



# **BiPAC 7800DX(L)**

**Dual-band Wireless-N 3G/4G LTE (VPN)  
ADSL2+ Router**

## **User Manual**

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# Chapter 1: Introduction

## Introduction to your Router

The BiPAC 7800DX(L) is a dual-band wireless network device, it utilizes two wireless bands for wireless communications, and offers maximum performance in setting up a network. Its built-in 4-port Gigabit Ethernet Switch, supporting high-speed data transfer including a Gigabit WAN port for Broadband connectivity. The Quality of Service (QoS) feature ensures a smooth net connection for inbound and outbound data transmission with minimal traffic congestion. With the BiPAC 7800DX(L), you can create your own mobile hotspot for Wi-Fi access.

### Dual-band

A Dual-band Router utilizes two different wireless bands that support connections on both 2.4GHz and 5GHz simultaneously. The BiPAC 7800DX(L) is a dual-band router which transmits on two frequency bands-2.4GHz and 5GHz simultaneously. The two wireless bands are fully independent. One band can be used for downloading while the other is used for uploading; or one is used for online gaming, video streaming and music downloading while the other takes care of accessing email, file sharing and regular internet surfing. With an integrated 802.11 wireless access point, the router can deliver up to 6 times the speed of an 802.11b/g wireless device. It supports a data rate of up to 300 Mbps with each band and is also compatible with 802.11b/g devices in 2.4GHz and 802.11a in 5GHz.

### 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  $3.4 \times 10^{38}$ ) 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.

### Jumbo frames supported

Jumbo frames are Ethernet frames with more than 1500 bytes (standard Ethernet frame) of payload. Conventionally, jumbo frames can carry up to 9720 bytes of payload to enjoy a high-efficiency communication in Gigabit Ethernet. Jumbo frames increase the frame size so that a certain large amount of data can be transported with less effort, reducing CPU utilization and increasing throughput by reducing the number of frames needing to be processed and reducing the total overhead byte count of all frames sent.

### **3G/LTE**

With 3G/LTE-based Internet connection (requires an additional 3G/LTE USB modem), user can access internet through 3G/LTE, whether you are seated at your desk or taking a cross-country trip.

### **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

- IPv6 ready (IPv4/IPv6 dual stack)
- Flexible WAN approach – ADSL2+, 3G/LTE mobile connection, and Ethernet WAN for Broadband Connectivity
- Dual-band (2.4GHz and 5GHz) wireless access point 600 Mbps
- Auto fail-over
- High-speed Internet Access via ADSL2 / 2+; Backward Compatible with ADSL
- Jumbo frames
- IEEE 802.11 a/b/g/n compliant Wireless Access Point with Wi-Fi Protected Setup (WPS), Wi-Fi Protected Access (WPA-PSK/ WPA2-PSK) and Wired Equivalent Privacy (WEP) support
- Secured IPsec VPN with powerful DES/ 3DES/ AES (*BiPAC 7800DX only*)
- L2TP over IPsec(*BiPAC 7800DX only*)
- PPTP VPN with Pap/ Chap/ MS-CHAPv2 authentication (*BiPAC 7800DX only*)
- GRE tunnel (*BiPAC 7800DX only*)
- SOHO Firewall Security with DoS Preventing and Packet Filtering
- Quality of Service Control for traffic prioritization and Bandwidth management
- Universal Plug and Play (UPnP) Compliance
- Supports IPTV Application<sup>\*2</sup>
- Supports Storage Service
- Ease of Use with Quick Installation Wizard (EZSO)

## ADSL Compliance

- Compliant with ADSL Standard
  - Full-rate ANSI T1.413 Issue 2
  - G.dmt (ITU G.992.1)
  - G.lite (ITU G.992.2)
  - G.hs (ITU G.994.1)
- Compliant with ADSL2 Standard
  - G.dmt.bis (ITU G.992.3)
  - ADSL2 Annex M (ITU G.992.3 Annex M)
- Compliant with ADSL2+ Standard
  - G.dmt.bis plus (ITU G.992.5)
  - ADSL2+ Annex M (ITU G.992.5 Annex M)

## **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 and one-to-one NAT
- 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

## **Firewall**

- Built-in NAT Firewall
- Stateful Packet Inspection (SPI)
- DoS attack prevention
- Packet Filtering (v4/v6) - port, source IP address, destination IP address, MAC address, Time Schedule control
- URL Content Filtering (v4/v6) – string or domain name detection in URL string, Time Schedule control
- MAC Filtering

## **Quality of Service Control**

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

## **ATM, PTM 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<sup>\*2</sup>**

- IGMP Snooping and IGMP Proxy
- MLD Snooping and MLD Proxy
- Virtual LAN (VLAN)
- Quality of Service (QoS)

## **Wireless LAN**

- Compliant with IEEE 802.11 a/ b/ g/ n standards
- 2.4 GHz and 5GHz radio band for wireless
- 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
- WDS repeater function support

## **USB Application Server**

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

## **Virtual Private Network (VPN) (7800DX only)**

- 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\*<sup>1</sup> supports remote management
- Available Syslog
- Mail alert for WAN IP changed
- SMS alert for WAN IP changed
- Auto failover and fallback
- Push Service for diagnostics and debug usage



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

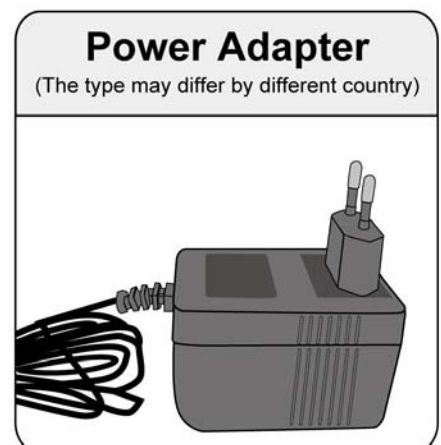
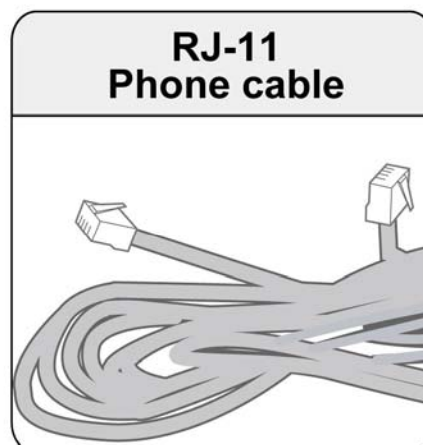
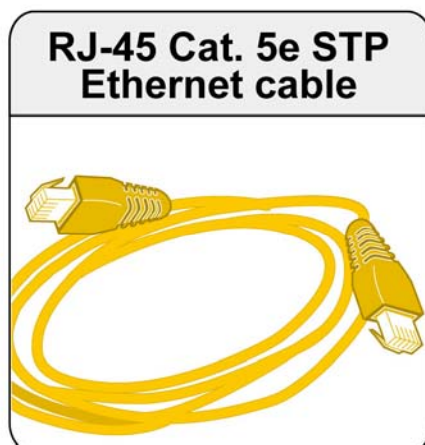
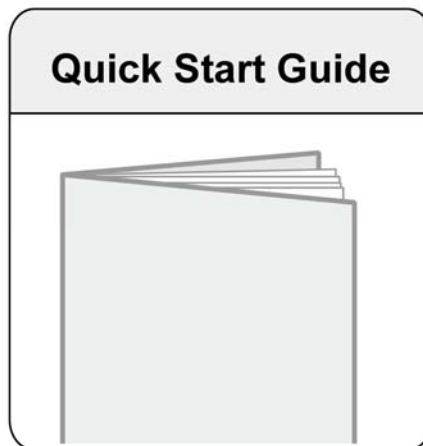
## Physical Interface

- WLAN: 2 fixed antennas
- DSL: ADSL port
- USB 2.0 port for storage service and printer server
- Ethernet: 4-port 10 / 100 / 1000Mbps auto-crossover (MDI / MDI-X) Switch
- EWAN: Ethernet port #4 can be configured as a WAN interface for Broadband connectivity.
- Factory default reset button
- WPS push button
- Power jack
- Power switch

# Chapter 2: Installing the Router

## Package Contents

- BiPAC 7800DX(L) Dual-band Wireless-N 3G/4G LTE (VPN) ADSL2+ Router
- Quick Start Guide
- CD containing the on-line manual
- Two fixed dual-band antennas
- RJ-45 Cat. 5e STP Ethernet cable
- RJ-11 ADSL/ telephone cable
- Power adapter
- 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.

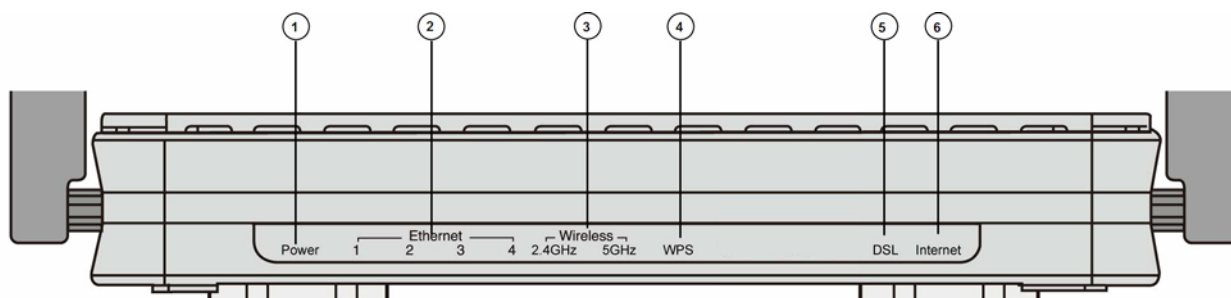


### Attention

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.

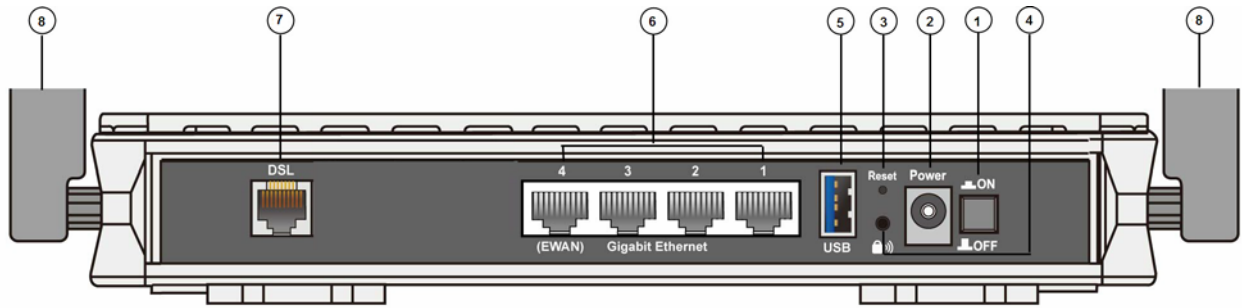
# Device Description

## The Front LEDs



LED	Status	Meaning	
1	Power	Red	Boot failure or in emergency mode
	Power	Green	System ready
2	Ethernet Port 1-4 (EWAN)	Green	Transmission speed hitting 1000Mbps
		Orange	Transmission speed hitting 10/100Mbps
		Blinking	Data being transmitted/received
3	Wireless	Green	Wireless connection established
		Green blinking	Sending/receiving data
4	WPS	Green blinking	WPS configuration being in progress
		Off	WPS process completed or WPS is off
5	DSL	Green Blinking	DSL synchronizing or waiting for DSL synchronizing
		Green	Successfully connected to an ADSL DSLAM (Line Sync).
		Off	DSL cable unplugged
6	Internet	Red	Obtaining IP failure
		Green	Having obtained an IP address successfully
		Off	Router in bridge mode or DSL connection not present.

# The Rear Ports



Port		Meaning
1	<b>Power Switch</b>	Power ON / OFF switch.
2	<b>Power</b>	Connect the supplied power adapter to this jack.
3	<b>RESET</b>	After the device is powered on, press it <b>5 seconds or above</b> : to restore to factory default settings (this is used when you cannot login to the router, e.g. forgot the password)
4	<b>WPS</b>	Push WPS button to trigger Wi-Fi Protected Setup function.
5	<b>USB</b>	Connect the USB device (Printer, USB 2.0 storage, 3G/LTE 3G USB modem) to this port.
6	<b>Ethernet</b>	Connect a UTP Ethernet cable (Cat-5 or Cat-5e) to one of the four LAN ports when connecting to a PC or an office/home network of 10Mbps /100Mbps /1000Mbps. <b>Note:</b> Port #4 can be configured as a WAN Interface for Broadband connectivity.
7	<b>DSL</b>	Connect this port to the DSL network with the RJ-11 cable (telephone) provided.
8	<b>Antenna</b>	The fixed dual-band antennas.

# Cabling

One of the most common causes of problems is bad cabling or ADSL 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 ADSL 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 ADSL 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 7 / 98 / NT / 2000 / XP / Me / Vista, 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.

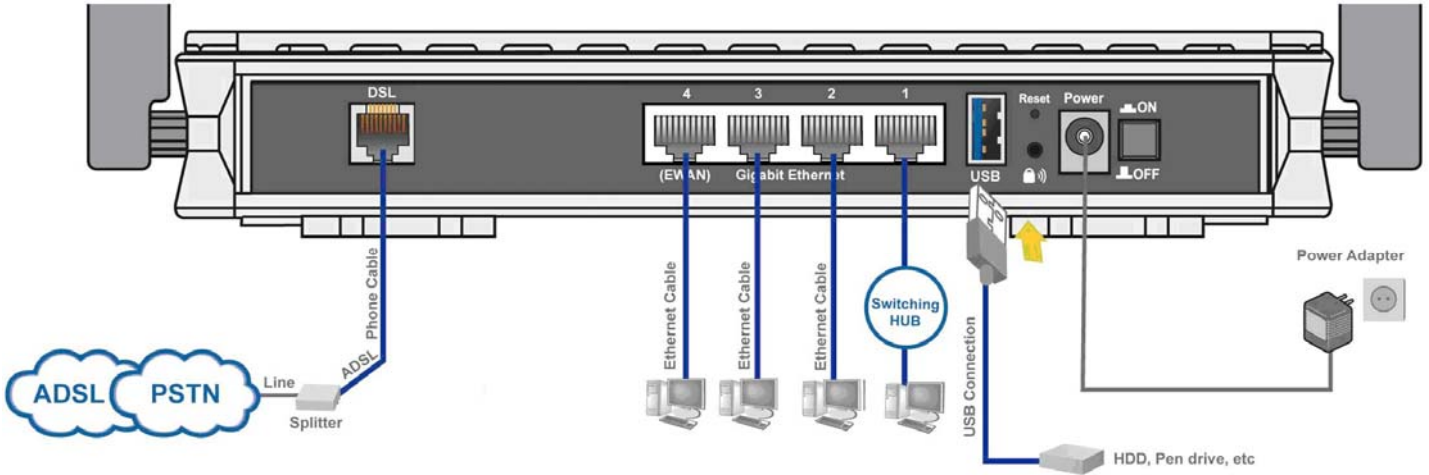


Any TCP/IP capable workstation can be used to communicate with or through this router. To configure other types of workstations, please consult your manufacturer documentation.

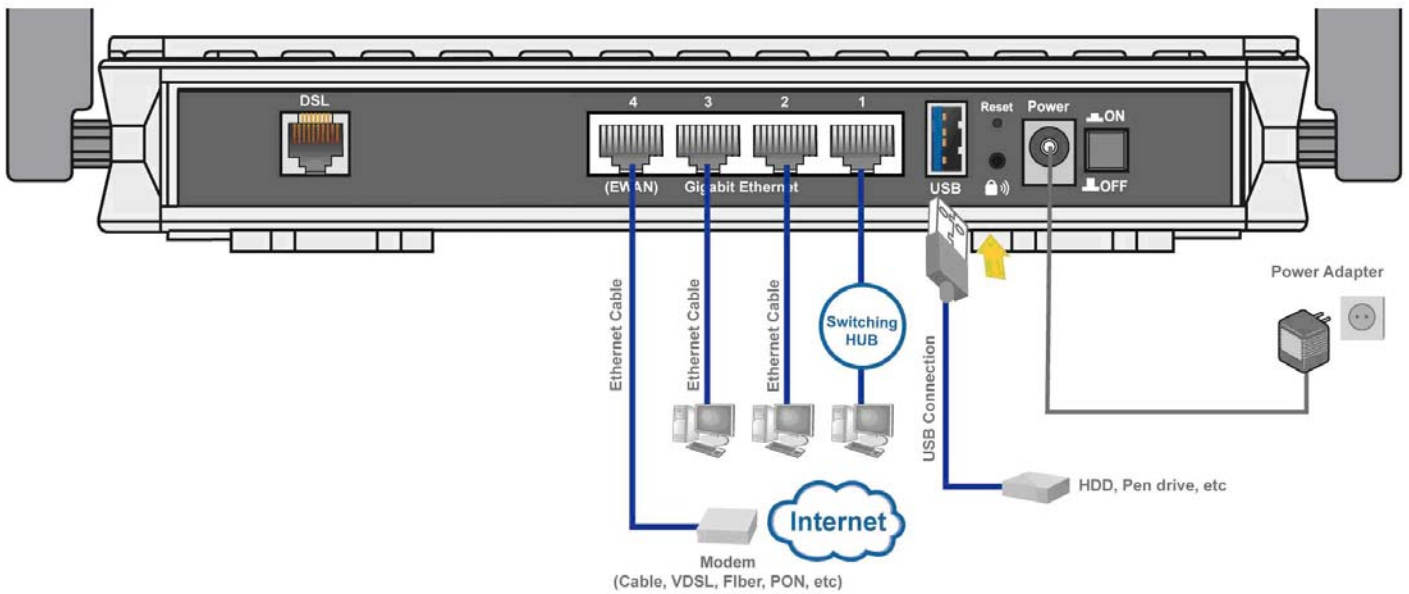
# Connecting Your Router

Users can connect the ADSL2+ router as the following.

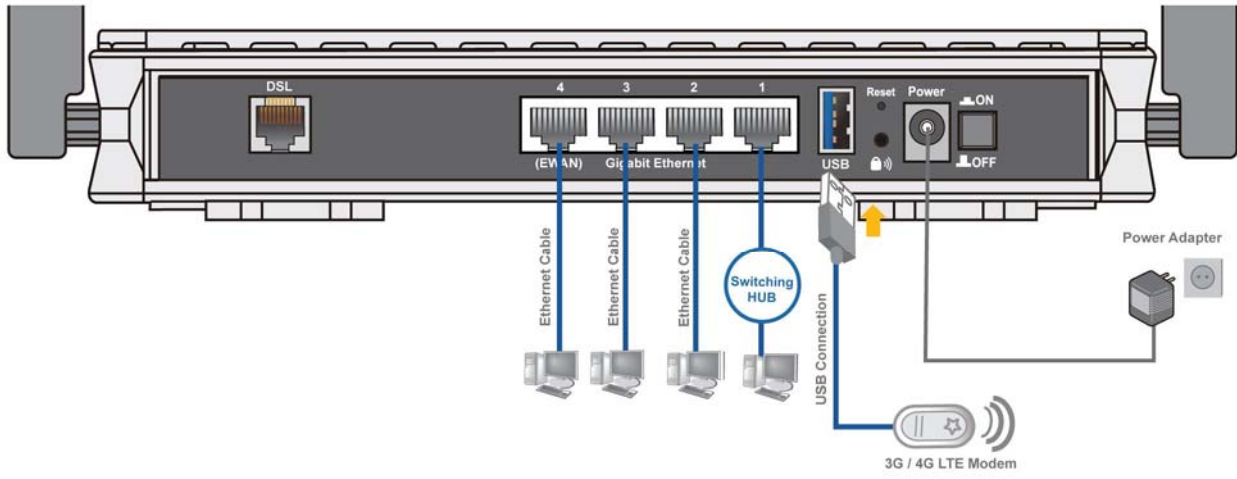
**ADSL Router mode:**



**Broadband Router mode:**



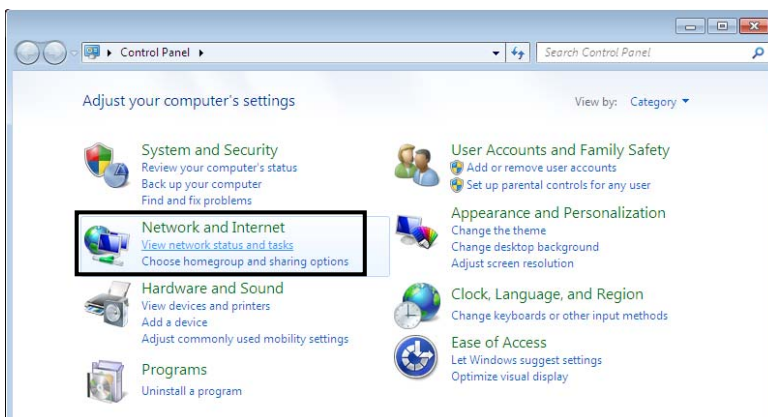
# 3G/LTE Router mode



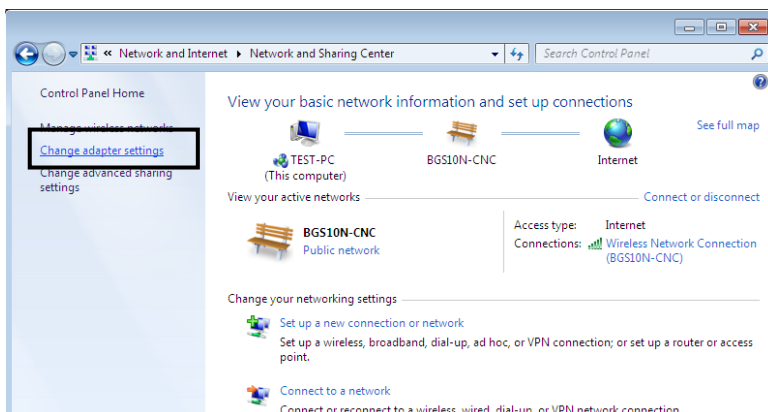
# Network Configuration

## Configuring a PC in Windows 7

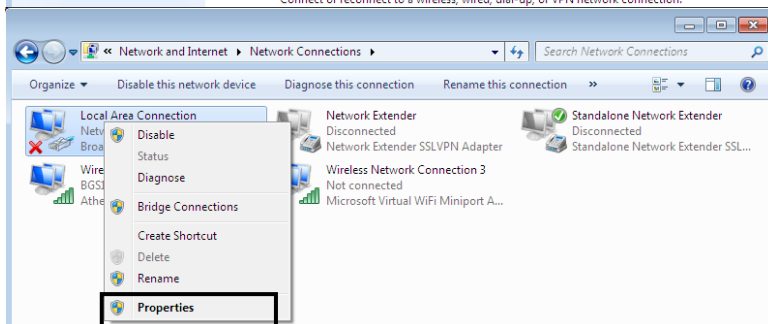
1. Go to **Start**. Click on **Control Panel**. Then click on **Network and Internet**.



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

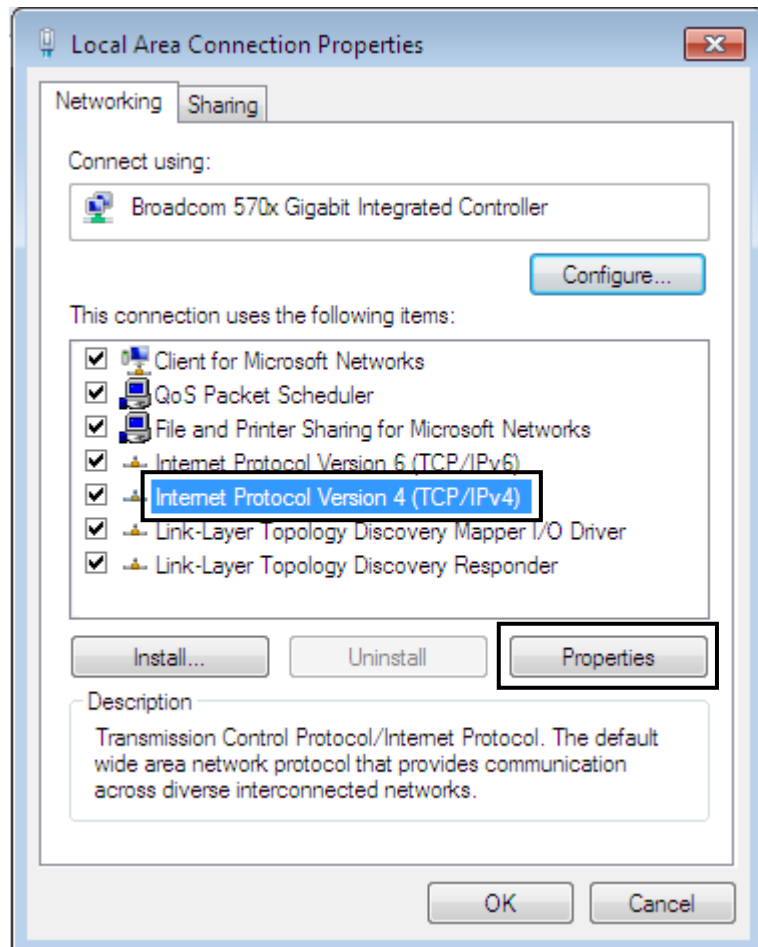


3. Select the **Local Area Connection**, and right click the icon to select **Properties**.

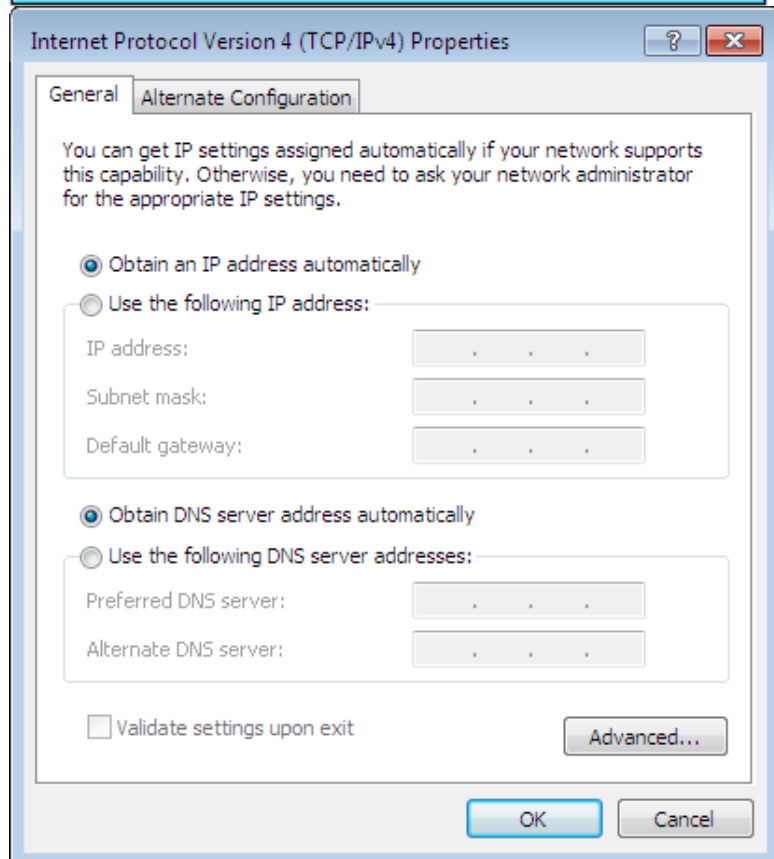


## IPv4:

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

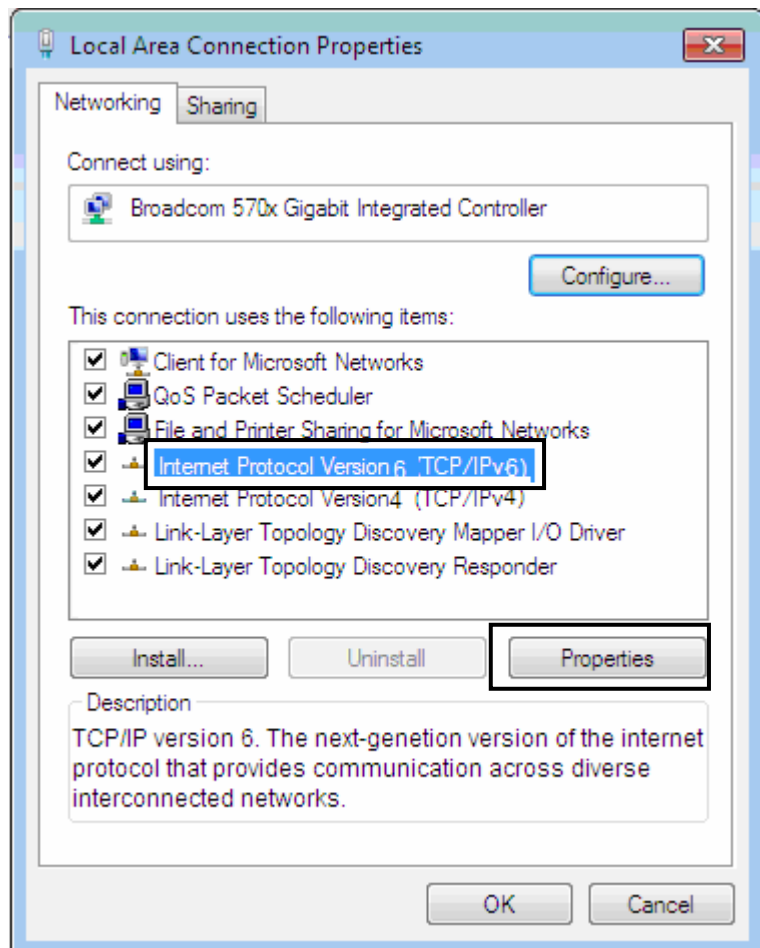


5. In the **TCP/IPv4 properties** window, select the **Obtain an IP address automatically** and **Obtain DNS Server address automatically** radio buttons. Then click **OK** to exit the setting.
6. Click **OK** again in the **Local Area Connection Properties** window to apply the new configuration.

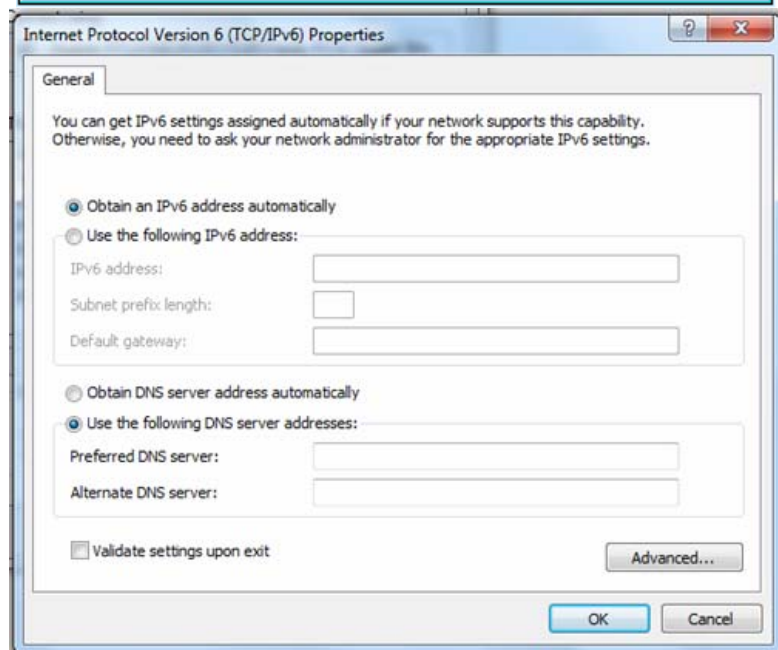


## IPv6:

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

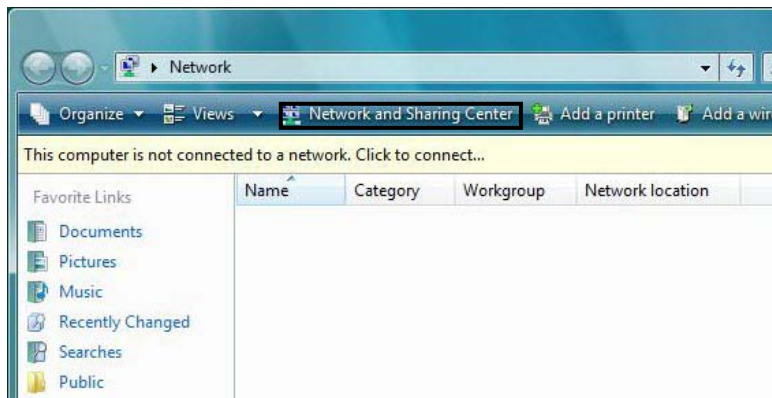


5. In the **TCP/IPv6 properties** window, select the **Obtain an IPv6 address automatically** and **Obtain DNS Server address automatically** radio buttons. Then click **OK** to exit the setting.
6. Click **OK** again in the **Local Area Connection Properties** window to apply the new configuration.

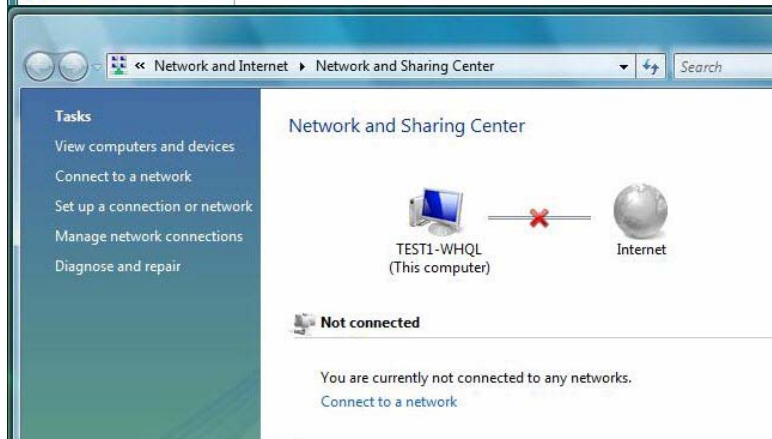


# Configuring a PC in Windows Vista

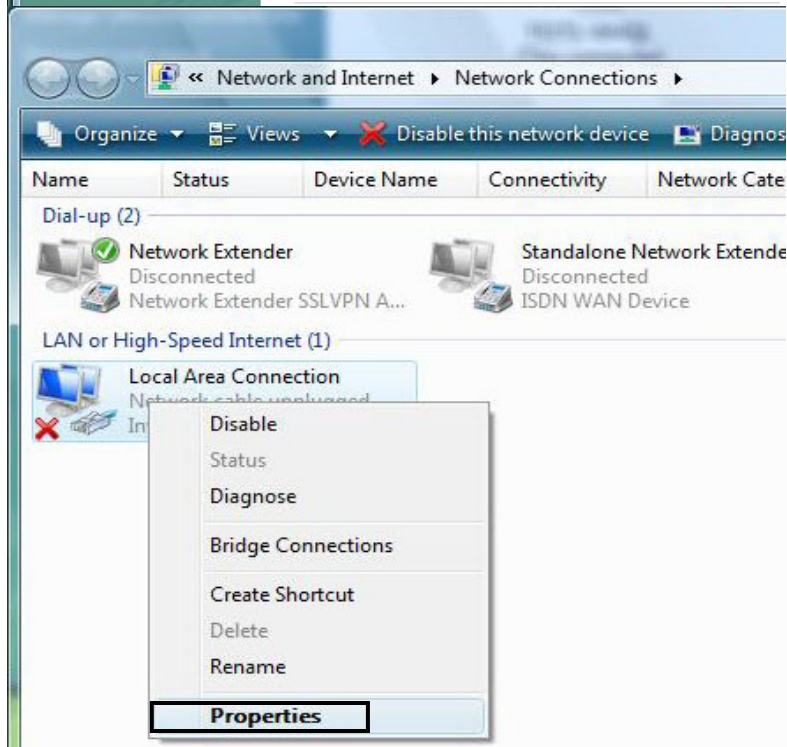
1. Go to **Start**. Click on **Network**.
2. Then click on **Network and Sharing Center** at the top bar.



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

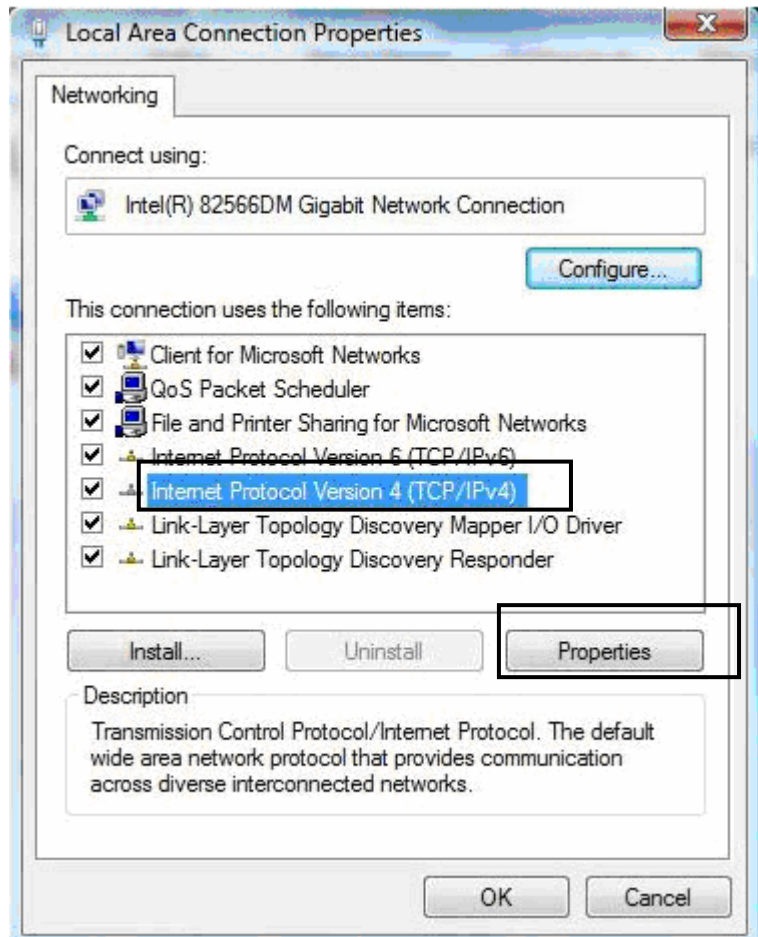


4. Select the **Local Area Connection**, and right click the icon to select **Properties**.

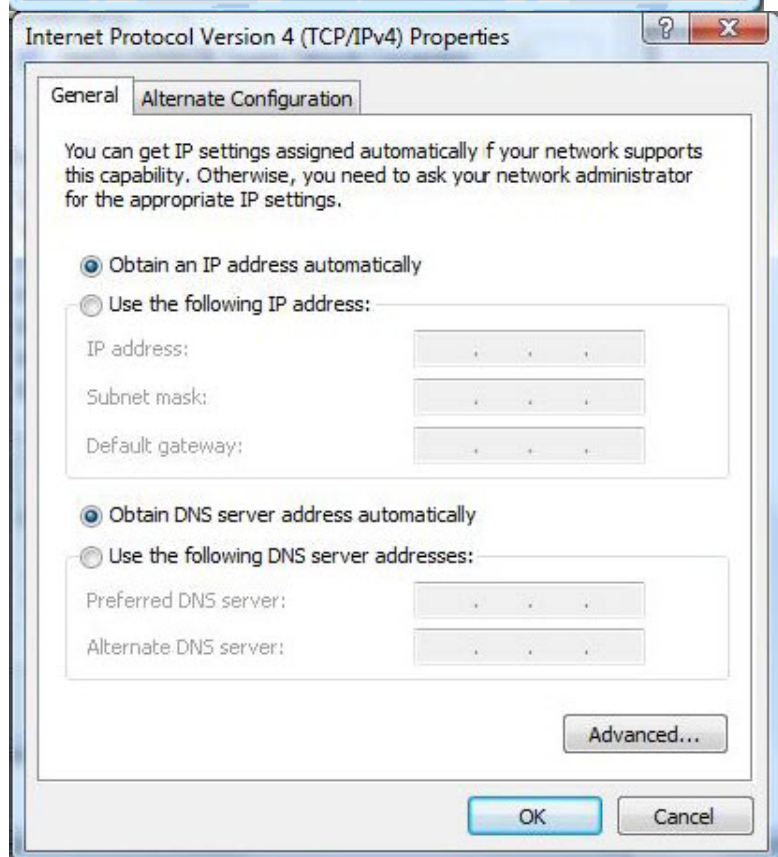


## IPv4:

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



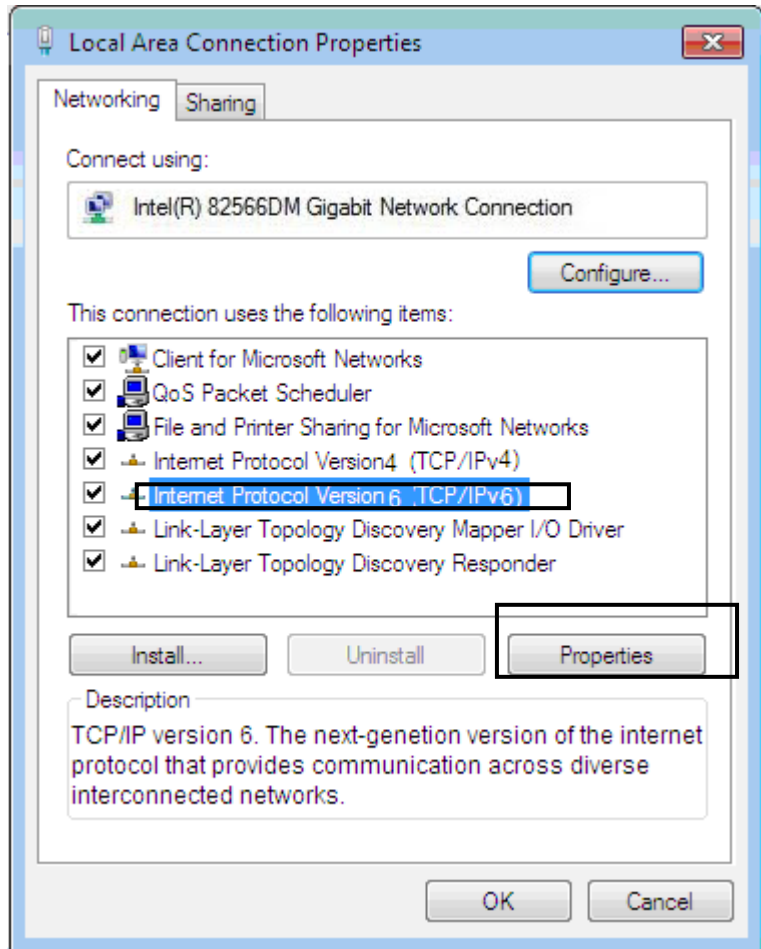
6. In the **TCP/IPv4 properties** window, select the **Obtain an IP address automatically** and **Obtain DNS Server address automatically** radio buttons. Then click **OK** to exit the setting.
7. Click **OK** again in the **Local Area Connection Properties** window to apply the new configuration.



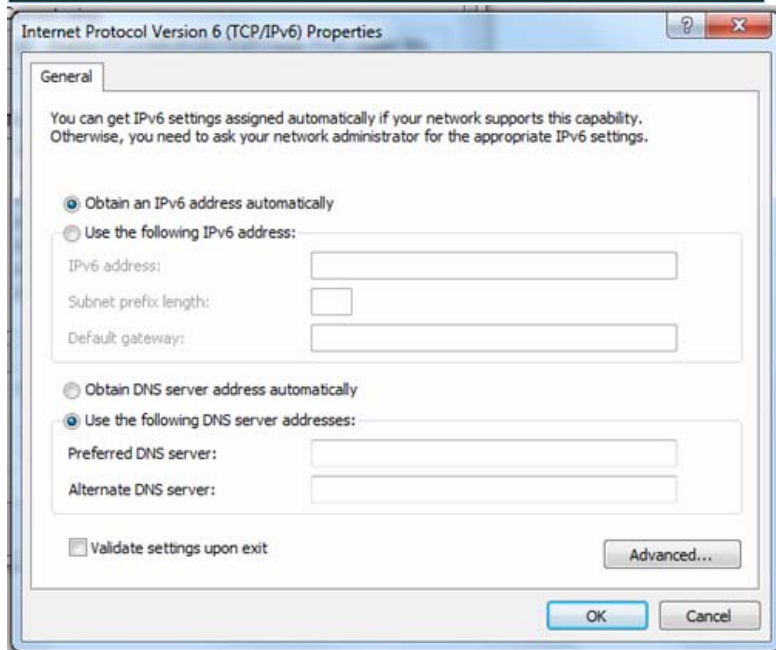


## IPv6:

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



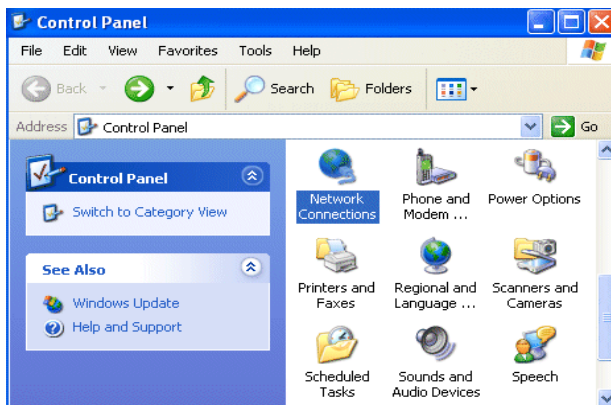
9. In the **TCP/IPv6 properties** window, select the **Obtain an IPv6 address automatically** and **Obtain DNS Server address automatically** radio buttons. Then click **OK** to exit the setting.
10. Click **OK** again in the **Local Area Connection Properties** window to apply the new configuration.



# Configuring a PC in Windows XP

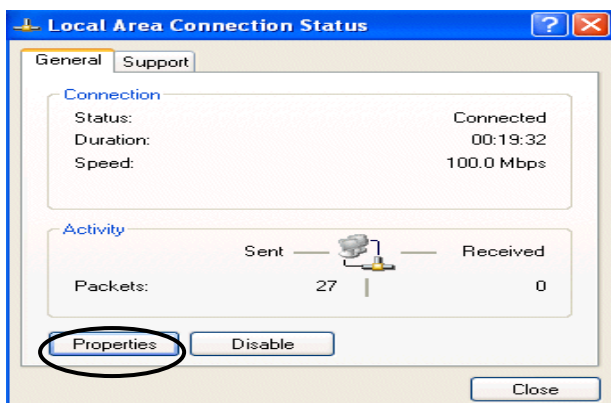
## IPv4:

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

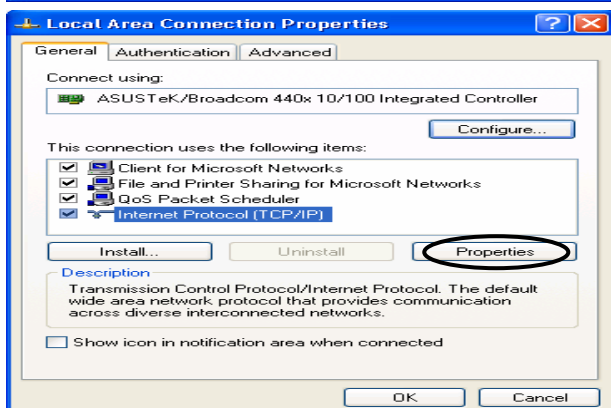


2. Double-click **Local Area Connection**.

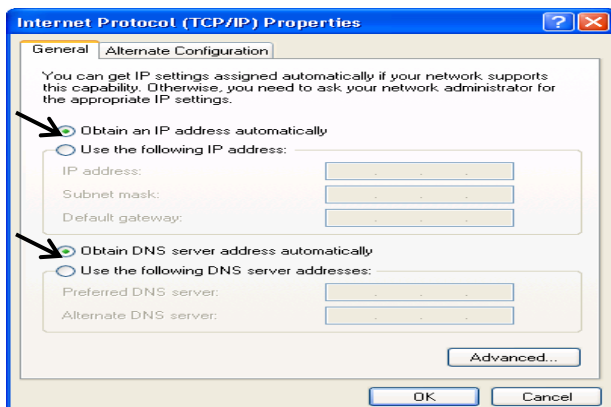
3. In the **Local Area Connection Status** window, click **Properties**.



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.



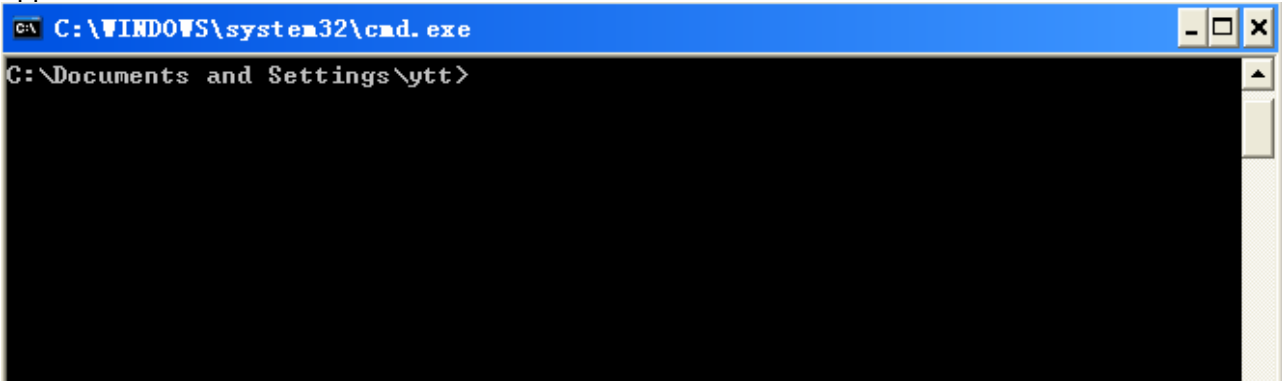
6. Click **OK** to finish the configuration.

## IPv6:

IPv6 is supported by Windows XP, but you should install it first.

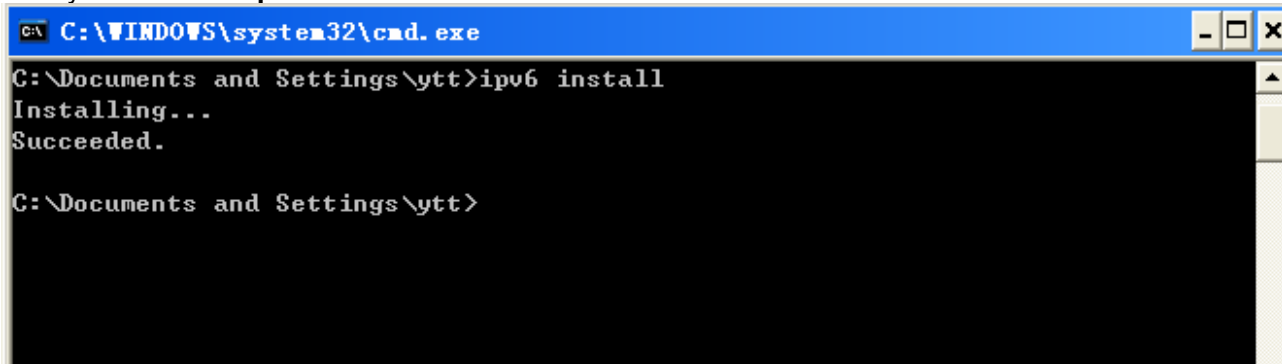
Act as shown below:

1. On the desktop, Click Start > Run, type cmd, then press Enter key in the keyboard, the following screen appears.



```
C:\WINDOWS\system32\cmd.exe
C:\Documents and Settings\ytt>
```

2. Key in command **ipv6 install**



```
C:\WINDOWS\system32\cmd.exe
C:\Documents and Settings\ytt>ipv6 install
Installing...
Succeeded.
C:\Documents and Settings\ytt>
```

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

# Configuring a PC in Windows 2000

1. Go to Start > Settings > Control Panel.  
In the Control Panel, double-click on Network and Dial-up Connections.

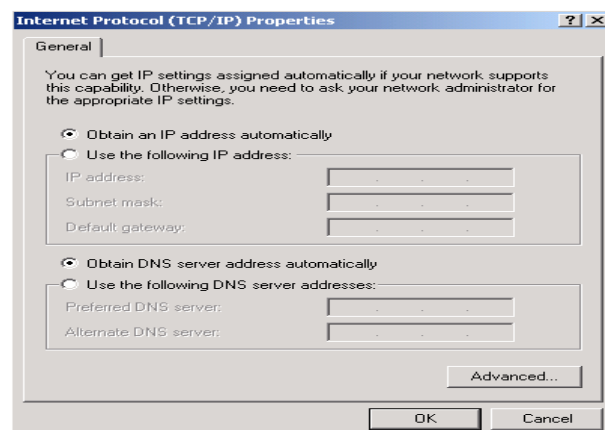
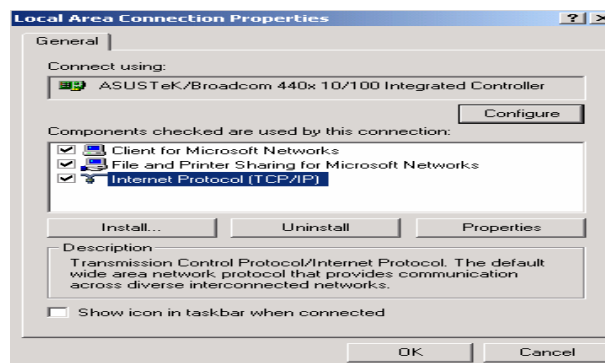
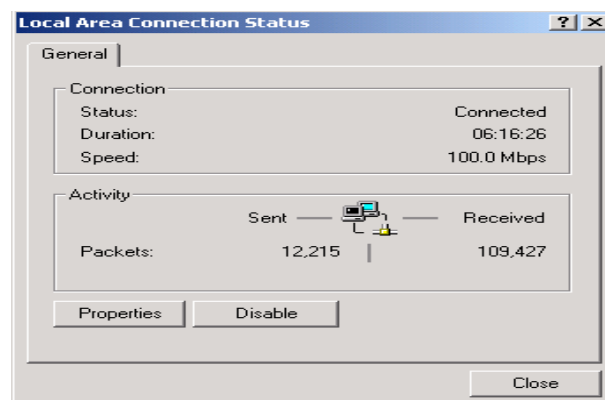
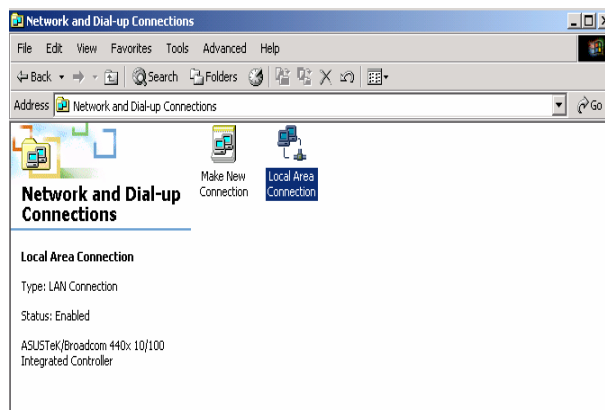
2. Double-click Local Area Connection.

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.



# Configuring a PC in Windows 95/98/Me

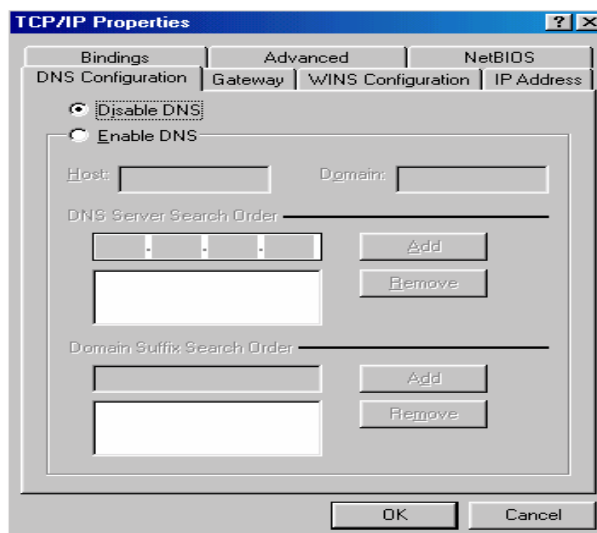
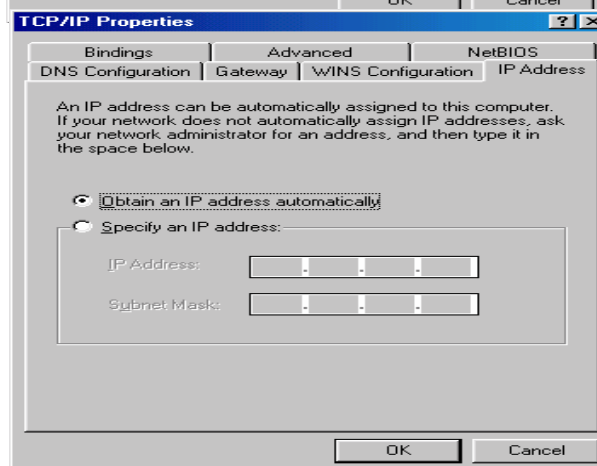
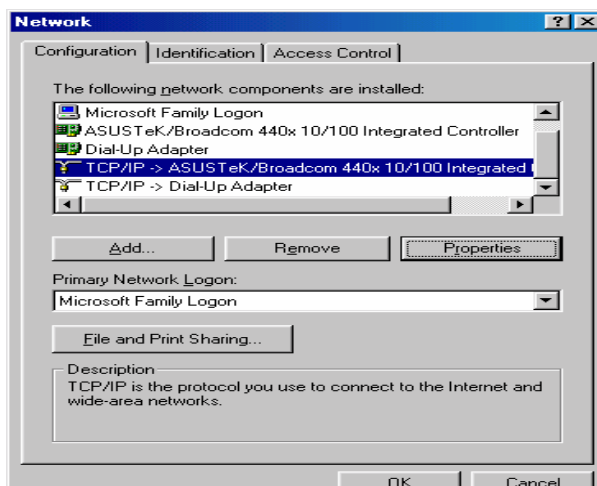
1. Go to Start > Settings > Control Panel. In the Control Panel, double-click on Network and choose the Configuration tab.

2. Select TCP/IP > NE2000 Compatible, or the name of your Network Interface Card (NIC) in your PC.

3. Select the Obtain an IP address automatically radio button.

4. Then select the DNS Configuration tab.

5. Select the Disable DNS radio button and click OK to finish the configuration.

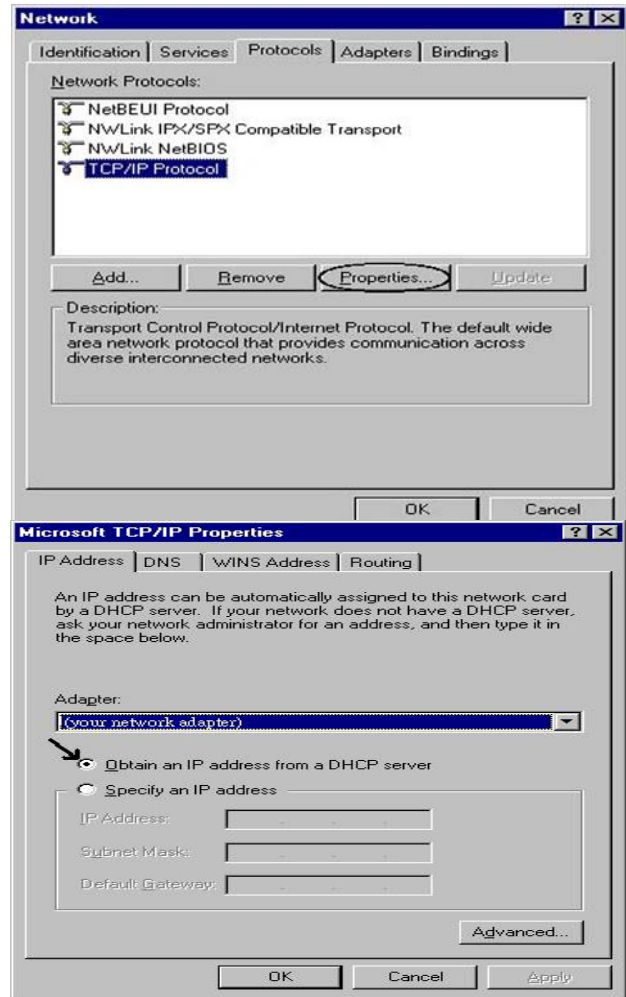


# Configuring a PC in Windows NT4.0

1. Go to Start > Settings > Control Panel. In the Control Panel, double-click on Network and choose the Protocols tab.

2. Select TCP/IP Protocol and click Properties.

3. Select the Obtain an IP address from a DHCP server radio button and click 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: 192.168.1.100
- ▶ 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.

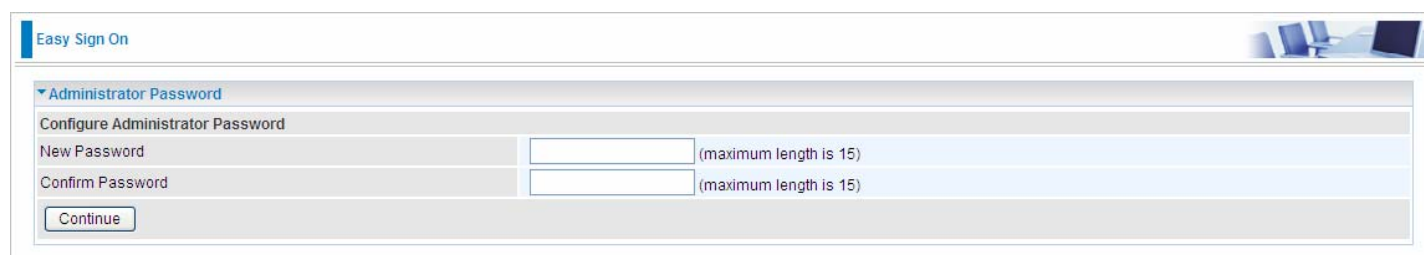
# Easy Sign On (EZSO)

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.



The screenshot shows the 'Easy Sign On' window with the 'Administrator Password' section expanded. It contains two input fields: 'New Password' and 'Confirm Password', both with a note '(maximum length is 15)'. A 'Continue' button is located at the bottom left of the section.

