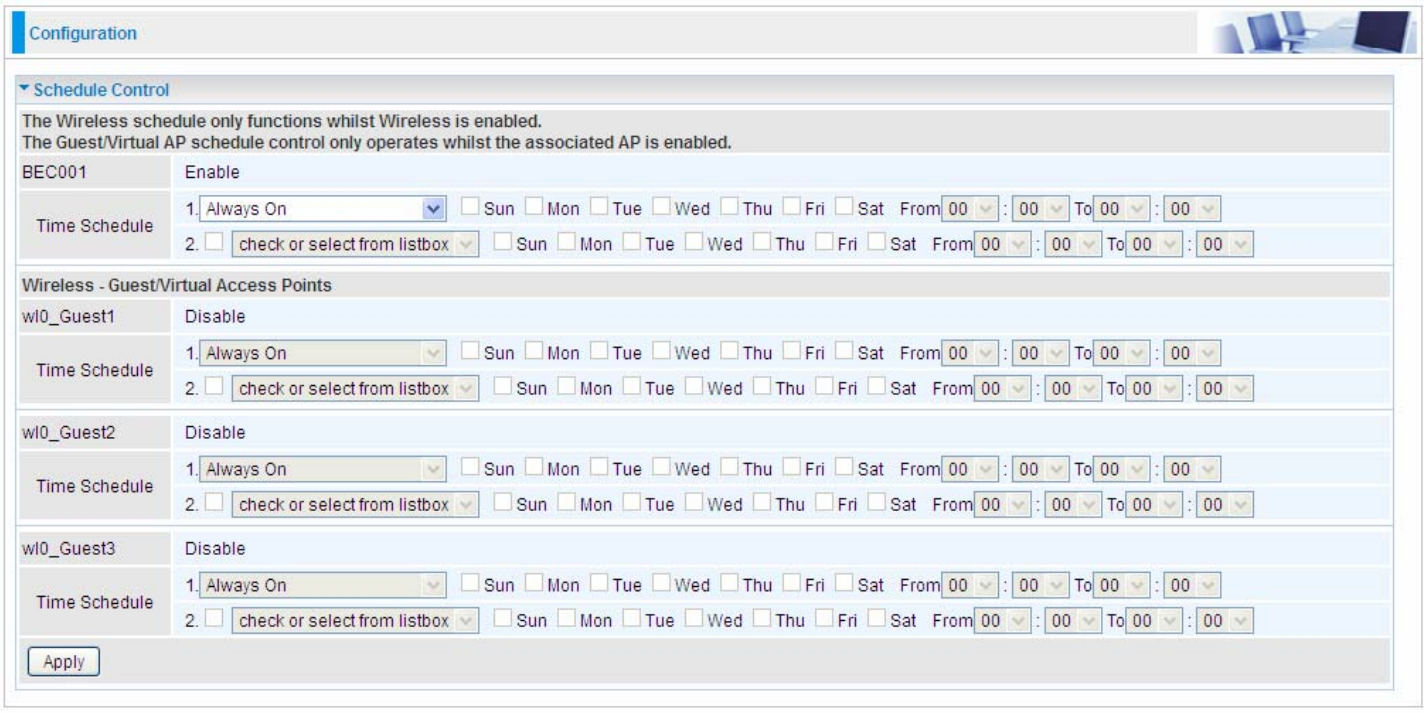
Refresh: To get the latest information.

Schedule Control

Schedule control is aimed to offer methods to flexibly control when the wireless network (SSID) is allowed for access.

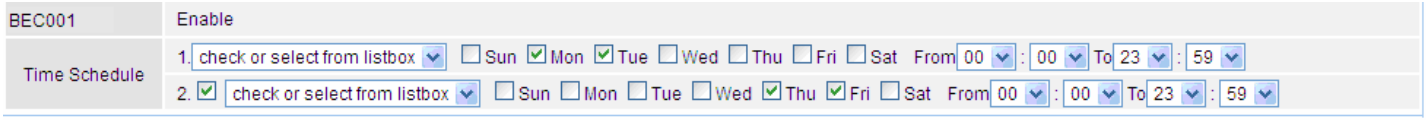
The Wireless schedule only functions whilst Wireless is enabled.
The Guest/Virtual AP schedule control only operates whilst the associated AP is enabled.

For detail setting the timeslot, user can turn to Time Schedule .



Time Schedule: Set when the SSID works. If user wants the SSID works all the time, please select “Always On”; if not, please set or select the exact time your want the SSID works. Here user can set two separate intervals.

For example: user wants the SSID “*BEC001*” to work on weekdays except for Wednesday, under this circumstance, user can set as shown below. (8920NXL-600 offers a optimal way to set two separate timeslots when user needs to activate the SSID during separate intervals.)

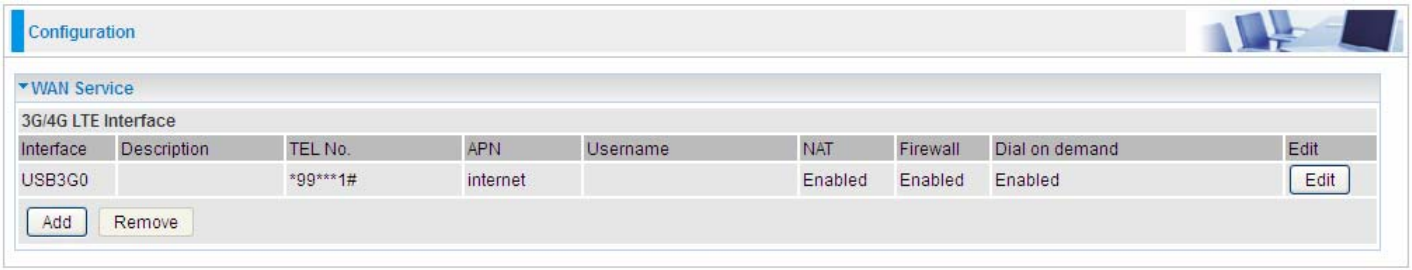


WAN-Wide Area Network

A WAN (Wide Area Network) is a computer network that covers a broad geographical area (eg. Internet) that is used to connect LAN and other types of network systems.

WAN Service

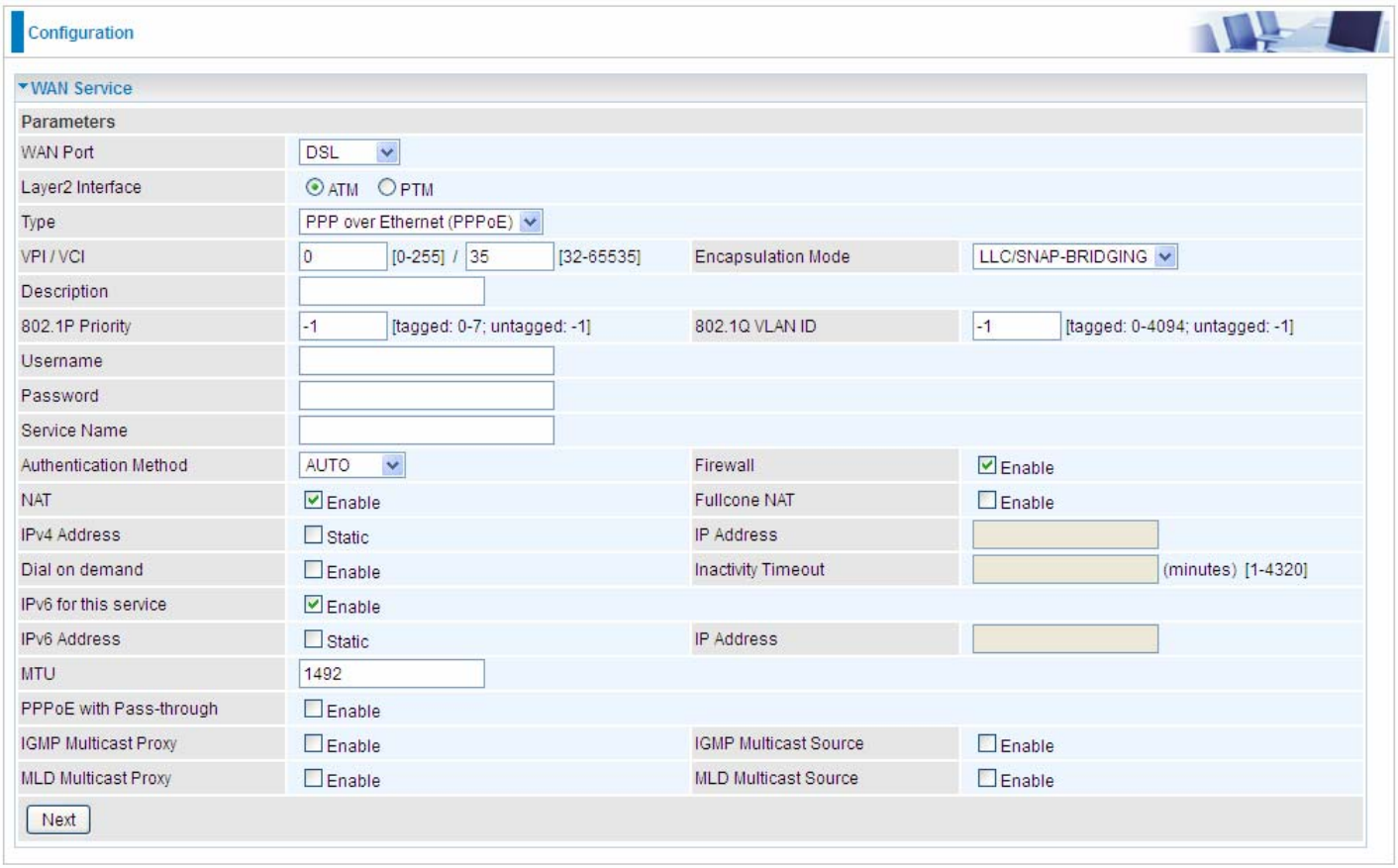
Three WAN interfaces are provided for WAN connection: DSL (VDSL/ADSL), Ethernet and 3G/4G LTE.



Click **Add** to add new WAN connections.