**Step 2:** Set the Time Zone.

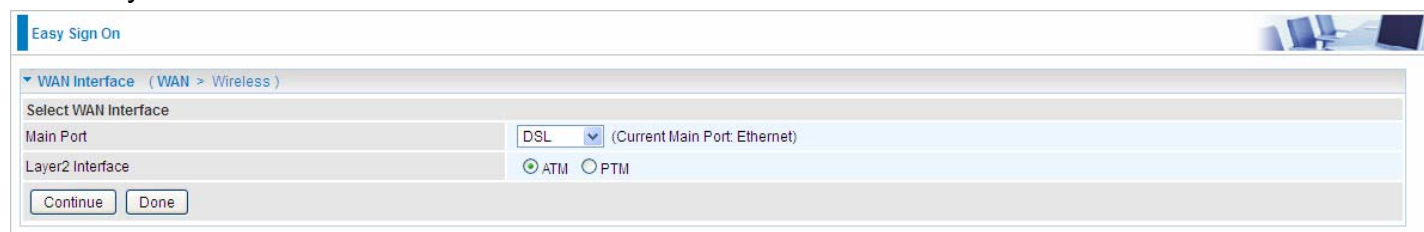


The screenshot shows the 'Easy Sign On' window with the 'Time Zone' section expanded. It contains a dropdown menu for 'Time zone offset' with the selected option '(GMT-00:00) Greenwich Mean Time: Dublin, Edinburgh, Lisbon, London'. A 'Continue' button is located at the bottom left of the section.

**Step 3:** Configure the WAN interface.

## DSL mode

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



The screenshot shows the 'Easy Sign On' window with the 'WAN Interface' section expanded. It contains a dropdown menu for 'Main Port' with the selected option 'DSL' and a note '(Current Main Port: Ethernet)'. Below it, there are radio buttons for 'Layer2 Interface' with 'ATM' selected and 'PTM' unselected. 'Continue' and 'Done' buttons are located at the bottom left of the section.

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

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.

Easy Sign On

WAN Interface (WAN > Wireless)

WAN Service

Type	PPP over Ethernet (PPPoE)
VPI / VCI	[0-255] / [32-65535]
Username	
Password	
Service Name	
Encapsulation Mode	LLC/SNAP-BRIDGING
Authentication Method	AUTO
IPv4 Address	<input type="checkbox"/> Static
IP Address	
IPv6 for this service	<input checked="" type="checkbox"/> Enable
IPv6 Address	<input type="checkbox"/> Static
IP Address	
MTU	1492

Continue

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

Easy Sign On

WAN Interface (WAN > Wireless)

DSL Line Is Not Ready. Please Check your DSL Line and wait for a while.

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

Easy Sign On

WAN Interface (WAN > Wireless)

Please wait while the device is configured.

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

Easy Sign On

WAN Interface (WAN > Wireless)

Congratulations !

Your WAN port has been successfully configured.

Next to Wireless Done

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

Easy Sign On

WAN Interface

Stop EZSO

You stopped the EZSO procedure. Web Configuration will now load.

5. After the configuration is successful, click **Next to Wireless** button and you may proceed to configure the Wireless setting. The 7800DX(L) supports dual-band wireless, here you can set to activate wireless on which band or both 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).

The screenshot shows the 'Easy Sign On' interface for configuring wireless settings. The 'Wireless' section is expanded, showing a table of parameters:

Parameters	
Band	2.4GHz (w10)
Wireless	<input checked="" type="checkbox"/> Enable
SSID	wlan-ap-2.4g
WPA Pre-Shared Key	<input type="text"/> <a href="#">Click here to display</a>

Below the table is a 'Continue' button. Below the configuration area, a message states: 'Please wait while the device is configured.'

6. Continue to set 5GHz wireless.

The screenshot shows the 'Easy Sign On' interface for configuring wireless settings. The 'Wireless' section is expanded, showing a table of parameters:

Parameters	
Band	5GHz (w11)
Wireless	<input checked="" type="checkbox"/> Enable
SSID	wlan-ap-5g
WPA Pre-Shared Key	<input type="text"/> <a href="#">Click here to display</a>

Below the table is a 'Continue' button. Below the configuration area, a message states: 'Please wait while the device is configured.'


7. Success in configuring the EZSO.

The screenshot shows the 'Easy Sign On' interface with a 'Process finished' message:

**Success.**  
The Easy-Sign-On process is finished. Your device has been successfully configured.  
You can now:

1. Log onto the router management interface for more advanced settings on [192.168.1.254](http://192.168.1.254)
2. Continue to [wpad.home.gateway/wpad.dat](http://wpad.home.gateway/wpad.dat)

Click link **192.168.1.254**, it will lead you to the following page.

Status 

▼ Device Information

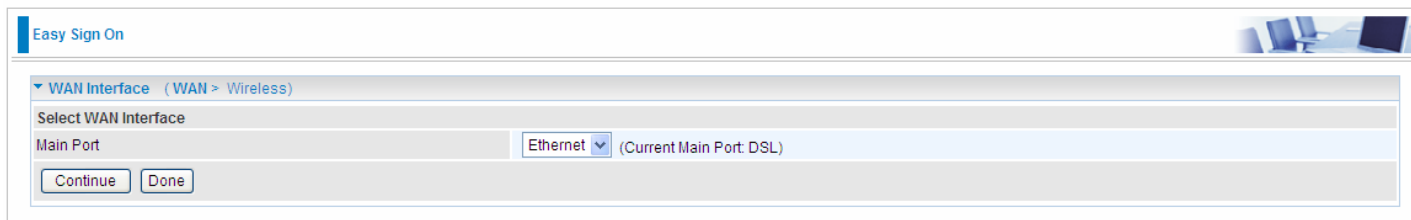
Model Name	BIPAC 7800DX
Host Name	home.gateway
System Up-Time	0D 0H 20M 46S
Date/Time	Mon Aug 5 07:28:23 2013 <input type="button" value="Sync"/>
Software Version	2.32b
LAN IPv4 Address	192.168.1.254
LAN IPv6 Address	2000:1211:1000:4d0b:204:edff:fe01:1/64
MAC Address	00:04:ed:01:00:01
DSL PHY and Driver Version	A2pD038f.d24h
Wireless Driver Version	6.30.102.7.cpe4.12L08.4

▼ WAN

Line Rate - Upstream (Kbps)	1291
Line Rate - Downstream (Kbps)	26919
Default Gateway / IPv4 Address	ppp0.1 (DSL) / 10.40.90.211
Connection Time	00:02:44
Primary DNS Server	218.2.135.1
Secondary DNS Server	218.2.135.1
Default IPv6 Gateway / IPv6 Address	ppp0.1 (DSL) / 2000:db98:1000:1000:29ac:afc6:59a4:5816/64

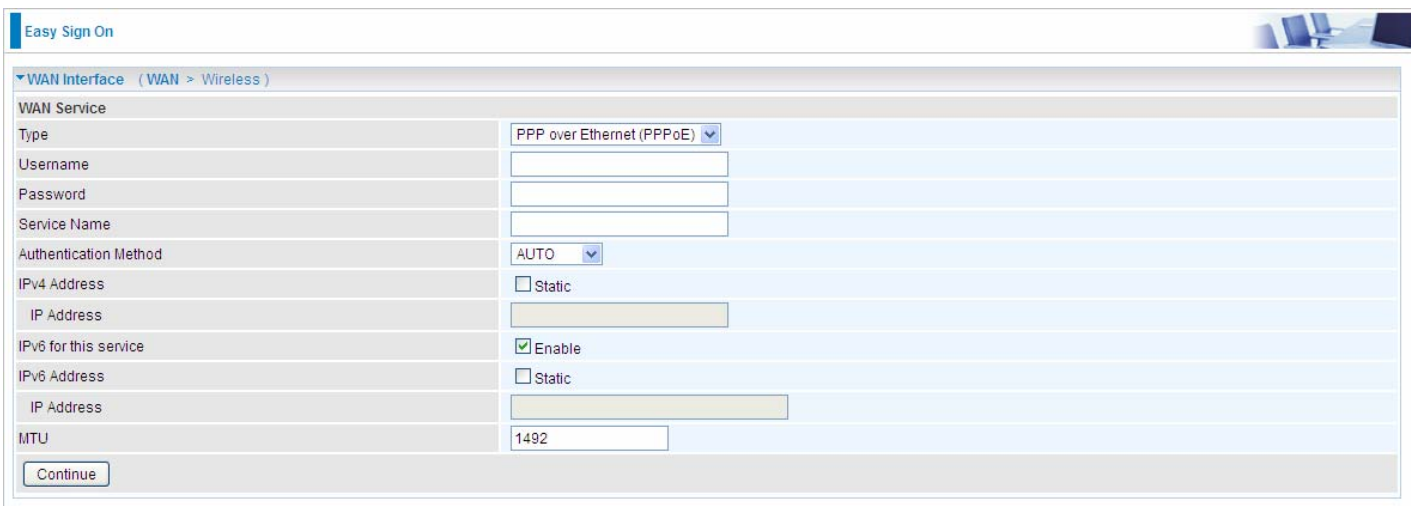
## Ethernet mode

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



The screenshot shows the 'Easy Sign On' configuration page. Under the 'WAN Interface (WAN > Wireless)' section, there is a 'Select WAN Interface' field. The 'Main Port' is set to 'Ethernet' (Current Main Port: DSL). There are 'Continue' and 'Done' buttons at the bottom.

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.



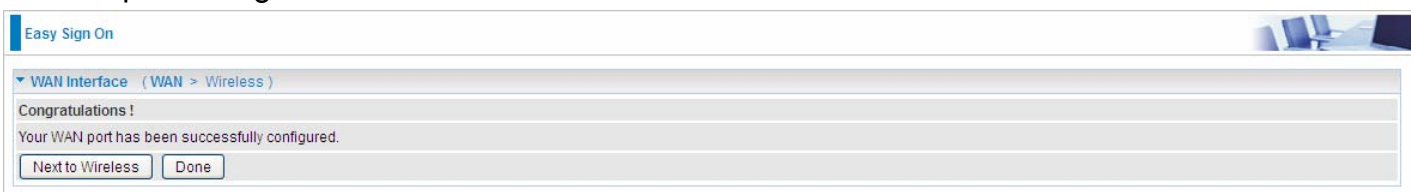
The screenshot shows the 'Easy Sign On' configuration page for 'WAN Service'. The 'Type' is set to 'PPP over Ethernet (PPPoE)'. The 'Authentication Method' is set to 'AUTO'. The 'IP Address' field is empty. The 'IPv6 for this service' checkbox is checked, indicating it is enabled. The 'MTU' is set to 1492. There are 'Continue' and 'Done' buttons at the bottom.

3. Wait while the device is configured.



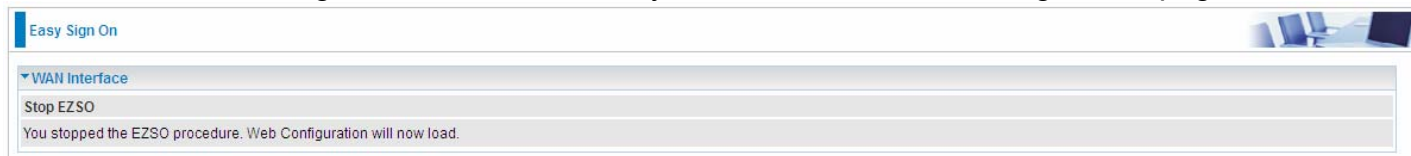
The screenshot shows the 'Easy Sign On' configuration page. Under the 'WAN Interface (WAN > Wireless)' section, there is a message: 'Please wait while the device is configured.' There are 'Next to Wireless' and 'Done' buttons at the bottom.

4. WAN port configuration is success.



The screenshot shows the 'Easy Sign On' configuration page. Under the 'WAN Interface (WAN > Wireless)' section, there is a message: 'Congratulations ! Your WAN port has been successfully configured.' There are 'Next to Wireless' and 'Done' buttons at the bottom.

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



The screenshot shows the 'Easy Sign On' configuration page. Under the 'WAN Interface' section, there is a message: 'Stop EZSO You stopped the EZSO procedure. Web Configuration will now load.' There are 'Next to Wireless' and 'Done' buttons at the bottom.

5. After the configuration is successful, click **Next to Wireless** button and you may proceed to configure the Wireless setting. The 7800DX(L) supports dual-band wireless, here you can set to activate wireless on which band or both 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).



Easy Sign On

Wireless (WAN > Wireless)

Parameters

Band	2.4GHz (w10)
Wireless	<input checked="" type="checkbox"/> Enable
SSID	wlan-ap-2.4g
WPA Pre-Shared Key	<input type="text"/> <a href="#">Click here to display</a>



Easy Sign On

Wireless (WAN > Wireless)

Please wait while the device is configured.

6. Continue to set 5GHz wireless.



Easy Sign On

Wireless (WAN > Wireless)

Parameters

Band	5GHz (w1)
Wireless	<input checked="" type="checkbox"/> Enable
SSID	wlan-ap-5g
WPA Pre-Shared Key	<input type="text"/> <a href="#">Click here to display</a>

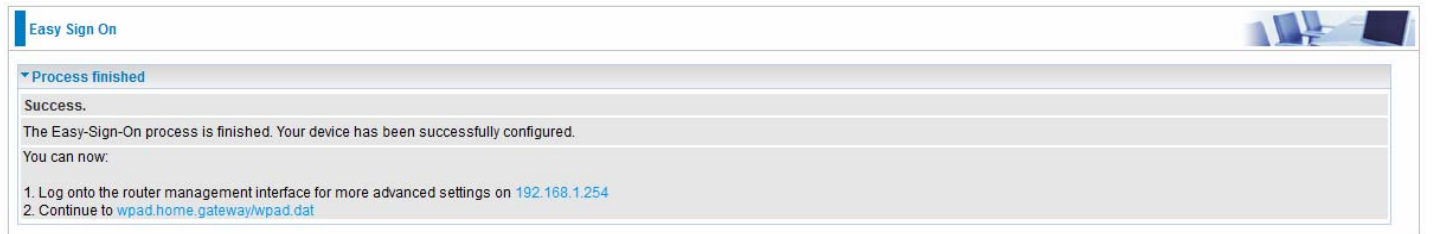


Easy Sign On

Wireless (WAN > Wireless)

Please wait while the device is configured.

7. Success in configuring the EZSO.



Easy Sign On

Process finished


Success.

The Easy-Sign-On process is finished. Your device has been successfully configured.

You can now:

1. Log onto the router management interface for more advanced settings on [192.168.1.254](http://192.168.1.254)
2. Continue to [wpad.home.gateway/wpad.dat](http://wpad.home.gateway/wpad.dat)

Click **192.168.1.254**, it will lead you to the following page.

Status 

▼ Device Information

Model Name	BIPAC 7800DX
Host Name	home.gateway
System Up-Time	0D 0H 23M 19S
Date/Time	Mon Aug 5 07:30:56 2013 <input type="button" value="Sync"/>
Software Version	2.32b
LAN IPv4 Address	192.168.1.254
LAN IPv6 Address	2000:1211:1000:4d0b:204:edffe01:1/64
MAC Address	00:04:ed:01:00:01
DSL PHY and Driver Version	A2pD038f.d24h
Wireless Driver Version	6.30.102.7.cpe4.12L08.4

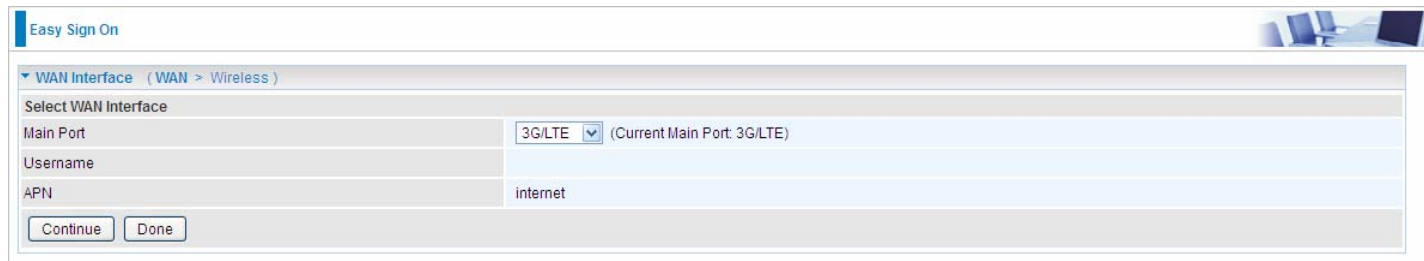
▼ WAN

Line Rate - Upstream (Kbps)	0
Line Rate - Downstream (Kbps)	0
Default Gateway / IPv4 Address	ppp0.1(Ethernet) / 10.40.90.211
Connection Time	00:02:44
Primary DNS Server	218.2.135.1
Secondary DNS Server	218.2.135.1
Default IPv6 Gateway / IPv6 Address	ppp0.1 (Ethernet) / 2000:db98:1000:1000:29ac:afc6:59a4:5816/64



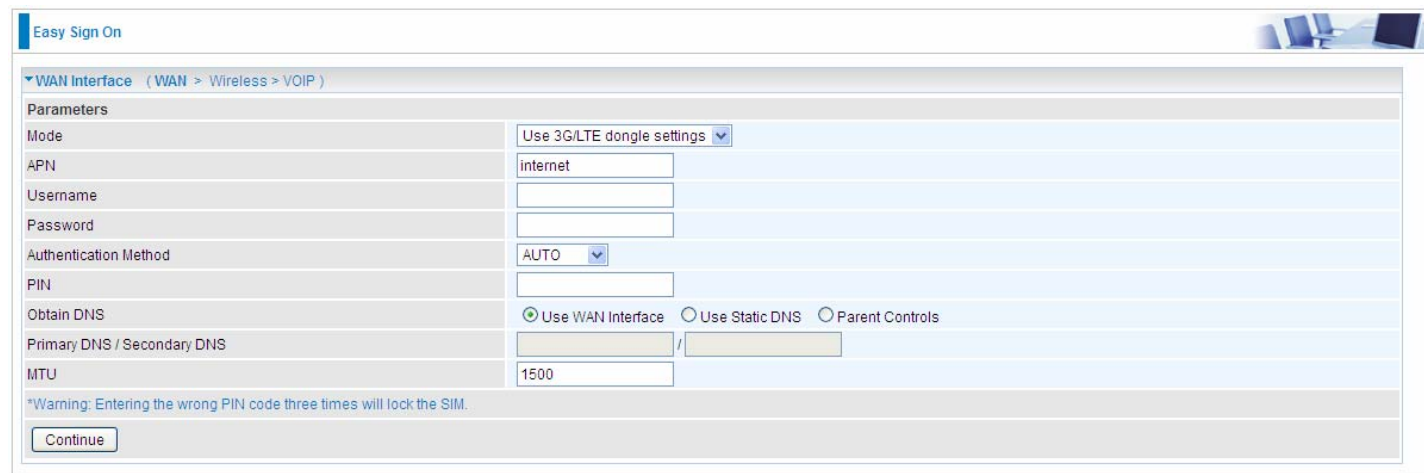
## 3G/LTE

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



The screenshot shows the 'Easy Sign On' configuration page for the WAN Interface. The breadcrumb trail is 'WAN > Wireless'. Under 'Select WAN Interface', the 'Main Port' is set to '3G/LTE' (Current Main Port: 3G/LTE). The 'APN' is set to 'internet'. There are 'Continue' and 'Done' buttons at the bottom.

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



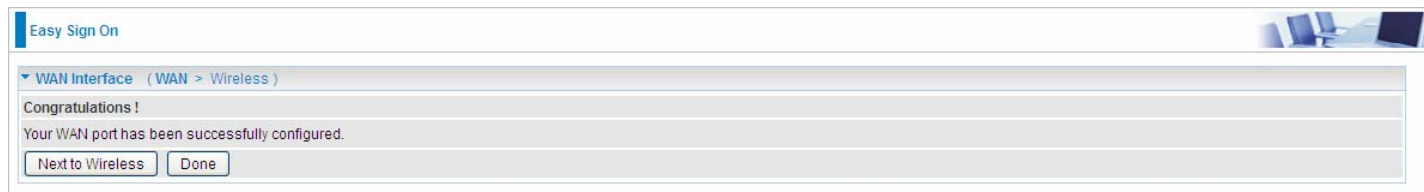
The screenshot shows the 'Easy Sign On' configuration page for the WAN Interface parameters. The breadcrumb trail is 'WAN > Wireless > VOIP'. The 'Mode' is set to 'Use 3G/LTE dongle settings'. The 'APN' is 'internet'. The 'Authentication Method' is 'AUTO'. The 'Obtain DNS' section has radio buttons for 'Use WAN Interface' (selected), 'Use Static DNS', and 'Parent Controls'. The 'MTU' is set to '1500'. A warning message states: '\*Warning: Entering the wrong PIN code three times will lock the SIM.' There is a 'Continue' button at the bottom.

3. Wait while the device is configured.



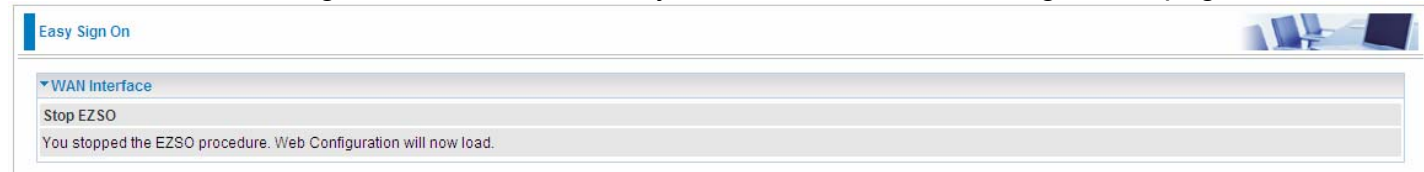
The screenshot shows the 'Easy Sign On' configuration page for the WAN Interface. The breadcrumb trail is 'WAN > Wireless'. The message reads: 'Please wait while the device is configured.'

4. WAN port configuration is success.



The screenshot shows the 'Easy Sign On' configuration page for the WAN Interface. The breadcrumb trail is 'WAN > Wireless'. The message reads: 'Congratulations ! Your WAN port has been successfully configured.' There are 'Next to Wireless' and 'Done' buttons at the bottom.

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



The screenshot shows the 'Easy Sign On' configuration page for the WAN Interface. The breadcrumb trail is 'WAN > Wireless'. The message reads: 'You stopped the EZSO procedure. Web Configuration will now load.'

5. After the configuration is successful, click **Next to Wireless** button and you may proceed to configure the Wireless setting. The 7800DX(L) supports dual-band wireless, here you can set to activate wireless on which band or both 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).



Easy Sign On

Wireless (WAN > Wireless)

Parameters

Band	2.4GHz (w10)
Wireless	<input checked="" type="checkbox"/> Enable
SSID	wlan-ap-2.4g
WPA Pre-Shared Key	<input type="text"/> <a href="#">Click here to display</a>



Easy Sign On

Wireless (WAN > Wireless)

Please wait while the device is configured.

6. Continue to set 5GHz wireless.



Easy Sign On

Wireless (WAN > Wireless)

Parameters

Band	5GHz (w1)
Wireless	<input checked="" type="checkbox"/> Enable
SSID	wlan-ap-5g
WPA Pre-Shared Key	<input type="text"/> <a href="#">Click here to display</a>



Easy Sign On

Wireless (WAN > Wireless)

Please wait while the device is configured.

7. Success in configuring the EZSO.



Easy Sign On

Process finished

Success.

The Easy-Sign-On process is finished. Your device has been successfully configured.

You can now:

1. Log onto the router management interface for more advanced settings on [192.168.1.254](http://192.168.1.254)
2. Continue to [www.sohu.com/](http://www.sohu.com/)

Click **192.168.1.254**, it will lead you to the following page.

Status 

▼ Device Information


Model Name	BIPAC 7800DX
Host Name	home.gateway
System Up-Time	0D 0H 22M 20S
Date/Time	Mon Aug 5 07:29:57 2013 <input type="button" value="Sync"/>
Software Version	2.32b
LAN IPv4 Address	192.168.1.254
LAN IPv6 Address	fe80::204:edff:fe02:1/64
MAC Address	00:04:ed:02:00:01
DSL PHY and Driver Version	A2pD038f.d24h
Wireless Driver Version	6.30.102.7.cpe4.12L08.4

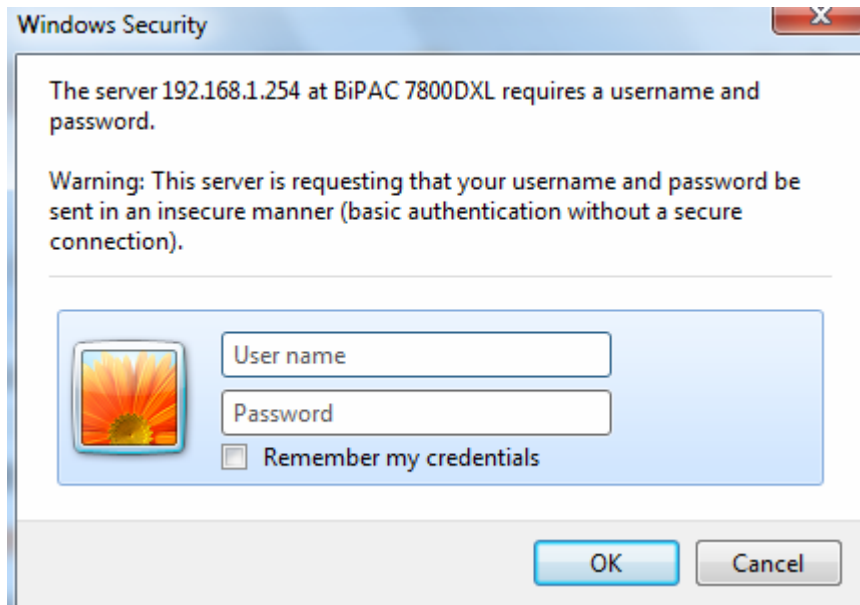
▼ WAN

Line Rate - Upstream (Kbps)	0
Line Rate - Downstream (Kbps)	0
Default Gateway / IPv4 Address	ppp3g0(3G/LTE) / 10.44.183.197
Connection Time	00:06:30
Primary DNS Server	221.5.4.55
Secondary DNS Server	58.240.57.33
Default IPv6 Gateway / IPv6 Address	ppp0.1 (DSL)

# 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 Firewall Router!**

Once you have logged on to your BiPAC 7800DX(L) 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, Route, 3G/LTE Status, ARP, DHCP, VPN (7800DX only), Log)

● **Quick Start** (Quick Start)

● **Configuration** (LAN, Wireless 2.4G(wl0), Wireless 5G(wl1), WAN, System, USB, IP Tunnel, Security, Quality of Service, NAT, Wake On LAN)

● **VPN** (IPSec, VPN Account, PPTP, L2TP, GRE)

● **Advanced Setup** (Routing, DNS, Static ARP, UPnP, Certificate, Multicast, Management, Diagnostics)

**Note:** VPN is only available for 7800DX.

# Status

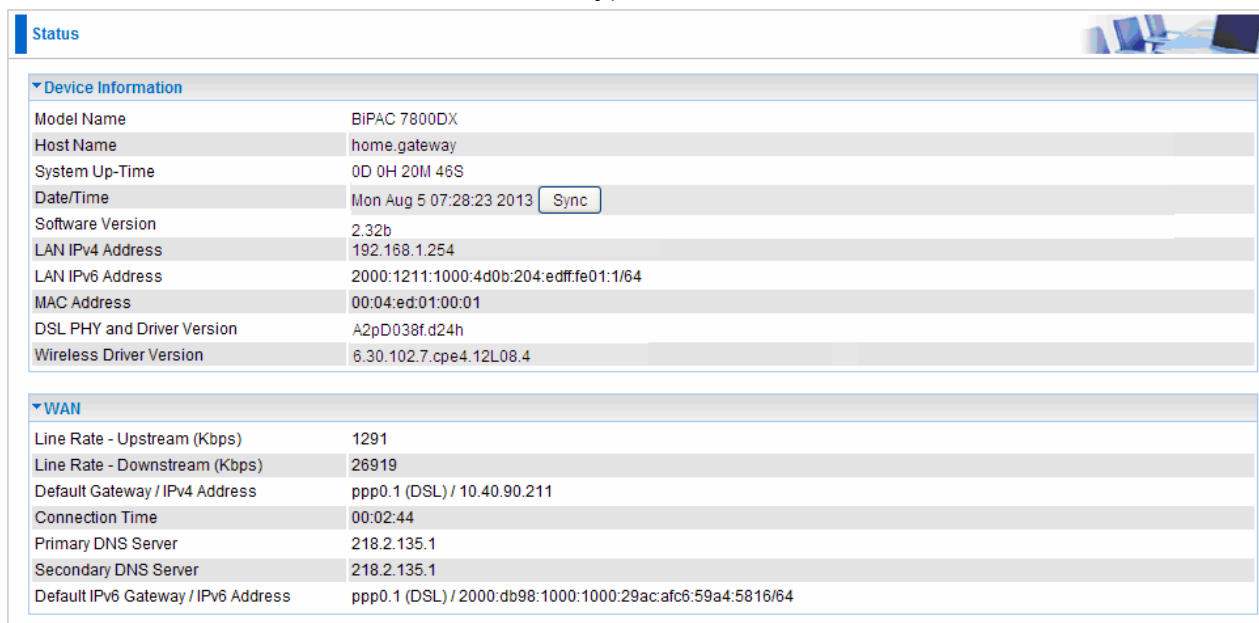
This Section gives users an easy access to the information about the working router and access to view the current status of the router. Here [Summary](#), [WAN](#), [Statistics](#), [Bandwidth Usage](#), [3G/LTE Status](#), [Route](#), [ARP](#), [DHCP](#), [VPN](#) (7800DX only) and [Log](#) subsections are included.

▼ Status
▪ Summary
▪ WAN
▶ Statistics
▶ Bandwidth Usage
▪ 3G/LTE Status
▪ Route
▪ ARP
▪ DHCP
▶ VPN
▶ Log
▪ Quick Start
▶ Configuration
▶ VPN
▶ Advanced Setup

(7800DX)

# Summary

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



The screenshot shows a web interface with a 'Status' tab. It contains two expandable sections: 'Device Information' and 'WAN'. The 'Device Information' section lists various system parameters, and the 'WAN' section lists network-related parameters.

Device Information	
Model Name	BIPAC 7800DX
Host Name	home.gateway
System Up-Time	0D 0H 20M 46S
Date/Time	Mon Aug 5 07:28:23 2013 <input type="button" value="Sync"/>
Software Version	2.32b
LAN IPv4 Address	192.168.1.254
LAN IPv6 Address	2000:1211:1000:4d0b:204:edff:fe01:1/64
MAC Address	00:04:ed:01:00:01
DSL PHY and Driver Version	A2pD038f.d24h
Wireless Driver Version	6.30.102.7.cpe4.12L08.4

WAN	
Line Rate - Upstream (Kbps)	1291
Line Rate - Downstream (Kbps)	26919
Default Gateway / IPv4 Address	ppp0.1 (DSL) / 10.40.90.211
Connection Time	00:02:44
Primary DNS Server	218.2.135.1
Secondary DNS Server	218.2.135.1
Default IPv6 Gateway / IPv6 Address	ppp0.1 (DSL) / 2000:db98:1000:1000:29ac:afc6:59a4:5816/64

## 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.

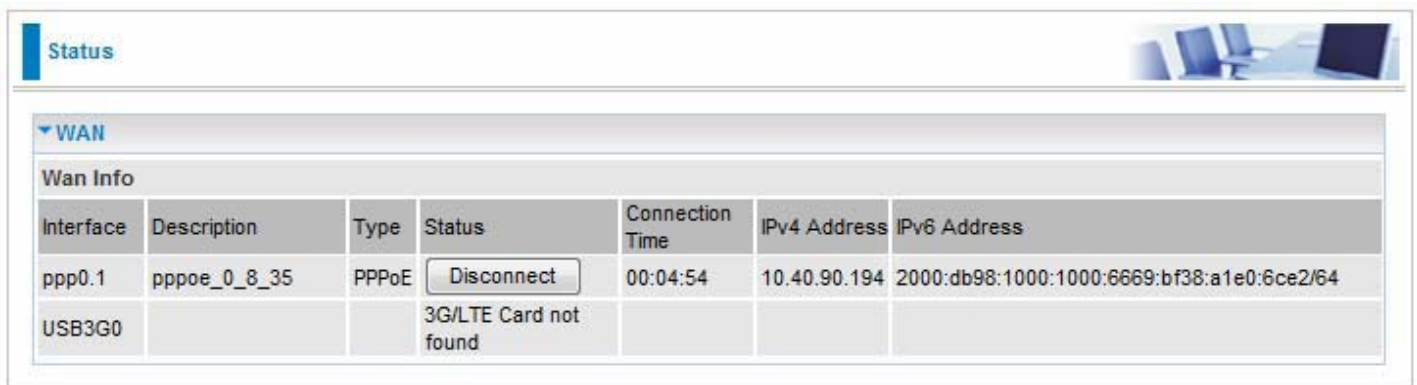
**Primary DNS Server:** Displays IPV4 address of Primary DNS Server.

**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.



The screenshot shows a 'Status' page with a 'WAN' section. Under 'WAN', there is a 'Wan Info' table. The table has columns for Interface, Description, Type, Status, Connection Time, IPv4 Address, and IPv6 Address. Two rows are visible: one for 'ppp0.1' with status 'Disconnect' and one for 'USB3G0' with status '3G/LTE Card not found'.

Interface	Description	Type	Status	Connection Time	IPv4 Address	IPv6 Address
ppp0.1	pppoe_0_8_35	PPPoE	<input type="button" value="Disconnect"/>	00:04:54	10.40.90.194	2000:db98:1000:1000:6669:bf38:a1e0:6ce2/64
USB3G0			3G/LTE Card not found			

**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.

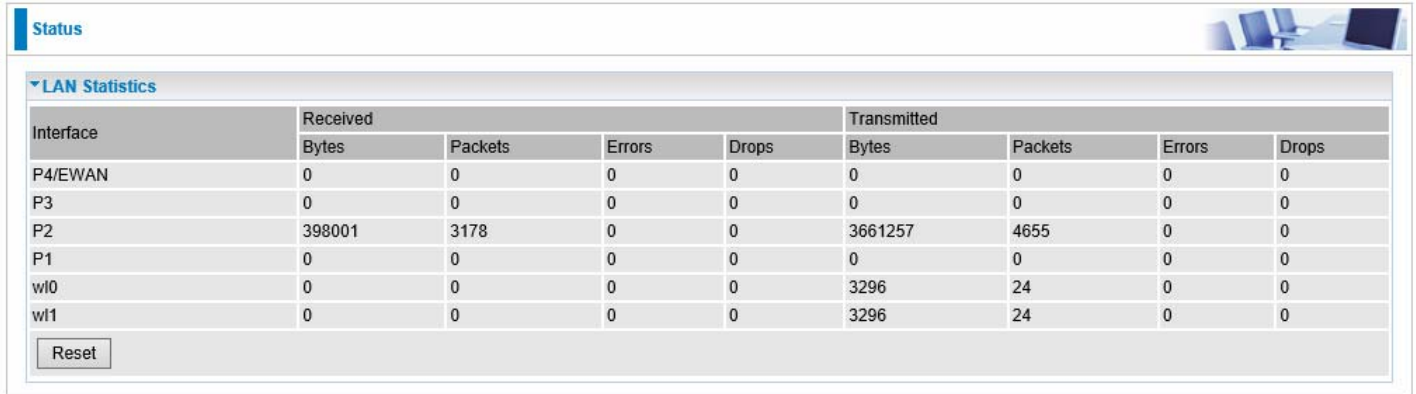


# Statistics

## LAN

The table shows the statistics of LAN.

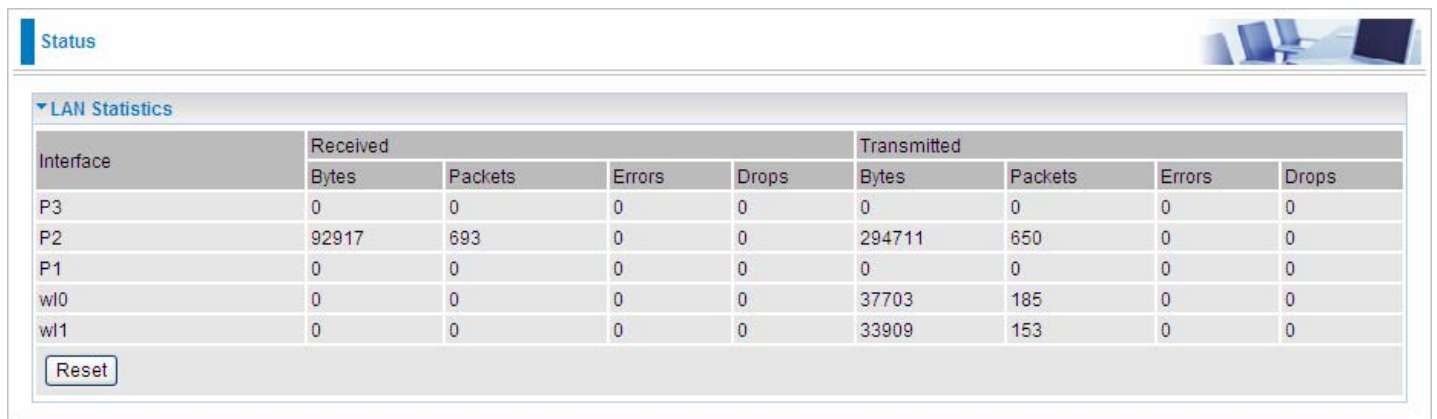
**Note:** P4 can be configured as EWAN, and when the device is in EWAN profile, there is no P4/EWAN interface as P4 is working as a WAN port.



Interface	Received				Transmitted			
	Bytes	Packets	Errors	Drops	Bytes	Packets	Errors	Drops
P4/EWAN	0	0	0	0	0	0	0	0
P3	0	0	0	0	0	0	0	0
P2	398001	3178	0	0	3661257	4655	0	0
P1	0	0	0	0	0	0	0	0
w10	0	0	0	0	3296	24	0	0
w11	0	0	0	0	3296	24	0	0

Reset

(DSL)



Interface	Received				Transmitted			
	Bytes	Packets	Errors	Drops	Bytes	Packets	Errors	Drops
P3	0	0	0	0	0	0	0	0
P2	92917	693	0	0	294711	650	0	0
P1	0	0	0	0	0	0	0	0
w10	0	0	0	0	37703	185	0	0
w11	0	0	0	0	33909	153	0	0

Reset

(EWAN)

**Interface:** List each LAN interface. P1-P4 indicates the four LAN interfaces.

**Bytes:** Display the Received and Transmitted traffic statistics in Bytes.

**Packets:** Display the Received and Transmitted traffic statistics in Packets.

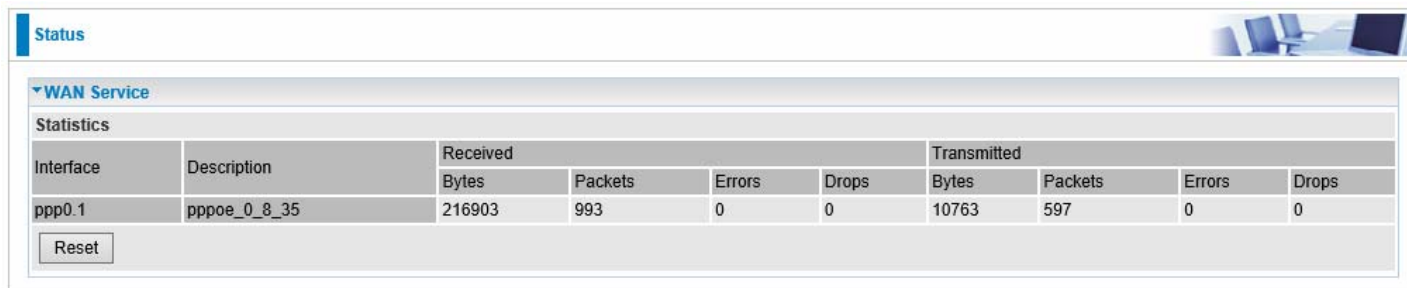
**Errors:** Display the statistics of errors arising in Receiving or Transmitting data.

**Drops:** Display the statistics of drops arising in Receiving or Transmitting data.

**Reset:** Press this button to refresh the statistics.

## WAN Service

The table shows the statistics of WAN.



The screenshot shows a web interface with a 'Status' tab and a 'WAN Service' section. Under 'Statistics', there is a table with columns for Interface, Description, Received (Bytes, Packets, Errors, Drops), and Transmitted (Bytes, Packets, Errors, Drops). A 'Reset' button is located below the table.

Interface	Description	Received				Transmitted			
		Bytes	Packets	Errors	Drops	Bytes	Packets	Errors	Drops
ppp0.1	pppoe_0_8_35	216903	993	0	0	10763	597	0	0

**Interface:** Display the connection interface.

**Description:** the description for the connection.

**Bytes:** Display the WAN Received and Transmitted traffic statistics in Bytes.

**Packets:** Display the WAN Received and Transmitted traffic statistics in Packests.

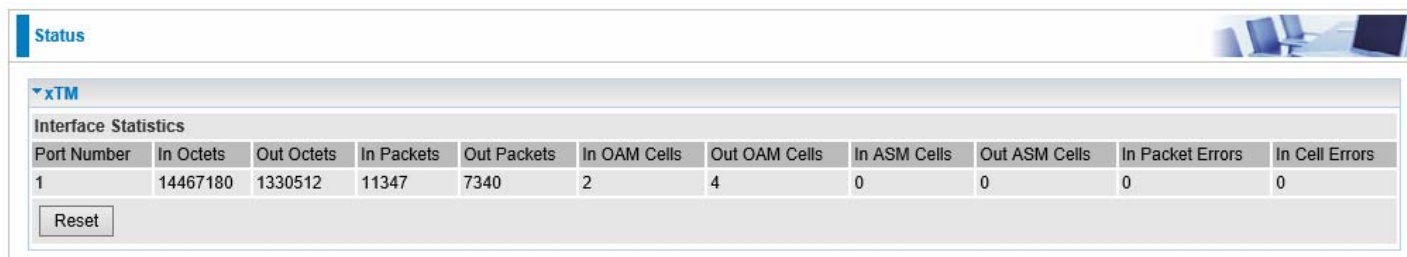
**Errors:** Display the statistics of errors arising in Receiving or Transmitting data.

**Drops:** Display the statistics of drops arising in Receiving or Transmitting data.

**Reset:** Press this button to refresh the statistics.

## xTM

The Statistics-xTM screen displays all the xTM statistics



The screenshot shows a web interface with a 'Status' tab and an 'xTM' section. Under 'Interface Statistics', there is a table with columns for Port Number, In Octets, Out Octets, In Packets, Out Packets, In OAM Cells, Out OAM Cells, In ASM Cells, Out ASM Cells, In Packet Errors, and In Cell Errors. A 'Reset' button is located below the table.

Port Number	In Octets	Out Octets	In Packets	Out Packets	In OAM Cells	Out OAM Cells	In ASM Cells	Out ASM Cells	In Packet Errors	In Cell Errors
1	14467180	1330512	11347	7340	2	4	0	0	0	0

**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.

Status

▼ xDSL

xDSL		
Mode	ADSL_2plus	
Traffic Type	ATM	
Status	Up	
Link Power State	L0	
	Downstream	Upstream
Line Coding (Trellis)	On	On
SNR Margin (dB)	7.2	7.2
Attenuation (dB)	0.0	1.3
Output Power (dBm)	7.2	9.3
Attainable Rate (Kbps)	28388	1335
Rate (Kbps)	27447	1299
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

**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.

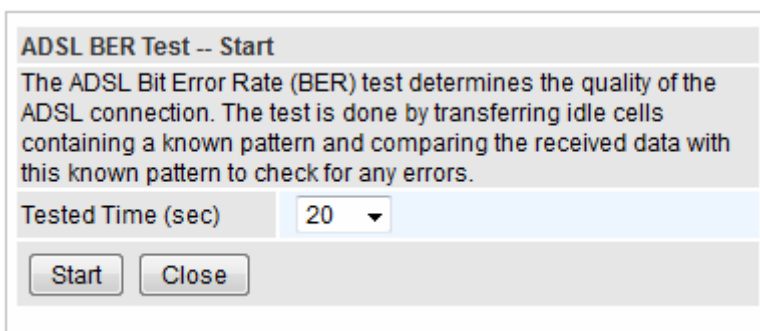
**Bit Errors:** Total number of bit errors.

**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.



ADSL BER Test -- Start

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.

Tested Time (sec) 20

Start Close

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

**ADSL BER Test -- Running**

The xDSL BER test is in progress.

Connection Speed	27447 Kbps
The test will run for	20 seconds

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

**ADSL BER Test -- Result**

The ADSL BER test completed successfully.

Test Time	20 seconds
Total Transferred Bits	0x000000001DA1F500
Error Ratio	0.00e+00

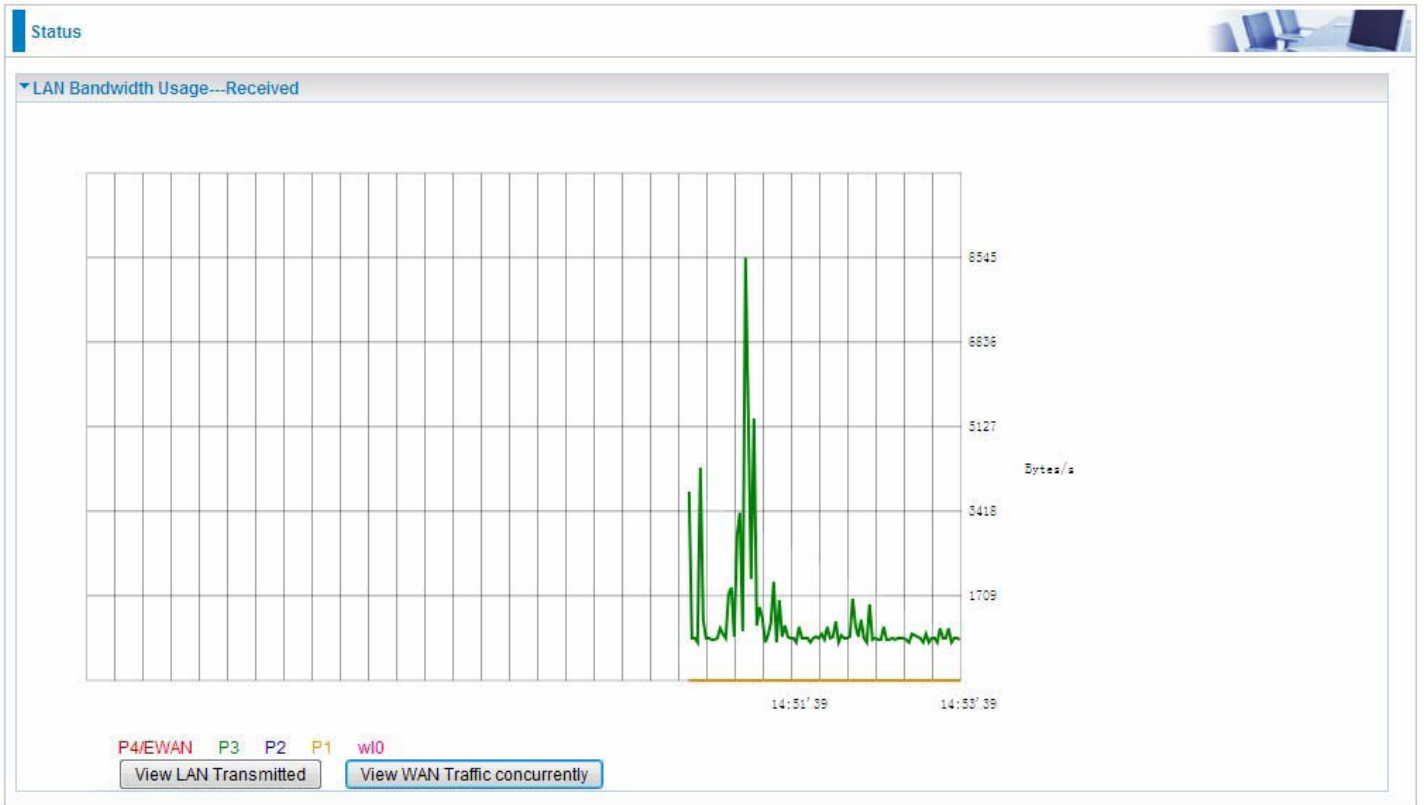
**Reset:** Click this button to reset the statistics.

# 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

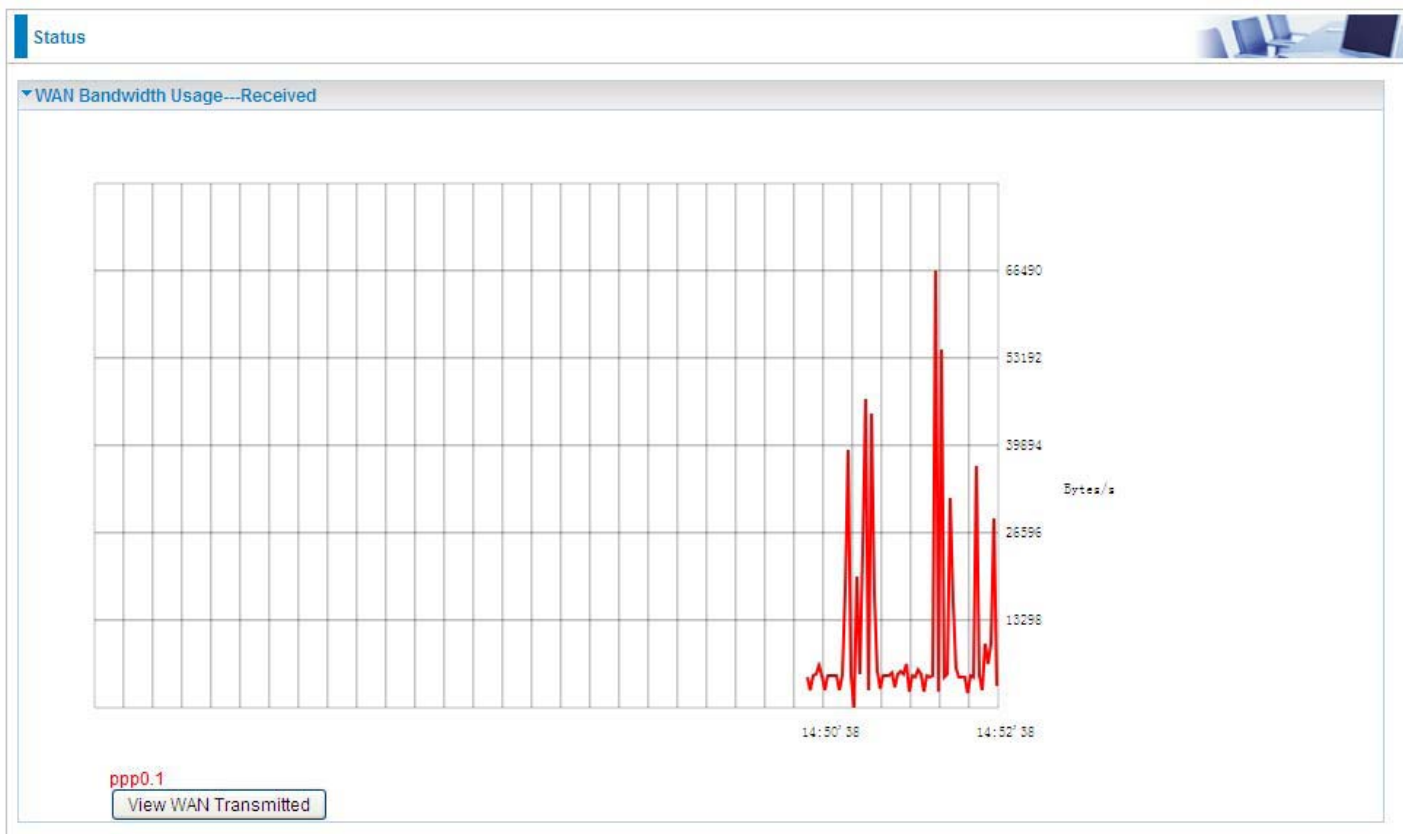
**Note:** P4 can be configured as EWAN, and when the device is in EWAN profile, there is no P4/EWAN interface as P4 is working as a WAN port.



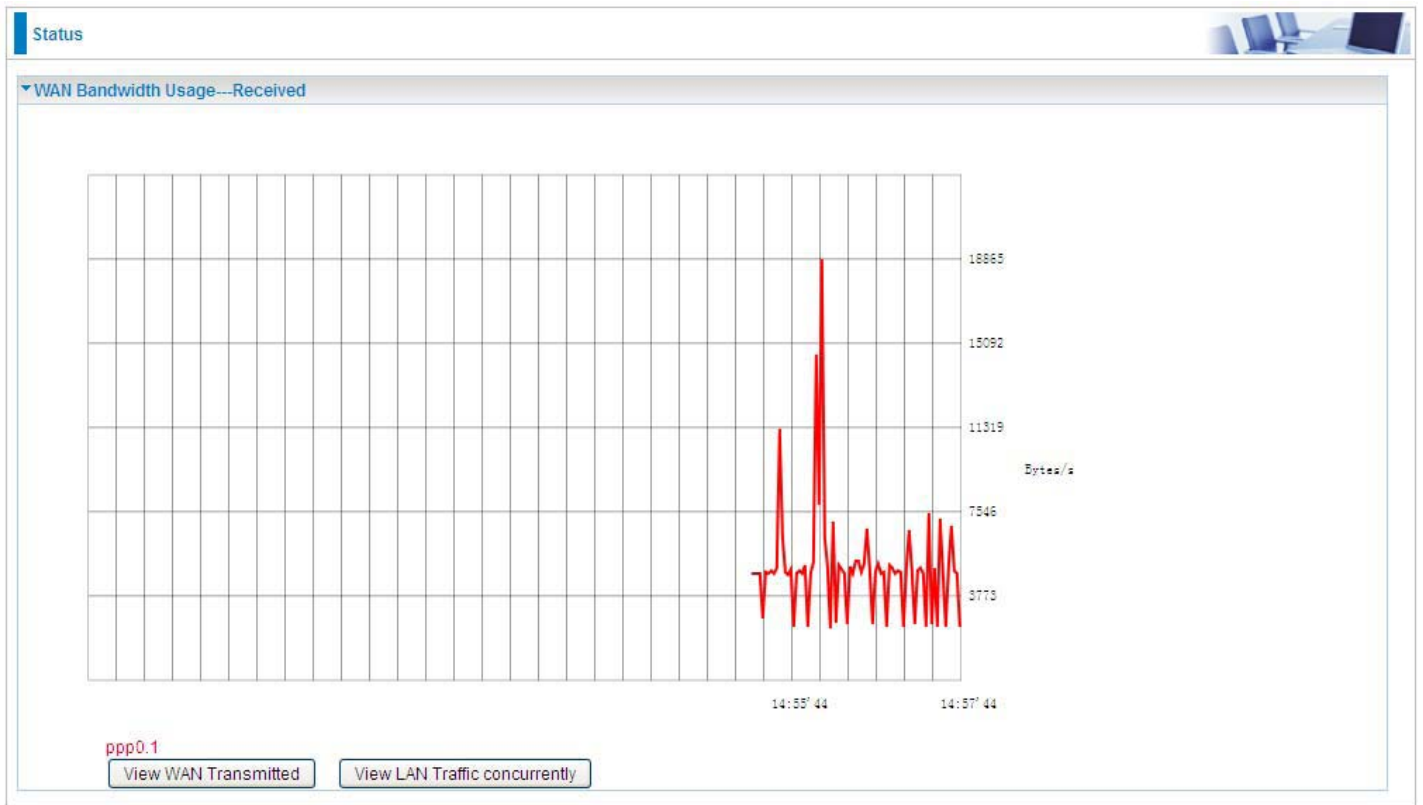
(DSL)

Press **View LAN Transmitted** button to change the diagram to the statistics from a Received Bytes of view. (**Note:** P3 means Ethernet port #3, and the traffic information of the port #3 is identified with green, the same color with P3 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.



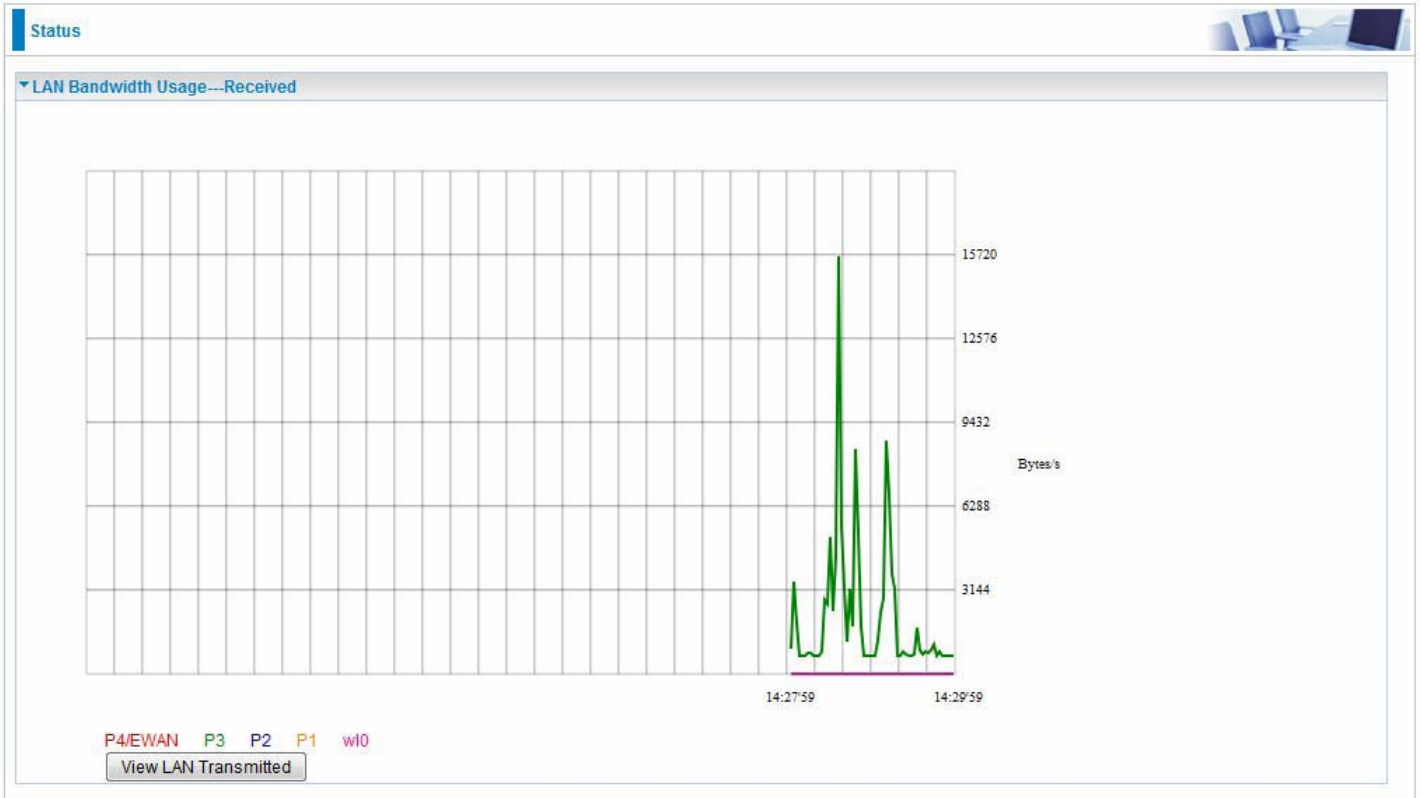
## WAN Service




Press **View WAN Transmitted** button to change the diagram to the statistics from a Received Bytes of view.



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



## 3G/LTE Status

Status	
3G/LTE Status	
Parameters	
Status	Up
Signal Strength	
Network Name	China Unicom
Network Mode	UMTS
Card Name	K4505-Z
Card Firmware	BD_P680A2V1.0.0B05

**Status:** The current status of the 3G/LTE card.

**Signal Strength:** The signal strength bar indicates current 3G signal strength.


**Network Name:** The network name that the device is connected to.

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

**Card Name:** The name of the 3G/LTE card.

**Card Firmware:** The current firmware for the 3G/LTE card.

# Route

Status 

▼ Route

Flags: U - up, ! - reject, G - gateway, H - host, R - reinstate, D - dynamic (redirect), M - modified (redirect)

Destination	Gateway	Subnet Mask	Flag	Metric	Service	Interface
10.0.0.46	0.0.0.0	255.255.255.255	UH	0	pppoe_0_8_35	ppp0.1
192.168.1.0	0.0.0.0	255.255.255.0	U	0		br0
0.0.0.0	0.0.0.0	0.0.0.0	U	0	pppoe_0_8_35	ppp0.1

**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.

- ① **U:** Show the route is activated or enabled.
- ① **H (host):** destination is host not the subnet.
- ① **G:** Show that the outside gateway is needed to forward packets in this route.
- ① **R:** Show that the route is reinstated from dynamic routing.
- ① **D:** Show that the route is dynamically installed by daemon or redirecting.
- ① **M:** Show the route is modified from routing daemon or redirect.

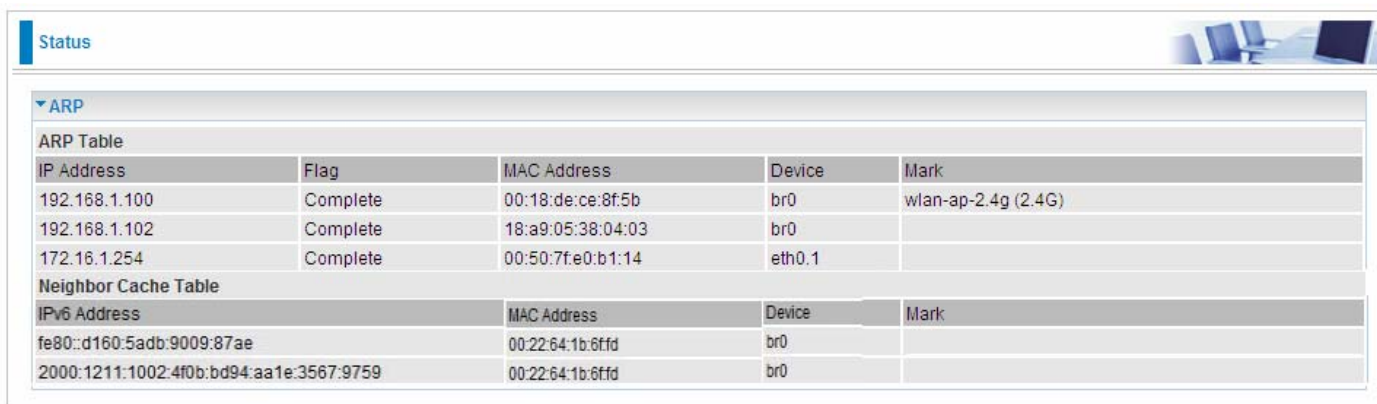
**Metric:** Display the number of hops counted as the Metric of the route.

**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.



The screenshot shows a web interface with a 'Status' tab. Underneath, there is a section for 'ARP' which contains two tables. The first table is the 'ARP Table' with columns for IP Address, Flag, MAC Address, Device, and Mark. It lists three entries with IP addresses 192.168.1.100, 192.168.1.102, and 172.16.1.254, all with a 'Complete' flag. The second table is the 'Neighbor Cache Table' with columns for IPv6 Address, MAC Address, Device, and Mark. It lists two entries with IPv6 addresses fe80::d160:5adb:9009:87ae and 2000:1211:1002:4f0b:bd94:aa1e:3567:9759, both with MAC address 00:22:64:1b:6ffd.

ARP Table				
IP Address	Flag	MAC Address	Device	Mark
192.168.1.100	Complete	00:18:de:ce:8f:5b	br0	wlan-ap-2.4g (2.4G)
192.168.1.102	Complete	18:a9:05:38:04:03	br0	
172.16.1.254	Complete	00:50:7f:e0:b1:14	eth0.1	

Neighbor Cache Table			
IPv6 Address	MAC Address	Device	Mark
fe80::d160:5adb:9009:87ae	00:22:64:1b:6ffd	br0	
2000:1211:1002:4f0b:bd94:aa1e:3567:9759	00:22:64:1b:6ffd	br0	

## 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.

- ① Complete: the route resolving is processing well.
- ① M(Marked as permanent entry): the route is permanent.
- ① 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	MAC Address	IP Address	Expires In	Mark
billion-17bc6f1	18:a9:05:38:04:03	192.168.1.100	15890 days, 4 hours, 20 minutes, 52 seconds	
ytt-PC	00:18:de:ce:8f:5b	192.168.1.101	23 hours, 56 minutes, 23 seconds	wlan-ap-2.4g (2.4G)

**Host Name:** The Host Name of DHCP client.

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

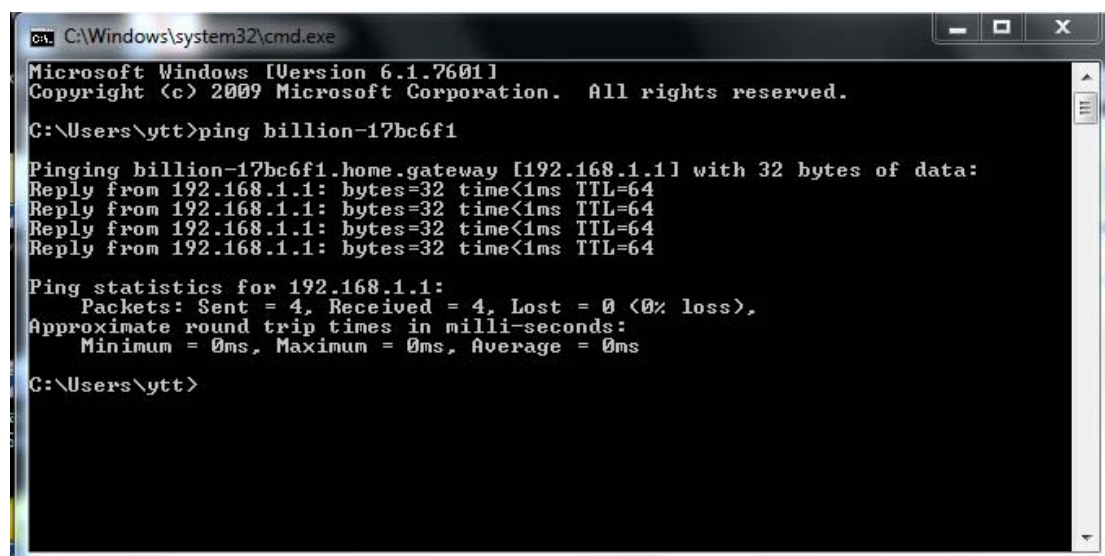
**IP Address:** The IP address which is assigned to the host with this MAC address.

**Expires in:** Show the remaining time after registration.

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

**Note:** The devices are free to access each other through device name on condition that they all obtain their IPs from the DHCP. If the device IP is obtained from the DHCP, other devices can access the device through the device name.

For example, the PC ytt-PC can ping the billion-17bc6f1 using the host name instead of its IP.



```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\ytt>ping billion-17bc6f1

Pinging billion-17bc6f1.home.gateway [192.168.1.1] with 32 bytes of data:
Reply from 192.168.1.1: bytes=32 time<1ms TTL=64
Reply from 192.168.1.1: bytes=32 time<1ms TTL=64
Reply from 192.168.1.1: bytes=32 time<1ms TTL=64
Reply from 192.168.1.1: bytes=32 time<1ms TTL=64

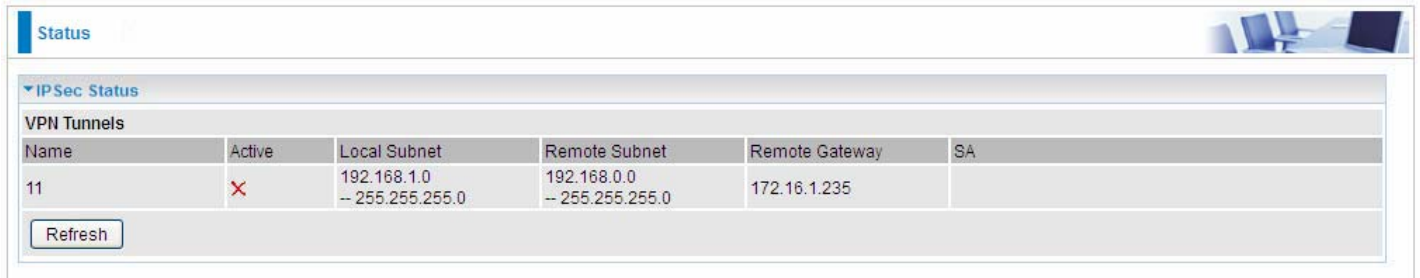
Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\ytt>
```


## VPN (7800DX only)

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

### IPSec



The screenshot shows a web interface for VPN status. At the top left, there is a 'Status' tab. Below it, a section titled 'IPSec Status' is expanded. Underneath, there is a table labeled 'VPN Tunnels'. The table has six columns: Name, Active, Local Subnet, Remote Subnet, Remote Gateway, and SA. There is one row with the name '11'. The 'Active' column contains a red 'X' icon. Below the table is a 'Refresh' button.

Name	Active	Local Subnet	Remote Subnet	Remote Gateway	SA
11		192.168.1.0 -- 255.255.255.0	192.168.0.0 -- 255.255.255.0	172.16.1.235	

**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

Status

▼ PPTP Status

PPTP Server ▼

Name ▼	Enable	Status	Connection Type	Peer Network IP	Connect By	Action
test	✓	Connected	Remote Access		172.16.1.207	Drop

PPTP Client ▼

Name	Enable	Status	Connection Type	Peer Network IP	Client IP	Action
------	--------	--------	-----------------	-----------------	-----------	--------

Refresh

### 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 Status						
L2TP Server						
Name	Enable	Status	Connection Type	Peer Network IP	Connect By	Action
test1	✓	Connected	Remote Access		192.168.1.10	Drop

L2TP Client						
Name	Enable	Status	Connection Type	Peer Network IP	Client IP	Action

Refresh

### 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.

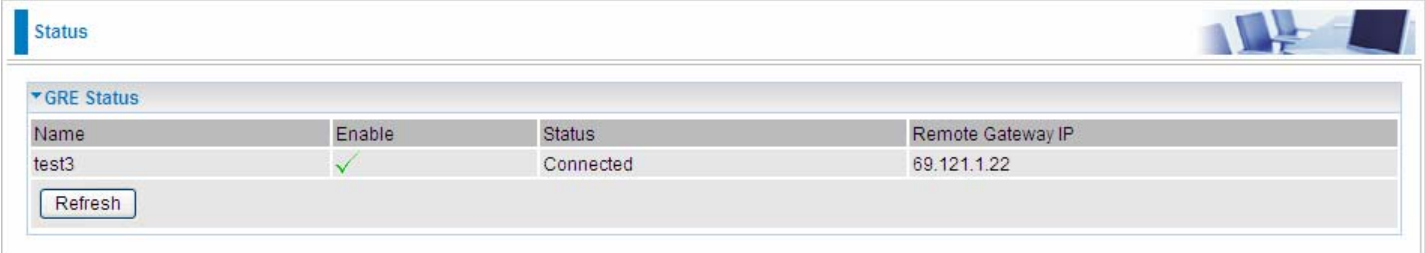
**Client:** Assigned IP by L2TP server.

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

**Refresh:** Click this button to refresh the connection status.



## GRE



The screenshot shows a web interface titled "Status" with a sub-section "GRE Status". It contains a table with the following data:

Name	Enable	Status	Remote Gateway IP
test3	✓	Connected	69.121.1.22

Below the table is a "Refresh" button.

**Name:** The GRE connection name.

**Enable:** Display the connection status with icons.

**Status:** The connection status, connected or disable.

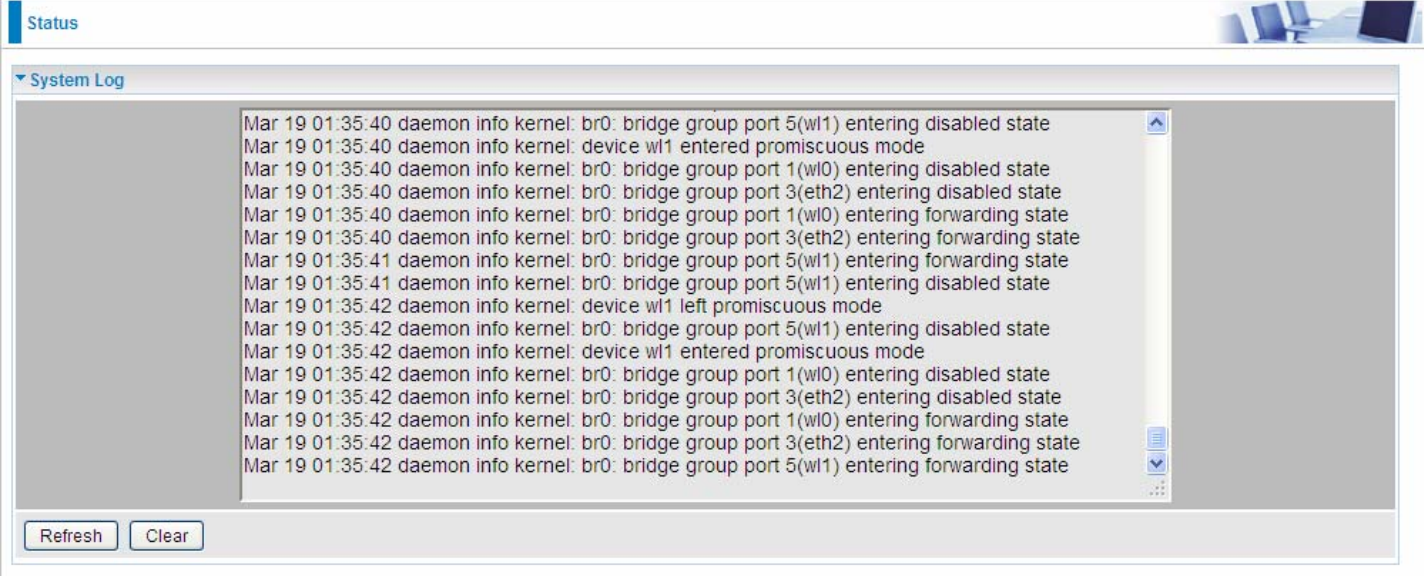
**Remote Gateway:** The IP of remote gateway.

**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.



The screenshot shows a web interface for viewing system logs. At the top left, there is a 'Status' tab. Below it, a 'System Log' section is expanded, displaying a list of log entries. Each entry includes a timestamp, log level, and kernel message. At the bottom of the log area, there are two buttons: 'Refresh' and 'Clear'. The log entries are as follows:

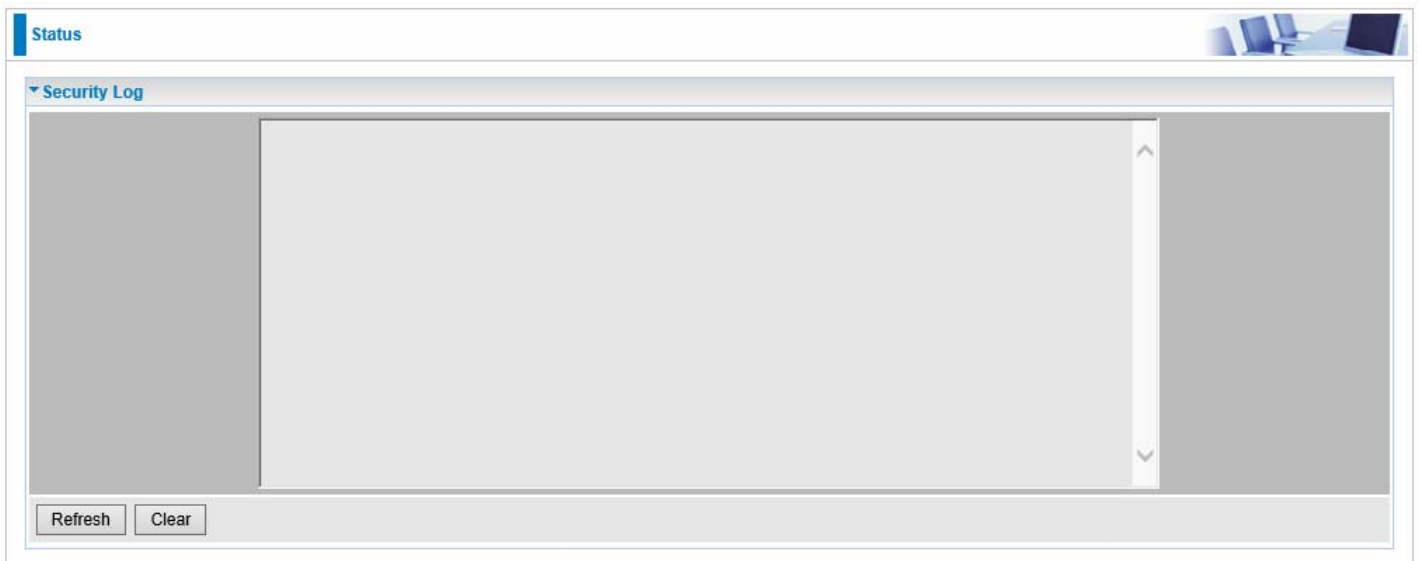
```
Mar 19 01:35:40 daemon info kernel: br0: bridge group port 5(wl1) entering disabled state
Mar 19 01:35:40 daemon info kernel: device wl1 entered promiscuous mode
Mar 19 01:35:40 daemon info kernel: br0: bridge group port 1(wl0) entering disabled state
Mar 19 01:35:40 daemon info kernel: br0: bridge group port 3(eth2) entering disabled state
Mar 19 01:35:40 daemon info kernel: br0: bridge group port 1(wl0) entering forwarding state
Mar 19 01:35:40 daemon info kernel: br0: bridge group port 3(eth2) entering forwarding state
Mar 19 01:35:41 daemon info kernel: br0: bridge group port 5(wl1) entering forwarding state
Mar 19 01:35:41 daemon info kernel: br0: bridge group port 5(wl1) entering disabled state
Mar 19 01:35:42 daemon info kernel: device wl1 left promiscuous mode
Mar 19 01:35:42 daemon info kernel: br0: bridge group port 5(wl1) entering disabled state
Mar 19 01:35:42 daemon info kernel: device wl1 entered promiscuous mode
Mar 19 01:35:42 daemon info kernel: br0: bridge group port 1(wl0) entering disabled state
Mar 19 01:35:42 daemon info kernel: br0: bridge group port 3(eth2) entering disabled state
Mar 19 01:35:42 daemon info kernel: br0: bridge group port 1(wl0) entering forwarding state
Mar 19 01:35:42 daemon info kernel: br0: bridge group port 3(eth2) entering forwarding state
Mar 19 01:35:42 daemon info kernel: br0: bridge group port 5(wl1) entering forwarding state
```

**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 system log.

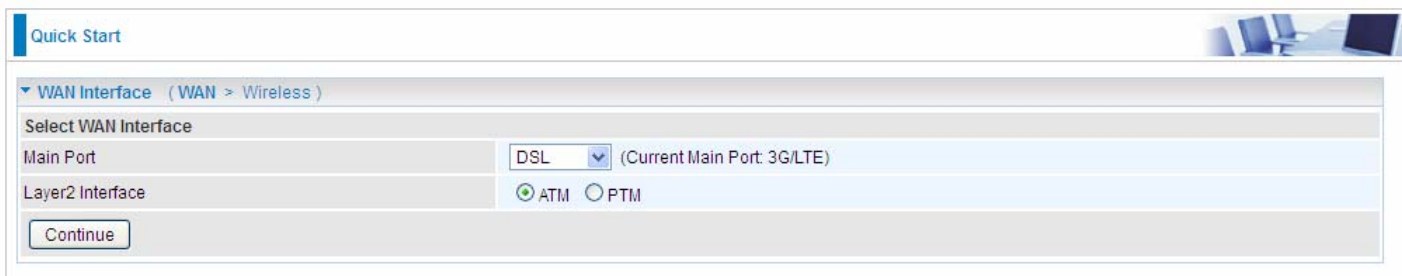
**Clear:** Click to clear the current log from the screen.

# Quick Start

## Quick Start

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

### DSL mode



Quick Start

WAN Interface (WAN > Wireless)

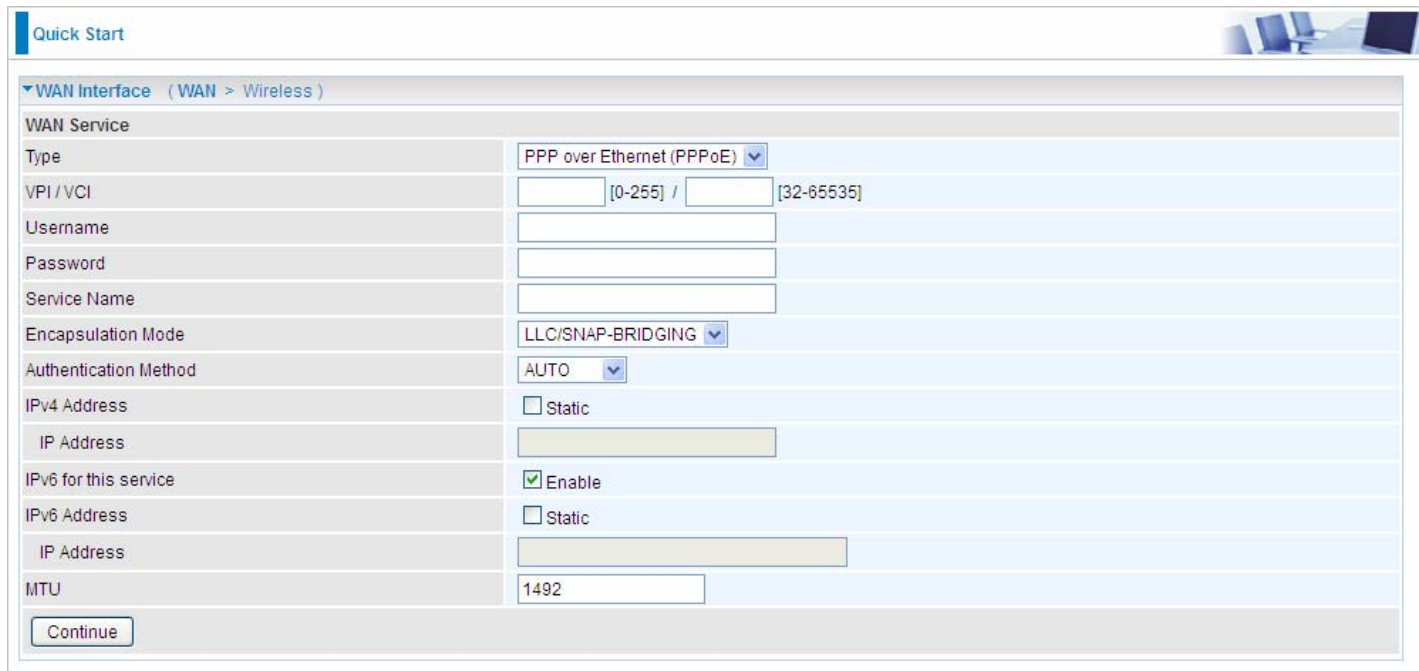
Select WAN Interface

Main Port: DSL (Current Main Port: 3G/LTE)

Layer2 Interface:  ATM  PTM

Continue

1. Select DSL, 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.



Quick Start

WAN Interface (WAN > Wireless)

WAN Service

Type: PPP over Ethernet (PPPoE)

VPI / VCI: [ ] [0-255] / [ ] [32-65535]

Username: [ ]

Password: [ ]

Service Name: [ ]

Encapsulation Mode: LLC/SNAP-BRIDGING

Authentication Method: AUTO

IPv4 Address:  Static

IP Address: [ ]

IPv6 for this service:  Enable

IPv6 Address:  Static

IP Address: [ ]

MTU: 1492

Continue

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



Quick Start

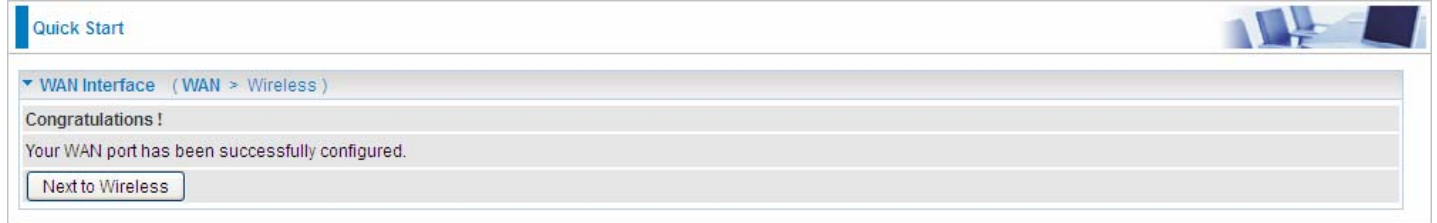
WAN Interface (WAN > Wireless)

DSL Line Is Not Ready. Please Check your DSL Line and wait for a while.

### 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. The 7800DX(L) supports dual-band wireless, here you can set to activate wireless on which band or both 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. Continue to set 5GHz wireless.




## 7. Success.

Quick Start 

▼ Process finished

Success.

If Quick Start is finished, user can turn to **Status > Summary** to see the basic information.

Status 

▼ Device Information

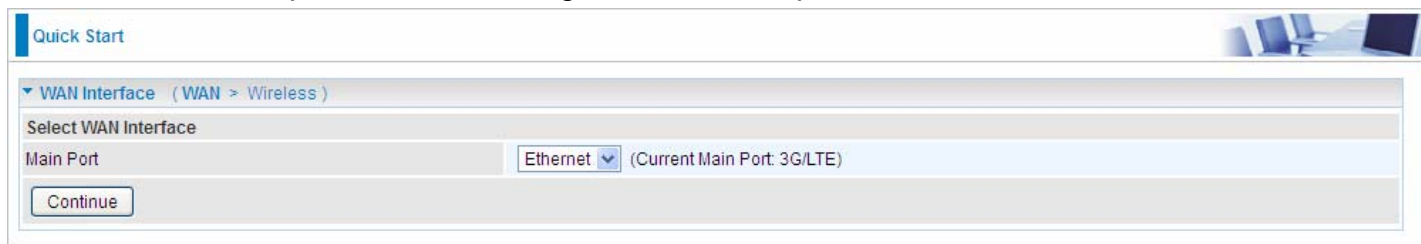
Model Name	BiPAC 7800DX
Host Name	home.gateway
System Up-Time	0D 0H 20M 46S
Date/Time	Mon Aug 5 07:28:23 2013 <input type="button" value="Sync"/>
Software Version	2.32b
LAN IPv4 Address	192.168.1.254
LAN IPv6 Address	2000:1211:1000:4d0b:204:edff:fe01:1/64
MAC Address	00:04:ed:01:00:01
DSL PHY and Driver Version	A2pD038f.d24h
Wireless Driver Version	6.30.102.7.cpe4.12L08.4

▼ WAN

Line Rate - Upstream (Kbps)	1291
Line Rate - Downstream (Kbps)	26919
Default Gateway / IPv4 Address	ppp0.1 (DSL) / 10.40.90.211
Connection Time	00:02:44
Primary DNS Server	218.2.135.1
Secondary DNS Server	218.2.135.1
Default IPv6 Gateway / IPv6 Address	ppp0.1 (DSL) / 2000:db98:1000:1000:29ac:afc6:59a4:5816/64

## Ethernet mode

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



Quick Start

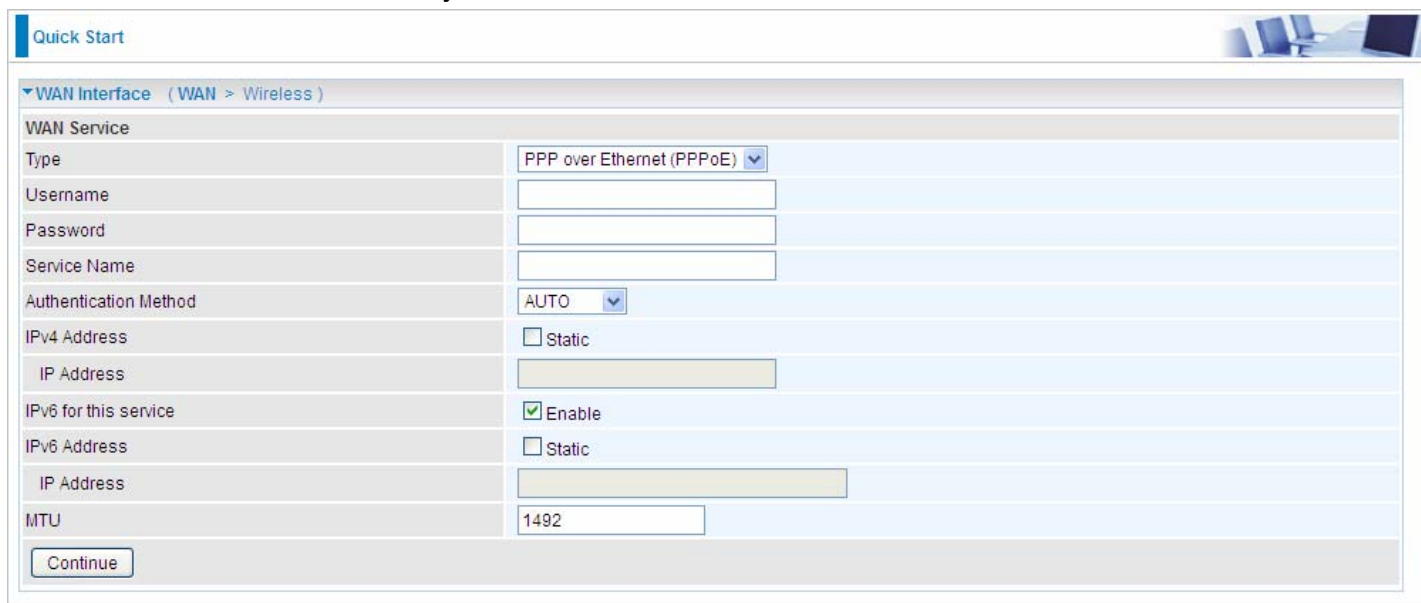
WAN Interface (WAN > Wireless)

Select WAN Interface

Main Port: Ethernet (Current Main Port: 3G/LTE)

Continue

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.



Quick Start

WAN Interface (WAN > Wireless)

WAN Service

Type: PPP over Ethernet (PPPoE)

Username: [Text Field]

Password: [Text Field]

Service Name: [Text Field]

Authentication Method: AUTO

IPv4 Address:  Static

IP Address: [Text Field]

IPv6 for this service:  Enable

IPv6 Address:  Static

IP Address: [Text Field]

MTU: 1492

Continue

3. Wait while the device is configured.



Quick Start

WAN Interface (WAN > Wireless)

Please wait while the device is configured.

4. WAN port configuration is successful.



Quick Start

WAN Interface (WAN > Wireless)

Congratulations !

Your WAN port has been successfully configured.

Next to Wireless

5. After the configuration is successful, click **Next to Wireless** button and you may proceed to configure the Wireless setting. The device supports dual-band wireless connections, in Quick Start part, users can only enable or disable the wireless on the band and the exact 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.



Quick Start

Wireless (WAN > Wireless)

Parameters

Band	2.4GHz (wl0)
Wireless	<input checked="" type="checkbox"/> Enable
SSID	wlan-ap-2.4g
WPA Pre-Shared Key	<input type="text"/> <a href="#">Click here to display</a>

Continue



Quick Start

Wireless (WAN > Wireless)

Please wait while the device is configured.

6. Continue to set 5GHz wireless.



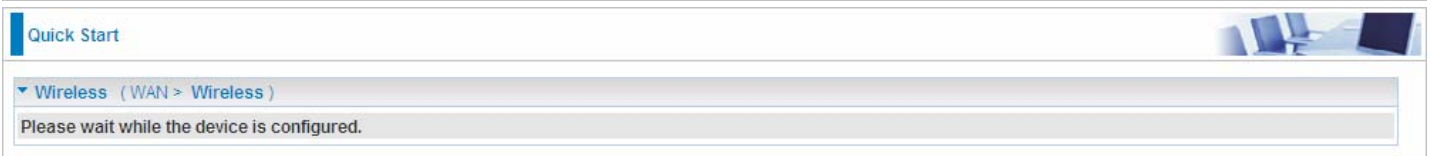
Quick Start

Wireless (WAN > Wireless)

Parameters

Band	5GHz (wl1)
Wireless	<input checked="" type="checkbox"/> Enable
SSID	wlan-ap-5g
WPA Pre-Shared Key	<input type="text"/> <a href="#">Click here to display</a>

Continue



Quick Start

Wireless (WAN > Wireless)

Please wait while the device is configured.

7. Success.



Quick Start

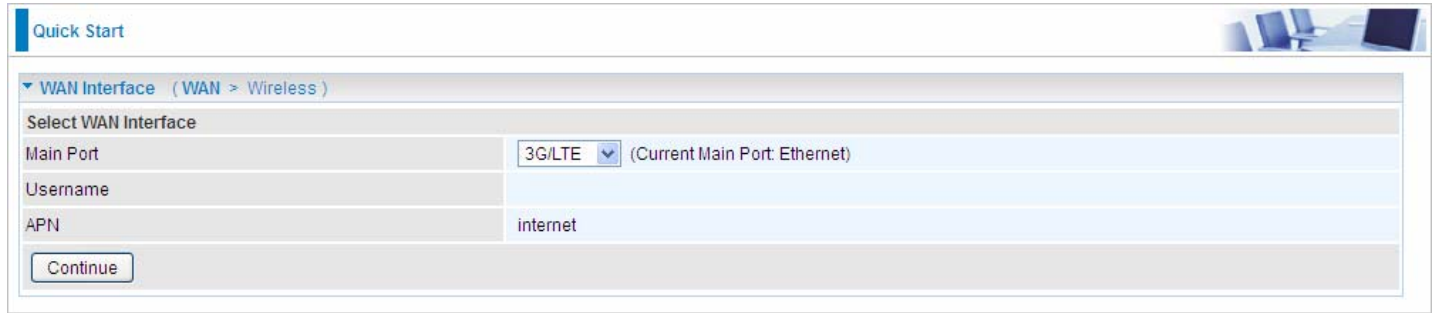
Process finished

Success.



## 3G/LTE

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



Quick Start

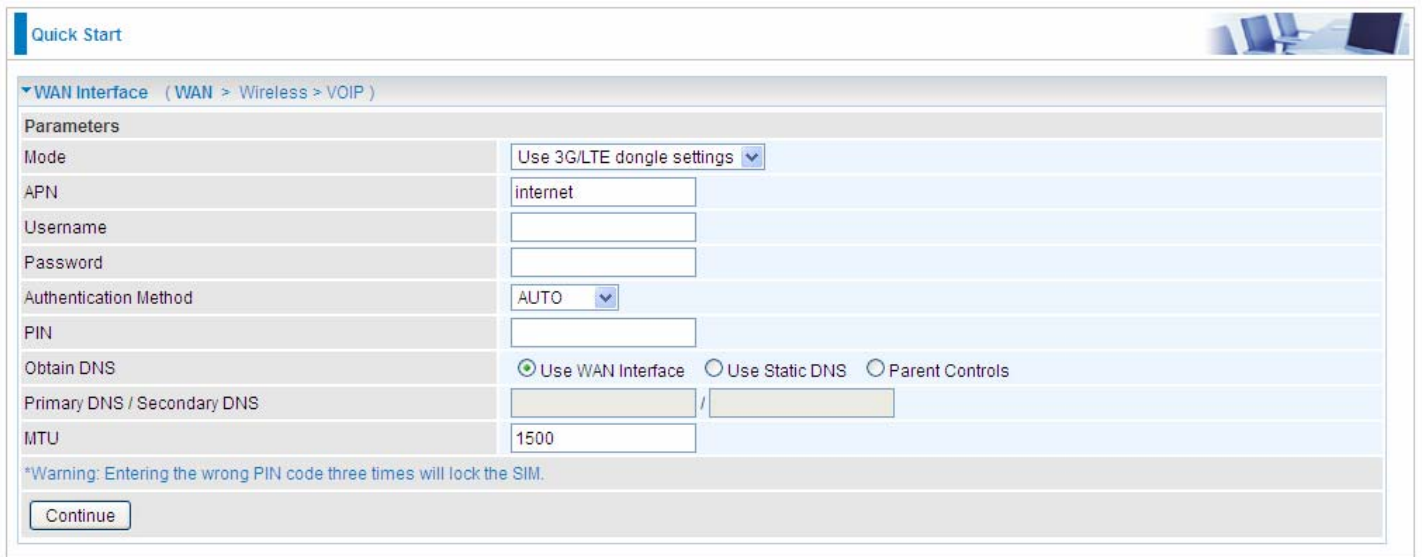
WAN Interface (WAN > Wireless)

Select WAN Interface

Main Port	3G/LTE (Current Main Port: Ethernet)
Username	
APN	internet

Continue

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



Quick Start

WAN Interface (WAN > Wireless > VOIP)

Parameters

Mode	Use 3G/LTE dongle settings
APN	internet
Username	
Password	
Authentication Method	AUTO
PIN	
Obtain DNS	<input checked="" type="radio"/> Use WAN Interface <input type="radio"/> Use Static DNS <input type="radio"/> Parent Controls
Primary DNS / Secondary DNS	
MTU	1500

\*Warning: Entering the wrong PIN code three times will lock the SIM.

Continue

3. Wait while the device is configured.

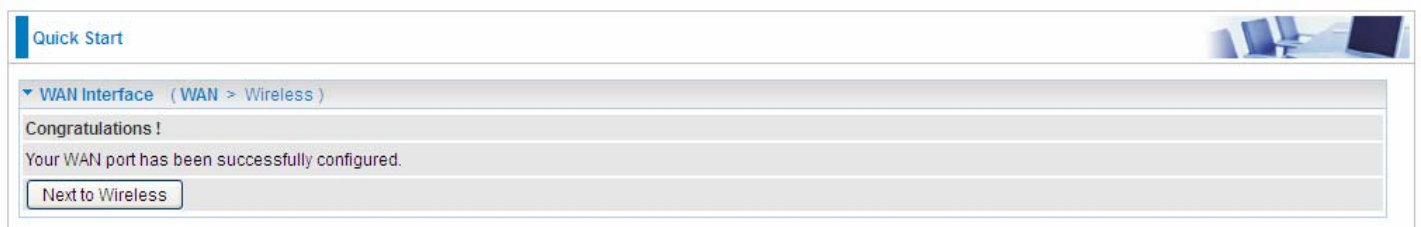


Quick Start

WAN Interface (WAN > Wireless)

Please wait while the device is configured.

4. WAN port configuration is successful.



Quick Start

WAN Interface (WAN > Wireless)

Congratulations!

Your WAN port has been successfully configured.

Next to Wireless

5. After the configuration is successful, click **Next to Wireless** button and you may proceed to configure the Wireless setting. The device supports dual-band wireless connections, in Quick Start part, users can only enable or disable the wireless on the band and the exact 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.

Quick Start 

▼ Wireless ( WAN > Wireless )

Parameters

Band	2.4GHz (wl0)
Wireless	<input checked="" type="checkbox"/> Enable
SSID	wlan-ap-2.4g
WPA Pre-Shared Key	<input type="text"/> <a href="#">Click here to display</a>

Quick Start 

▼ Wireless ( WAN > Wireless )

Please wait while the device is configured.


6. Continue to set 5GHz wireless.

Quick Start 

▼ Wireless ( WAN > Wireless )

Parameters

Band	5GHz (wl1)
Wireless	<input checked="" type="checkbox"/> Enable
SSID	wlan-ap-5g
WPA Pre-Shared Key	<input type="text"/> <a href="#">Click here to display</a>

Quick Start 

▼ Wireless ( WAN > Wireless )

Please wait while the device is configured.


## 7. Success.

Quick Start 

▼ Process finished

Success.

If Quick Start is finished, user can turn to **Status** > **Summary** to see the basic information.

Status 

▼ Device Information

Model Name	BIPAC 7800DX
Host Name	home.gateway
System Up-Time	0D 0H 23M 19S
Date/Time	Mon Aug 5 07:30:56 2013 <input type="button" value="Sync"/>
Software Version	2.32b
LAN IPv4 Address	192.168.1.254
LAN IPv6 Address	2000:1211:1000:4d0b:204:edffe01:1/64
MAC Address	00:04:ed:01:00:01
DSL PHY and Driver Version	A2pD038f.d24h
Wireless Driver Version	6.30.102.7.cpe4.12L08.4

▼ WAN

Line Rate - Upstream (Kbps)	0
Line Rate - Downstream (Kbps)	0
Default Gateway / IPv4 Address	ppp0.1(Ehternet) / 10.40.90.211
Connection Time	00:02:44
Primary DNS Server	218.2.135.1
Secondary DNS Server	218.2.135.1
Default IPv6 Gateway / IPv6 Address	ppp0.1 (Ehternet) / 2000:db98:1000:1000:29ac:afc6:59a4:5816/64

# 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 2.4G (wl0), Wireless 5G (wl1), WAN, System, USB, IP Tunnel, Security, Quality of Service, NAT and Wake On LAN.**

▶ Status
• Quick Start
▼ Configuration
▶ LAN
▶ Wireless 2.4G (wl0)
▶ Wireless 5G (wl1)
▶ WAN
▶ System
▶ USB
▶ IP Tunnel
▶ Security
▶ Quality of Service
▶ NAT
• Wake On LAN
▶ VPN
▶ Advanced Setup

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

The screenshot shows a configuration page for a LAN interface. The 'Parameters' section includes: Group Name (Default), IP Address (192.168.1.254), Subnet Mask (255.255.255.0), IGMP Snooping (checked), IGMP Snooping Mode (Blocking Mode selected), LAN side firewall (unchecked), DHCP Server (Enable), Start IP Address (192.168.1.100), End IP Address (192.168.1.199), Leased Time (24), and Option 66 (unchecked). Below this is a 'Static IP Lease List' table with columns for Host Label, MAC Address, IP Address, Remove, and Edit. An 'Add' button is present. The 'IP Alias' section has an 'IP Alias' checkbox (unchecked), and fields for 'IP Address' and 'Subnet Mask'. 'Apply' and 'Cancel' buttons are at the bottom.

### 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:

- ① **Standard Mode:** In standard mode, multicast traffic will flood to all bridge ports when no client subscribes to a multicast group.
- ① **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.

**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.

### ❶ Disable

DHCP Server	
DHCP Server	Disable

Disable the DHCP Server function.

### ❷ Enable

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

DHCP Server	
DHCP Server	Enable
Start IP Address	192.168.1.100
End IP Address	192.168.1.199
Leased Time (hour)	24
Option 66	<input type="checkbox"/> Enable

**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 of 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.

### ❸ DHCP Server Relay

DHCP Server	
DHCP Server	DHCP Server Relay
DHCP Server IP Address	


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

## Static IP 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.

Static IP Lease List				
Host Label	MAC Address	IP Address	Remove	Edit
<input type="button" value="Add"/>				

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

Configuration 

Static IP

Parameters

Host Label

MAC Address

IP Address

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.

Static IP Lease List				
Host Label	MAC Address	IP Address	Remove	Edit
HP	18:a9:05:38:04:05	192.168.1.200	<input type="checkbox"/>	<input type="button" value="Edit"/>

## 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

IP Alias  Enable

IP Address

Subnet Mask

**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.

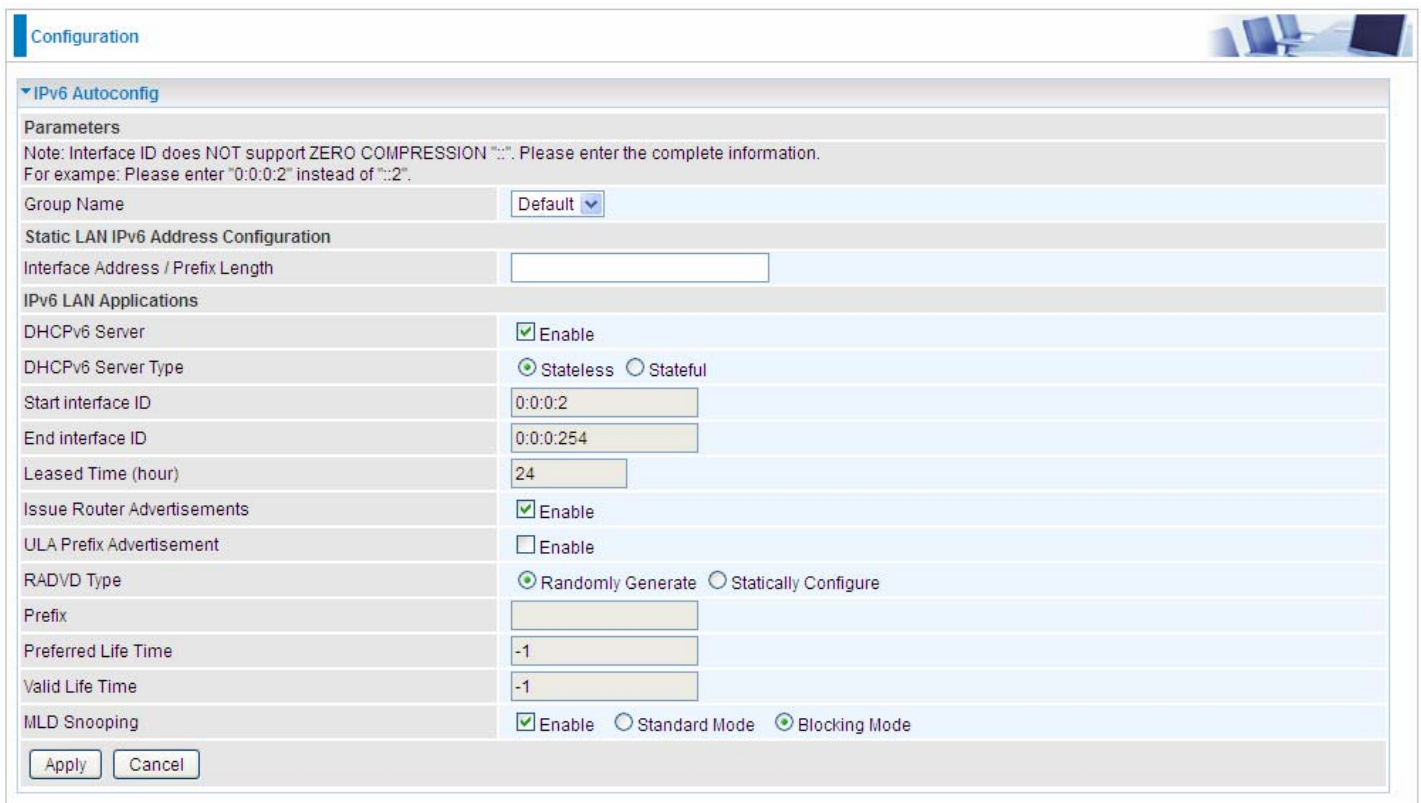
Click **Apply** to apply your settings.

## 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.



The screenshot shows a web-based configuration interface for IPv6 Autoconfig. The page title is "Configuration". Under the "IPv6 Autoconfig" section, there are several configuration options:

- Parameters:** A note states: "Interface ID does NOT support ZERO COMPRESSION '::'. Please enter the complete information. For example: Please enter '0:0:0:2' instead of '::2'".
- Group Name:** A dropdown menu is set to "Default".
- Static LAN IPv6 Address Configuration:** A text input field for "Interface Address / Prefix Length" is empty.
- IPv6 LAN Applications:**
  - DHCPv6 Server:**  Enable
  - DHCPv6 Server Type:**  Stateless  Stateful
  - Start interface ID:**
  - End interface ID:**
  - Leased Time (hour):**
  - Issue Router Advertisements:**  Enable
  - ULA Prefix Advertisement:**  Enable
  - RADVD Type:**  Randomly Generate  Statically Configure
  - Prefix:**
  - Preferred Life Time:**
  - Valid Life Time:**
  - MLD Snooping:**  Enable  Standard Mode  Blocking Mode

At the bottom, there are "Apply" and "Cancel" buttons.

**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.

- ① Randomly Generated
- ① 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.

- ① **Standard Mode:** In standard mode, multicast traffic will flood to all bridge ports when no client subscribes to a multicast group.
- ① **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.

## Stateless and Stateful IPv6 address Configuration

**Stateless:** Two methods can be carried.

- ① With DHCPv6 disabled, but Issue Router Advertisement Enabled

DHCPv6 Server	<input type="checkbox"/> Enable
Issue Router Advertisements	<input checked="" type="checkbox"/> Enable

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.

- ① With both DHCPv6 and Issue Router Advertisement Enabled

DHCPv6 Server	<input checked="" type="checkbox"/> Enable
DHCPv6 Server Type	<input checked="" type="radio"/> Stateless <input type="radio"/> Stateful
Start interface ID	<input type="text" value="0:0:0:2"/>
End interface ID	<input type="text" value="0:0:0:254"/>
Leased Time (hour)	<input type="text" value="24"/>
Issue Router Advertisements	<input checked="" type="checkbox"/> Enable

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.

① With only DHCPv6 enabled

DHCPv6 Server	<input checked="" type="checkbox"/> Enable
DHCPv6 Server Type	<input type="radio"/> Stateless <input checked="" type="radio"/> Stateful
Start interface ID	<input type="text" value="0:0:0:2"/>
End interface ID	<input type="text" value="0:0:0:254"/>
Leased Time (hour)	<input type="text" value="24"/>
Issue Router Advertisements	<input type="checkbox"/> Enable

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

① With both DHCPv6 and Issue Router Advertisement Enabled

DHCPv6 Server	<input checked="" type="checkbox"/> Enable
DHCPv6 Server Type	<input type="radio"/> Stateless <input checked="" type="radio"/> Stateful
Start interface ID	<input type="text" value="0:0:0:2"/>
End interface ID	<input type="text" value="0:0:0:254"/>
Leased Time (hour)	<input type="text" value="24"/>
Issue Router Advertisements	<input checked="" type="checkbox"/> Enable


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**: P4 can be configured as EWAN, and when the device is in EWAN profile, there is no P4/EWAN interface as P4 is working as a WAN port.)

Configuration 

▼ Interface Grouping

Groups Isolation  Enable

Group Configuration

Maximum number of entries can be configured : 16

Group Name	Remove	WAN Interface	LAN Interfaces	DHCP Vendor IDs
Default		ppp0.1	P4/EWAN	
			P3	
			P2	
			P1	
			wlan-ap-2.4g	
		wlan-ap-5g		

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

Click **Add** to add groups.

**Configuration**

**Interface grouping Configuration**

**Parameters**  
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.  
**IMPORTANT** 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.

Group Name

Grouped WAN Interfaces

Available WAN Interfaces  
pppoe\_0\_8\_35/ppp0.1

Grouped LAN Interfaces

Available LAN Interfaces  
P4/EWAN  
P3  
P2  
P1  
wlan-ap-2.4g  
wlan-ap-5g

Automatically Add Clients With the following DHCP Vendor IDs

**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](#).

Configuration

Interface Grouping

Groups Isolation Enable

Apply

Group Configuration

Maximum number of entries can be configured : 16

Group Name	Remove	WAN Interface	LAN Interfaces	DHCP Vendor IDs
Default			P4/EWAN	
			P3	
			P1	
			wlan-ap-2.4g	
			wlan-ap-5g	
test	<input type="checkbox"/>	ppp0.1	P2	

Add Remove

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

Configuration

Interface Grouping

Groups Isolation Enable

Apply

Group Configuration

Maximum number of entries can be configured : 16

Group Name	Remove	WAN Interface	LAN Interfaces	DHCP Vendor IDs
Default			P4/EWAN	
			P3	
			P1	
			wlan-ap-2.4g	
			wlan-ap-5g	
test	<input checked="" type="checkbox"/>	ppp0.1	P2	

Add 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 2.4G(wl0)

This section provides you ways to configure wireless access. The BiPAC 7800DX(L) utilizes two radio bands-2.4GHz and 5GHz simultaneously, to run wireless connection for users. Wl0, operating on 2.4GHz, has sub-items as [Basic](#), [Security](#), [MAC Filter](#), [Wireless Bridge](#), [Advanced](#), [Station Info](#) and [Schedule Control](#) here. Wl1, running on 5GHz, are to set with the same ways as in Wl0.

**Note:** The dual-band wireless is simultaneous with different clients, not the same one. Users can freely choose the optimum radio band wireless connection base on your environment.

▶ Status
• Quick Start
▼ Configuration
▶ LAN
▼ Wireless 2.4G (wl0)
• Basic
• Security
• MAC Filter
• Wireless Bridge
• Advanced
• Station Info
• Schedule Control
▶ Wireless 5G (wl1)
▶ WAN
▶ System
▶ USB
▶ IP Tunnel
▶ Security
▶ Quality of Service
▶ NAT
• Wake On LAN
▶ VPN
▶ Advanced Setup

## Basic

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

Configuration

Basic

Parameters

Wireless	<input checked="" type="checkbox"/> Enable
Enable Wireless Hotspot2.0 [WPA2 is required]	<input type="checkbox"/> Enable
Hide SSID	<input type="checkbox"/> Enable
Clients Isolation	<input type="checkbox"/> Enable
Disable WMM Advertise	<input type="checkbox"/> Enable
Wireless Multicast Forwarding (WMF)	<input type="checkbox"/> Enable
SSID	wlan-ap-2.4g
BSSID	00:04:ED:01:00:02
Country	UNITED STATES
Max Clients	16 [1-16]

Wireless - Guest/Virtual Access Points

SSID	Hidden	Clients Isolation	Disable WMM Advertise	WMF	Hotspot	Max Clients	BSSID	Enable
wl0_Guest1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> [wpa2!]	16	N/A	<input type="checkbox"/>
wl0_Guest2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> [wpa2!]	16	N/A	<input type="checkbox"/>
wl0_Guest3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> [wpa2!]	16	N/A	<input type="checkbox"/>

Apply Cancel

Configuration

Basic

Parameters

Wireless	<input checked="" type="checkbox"/> Enable
Enable Wireless Hotspot2.0	<input type="checkbox"/> Enable
Hide SSID	<input type="checkbox"/> Enable
Clients Isolation	<input type="checkbox"/> Enable
Disable WMM Advertise	<input type="checkbox"/> Enable
Wireless Multicast Forwarding (WMF)	<input type="checkbox"/> Enable
SSID	wlan-ap-2.4g
BSSID	00:04:ED:01:00:02
Country	UNITED STATES
Max Clients	16 [1-16]

Wireless - Guest/Virtual Access Points

SSID	Hidden	Clients Isolation	Disable WMM Advertise	WMF	Hotspot	Max Clients	BSSID	Enable
wl0_Guest1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> [wpa2!]	16	N/A	<input type="checkbox"/>
wl0_Guest2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> [wpa2!]	16	N/A	<input type="checkbox"/>
wl0_Guest3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> [wpa2!]	16	N/A	<input type="checkbox"/>

Apply Cancel

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

**Enable Wireless Hotspot2.0:** Make sure you use the WPA2 security mechanism. Move to [WPA2](#). Enable to use the Hotspot2.0, same operation as with WPA2.

**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 wlan-ap-2.4g to a unique ID name to the AP already built-in to the router's wireless interface. It is case sensitive and must not exceed 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.

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

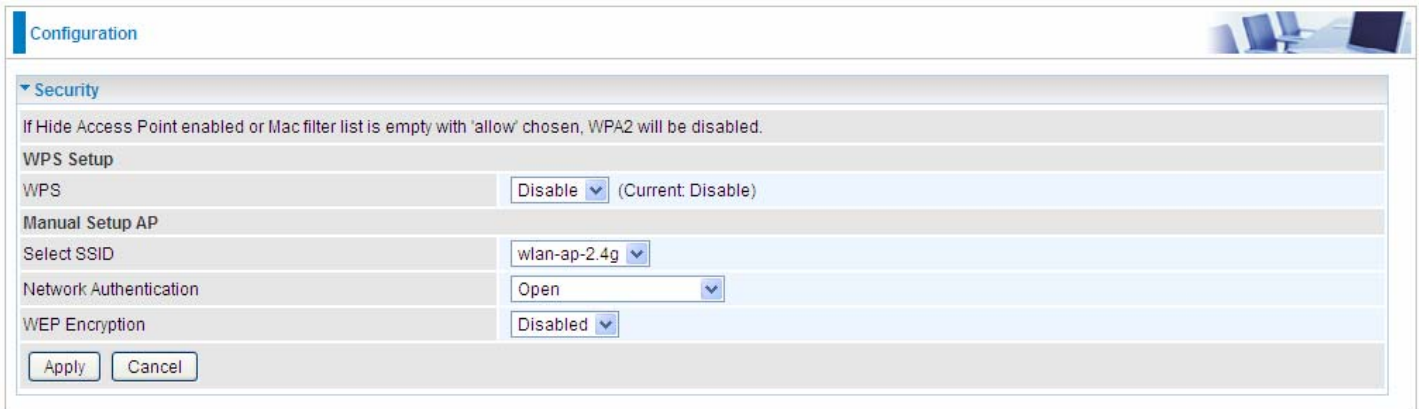
**Guest/virtual Access Points:** A "Virtual Access Point" is a logical entity that exists within a physical Access Point (AP). When a single physical AP supports multiple "Virtual APs", each Virtual AP appears to stations (STAs) to be an independent physical AP, even though only a single physical AP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



The screenshot shows a web interface for configuring a wireless network. The 'Security' section is expanded, showing the following settings:

- WPS Setup: WPS is set to 'Disable' (Current: Disable).
- Manual Setup AP: Select SSID is set to 'wlan-ap-2.4g'.
- Network Authentication: Set to 'Open'.
- WEP Encryption: Set to 'Disabled'.

Buttons for 'Apply' and 'Cancel' are visible at the bottom of the configuration area.

### 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

Network Authentication	Open
WEP Encryption	Enable
Encryption Strength	128-bit
Current Network Key	1
Network Key 1	1234567890123
Network Key 2	1234567890123
Network Key 3	1234567890123
Network Key 4	1234567890123

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.

**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.

## ① Shared

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

Network Authentication	Shared
WEP Encryption	Enable
Encryption Strength	128-bit
Current Network Key	2
Network Key 1	1234567890123
Network Key 2	1234567890123
Network Key 3	1234567890123
Network Key 4	1234567890123

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.

## ① 802.1x

Network Authentication	802.1X
RADIUS Server IP Address	0.0.0.0
RADIUS Port	1812
RADIUS Key	
WEP Encryption	Enable
Encryption Strength	128-bit
Current Network Key	2
Network Key 1	1234567890123
Network Key 2	1234567890123
Network Key 3	1234567890123
Network Key 4	1234567890123

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.

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

**RADIUS Server 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.

## ① WPA

Network Authentication	<input type="text" value="WPA"/>
WPA Group Rekey Interval	<input type="text" value="3600"/> [0-2147483647]
RADIUS Server IP Address	<input type="text" value="0.0.0.0"/>
RADIUS Port	<input type="text" value="1812"/>
RADIUS Key	<input type="text"/>
WPA/WAPI Encryption	<input type="text" value="TKIP+AES"/>
WEP Encryption	<input type="text" value="Disabled"/>

**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 Server 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.

## ① WPA-PSK / WPA2-PSK

Network Authentication	<input type="text" value="WPA-PSK"/>
WPA/WAPI passphrase	<input type="text" value="••••••••"/> <a href="#">Click here to display</a>
WPA Group Rekey Interval	<input type="text" value="3600"/> [0-2147483647]
WPA/WAPI Encryption	<input type="text" value="TKIP+AES"/>
WEP Encryption	<input type="text" value="Disabled"/>

**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.

## ① WPA2

Network Authentication	WPA2
WPA2 Preauthentication	Disable
Network Re-auth Interval	36000 [0-2147483647]
WPA Group Rekey Interval	3600 [0-2147483647]
RADIUS Server IP Address	0.0.0.0
RADIUS Port	1812
RADIUS Key	
WPA/WAPI Encryption	AES
WEP Encryption	Disabled

**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 Server 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.

## ① Mixed WPA2/WPA

Network Authentication	Mixed WPA2/WPA
WPA2 Preauthentication	Disable
Network Re-auth Interval	36000 [0-2147483647]
WPA Group Rekey Interval	3600 [0-2147483647]
RADIUS Server IP Address	0.0.0.0
RADIUS Port	1812
RADIUS Key	
WPA/WAPI Encryption	AES
WEP Encryption	Disabled

**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 Server 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.

### ① Mixed WPA2/WPA-PSk

Network Authentication	Mixed WPA2/WPA -PSK
WPA/WAPI passphrase	●●●●●●●● <a href="#">Click here to display</a>
WPA Group Rekey Interval	3600 [0-2147483647]
WPA/WAPI Encryption	AES
WEP Encryption	Disabled

**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.

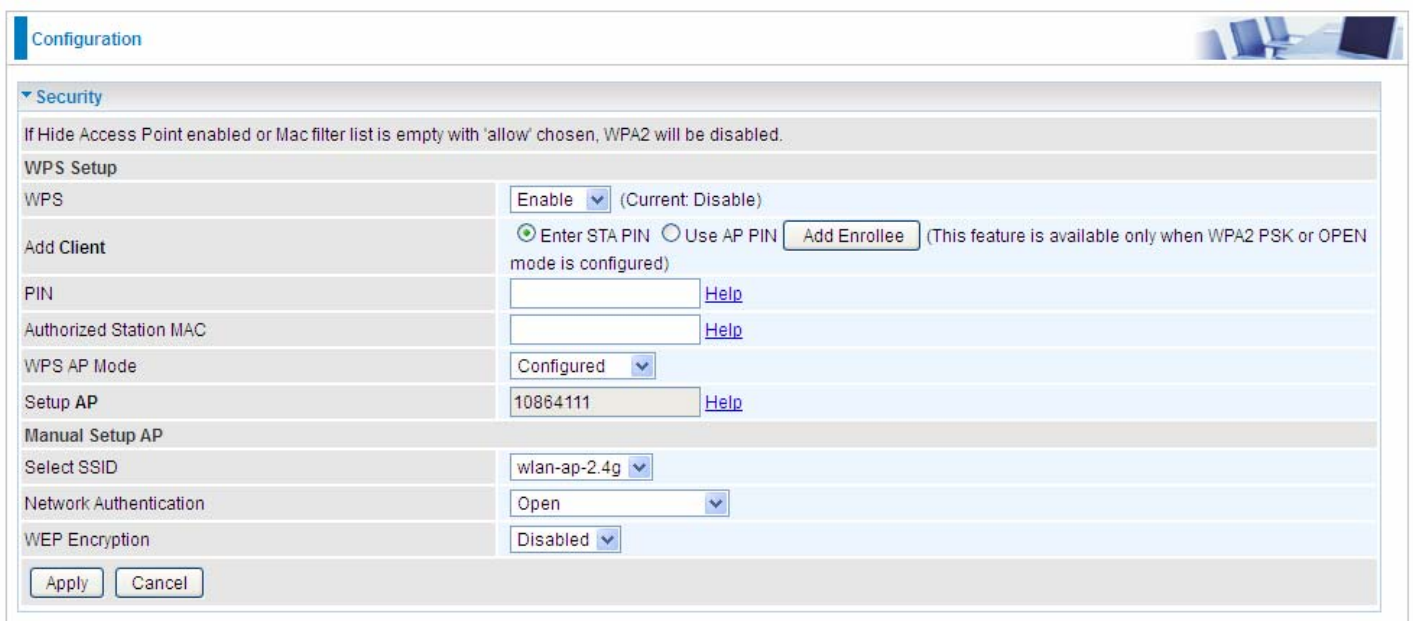
## WPS Setup

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.



The screenshot shows a web-based configuration interface for WPS. The page title is "Configuration" and the section is "Security". A warning message states: "If Hide Access Point enabled or Mac filter list is empty with 'allow' chosen, WPA2 will be disabled." The "WPS Setup" section includes the following fields:

WPS	Enable (Current: Disable)
Add Client	<input checked="" type="radio"/> Enter STA PIN <input type="radio"/> Use AP PIN <input type="button" value="Add Enrollee"/> (This feature is available only when WPA2 PSK or OPEN mode is configured)
PIN	<input type="text"/> <a href="#">Help</a>
Authorized Station MAC	<input type="text"/> <a href="#">Help</a>
WPS AP Mode	Configured
Setup AP	10864111 <a href="#">Help</a>

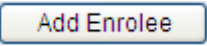
The "Manual Setup AP" section includes the following fields:

Select SSID	wlan-ap-2.4g
Network Authentication	Open
WEP Encryption	Disabled

At the bottom of the form are "Apply" and "Cancel" buttons.