ⓘ DSL

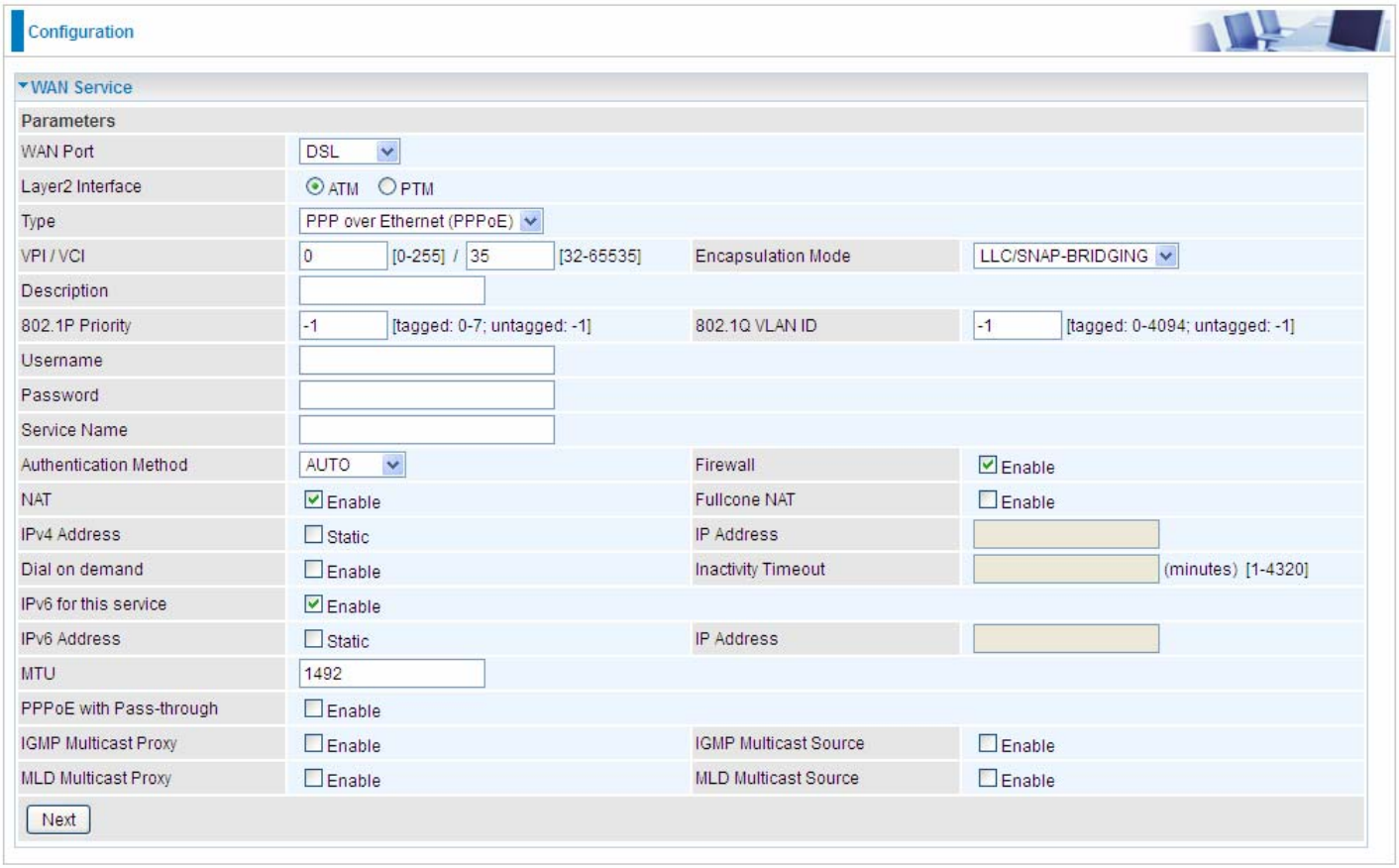
In DSL mode, there are two transfer modes for you to configure for WAN connection, namely **ATM (ADSL)** and **PTM (VDSL)** configuration of PTM mode is similar as ATM mode, here take ATM mode WAN configuration for example.



Layer2 Interface: 2 transfer mode, ATM or PTM.

PPPoE

PPPoE (PPP over Ethernet) provides access control in a manner which is similar to dial-up services using PPP.



VPI/VCI: Enter the VPI/VCI combination from you ISP.

Encapsulation Mode: Select the encapsulation mode, LLC/SNAP-BRIDGING, or VC/MUX.

Description: User-defined description for the connection, commonly for friendly use.

802.1P Priority: The parameter indicates the frame priority level from 0 (lowest) to 7 (highest), which can be used to prioritize different classes of traffic (voice, video, data, etc). Enter the priority identification, tagged: 0-1, untagged: -1.

802.1Q VLAN ID: It is a parameter to specify the VLAN which the frame belongs. Enter the VLAN ID identification, tagged: 0-4094, untagged : -1.

Username: Enter the account obtained from the ISP.

Password: Enter the password obtained from the ISP.

Service Name: The item is for identification purposes, user can define this.

Authentication Method: Default is ***Auto***. Or else your ISP will advise you the appropriate mode.

Firewall: Enable to drop all traffic from WAN side. If enabled, all incoming packets by default would be dropped, and please turn to IP Filtering Incoming to add allowing rules.

NAT: The NAT (Network Address Translation) feature allows multiple users to access the Internet through a single IP account by sharing the single IP address. If users on your LAN have their own public IP addresses to access the Internet, NAT function can be disabled. When enabled, a Fullcone NAT parameter will appear, you can determine whether to enable Fullcone NAT. While only NAT enabled, the default NAT type Port-Restricted cone NAT will be used.

Fullcone NAT: Enable or disable fullcone NAT. Fullcone is a kind of NAT, in this mode, all requests from the same internal IP address and port are mapped to the same external IP address and port.

Furthermore, any external host can send a packet to the internal host, by sending a packet to the mapped external address.

Note: In PPPoE connection, NAT is enabled by default, you can determine whether to enable Fullcone NAT or disable Fullcone NAT and only use NAT, the default NAT type is Port Restricted cone NAT. Of Port-Restricted cone NAT, the restriction includes port numbers. Specifically, an external host can send a packet, with source IP address X and source port P, to the internal host only if the internal host had previously sent a packet to IP address X and port P

IPv4 Address: Select whether to set static IPv4 address or obtain automatically.

IP Address: If ***Static*** is enabled in the above field, enter the static IPv4 address get from the ISP.

Dial on demand: It is a parameter to let users to dial for connection to internet themselves. It is useful when saving internet fees.

Inactivity Timeout: The set Inactivity timeout period, unit: minutes. It is combined use with Dial on Demand, users should specify the concrete time interval for dial on demand.

IPv6 for this service: Enable to use IPv6 service.

IPv6 Address: Select whether to set static IPv6 address or obtain automatically.

IP Address: If ***Static*** is enabled in the above field, enter the static IPv4 address.

MTU: Maximum Transmission Unit, the size of the largest datagram (excluding media-specific headers) that IP will attempt to send through the interface.

PPPoE with Pass-through: Enable or disable PPPoE pass-through. If it is enabled, PCs behind the router can dial itself.

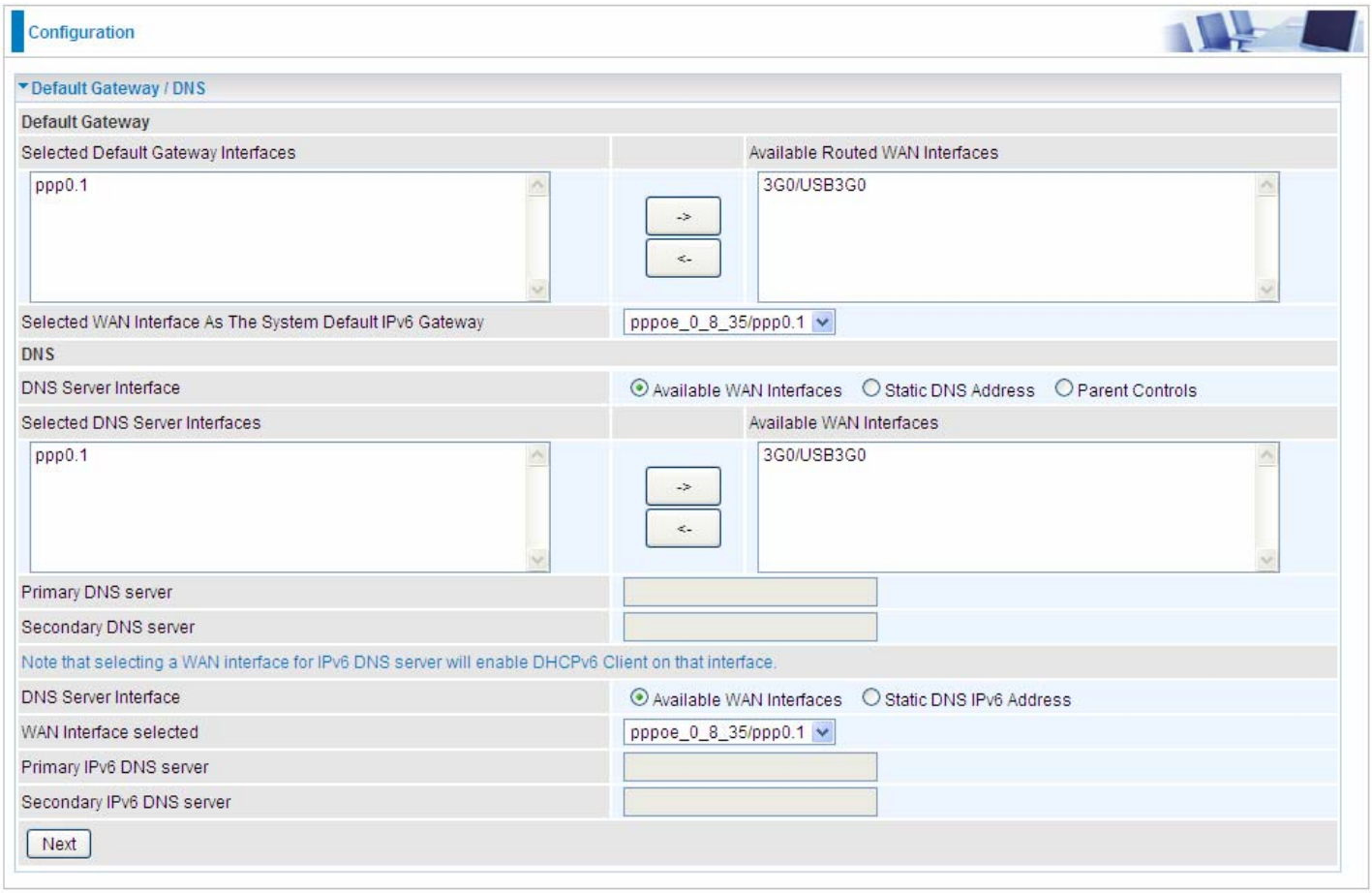
IGMP Multicast Proxy: Check whether to enable this feature. IGMP (**Internet Group Management Protocol**) Proxy intercepts the IGMP request from Clients and set up the multicast-forwarding table, it takes over some of the router's job, simplifying the router's job and multicast communication.

IGMP Multicast Source: Enable to support the "source filtering" which is the ability for a system to report interest in receiving packets "only " from specific source address(es), or "all but" specific source address(es), sent to a particular multicast address. **Note:** It works only on IGMP version 3.

MLD Multicast Proxy: check whether to enable this function. MLD (**Multicast Listener Discovery** Protocol) Proxy intercepts the MLD request from Clients a set up the multicast-forwarding table. it takes over some of the router's job, simplifying the router's job and multicast communication. Support MLDv1 and MLDv2.

MLD Multicast Source: Used in a similar way by IPv6 system as IGMP Multicast source in IPv4 system. Enable it to support the source filtering functionality for IPv6 system. **Note:** It works only on MLD version 2.

Click **Next** to continue to set the default gateway and DNS for IPv4 and IPv6.



Default Gateway

Select default gateway for you connection (IPv4 and IPv6).

DNS

- **IPv4**

Three ways to set an IPv4 DNS server

- **Available WAN interfaces:** Select a desirable WAN interface as the IPv4 DNS server.
- **Static DNS Address:** To specify DNS server manually by entering your primary and secondary DNS server addresses.
- **Parent Controls:** If user registers and gets a DNS account in the parental control provider website, expecting to enjoy a more reliable and safer internet surfing environment, please select this option (need to configure at Parental Control Provider).

- **IPv6**

Obtain IPv6 DNS info from a WAN interface

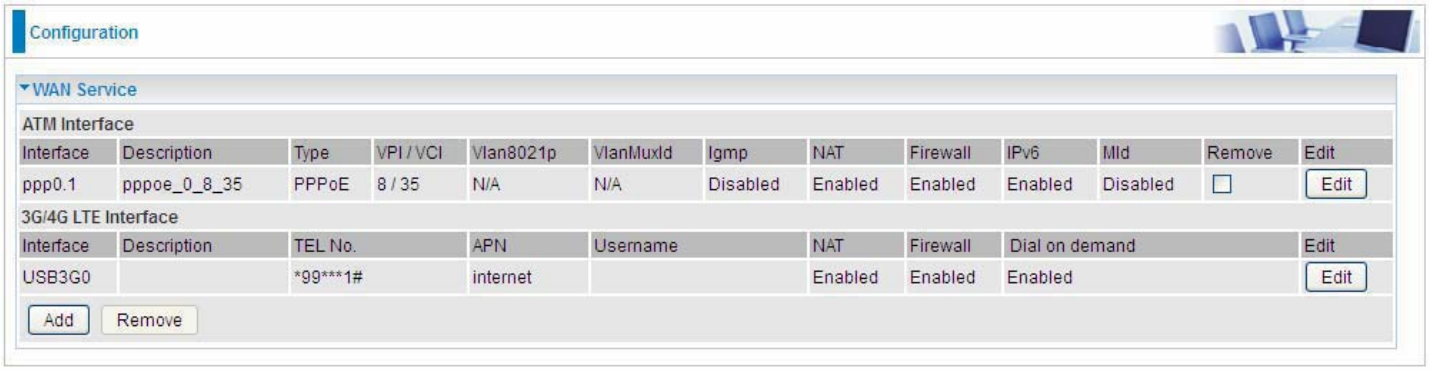
WAN Interface selected: Select one configured IPv6 WAN connection from the menu to be as an IPv6 DNS.