## Configure AP as Registrar

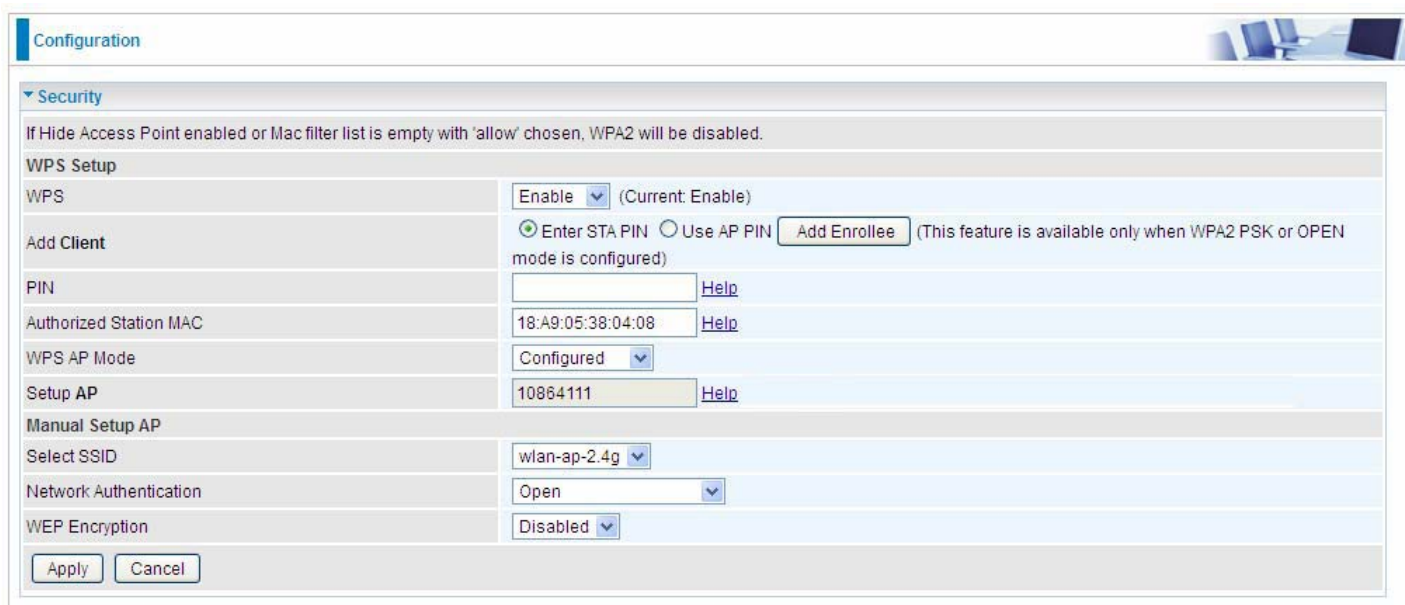
### Add Enrollee with PIN method

1. Select radio button “**Enter 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 .



The screenshot shows the 'Configuration' page with the 'Security' section expanded. Under 'WPS Setup', the 'WPS' dropdown is set to 'Enable'. The 'Add Client' section has the 'Enter STA PIN' radio button selected. The 'PIN' field contains '16837546'. The 'Authorized Station MAC' field is empty. The 'WPS AP Mode' is 'Configured' and the 'Setup AP' is '10864111'. The 'Manual Setup AP' section shows 'wlan-ap-2.4g' for SSID, 'Open' for Network Authentication, and 'Disabled' for WEP Encryption. 'Apply' and 'Cancel' buttons are at the bottom.

(Station PIN)



The screenshot shows the 'Configuration' page with the 'Security' section expanded. Under 'WPS Setup', the 'WPS' dropdown is set to 'Enable'. The 'Add Client' section has the 'Use AP PIN' radio button selected. The 'PIN' field is empty. The 'Authorized Station MAC' field contains '18:A9:05:38:04:08'. The 'WPS AP Mode' is 'Configured' and the 'Setup AP' is '10864111'. The 'Manual Setup AP' section shows 'wlan-ap-2.4g' for SSID, 'Open' for Network Authentication, and 'Disabled' for WEP Encryption. 'Apply' and 'Cancel' buttons are at the bottom.

(Station MAC)

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



- 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-2.4g) from the WPS AP List column. Then press the PIN button located on the middle left of the page to run the scan.

The screenshot displays the WPS utility interface with the following components:

- Navigation Bar:** Profile, Network, Advanced, Statistics, WMM, WPS, Radio On/Off, About.
- WPS AP List:**

ID	AP Name	MAC Address	Count
0x0000	wlan-ap	00-04-ED-01-00-02	1
	wlan-ap-2.4g	00-04-ED-00-00-01	1
- WPS Profile List:** (Empty)
- WPS Configuration:**
  - WPS Associate IE
  - WPS Probe IE
  - Progress >> 0%
  - WPS status is disconnected
- Buttons:** PIN, PBC, Rescan, Information, Pin Code (16837546), Renew, Config Mode (Enrollee), Detail, Connect, Rotate, Disconnect, Export Profile, Delete.
- Status & Metrics:**
  - Status >> Disconnected
  - Link Quality >> 0%
  - Signal Strength 1 >> 0%
  - Signal Strength 2 >> 0%
  - Noise Strength >> 0%
  - Transmit: Link Speed >> Max, Throughput >> 0.000 Kbps
  - Receive: Link Speed >> Max, Throughput >> 0.000 Kbps
  - HT: BW >> n/a, SNR0 >> n/a, GI >> n/a, MCS >> n/a, SNR1 >> n/a

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

The screenshot displays a network configuration interface with several sections:

- Navigation Bar:** Profile, Network, Advanced, Statistics, WMM, WPS (selected), Radio On/Off, About.
- WPS AP List:**

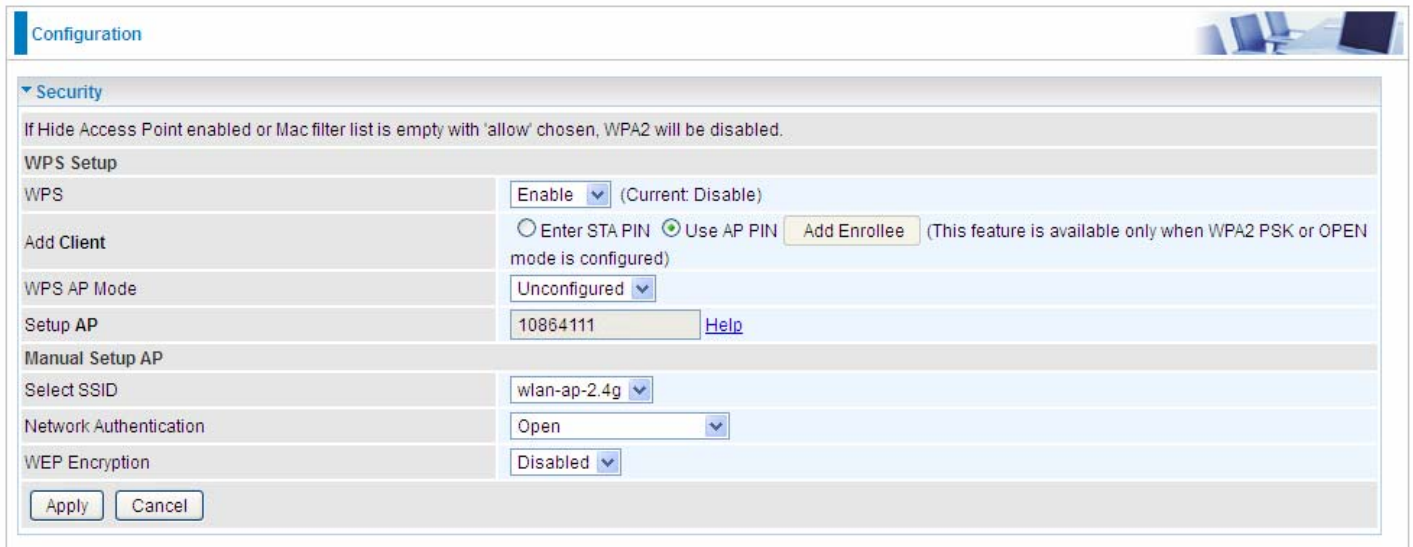
ID :	wlan-ap-2.4g	00-04-ED-01-00-01	1
ID :	wlan-ap	00-04-ED-38-F7-2E	1
- WPS Profile List:** wlan-ap
- WPS Configuration:**
  - WPS Associate IE
  - WPS Probe IE
  - Progress >> 100%
  - Message: PIN - Get WPS profile successfully.
- Right Panel:** Rescan, Information, Pin Code (16837546), Renew, Config Mode (Enrollee), Detail, Connect, Rotate, Disconnect, Export Profile, Delete.
- Status & Performance:**
  - Status >> wlan-ap-2.4g <-> 00-04-ED-01-00-01
  - Extra Info >> Link is Up [TxPower:100%]
  - Channel >> 1 <-> 2412 MHz; central channel : 3
  - Authentication >> Open
  - Encryption >> NONE
  - Network Type >> Infrastructure
  - IP Address >> 192.168.1.100
  - Sub Mask >> 255.255.255.0
  - Default Gateway >> 192.168.1.254
- HT (High Throughput) Parameters:**
  - BW >> 40
  - SNRO >> 19
  - GI >> long
  - MCS >> 15
  - SNR1 >> n/a
- Link Quality & Signal Strength:**
  - Link Quality >> 100%
  - Signal Strength 1 >> 64%
  - Signal Strength 2 >> 34%
  - Noise Strength >> 26%
- Transmit Performance:**
  - Link Speed >> 270.0 Mbps
  - Throughput >> 5.600 Kbps
  - Graph: Max 38.624 Kbps
- Receive Performance:**
  - Link Speed >> 54.0 Mbps
  - Throughput >> 81.608 Kbps
  - Graph: Max 146.840 Kbps

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

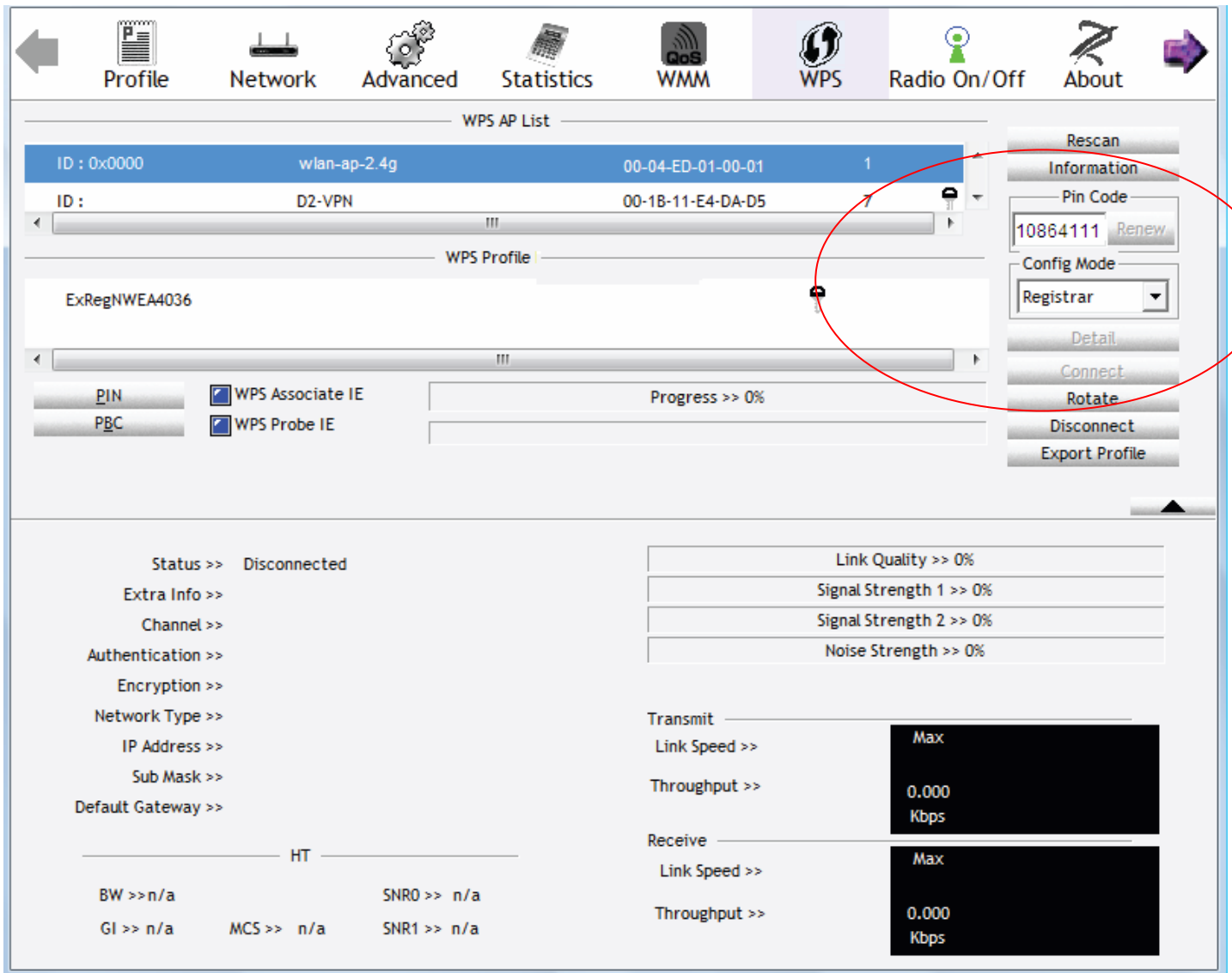
1. Set AP to “*Unconfigured Mode*”.



The screenshot shows the 'Configuration' page with a 'Security' section expanded. Under 'WPS Setup', the 'WPS' dropdown is set to 'Enable' (Current: Disable). The 'Add Client' section has 'Use AP PIN' selected, with an 'Add Enrollee' button. The 'WPS AP Mode' dropdown is set to 'Unconfigured'. The 'Setup AP' field contains '10864111' and a 'Help' link. The 'Manual Setup AP' section shows 'wlan-ap-2.4g' for 'Select SSID', 'Open' for 'Network Authentication', and 'Disabled' for 'WEP Encryption'. 'Apply' and 'Cancel' buttons are at the bottom.

Security	
If Hide Access Point enabled or Mac filter list is empty with 'allow' chosen, WPA2 will be disabled.	
<b>WPS Setup</b>	
WPS	Enable (Current: Disable)
Add Client	<input type="radio"/> Enter STA PIN <input checked="" type="radio"/> Use AP PIN <a href="#">Add Enrollee</a> (This feature is available only when WPA2 PSK or OPEN mode is configured)
WPS AP Mode	Unconfigured
Setup AP	10864111 <a href="#">Help</a>
<b>Manual Setup AP</b>	
Select SSID	wlan-ap-2.4g
Network Authentication	Open
WEP Encryption	Disabled
<a href="#">Apply</a> <a href="#">Cancel</a>	

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-2.4g) 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.

The screenshot displays the WPS configuration interface. At the top, navigation tabs include Profile, Network, Advanced, Statistics, WMM, WPS (selected), Radio On/Off, and About. The main area is divided into two sections: WPS AP List and WPS Profile List.

**WPS AP List:**

ID	MAC	Count
wlan-ap-2.4g	00-04-ED-01-00-01	1
wlan-ap	00-04-ED-38-F7-2E	1

**WPS Profile List:**

Profile Name	MAC
ExRegNWEA4036	6229909

Below the lists, there are checkboxes for  WPS Associate IE and  WPS Probe IE. A progress bar shows "Progress >> 100%" and a message states "PIN - Get WPS profile successfully." On the right, a sidebar contains buttons for Rescan, Information, Pin Code (10864111), Config Mode (Registrar), Detail, Connect, Rotate, Disconnect, and Export Profile.

The bottom section shows connection status for the selected AP:

- Status >> wlan-ap-2.4g <-> 00-04-ED-01-00-01
- Extra Info >> Link is Up [TxPower:100%]
- Channel >> 1 <-> 2412 MHz; central channel : 3
- Authentication >> WPA2-PSK
- Encryption >> AES
- Network Type >> Infrastructure
- IP Address >> 192.168.1.100
- Sub Mask >> 255.255.255.0
- Default Gateway >> 192.168.1.254

Additional metrics and graphs are shown on the right:

- Link Quality >> 100%
- Signal Strength 1 >> 65%
- Signal Strength 2 >> 39%
- Noise Strength >> 26%
- Transmit: Link Speed >> 243.0 Mbps, Throughput >> 0.000 Kbps
- Receive: Link Speed >> 40.5 Mbps, Throughput >> 98.612 Kbps

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

## MAC Filter



Configuration

MAC Filter

Parameters

Select SSID: wlan-ap-2.4g

MAC Restrict Mode \*:  Disable  Allow  Deny

\* If 'allow' is chosen and mac filter is empty, WPS will be disabled.

MAC Address: Remove

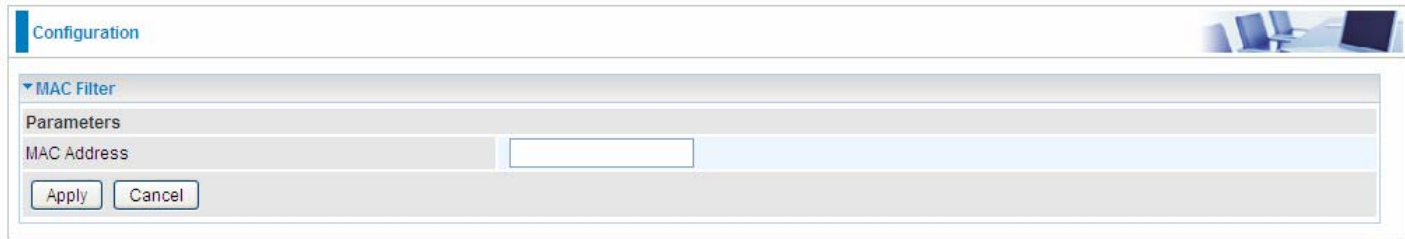
Add Remove

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

### MAC Restrict Mode:

- ① **Disable:** disable the MAC Filter function.
- ① **Allow:** allow the hosts with the following listed MACs to access the wireless network.
- ① **Deny:** deny the hosts with the following listed MACs to access the wireless network.

Click **Add** to add the MACs.



Configuration

MAC Filter

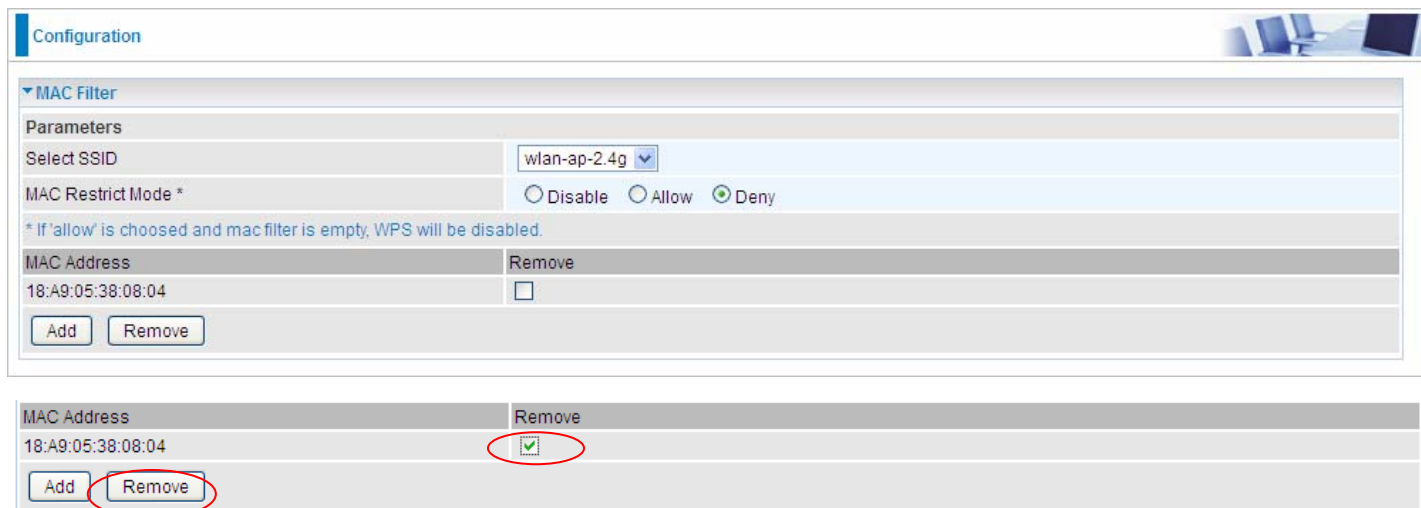
Parameters

MAC Address:

Apply Cancel

**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.



Configuration

MAC Filter

Parameters

Select SSID: wlan-ap-2.4g

MAC Restrict Mode \*:  Disable  Allow  Deny

\* If 'allow' is chosen and mac filter is empty, WPS will be disabled.

MAC Address: Remove

18:A9:05:38:08:04

Add Remove

MAC Address: Remove

18:A9:05:38:08:04

Add Remove

If you don't need a rule, check the remove checkbox and press **Remove** to delete it.

## 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.

Here you can select what role the AP server has, AP or wireless bridge (WDS).

Configuration

**Wireless Bridge**

**Parameters**  
You can select Wireless Bridge (also known as Wireless Distribution System) to disable access point functionality. Selecting Access Point enables access point functionality. Wireless bridge functionality will still be available and wireless stations will be able to associate to the AP. Select Disabled in Bridge Restrict which disables wireless bridge restriction. Any wireless bridge will be granted access. Selecting Enabled or Enabled(Scan) enables wireless bridge restriction. Only those bridges selected in Remote Bridges will be granted access.

AP Mode: Access Point

Bridge Restrict: Enable

Remote Bridges MAC Address

Apply Refresh

**AP Mode:** determines whether the gateway will act as an Access point or as a Bridge.

- ① **Access Point:** the gateway communicates with both clients and bridges.
- ① **Wireless Bridge:** the gateway communicates with other WDS devices only. In this mode, the gateway doesn't communicate with client devices.

If your wireless network includes repeaters that use WDS, the gateway in wireless bridge mode will also communicate with your repeaters. The gateway in wireless bridge mode will not communicate with a repeater that uses a proprietary (non-WDS) mode.

**Bridge Restrict:** When **AP Mode** is set to **Wireless Bridge**, this determines whether the gateway will communicate with all other bridges or only specific ones:

- ① **Enable:** to enable wireless bridge restriction. Only those specified in the Remote MAC Address the gateway can communicate with.

Bridge Restrict: Enable

Remote Bridges MAC Address

Apply Refresh

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

- ① **Enabled (Scan):** to enable wireless bridge restriction. Only those scanned by the gateway can communicate.

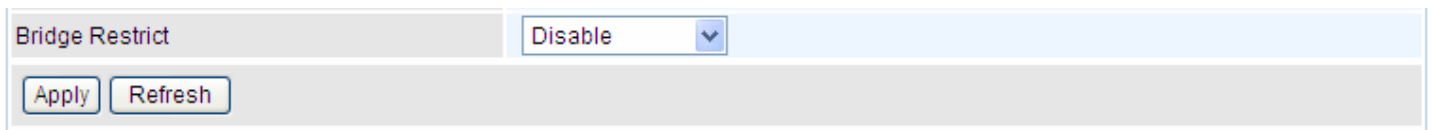
Bridge Restrict: Enabled(Scan)

Remote Bridges MAC Address	SSID	BSSID
<input type="checkbox"/>	wlan-ap	00:04:ED:14:27:13

Apply Refresh

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

- ① **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.



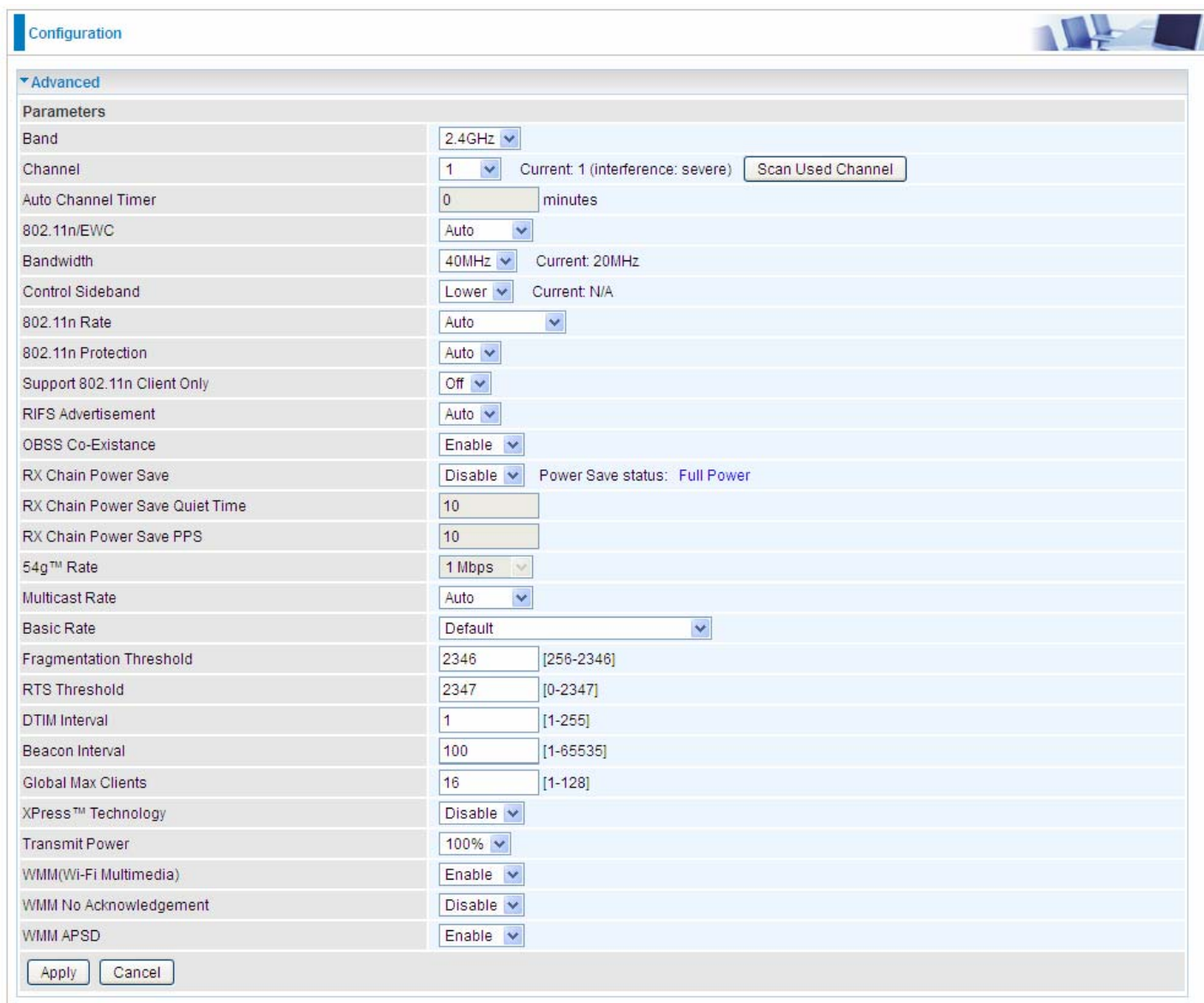
The screenshot shows a configuration panel for 'Bridge Restrict'. The label 'Bridge Restrict' is on the left. To its right is a dropdown menu currently displaying 'Disable'. Below these elements are two buttons: 'Apply' and 'Refresh'.

Click **Apply** to apply your settings.



## Advanced

Here users can set some advanced parameters about wireless.



The screenshot shows a web-based configuration interface for wireless settings. The page is titled "Configuration" and has a sub-section for "Advanced". The "Parameters" section is expanded, showing a list of settings. Each setting has a label, a value field (either a dropdown menu or a text input), and sometimes a "Current" status or a "Scan Used Channel" button. The settings are as follows:

Parameter	Value	Current / Notes
Band	2.4GHz	
Channel	1	Current: 1 (interference: severe) Scan Used Channel
Auto Channel Timer	0	minutes
802.11n/EWC	Auto	
Bandwidth	40MHz	Current: 20MHz
Control Sideband	Lower	Current: N/A
802.11n Rate	Auto	
802.11n Protection	Auto	
Support 802.11n Client Only	Off	
RIFS Advertisement	Auto	
OBSS Co-Existence	Enable	
RX Chain Power Save	Disable	Power Save status: Full Power
RX Chain Power Save Quiet Time	10	
RX Chain Power Save PPS	10	
54g™ Rate	1 Mbps	
Multicast Rate	Auto	
Basic Rate	Default	
Fragmentation Threshold	2346	[256-2346]
RTS Threshold	2347	[0-2347]
DTIM Interval	1	[1-255]
Beacon Interval	100	[1-65535]
Global Max Clients	16	[1-128]
XPress™ Technology	Disable	
Transmit Power	100%	
WMM(Wi-Fi Multimedia)	Enable	
WMM No Acknowledgement	Disable	
WMM APSD	Enable	

At the bottom of the configuration area, there are "Apply" and "Cancel" buttons.

**Band:** select frequency band. Here 2.4GHz.

**Channel:** Allows channel selection of a specific channel (1-7) or Auto mode.

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

**Auto Channel Timer (min):** The auto channel times length it takes to scan in minutes. Only available for auto channel mode.

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

**Bandwidth:** Select bandwidth. The higher the bandwidth the better the performance will be.

**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. Auto for greater security.

**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 a 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 Co-Existence:** coexistence (or not) between 20 MHz and 40 MHz overlapping basic service sets (OBSS) in wireless local area networks.

**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 a duration of Quiet Time, described above, before the Rx Chain Power Save feature activates itself.

**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.

**Regulatory Mode:** Select to deny any regulatory mode, which is only for **5GHz** band wireless. There are two regulatory modes:

802.11h: The standard solves interference problems with e.g. satellites and radar using the same 5 GHz band as 802.11a or 802.11n dual-band access points.

802.11d: This standard automatically adjusts its allowed frequencies, power levels and bandwidth accordingly to the country it's located in.

This means that manufacturers don't need to make country specific products.

**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.

## 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](#) .

The screenshot shows the 'Configuration' page with a 'Schedule Control' section. It includes instructions: 'The Wireless schedule only functions whilst Wireless is enabled. The Guest/Virtual AP schedule control only operates whilst the associated AP is enabled.' Under 'wlan-ap-2.4g', the 'Enable' checkbox is checked. The 'Time Schedule' section has two rows: Row 1 is set to 'Always On' with checkboxes for Sun, Mon, Tue, Wed, Thu, Fri, and Sat, and time slots 'From 00:00 To 00:59'. Row 2 is set to 'check or select from listbox' with checkboxes for Sun, Mon, Tue, Wed, Thu, Fri, and Sat, and time slots 'From 00:00 To 00:00'. Below this is the 'Wireless - Guest/Virtual Access Points' section with three entries: 'w0\_Guest1', 'w0\_Guest2', and 'w0\_Guest3', each set to 'Disable' with their own 'Time Schedule' rows. An 'Apply' button is at the bottom.

**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 “*wlan-ap-2.4g*” to work on weekdays except for Wednesday, under this circumstance, user can set as shown below. (7800DX(L) offers a optimal way to set two separate timeslots when user needs to activate the SSID during separate intervals. )

This close-up shows the 'wlan-ap-2.4g' settings. The 'Enable' checkbox is checked. The 'Time Schedule' section has two rows: Row 1 is set to 'check or select from listbox' with checkboxes for Sun, Mon, Tue, Wed, Thu, Fri, and Sat, and time slots 'From 00:00 To 23:59'. Row 2 is set to 'check or select from listbox' with checkboxes for Sun, Mon, Tue, Wed, Thu, Fri, and Sat, and time slots 'From 00:00 To 23:59'. The checkboxes for Mon, Tue, Thu, and Fri are checked.

## Wireless 5G(wl1)

The BiPAC 7800DX(L) uses two radio bands-2.4GHz and 5GHz simultaneously, to run wireless connection for users. Wl1, operating on 5GHz, has sub-items as **Basic**, **Security**, **MAC Filter**, **Wireless Bridge**, **Advanced**, **Station Info** and **Schedule Control** here.

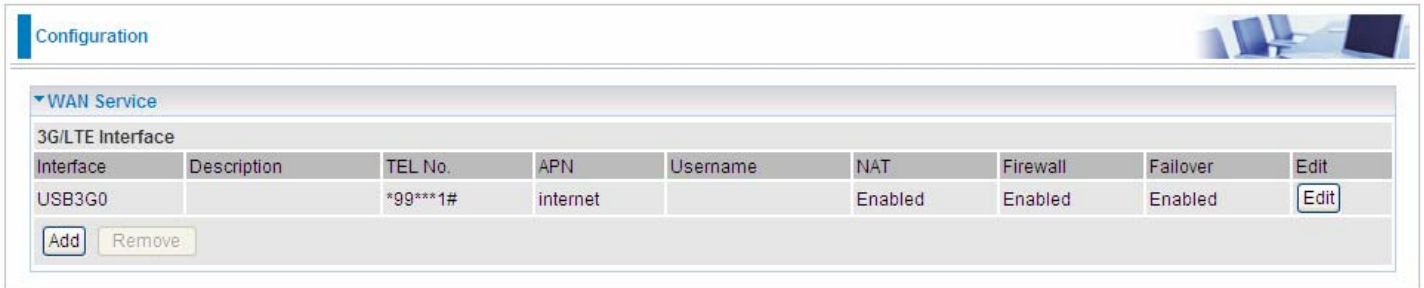
See [Wireless 2.4G\(wl0\)](#).

# 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

Two WAN interfaces are provided for WAN connection: DSL and Ethernet.



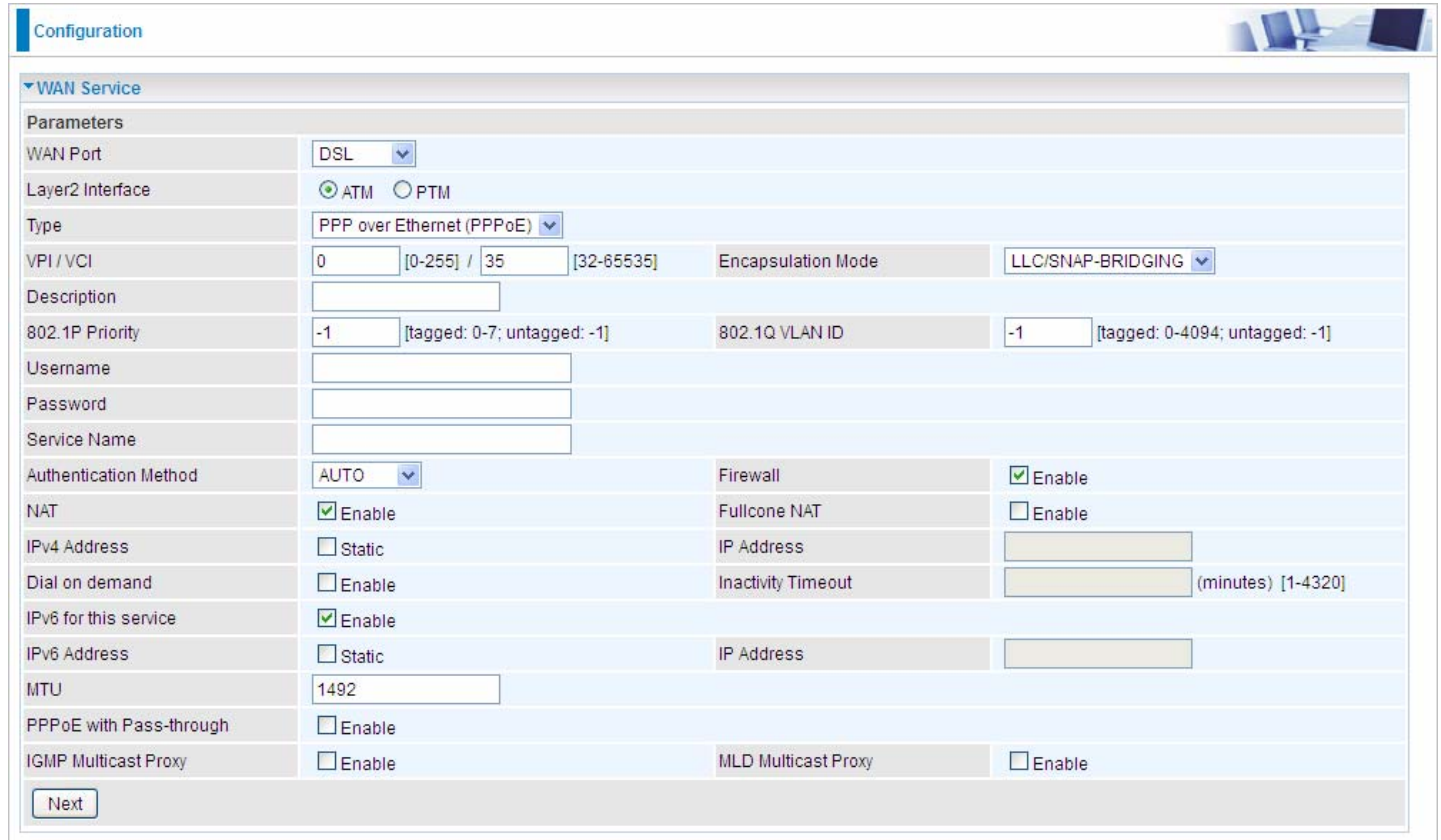
The screenshot shows a configuration page for WAN Service. It features a table with columns: Interface, Description, TEL No., APN, Username, NAT, Firewall, Failover, and Edit. A single entry is shown for interface USB3G0 with TEL No. \*99\*\*\*1#, APN internet, and NAT, Firewall, and Failover all enabled. There are 'Add' and 'Remove' buttons below the table.

Interface	Description	TEL No.	APN	Username	NAT	Firewall	Failover	Edit
USB3G0		*99***1#	internet		Enabled	Enabled	Enabled	Edit

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

### ① DSL

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



The screenshot shows a detailed configuration form for WAN Service. It includes fields for WAN Port (DSL), Layer2 Interface (ATM selected), Type (PPP over Ethernet (PPPoE)), VPI/VCI (0/35), Encapsulation Mode (LLC/SNAP-BRIDGING), 802.1P Priority (-1), 802.1Q VLAN ID (-1), Username, Password, Service Name, Authentication Method (AUTO), Firewall (checked), NAT (checked), IPv4 Address (Static), Dial on demand (unchecked), IPv6 for this service (checked), IPv6 Address (Static), MTU (1492), PPPoE with Pass-through (unchecked), IGMP Multicast Proxy (unchecked), MLD Multicast Proxy (unchecked), and a 'Next' button.

**Layer2 Interface:** 2 transfer mode, ATM or PTM.

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

The screenshot shows a configuration page for a WAN Service. The 'Parameters' section includes:

- WAN Port: DSL
- Layer2 Interface: ATM (selected), PTM
- Type: PPP over Ethernet (PPPoE)
- VPI / VCI: 0 [0-255] / 35 [32-65535]
- Encapsulation Mode: LLC/SNAP-BRIDGING
- Description: (empty)
- 802.1P Priority: -1 [tagged: 0-7; untagged: -1]
- 802.1Q VLAN ID: -1 [tagged: 0-4094; untagged: -1]
- Username: (empty)
- Password: (empty)
- Service Name: (empty)
- Authentication Method: AUTO
- Firewall:  Enable
- NAT:  Enable
- Fullcone NAT:  Enable
- IPv4 Address:  Static
- IP Address: (empty)
- Dial on demand:  Enable
- Inactivity Timeout: (empty) (minutes) [1-4320]
- IPv6 for this service:  Enable
- IPv6 Address:  Static
- IP Address: (empty)
- MTU: 1492
- PPPoE with Pass-through:  Enable
- IGMP Multicast Proxy:  Enable
- MLD Multicast Proxy:  Enable

A 'Next' button is located at the bottom left of the configuration area.

**VCP/VPI:** Enter the VCI/VPI 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 (**I**nternet **G**roup **M**anagement **P**rotocol) 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.

**MLD Multicast Proxy:** check whether to enable this function. MLD (**M**ulticast **L**istener **D**iscovery **P**rotocol) 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.



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

The screenshot shows the 'Configuration' page with the 'Default Gateway / DNS' section expanded. It is divided into two main parts: 'Default Gateway' and 'DNS'.

**Default Gateway:**

- Selected Default Gateway Interfaces:** A list box containing 'pppoe\_0\_8\_35/ppp0.1'.
- Available Routed WAN Interfaces:** A list box containing 'USB3G0'.
- Two arrow buttons (right and left) are positioned between the two list boxes.
- Selected WAN Interface As The System Default IPv6 Gateway:** A dropdown menu showing 'pppoe\_0\_8\_35/ppp0.1'.

**DNS:**

- DNS Server Interface:** Radio buttons for 'Available WAN Interfaces' (selected), 'Static DNS Address', and 'Parent Controls'.
- Selected DNS Server Interfaces:** A list box containing 'pppoe\_0\_8\_35/ppp0.1'.
- Available WAN Interfaces:** A list box containing 'USB3G0'.
- Two arrow buttons (right and left) are positioned between the two list boxes.
- Primary DNS server:** An empty text input field.
- Secondary DNS server:** An empty text input field.
- Note:** 'Note that selecting a WAN interface for IPv6 DNS server will enable DHCPv6 Client on that interface.'
- DNS Server Interface:** Radio buttons for 'Available WAN Interfaces' (selected) and 'Static DNS IPv6 Address'.
- WAN Interface selected:** A dropdown menu showing 'pppoe\_0\_8\_35/ppp0.1'.
- Primary IPv6 DNS server:** An empty text input field.
- Secondary IPv6 DNS server:** An empty text input field.

A 'Next' button is located at the bottom left of the configuration area.

## Default Gateway

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

## DNS

### ➤ IPv4

#### Three ways to set an IPv4 DNS server

- ① **Available WAN interfaces:** Select a desirable WAN interface as the IPv4 DNS server.
- ① **Static DNS Address:** To specify DNS server manually by entering your primary and secondary DNS server addresses.
- ① **Parental 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.

Configuration 

▼ WAN Service

ATM Interface

Interface	Description	Type	VPI / VCI	Vlan8021p	VlanMuxId	Igmp	NAT	Firewall	IPv6	Mld	Remove	Edit
ppp0.1	pppoe_0_8_35	PPPoE	8 / 35	N/A	N/A	Disabled	Enabled	Enabled	Enabled	Disabled	<input type="checkbox"/>	Edit

3G/LTE Interface

Interface	Description	TEL No.	APN	Username	NAT	Firewall	Failover	Edit
USB3G0		*99***1#	internet		Enabled	Enabled	Enabled	Edit

Add Remove

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)**

Status

---

▼ WAN

**Wan Info**

Interface	Description	Type	Status	Connection Time	IPv4 Address	IPv6 Address
ppp0.1	pppoe_0_8_35	PPPoE	<input type="button" value="Disconnect"/>	00:04:03	10.40.90.211	2000:db98:1000:1000:29ac:afc6:59a4:5816/64
USB3G0			3G/LTE Card not found			

Status

---

▼ Device Information

Model Name	BIPAC 7800DX
Host Name	home.gateway
System Up-Time	0D 0H 20M 46S
Date/Time	Mon Aug 5 07:28:23 2013 <input type="button" value="Sync"/>
Software Version	2.32b
LAN IPv4 Address	192.168.1.254
LAN IPv6 Address	2000:1211:1000:4d0b:204:edff:fe01:1/64
MAC Address	00:04:ed:01:00:01
DSL PHY and Driver Version	A2pD038f.d24h
Wireless Driver Version	6.30.102.7.cpe4.12L08.4

▼ WAN

Line Rate - Upstream (Kbps)	1291
Line Rate - Downstream (Kbps)	26919
Default Gateway / IPv4 Address	ppp0.1 (DSL) / 10.40.90.211
Connection Time	00:02:44
Primary DNS Server	218.2.135.1
Secondary DNS Server	218.2.135.1
Default IPv6 Gateway / IPv6 Address	ppp0.1 (DSL) / 2000:db98:1000:1000:29ac:afc6:59a4:5816/64

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

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

**Description:** User-defined description for the connection.

**Username:** Enter the account obtained from the ISP.

**Password:** Enter the password obtained from the ISP.

**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 this 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. With 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.

**IGMP Multicast Proxy:** Check whether to enable this feature. IGMP (**I**nternet **G**roup **M**anagement **P**rotocol) 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.

**MLD Multicast Proxy:** check whether to enable this function. MLD (**M**ulticast **L**istener **D**iscovery **P**rotocol) 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.

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

## IP over Ethernet

WAN Service

Parameters

WAN Port	DSL
Layer2 Interface	<input checked="" type="radio"/> ATM <input type="radio"/> PTM
Type	IP over Ethernet
VPI / VCI	0 [0-255] / 35 [32-65535] Encapsulation Mode LLC/SNAP-BRIDGING
Description	
802.1P Priority	-1 [tagged: 0-7; untagged: -1] 802.1Q VLAN ID -1 [tagged: 0-4094; untagged: -1]
Obtain an IP address automatically	<input checked="" type="checkbox"/> Enable
Option 60 Vendor ID	
Option 61 Client ID	
Option 125	<input checked="" type="radio"/> Disable <input type="radio"/> Enable
WAN IP Address	
WAN Subnet Mask	
WAN gateway IP Address	
IPv6 for this service	<input checked="" type="checkbox"/> Enable
Obtain an IPv6 address automatically	<input checked="" type="checkbox"/> Enable
WAN IPv6 Address/Prefix Length	
WAN Next-Hop IPv6 Address	
NAT	<input checked="" type="checkbox"/> Enable Fullcone NAT <input type="checkbox"/> Enable
Firewall	<input checked="" type="checkbox"/> Enable IGMP Multicast <input type="checkbox"/> Enable
MLD Multicast Proxy	<input type="checkbox"/> Enable
MTU	1500 MAC Spoofing

Next

**VCP/VPI:** Enter the VCI/VPI 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.

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

**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:** IGMP (**I**nternet **G**roup **M**embership 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.

**MLD Multicast Proxy:** check whether to enable this function. MLD (**M**ulticast **L**istener **D**iscovery 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.

**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.

The screenshot shows a configuration window for WAN Service. Under the 'Parameters' section, the following settings are visible:

- WAN Port:** DSL
- Layer2 Interface:** ATM (selected), PTM
- Type:** IPoA
- VPI / VCI:** 0 [0-255] / 35 [32-65535]
- Encapsulation Mode:** LLC/SNAP-ROUTING
- Description:** (empty text box)
- WAN IP Address:** (empty text box)
- WAN Subnet Mask:** (empty text box)
- NAT:**  Enable
- Fullcone NAT:**  Enable
- Firewall:**  Enable
- IGMP Multicast:**  Enable

A 'Next' button is located at the bottom left of the configuration area.

**VCP/VPI:** Enter the VCI/VPI 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:** Enter the WAN IP from the ISP.

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

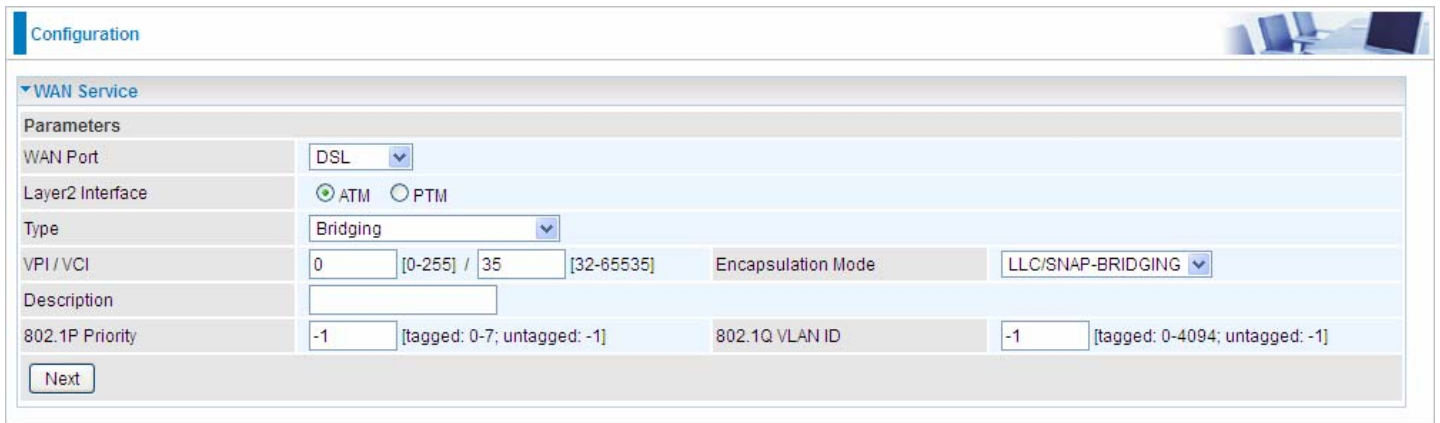
**NAT:** The NAT (Network Address Translation) feature allows multiple users to access the Internet through a single IP account by sharing the single IP address. If users on your LAN have their own public IP addresses to access the Internet, NAT function can be disabled. When enabled, a Fullcone NAT 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.

**IGMP Multicast:** IGMP (**I**nternet **G**roup **M**embership 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.





Configuration

WAN Service

Parameters

WAN Port: DSL

Layer2 Interface:  ATM  PTM

Type: Bridging

VPI / VCI: 0 [0-255] / 35 [32-65535] Encapsulation Mode: LLC/SNAP-BRIDGING

Description:

802.1P Priority: -1 [tagged: 0-7; untagged: -1] 802.1Q VLAN ID: -1 [tagged: 0-4094; untagged: -1]

Next

**VCP/VPI:** Enter the VCI/VPI 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.

## ① Ethernet

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

Configuration

WAN Service

Parameters

WAN Port	Ethernet		
Type	PPP over Ethernet (PPPoE)		
Description			
802.1P Priority	-1 [tagged: 0-7; untagged: -1]	802.1Q VLAN ID	-1 [tagged: 0-4094; untagged: -1]
Username			
Password			
Service Name			
Authentication Method	AUTO	Firewall	<input checked="" type="checkbox"/> Enable
NAT	<input checked="" type="checkbox"/> Enable	Fullcone NAT	<input type="checkbox"/> Enable
IPv4 Address	<input type="checkbox"/> Static	IP Address	
Dial on demand	<input type="checkbox"/> Enable	Inactivity Timeout	(minutes) [1-4320]
IPv6 for this service	<input checked="" type="checkbox"/> Enable		
IPv6 Address	<input type="checkbox"/> Static	IP Address	
MTU	1492		
PPPoE with Pass-through	<input type="checkbox"/> Enable		
IGMP Multicast Proxy	<input type="checkbox"/> Enable	MLD Multicast Proxy	<input type="checkbox"/> Enable

Next

## ● PPPoE

Configuration

WAN Service

Parameters

WAN Port	Ethernet		
Type	PPP over Ethernet (PPPoE)		
Description			
802.1P Priority	-1 [tagged: 0-7; untagged: -1]	802.1Q VLAN ID	-1 [tagged: 0-4094; untagged: -1]
Username			
Password			
Service Name			
Authentication Method	AUTO	Firewall	<input checked="" type="checkbox"/> Enable
NAT	<input checked="" type="checkbox"/> Enable	Fullcone NAT	<input type="checkbox"/> Enable
IPv4 Address	<input type="checkbox"/> Static	IP Address	
Dial on demand	<input type="checkbox"/> Enable	Inactivity Timeout	(minutes) [1-4320]
IPv6 for this service	<input checked="" type="checkbox"/> Enable		
IPv6 Address	<input type="checkbox"/> Static	IP Address	
MTU	1492		
PPPoE with Pass-through	<input type="checkbox"/> Enable		
IGMP Multicast Proxy	<input type="checkbox"/> Enable	MLD Multicast Proxy	<input type="checkbox"/> Enable

Next

**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 (**I**nternet **G**roup **M**anagement **P**rotocol) 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.

**MLD Multicast Proxy:** check whether to enable this function. MLD (**M**ulticast **L**istener **D**iscovery **P**rotocol) 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.

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

The screenshot shows a configuration interface with the following sections:

- Default Gateway / DNS** (Section Header)
- Default Gateway**
  - Selected Default Gateway Interfaces: ppp0.1
  - Available Routed WAN Interfaces: 3G0/USB3G0
  - Selected WAN Interface As The System Default IPv6 Gateway: pppoe\_eth0/ppp0.1
- DNS**
  - DNS Server Interface:  Available WAN Interfaces,  Static DNS Address,  Parent Controls
  - Selected DNS Server Interfaces: ppp0.1
  - Available WAN Interfaces: 3G0/USB3G0
  - Primary DNS server: [Empty text box]
  - Secondary DNS server: [Empty text box]
  - Note that selecting a WAN interface for IPv6 DNS server will enable DHCPv6 Client on that interface.
  - DNS Server Interface:  Available WAN Interfaces,  Static DNS IPv6 Address
  - WAN Interface selected: pppoe\_eth0/ppp0.1
  - Primary IPv6 DNS server: [Empty text box]
  - Secondary IPv6 DNS server: [Empty text box]
- Next** (Button)

## Default Gateway

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

## DNS

### ➤ IPv4

#### Three ways to set an IPv4 DNS server

- ① **Available WAN interfaces:** Select a desirable WAN interface as the IPv4 DNS server.
- ① **Static DNS Address:** To specify DNS server manually by entering your primary and secondary DNS server addresses.
- ① **Parental 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.

**Configuration**

▼ WAN Service

ETH Interface

Interface	Description	Type	Vlan8021p	VlanMuxId	Igmp	NAT	Firewall	IPv6	Mld	Remove	Edit
ppp0.1	pppoe_eth0	PPPoE	N/A	N/A	Disabled	Enabled	Enabled	Enabled	Disabled	<input type="checkbox"/>	<a href="#">Edit</a>

3G/LTE Interface

Interface	Description	TEL No.	APN	Username	NAT	Firewall	Failover	Edit
USB3G0		*99***1#	internet		Enabled	Enabled	Enabled	<a href="#">Edit</a>

[Add](#) [Remove](#)

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)**

**Status**

▼ WAN

Wan Info

Interface	Description	Type	Status	Connection Time	IPv4 Address	IPv6 Address
ppp0.1	pppoe_0_8_35	PPPoE	<a href="#">Disconnect</a>	00:04:03	10.40.90.211	2000:db98:1000:1000:29ac:afc6:59a4:5816/64
USB3G0			3G/LTE Card not found			

The device summary information

**Status**

▼ Device Information

Model Name	BIPAC 7800DX
Host Name	home.gateway
System Up-Time	0D 0H 23M 19S
Date/Time	Mon Aug 5 07:30:56 2013 <a href="#">Sync</a>
Software Version	2.32b
LAN IPv4 Address	192.168.1.254
LAN IPv6 Address	2000:1211:1000:4d0b:204:edffe01:1/64
MAC Address	00:04:ed:01:00:01
DSL PHY and Driver Version	A2pD038f.d24h
Wireless Driver Version	6.30.102.7.cpe4.12L08.4

▼ WAN

Line Rate - Upstream (Kbps)	0
Line Rate - Downstream (Kbps)	0
Default Gateway / IPv4 Address	ppp0.1(Ethernet) / 10.40.90.211
Connection Time	00:02:44
Primary DNS Server	218.2.135.1
Secondary DNS Server	218.2.135.1
Default IPv6 Gateway / IPv6 Address	ppp0.1 (Ethernet) / 2000:db98:1000:1000:29ac:afc6:59a4:5816/64

WAN Service			
Parameters			
WAN Port	Ethernet		
Type	IP over Ethernet		
Description			
802.1P Priority	-1 [tagged: 0-7; untagged: -1]	802.1Q VLAN ID	-1 [tagged: 0-4094; untagged: -1]
Obtain an IP address automatically	<input checked="" type="checkbox"/> Enable		
Option 60 Vendor ID			
Option 61 Client ID			
Option 125	<input checked="" type="radio"/> Disable <input type="radio"/> Enable		
WAN IP Address			
WAN Subnet Mask			
WAN gateway IP Address			
IPv6 for this service	<input checked="" type="checkbox"/> Enable		
Obtain an IPv6 address automatically	<input checked="" type="checkbox"/> Enable		
WAN IPv6 Address/Prefix Length			
WAN Next-Hop IPv6 Address			
NAT	<input checked="" type="checkbox"/> Enable	Fullcone NAT	<input type="checkbox"/> Enable
Firewall	<input checked="" type="checkbox"/> Enable	IGMP Multicast	<input type="checkbox"/> Enable
MLD Multicast Proxy	<input type="checkbox"/> Enable		
MTU	1500	MAC Spoofing	
<input type="button" value="Next"/>			

**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.

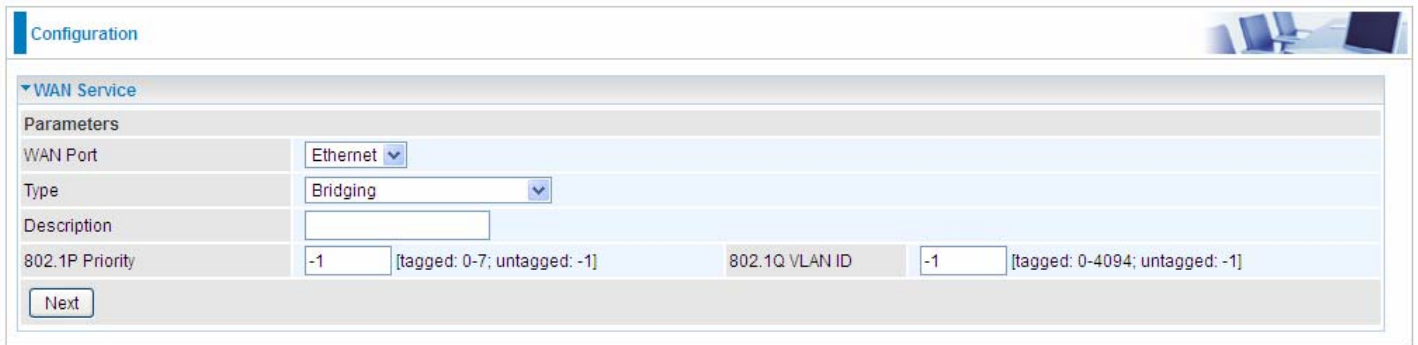
**IGMP Multicast:** IGMP (**I**nternet **G**roup **M**embership Protocol) is a protocol used by IP hosts to report their multicast group memberships to any immediately neighboring multicast routers. Check this item to enable IGMP multicast on that WAN interface for multicast forwarding.

**MLD Multicast Proxy:** check whether to enable this function. MLD (**M**ulticast **L**istener **D**iscovery 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.

**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



The screenshot shows a configuration window titled "Configuration" with a sub-section "WAN Service". Under "Parameters", there are four rows of settings:

Parameters			
WAN Port	Ethernet		
Type	Bridging		
Description			
802.1P Priority	-1 [tagged: 0-7; untagged: -1]	802.1Q VLAN ID	-1 [tagged: 0-4094; untagged: -1]

At the bottom left of the configuration area is a "Next" button.

**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.



## ① 3G/LTE

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

Configuration

WAN Service

ATM Interface

Interface	Description	Type	VPI / VCI	Vlan8021p	VlanMuxId	Igmp	NAT	Firewall	IPv6	Mld	Remove	Edit
ppp0.1	pppoe_0_8_35	PPPoE	8 / 35	N/A	N/A	Disabled	Enabled	Enabled	Enabled	Disabled	<input type="checkbox"/>	<a href="#">Edit</a>

3G/LTE Interface

Interface	Description	TEL No.	APN	Username	NAT	Firewall	Failover	Edit
USB3G0		*99***1#	internet		Enabled	Enabled	Enabled	<a href="#">Edit</a>

[Add](#) [Remove](#)

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

Configuration

WAN Service

Parameters

Failover  Enable

Mode [Use 3G/LTE dongle settings](#)

TEL No.  APN

Username  Password

Authentication Method [AUTO](#) PIN

Dial on demand  Enable

Keep Alive  Enable  seconds [1-86400]

IP Address

NAT  Enable Firewall  Enable

MTU

Selected Default Gateway Interfaces

USB3G0

Available Routed WAN Interfaces

eth0.1  
ppp0.1

Obtain DNS  Use WAN Interface  Use Static DNS  Parent Controls

Selected Default Gateway Interfaces

USB3G0

Available Routed WAN Interfaces

eth0.1  
ppp0.1

Obtain DNS  Use WAN Interface  Use Static DNS  Parent Controls

Selected DNS Server Interfaces

USB3G0

Available WAN Interfaces

eth0.1  
ppp0.1

Primary DNS  Secondary DNS

\*Warning: Entering the wrong PIN code three times will lock the SIM.

[Apply](#) [Cancel](#)

**Failover:** If enabled, the 3G/LTE will work in failover mode and be brought up only when there is no active default route. In this mode, 3G/LTE work as a backup for the WAN connectivity. While if disabled, 3G/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/LTE 3g 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/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 Protocol:** 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.

- ① **Connect 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.

Dial on demand	<input checked="" type="checkbox"/> Enable
Idle Timeout	600 seconds [10-86400]

- ① **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.

Dial on demand	<input type="checkbox"/> Enable
Keep Alive	<input checked="" type="checkbox"/> Enable 7 seconds [1-86400]
IP Address	8.8.8.8

**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 ppp3g0.

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

- ① **Available WAN interfaces:** Select a desirable WAN interface as the DNS server.
- ① **Static DNS Address:** To specify DNS server manually by entering your primary and secondary DNS server addresses.
- ① **Parental 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 (Here user can see the 3G/LTE failover).

The screenshot shows the 'Status' page of a router. It is divided into two main sections: 'WAN' and 'Device Information'.

**WAN Section:**

Interface	Description	Type	Status	Connection Time	IPv4 Address	IPv6 Address
ppp0.1	pppoe_0_8_35	PPPoE	Unconfigured			
ppp3g0	3G0	PPP	Failover / Connected	00:01:10	10.44.183.197	

**Device Information Section:**

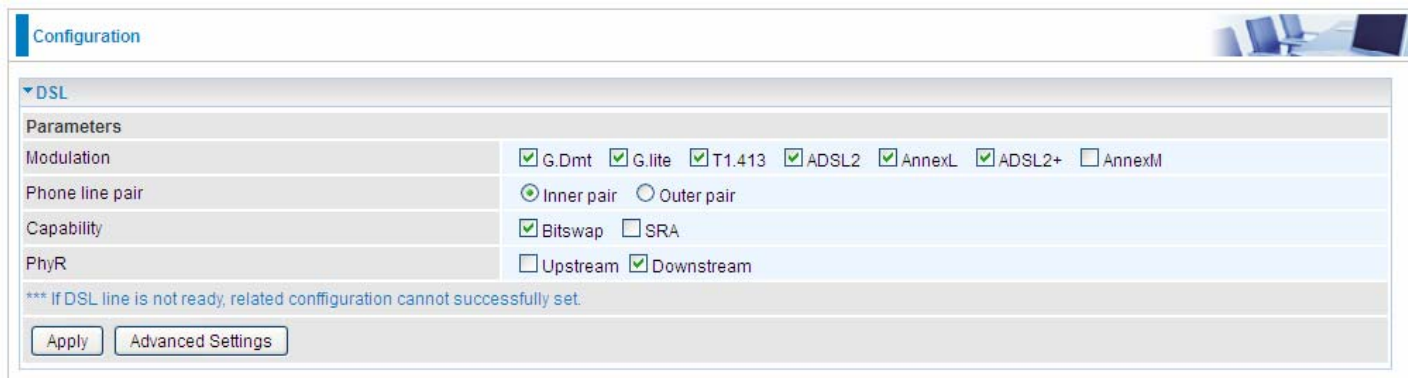
Model Name	BIPAC 7800DX
Host Name	home.gateway
System Up-Time	0D 0H 22M 20S
Date/Time	Mon Aug 5 07:29:57 2013 <input type="button" value="Sync"/>
Software Version	2.32b
LAN IPv4 Address	192.168.1.254
LAN IPv6 Address	fe80::204:edff:fe02:1/64
MAC Address	00:04:ed:02:00:01
DSL PHY and Driver Version	A2pD038f.d24h
Wireless Driver Version	6.30.102.7.cpe4.12L08.4

**WAN Section (continued):**

Line Rate - Upstream (Kbps)	0
Line Rate - Downstream (Kbps)	0
Default Gateway / IPv4 Address	ppp3g0(3G/LTE) / 10.44.183.197
Connection Time	00:06:30
Primary DNS Server	221.5.4.55
Secondary DNS Server	58.240.57.33
Default IPv6 Gateway / IPv6 Address	ppp0.1 (DSL)

## 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.



Configuration

DSL

Parameters

Modulation  G.Dmt  G.lite  T1.413  ADSL2  AnnexL  ADSL2+  AnnexM

Phone line pair  Inner pair  Outer pair

Capability  Bitswap  SRA

PhyR  Upstream  Downstream

\*\*\* If DSL line is not ready, related configuration cannot successfully set.

Apply Advanced Settings

**Modulation:** There are 7 modes “G.Dmt”, “G.lite”, “T1.413”, “ADSL2”, “AnnexL”, “ADSL2+”, “AnnexM” that user can select for this connection.

**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.

① Bitswap Enable: Allows bitswapping function.

① 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.

Click [Advanced Settings](#) to future configure DSL.



Configuration

DSL Advanced Settings

Parameters

Test Mode  Normal  Reverb  Medley  No Retrain  L3

Apply Tone Selection

Select the Test Mode, or leave it as default.

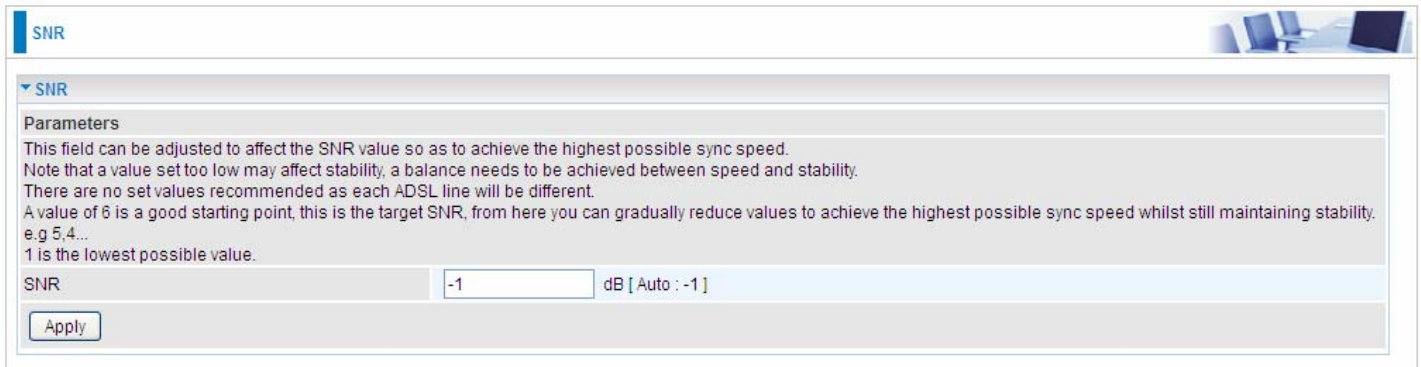
**Tone Selection:** This should be left as default or be configured by an advanced user.

The frequency band of ADSL is split up into 256 separate tones, each spaced 4.3125 kHz apart.

With each tone carrying separate data, the technique operates as if 256 separate modems were running in parallel. The tone range is from 0 to 31 for upstream and from 32 to 255 for downstream.

## 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.



The screenshot shows a configuration window titled "SNR". Inside, there is a section labeled "Parameters" with the following text: "This field can be adjusted to affect the SNR value so as to achieve the highest possible sync speed. Note that a value set too low may affect stability, a balance needs to be achieved between speed and stability. There are no set values recommended as each ADSL line will be different. A value of 6 is a good starting point, this is the target SNR, from here you can gradually reduce values to achieve the highest possible sync speed whilst still maintaining stability. e.g 5,4... 1 is the lowest possible value." Below this text is a text input field labeled "SNR" containing the value "-1", followed by the unit "dB [ Auto : -1 ]". At the bottom left of the configuration area is an "Apply" button.

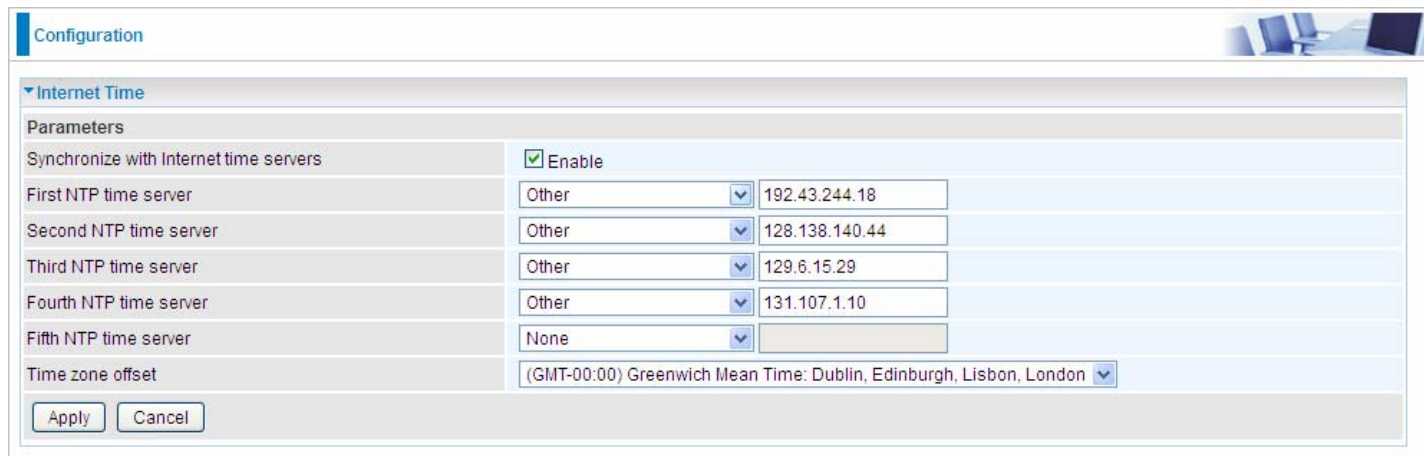
**SNR:** Change the value to adjust the DSL link rate, more suitable for an advanced user.

# System

## Internet Time

The router does not have a real time clock on board; instead, it uses the Network Time Protocol (NTP) to get the most current time from an NTP server.

NTP is a protocol for synchronization of computers. It can enable computers synchronize to the NTP server or clock source with a high accuracy.



Parameters	
Synchronize with Internet time servers	<input checked="" type="checkbox"/> Enable
First NTP time server	Other <input type="text" value="192.43.244.18"/>
Second NTP time server	Other <input type="text" value="128.138.140.44"/>
Third NTP time server	Other <input type="text" value="129.6.15.29"/>
Fourth NTP time server	Other <input type="text" value="131.107.1.10"/>
Fifth NTP time server	None <input type="text"/>
Time zone offset	(GMT-00:00) Greenwich Mean Time: Dublin, Edinburgh, Lisbon, London

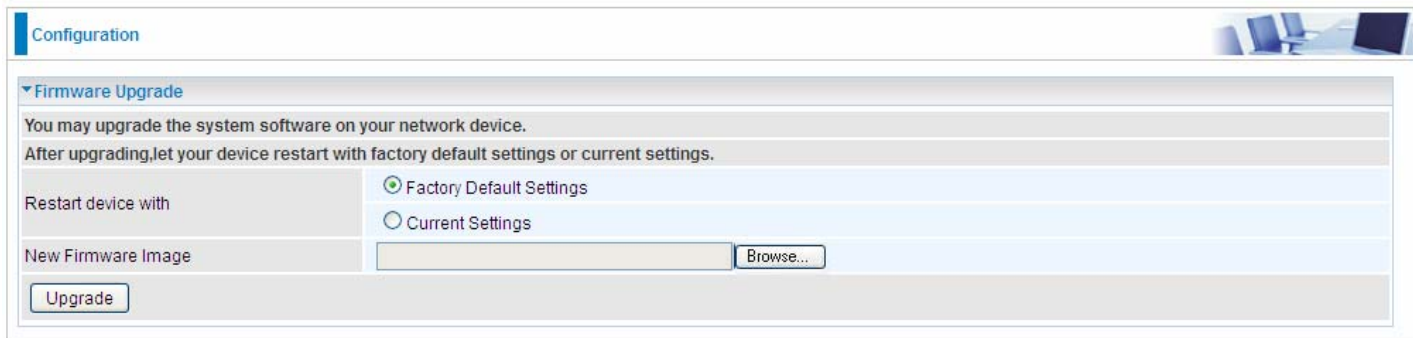
Choose the NTP time server from the drop-down menu, if you prefer to specify an NTP server other than those in the drop-down list, simply enter its IP address in their appropriate blanks provided as shown above. Your ISP may also provide an SNTP server for you to use.

Choose your local time zone from the drop-down menu. After a successful connection to the Internet, the router will retrieve the correct local time from the NTP server you have specified. If you prefer to specify an NTP server other than those in the drop-down list, simply enter its IP address in their appropriate blanks provided as shown above. Your ISP may also provide an NTP server for you to use.

Click **Apply** to apply your settings.

## Firmware Upgrade

Software upgrading lets you experience new and integral functions of your router.



The screenshot shows the 'Configuration' page for a router, specifically the 'Firmware Upgrade' section. The page has a blue header with the word 'Configuration'. Below it, the 'Firmware Upgrade' section is highlighted. The text reads: 'You may upgrade the system software on your network device. After upgrading, let your device restart with factory default settings or current settings.' There are two radio buttons: 'Factory Default Settings' (which is selected) and 'Current Settings'. Below this is a field for 'New Firmware Image' with a 'Browse...' button. At the bottom left of the section is an 'Upgrade' button.

### Restart device with:

- ① **Factory Default Settings:** Restart the device with factory default settings automatically when finishing upgrading.
- ① **Current Settings:** Restart the device with the current settings automatically when finishing upgrading.

Your router's "firmware" is the software that allows it to operate and provides all its functionality.

Think of your router as a dedicated computer, and the firmware as the software it runs. Over time this software may be improved and revised, and your router allows you to upgrade the software it runs to take advantage of these changes.

Clicking on **Browse** will allow you to select the new firmware image file you have downloaded to your PC. Once the correct file is selected, click **Upgrade** to update the firmware in your router.

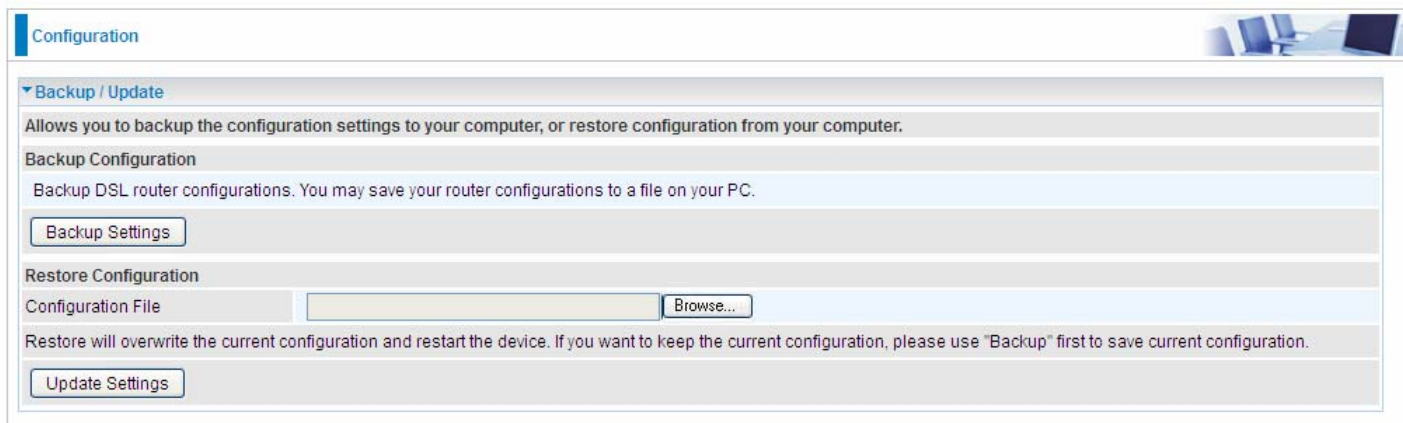


### Warning

DO NOT power down the router or interrupt the firmware upgrading while it is still in process. Improper operation could damage the router.

## Backup / Update

These functions allow you to save and backup your router's current settings to a file on your PC, or to restore from a previously saved backup. This is useful if you wish to experiment with different settings, knowing that you have a backup handy in the case of any mistakes. It is advisable to backup your router's settings before making any significant changes to your router's configuration.



The screenshot shows the 'Configuration' page with a sub-section titled 'Backup / Update'. It contains instructions for backing up and restoring settings, a 'Backup Settings' button, a 'Restore Configuration' section with a 'Configuration File' input field and a 'Browse...' button, and an 'Update Settings' button.

Configuration

Backup / Update

Allows you to backup the configuration settings to your computer, or restore configuration from your computer.

Backup Configuration

Backup DSL router configurations. You may save your router configurations to a file on your PC.

Backup Settings

Restore Configuration

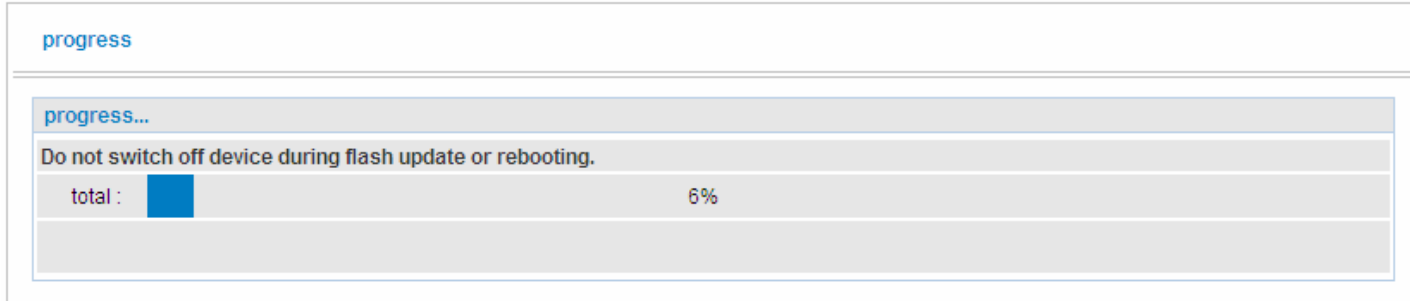
Configuration File  Browse...

Restore will overwrite the current configuration and restart the device. If you want to keep the current configuration, please use "Backup" first to save current configuration.

Update Settings

Click **Backup Settings**, a window appears, click save , then browse the location where you want to save the backup file.

Click **Browse** and browse to the location where your backup file is saved, the click **Open**. Then in the above page, click **Update Settings**, the following process indicating screen will appear. Let it update to 100%, it will automatically turn to the Device Info page.



The screenshot shows a 'progress' screen with a warning to not switch off the device and a progress bar indicating 6% completion.

progress

progress...

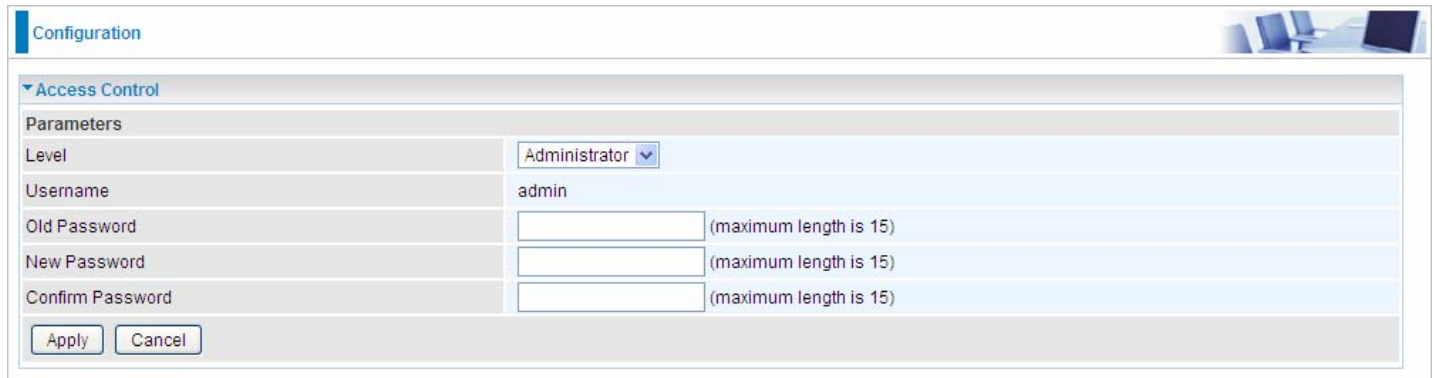
Do not switch off device during flash update or rebooting.

total :  6%



## Access Control

Access Control is used to prevent unauthorized access to the router configuration page. Here you can change the login user password. Three user levels are provided here. Each user level there's a default provided user. You must access the router with the appropriate username and password. Here the corresponding passwords are allowed to change.



The screenshot shows the 'Configuration' page with the 'Access Control' section expanded. Under 'Parameters', the 'Level' is set to 'Administrator'. The 'Username' is 'admin'. There are three password fields: 'Old Password', 'New Password', and 'Confirm Password', each with a note '(maximum length is 15)'. At the bottom are 'Apply' and 'Cancel' buttons.

**Level:** select which level you want to change password to. There are three default levels.

- ① **Administrator:** the root user, corresponding default username and password are admin and admin respectively.
- ① **Remote:** username for the remote user to login, corresponding default username and password are support and support respectively.
- ① **Local:** username for the general user, when logon to the web page, only lit items would be listed for common user, corresponding default username password are user and user respectively.

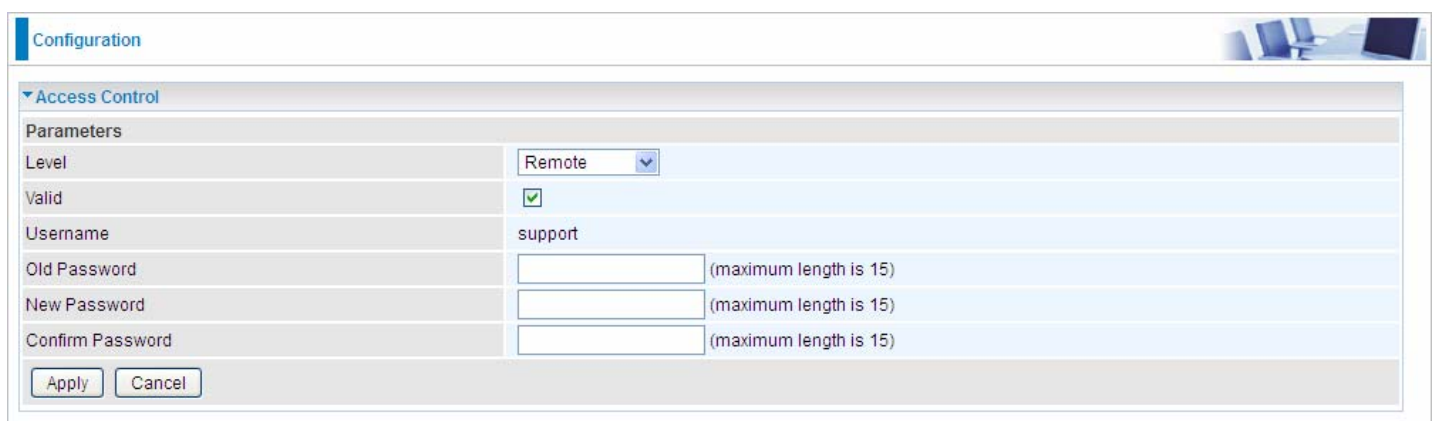
**Username:** the default username for each user level.

**Old Password:** Enter the old password.

**New Password:** Enter the new password.

**Confirm Password:** Enter again the new password to confirm.

**Note:** By default the accounts of **Remote** and **Local** are disabled, please click **Valid** check-box to activate the accounts.

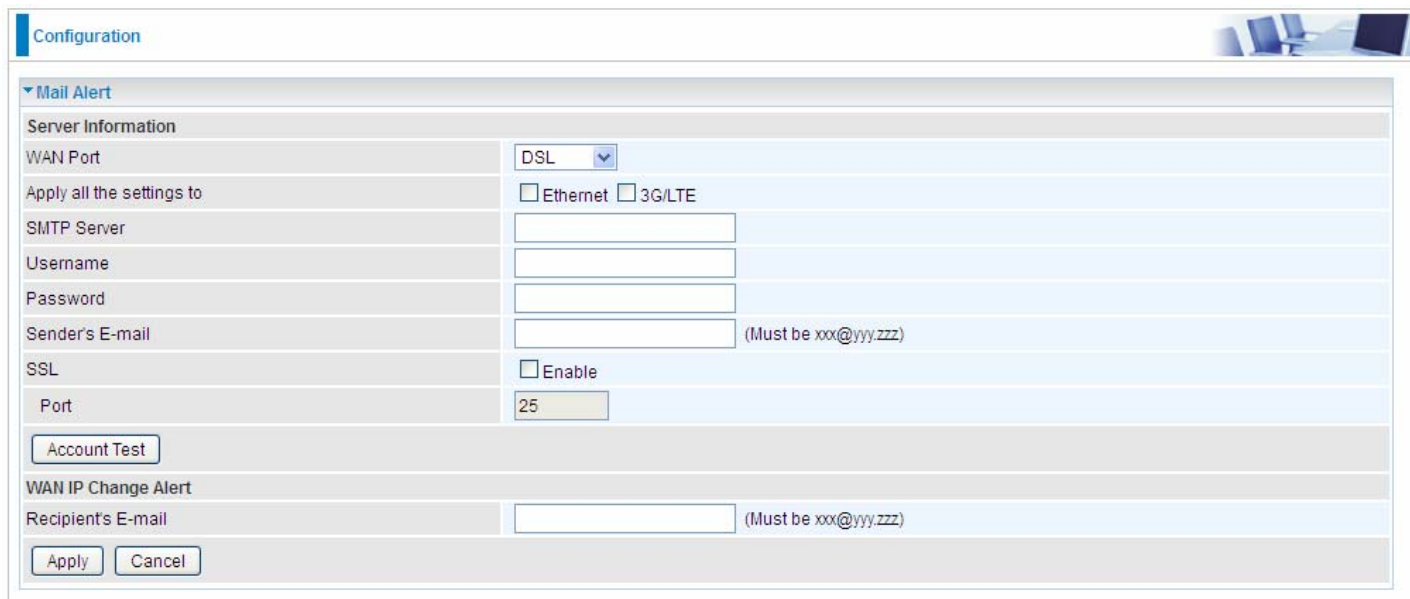


The screenshot shows the 'Configuration' page with the 'Access Control' section expanded. Under 'Parameters', the 'Level' is set to 'Remote'. The 'Valid' checkbox is checked. The 'Username' is 'support'. There are three password fields: 'Old Password', 'New Password', and 'Confirm Password', each with a note '(maximum length is 15)'. At the bottom are 'Apply' and 'Cancel' buttons.

Click **Apply** to apply your new settings.

## Mail Alert

Mail alert is designed to keep system administrator or other relevant personnel alerted of any unexpected events that might have occurred to the network computers or server for monitoring efficiency. With this alert system, appropriate solutions may be tackled to fix problems that may have arisen so that the server can be properly maintained.



The screenshot shows a web-based configuration page titled "Configuration" with a sub-section for "Mail Alert". The page is divided into two main sections: "Server Information" and "WAN IP Change Alert".

**Server Information:**

- WAN Port:** A dropdown menu currently set to "DSL".
- Apply all the settings to:** Two checkboxes, "Ethernet" and "3G/LTE", both of which are unchecked.
- SMTP Server:** An empty text input field.
- Username:** An empty text input field.
- Password:** An empty text input field.
- Sender's E-mail:** An empty text input field with a tooltip that reads "(Must be xxx@yyy.zzz)".
- SSL:** A checkbox labeled "Enable" which is unchecked.
- Port:** A text input field containing the number "25".

Below the "Server Information" section is a button labeled "Account Test".

**WAN IP Change Alert:**

- Recipient's E-mail:** An empty text input field with a tooltip that reads "(Must be xxx@yyy.zzz)".

At the bottom of the configuration area are two buttons: "Apply" and "Cancel".

**WAN Port:** Mail Alert feature can be applicable to every WAN mode: Ethernet, DSL and 3G/LTE. Select the port you want to use Mail Alert.

For example DSL, then when the WAN connection is in DSL mode and when there is any unexpected event, the alert message will be sent to your specified E-mail.

**Apply all settings to:** check whether you want to have a copy of the settings to apply to other WAN port, suppose the above Main port is DSL, then if you enable this function, then Ethernet port will have the same configuration.

**SMTP Server:** Enter the SMTP server that you would like to use for sending emails.

**Username:** Enter the username of your email account to be used by the SMTP server.

**Password:** Enter the password of your email account.

**Sender's Email:** Enter your email address.

**SSL:** Check to whether to enable SSL encryption feature.

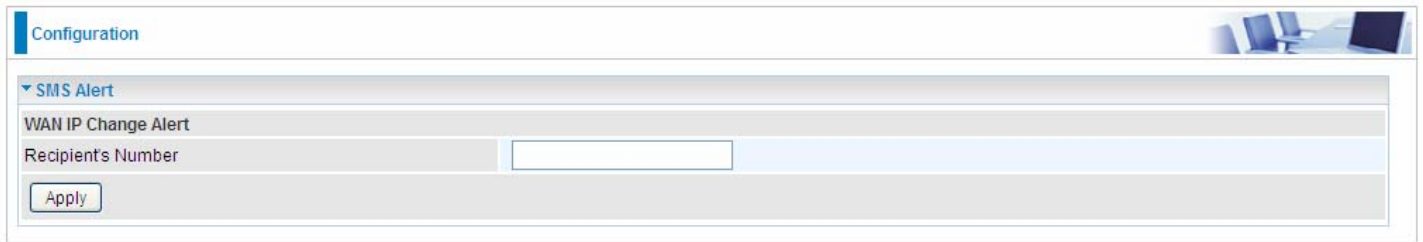
**Port:** the port, default is 25.

**Account Test:** Press this button to test the connectivity and feasibility to your sender's e-mail.

**Recipient's Email (WAN IP Change Alert):** Enter the email address that will receive the alert message once a WAN IP change has been detected.

## SMS Alert

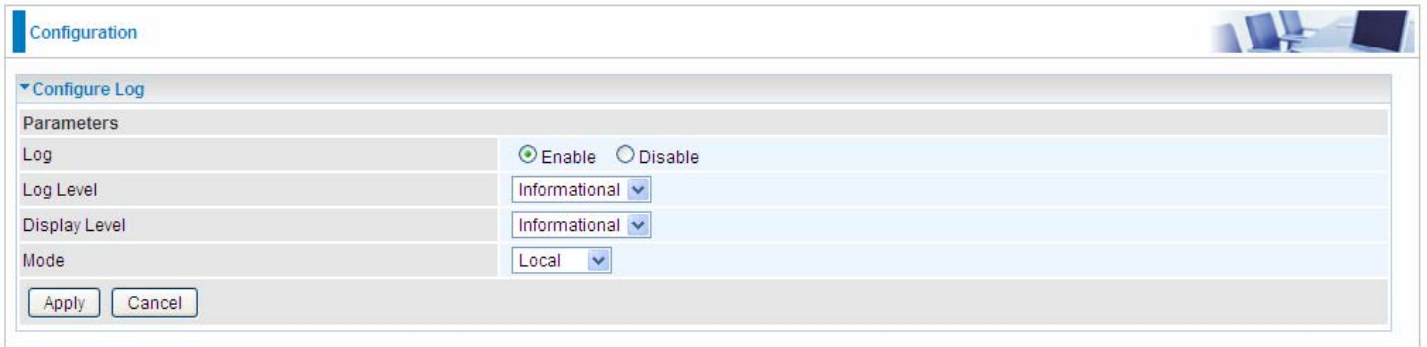
SMS, Short Message Service, is to inform clients the information clients subscribe. The BiPAC 7800DX(L) offers SMS alert sending clients alert messages when a WAN IP change is detected.



The screenshot shows a web-based configuration interface. At the top, there is a 'Configuration' tab. Below it, a section titled 'SMS Alert' is expanded. Under this section, there is a 'WAN IP Change Alert' heading. Below that, there is a label 'Recipient's Number' followed by an empty text input field. At the bottom of this section, there is an 'Apply' button.

**Recipient's Number (WAN IP Change Alert):** Enter the Recipient's number that will receive the alert message once a WAN IP change has been detected.

## Configure Log



Configuration

Configure Log

Parameters

Log  Enable  Disable

Log Level Informational

Display Level Informational

Mode Local

Apply Cancel

**Log:** Enable or disable this function.

**Log level:** Select your log level. The log level allows you to configure which types of events are logged. There are eight log levels from high to low are displayed below:

- ① **Emergency** = system is unusable
- ① **Alert** = action must be taken immediately
- ① **Critical** = critical conditions
- ① **Error** = error conditions
- ① **Warning** = warning conditions
- ① **Notice** = normal but significant conditions
- ① **Informational** = information events
- ① **Debugging** = debug-level messages

The gateway records all log events at the chosen level and above. For instance, if you set the log level to Critical, all critical, alert, and emergency events are logged, but none of the others are recorded

**Display Level:** Display the log according to the level you set when you view system log. Once you set the display level, the logs of the same or higher priority will be displayed.

**Mode:** Select the mode the system log adopted. Three modes: local, Remote and Both.

- ① **Local:** Select this mode to store the logs in the router's local memory.
- ① **Remote:** Select this mode to send the log information to a remote log server. Then you must assign the remote log server and port, 514 is often used.
- ① **Both:** Logs stored adopting above two ways.

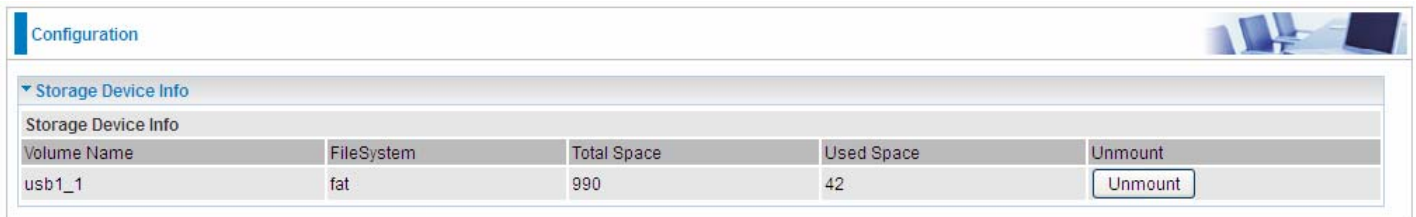
Click **Apply** to save your settings.

# USB

Storage here refers to network sharing in the network environment, USB devices act as the storage carrier for DLNA, common file sharing.

## Storage Device Info

This part provides users direct access to the storage information like the total volume, the used and the remaining capacity of the device.



The screenshot shows a web interface with a 'Configuration' header. Below it is a section titled 'Storage Device Info' which contains a table with the following data:

Volume Name	FileSystem	Total Space	Used Space	Unmount
usb1_1	fat	990	42	<input type="button" value="Unmount"/>

**Volume Name:** Display the storage volume name

**FileSystem:** Display the storage device's file system format, well-known is FAT.

**Total Space:** Display the total space of the storage, with unit MB.

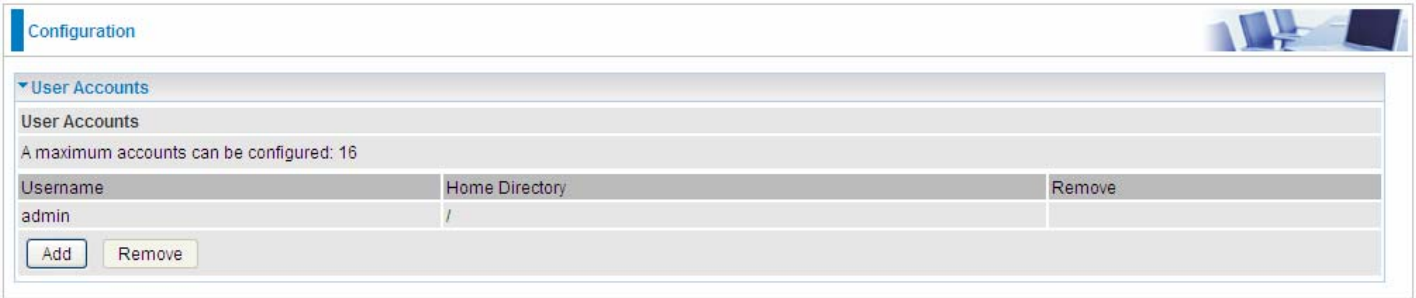
**Used Space:** Display the remaining space of each partition, unit MB.

**Unmount:** Click **Unmount** button if you want to uninstall the USB device. Please **Note** that first click **Unmount** before you uninstall your USB storage.

## User Account

Users here can add user accounts for access to the storage, in this way users can access the network sharing storage with the specified account, and again protect their own data.

Default user admin.



Configuration

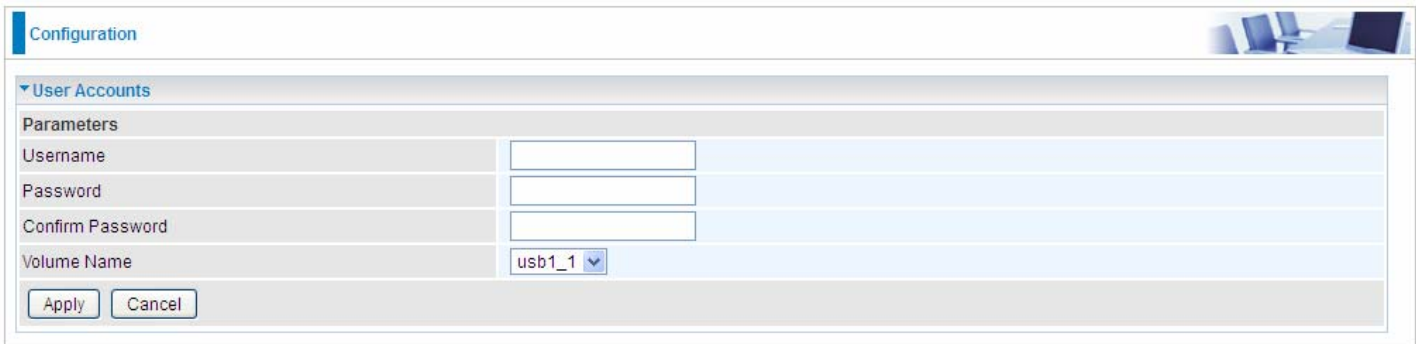
▼ User Accounts

User Accounts

A maximum accounts can be configured: 16

Username	Home Directory	Remove
admin	/	

Click **Add** button, enter the user account-adding page:



Configuration

▼ User Accounts

Parameters

Username

Password

Confirm Password

Volume Name

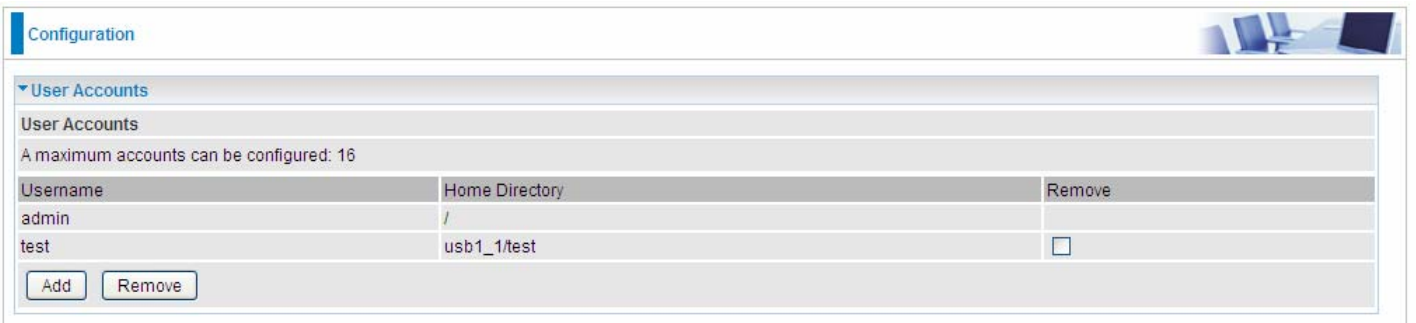
**Username:** user-defined name, but simpler and more convenient to remember would be favorable.

**Password:** Set the password.

**Confirm Password:** Reset the password for confirmation.

**Volume Name:** Select Volume name, as to create access to the volume of the specified partition of the storage.

For example, a user **test** is setup behind the usb1\_1.



Configuration

▼ User Accounts

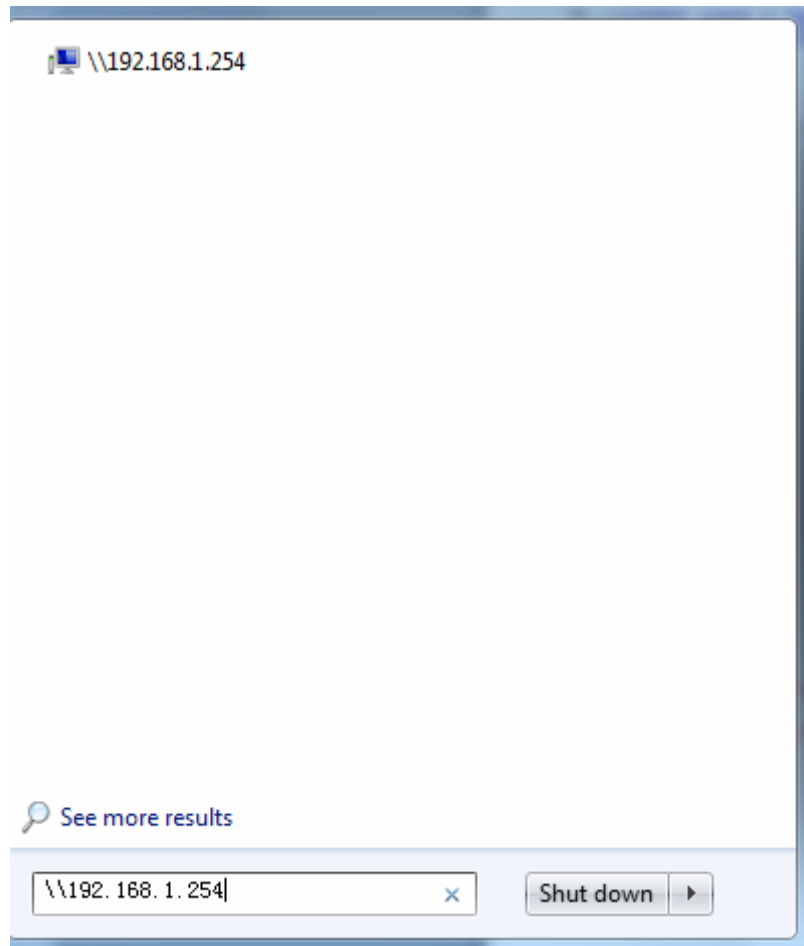
User Accounts

A maximum accounts can be configured: 16

Username	Home Directory	Remove
admin	/	
test	usb1_1/test	<input type="checkbox"/>

## Accessing mechanism of Storage:

In your computer, Click **Start > Run**, enter [\\192.168.1.254](#)

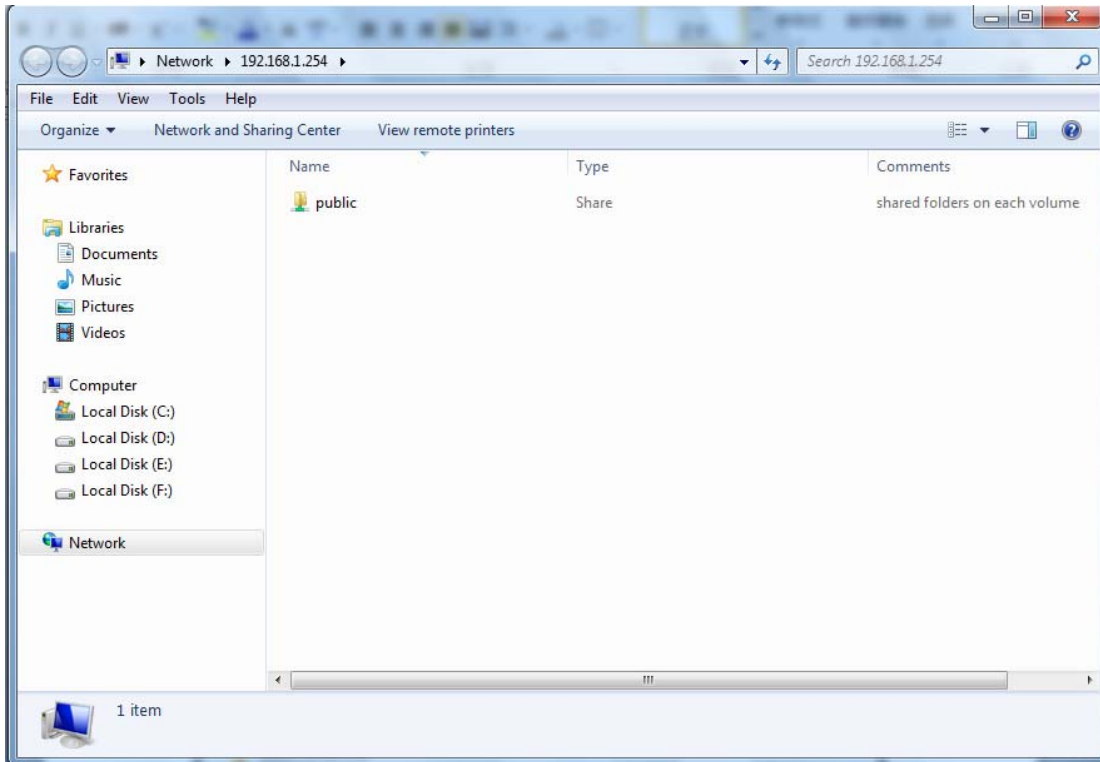


When accessing the network storage, you can see a folder named “**public**”, users should have the account to enter, and the account can be set at the User Accounts section.

When first logged on to the network folder, you will see the “**public**” folder.

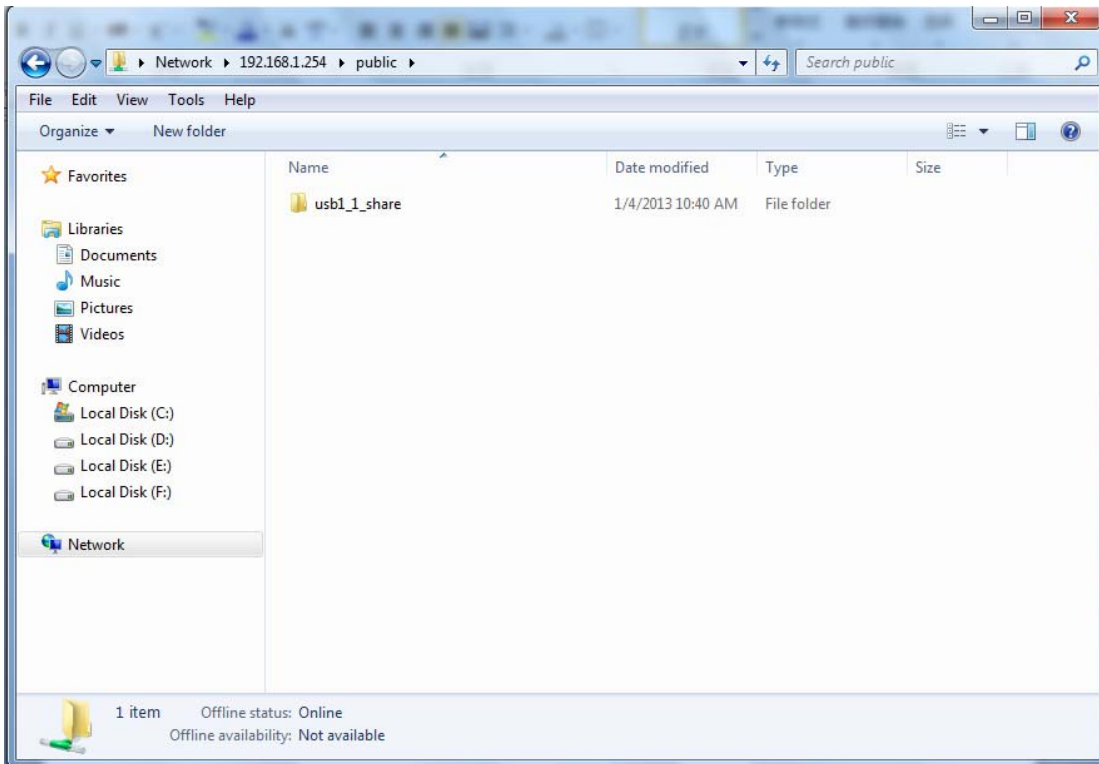
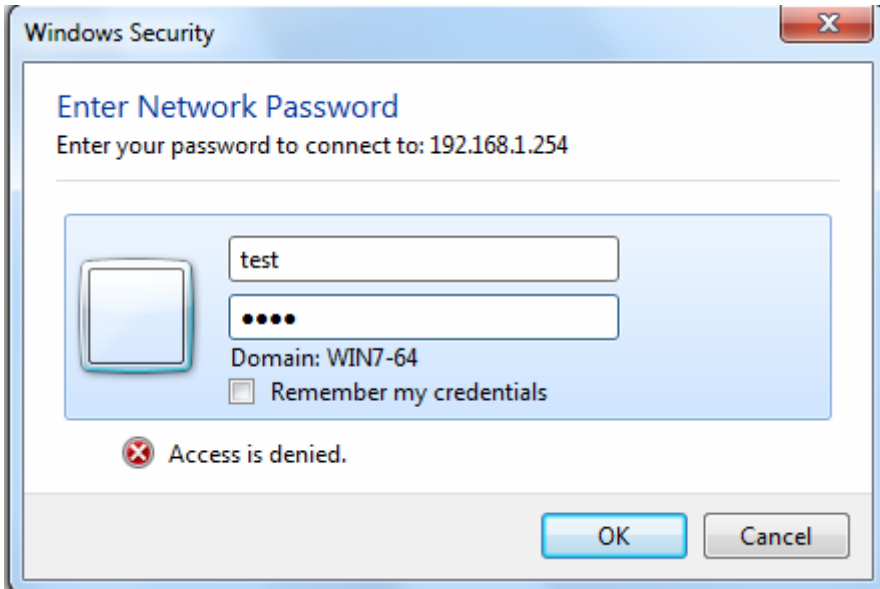
**Public:** The public sharing space for each user in the USB Storage.

When user register a USB account and log successfully, a private folder (the same name as the user account registered) exclusive for each user is established. Go on to see the details.

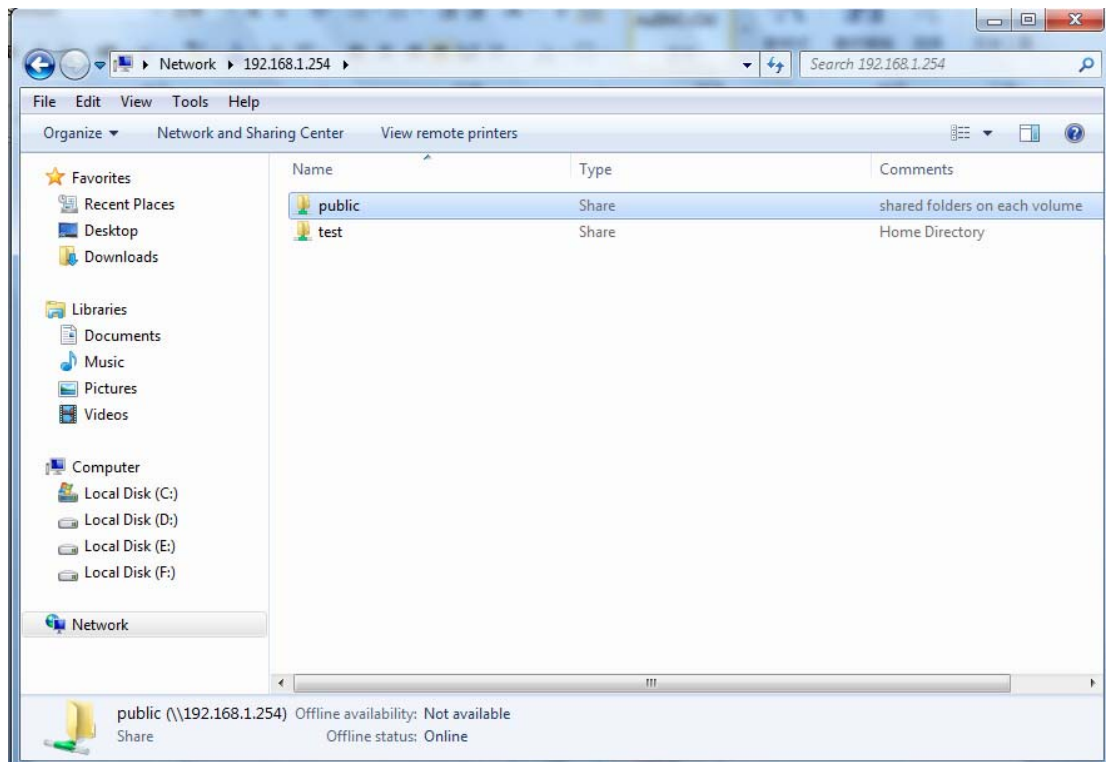




Access the folder *public*.



When successfully accessed, the private folder of each user is established, and user can see from the following picture. The **test** fold in the picture is the private space for each user.



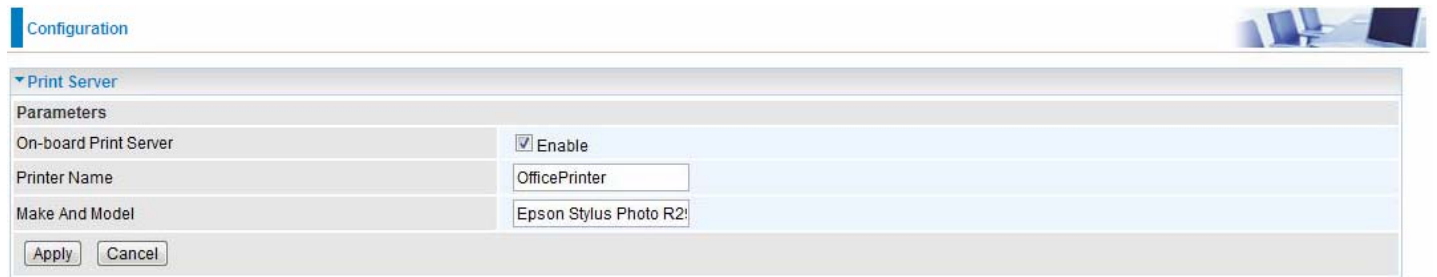
## Print Server

The Print Server feature allows you to share a printer on your network by connecting a USB cable from your printer to the USB port on the 7800DX(L). This allows you to print from any location on your network.

**Note:** Only USB printers are supported

Setup of the printer is a 3 step process

1. Connect the printer to the 7800DXL's USB port
2. Enable the print server on the 7800DXL
3. Install the printer drivers on the PC you want to print from



Configuration

Print Server

Parameters

On-board Print Server	<input checked="" type="checkbox"/> Enable
Printer Name	OfficePrinter
Make And Model	Epson Stylus Photo R2!

Apply Cancel

**On-board Print Server:** Check Enable to activate the print server

**Printer Name:** Enter the Printer name, for example, *OfficePrinter*

**Make and Model:** Enter in the Make and Model information for the printer, for example, *Epson Stylus Photo R290*

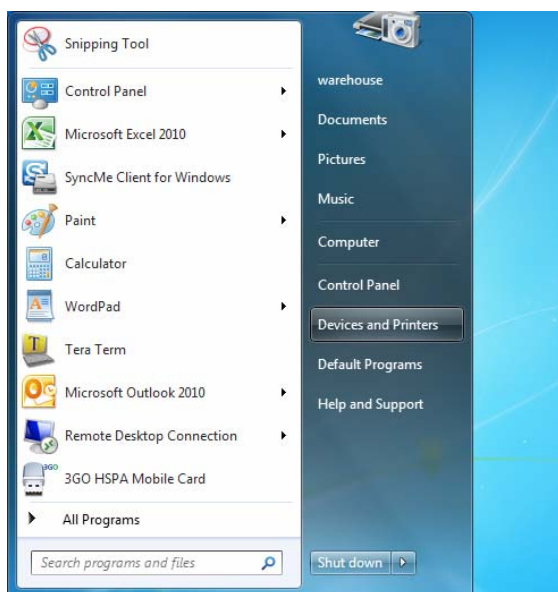
### Note:

The **Printer name** can be any text string up to **40** characters. It cannot contain spaces.

The **Make and Model** can be any text string up to **128** characters.

Set up of Printer client (Windows 7)

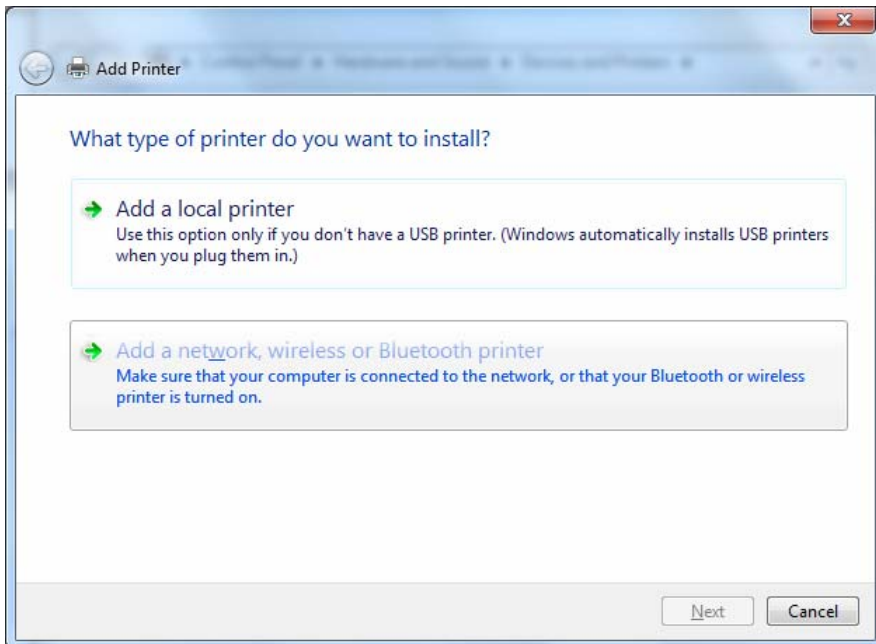
**Step 1:** Click **Start** and select "Devices and Printers"



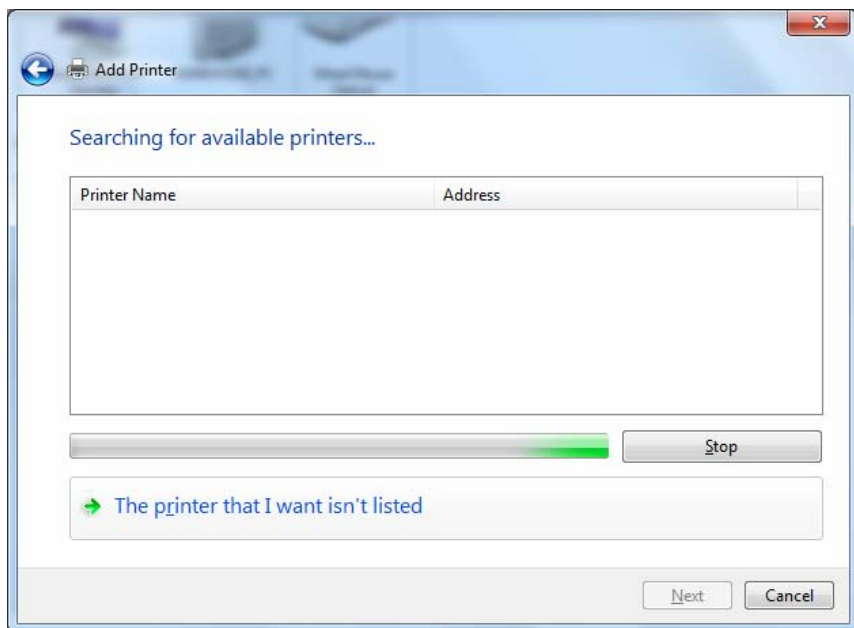
**Step 2:** Click "Add a Printer".



**Step 3:** Click "Add a network, wireless or Bluetooth printer".



**Step 4:** Click “The printer that I want isn’t listed”

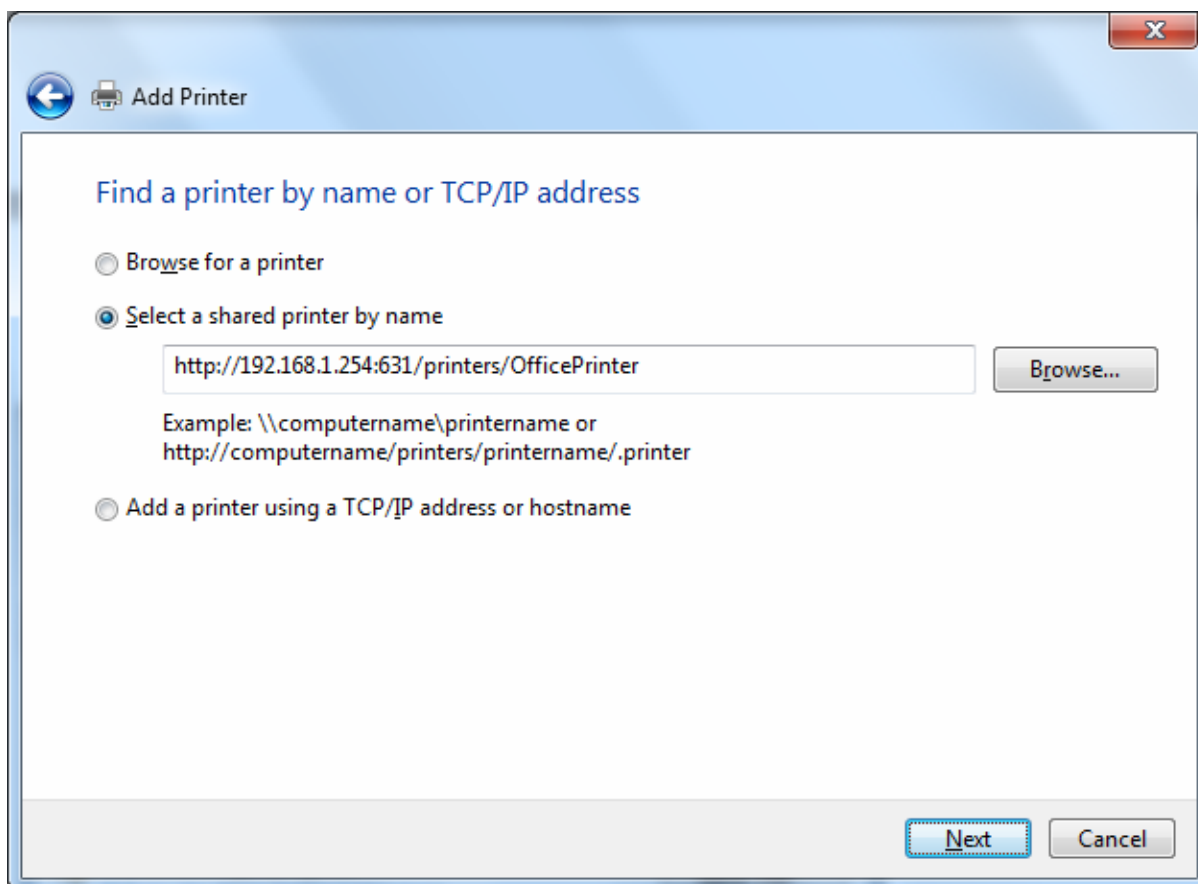


**Step 5:** Select “Select a shared printer by name”

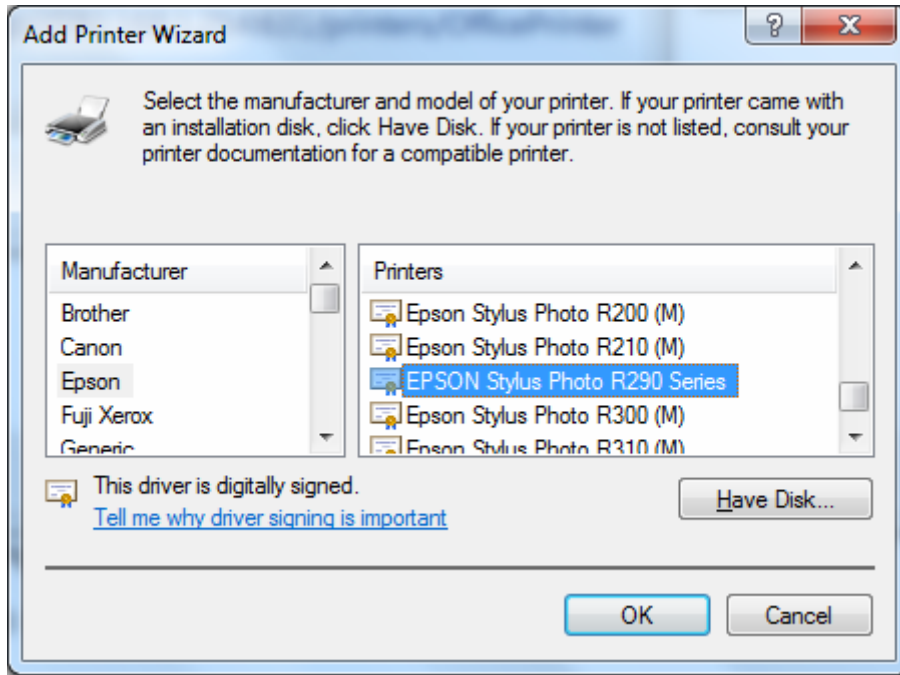
Enter `http://7800DXL-LAN-IP:631/printers/printer-name` or. Make sure printer's name is the same as what you set in the 7800DXL earlier

For Example: `http://192.168.1.254:631/printers/OfficePrinter`

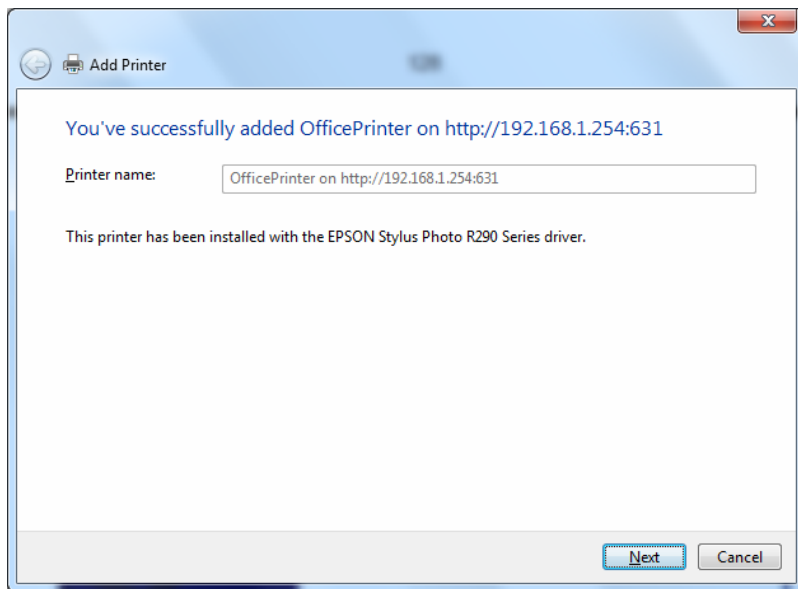
OfficePrinter is the Printer Name we setup earlier



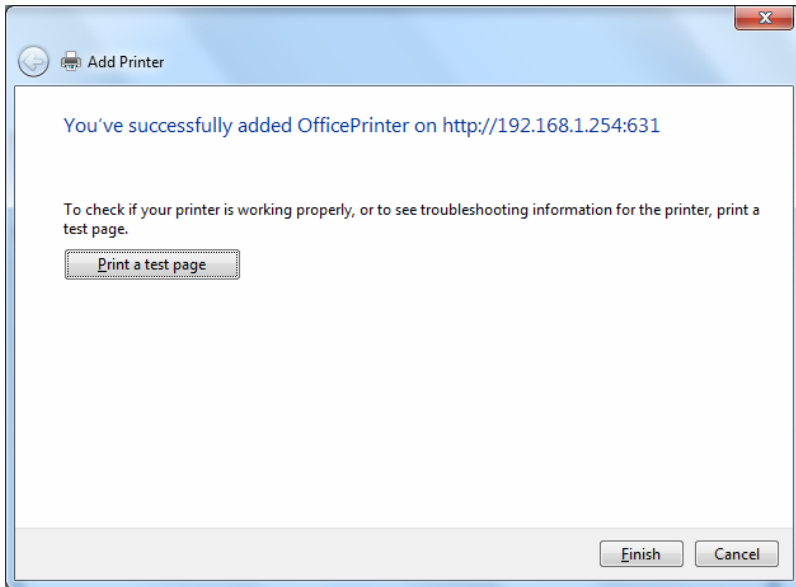
**Step 6:** Click “Next” to add the printer driver. If your printer is not listed and your printer came with an installation disk, click “Have Disk” find it and install the driver.