Static DNS IPv6 Address

Primary IPv6 DNS Server / Secondary IPv6 DNS Server: Type the specific primary and secondary IPv6 DNS Server address.

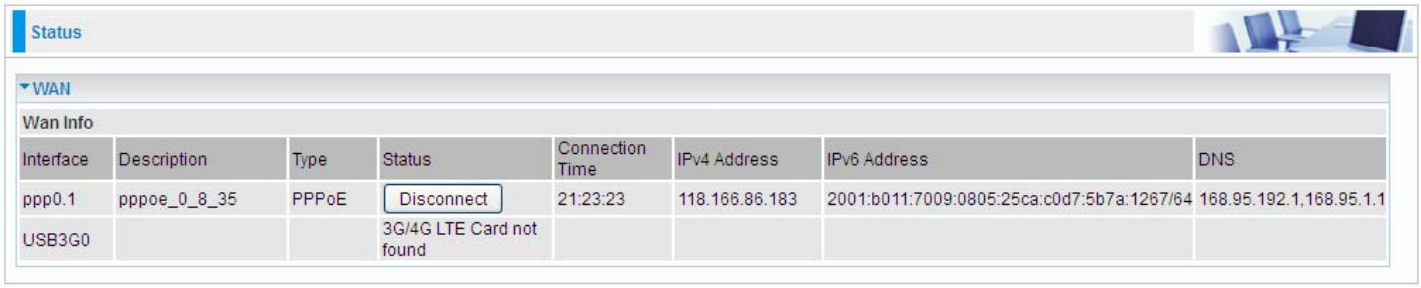
If you don’t need a service, select the item you want to remove, check the checkbox, then press **Remove**.

Press **Edit** button to re-edit this service settings.

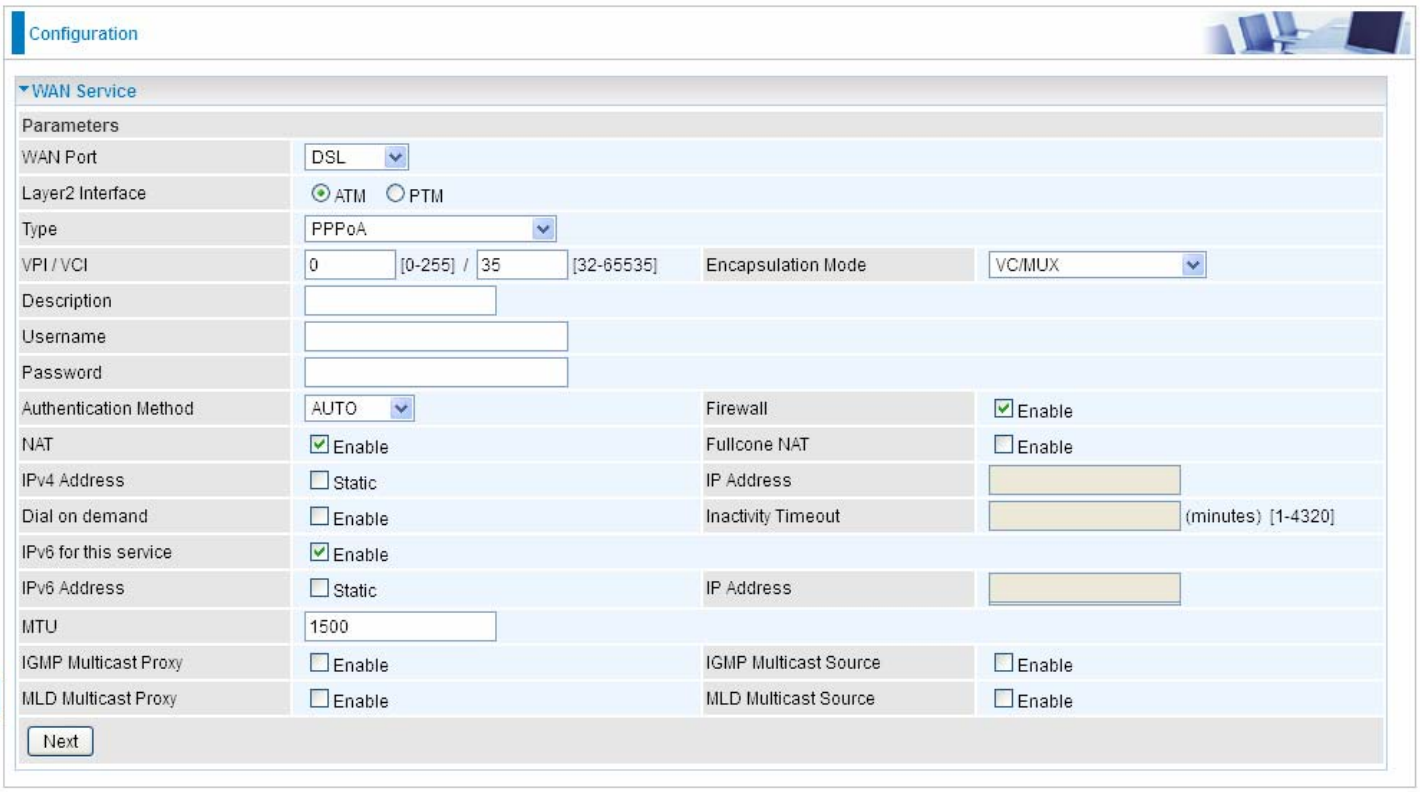


Here you can configure WAN Service, if it is OK, you can access the internet. You can go to **Status >WAN** or **Summary** to view the WAN connection information (if your ISP provides IPv6 service, then you will obtain an IPv6 address).

(IPv4 or IPv6)



PPPoA



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Dial on demand: It is a parameter to let users to dial for connection to internet themselves. It is

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Inactivity Timeout: The set Inactivity timeout period, unit: minutes. It is combined use with Dial on Demand, users should specify the concrete time interval for dial on demand.

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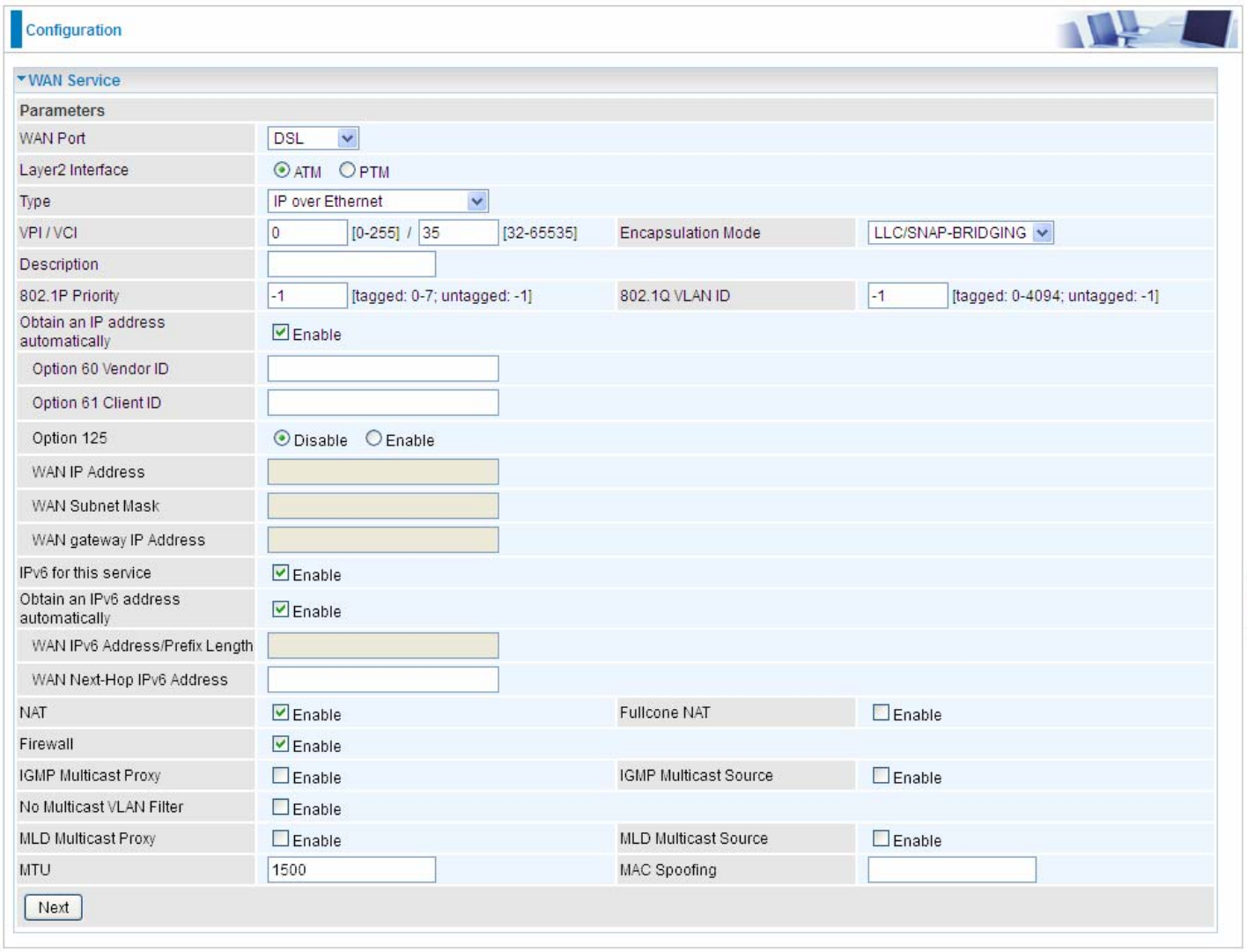
Click **Next** to continue to set the default gateway and DNS for IPv4 and IPv6.

IP over Ethernet



VPI/VCI: Enter the VPI/VCI combination from you ISP.

Encapsulation Mode: Select the encapsulation mode, LLC/SNAP-BRIDGING, or VC/MUX.

Description: User-defined description for the connection, commonly for friendly use.

802.1P Priority: The parameter indicates the frame priority level from 0 (lowest) to 7 (highest), which can be used to prioritize different classes of traffic (voice, video, data, etc). Enter the priority identification, tagged: 0-1, untagged: -1.

802.1Q VLAN ID: It is a parameter to specify the VLAN which the frame belongs. Enter the VLAN ID identification, tagged: 0-4094, untagged : -1.

Here two modes are supported for users to deal with the IP and DNS. You can select obtain automatically or manually input the information according to your ISP.

Obtain an IP address automatically: Check whether to enable this function.

Option 60 Vendor ID: Enter the associated information by your ISP. This option is used by DHCP clients to optionally identify the vendor type and configuration of a DHCP client. The information is a string of n octets, interpreted by servers. Vendors may choose to define specific vendor class identifiers to convey particular configuration or other identification information about a client.

Option 61 ClientID: Enter the associated information provided by your ISP.

Option 125: Option 125 is a complementary standard of DHCP protocol, it is used to encapsulate option 125 message into DHCP offer packet before forward it to clients. After the clients receive the

packet, it check the option 125 field in the packet with the prestored message, if it is matched, then the client accepts this offer, otherwise it will be abandoned. Check Enable or Disable this function. Default setting is ***Disable***.

WAN IP Address: Enter your IPv4 address to the device provided by your ISP.

WAN Subnet Mask: Enter your submask to the device provided by your ISP.

WAN gateway IP Address: Enter your gateway IP address to the device provided by your ISP.

IPv6 for this service: Enable to use IPv6 service.

Obtain an IPv6 address automatically: check whether to enable or disable this feature.

WAN IPv6 Address/Prefix Length: Enter the WAN IPv6 Address/Prefix Length from your ISP.

WAN Next-Hop IPv6 Address: Enter the WAN Next-Hop IPv6 Address from your ISP.

Note: If you don't know well about the DHCP Option, you can leave it empty or leave it as default.

NAT: The NAT (Network Address Translation) feature allows multiple users to access the Internet through a single IP account by sharing the single IP address. If users on your LAN have their own public IP addresses to access the Internet, NAT function can be disabled. When enabled, a Fullcone NAT parameter will appear, you can determine whether to enable Fullcone NAT. While only NAT enabled, the default NAT type Port-Restricted cone NAT will be used.

Fullcone NAT: Enable or disable fullcone NAT. Fullcone is a kind of NAT, in this mode, all requests from the same internal IP address and port are mapped to the same external IP address and port. Furthermore, any external host can send a packet to the internal host, by sending a packet to the mapped external address.

Firewall: Enable to drop all traffic from WAN side. If enabled, all incoming packets by default would be dropped, and please turn to IP Filtering Incoming to add allowing rules.

IGMP Multicast Proxy: Check whether to enable this feature. IGMP (**Internet Group Management Protocol**) Proxy intercepts the IGMP request from Clients and set up the multicast-forwarding table, it takes over some of the router's job, simplifying the router's job and multicast communication.

IGMP Multicast Source: Enable to support the "source filtering" which is the ability for a system to report interest in receiving packets "only " from specific source address(es), or "all but" specific source address(es), sent to a particular multicast address. **Note:** It works only on IGMP version 3.

No Multicast VLAN Filter: Enable to deactivate the multicast VLAN filter which allows users to filter on all multicast packets or on specific multicast groups.

MLD Multicast Proxy: check whether to enable this function. MLD (**Multicast Listener Discovery**

Protocol) Proxy intercepts the MLD request from Clients a set up the multicast-forwarding table. it takes over some of the router's job, simplifying the router's job and multicast communication. Support MLDv1 and MLDv2. **Note:** It works only on MLD version 2.

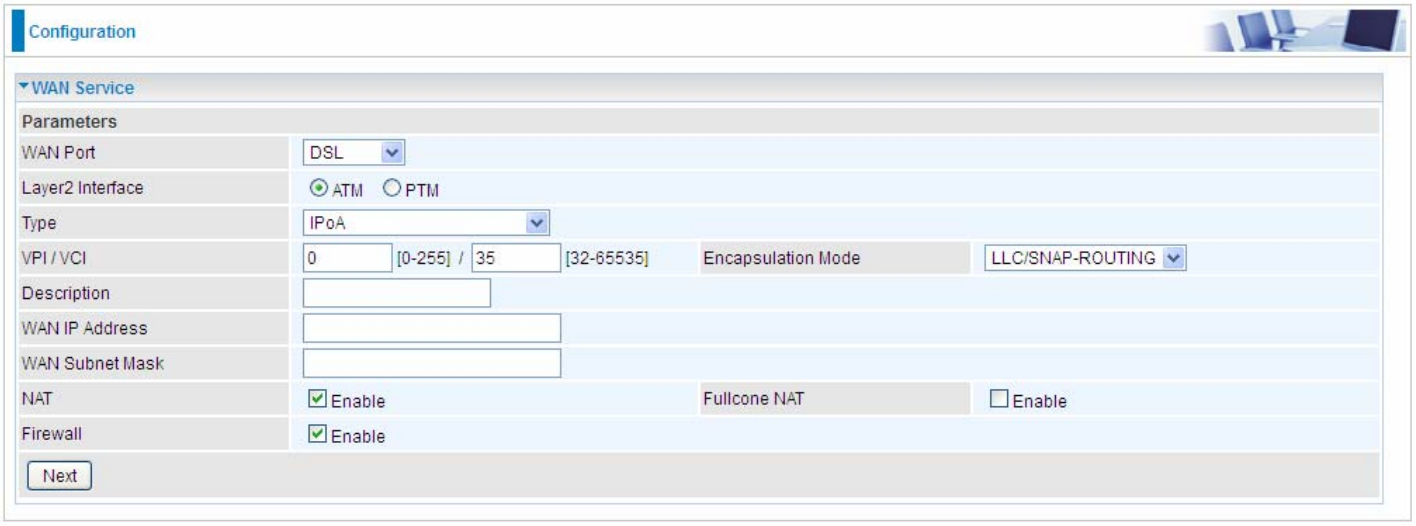
MLD Multicast Source: Used in a similar way by IPv6 system as IGMP Multicast source in IPv4 system. Enable it to support the source filtering functionality for IPv6 system.

MTU: Maximum Transmission Unit, the size of the largest datagram (excluding media-specific headers) that IP will attempt to send through the interface.

MAC Spoofing: This option is required by some service providers specifying some specific MAC allowed for joining network. You must fill in the MAC address specified by your service provider when this information is required.

Click **Next** to continue to set the default gateway and DNS for IPv4 and IPv6.

IPoA



VPI/VCI: Enter the VPI/VCI combination from you ISP.

Encapsulation Mode: Select the encapsulation mode, LLC/SNAP-BRIDGING, or VC/MUX.

Description: User-defined description for the connection, commonly for friendly use.

WAN IP Address: Enter the WAN IP from the ISP.

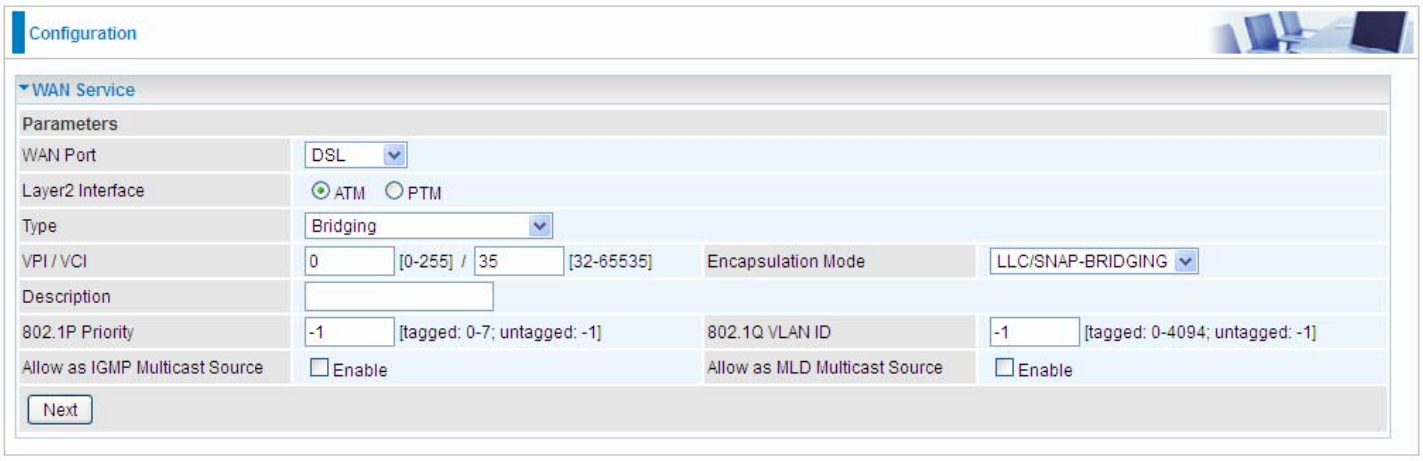
WAN Subnet Mask: Enter the WAN Subnet Mask from the ISP.

NAT: The NAT (Network Address Translation) feature allows multiple users to access the Internet through a single IP account by sharing the single IP address. If users on your LAN have their own public IP addresses to access the Internet, NAT function can be disabled. When enabled, a Fullcone NAT parameter will appear, you can determine whether to enable Fullcone NAT. While only NAT enabled, the default NAT type Port-Restricted cone NAT will be used.

Fullcone NAT: Enable or disable fullcone NAT. Fullcone is a kind of NAT, in this mode, all requests from the same internal IP address and port are mapped to the same external IP address and port. Furthermore, any external host can send a packet to the internal host, by sending a packet to the mapped external address.

Firewall: Enable to drop all traffic from WAN side. If enabled, all incoming packets by default would be dropped, and please turn to IP Filtering Incoming to add allowing rules.

Bridging



VPI/VCI: Enter the VPI/VCI combination from you ISP.

Encapsulation Mode: Select the encapsulation mode, LLC/SNAP-BRIDGING, or VC/MUX.

Description: User-defined description for the connection, commonly for friendly use.

802.1P Priority: The parameter indicates the frame priority level from 0 (lowest) to 7 (highest), which can be used to prioritize different classes of traffic (voice, video, data, etc). Enter the priority identification, tagged: 0-1, untagged: -1.

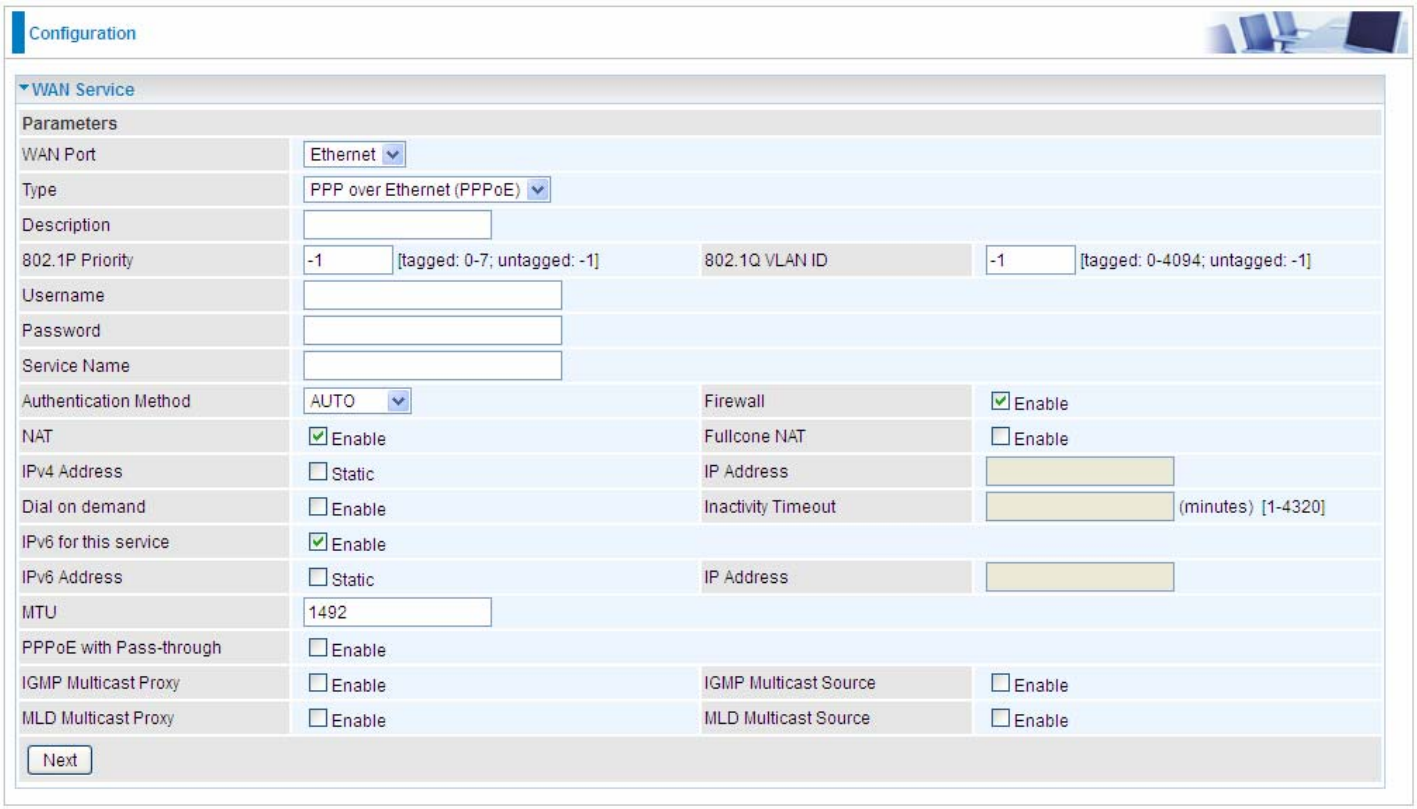
802.1Q VLAN ID: It is a parameter to specify the VLAN which the frame belongs. Enter the VLAN ID identification, tagged: 0-4094, untagged : -1.