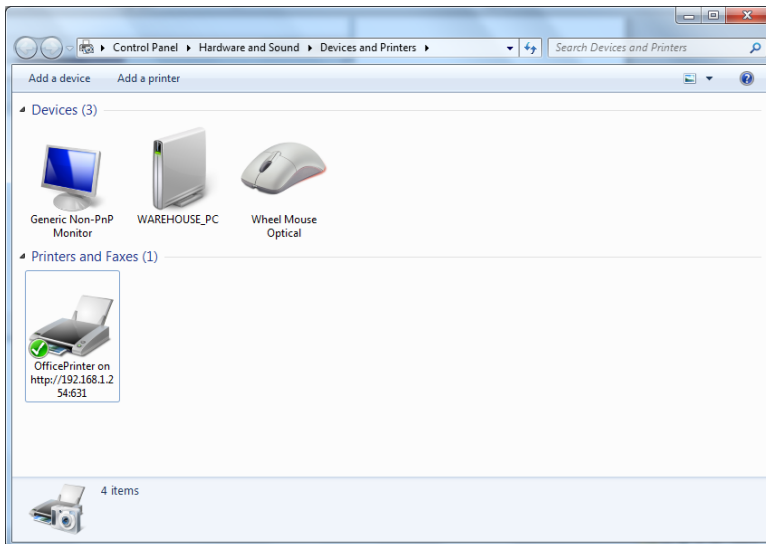
**Step 7:** Click “Next”



**Step 8:** Click “Next” and you are done



You will now be able to see your printer on the Devices and Printers Page



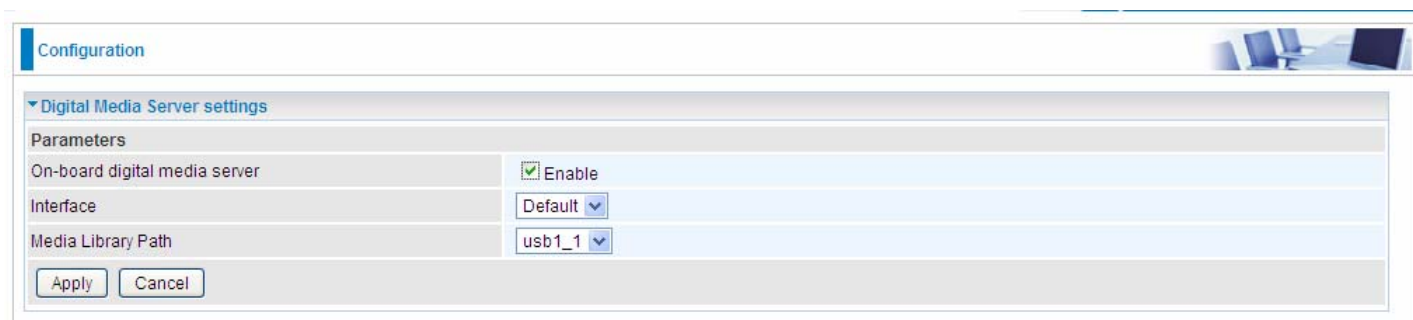
## DLNA

The Digital Living Network Alliance (DLNA) is a non-profit collaborative trade organization established by Sony in June 2003, which is responsible for defining interoperability guidelines to enable sharing of digital media between consumer devices such as computers, printers, cameras, cell phones and other multiple devices.

DLNA uses Universal Plug and Play (UPnP) for media management, discovery and control. UPnP defines the types of devices ('server', 'renderer', 'controller') that DLNA supports and the mechanism for accessing media over a network.

Overall, DLNA allows more convenience, more choices and enjoyment of your digital content through DLNA certified devices. Any DLNA certified devices or software can access the DLNA server.

With USB storage, 7800DX(L) can serve as a DLNA server.



The screenshot shows a configuration window titled "Configuration" with a sub-section for "Digital Media Server settings". Under "Parameters", there are three settings: "On-board digital media server" is checked and set to "Enable"; "Interface" is set to "Default"; and "Media Library Path" is set to "usb1\_1". At the bottom of the settings area are "Apply" and "Cancel" buttons.

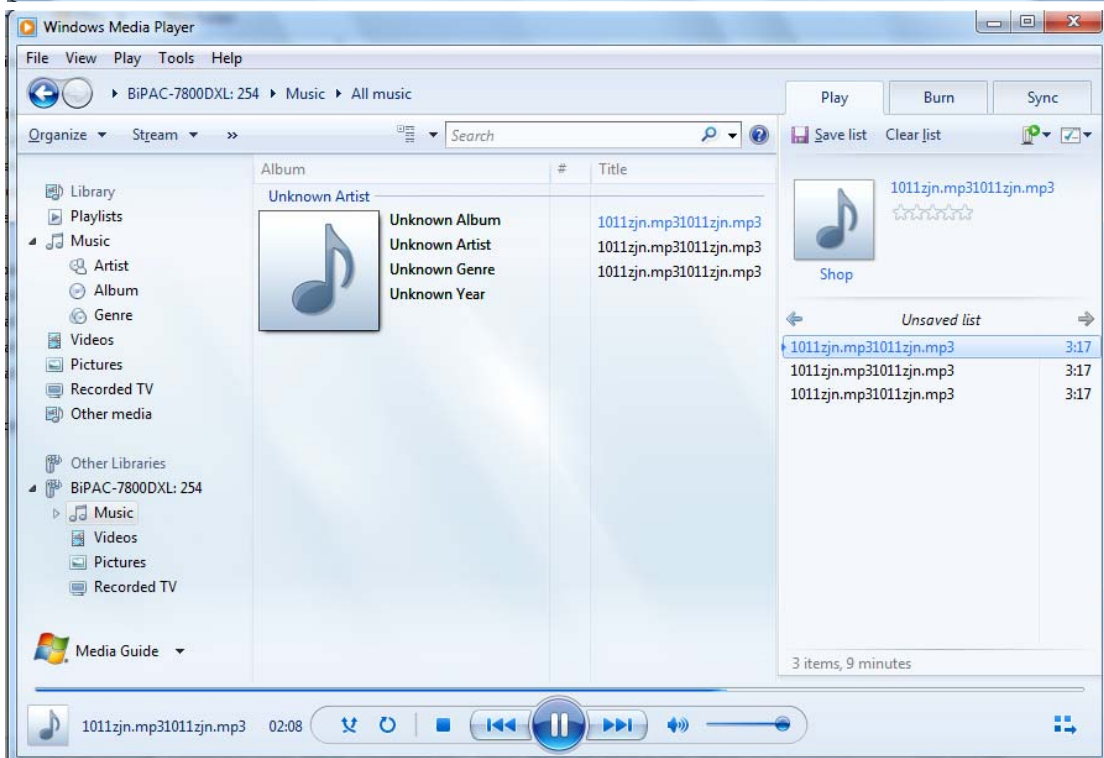
**On-board digital media server:** Enable to share the device as a DLNA server.

**Interface:** The VLAN group, it is the bound interface for DLNA server accessing.

**Media Library Path:** Default is usb1\_1, total USB space (pictures, videos, music, etc, all can be accessed with this path).



Take Windows media player in Windows 7 accessing the DLNA server for example for usage of DLNA .



# IP Tunnel

An IP Tunnel is an Internet Protocol (IP) network communication channels between two networks of different protocols. It is used to transport another network protocol by encapsulation of its packets.

IP Tunnels are often used to connect two disjoint IP networks that do not have a native routing path to each other, via an underlying routable protocol across an intermediate transport network, like VPN.

Another prominent use of IP Tunnel is to connect islands of IPv6 installations across the IPv4 internet.

## IPv6inIPv4

6in4 is an Internet transition mechanism for migrating from IPv4 to IPv6. 6in4 uses tunneling to encapsulate IPv6 traffic over explicitly configured IPv4 links. The 6in4 traffic is sent over the IPv4 Internet inside IPv4 packets whose IP headers have the IP Protocol number set to 41. This protocol number is specifically designated for IPv6 capsulation.

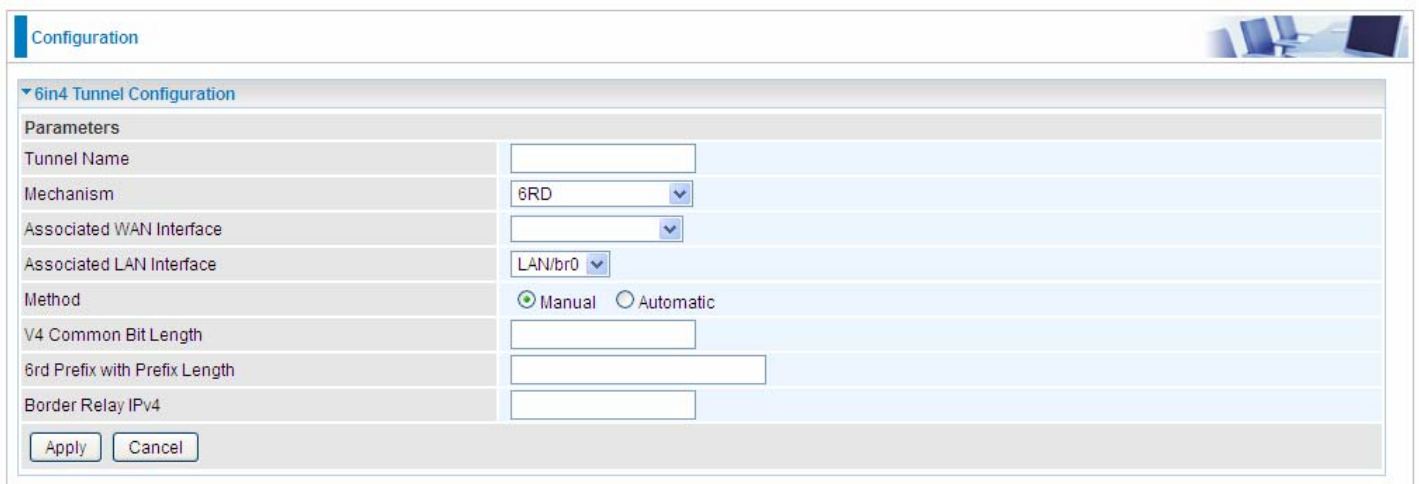
### 6RD:

6RD is a mechanism to facilitate IPv6 rapid deployment across IPv4 infrastructures of internet service providers (ISPs).

It is derived from 6to4, a preexisting mechanism to transporting IPv6 packets over IPv4 infrastructure network, with the significant change that it operates entirely within the enduser's ISP network, thus avoiding the major architectural problems inherent in the original design of 6to4.



Click **Add** button to manually add the 6in4 rules.



**Tunnel Name:** User-defined name.

**Mechanism:** Here only 6RD.

**Associated WAN Interface:** The applied WAN interface with the set tunnel, thus when there are packets from/to the WAN interface, the tunnel would be used to transport the packets.

**Associated LAN Interface:** Set the linked LAN interface with the tunnel.

**Method:** 6rd operation mechanism: manually configured or automatically configured. If manually, please fill out the following 6rd parameters.

**V4 Common Bit Length:** Specify the length of IPv4 address carried in IPv6 prefix, for example, 0 means to carry all the 32 bits of IPv4 address while 8 carries 24 bits of the IPv4 address.

**6rd Prefix with Prefix Length:** Enter the 6rd prefix and prefix length you uniquely designate to 6rd by the ISP( The 6rd prefix and prefix length are to replace the standard 6to4 prefix 2002::/16 by an IPv6 prefix that belongs to the ISP-assigned.)

**Border Relay IPv4 Address:** The IPv4 address of the border relay. The relay is used to unwrap capsulated IPv4 packets into IPv6 packets and send them to the IPv6 network.

## IPv4inIPv6

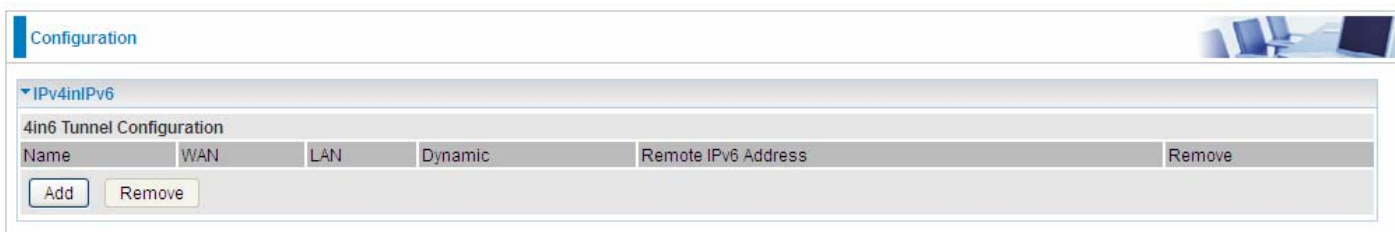
4in6 refers to tunneling of IPv4 in IPv6. It is an inherent internet interoperation mechanism allowing IPv4 to be used in an IPv6 only network.

4in6 uses tunneling to encapsulate IPv4 traffic over configured IPv6 tunnels. 4in6 tunnels are usually manually configured but they can be automated using protocols such as TSP to allow easy connection to a tunnel broker.

### DS – Lite

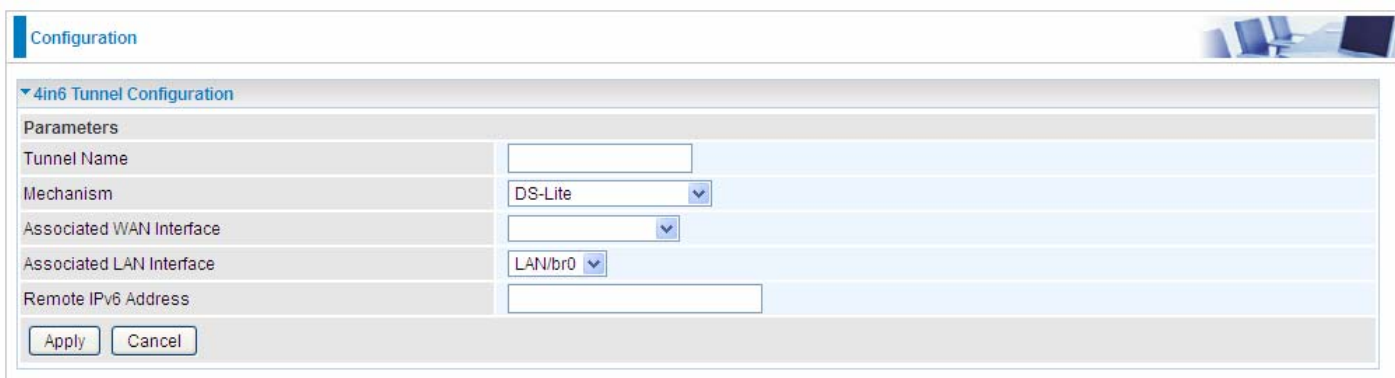
DS –Lite, or Dual-Stack Lite, is designed to let an ISP omit the deployment of any IPv4 address to the customer's CPE. Instead, only global IPv6 addresses are provided (Regular Dual-Stack Lite deploys global addresses for both IPv4 and IPv6).

The CPE distributes private IPv4 addresses for the LAN clients, the same as a NAT device. The subnet information is chosen by the customer, identically to the NAT model. However, instead of performing the NAT itself, the CPE encapsulates the IPv4 packet inside an IPv6 packet.



The screenshot shows a web interface for configuring IPv4inIPv6. At the top, there is a 'Configuration' tab. Below it, a section titled 'IPv4inIPv6' contains a table for '4in6 Tunnel Configuration'. The table has columns for Name, WAN, LAN, Dynamic, Remote IPv6 Address, and Remove. Below the table are 'Add' and 'Remove' buttons.

Click **Add** button to manually add the 4in6 rules.



The screenshot shows the '4in6 Tunnel Configuration' form. It includes fields for Tunnel Name, Mechanism (set to DS-Lite), Associated WAN Interface, Associated LAN Interface (set to LAN/br0), and Remote IPv6 Address. At the bottom are 'Apply' and 'Cancel' buttons.

**Tunnel Name:** User-defined tunnel name.

**Mechanism:** It is the 4in6 tunnel operation technology. Please select DS-Lite.

**Associated WAN Interface:** The applied WAN interface with the set tunnel, and when there are packets from/to the WAN interface, the tunnel would be used to transport the packets.

**Associated LAN Interface:** Specify the linked LAN interface with the tunnel.

**Remote IPv6 Address:** Specify the remote IPv6 address. The remote relay is used to unwrap capsulated IPv6 packets into IPv4 packets, and do the NAT before sending them to the IPv4 network.

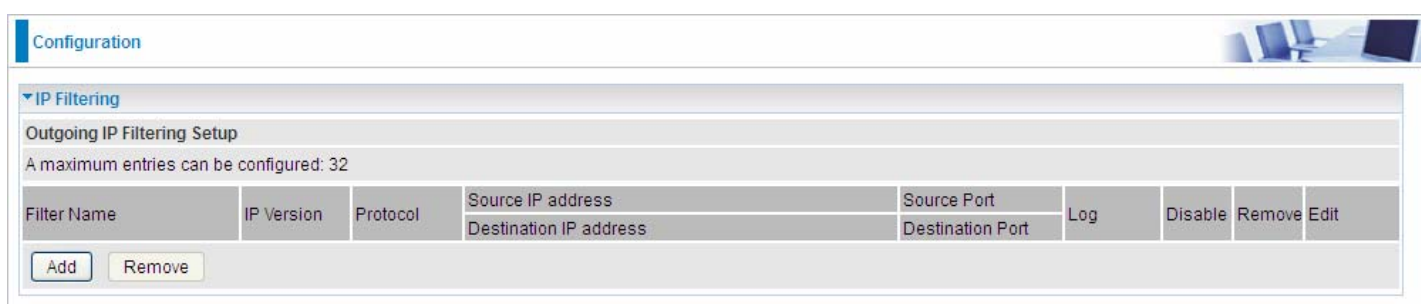
# Security

## IP Filtering Outgoing

IP filtering enables you to configure your router to block specified internal/external users (**IP address**) from Internet access, or you can disable specific service requests (**Port number**) to /from Internet. The relationship among all filters is “**or**” operation, which means that the router checks these different filter rules one by one, starting from the first rule. As long as one of the rules is satisfied, the specified action will be taken.

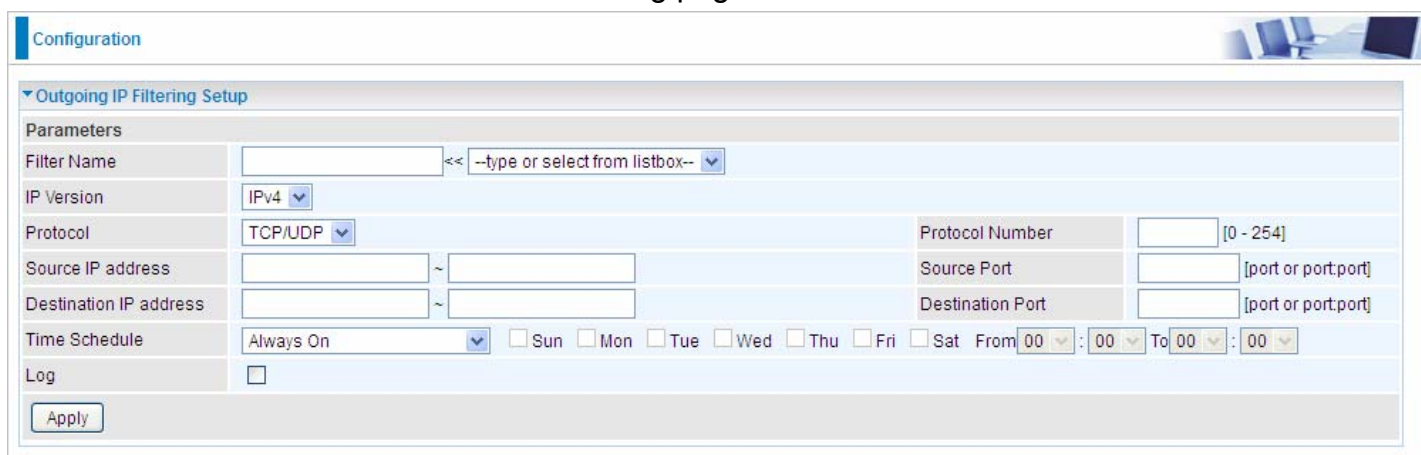
Outbound IP Filtering by default is set to **forward** all outgoing traffic from LAN to go through the router, but user can set rules to **block** the specific outgoing traffic.

**Note:** The maximum number of entries: 32.



The screenshot shows the 'Configuration' page for 'IP Filtering'. Under 'Outgoing IP Filtering Setup', it states 'A maximum entries can be configured: 32'. Below this is a table with columns: Filter Name, IP Version, Protocol, Source IP address, Destination IP address, Source Port, Destination Port, Log, Disable, Remove, and Edit. There are 'Add' and 'Remove' buttons at the bottom left of the table.

Click **Add** button to enter the exact rule setting page.



The screenshot shows the 'Outgoing IP Filtering Setup' configuration page. It includes fields for: Filter Name (with a dropdown), IP Version (IPv4), Protocol (TCP/UDP), Protocol Number (0-254), Source IP address, Destination IP address, Source Port, Destination Port, Time Schedule (Always On, with checkboxes for days of the week), and Log (checkbox). An 'Apply' button is at the bottom.

**Filter Name:** A user-defined rule name. User can select simply from the list box for the application for quick setup.

**IP Version:** Select the IP Version, IPv4 or IPv6.


**Protocol:** Set the traffic type (TCP/UDP, TCP, UDP, ICMP ) that the rule applies to.

**Source IP address:** This is the Address-Filter used to allow or block traffic to/from particular IP address(es) featured in the IP range. If you leave empty, it means any IP address.

**Source Port [port or port:port]:** The port or port range defines traffic from the port (specific application) or port in the set port range blocked to go through the router. Default is set port from range 1 – 65535.

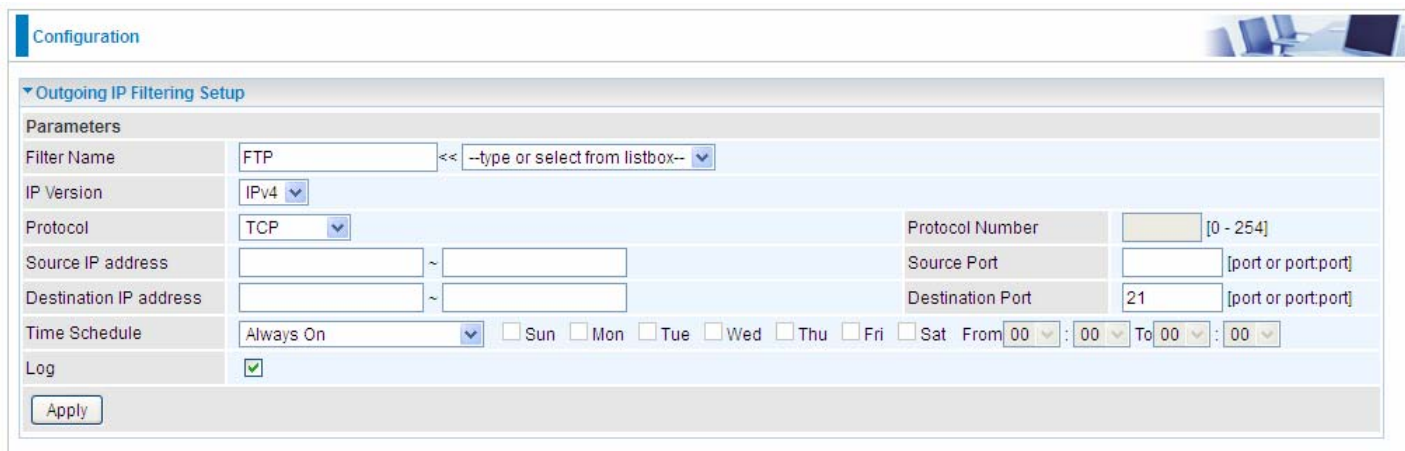
**Destination IP address:** Traffic from LAN with the particular traffic destination address specified in the IP range is to be blocked from going through the router, similarly set as the Source IP address above.

**Destination Port [port or port: port]:** Traffic with the particular set destination port or port in the set port range is to be blocked from going through the router. Default is set port from port range: 1 – 65535.

**Time Schedule:** Select or set exactly when the rule works. When set to “Always On”, the rule will work all time; and also you can set the precise time when the rule works, like 01:00 - 19:00 from Monday to Friday. Or you can select the already set timeslot in “**Time Schedule**” during which the rule works. And when set to “Disable”, the rule is disabled or inactive and there will be an icon  in list table indicating the rule is inactive. See [Time Schedule](#).

**Log:** check the check-box to record the security log. To check the log, users can turn to [Security Log](#).

**Example:** For example, if there is an outgoing rule set as follows, then the 21 application between source IP and destination IP will be blocked. Or exactly in the rule below, all traffic trying to access FTP will be blocked.



Configuration

Outgoing IP Filtering Setup

Parameters

Filter Name: FTP << --type or select from listbox-- >>

IP Version: IPv4

Protocol: TCP

Protocol Number: [0 - 254]

Source IP address: [ ] ~ [ ]

Source Port: [ ] [port or port:port]

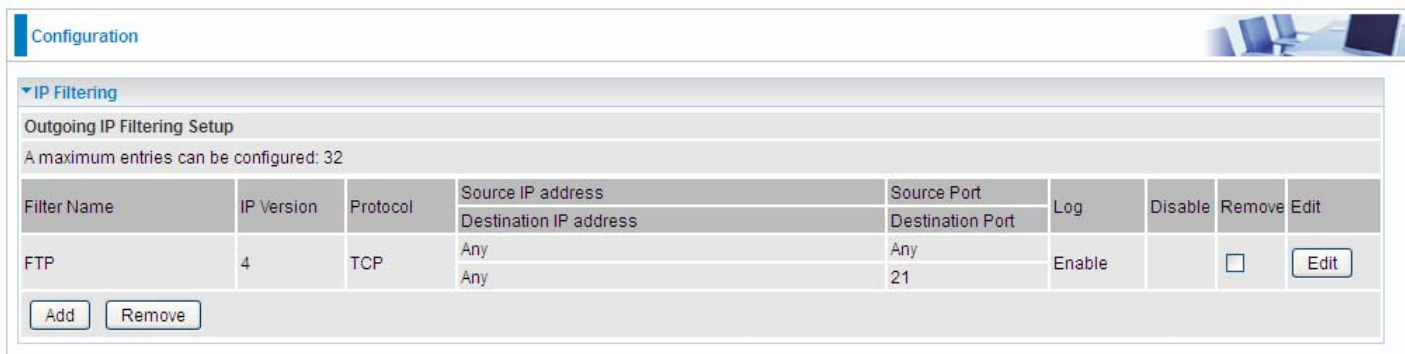
Destination IP address: [ ] ~ [ ]

Destination Port: 21 [port or port:port]

Time Schedule: Always On

Log:

Apply



Configuration

IP Filtering

Outgoing IP Filtering Setup

A maximum entries can be configured: 32

Filter Name	IP Version	Protocol	Source IP address	Destination IP address	Source Port	Destination Port	Log	Disable	Remove	Edit
FTP	4	TCP	Any	Any	Any	21	Enable	<input type="checkbox"/>	<input type="checkbox"/>	Edit

Add Remove

(The rule is active; disable field shows the status of the rule, active or inactive)

Configuration

Outgoing IP Filtering Setup

Parameters

Filter Name: FTP << --type or select from listbox-- >>

IP Version: IPv4

Protocol: TCP Protocol Number: [0 - 254]

Source IP address: ~ Source Port: [port or port:port]

Destination IP address: ~ Destination Port: 21 [port or port:port]

Time Schedule: **Disable**  Sun  Mon  Tue  Wed  Thu  Fri  Sat From 00 : 00 To 00 : 00

Log:

Apply

Configuration

IP Filtering

Outgoing IP Filtering Setup

A maximum entries can be configured: 32

Filter Name	IP Version	Protocol	Source IP address Destination IP address	Source Port Destination Port	Log	Disable	Remove	Edit
FTP	4	TCP	Any Any	Any 21	Enable	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Edit

Add Remove

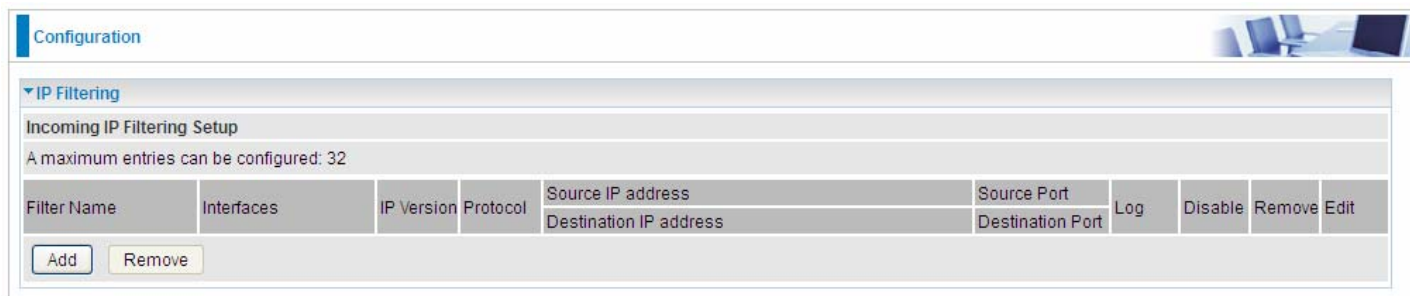
(Rule inactive)

## IP Filtering Incoming

Incoming IP Filtering is set by default to **block** all incoming traffic, but user can set rules to **forward** the specific incoming traffic.

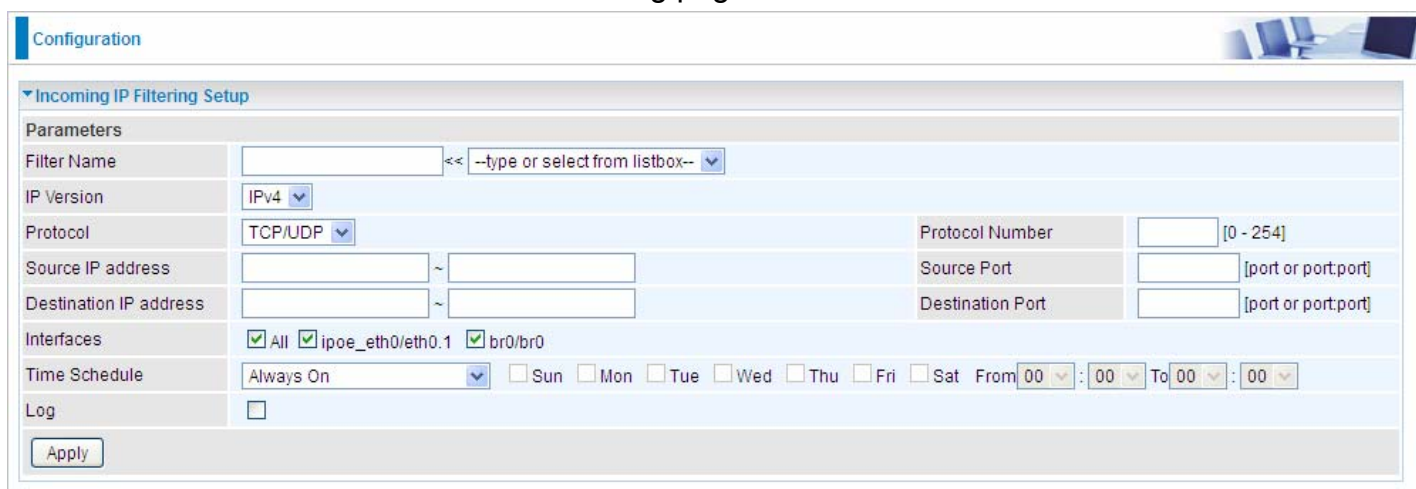
### Note:

1. The maximum number of entries: 32.
2. When LAN side firewall or firewall in WAN interface(s) is enabled, user can move here to add allowing rules to pass through the firewall.



The screenshot shows the 'Configuration' page for IP Filtering. Under 'Incoming IP Filtering Setup', there is a table with columns: Filter Name, Interfaces, IP Version, Protocol, Source IP address, Destination IP address, Source Port, Destination Port, Log, Disable, Remove, and Edit. Below the table are 'Add' and 'Remove' buttons. A note above the table states: 'A maximum entries can be configured: 32'.

Click **Add** button to enter the exact rule setting page.



The screenshot shows the 'Incoming IP Filtering Setup' configuration page. It includes fields for Filter Name (with a dropdown), IP Version (IPv4), Protocol (TCP/UDP), Protocol Number (0-254), Source IP address, Destination IP address, Source Port, Destination Port, Interfaces (All, ipoe\_eth0/eth0.1, br0/br0), Time Schedule (Always On, Sun-Fri, Sat, From/To times), and Log (checkbox). An 'Apply' button is at the bottom.

**Filter Name:** A user-defined rule name. User can select simply from the list box for the application for quick setup.

**IP Version:** Select the IP Version, IPv4 or IPv6.

**Protocol:** Set the traffic type (TCP/UDP, TCP, UDP, ICMP ) that the rule applies to.

**Source IP address:** This is the Address-Filter used to allow or block traffic to/from particular IP address(es) featured in the IP range.. If you leave empty, it means any IP address.


**Source Port [port or port:port]:** The port or port range defines traffic from the port (specific application) or port in the set port range blocked to go through the router. Default is set port from range 1 – 65535.

**Destination IP address:** Traffic from LAN with the particular traffic destination address specified in the IP range is to be blocked from going through the router, similarly set as the Source IP address above.

**Destination Port [port or port : port]:** Traffic with the particular set destination port or port in the set port range is to be blocked from going through the router. Default is set port from port range: 1 – 65535

**Interfaces:** Check if the filter rule applies to all interfaces. User can base on need select interfaces to make the rule take effect with those interfaces.



**Time Schedule:** Select or set exactly when the rule works. When set to “Always On”, the rule will work all time; and also you can set the precise time when the rule works, like 01:00 - 19:00 from Monday to Friday. Or you can select the already set timeslot in “**Time Schedule**” during which the rule works. And when set to “Disable”, the rule is disabled or inactive and there will be an icon”  ” in the list table indicating the rule is inactive. See [Time Schedule](#).

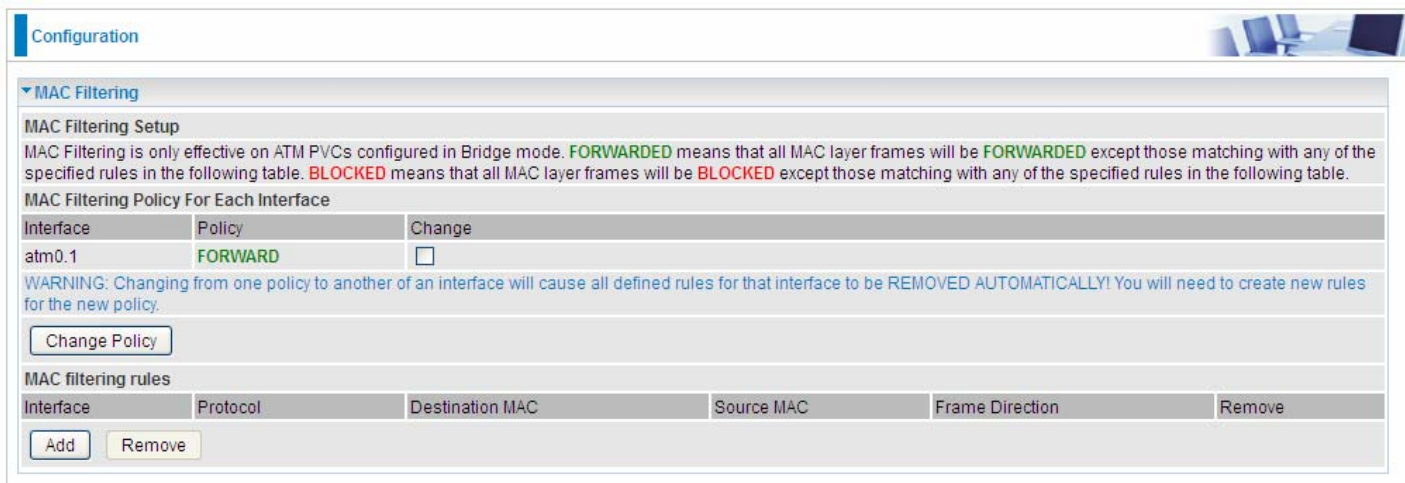
**Log:** check the check-box to record the security log. To check the log, users can turn to [Security Log](#).

## MAC Filtering

MAC Filtering is only effective on ATM PVCs configured in Bridged mode.

**FORWARDED** means that all MAC layer frames will be **forwarded** except those matching with any of the specified rules in the following table.

**BLOCKED** means that all MAC layer frames will be **blocked** except those matching with any of the specified rules in the following table.



Configuration

MAC Filtering

MAC Filtering Setup

MAC Filtering is only effective on ATM PVCs configured in Bridge mode. **FORWARDED** means that all MAC layer frames will be **FORWARDED** except those matching with any of the specified rules in the following table. **BLOCKED** means that all MAC layer frames will be **BLOCKED** except those matching with any of the specified rules in the following table.

MAC Filtering Policy For Each Interface

Interface	Policy	Change
atm0.1	FORWARD	<input type="checkbox"/>

WARNING: Changing from one policy to another of an interface will cause all defined rules for that interface to be REMOVED AUTOMATICALLY! You will need to create new rules for the new policy.

Change Policy

MAC filtering rules

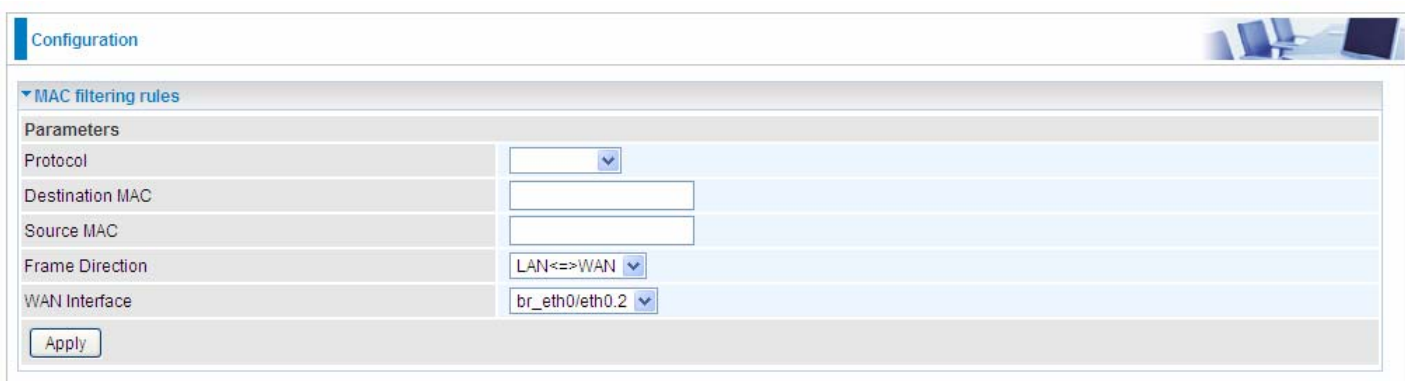
Interface	Protocol	Destination MAC	Source MAC	Frame Direction	Remove
-----------	----------	-----------------	------------	-----------------	--------

Add Remove

By default, all MAC frames of the interface in Bridge Mode will be **forwarded**, you can check **Change** checkbox and then press **Change Policy** to change the settings to the interface.

For example, from above, the interface atm0.1 is of bridge mode, and all the MAC layer frames will be **forward**, but you can set some rules to let some item matched the rules to be **blocked**.

Click **Add** button to add the rules.



Configuration

MAC filtering rules

Parameters

Protocol: [dropdown]

Destination MAC: [input]

Source MAC: [input]

Frame Direction: LAN<=>WAN [dropdown]

WAN Interface: br\_eth0/eth0.2 [dropdown]

Apply

**Protocol type:** Select from the drop-down menu the protocol that applies to this rule.

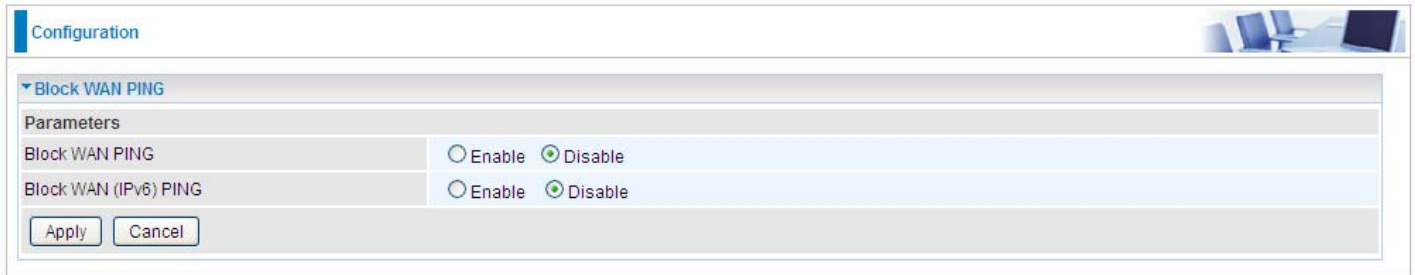
**Destination /Source MAC Address:** Enter the destination/source address.

**Frame Direction:** Select the frame direction this rule applies, both LAN and WAN: LAN <=>WAN, only LAN to WAN: LAN=>WAN, only WAN to LAN: WAN=>LAN.

**WAN Interfaces:** Select the interfaces configured in Bridge mode.

## Blocking WAN PING

This feature is enabled to let your router not respond to any ping command when someone others “Ping” your WAN IP.



The screenshot shows a configuration window titled "Configuration" with a sub-section "Block WAN PING". Under "Parameters", there are two rows of radio button options. The first row is for "Block WAN PING" and the second is for "Block WAN (IPv6) PING". In both rows, the "Disable" option is selected. At the bottom of the configuration area, there are "Apply" and "Cancel" buttons.

Parameters	
Block WAN PING	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Block WAN (IPv6) PING	<input type="radio"/> Enable <input checked="" type="radio"/> Disable

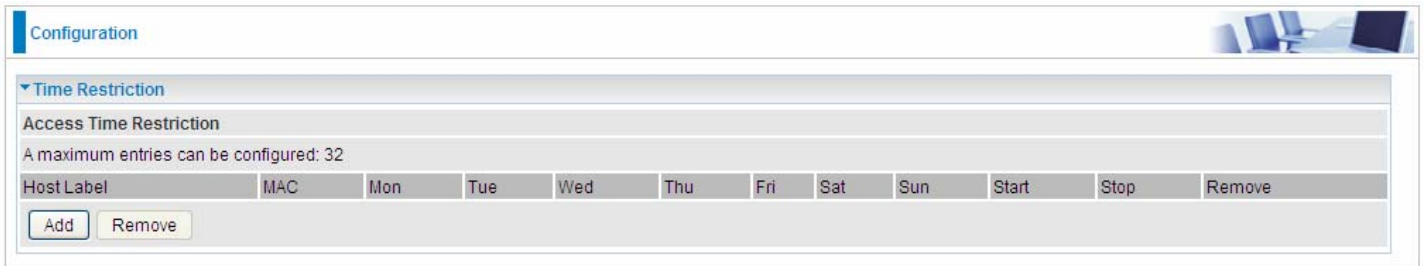
Apply Cancel

## Time Restriction

A MAC (Media Access Control) address is the unique network hardware identifier for each PC on your network's interface (i.e. its Network Interface Card or Ethernet card). Using your router's MAC Address Filter function, you can configure the network to block specific machines from accessing your LAN during the specified time.

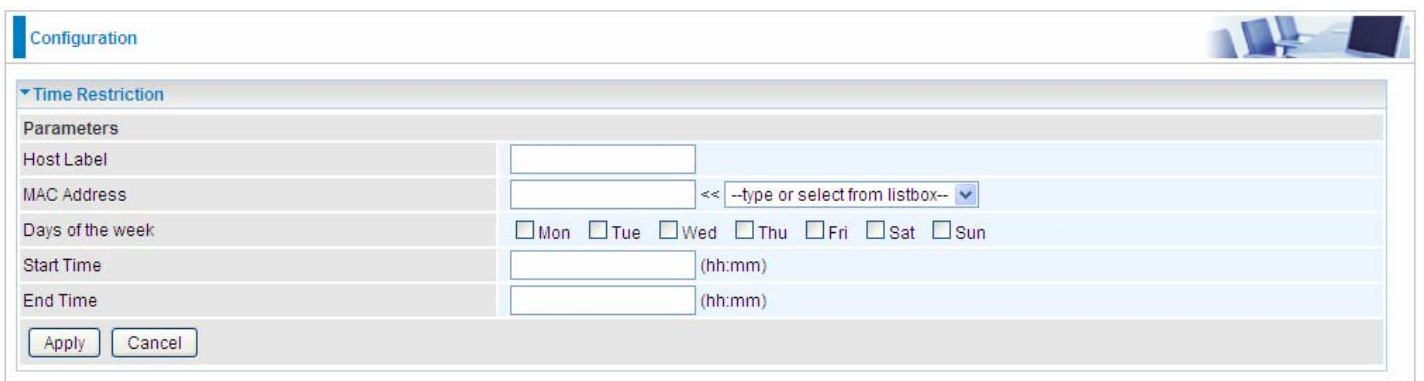
This page adds time of day restriction to a special LAN device connected to the router. To **Restrict** LAN device(s), please click Add button to add the device(s) from accessing internet under some set time. To find out the MAC address of a window based PC, go to command window, and type "ipconfig/all".

**Note:** The maximum entries configured: 32.



The screenshot shows the 'Configuration' page for 'Time Restriction'. It features a table with the following columns: Host Label, MAC, Mon, Tue, Wed, Thu, Fri, Sat, Sun, Start, Stop, and Remove. Below the table are 'Add' and 'Remove' buttons. A note above the table states 'A maximum entries can be configured: 32'.

Click **Add** to add the rules.



The screenshot shows the 'Parameters' section of the 'Time Restriction' configuration. It includes input fields for 'Host Label', 'MAC Address', 'Start Time', and 'End Time'. The 'Days of the week' section has checkboxes for Mon, Tue, Wed, Thu, Fri, Sat, and Sun. A dropdown menu for 'MAC Address' is set to '--type or select from listbox--'. 'Apply' and 'Cancel' buttons are at the bottom.

**Host Label:** User-defined name.

**MAC Address:** Enter the MAC address(es) you want to allow or block to access the router and LAN. The format of MAC address could be: xx:xx:xx:xx:xx:xx or xx-xx-xx-xx-xx-xx. For convenience, user can select from the list box.

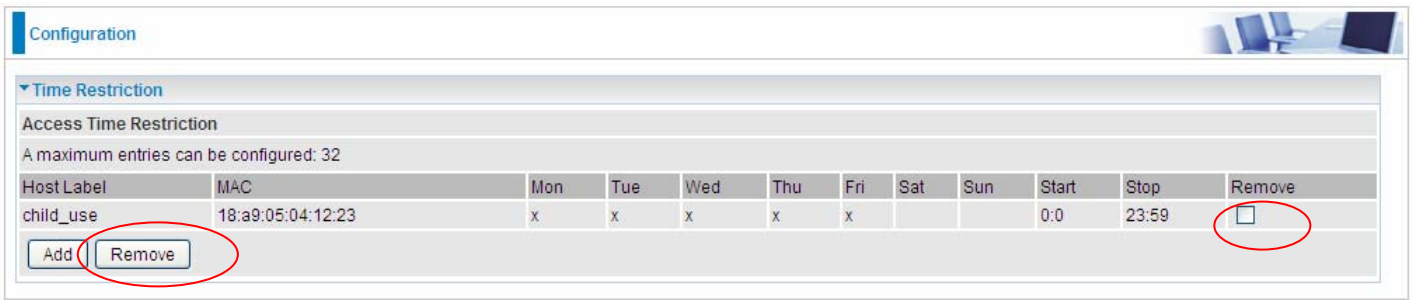
**Days of the week:** Select the days of a week the rule takes efforts.

**Start Time:** Enter the start time of each day in hh:mm format. Leaving it empty means 00:00.

**End Time:** Enter the end time of each day in hh:mm format. Leaving it empty means 23:59.

Click **Apply** to confirm your settings. The following prompt window will appear to remind you of the attention.

An example:



The screenshot shows a configuration page titled "Configuration" with a sub-section "Time Restriction". Under "Access Time Restriction", it states "A maximum entries can be configured: 32". Below this is a table with columns for Host Label, MAC, and days of the week (Mon-Fri), along with Start and Stop times and a Remove checkbox. The entry for "child\_use" has a MAC of "18:a9:05:04:12:23" and is active from 0:0 to 23:59 on Monday through Friday. The "Remove" checkbox is unchecked. Below the table are "Add" and "Remove" buttons.

Host Label	MAC	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Start	Stop	Remove
child_use	18:a9:05:04:12:23	x	x	x	x	x			0:0	23:59	<input type="checkbox"/>

Here you can see that the user “child\_use” with a MAC of 18:a9:05:04:12:23 is blocked to access the router from 00:00 to 23:59 Monday through Friday.

If you needn't this rule, you can check the box, press Remove, it will be OK.

## URL Filter

URL (Uniform Resource Locator – e.g. an address in the form of <http://www.abcde.com> or <http://www.example.com>) filter rules allow you to prevent users on your network from accessing particular websites by their URL. There are no pre-defined URL filter rules; you can add filter rules to meet your requirements.

### Note:

- 1) URL Filter rules apply to both IPv4 and IPv6 sources.
- 2) But in **Exception IP Address** part, user can click [Detail ▶](#) to set the exception IP address(es) for IPv4 and IPv6 respectively.

The screenshot shows a configuration window for a URL filter. The window is titled "Configuration" and has a "URL Filter" section. Under "Parameters", there are several options: "Keywords Filtering" (checkbox "Enable" and "Detail ▶"), "Domains Filtering" (checkbox "Enable" and "Detail ▶"), "Restrict URL Features" (BLOCK checkbox, and sub-options for Java Applet, ActiveX, Cookie, Proxy), "Except IP Address" (checkbox and "Detail ▶"), "Log" (checkbox), and "Time Schedule" (dropdown "Always On", checkboxes for Sun-Sat, and time range "From 00:00 To 00:00"). At the bottom are "Apply" and "Cancel" buttons.

**Keywords Filtering:** Allow blocking against specific keywords within a particular URL rather than having to specify a complete URL (e.g. to block any image called “advertisement.gif”). When enabled, your specified keywords list will be checked to see if any keywords are present in URLs accessed to determine if the connection attempt should be blocked. Please note that the URL filter blocks web browser (HTTP) connection attempts using port 80 only.

**Domains Filtering:** This function checks the whole URL address but not the IP address against your list of domains to block or allow. If it is matched, the URL request will either be sent (Trusted) or dropped (Forbidden).

**Restrict URL Features:** Click Block Java Applet to filter web access with Java Applet components. Click Block ActiveX to filter web access with ActiveX components. Click Block Cookie to filter web access with Cookie components. Click Block Proxy to filter web proxy access.

**Exception IP Address:** You can input a list of IP addresses as the exception list for URL filtering. These IPs will not be covered by the URL rules.

**Time Schedule:** Select or set exactly when the rule works. When set to “Always On”, the rule will work all time; and also you can set the precise time when the rule works, like 01:00 - 19:00 from Monday to Friday. Or you can select the already set timeslot in “**Time Schedule**” during which the rule works. And when set to “Disable”, the rule is disabled. See [Time Schedule](#).

**Log:** Select Enable for this option if you will like to capture the logs for this URL filter policy. To check the log, users can turn to [Security Log](#).

## Keywords Filtering

**Note:** Maximum number of entries: 32.

Click [Detail ▶](#) to add the keywords.



Configuration

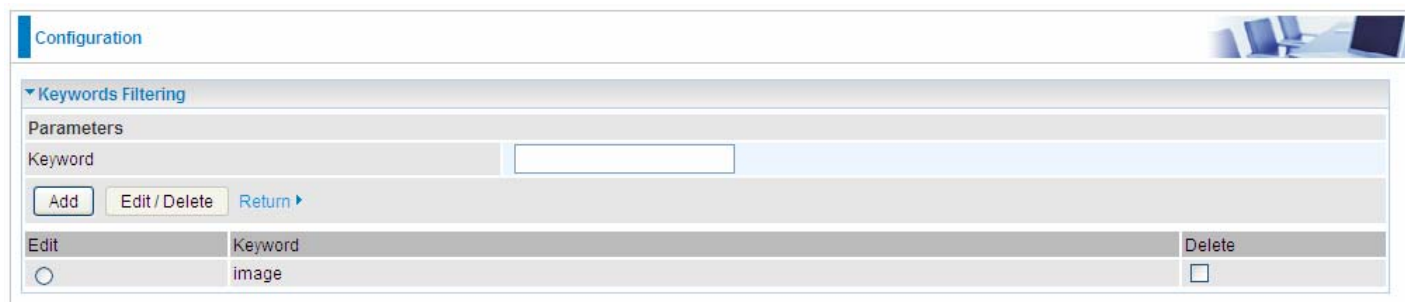
▼ Keywords Filtering

Parameters

Keyword

[Return ▶](#)

Enter the Keyword, for example image, and then click **Add**.



Configuration

▼ Keywords Filtering

Parameters

Keyword

[Return ▶](#)

Edit	Keyword	Delete
<input type="radio"/>	image	<input type="checkbox"/>

You can add other keywords like this. The keywords you add will be listed as above. If you want to reedit the keyword, press the Edit radio button left beside the item, and the word will listed in the Keyword field, edit, and then press **Edit/Delete** to confirm. If you want to delete certain keyword, check Delete checkbox right beside the item, and press **Edit/Delete**. Click **Return** to be back to the previous page.

## Domain Filtering

**Note:** Maximum number of entries: 32.

Click [Detail ▶](#) to add Domains.



Configuration

▼ Domains Filtering

Parameters

Domains Filtering  Type

[Return ▶](#)

**Domain Filtering:** enter the domain you want this filter to apply.

**Type:** select the action this filter deals with the Domain.

- ① **Forbidden Domain:** The domain is forbidden access.
- ① **Trusted Domain:** The domain is trusted and allowed access.

Enter a domain and select whether this domain is trusted or forbidden with the pull-down menu. Next, click **Add**. Your new domain will be added to either the Trusted Domain or Forbidden Domain listing, depending on which you selected previously. For specific process, please refer to **Keywords**

## Filtering.

### Exception IP Address

In the section, users can set the exception IP respectively for IPv4 and IPv6.

Click [Detail ▶](#) to add the IP Addresses.



The screenshot shows a web interface for configuring exception IP addresses. At the top, there is a 'Configuration' tab. Below it, a section titled 'Except IP Address' is expanded. Under the 'Parameters' heading, there are two rows: 'IP Version' with a dropdown menu set to 'IPv4', and 'Internal IP Address' with two empty input fields separated by a tilde '~'. At the bottom of this section, there are three buttons: 'Add', 'Edit / Delete', and 'Return ▶'.

Enter the except IP address. Click **Add** to save your changes. The IP address will be entered into the **Exception List**, and excluded from the URL filtering rules in effect. For specific process, please refer to **Keywords Filtering**.

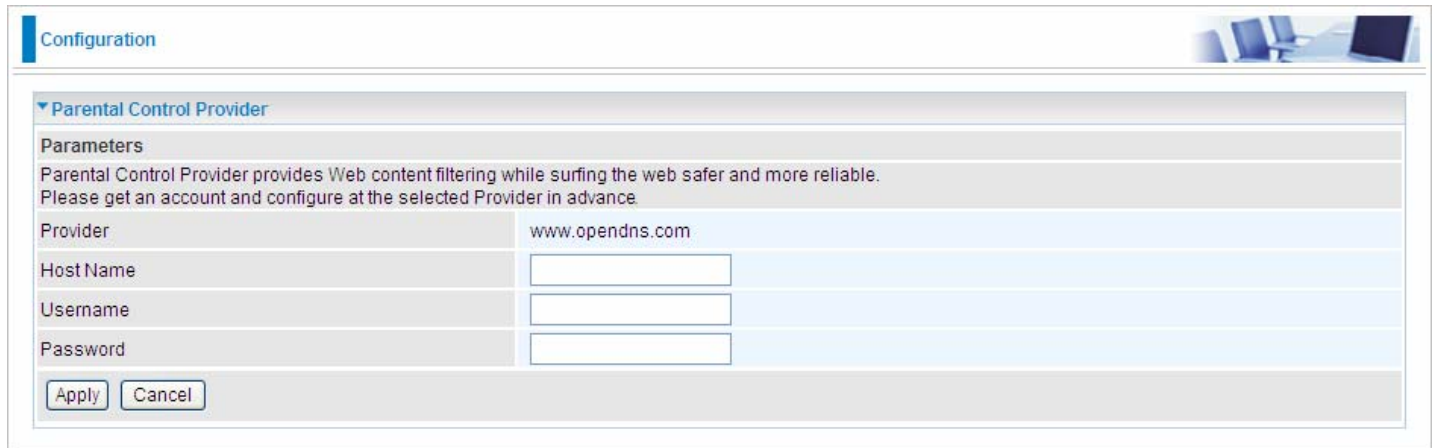
For example, users can set IPv4 client 192.168.1.103 in your network as a exception address that is not limited to the rules set in URL filter ( or IPv4 clients (a range) ). And also an IPv6 client (2000:1211:1002:6ba4:d160:5adb:9009:87ae) or IPv6 clients(a range ) can be the exceptions from the URL rules.

At the URL Filter page, press **Apply** to confirm your settings.



## Parental Control Provider

Parental Control Provider provides Web content filtering offering safer and more reliable web surfing for users. Please get an account and configure at the selected Provider “[www.opendns.com](http://www.opendns.com)” in advance. To use parental control (DNS), user needs to configure to use parental control (DNS provided by parental control provider) to access internet at WAN configuration or DNS page(See [DNS](#)).