Allow as IGMP Multicast Source: Enable to support the “source filtering” which is the ability for a system to report interest in receiving packets “only ” from specific source address(es), or “all but” specific source address(es), sent to a particular multicast address. **Note:** It works only on IGMP version 3.

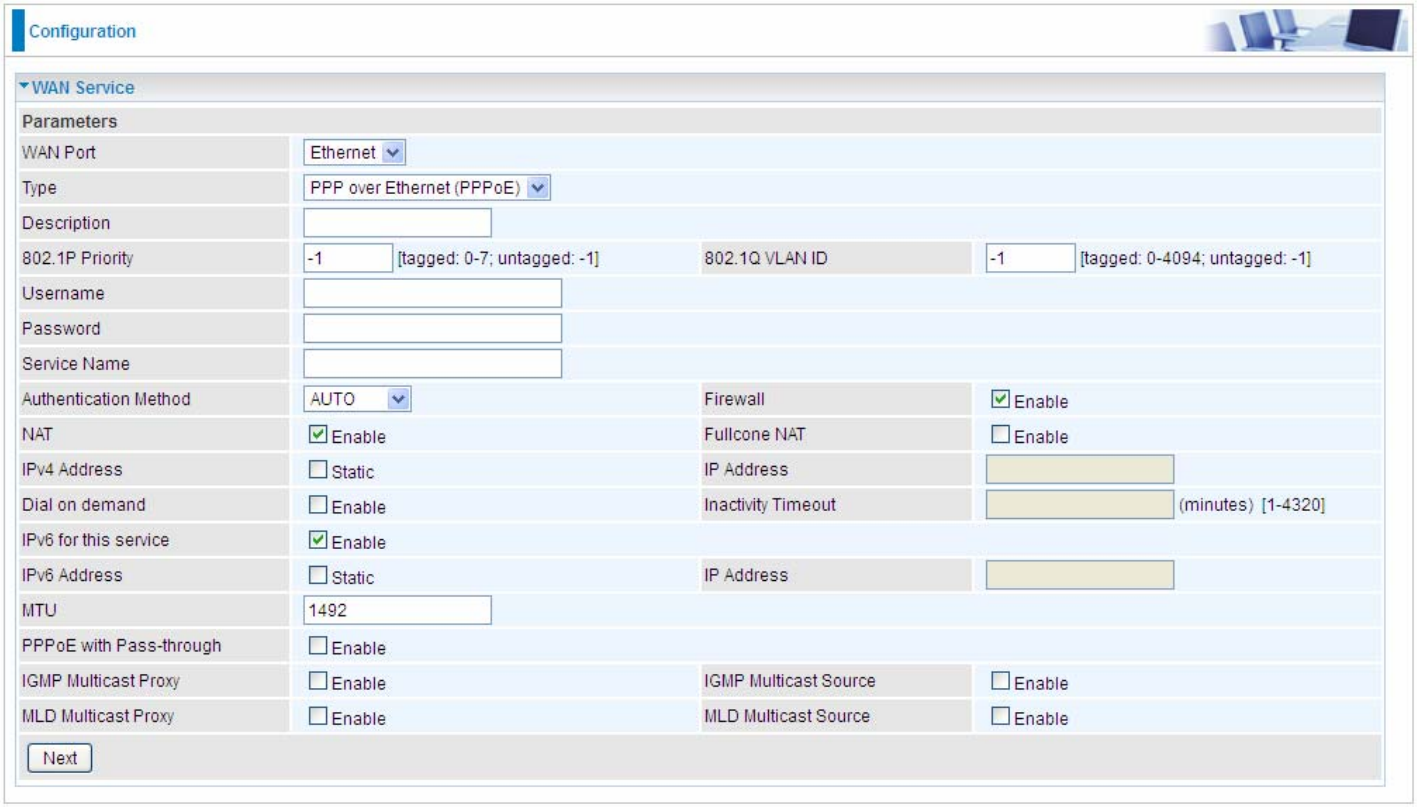
Allow as MLD Multicast Source: Used in a similar way by IPv6 system as IGMP Multicast source in IPv4 system. Enable it to support the source filtering functionality for IPv6 system. **Note:** It works only on MLD version 2.

ⓘ Ethernet

Ethernet WAN connection is well known as directly broadband WAN connection.



PPPoE



Description: User-defined description for the connection, commonly for friendly use.

802.1P Priority: The parameter indicates the frame priority level from 0 (lowest) to 7 (highest), which can be used to prioritize different classes of traffic (voice, video, data, etc). Enter the priority identification, tagged: 0-1, untagged: -1.

802.1Q VLAN ID: It is a parameter to specify the VLAN which the frame belongs. Enter the VLAN ID

identification, tagged: 0-4094, untagged : -1.

Username: Enter the account obtained from the ISP.

Password: Enter the password obtained from the ISP.

Service Name: The item is for identification purpose, user can define it yourselfe.

Authentication Method: Default is ***Auto***. Or else your ISP will advise you the appropriate mode.

Firewall: Enable to drop all traffic from WAN side. If enabled, all incoming packets by default would be dropped, and please turn to IP Filtering Incoming to add allowing rules.

NAT: The NAT (Network Address Translation) feature allows multiple users to access the Internet through a single IP account by sharing the single IP address. If users on your LAN have their own public IP addresses to access the Internet, NAT function can be disabled. When enabled, a Fullcone NAT parameter will appear, you can determine whether to enable Fullcone NAT. While only NAT enabled, the default NAT type Port-Restricted cone NAT will be used.

Fullcone NAT: Enable or disable fullcone NAT. Fullcone is a kind of NAT, in this mode, all requests from the same internal IP address and port are mapped to the same external IP address and port. Furthermore, any external host can send a packet to the internal host, by sending a packet to the mapped external address.

Note: In PPPoE connection, NAT is enabled by default, you can determine whether to enable Fullcone NAT. and while you disable Fullcone NAT and only use NAT, the default NAT type is Port Restricted or Port-Restricted cone NAT, the restriction includes port numbers. Specifically, an external host can send a packet, with source IP address X and source port P, to the internal host only if the internal host had previously sent a packet to IP address X and port P.

IPv4 Address: Select whether to set static IPv4 address or obtain automatically.

IP Address: If ***Static*** is enabled in the above field, enter the static IPv4 address get from the ISP.

Dial on demand: It is a parameter to let users to dial for connection to internet themselves. It is useful when saving internet fees.

Inactivity Timeout: The set Inactivity timeout period, unit: minutes. It is combined use with Dial on Demand, users should specify the concrete time interval for dial on demand.

IPv6 for this service: Enable to use IPv6 service.

IPv6 Address: Select whether to set static IPv6 address or obtain automatically.

IP Address: If ***Static*** is enabled in the above field, enter the static IPv4 address.

MTU: Maximum Transmission Unit, the size of the largest datagram (excluding media-specific headers) that IP will attempt to send through the interface.

PPPoE with Pass-through: Enable or disable PPPoE pass-through. If it is enabled, PCs behind the router can dial itself.

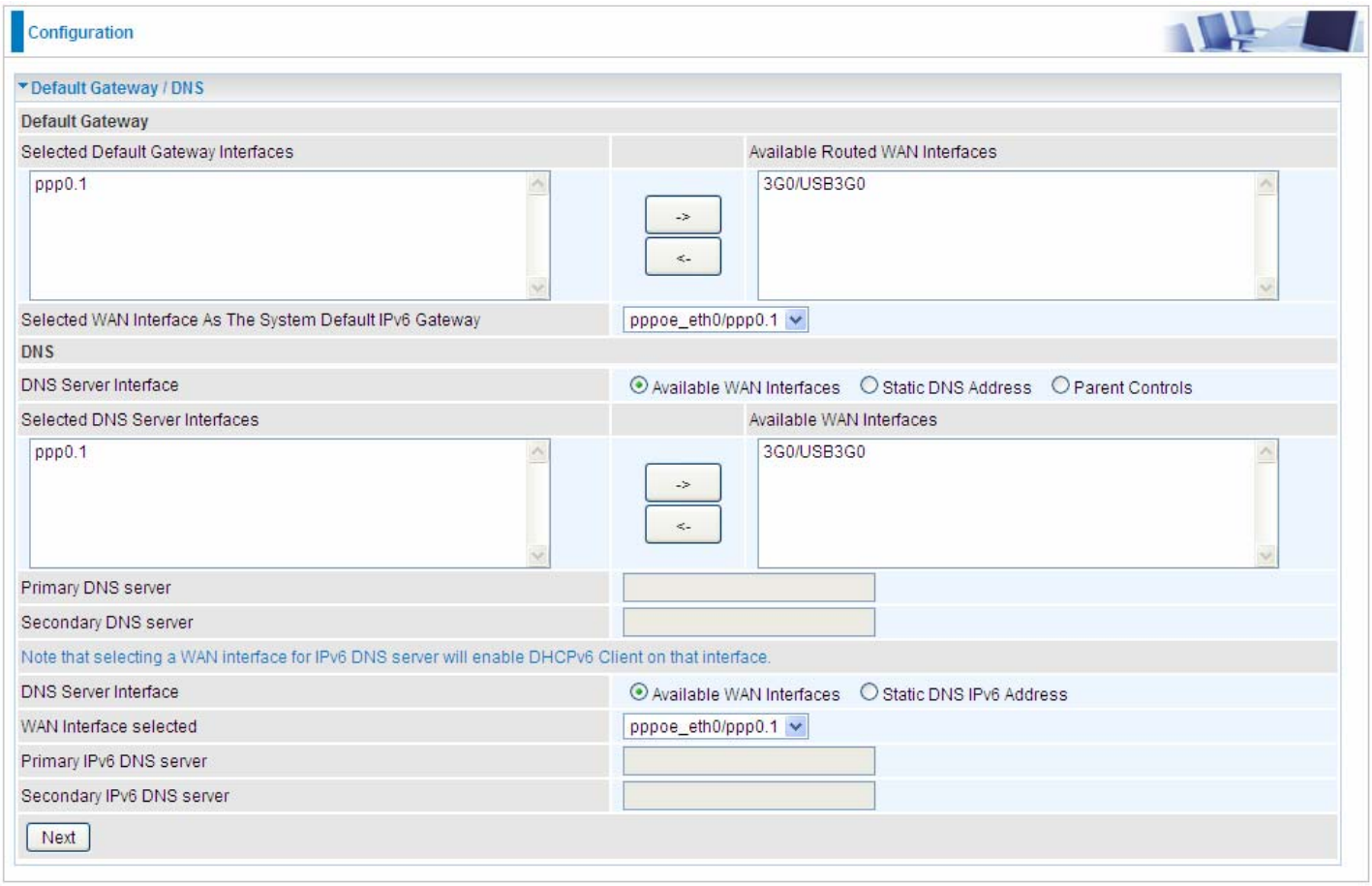
IGMP Multicast Proxy: Check whether to enable this feature. IGMP (**Internet Group Management Protocol**) Proxy intercepts the IGMP request from Clients and set up the multicast-forwarding table, it takes over some of the router's job, simplifying the router's job and multicast communication.

IGMP Multicast Source: Enable to support the "source filtering" which is the ability for a system to report interest in receiving packets "only " from specific source address(es), or "all but" specific source address(es), sent to a particular multicast address. **Note:** It works only on IGMP version 3.

MLD Multicast Proxy: check whether to enable this function. MLD (**Multicast Listener Discovery** Protocol) Proxy intercepts the MLD request from Clients a set up the multicast-forwarding table. it takes over some of the router's job, simplifying the router's job and multicast communication. Support MLDv1 and MLDv2.

MLD Multicast Source: Used in a similar way by IPv6 system as IGMP Multicast source in IPv4 system. Enable it to support the source filtering functionality for IPv6 system. **Note:** It works only on MLD version 2.

Click **Next** to continue to set the default gateway and DNS for IPv4 and IPv6.



Default Gateway

Select default gateway for you connection (IPv4 and IPv6).

DNS

- **IPv4**

Three ways to set an IPv4 DNS server

- **Available WAN interfaces:** Select a desirable WAN interface as the IPv4 DNS server.
- **Static DNS Address:** To specify DNS server manually by entering your primary and secondary DNS server addresses.
- **Parent Controls:** If user registers and gets a DNS account in the parental control provider website, expecting to enjoy a more reliable and safer internet surfing environment, please select this option (need to configure at Parental Control Provider).

- **IPv6**

Obtain IPv6 DNS info from a WAN interface

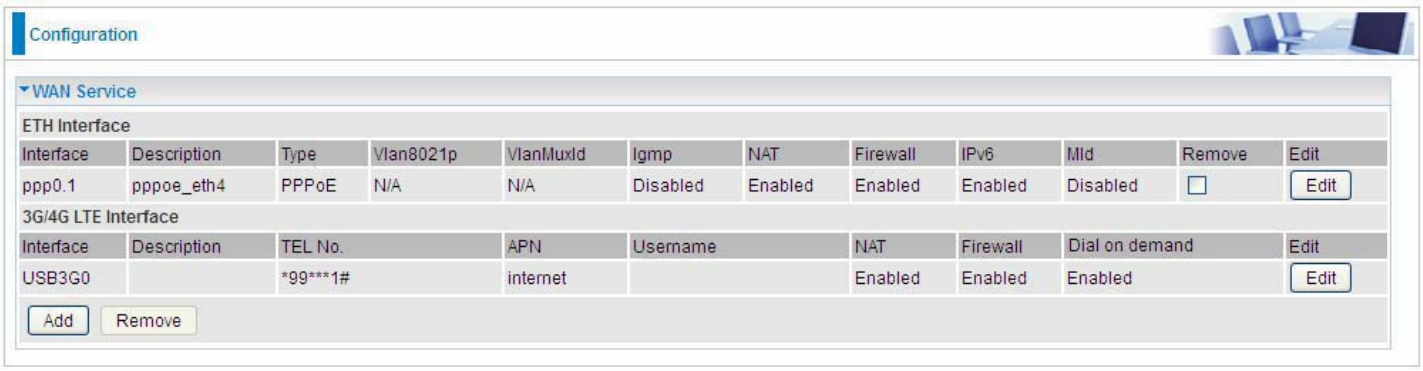
WAN Interface selected: Select one configured IPv6 WAN connection from the menu to be as an IPv6 DNS.

Static DNS IPv6 Address

Primary IPv6 DNS Server / Secondary IPv6 DNS Server: Type the specific primary and secondary IPv6 DNS Server address.

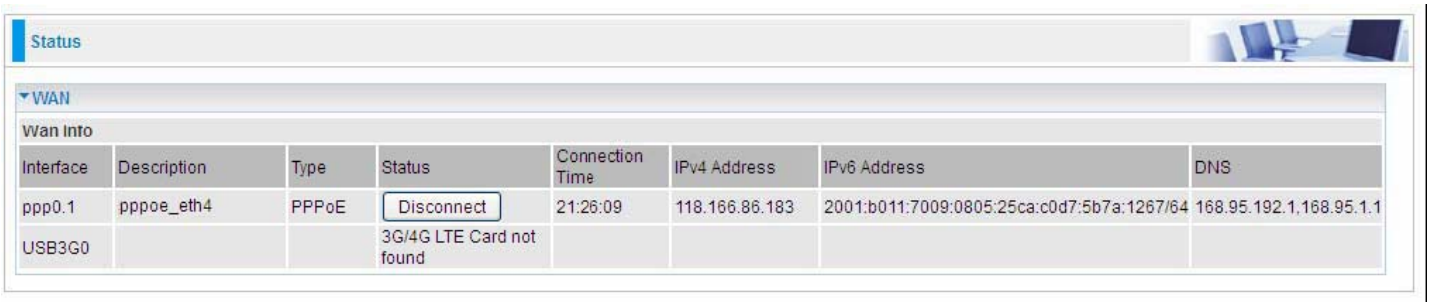
If you don't need the service, select the item you want to remove, check the checkbox, then press **Remove**, it will be OK.

Press **Edit** button to re-edit this service settings.

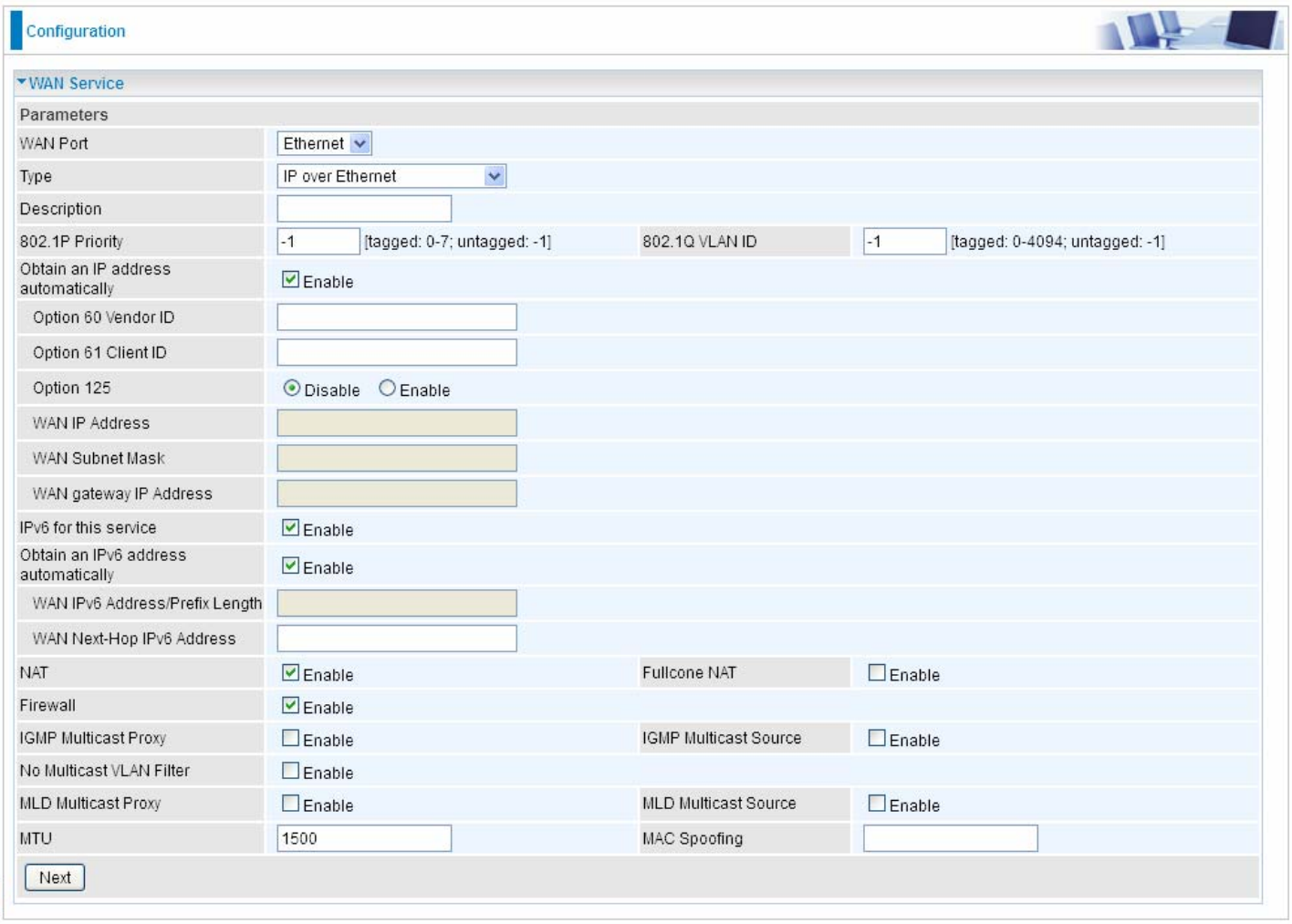


Here the corresponding WAN Service have been configured, if it is OK, you can access the internet. You can go to **Status>WAN** or **Summary** to view the WAN connection information (if your ISP provides IPv6 service, then you will obtain an IPv6 address).

(IPv4 or IPv6)



IP over Ethernet



Description: User-defined description for the connection, commonly for friendly use.

802.1P Priority: The parameter indicates the frame priority level from 0 (lowest) to 7 (highest), which can be used to prioritize different classes of traffic (voice, video, data, etc). Enter the priority identification, tagged: 0-1, untagged: -1.

802.1Q VLAN ID: It is a parameter to specify the VLAN which the frame belongs. Enter the VLAN ID identification, tagged: 0-4094, untagged : -1.

Here two modes are supported for users to deal with the IP and DNS. You can select obtain automatically or manually input the information according to your ISP.

Obtain an IP address automatically: Check whether to enable this function.

Option 60 Vendor ID: Enter the associated information by your ISP. This option is used by DHCP clients to optionally identify the vendor type and configuration of a DHCP client. The information is a string of n octets, interpreted by servers. Vendors may choose to define specific vendor class identifiers to convey particular configuration or other identification information about a client.

Option 61 ClientID: Enter the associated information provided by your ISP.

Option 125: Option 125 is a complementary standard of DHCP protocol, it is used to encapsulate option 125 message into DHCP offer packet before forward it to clients. After the clients receive the packet, it check the option 125 field in the packet with the pre-stored message, if it is matched, then the client accepts this offer, otherwise it will be abandoned. Check Enable or Disable this function. Default setting is ***Disable***.

WAN IP Address: Enter your IPv4 address to the device provided by your ISP.

WAN Subnet Mask: Enter your submask to the device provided by your ISP.

WAN gateway IP Address: Enter your gateway IP address to the device provided by your ISP.

IPv6 for this service: Enable to use IPv6 service.

Obtain an IPv6 address automatically: check whether to enable or disable this feature.

WAN IPv6 Address/Prefix Length: Enter the WAN IPv6 Address/Prefix Length from your ISP.

WAN Next-Hop IPv6 Address: Enter the WAN Next-Hop IPv6 Address from your ISP.

Note: If you don't know well about the DHCP Option, you can leave it empty or leave it as default.

NAT: The NAT (Network Address Translation) feature allows multiple users to access the Internet through a single IP account by sharing the single IP address. If users on your LAN have their own public IP addresses to access the Internet, NAT function can be disabled. When enabled, a Fullcone NAT parameter will appear, you can determine whether to enable Fullcone NAT. While only NAT enabled, the default NAT type Port-Restricted cone NAT will be used.

Fullcone NAT: Enable or disable fullcone NAT. Fullcone is a kind of NAT, in this mode, all requests from the same internal IP address and port are mapped to the same external IP address and port. Furthermore, any external host can send a packet to the internal host, by sending a packet to the mapped external address.

Firewall: Enable to drop all traffic from WAN side. If enabled, all incoming packets by default would be dropped, and please turn to IP Filtering Incoming to add allowing rules.

IGMP Multicast Proxy: IGMP (**Internet Group Membership** Protocol) is a protocol used by IP hosts to report their multicast group memberships to any immediately neighboring multicast routers. Check this item to enable IGMP multicast on that WAN interface for multicast forwarding.

IGMP Multicast Source: Enable to support the "source filtering" which is the ability for a system to report interest in receiving packets "only " from specific source address(es), or "all but" specific source address(es), sent to a particular multicast address. **Note:** It works only on IGMP version 3.

No Multicast VLAN Filter: Enable to deactivate the multicast VLAN filter which allows users to filter on all multicast packets or on specific multicast groups.