The screenshot shows a configuration window titled "Configuration" with a sub-section for "Parental Control Provider". Under "Parameters", there is a descriptive text: "Parental Control Provider provides Web content filtering while surfing the web safer and more reliable. Please get an account and configure at the selected Provider in advance." Below this, there are four input fields: "Provider" (pre-filled with "www.opendns.com"), "Host Name", "Username", and "Password". At the bottom left, there are "Apply" and "Cancel" buttons.

Parental Control Provider	
<b>Parameters</b>	
Parental Control Provider provides Web content filtering while surfing the web safer and more reliable. Please get an account and configure at the selected Provider in advance.	
Provider	www.opendns.com
Host Name	<input type="text"/>
Username	<input type="text"/>
Password	<input type="text"/>
<input type="button" value="Apply"/> <input type="button" value="Cancel"/>	

**Host Name, Username and Password:** Enter your registered domain name and your username and password at the provider website [www.opendns.com](http://www.opendns.com).

# QoS - Quality of Service

## Quality of Service

QoS helps you to control the data upload traffic of each application from LAN (Ethernet) to WAN (Internet). This feature allows you to control the quality and speed of throughput for each application when the system is running with full upstream load.

**Note:** ADSL line speed is based on the ADSL sync rate. But there is no QoS on 3G/LTE as the 3G/LTE line speed is various and can not be known exactly.

Configuration

QoS Classification Setup

EWAN Line Speed

Upstream / Downstream  /  kbps [0 : Disable]

Apply

Maximum rules can be configured: 32

Class Name	IP Version	Direction	Internal IP Address	Internal Port	Protocol	External IP Address	External Port	DSCP Mark	Rate Type	Disabled	Remove	Edit
------------	------------	-----------	---------------------	---------------	----------	---------------------	---------------	-----------	-----------	----------	--------	------

Add Remove

## EWAN Line Speed

**Upstream / Downstream:** Specify the upstream and downstream rate of the EWAN interface. Click **Apply** to save the EWAN rate settings.

Click **Add** to enter QoS rules.

Configuration

Quality of Service

Non-Assigned Bandwidth Ratio => Upstream (LAN to WAN) : 100% Downstream (WAN to LAN) : 100%

IP Version

Application  << --type or select from listbox-- >>

Direction  Protocol  DSCP Marking

Rate Type  Ratio  % Priority

Internal IP Address  ~  Internal Port  ~

External IP Address  ~  External Port  ~

Time Schedule   Sun  Mon  Tue  Wed  Thu  Fri  Sat From  :  To  :

Apply

**IP Version:** Select either IPv4 or IPv6 base on need.

**Application:** Assign a name that identifies the new QoS application rule. Select from the list box for quick setup.

**Direction:** Shows the direction mode of the QoS application.

- ① **LAN to WAN:** You want to control the traffic from local network to the outside (Upstream). You can assign the priority for the application or you can limit the rate of the application.  
*Eg:* you have a FTP server inside the local network, and you want to have a limited control by the QoS policy and so you need to add a policy with LAN to WAN direction setting.
- ① **WAN to LAN:** Control traffic from WAN to LAN (Downstream).

**Protocol:** Select the supported protocol from the drop down list.

**DSCP Marking:** Differentiated Services Code Point (DSCP), it is the first 6 bits in the ToS byte. DSCP Marking allows users to classify the traffic of the application to be executed according to the DSCP value.

**IP Precedence and DSCP Mapping Table**

Mapping Table	
Default (000000)	Best Effort
EF(101110)	Expedited Forwarding
AF11 (001010)	Assured Forwarding Class1(L)
AF12 (001100)	Assured Forwarding Class1(M)
AF13 (001110)	Assured Forwarding Class1(H)
AF21 (010010)	Assured Forwarding Class1(L)
AF22 (010100)	Assured Forwarding Class1(M)
AF23 (010110)	Assured Forwarding Class1(H)
AF31 (011010)	Assured Forwarding Class1(L)
AF32 (011100)	Assured Forwarding Class1(M)
AF33 (011110)	Assured Forwarding Class1(H)
AF41 (100010)	Assured Forwarding Class1(L)
AF42 (100100)	Assured Forwarding Class1(M)
AF43 (100110)	Assured Forwarding Class1(H)
CS1(001000)	Class Selector(IP precedence)1
CS2(010000)	Class Selector(IP precedence) 2
CS3(011000)	Class Selector(IP precedence)3
CS4(100000)	Class Selector(IP precedence) 4
CS5(101000)	Class Selector(IP precedence) 5
CS6(110000)	Class Selector(IP precedence) 6
CS7(111000)	Class Selector(IP precedence) 7

DSCP offers three levels of service, Class Selector (CS), Assured Forwarding (AF) and Expedited Forwarding (EF). AF1, AF2, AF3 and AF4 are four levels of assured forwarding services. Each AF has three different packet loss priorities from high, medium, to low. Also, CS1-CS7 indicates the IP precedence.

**Rate Type:** You can choose *Limited* or *Prioritization*.

- ① **Limited (Maximum):** Specify a limited data rate for this policy. It also is the maximum rate for this policy. When you choose *Limited*, type the *Ratio* proportion. As above FTP server example, you may want to “throttle” the outgoing FTP speed to 20% of 256K and limit to it, you may use this type.
- ① **Prioritization:** Specify the rate type control for the rule to used. If you choose *Prioritization* for the rule, you parameter *Priority* would be available, you can set the priority for this rule.
- ① **Set DSCP Marking:** When select *Set DSCP Marking*, the packets matching the rule will be forwarded according to the pre-set DSCP marking.

**Ratio:** The rate percent of each application/policy compared to total traffic on the interface with limited rate type. For example, we want to only allow 20% of the total data for the LAN-to-WAN direction to be used for FTP server. Then we can specify here with data ratio = 20. If you have ADSL LINE with 256K/bps.rate, the estimated data rate, in kbps, for this rule is  $20\% * 256 * 0.9 = 46\text{kbps}$ . (For 0.9 is an estimated factor for the effective data transfer rate for an ADSL LINE from LAN to WAN. For WAN-to-LAN, it is 0.85 to 0.8)

**Priority:** Set the priority given to each policy/application. Specify the priority for the use of bandwidth. You can specify which application can have higher priority to acquire the bandwidth. Its default setting is set to Normal. You may adjust this setting to fit your policy / application.


**Internal IP Address:** The IP address values for Local LAN devices you want to give control.

**Internal Port:** The Port number on the LAN side, it is used to identify an application.

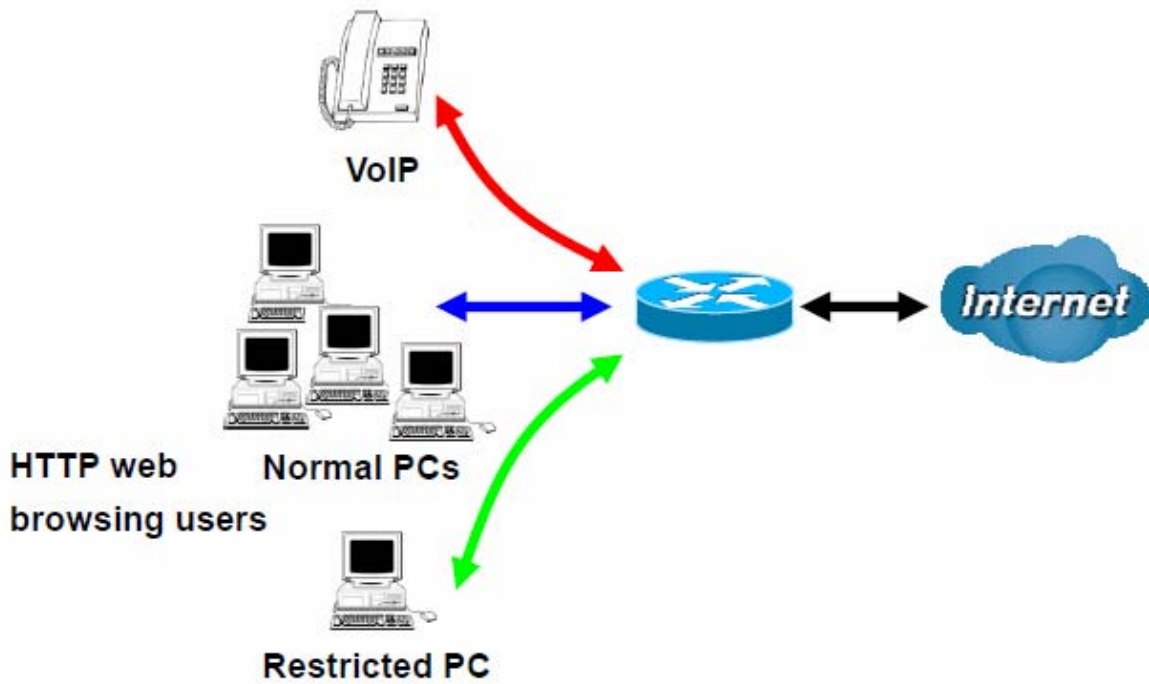
**External IP Address:** The IP address on remote / WAN side.

**External Port:** The Port number on the remote / WAN side.

**Time Schedule:** Select or set exactly when the rule works. When set to “Always On”, the rule will work all time; and also you can set the precise time when the rule works, like 01:00 - 19:00 from Monday to Friday. Or you can select the already set timeslot in “**Time Schedule**” during which the rule works. And when set to “Disable”, the rule is disabled or inactive and there will be an icon”

 ” indicating the rule is inactive. See [Time Schedule](#).

**Examples:** Common usage



1. Give outgoing VoIP traffic more priority.

The default queue priority is normal, so if you have VoIP users in your local network, you can set a higher priority to the outgoing VoIP traffic.

Configuration

Quality of Service

Non-Assigned Bandwidth Ratio => Upstream (LAN to WAN) : 100% Downstream (WAN to LAN) : 100%

IP Version	IPv4
Application	Voip
Direction	LAN to WAN
Rate Type	Prioritization
Internal IP Address	
External IP Address	
Time Schedule	timeslot1

Apply

2. Give regular web http access a limited rate

Configuration

Quality of Service

Non-Assigned Bandwidth Ratio => Upstream (LAN to WAN) : 100% Downstream (WAN to LAN) : 100%

IP Version	IPv4
Application	HTTP
Direction	LAN to WAN
Rate Type	Limited (Maximum)
Internal IP Address	
External IP Address	
Time Schedule	timeslot1

Apply

3. If you are actively engaged in P2P and are afraid of slowing down internet access for other users within your network, you can then use QoS to set a rule that has low priority. In this way, P2P application will not congest the data transmission with other applications.

Configuration

Quality of Service

Non-Assigned Bandwidth Ratio => Upstream (LAN to WAN) : 80% Downstream (WAN to LAN) : 100%

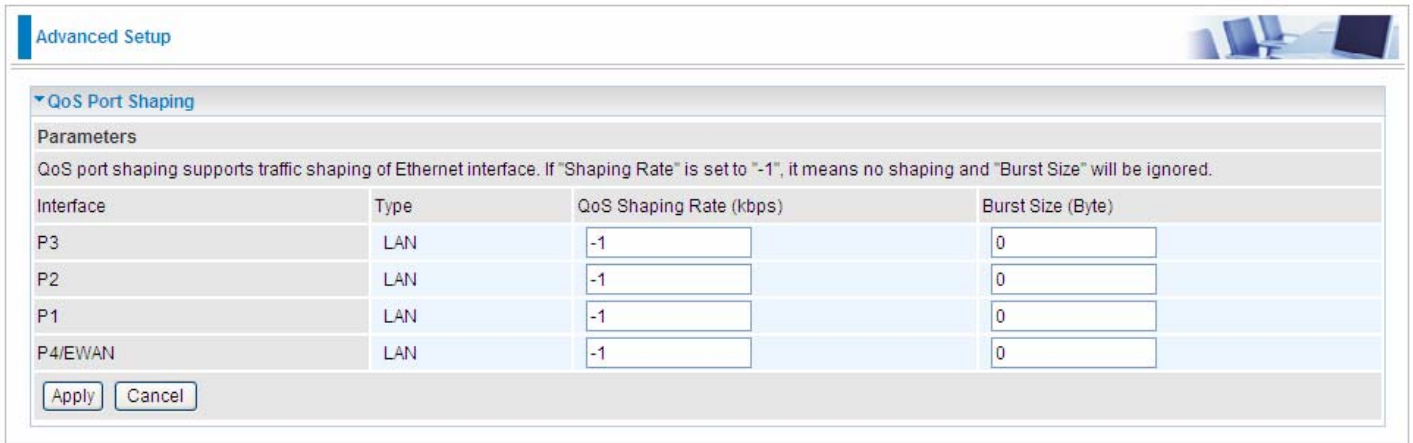
IP Version	IPv4				
Application	P2P << --type or select from listbox--				
Direction	LAN to WAN	Protocol	Any	DSCP Marking	Disable
Rate Type	Prioritization	Ratio	%	Priority	Low
Internal IP Address	~	Internal Port	~		
External IP Address	~	External Port	~		
Time Schedule	timeslot1	<input type="checkbox"/> Sun <input checked="" type="checkbox"/> Mon <input checked="" type="checkbox"/> Tue <input checked="" type="checkbox"/> Wed <input checked="" type="checkbox"/> Thu <input checked="" type="checkbox"/> Fri <input type="checkbox"/> Sat	From 00 : 00 To 09 : 19		

Apply

Other applications, like FTP, Mail access, users can use QoS to control based on need.

## QoS Port Shaping

QoS port shaping supports traffic shaping of Ethernet interfaces. It forcefully maximizes the throughput of the Ethernet interface. When “Shaping Rate” is set to “-1”, no shaping will be in place and the “Burst Size” is to be ignored.



Advanced Setup

QoS Port Shaping

Parameters

QoS port shaping supports traffic shaping of Ethernet interface. If "Shaping Rate" is set to "-1", it means no shaping and "Burst Size" will be ignored.

Interface	Type	QoS Shaping Rate (kbps)	Burst Size (Byte)
P3	LAN	-1	0
P2	LAN	-1	0
P1	LAN	-1	0
P4/EWAN	LAN	-1	0

Apply Cancel

**Interface:** P1-P4. P4 used as EWAN also covered.

**Type:** All LAN when P4 is LAN port; P4 used as EWAN, type WAN and all others LAN.

**QoS Shaping Rate (Kbps):** Set the forcefully maximum rate.

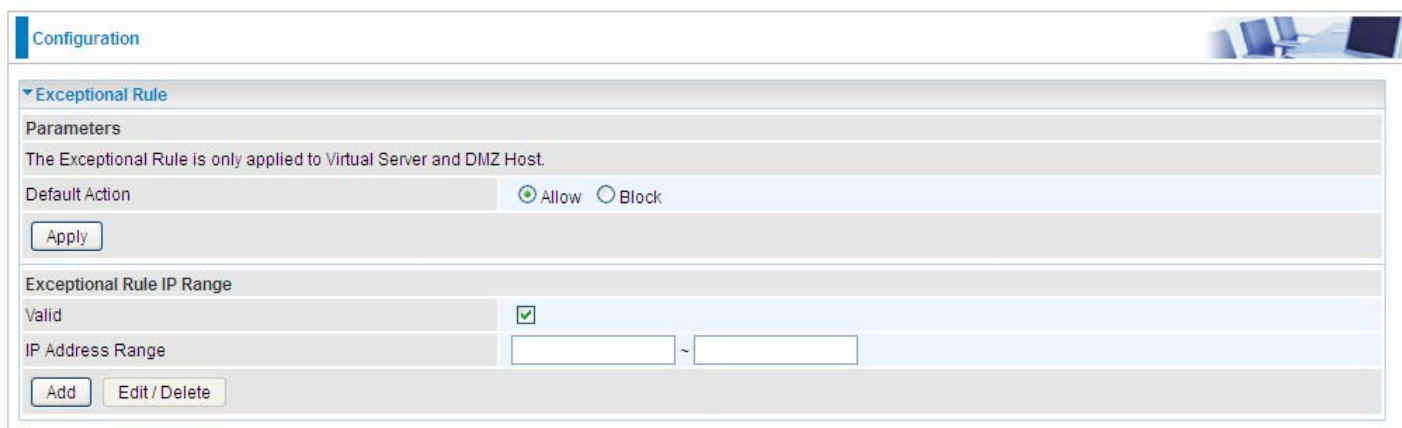
**Burst Size(Bytes):** Set the forcefully Burst Size.

# NAT

NAT (Network Address Translation) feature translates a private IP to a public IP, allowing multiple users to access the Internet through a single IP account, sharing the single IP address. It is a natural firewall for the private network.

## Exceptional Rule

Exceptional Rule is dedicated to giving or blocking NAT/DMZ access to some specific IP or IPs(range).



Configuration

Exceptional Rule

Parameters

The Exceptional Rule is only applied to Virtual Server and DMZ Host.

Default Action  Allow  Block

Apply

Exceptional Rule IP Range

Valid

IP Address Range  ~

Add Edit / Delete

**Default Action:** Select “Allow” to grant access to the listed IP or IPs to Virtual Server and DMZ Host. While choose “Block” to ban the listed IP or IPs to access the Virtual Server and DMZ Host.

**Apply:** Press **Apply** button to apply the change.

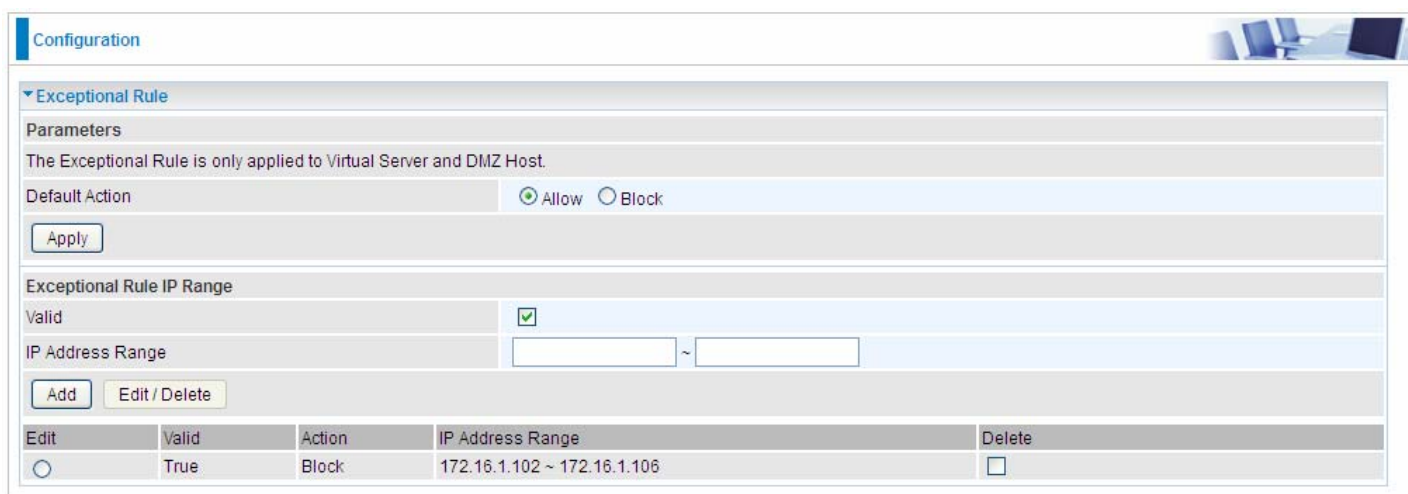
## Exceptional Rule Range

**Valid:** Check the box to enable or disable the IP range.

**IP Address Range:** Specify the IP address range; IPv4 address range can be supported.

Click **Add** to add the IP Range.

For instance, if user wants block IP range of 172.16.1.102-172.16.1.106 from accessing your set virtual server and DMZ host, you can add this IP range and valid it.



Configuration

Exceptional Rule

Parameters

The Exceptional Rule is only applied to Virtual Server and DMZ Host.

Default Action  Allow  Block

Apply

Exceptional Rule IP Range

Valid

IP Address Range  ~

Add Edit / Delete

Edit	Valid	Action	IP Address Range	Delete
<input type="radio"/>	True	Block	172.16.1.102 ~ 172.16.1.106	<input type="checkbox"/>



## Virtual Servers

In TCP/IP and UDP networks a port is a 16-bit number used to identify which application program (usually a server) incoming connections should be delivered to. Some ports have numbers that are pre-assigned to them by the IANA (the Internet Assigned Numbers Authority), and these are referred to as “well-known ports”. Servers follow the well-known port assignments so clients can locate them.

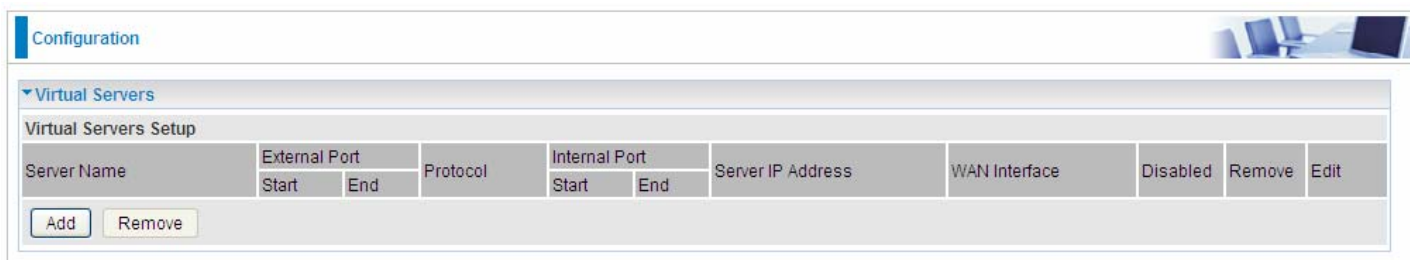
If you wish to run a server on your network that can be accessed from the WAN (i.e. from other machines on the Internet that are outside your local network), or any application that can accept incoming connections (e.g. Peer-to-peer/P2P software such as instant messaging applications and P2P file-sharing applications) and are using NAT (Network Address Translation), then you will usually need to configure your router to forward these incoming connection attempts using specific ports to the PC on your network running the application. You will also need to use port forwarding if you want to host an online game server.

The reason for this is that when using NAT, your publicly accessible IP address will be used by and point to your router, which then needs to deliver all traffic to the private IP addresses used by your PCs. Please see the **WAN** configuration section of this manual for more information on NAT.

The device can be configured as a virtual server so that remote users accessing services such as Web or FTP services via the public (WAN) IP address can be automatically redirected to local servers in the LAN network. Depending on the requested service (TCP/UDP port number), the device redirects the external service request to the appropriate server within the LAN network.

This part is only available when NAT is enabled.

**Note:** The maximum number of entries: 64.



Configuration

Virtual Servers

Virtual Servers Setup

Server Name	External Port		Protocol	Internal Port		Server IP Address	WAN Interface	Disabled	Remove	Edit
	Start	End		Start	End					

Add Remove

It is virtual server listing table as you see, Click **Add** to move on.

The following configuration page will appear to let you configure.

**Virtual Servers**

**Parameters**

Interface: pppoe\_0\_8\_35/ppp0.1

Server Name: Custom Service

Custom Service: [Empty]

Server IP Address: [Empty] << --type or select from listbox-- >>

Time Schedule: Always On  Sun  Mon  Tue  Wed  Thu  Fri  Sat From 00 : 00 To 00 :

External Port		Protocol	Protocol Number	Internal Port	
Start	End			Start	End
[Empty]	[Empty]	TCP	[Empty]	[Empty]	[Empty]
[Empty]	[Empty]	TCP	[Empty]	[Empty]	[Empty]
[Empty]	[Empty]	TCP	[Empty]	[Empty]	[Empty]
[Empty]	[Empty]	TCP	[Empty]	[Empty]	[Empty]
[Empty]	[Empty]	TCP	[Empty]	[Empty]	[Empty]
[Empty]	[Empty]	TCP	[Empty]	[Empty]	[Empty]
[Empty]	[Empty]	TCP	[Empty]	[Empty]	[Empty]
[Empty]	[Empty]	TCP	[Empty]	[Empty]	[Empty]
[Empty]	[Empty]	TCP	[Empty]	[Empty]	[Empty]
[Empty]	[Empty]	TCP	[Empty]	[Empty]	[Empty]
[Empty]	[Empty]	TCP	[Empty]	[Empty]	[Empty]
[Empty]	[Empty]	TCP	[Empty]	[Empty]	[Empty]

Apply Cancel

**Interface:** select from the drop-down menu the interface you want the virtual server(s) to apply.

**Server Name:** select the server name from the drop-down menu.

**Custom Service:** It is a kind of service to let users customize the service they want. Enter the user-defined service name here. It is a parameter only available when users select **Custom Service** in the above parameter.

**Server IP Address:** Enter your server IP Address here. User can select from the list box for quick setup.


### External Port

- ① **Start:** Enter a port number as the external starting number for the range you want to give access to internal network.
- ① **End:** Enter a port number as the external ending number for the range you want to give access to internal network.

### Internal Port

- ① **Start:** Enter a port number as the internal starting number.
- ① **End:** Here it will generate automatically according to the End port number of External port and can't be modified.

**Protocol:** select the protocol this service used: TCP/UDP, TCP, UDP.

**Time Schedule:** Select or set exactly when the Virtual Server works. When set to "Always On", the Virtual Server will work all time; and also you can set the precise time when Virtual Server works, like 01:00 - 19:00 from Monday to Friday. Or you can select the already set timeslot in **Time Schedule** during which the Virtual Server works. And when set to "Disable", the rule is disabled and there will be an icon  in the list table indicating the rule is disabled. See [Time Schedule](#).

## Set up

1. Select a Server Name from the drop-down menu, then the port will automatically appear, modify some as you like, or you can just leave it as default. Remember to enter your server IP Address.

Virtual Servers

Parameters

Interface: pppoe\_0\_8\_35/ppp0.1

Server Name: Custom Service

Custom Service:

Server IP Address:  << --type or select from listbox--

Time Schedule: Always On  Sun  Mon  Tue  Wed  Thu  Fri  Sat From 00:00 To 00:00

External Port		Protocol	Internal Port	
Start	End		Start	End
<input type="text"/>	<input type="text"/>	TCP	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	TCP	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	TCP	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	TCP	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	TCP	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	TCP	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	TCP	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	TCP	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	TCP	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	TCP	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	TCP	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	TCP	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	TCP	<input type="text"/>	<input type="text"/>

Apply Cancel

2. Press **Apply** to conform, and the items will be list in the **Virtual Servers Setup** table.

Configuration

Virtual Servers

Virtual Servers Setup

Server Name	External Port		Protocol	Internal Port		Server IP Address	WAN Interface	Disabled	Remove	Edit
	Start	End		Start	End					
Age of Empires	47624	47624	TCP	47624	47624	192.168.1.103	ppp0.1	<input type="checkbox"/>	<input type="checkbox"/>	Edit
Age of Empires	6073	6073	TCP	6073	6073	192.168.1.103	ppp0.1	<input type="checkbox"/>	<input type="checkbox"/>	Edit
Age of Empires	2300	2400	TCP	2300	2400	192.168.1.103	ppp0.1	<input type="checkbox"/>	<input type="checkbox"/>	Edit
Age of Empires	2300	2400	UDP	2300	2400	192.168.1.103	ppp0.1	<input type="checkbox"/>	<input type="checkbox"/>	Edit

Add Remove

Configuration

Virtual Servers

Virtual Servers Setup


Server Name	External Port		Protocol	Internal Port		Server IP Address	WAN Interface	Disabled	Remove	Edit
	Start	End		Start	End					
Age of Empires	47624	47624	TCP	47624	47624	192.168.1.103	ppp0.1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Edit
Age of Empires	6073	6073	TCP	6073	6073	192.168.1.103	ppp0.1	<input type="checkbox"/>	<input type="checkbox"/>	Edit
Age of Empires	2300	2400	TCP	2300	2400	192.168.1.103	ppp0.1	<input type="checkbox"/>	<input type="checkbox"/>	Edit
Age of Empires	2300	2400	UDP	2300	2400	192.168.1.103	ppp0.1	<input type="checkbox"/>	<input type="checkbox"/>	Edit

Add Remove

( Means the rule is inactive)

## Remove

If you don't need a specified Server, you can remove it. Check the check box beside the item you want to remove, then press **Remove**, it will be OK.

Configuration 

Virtual Servers

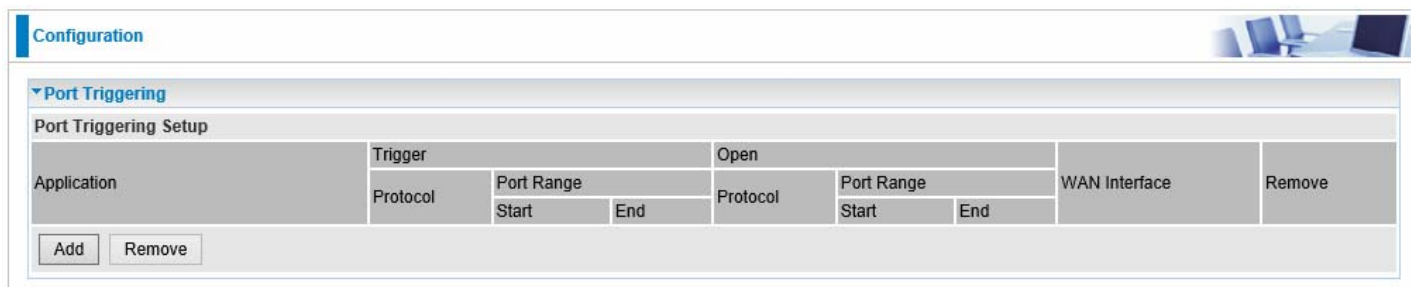
Virtual Servers Setup

Server Name	External Port		Protocol	Internal Port		Server IP Address	WAN Interface	Disabled	Remove	Edit
	Start	End		Start	End					
Age of Empires	47624	47624	TCP	47624	47624	192.168.1.103	ppp0.1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Edit
Age of Empires	6073	6073	TCP	6073	6073	192.168.1.103	ppp0.1	<input type="checkbox"/>	<input type="checkbox"/>	Edit
Age of Empires	2300	2400	TCP	2300	2400	192.168.1.103	ppp0.1	<input type="checkbox"/>	<input type="checkbox"/>	Edit
Age of Empires	2300	2400	UDP	2300	2400	192.168.1.103	ppp0.1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Edit

Add Remove

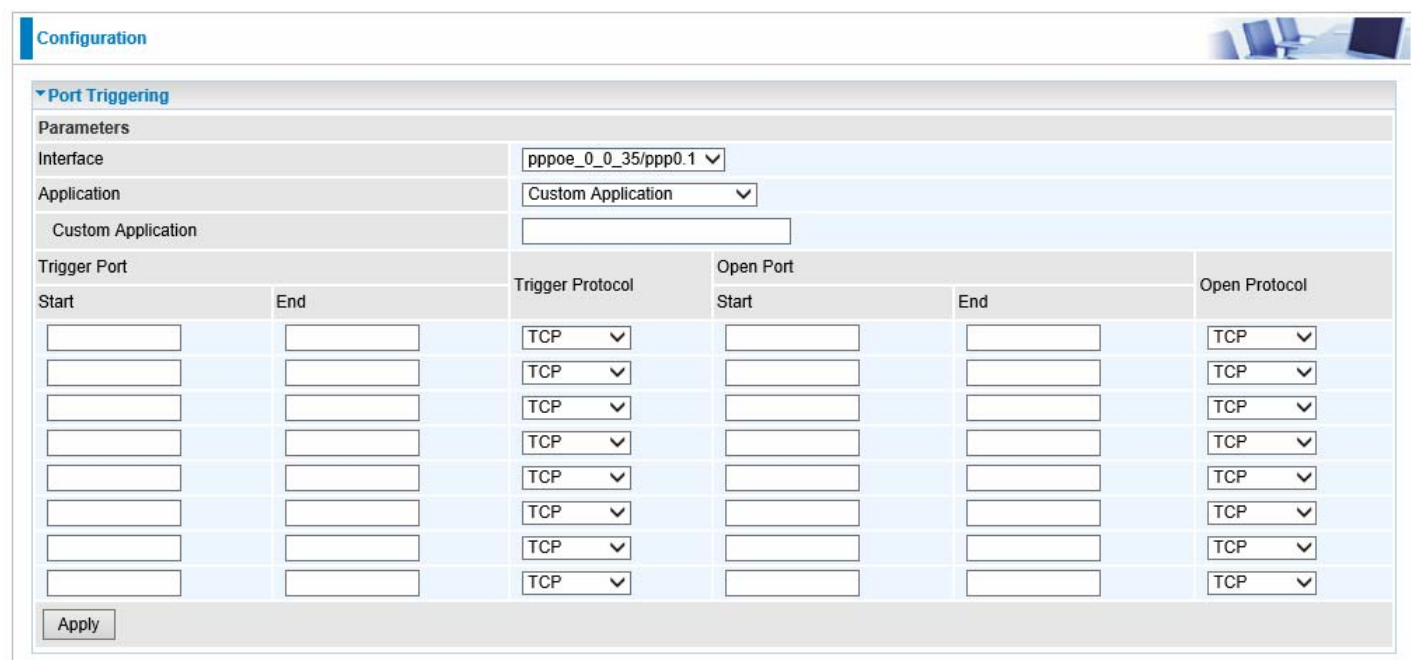
## Port Triggering

Port triggering is a way to automate port forwarding with outbound traffic on predetermined ports ('triggering ports'), incoming ports are dynamically forwarded to the initiating host, while the outbound ports are in use. Port triggering triggers can open an incoming port when a client on the local network makes an outgoing connection on a predetermined port or a range of ports.



The screenshot shows the 'Configuration' page with the 'Port Triggering' section expanded. Below the 'Port Triggering Setup' header is a table with columns for 'Application', 'Trigger', 'Open', 'WAN Interface', and 'Remove'. The 'Trigger' and 'Open' columns are further divided into 'Protocol' and 'Port Range' (with sub-columns for 'Start' and 'End'). There are 'Add' and 'Remove' buttons at the bottom left of the table.

Click **Add** to add a port triggering rule.



The screenshot shows the 'Configuration' page with the 'Port Triggering' section expanded. Below the 'Port Triggering' header is the 'Parameters' section, which includes a dropdown for 'Interface' (set to 'pppoe\_0\_0\_35/ppp0.1'), a dropdown for 'Application' (set to 'Custom Application'), and a text input for 'Custom Application'. Below this is the 'Trigger Port' section, which is a table with columns for 'Start', 'End', 'Trigger Protocol', 'Open Port' (with sub-columns for 'Start' and 'End'), and 'Open Protocol'. The table contains eight rows, each with input fields for 'Start' and 'End' ports, a dropdown for 'Trigger Protocol' (all set to 'TCP'), and a dropdown for 'Open Protocol' (all set to 'TCP'). There is an 'Apply' button at the bottom left.

**Interface:** Select from the drop-down menu the interface you want the port triggering rules apply to.

**Application:** Preinstalled applications or Custom Application user can customize the utility yourself.

**Custom Application:** It is a kind of service to let users themselves customize the service they want. Enter the user-defined service name here.

### Trigger Port

① **Start:** Enter a port number as the triggering port starting number.

① **End:** Enter a port number as the triggering port ending number.

Any port in the range delimited by the 'Start' and 'End' would be the trigger port.

## Open port

① **Start:** Enter a port number as the open port starting number.

① **End:** Enter a port number as the open port ending number.

Any port in the range delimited by the 'Start' and 'End' would be the preset forwarding port or open port.

**Protocol:** select the protocol this service used: TCP/UDP, TCP, UDP.

## Set up

An example of how port triggering works, when a client behind a NAT router connecting to Aim Talk, it is a TCP connection with the default port 4099.

When connecting to Aim Talk, the client typically makes an outgoing connection on port 4099 to the Aim Talk server, but when the computer is behind the NAT, the NAT silently drops this connection because it does not know which computer behind the NAT to send the request to connect.

So, in this case, port triggering in the router is working, when an outbound connection is attempted on port 4099 (or any port in the range set), it should allow inbound connections to that particular computer.

1. Select a Server Name from the drop-down menu, then the port will automatically appear, modify some as you like, or you can just leave it as default. Remember to enter your server IP Address.

**Configuration**

**Port Triggering**

Parameters

Interface: pppoe\_0\_0\_35/ppp0.1

Application: Aim Talk

Custom Application:

Trigger Port		Trigger Protocol	Open Port		Open Protocol
Start	End		Start	End	
4099	4099	TCP	5191	5191	TCP
		TCP			TCP
		TCP			TCP
		TCP			TCP
		TCP			TCP
		TCP			TCP
		TCP			TCP
		TCP			TCP

Apply

2. Press **Apply** to conform, and the items will be list in the **Virtual Servers Setup** table.

**Configuration**

**Port Triggering**

Port Triggering Setup

Application	Trigger			Open			WAN Interface	Remove
	Protocol	Port Range		Protocol	Port Range			
		Start	End		Start	End		
Aim Talk	TCP	4099	4099	TCP	5191	5191	ppp0.1	<input type="checkbox"/>

Add Remove

## Remove

If you don't need a specified Server, you can remove it. Check the check box beside the item you want to remove, and then press **Remove**.

Advanced Setup

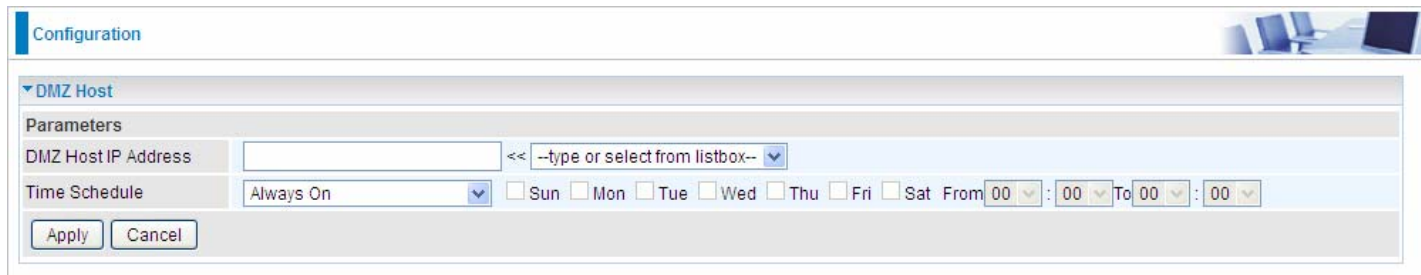
Port Triggering

Port Triggering Setup

Application	Trigger		Open			WAN Interface	Remove
	Protocol	Port Range	Protocol	Port Range			
		Start	End		Start	End	
Aim Talk	TCP	4099	4099	TCP	5191	5191	ppp0.1 <input type="checkbox"/>

## DMZ Host

The DMZ Host is a local computer exposed to the Internet. When setting a particular internal IP address as the DMZ Host, all incoming packets will be checked by Firewall and NAT algorithms before being passed to the DMZ host, when a packet received does not use a port number used by any other Virtual Server entries.



**DMZ Host IP Address:** Enter the IP Address of a host you want it to be a DMZ host. Select from the list box to quick set the DMZ.

**Time Schedule:** Select or set exactly when the DMZ works. When set to “Always On”, the DMZ will work all time; and also you can set the precise time when DMZ works, like 01:00 - 19:00 from Monday to Friday. Or you can select the already set timeslot in **Time Schedule** during which the DMZ works. And when set to “Disable”, the rule is disabled. See [Time Schedule](#).



Using port mapping does have security implications, since outside users are able to connect to PCs on your network. For this reason you are advised to use specific Virtual Server entries just for the ports your application requires instead of simply using DMZ or creating a Virtual Server entry for “All” protocols, as doing so results in all connection attempts to your public IP address accessing the specified PC.



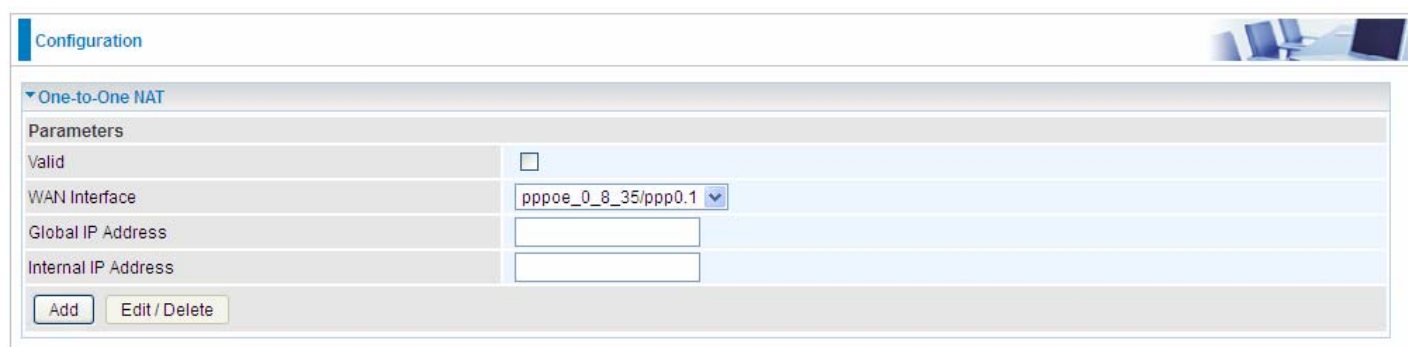
**Attention**

If you have disabled the NAT option in the WAN-ISP section, the Virtual Server function will hence be invalid.  
If the DHCP server option is enabled, you have to be very careful in assigning the IP addresses of the virtual servers in order to avoid conflicts. The easiest way of configuring Virtual Servers is to manually assign static IP address to each virtual server PC, with an address that does not fall into the range of IP addresses that are to be issued by the DHCP server. You can configure the virtual server IP address manually, but it must still be in the same subnet as the router.



## One-to-One NAT

One-to-One NAT maps a specific private/local address to a global/public IP address. If user has multiple global/public IP addresses from your ISP, you are free to use one-to-one NAT to assign some specific public IP for an internal IP like a public web server mapped with a global/public IP for outside access.



The screenshot shows a configuration window titled "Configuration" with a sub-section for "One-to-One NAT". Under "Parameters", there are four fields: "Valid" (checkbox), "WAN Interface" (dropdown menu showing "pppoe\_0\_8\_35/ppp0.1"), "Global IP Address" (text input), and "Internal IP Address" (text input). At the bottom, there are two buttons: "Add" and "Edit / Delete".

**Valid:** Check whether to validate the one-to-one NAT mapping rule.

**WAN Interface:** Select one based WAN interface to configure the one-to-one NAT.

**Global IP address:** The Global IP mapped to an internal device. It can be left empty, and under this circumstance, it can be reached through the WAN IP of interface set in the field above.

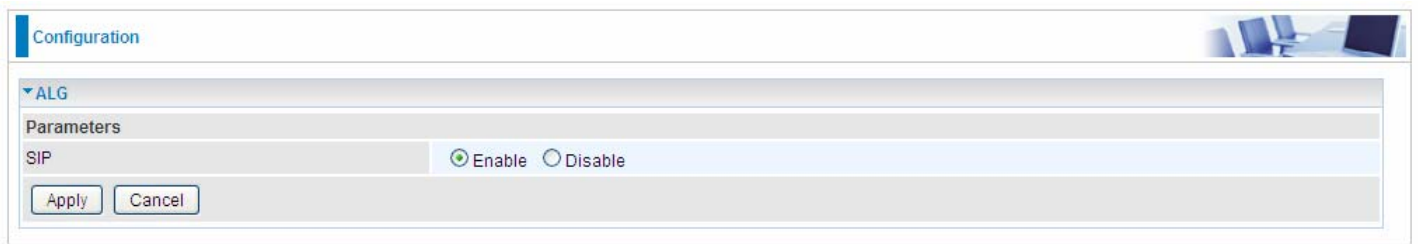
**Internal Address:** The IP address of an internal device in the LAN.

**For example,** you have an ADSL connection of pppoe\_0\_8\_35/ppp0.1 interface with three fixed global IP, and you then can assign the other two global IPs to two internal devices respectively.

If you have a WEB server (IP address: 192.168.1.3) and a FTP server (IP address: 192.168.1.4) in local network, owning a public IP address range of 123.1.1.2 to 123.1.1.4 assigned by ISP. 123.1.1.2 is used as WAN IP address of the router, 123.1.1.3 is used for WEB server and 123.1.1.4 is used for FTP server. With One-to-One NAT, the servers with private IP addresses can be accessed at the corresponding valid public IP addresses.

## ALG

The ALG Controls enable or disable protocols over application layer.



The screenshot shows a configuration window titled "Configuration" with a small icon of a desk and chairs in the top right corner. Below the title bar, there is a section for "ALG" with a dropdown arrow. Underneath, the "Parameters" section is visible, containing a row for "SIP" with radio buttons for "Enable" (which is selected) and "Disable". At the bottom of the configuration area, there are two buttons: "Apply" and "Cancel".

# Wake On LAN

Wake on LAN (WOL, sometimes WoL) is an Ethernet computer networking standard that allows a computer to be turned on or woken up remotely by a network message.

Configuration

Wake On LAN

Parameters

Host Label

MAC Address  << --select--  (type or select from listbox)

Wake by Schedule  Enable [Schedule](#)

**Host Label:** Enter identification for the host.

**Select:** Select MAC address of the computer that you want to wake up or turn on remotely.

**Wake by Schedule:** Enable to wake up your set device at some specific time. For instance, user can set to get some device woken up at 8:00 every weekday. Click [Schedule](#) to enter time schedule configuring page to set the exact timeline.

Configuration

Wake up Time Schedule

Parameters

Name

Day in a week  Sun  Mon  Tue  Wed  Thu  Fri  Sat

Time  :

Edit	Name	Day in a week	Time	Delete
<input type="radio"/>	11	SMTWTFs	08:00	<input type="checkbox"/>

**Add:** After selecting, click Add then you can submit the Wake-up action.

**Edit/Delete:** Click to edit or delete the selected MAC address.

**Ready:**

“**Yes**” indicating the remote computer is ready for your waking up.

“**No**” indicating the machine is not ready for your waking up.

**Delete:** Delete the selected MAC address.

Configuration

Wake On LAN

Parameters

Host Label

MAC Address  << --select--  (type or select from listbox)

Wake by Schedule  Enable [Schedule](#)

Edit	Action	Host Label	MAC Address	Ready	Delete
<input type="radio"/>	Schedule	billion-17bc6f1	18:A9:05:38:04:03	Yes	<input type="checkbox"/>

# VPN

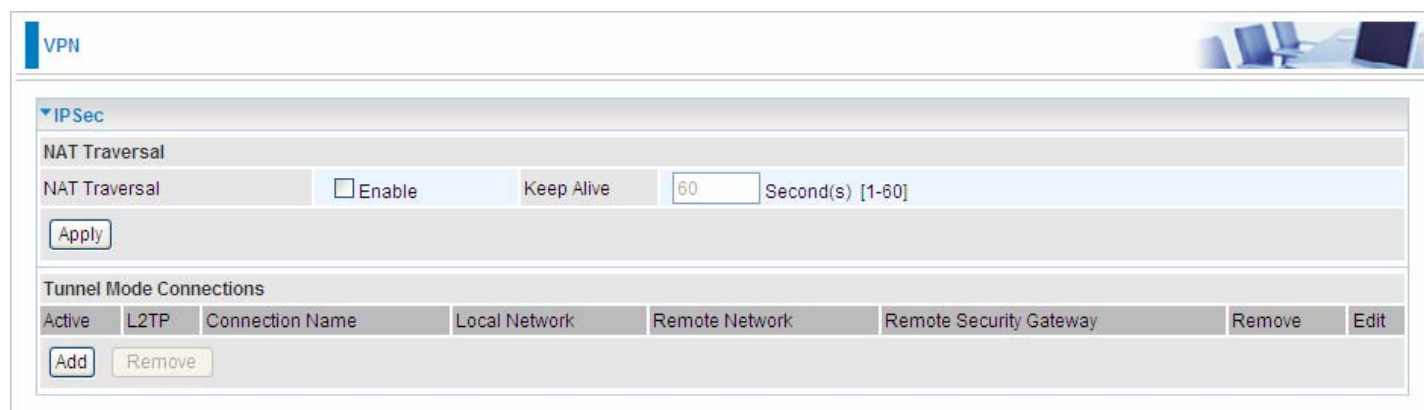
A **virtual private network (VPN)** is a private network that interconnects remote (and often geographically separate) networks through primarily public communication infrastructures such as the Internet. VPNs provide security through tunneling protocols and security procedures such as encryption. For example, a VPN could be used to securely connect the branch offices of an organization to a head office network through the public Internet.

## IPSec

**Internet Protocol Security (IPsec)** is a protocol suite for securing Internet Protocol (IP) communications by authenticating and encrypting each IP packet of a communication session. IPsec also includes protocols for establishing mutual authentication between agents at the beginning of the session and negotiation of cryptographic keys to be used during the session.

IPsec is an end-to-end security scheme operating in the Internet Layer of the Internet Protocol Suite. It can be used in protecting data flows between a pair of security gateways (*network-to-network*), or between a security gateway and a host (*network-to-host*).

**Note:** A maximum of 16 sessions for IPsec.



The screenshot shows a web-based configuration interface for a VPN. At the top left, there is a 'VPN' header. Below it, the 'IPSec' section is expanded. Under 'NAT Traversal', there is a checkbox for 'Enable' which is currently unchecked. To its right is a 'Keep Alive' field with a value of '60' and the unit 'Second(s) [1-60]'. An 'Apply' button is located below these settings. Below the NAT Traversal section is a 'Tunnel Mode Connections' table. The table has columns for 'Active', 'L2TP', 'Connection Name', 'Local Network', 'Remote Network', 'Remote Security Gateway', 'Remove', and 'Edit'. There are 'Add' and 'Remove' buttons below the table.

### NAT Traversal

**NAT Traversal:** This directive enables use of the NAT-Traversal IPsec extension (NAT-T). NAT-T allows one or both peers to reside behind a NAT gateway (i.e., doing address- or port-translation).

**Keep Alive:** Type the interval time(sec) for sending packets to keep the NAT Traversal alive.

Click **Apply** to save and apply your settings.

Click **Add** to create IPSec connections.

The screenshot shows the 'VPN' configuration page with the 'IPSec' section expanded. The 'IPSec Settings' section includes a checkbox for 'L2TP over IPSec' (disabled), a 'Connection Name' field, a 'WAN Interface' dropdown (set to 'Default'), and an 'IP Version' dropdown (set to 'IPv4'). Below this are fields for 'Local Network' (with a 'Single Address' dropdown), 'Remote Security Gateway' (with an 'Anonymous' checkbox), and 'Remote Network' (with a 'Single Address' dropdown). The 'Key Exchange Method' is set to 'IKE' and 'IPsec Protocol' to 'ESP'. There are fields for 'Pre-Shared Key', 'Local ID Type', and 'Remote ID Type', each with a dropdown and an 'ID Content' field. The 'Phase 1' section has a 'Mode' dropdown (set to 'Main'), 'Encryption Algorithm' (3DES), 'Integrity Algorithm' (MD5), 'DH Group' (MODP1024(DH2)), and 'SA Lifetime' (480). The 'Phase 2' section has 'Encryption Algorithm' (3DES), 'Integrity Algorithm' (MD5), 'DH Group' (None), and 'IPsec Lifetime' (60). There is also a 'Ping for Keep Alive' dropdown (set to 'None') and an 'Apply' button at the bottom.

## IPSec Settings

**L2TP over IPSec:** Select Enable if user wants to use L2TP over IPSec. See [L2TP over IPSec](#)

**Connection Name:** A given name for the connection, but it should contain no spaces (e.g. "connection-to-office").

**WAN Interface:** Select the set used interface for the IPSec connection, when you select adsl pppoe\_0\_0\_35/ppp0.1 interface, the IPSec tunnel would transmit data via this interface to connect to the remote peer.

**IP Version:** Select the IP version base on your network framework.

**Local Network:** Set the IP address or subnet of the local network.

- ① **Single Address:** The IP address of the local host, for establishing an IPSec connection between a security gateway and a host (*network-to-host*).
- ① **Subnet:** The subnet of the local network, for establishing an IPSec tunnel between a pair of security gateways (*network-to-network*)

**IP Address:** The local network address.

**Netmask:** The local network netmask.

**Remote Secure Gateway:** The IP address of the remote VPN device that is connected and establishes a VPN tunnel.

**Anonymous:** Enable any IP to connect in.

**Remote Network:** Set the IP address or subnet of the remote network.

- ① **Single Address:** The IP address of the local host, for establishing an IPSec connection between a security gateway and a host (*network-to-host*). If the remote peer is a host, select Single Address.
- ① **Subnet:** The subnet of the local network, for establishing an IPSec tunnel between a pair of security gateways (*network-to-network*), If the remote peer is a network, select Subnet.

**Key Exchange Method:** Displays key exchange method.

**Pre-Shared Key:** This is for the Internet Key Exchange (IKE) protocol, a string from 4 to 128 characters. Both sides should use the same key. IKE is used to establish a shared security policy and authenticated keys for services (such as IPSec) that require a key. Before any IPSec traffic can be passed, each router must be able to verify the identity of its peer. This can be done by manually entering the pre-shared key into both sides (router or hosts).

**Local ID Type and Remote ID Type:** When the mode of phase 1 is aggressive, Local and Remote peers can be identified by other IDs.

**ID content:** Enter ID content the name you want to identify when the Local and Remote Type are Domain Name; Enter ID content IP address you want to identify when the Local and Remote Type are IP addresses (IPv4 and IPv6 supported).

## Phase 1

**Mode:** Select IKE mode from the drop-down menu: **Main** or **Aggressive**. This IKE provides secured key generation and key management.

**Encryption Algorithm:** Select the encryption algorithm from the drop-down menu. There are several options: 3DES and AES (128, 192 and 256). 3DES and AES are more powerful but increase latency.

- ① **DES:** Stands for Triple Data Encryption Standard, it uses 56 bits as an encryption method.
- ① **3DES:** Stands for Triple Data Encryption Standard, it uses 168 (56\*3) bits as an encryption method.
- ① **AES:** Stands for Advanced Encryption Standards, you can use 128, 192 or 256 bits as encryption method.

**Integrity Algorithm:** Authentication establishes the integrity of the datagram and ensures it is not tampered with in transmit. There are 2 options: Message Digest 5 (MD5) and Secure Hash Algorithm (SHA1). SHA1 is more resistant to brute-force attacks than MD5. However, it is slower.

- ① **MD5:** A one-way hashing algorithm that produces a 128-bit hash.
- ① **SHA1:** A one-way hashing algorithm that produces a 160-bit hash.

**DH Group:** It is a public-key cryptography protocol that allows two parties to establish a shared secret over an unsecured communication channel (i.e. over the Internet). MODP stands for Modular Exponentiation Groups.

**SA Lifetime:** Specify the number of minutes that a Security Association (SA) will stay active before new encryption and authentication key will be exchanged. Enter a value to issue an initial connection request for a new VPN tunnel. Default is 480 minutes (28800 seconds). A short SA time increases security by forcing the two parties to update the keys. However, every time when the VPN tunnel re-negotiates, access through the tunnel will be temporarily disconnected.

## Phase 2

**Encryption Algorithm:** Select the encryption algorithm from the drop-down menu. There are several options: 3DES and AES (128, 192 and 256). 3DES and AES are more powerful but increase latency.

**Integrity Algorithm:** Authentication establishes the integrity of the datagram and ensures it is not tampered with in transmit. There are 2 options: Message Digest 5 (MD5) and Secure Hash Algorithm (SHA1). SHA1 is more resistant to brute-force attacks than MD5. However, it is slower.

**DH Group:** It is a public-key cryptography protocol that allows two parties to establish a shared secret over an unsecured communication channel (i.e. over the Internet). MODP stands for Modular Exponentiation Groups.

**IPSec Lifetime:** Specify the number of minutes that IPSec will stay active before new encryption

and authentication key will be exchanged. Enter a value to negotiate and establish secure authentication. Default is 60 minutes (3600 seconds). A short time increases security by forcing the two parties to update the keys. However, every time when the VPN tunnel re-negotiates, access through the tunnel will be temporarily disconnected.

**Ping for Keep Alive:** Select the operation methods:

- ① **None:** The default setting is “None”. To this mode, it will not detect the remote IPSec peer has been lost or not. It only follows the policy of Disconnection time after no traffic, which the remote IPSec will be disconnected after the time you set in this function.
- ① **DPD:** Dead peer detection (DPD) is a keeping alive mechanism that enables the router to be detected lively when the connection between the router and a remote IPSec peer has lost. Please be noted, it must be enabled on the both sites.

Detection Interval	<input type="text" value="180"/>	Second(s) [180-86400]	Idle Timeout	<input type="text" value="5"/>	Consecutive times [5-99]
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**Detection Interval:** The period cycle for dead peer detection. The interval can be 180~86400 seconds.

**Idle Timeout:** Auto-disconnect the IPSec connection after trying several consecutive times.

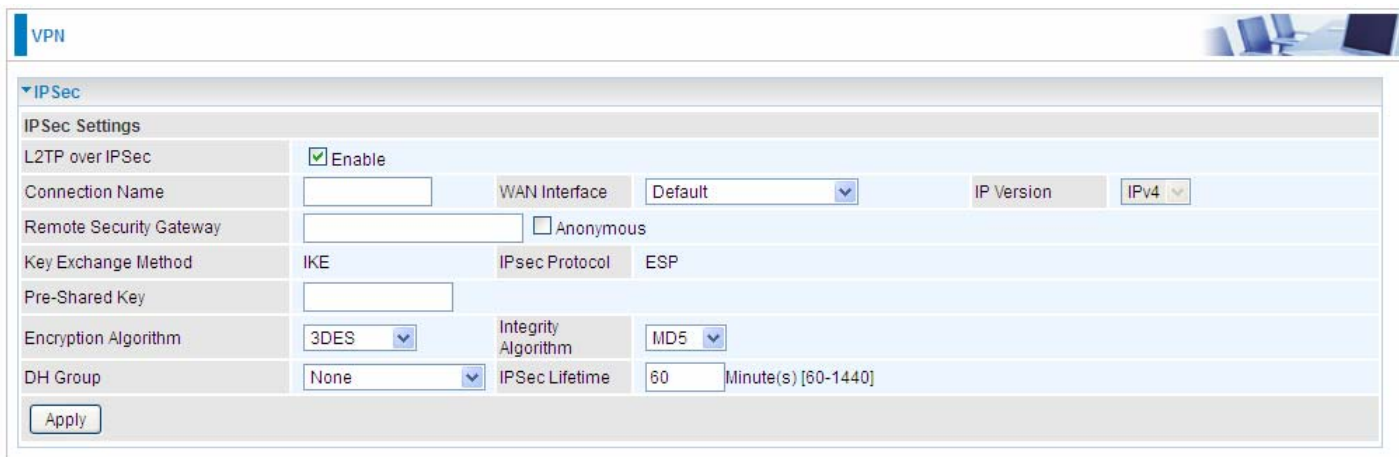
- ① **Ping:** This mode will detect whether the remote IPSec peer has lost or not by pinging specify IP address.

Ping IP (0.0.0.0 : NEVER)	<input type="text" value="0.0.0.0"/>	Interval	<input type="text" value="10"/>	Second(s) [0-3600, 0 : NEVER]
---------------------------	--------------------------------------	----------	---------------------------------	-------------------------------

**Ping IP:** Type the IP for ping operation. It is able to IP Ping the remote PC with the specified IP address and alert when the connection fails. Once alter message is received, Router will drop this tunnel connection. Reestablish of this connection is required. Default setting is 0.0.0.0 which disables the function.

**Interval:** This sets the time interval between Pings to the IP function to monitor the connection status. Default interval setting is 10 seconds. Time interval can be set from 0 to 3600 second, 0 second disables the function.

## IPSec for L2TP



The screenshot shows a configuration window for a VPN connection. The 'IPSec' section is expanded, showing the following settings:

- L2TP over IPSec:**  Enable
- Connection Name:** [Empty text box]
- WAN Interface:** Default (dropdown menu)
- IP Version:** IPv4 (dropdown menu)
- Remote Security Gateway:** [Empty text box]  Anonymous
- Key Exchange Method:** IKE
- IPsec Protocol:** ESP
- Pre-Shared Key:** [Empty text box]
- Encryption Algorithm:** 3DES (dropdown menu)
- Integrity Algorithm:** MD5 (dropdown menu)
- DH Group:** None (dropdown menu)
- IPsec Lifetime:** 60 Minute(s) [60-1440]

An 'Apply' button is located at the bottom left of the configuration area.

**Connection Name:** A given name for the connection, but it should contain no spaces (e.g. “connection-to-office”).

**WAN Interface:** Select the set interface for the IPSec tunnel.

**Remote Security Gateway:** Input the IP of remote security gateway.

**Key Exchange Method:** Displays key exchange method.

**Pre-Shared Key:** This is for the Internet Key Exchange (IKE) protocol, a string from 4 to 128 characters. Both sides should use the same key. IKE is used to establish a shared security policy and authenticated keys for services (such as IPSec) that require a key. Before any IPSec traffic can be passed, each router must be able to verify the identity of its peer. This can be done by manually entering the pre-shared key into both sides (router or hosts).

**Encryption Algorithm:** Select the encryption algorithm from the drop-down menu. There are several options: 3DES and AES (128, 192 and 256). 3DES and AES are more powerful but increase latency.

- ① **DES:** Stands for Triple Data Encryption Standard, it uses 56 bits as an encryption method.
- ① **3DES:** Stands for Triple Data Encryption Standard, it uses 168 (56\*3) bits as an encryption method.
- ① **AES:** Stands for Advanced Encryption Standards, you can use 128, 192 or 256 bits as encryption method.

**Integrity Algorithm:** Authentication establishes the integrity of the datagram and ensures it is not tampered with in transmit. There are 2 options: Message Digest 5 (MD5) and Secure Hash Algorithm (SHA1). SHA1 is more resistant to brute-force attacks than MD5. However, it is slower.

- ① **MD5:** A one-way hashing algorithm that produces a 128-bit hash.
- ① **SHA1:** A one-way hashing algorithm that produces a 160-bit hash.

**DH Group:** It is a public-key cryptography protocol that allows two parties to establish a shared secret over an unsecured communication channel (i.e. over the Internet). MODP stands for Modular Exponentiation Groups.

**IPSec Lifetime:** Specify the number of minutes that IPSec will stay active before new encryption and authentication key will be exchanged. Enter a value to negotiate and establish secure authentication. Default is 60 minutes (3600 seconds). A short time increases security by forcing the two parties to update the keys. However, every time when the VPN tunnel re- negotiates, access through the tunnel will be temporarily disconnected.