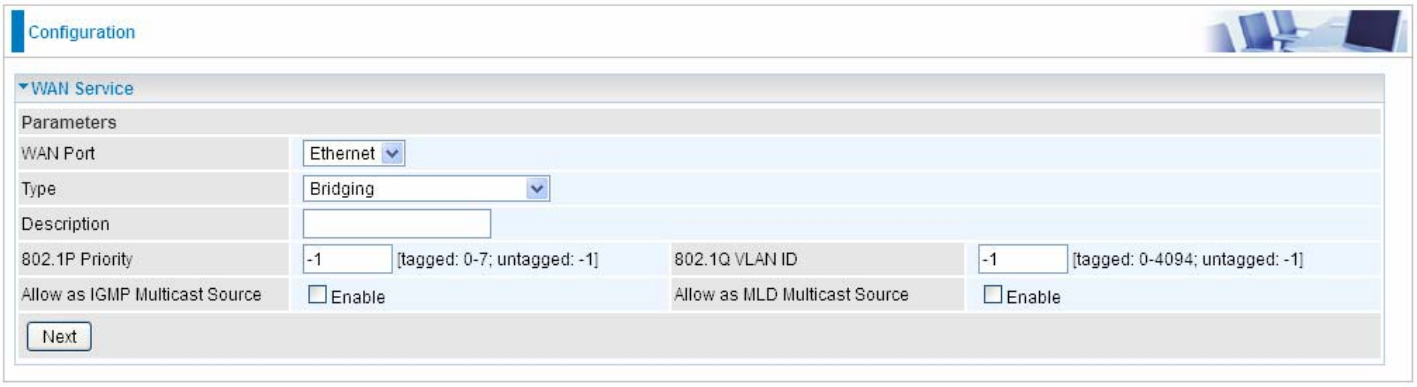
MLD Multicast Proxy: check whether to enable this function. MLD (**Multicast Listener Discovery** Protocol) Proxy intercepts the MLD request from Clients a set up the multicast-forwarding table. it takes over some of the router's job, simplifying the router's job and multicast communication. Support MLDv1 and MLDv2.

MLD Multicast Source: Used in a similar way by IPv6 system as IGMP Multicast source in IPv4 system. Enable it to support the source filtering functionality for IPv6 system. **Note:** It works only on MLD version 2.

MTU: Maximum Transmission Unit, the size of the largest datagram (excluding media-specific headers) that IP will attempt to send through the interface.

MAC Spoofing: This option is required by some service providers specifying some specific MAC allowed to join in network. You must fill in the MAC address specified by your service provider when this information is required.

Bridging



Description: User-defined description for the connection, commonly for friendly use.

802.1P Priority: The parameter indicates the frame priority level from 0 (lowest) to 7 (highest), which can be used to prioritize different classes of traffic (voice, video, data, etc). Enter the priority identification, tagged: 0-1, untagged: -1.

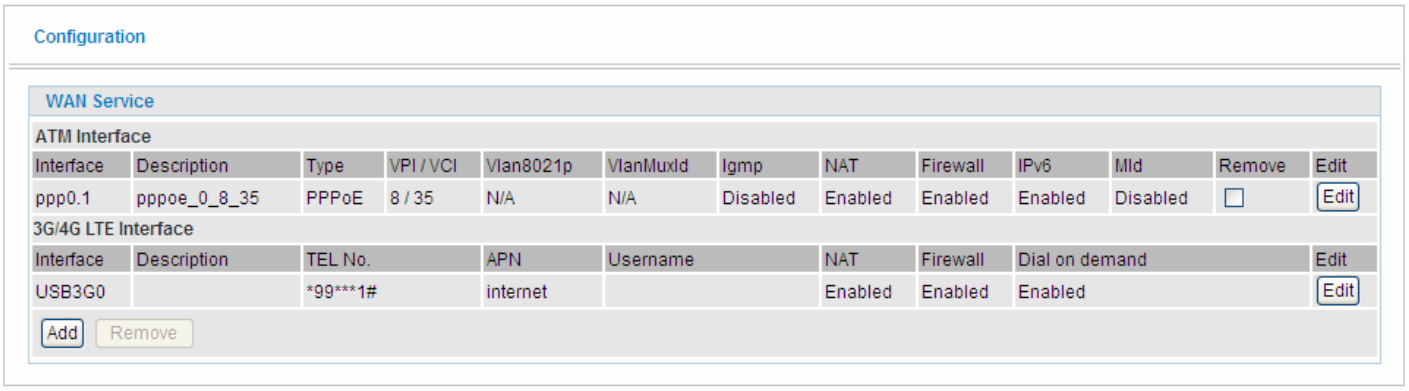
802.1Q VLAN ID: It is a parameter to specify the VLAN which the frame belongs. Enter the VLAN ID identification, tagged: 0-4094, untagged : -1.

Allow as IGMP Multicast Source: Enable to support the “source filtering” which is the ability for a system to report interest in receiving packets “only ” from specific source address(es), or “all but” specific source address(es), sent to a particular multicast address. **Note:** It works only on IGMP version 3.

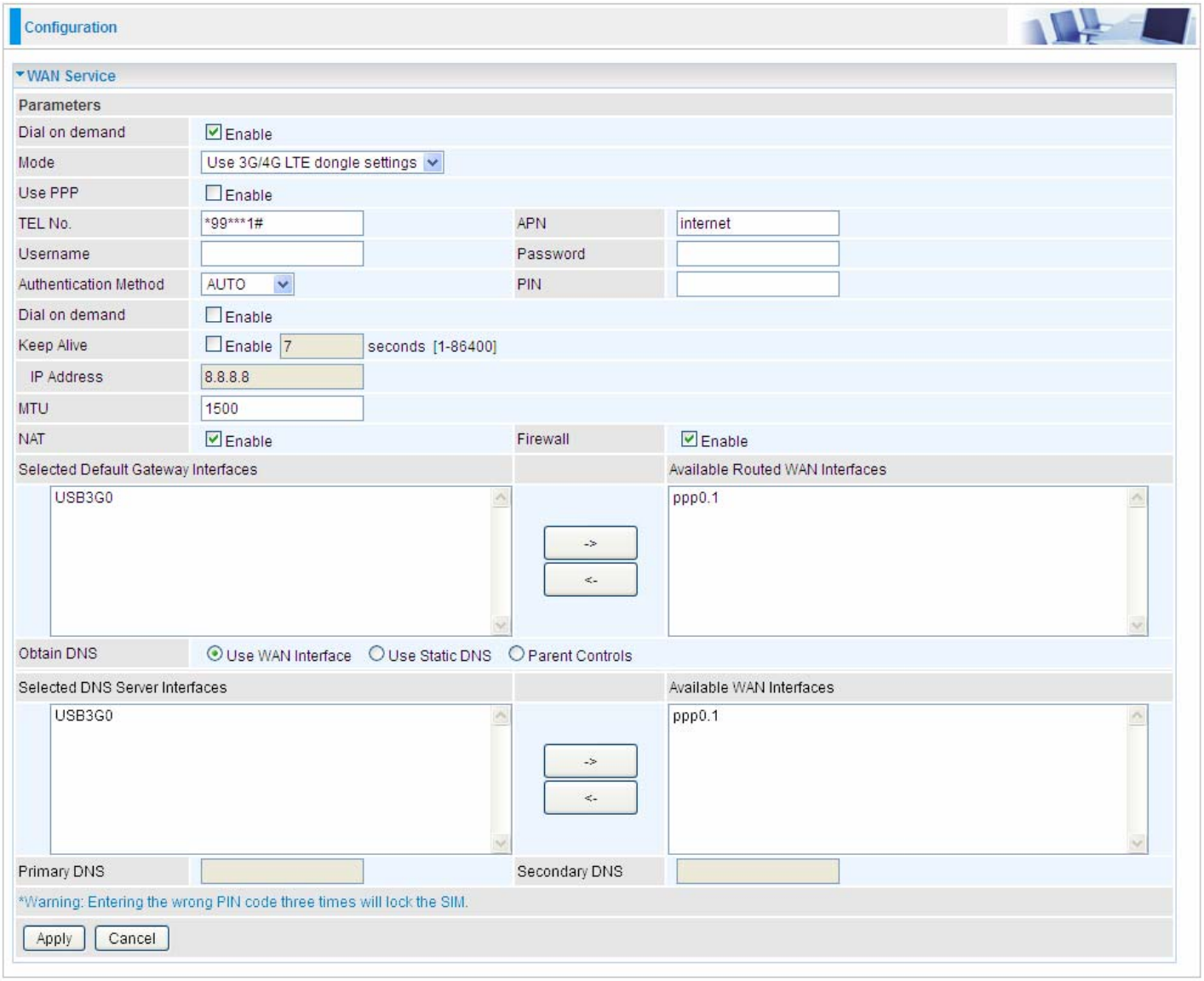
Allow as MLD Multicast Source: Used in a similar way by IPv6 system as IGMP Multicast source in IPv4 system. Enable it to support the source filtering functionality for IPv6 system. **Note:** It works only on MLD version 2.

ⓘ 3G/4G LTE

Select 3G/4G LTE to configure the route to enjoy the mobility. By default the 3G/4G LTE interface is on, user can edit the parameters to meet your own requirements.



Click **Edit** button to enter the 3G/4G LTE configuration page.



Dial on demand: If enabled, the 3G/LTE will work in dial on demand and be brought up only when there is no active default route. In this mode, 3G/4G LTE work as a backup for the WAN connectivity. While if disabled, 3G/4G LTE serves as a normal interface, and can only be brought up when it has been configured to achieve a mobile connectivity.

Mode: There are 6 options of phone service standards: GSM 2G only, UTMS 3G only, GSM 2G

preferred, UMTS 3G preferred, Automatic, and Use 3G/4G LTE dongle settings. If you are uncertain what services are available to you, and then please select Automatic.

TEL No.: The dial string to make a 3G/4G LTE user internetworking call. It may provide by your mobile service provider.

APN: An APN is similar to a URL on the WWW, it is what the unit makes a GPRS / UMTS call. The service provider is able to attach anything to an APN to create a data connection, requirements for APNs varies between different service providers. Most service providers have an internet portal which they use to connect to a DHCP Server, thus giving you access to the internet i.e. some 3G operators use the APN 'internet' for their portal. The default value is "internet".

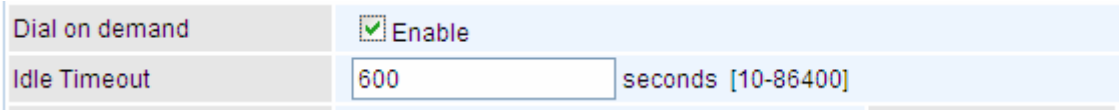
Username/Password: Enter the username and password provided by your service provider. The username and password are case sensitive.

Authentication Method: Default is Auto. Please consult your service provider on whether to use PAP, CHAP or MSCHAP.

PIN: PIN stands for Personal Identification Number. A PIN code is a numeric value used in certain systems as a password to gain access, and authenticate. In mobile phones a PIN code locks the SIM card until you enter the correct code. If you enter the PIN code incorrectly into the phone 3 times in a row, then the SIM card will be blocked and you will require a PUK code from your network/ service provider.

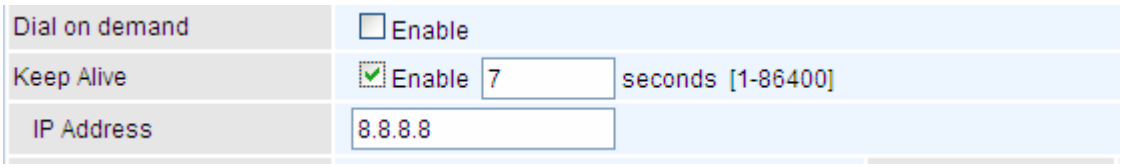
- **Dial on Demand:** If you want to make UMTS/GPRS call only when there is a packet requesting access to the Internet (i.e. when a program on your computer attempts to access the Internet). In this mode, you must set Idle Timeout value at same time. Click on Connect on Demand, the Idle Timeout field will display.

  Idle Timeout: Auto-disconnect the broadband firewall gateway when there is no activity on the line for a predetermined period of time. Default is 600 seconds.



- **Keep Alive:** Check Enable to allow the router to send message out every 7 seconds (can be changed base on need) to prevent the connection being dropped by ISP.

  IP Address: The IP address is used to "ping", and router will ping the IP to find whether the connection is still on.



NAT: Check to enable the NAT function.

Firewall: Enable to drop all traffic from WAN side. If enabled, all incoming packets by default would be dropped, and please turn to IP Filtering Incoming to add allowing rules.

MTU: MTU (Maximum Transmission Unit) is the size of the largest datagram that IP will attempt to send through the interface.

Select default gateway interfaces: Select from the interfaces the default gateway, here commonly we select USB3G0.

Selected DNS Server Interfaces: Three ways to set a DNS server.

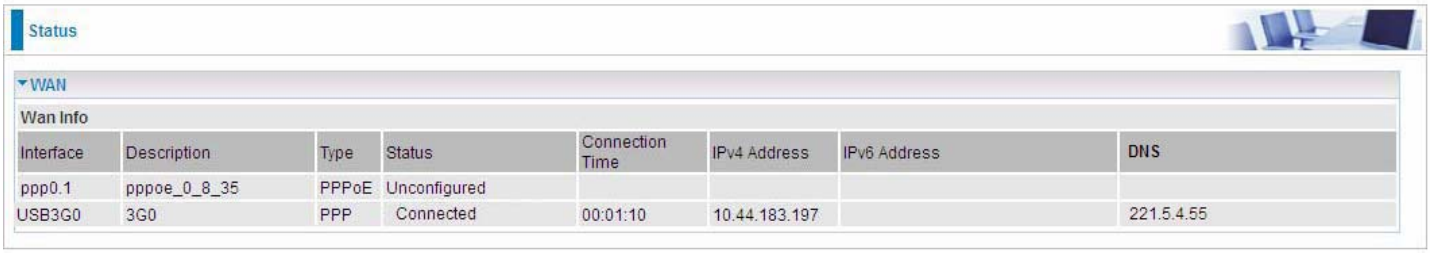
- **Use WAN interface:** Select a desirable WAN interface as the DNS server.
- **Use Static DNS:** To specify DNS server manually by entering your primary and secondary

DNS server addresses.

- **Parent Controls:** If user registers and gets a DNS account in the parental control provider website, expecting to enjoy a more reliable and safer internet surfing environment, please select this option (need to configure at Parental Control Provider).

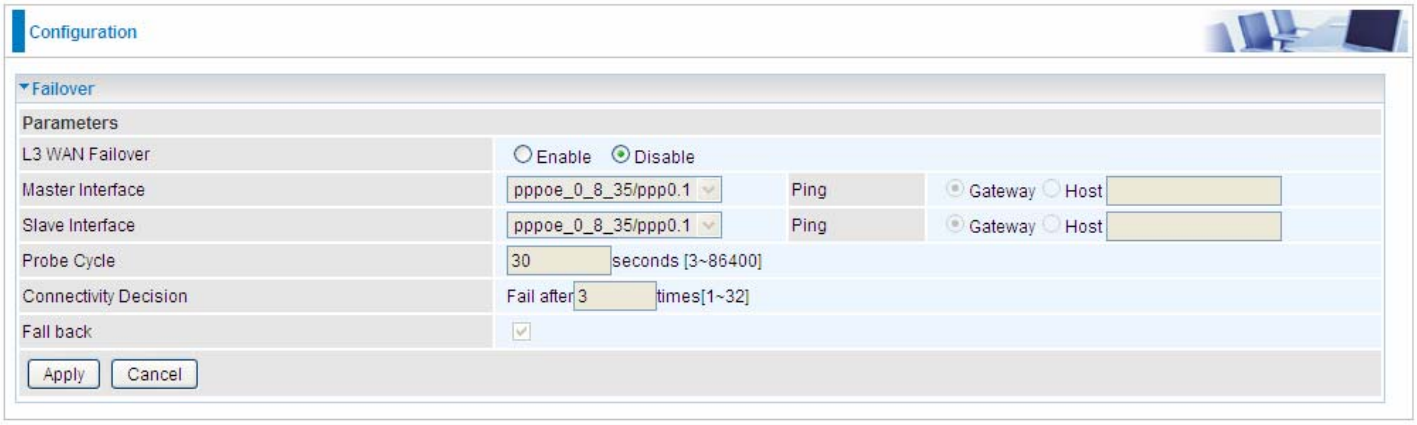
Click **Apply** to confirm the settings.

Here you can configure WAN Service, if it is OK, you can access the internet. You can go to **Status >WAN** or **Summary** to view the WAN connection information.



Failover

Auto failover/failback is to ensure an always-on internet connection. Users can set a Master WAN interface (main WAN) and a slave interface (backup WAN), and when Master WAN fails, it will switch to slave WAN, and when master WAN restores, it will switch to master WAN interface again.



L3 WAN Failover: Check Enable to activate L3 WAN failover.

Master Interface: Select a master WAN interface.

Ping: To ping to check the master WAN interface's connectivity.

- **Gateway:** It will send ping packets to gateway of master interface and wait for response from it in every "Probe Cycle" to check the connectivity of the gateway of master interface.
- **Host:** It will send ping packets to specific host and wait for response in every "Probe Cycle".

Slave Interface: Select a slave WAN interface as backup port.

Ping: To ping to check the slave WAN inteface's connectivity.

- **Gateway:** It will send ping packets to gateway of slave interface and wait for response from it in every "Probe Cycle" to check the connectivity of the gateway of slave interface.
- **Host:** It will send ping packets to specific host and wait for response in every "Probe Cycle".

Probe Cycle: Set the time duration for the **Probe Cycle** to determine when the router will switch to the backup connection once the main connection (main port) fails. For example, when set to 30 seconds, the probe will be conducted every 30 seconds.

Connectivity Decision: Set how many times of probing failure to switch to backup port.

Fallback: Enable to reconnect to the master interface when master interface connection recovers.

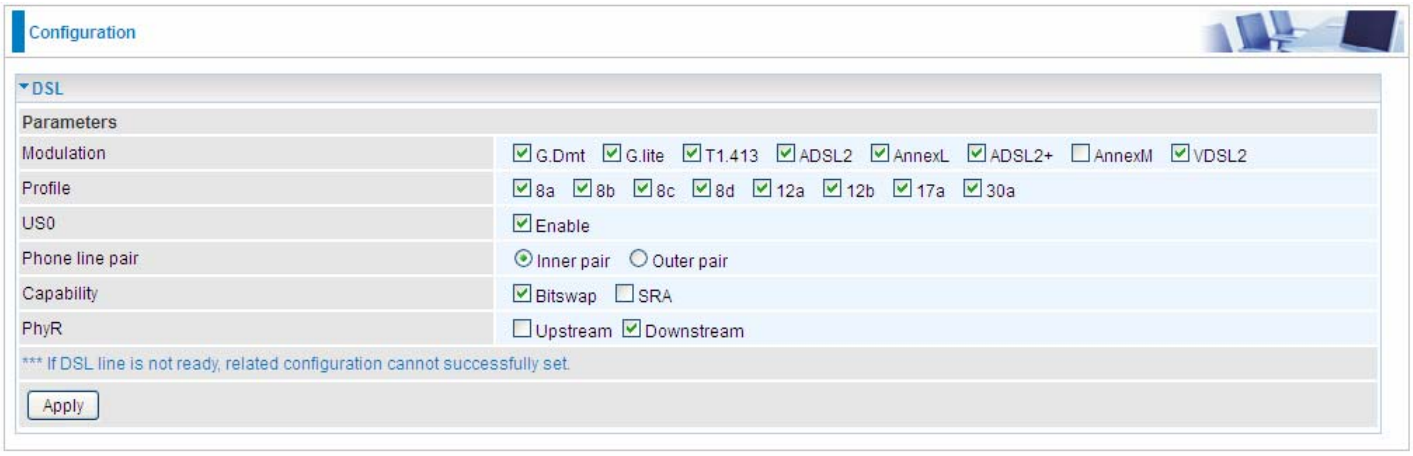
Note:

1) The time set is for each probe cycle, but the decision to change to the backup port is determined by **Probe Cycle** multiplied by **connection Decision amount** (e.g. From the image above it will be 30 seconds multiplied by 3 consecutive fails, the router will determine failover to slave interface.

2).The failback setting follow the same decision policy as the failover. For example, according to settings above in the screenshot, the connection probe will be carried out every 30 seconds, and 3 consecutive times of probe success is found, the router will determine failback to master interface.

DSL

This screen allows you to set DSL parameters. DSL knowledge is required to configure these settings. Contact your ISP to make sure that these parameters are correct.



Modulation: There are 8 modes “G.Dmt”, “G.lite”, “T1.413”, “ADSL2”, “AnnexL”, ”ADSL2+”, “AnnexM”, that user can select for this connection.

Profile: VDSL profiles up to 30a.

US0: Select to enable US0. In VDSL mode, profiles like 8a, 8b, 8c, 8d and 12a need users to enable US0 band.

Phone line pair: This is for reserved only. You can choose "Inner Pair" or "Outer Pair".

Capability: There are 2 options “Bitswap Enable” and “SRA Enable” that user can select for this connection.

- Bitswap Enable: Allows bitswaping function.
- SRA Enable: Allows seamless rate adaptation.

PhyR: A new technology to control impulse and noise to improve the BER and DSL data quality.

Click **Apply** to confirm the settings.

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DSL Bonding

This feature allows you to double your VDSL2/ADSL2+ data rate. Contact your ISP to see if you can upgrade your Internet service in order to use this feature.

xDSL Bonding Capability: To enable or disable the Dual VDSL2/ADSL2+ feature.

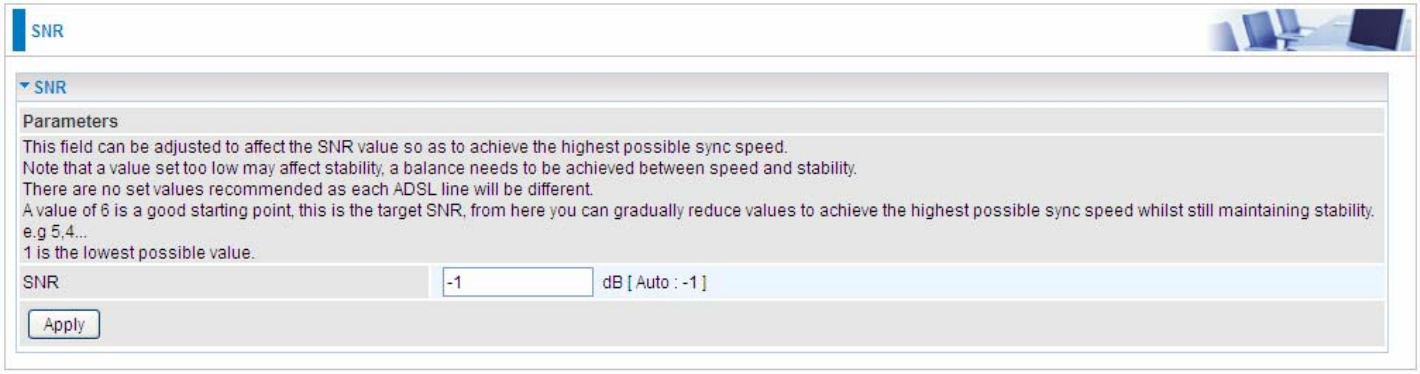
- **Enable**: The device will attempt to make connection in two-pair VDSL2/ADSL2+ mode.
- **Disable**: The device will only make a connection in single-pair VDSL2/ADSL2+ mode.

Current WAN xDSL Mode: This displays your current VDSL2/ADSL2+ connection mode on the DSLAM/ISP. two-pair VDSL2/ADSL2+ or single-pair VDSL2/ADSL2+ is available.

Click **Apply/Reboot** to save settings then reboot the system to activate the changes.

SNR

Signal-to-noise ratio (often abbreviated **SNR** or **S/N**) is a measure used in science and engineering that compares the level of a desired signal to the level of background noise. It is defined as the ratio of signal power to the noise power.



SNR: Change the value to adjust the DSL link rate, more suitable for an advanced user.