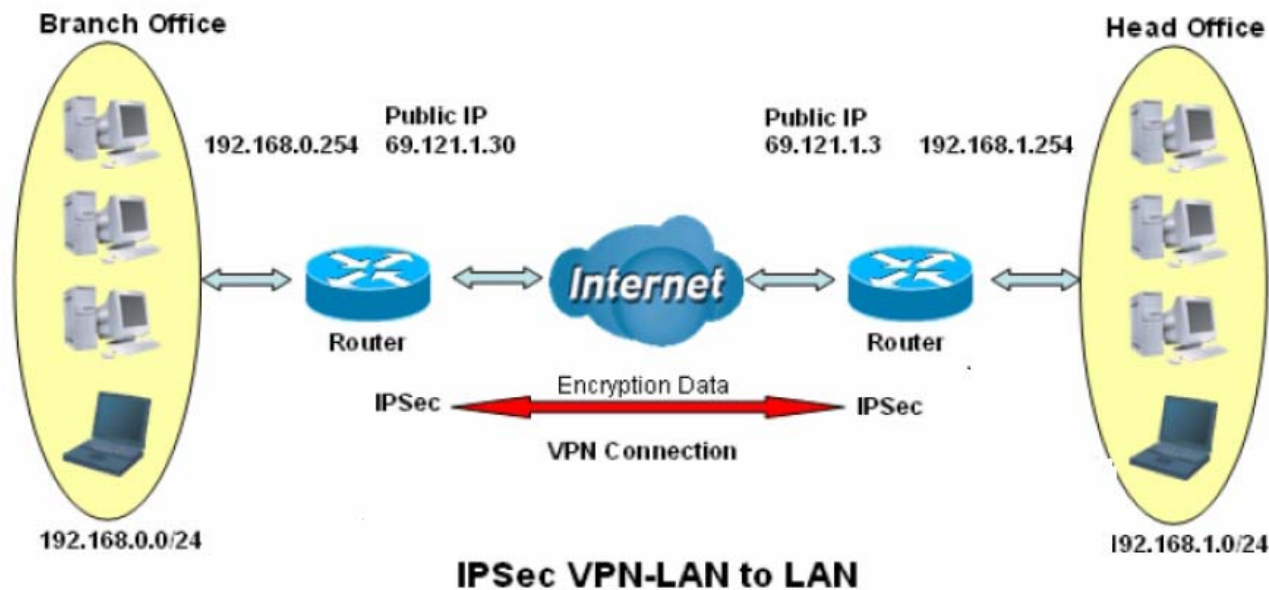


## Examples:

### 1. LAN-to-LAN connection

Two BiPAC 7800DXs want to setup a secure IPSec VPN tunnel

**Note:** The IPSec Settings shall be consistent between the two routers.



#### Head Office Side:

Setup details:

Item	Function		Description
1	Connection Name	H-to-B	Give a name for IPSec connection
2	Local Network		
	Subnet		Select Subnet
	IP Address	192.168.1.0	Head Office network
	Netmask	255.255.255.0	
3	Secure Gateway Address(Hostanme)	69.121.1.30	IP address of the Branch office router (on WAN side)
4	Remote Network		
	Subnet		Select Subnet
	IP Address	192.168.0.0	Branch office network
	Netmask	255.255.255.0	
5	Proposal		
	Method	ESP	Security Plan
	Authentication	MD5	
	Encryption	3DES	
	Prefer Forward Security	MODP 1024(group2)	
Pre-shared Key	123456		



### ▼ IPsec

#### IPsec Settings

L2TP over IPsec	<input type="checkbox"/> Enable		
Connection Name	H-to-B	WAN Interface	Default
Local Network	Subnet	IP Address	192.168.1.0
Remote Security Gateway	69.121.1.30	<input type="checkbox"/> Anonymous	
Remote Network	Subnet	IP Address	192.168.0.0
Key Exchange Method	IKE	IPsec Protocol	ESP
Pre-Shared Key	123456		
Local ID Type	Default	ID Content	
Remote ID Type	Default	ID Content	

#### Phase 1

Mode	Main
Encryption Algorithm	3DES
DH Group	MODP1024(DH2)
Integrity Algorithm	MD5
SA Lifetime	480 Minute(s) [60-1440]

#### Phase 2

Encryption Algorithm	3DES
DH Group	MODP1024(DH2)
Integrity Algorithm	MD5
IPsec Lifetime	60 Minute(s) [60-1440]
Ping for Keep Alive	DPD
Detection Interval	180 Second(s) [180-86400]
Idle Timeout	5 Consecutive times [5-99]

Apply

**Branch Office Side:**

Setup details: the same operation as done in Head Office side

Item	Function		Description	
1	Connection Name	B-to-H	Give a name for IPSec connection	
2	Local Network		Branch Office network	
	Subnet			Select Subnet
	IP Address	192.168.0.0		
	Netmask	255.255.255.0		
3	Remote Secure Gateway Address(Hostanme)	69.121.1.3	IP address of the Head office router (on WAN side)	
4	Remote Network		Head office network	
	Subnet			Select Subnet
	IP Address	192.168.1.0		
	Netmask	255.255.255.0		
5	Proposal		Security Plan	
	Method	ESP		
	Authentication	MD5		
	Encryption	3DES		
	Prefer Forward Security	MODP 1024(group2)		
	Pre-shared Key	123456		

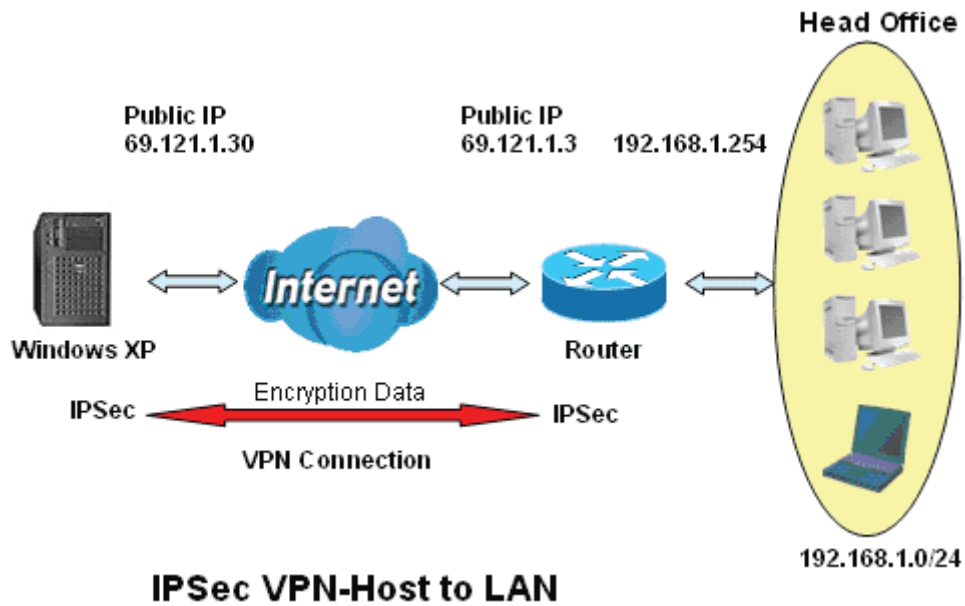
The screenshot shows a VPN configuration page with the following sections:

- IPSec Settings:**
  - L2TP over IPSec:  Enable
  - Connection Name: B-to-H
  - WAN Interface: Default
  - IP Version: IPv4
  - Local Network: Subnet (dropdown), IP Address: 192.168.0.0, Netmask: 255.255.255.0
  - Remote Security Gateway: 69.121.1.3,  Anonymous
  - Remote Network: Subnet (dropdown), IP Address: 192.168.1.0, Netmask: 255.255.255.0
  - Key Exchange Method: IKE, IPsec Protocol: ESP
  - Pre-Shared Key: 123456
  - Local ID Type: Default, ID Content: (empty)
  - Remote ID Type: Default, ID Content: (empty)
- Phase 1:**
  - Mode: Main
  - Encryption Algorithm: 3DES, Integrity Algorithm: MD5
  - DH Group: MODP1024(DH2), SA Lifetime: 480 Minute(s) [60-1440]
- Phase 2:**
  - Encryption Algorithm: 3DES, Integrity Algorithm: MD5
  - DH Group: MODP1024(DH2), IPsec Lifetime: 60 Minute(s) [60-1440]
  - Ping for Keep Alive: DPD
  - Detection Interval: 180 Second(s) [180-86400], Idle Timeout: 5 Consecutive times [5-99]

An "Apply" button is located at the bottom left of the configuration area.

## 2. Host to LAN

Router servers as VPN server, and host should install the IPSec client to connect to head office through IPSec VPN.



Item	Function		Description
1	Connection Name	Headoffice-to-Host	Give a name for IPSec connection
2	Local Network		
	Subnet		Select Subnet
	IP Address	192.168.1.0	Head Office network
Netmask	255.255.255.0		
3	Remote Secure Gateway (Hostanme)	69.121.1.30	IP address of the Branch office router (on WAN side)
4	Remote Network		
	Single Address	69.121.1.30	Host
5	Proposal		
	Method	ESP	Security Plan
	Authentication	MD5	
	Encryption	3DES	
	Prefer Forward Security	MODP 1024(group2)	
Pre-shared Key	123456		



▼ IPsec

IPsec Settings

L2TP over IPsec	<input type="checkbox"/> Enable		
Connection Name	Headoffice-to-H	WAN Interface	Default
Local Network	Subnet	IP Address	192.168.1.0
Remote Security Gateway	69.121.1.30	<input type="checkbox"/> Anonymous	IP Version
Remote Network	Single Address	IP Address	69.121.1.30
Key Exchange Method	IKE	IPsec Protocol	ESP
Pre-Shared Key	123456		
Local ID Type	Default	ID Content	
Remote ID Type	Default	ID Content	

Phase 1

Mode	Main
Encryption Algorithm	3DES
DH Group	MODP1024(DH2)
Integrity Algorithm	MD5
SA Lifetime	480 Minute(s) [60-1440]

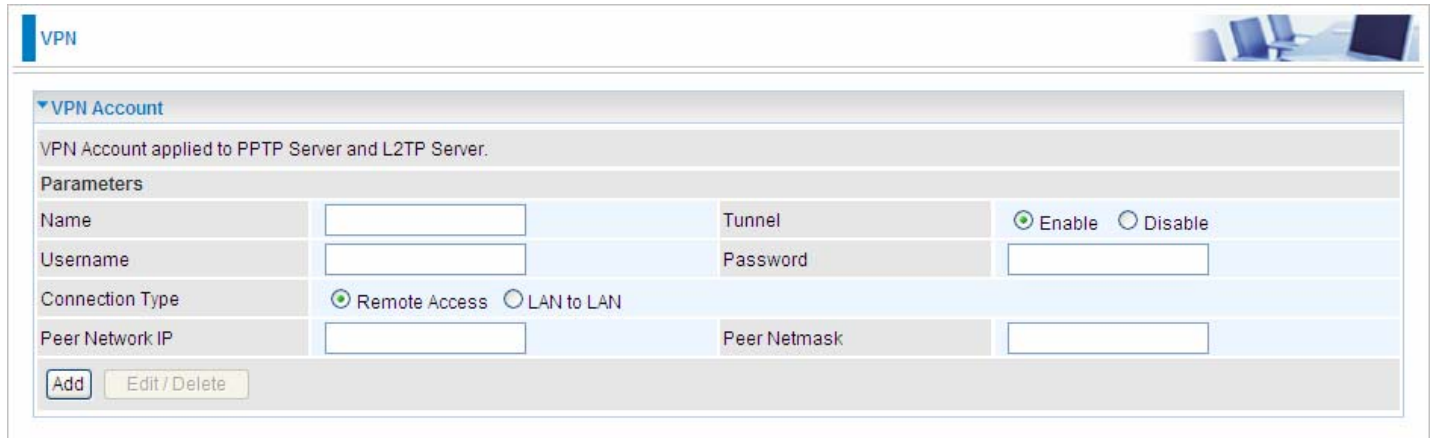
Phase 2

Encryption Algorithm	3DES
DH Group	MODP1024(DH2)
Integrity Algorithm	MD5
IPsec Lifetime	60 Minute(s) [60-1440]
Ping for Keep Alive	DPD
Detection Interval	180 Second(s) [180-86400]
Idle Timeout	5 Consecutive times [5-99]

Apply

## VPN Account

PPTP and L2TP server share the same account database set in VPN Account page.



VPN

VPN Account

VPN Account applied to PPTP Server and L2TP Server.

Parameters

Name	<input type="text"/>	Tunnel	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
Username	<input type="text"/>	Password	<input type="text"/>
Connection Type	<input checked="" type="radio"/> Remote Access <input type="radio"/> LAN to LAN		
Peer Network IP	<input type="text"/>	Peer Netmask	<input type="text"/>

**Name:** A user-defined name for the connection.

**Tunnel:** Select **Enable** to activate the account. PPTP(L2TP) server is waiting for the client to connect to this account.

**Username:** Please input the username for this account.

**Password:** Please input the password for this account.

**Connection Type:** Select Remote Access for single user, Select LAN to LAN for remote gateway.

**Peer Network IP:** Please input the subnet IP for remote network.

**Peer Netmask:** Please input the Netmask for remote network.

## PPTP

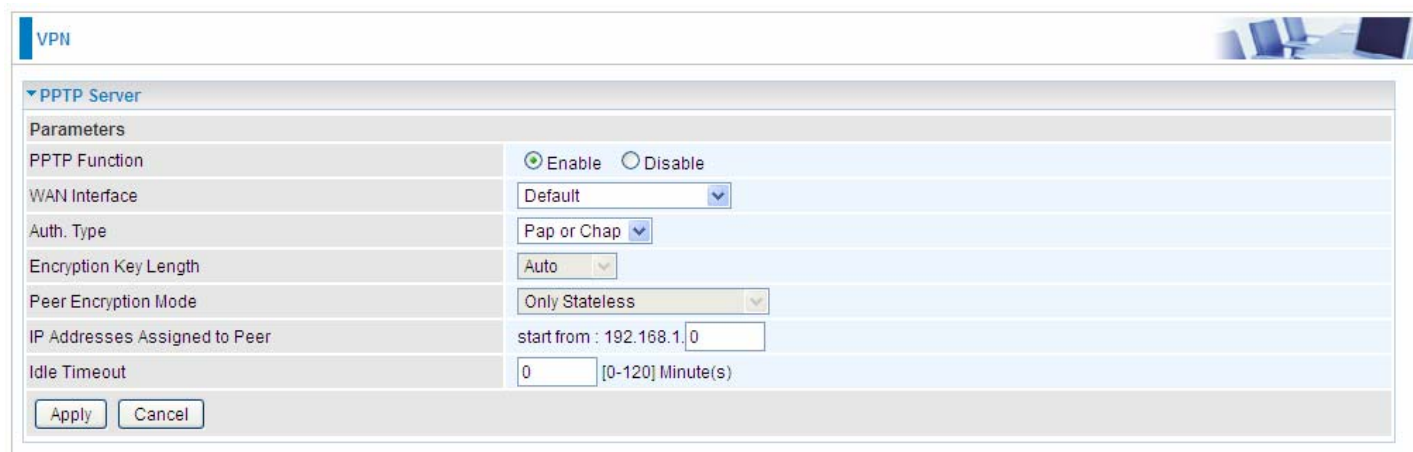
The **Point-to-Point Tunneling Protocol** (PPTP) is a Layer2 tunneling protocol for implementing virtual private networks through IP network. PPTP uses an enhanced GRE (Generic Routing Encapsulation) mechanism to provide a flow- and congestion-controlled encapsulated datagram service for carrying PPP packets.

In the Microsoft implementation, the tunneled PPP traffic can be authenticated with PAP, CHAP, Microsoft CHAP V1/V2 or EAP-TLS. The PPP payload is encrypted using Microsoft Point-to-Point Encryption (MPPE) when using MSCHAPv1/v2 or EAP-TLS.

**Note:** 4 sessions for Client and 4 sessions for Server respectively.

### PPTP Server

In PPTP session, users can set the basic parameters (authentication, encryption, peer address, etc) for PPTP Server, and accounts in the next page of PPTP Account. They both constitute the PPTP Server setting.



Parameters	
PPTP Function	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
WAN Interface	Default
Auth. Type	Pap or Chap
Encryption Key Length	Auto
Peer Encryption Mode	Only Stateless
IP Addresses Assigned to Peer	start from : 192.168.1.0
Idle Timeout	0 [0-120] Minute(s)

**PPTP Function:** Select **Enable** to activate PPTP Server. **Disable** to deactivate PPTP Server function.

**WAN Interface:** Select the exact WAN interface configured for the tunnel. Select **Default** to use the now-working WAN interface for the tunnel.

**Auth. Type:** The authentication type, Pap or Chap, PaP, Chap and MS-CHAPv2. When using PAP, the password is sent unencrypted, whilst CHAP encrypts the password before sending, and also allows for challenges at different periods to ensure that an intruder has not replaced the client. When passed the authentication with MS-CHAPv2, the MPPE encryption is supported.

**Encryption Key Length:** The data can be encrypted by MPPE algorithm with 40 bits or 128 bits. Default is Auto, it is negotiated when establishing a connection. 128 bit keys provide stronger encryption than 40 bit keys.

**Peer Encryption Mode:** You may select "Only Stateless" or "Allow Stateless and Stateful" mode. The key will be changed every packet when you select Stateless mode.

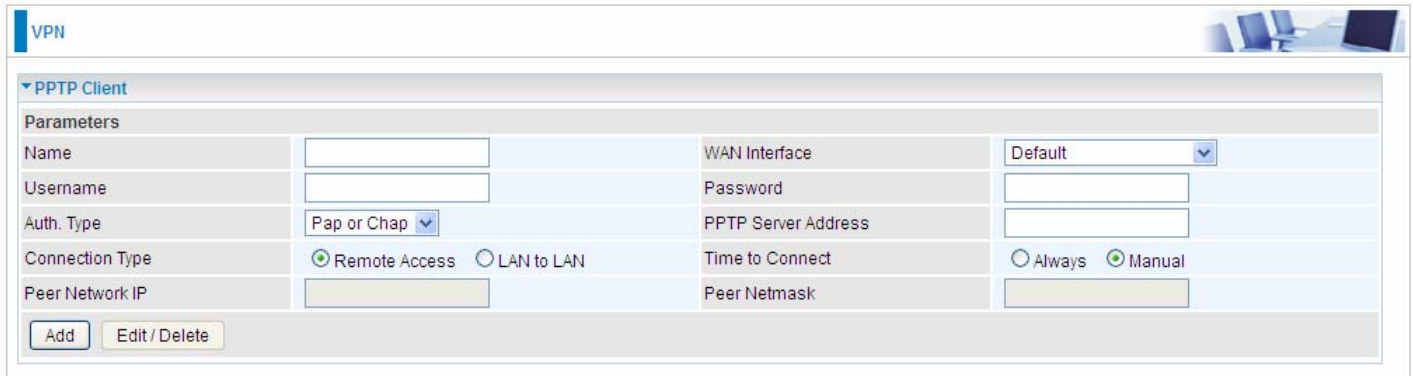
**IP Addresses Assigned to Peer:** 192.168.1.x: please input the IP assigned range from 1~ 254.

**Idle Timeout:** Specify the time for remote peer to be disconnected without any activities, from 0~120 minutes.

Click **Apply** to submit your PPTP Server basic settings.

## PPTP Client

PPTP client can help you dial-in the PPTP server to establish PPTP tunnel over Internet.



The screenshot shows a web-based configuration interface for a VPN. At the top left, there is a 'VPN' tab. Below it, a section titled 'PPTP Client' is expanded. Underneath, a 'Parameters' section contains a grid of input fields and controls:

Name	<input type="text"/>	WAN Interface	Default <input type="button" value="v"/>
Username	<input type="text"/>	Password	<input type="text"/>
Auth. Type	Pap or Chap <input type="button" value="v"/>	PPTP Server Address	<input type="text"/>
Connection Type	<input checked="" type="radio"/> Remote Access <input type="radio"/> LAN to LAN	Time to Connect	<input type="radio"/> Always <input checked="" type="radio"/> Manual
Peer Network IP	<input type="text"/>	Peer Netmask	<input type="text"/>

At the bottom of the parameters section, there are two buttons: 'Add' and 'Edit / Delete'.

**Name:** user-defined name for identification.

**WAN Interface:** Select the exact WAN interface configured for the tunnel. Select Default to use the now-working WAN interface for the tunnel.

**Username:** Enter the username provided by your VPN Server.

**Password:** Enter the password provided by your VPN Server.

**Auth. Type:** Default is Auto if you want the router to determine the authentication type to use, or else manually specify CHAP (Challenge Handshake Authentication Protocol) or PAP (Password Authentication Protocol) if you know which type the server is using (when acting as a client), or else the authentication type you want clients connecting to you to use (when acting as a server). When using PAP, the password is sent unencrypted, whilst CHAP encrypts the password before sending, and also allows for challenges at different periods to ensure that an intruder has not replaced the client.

**PPTP Server Address:** Enter the IP address of the PPTP server.

**Connection Type:** Select Remote Access for single user, Select LAN to LAN for remote gateway.

**Time to Connect:** Select Always to keep the connection always on, or Manual to connect manually any time.

**Peer Network IP:** Please input the subnet IP for Server peer.

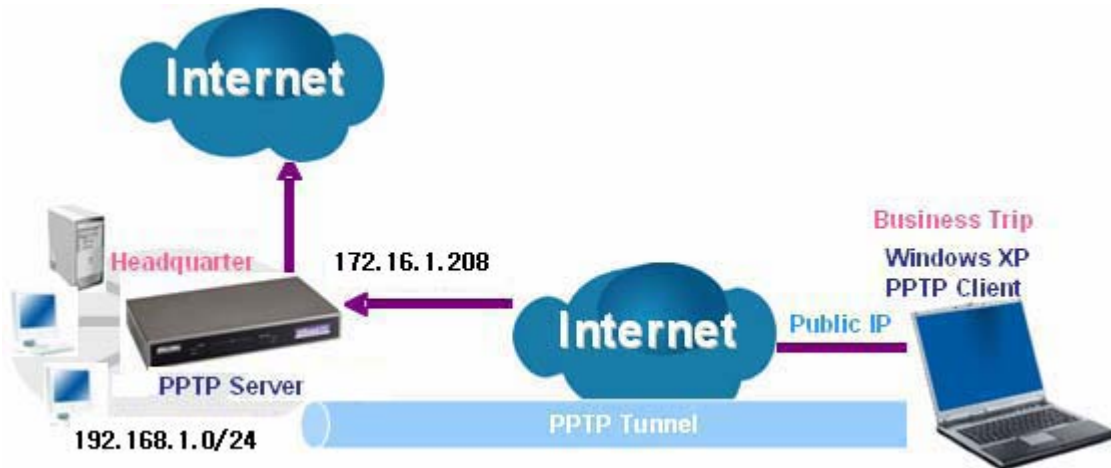
**Peer Netmask:** Please input the Netmask for server peer.

Click **Add** button to save your changes.

## Example: PPTP Remote Access with Windows7



(Note: inside test with 172.16.1.208, just an example for illustration)



**Server Side:**

1. Configuration > VPN > PPTP and Enable the PPTP function, Click **Apply**.

VPN

▼ PPTP Server

Parameters

PPTP Function  Enable  Disable

WAN Interface Default

Auth. Type MS-CHAPv2

Encryption Key Length Auto

Peer Encryption Mode Only Stateless

IP Addresses Assigned to Peer start from : 192.168.1.100

Idle Timeout 10 [0-120] Minute(s)

Apply Cancel

2. Create a PPTP Account “test”.

VPN

▼ VPN Account

VPN Account applied to PPTP Server and L2TP Server.

Parameters

Name  Tunnel  Enable  Disable

Username  Password

Connection Type  Remote Access  LAN to LAN

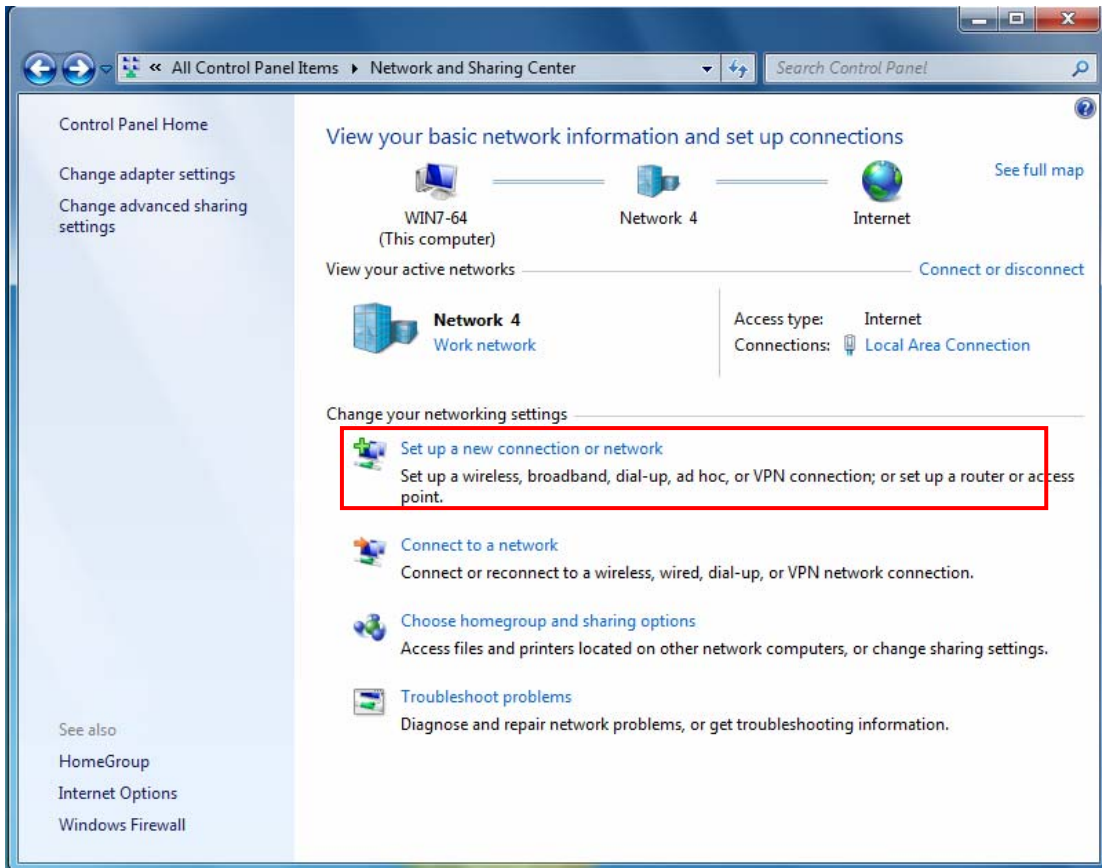
Peer Network IP  Peer Netmask

Add Edit / Delete

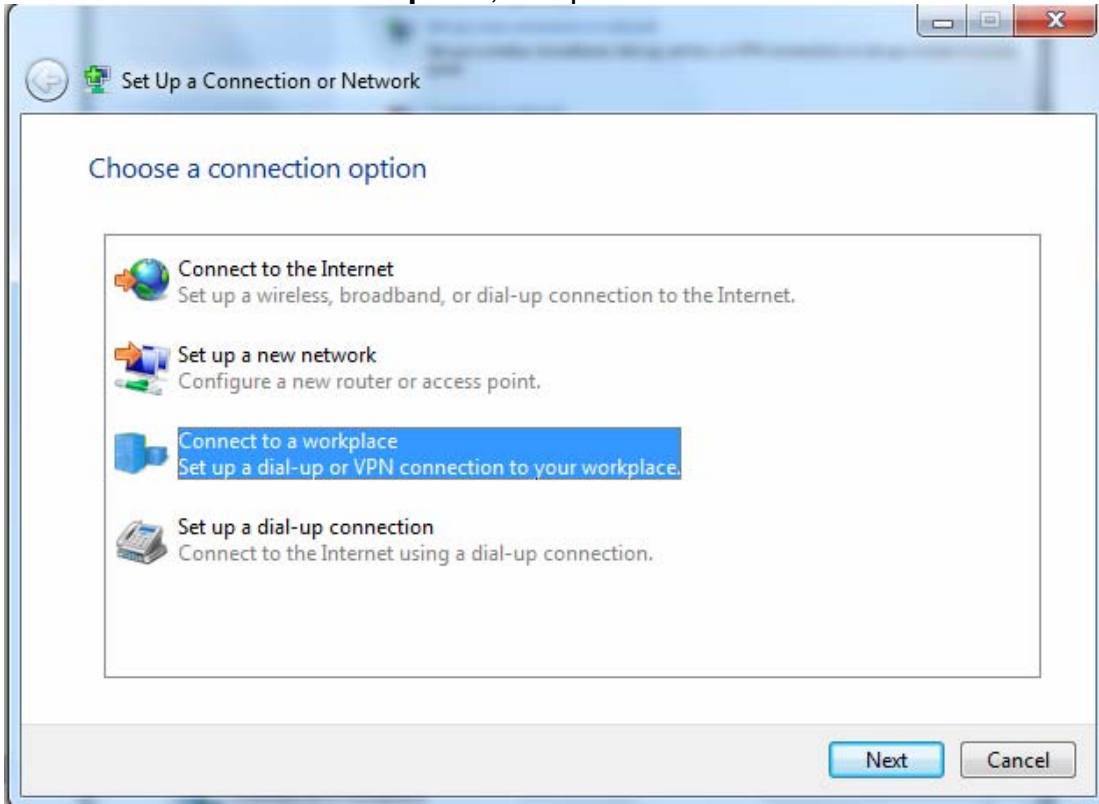
Edit	Name	Tunnel	Connection Type	Peer Network IP	Peer Netmask	Delete
<input type="radio"/>	test	Enable	Remote Access			<input type="checkbox"/>

**Client Side:**

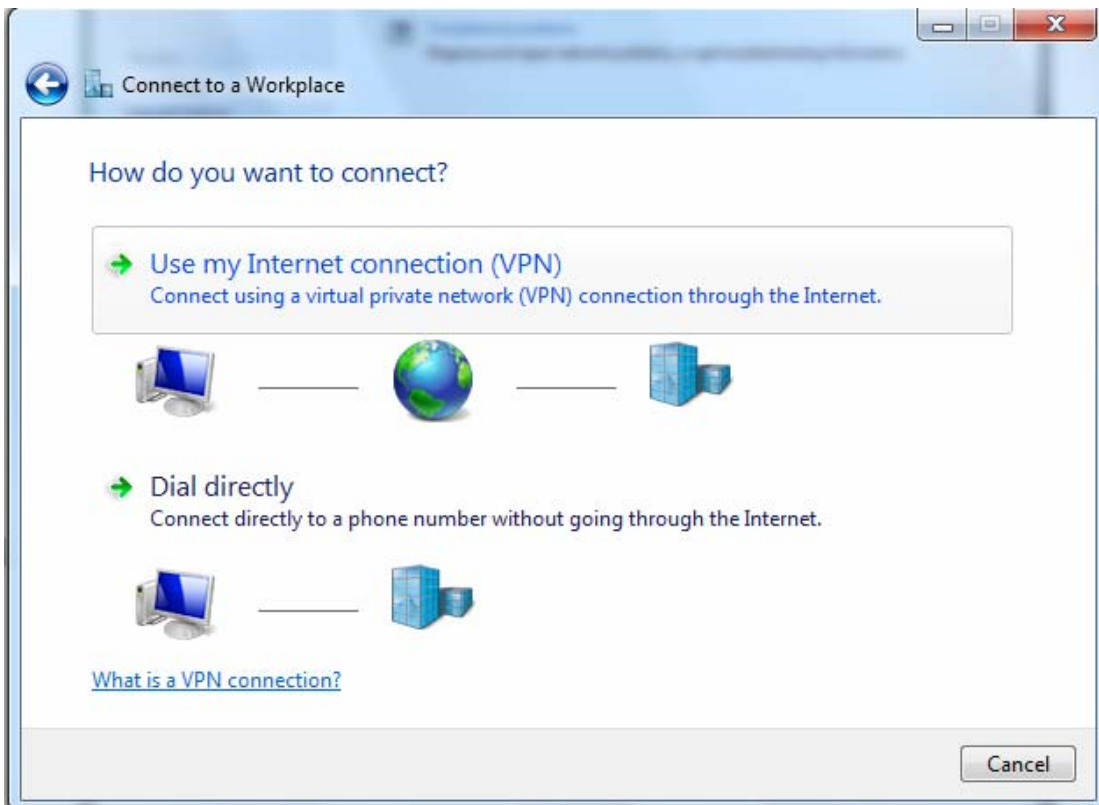
1. In Windows7 click **Start > Control Panel> Network and Sharing Center**, Click **Set up a new connection network**.



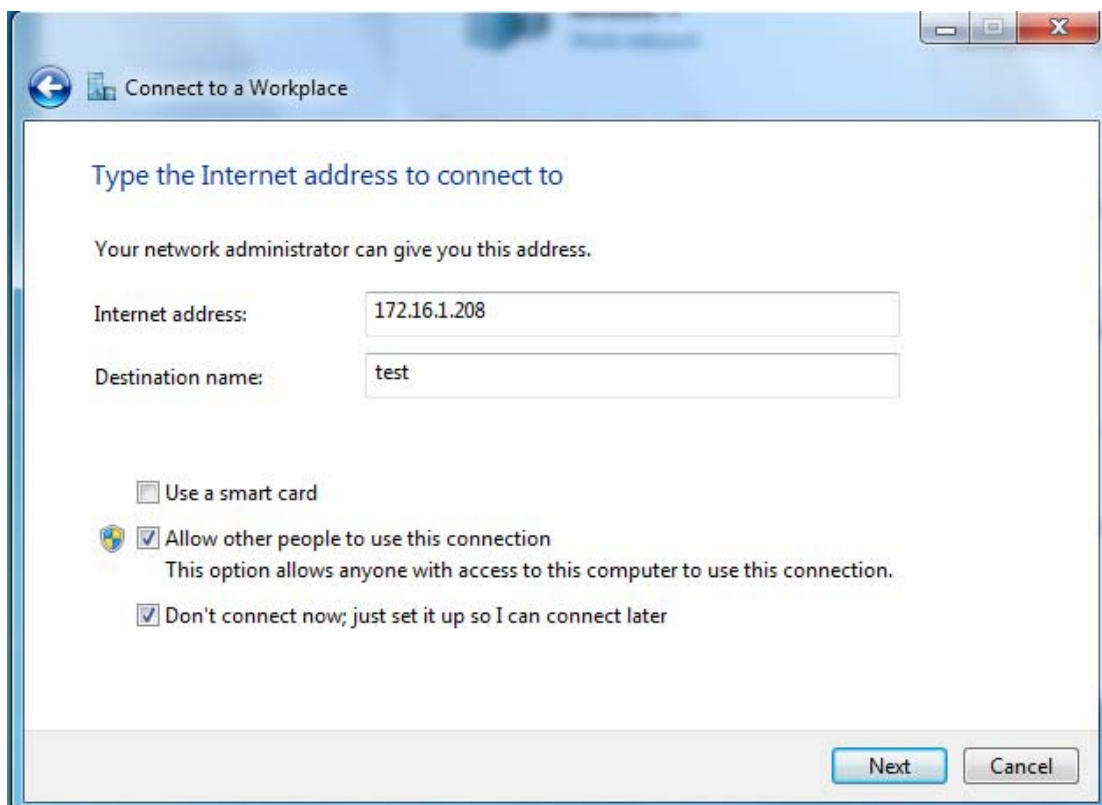
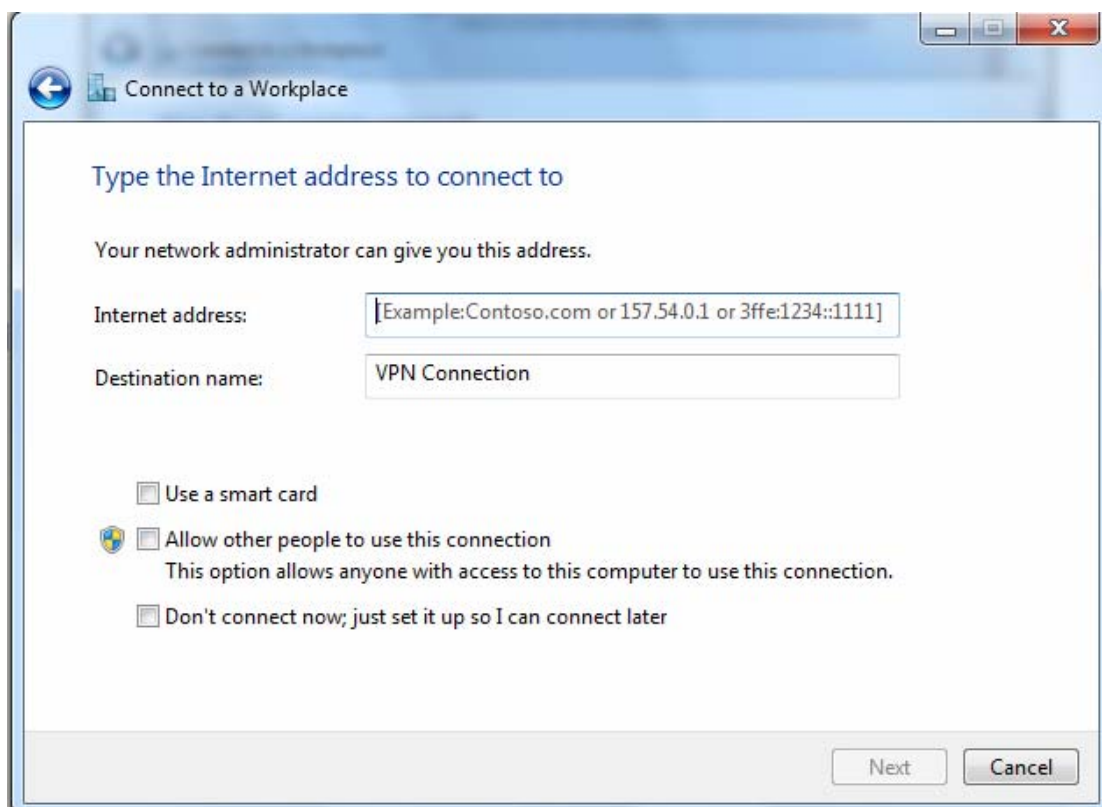
2. Click **Connect to a workplace**, and press **Next**.



3. Select **Use my Internet connection (VPN)** and press **Next**.



4. Input **Internet address** and **Destination name** for this connection and press **Next**.



5. Input the account (**user name** and **password**) and press **Create**.

Connect to a Workplace

Type your user name and password

User name:

Password:

Show characters

Remember this password

Domain (optional):

Create Cancel

Connect to a Workplace

Type your user name and password

User name:

Password:

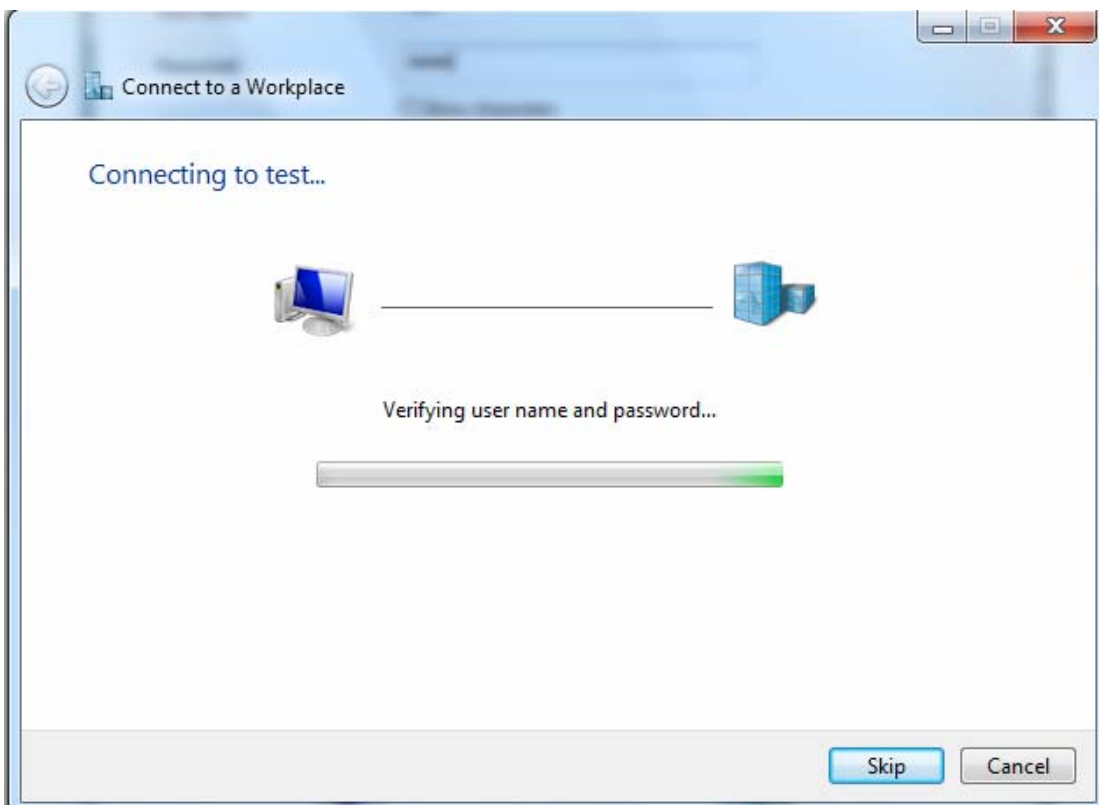
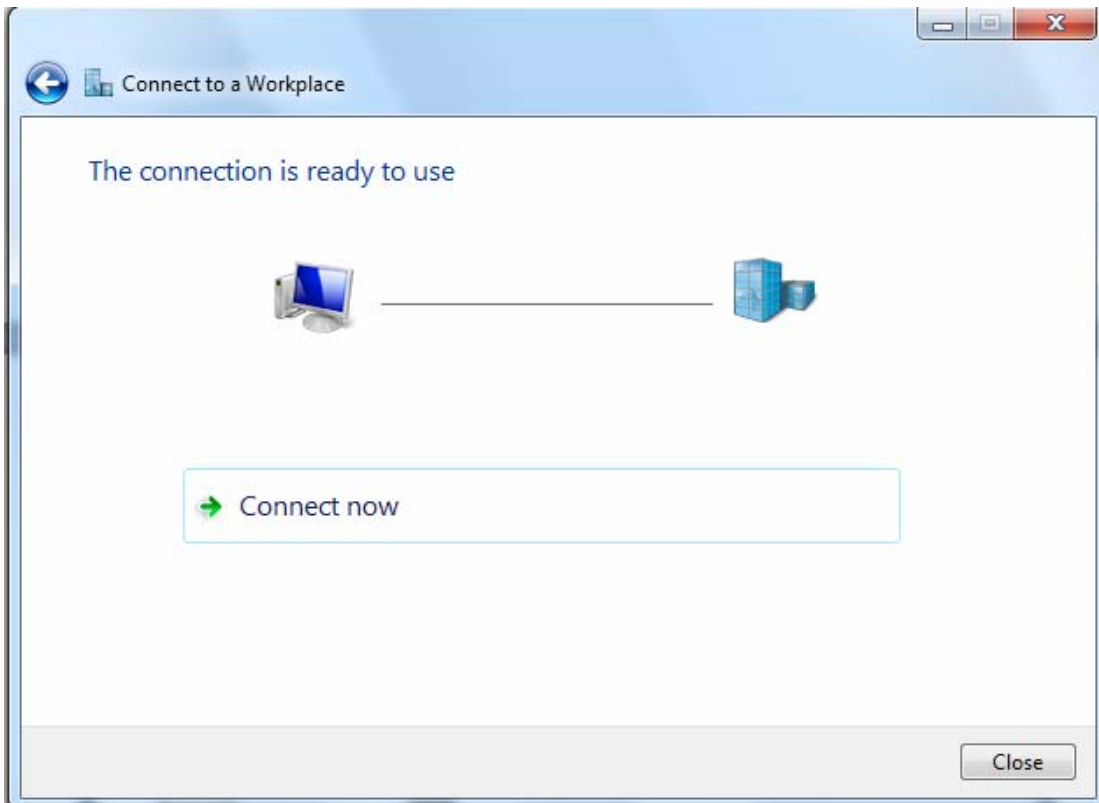
Show characters

Remember this password

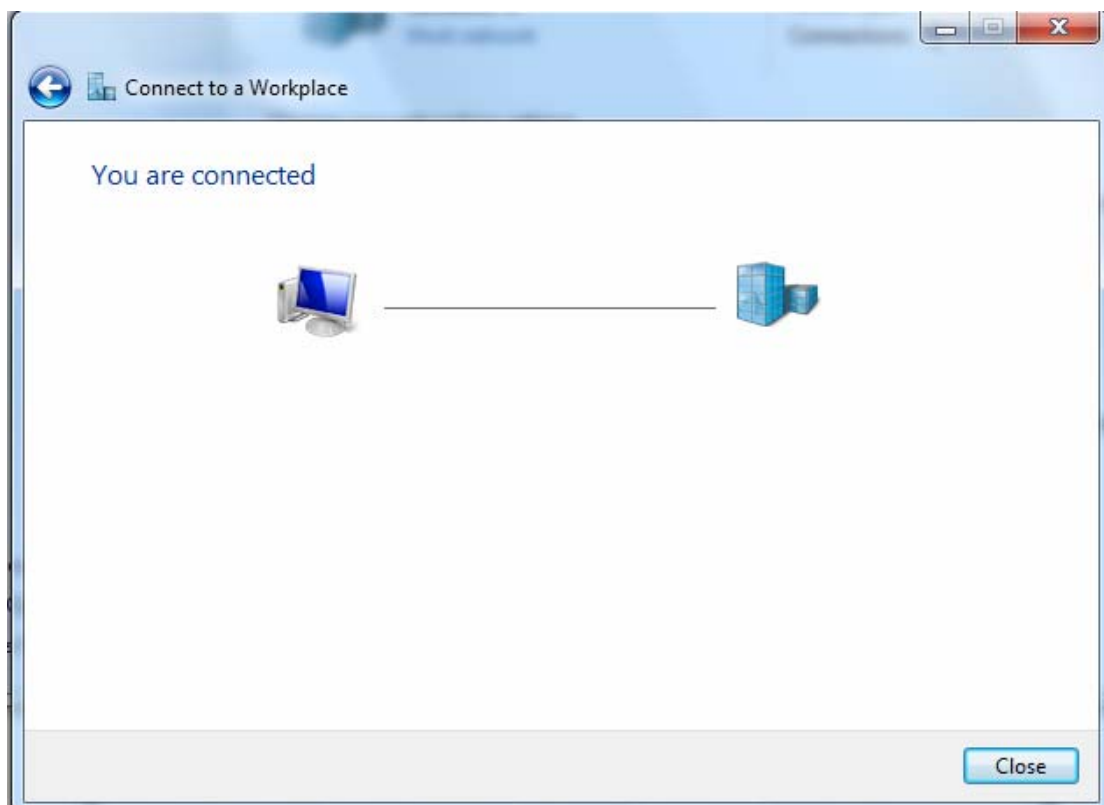
Domain (optional):

Create Cancel

6. Connect to the server.

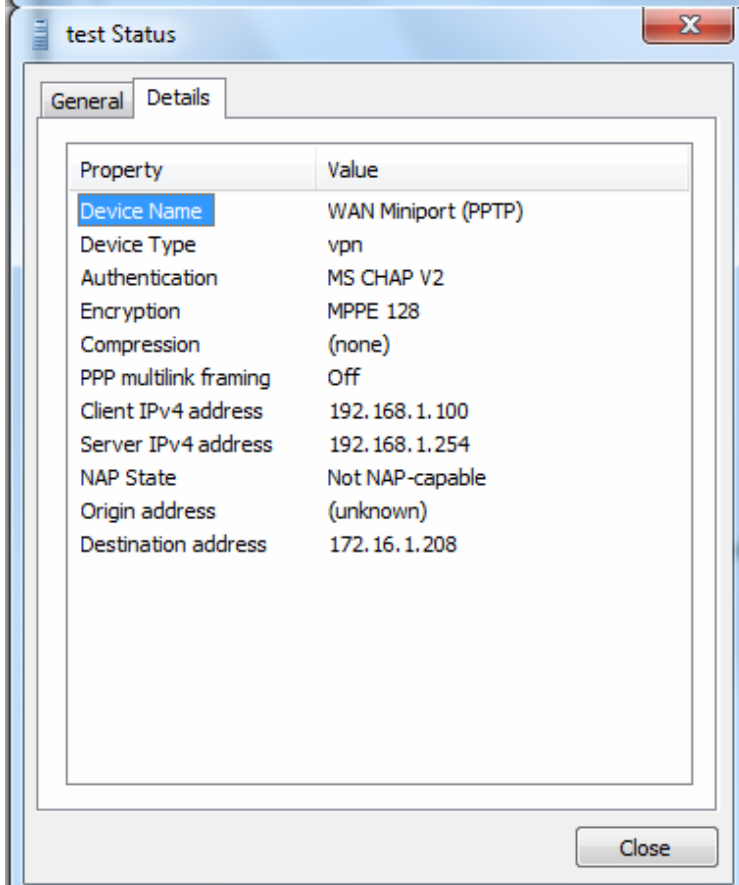
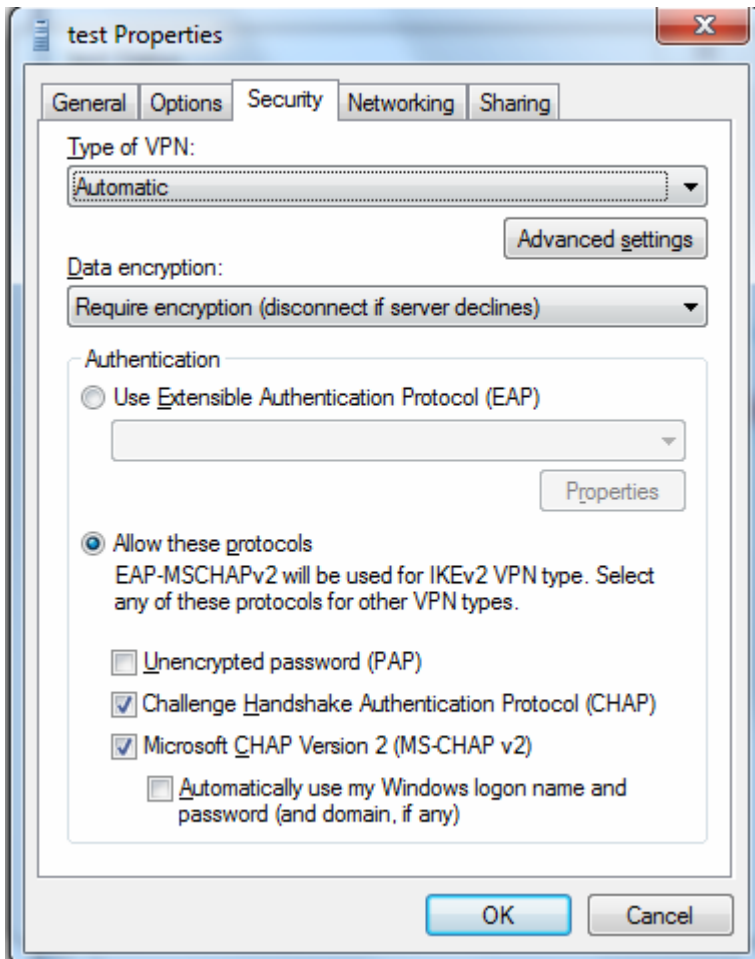


7. Successfully connected.



**PS:** You can also go to **Network Connections** shown below to check the detail of the connection. Right click "test" icon, and select "Properties" to change the security parameters (if the connection fails, users can go here to change the settings)

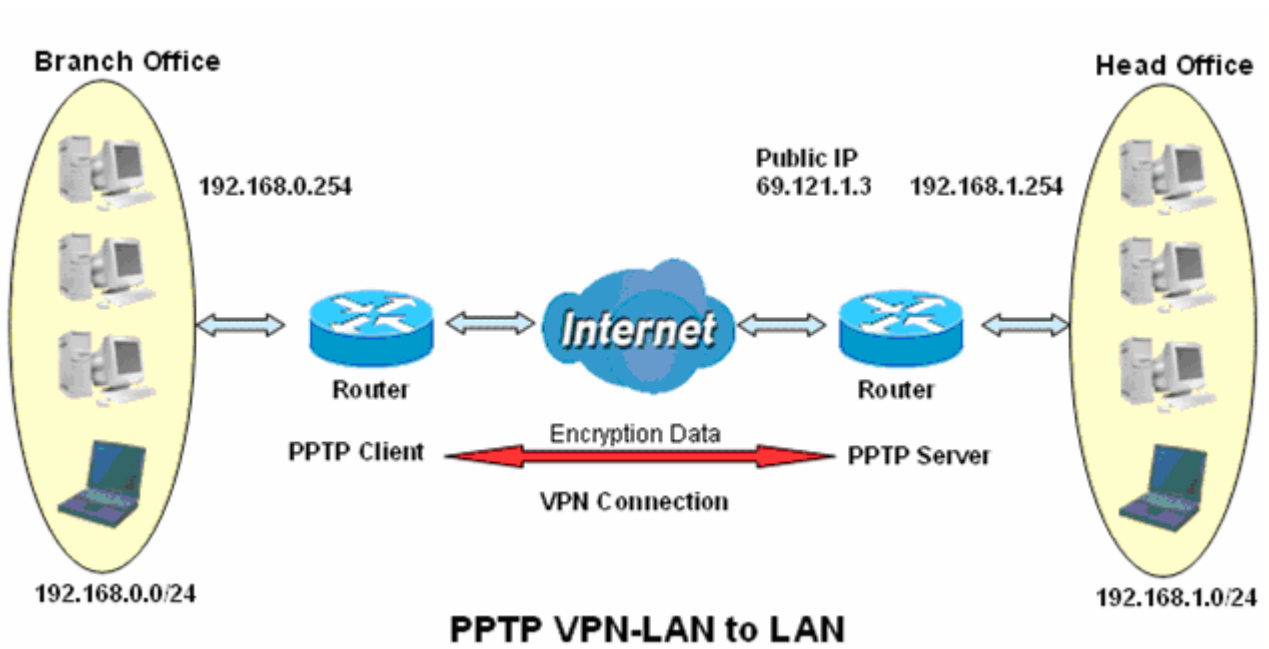






## Example: Configuring a LAN-to-LAN PPTP VPN Connection

The branch office establishes a PPTP VPN tunnel with head office to connect two private networks over the Internet. The routers are installed in the head office and branch offices accordingly.



### Server side: Head Office

The screenshot shows the configuration interface for the PPTP Server. The title bar reads **VPN**. The main section is titled **PPTP Server** and contains the following parameters:

Parameter	Value
PPTP Function	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
WAN Interface	Default
Auth. Type	MS-CHAPv2
Encryption Key Length	Auto
Peer Encryption Mode	Only Stateless
IP Addresses Assigned to Peer	start from : 192.168.1.100
Idle Timeout	10 [0-120] Minute(s)

At the bottom of the configuration area, there are **Apply** and **Cancel** buttons.

The above is the common setting for PPTP Server, set as you like for authentication and encryption. The settings in Client side should be in accordance with settings in Server side.

Then the PPTP Account.

VPN

▼ VPN Account

VPN Account applied to PPTP Server and L2TP Server.

Parameters

Name: HO Tunnel:  Enable  Disable

Username: HO Password: ●●●●

Connection Type:  Remote Access  LAN to LAN

Peer Network IP: 192.168.0.0 Peer Netmask: 255.255.255.0

Edit	Name	Tunnel	Connection Type	Peer Network IP	Peer Netmask	Delete
<input checked="" type="checkbox"/>	Ho	Enable	LAN to LAN	192.168.0.0	255.255.255.0	<input type="checkbox"/>

### Client Side: Branch Office

The client user can set up a tunnel connecting to the PPTP server, and can also set the tunnel as the default route for all outgoing traffic.

VPN

▼ PPTP Client

Parameters

Name: BO WAN Interface: Default

Username: test Password: ●●●●

Auth. Type: MS-CHAPv2 PPTP Server Address: 69.121.1.3

Connection Type:  Remote Access  LAN to LAN Time to Connect:  Always  Manual

Peer Network IP: 192.168.1.0 Peer Netmask: 255.255.255.0

Edit	Enable	Default Gateway	Name	Time to Connect	PPTP Server Address	Connection Type	Peer Network IP	Peer Netmask	Delete
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	BO	Manual	69.121.1.3	LAN to LAN	192.168.1.0	255.255.255.0	<input type="checkbox"/>

**Note:** users can see the “Default Gateway” item in the bar, and user can check to select the tunnel as the default gateway (default route) for traffic. If selected, all outgoing traffic will be forwarded to this tunnel and routed to the next hop.

## L2TP

The **Layer 2 Tunneling Protocol (L2TP)** is a Layer2 tunneling protocol for implementing virtual private networks.

L2TP does not provide confidentiality or strong authentication by itself. IPsec is often used to secure L2TP packets by providing confidentiality, authentication and integrity. The combination of these two protocols is generally known as L2TP/IPsec.

In L2TP section, both pure L2TP and L2TP/IPSec are supported. Users can choose your preferable option for your own needs.

**Note:** 4 sessions for Client and only one for Server respectively.

### L2TP Server

In L2TP session, users can set the basic parameters(authentication, encryption, peer address, etc) for L2TP Server, and accounts in the page of VPN Account. They both constitutes the complete L2TP Server settings.

The screenshot shows the 'L2TP Server' configuration window. It includes a 'Parameters' section with the following fields:

- L2TP:** Radio buttons for 'Enable' (selected) and 'Disable'.
- WAN Interface:** A dropdown menu showing 'Default or IPsec Tunnel' and 'IPSec'.
- Auth. Type:** A dropdown menu showing 'Pap or Chap'.
- IP Addresses Assigned to Peer:** A text input field with 'start from: 192.168.1.0'.
- Tunnel Authentication:** A checkbox that is currently unchecked.
- Secret:** A text input field.
- Remote Host Name:** A text input field.
- Local Host Name:** A text input field.

At the bottom of the window, there are 'Apply' and 'Cancel' buttons.

**L2TP:** Select **Enable** to activate L2TP Server. **Disable** to deactivate L2TP Server.

**WAN Interface:** Select the exact WAN interface configured as source for the tunnel. Select different interfaces, you will decide whether to use L2TP over IPsec or the pure L2TP.

- ① **L2TP over IPsec,** Select "Default or IPsec Tunnel" only when there is IPsec for L2TP rule in place.
- ① **Pure L2TP,** Select Default (there is no IPsec for L2TP in place) or other interface to activate the pure L2TP.

**Auth. Type:** The authentication type, Pap or Chap, PaP, Chap. When using PAP, the password is sent unencrypted, whilst CHAP encrypts the password before sending, and also allows for challenges at different periods to ensure that an intruder has not replaced the client.

**IP Addresses Assigned to Peer:** 192.168.1.x: please input the IP assigned range from 1~ 254.

**Tunnel Authentication:** Select whether to enable L2TP tunnel authentication. Enable it if needed and set the same in the client side.

**Secret:** Enter the secretly pre-shared password for tunnel authentication.

**Remote Host Name:** Enter the remote host name (of peer) featuring the destination of the L2TP tunnel.

**Local Host Name:** Enter the local host name featuring the source of the L2TP tunnel.

Click **Apply** to submit your L2TP Server basic settings.

## L2TP Client

L2TP client can help you dial-in the L2TP server to establish L2TP tunnel over Internet.



The screenshot shows the 'L2TP Client' configuration page. The 'L2TP over IPsec' checkbox is unchecked. The form includes fields for Name, WAN Interface (Default), Username, Password, Auth. Type (Pap or Chap), L2TP Server Address, Connection Type (Remote Access selected), Peer Network IP, Peer Netmask, Tunnel Authentication, Remote Host Name, and Local Host Name. There are 'Add' and 'Edit / Delete' buttons at the bottom.

**Name:** user-defined name for identification.

**L2TP over IPsec:** If your L2TP server has used L2TP over IPsec feature, please enable this item. under this circumstance, client and server communicate using L2TP over IPsec.

### ① Enable



The screenshot shows the 'L2TP Client' configuration page with 'L2TP over IPsec' checked. An 'IPsec Tunnel' dropdown menu is now visible, showing 'test2' and 'IPsec' options. The rest of the form and buttons are the same as in the previous screenshot.

**IPsec Tunnel:** Select the appropriate IPsec for L2TP rule configured for the L2TP Client.

**Username:** Enter the username provided by your L2TP Server.

**Password:** Enter the password provided by your L2TP Server.

**Auth. Type:** Default is Pap or CHap if you want the router to determine the authentication type to use, or else manually specify CHAP (Challenge Handshake Authentication Protocol) or PAP (Password Authentication Protocol) if you know which type the server is using. When using PAP, the password is sent unencrypted, whilst CHAP encrypts the password before sending, and also allows for challenges at different periods to ensure that an intruder has not replaced the client.

**L2TP Server Address:** Enter the IP address of the L2TP server.

**Connection Type:** Select Remote Access for single user, Select LAN to LAN for remote gateway.

**Peer Network IP:** Please input the subnet IP for Server.

**Peer Netmask:** Please input the Netmask for Server.

**Tunnel Authentication:** Select whether to enable L2TP tunnel authentication, if the server side enables this feature, please follow.

**Secret:** Enter the set secret password in the server side.

**Remote Host Name:** Enter the remote host name featuring the destination of the L2TP tunnel.

**Local Host Name:** Enter the local host name featuring the source of the L2TP tunnel.

Click **Add** button to save your changes.

### ❶ Disable

Parameters			
Name	<input type="text"/>	L2TP over IPsec	<input type="checkbox"/> Enable
WAN Interface	Default		
Username	<input type="text"/>	Password	<input type="text"/>
Auth. Type	Pap or Chap	L2TP Server Address	<input type="text"/>
Connection Type	<input checked="" type="radio"/> Remote Access <input type="radio"/> LAN to LAN		
Peer Network IP	<input type="text"/>	Peer Netmask	<input type="text"/>
Tunnel Authentication	<input type="checkbox"/>	Secret	<input type="text"/>
Remote Host Name	<input type="text"/>	Local Host Name	<input type="text"/>

**WAN Interface:** Select the exact WAN interface configured for the tunnel. Select Default to use the now-working WAN interface for the tunnel. Under this circumstance, client and server communicate through pure L2TP server.

**Username:** Enter the username provided by your L2TP Server.

**Password:** Enter the password provided by your L2TP Server.

**Auth. Type:** Default is Pap or CHap if you want the router to determine the authentication type to use, or else manually specify CHAP (Challenge Handshake Authentication Protocol) or PAP (Password Authentication Protocol) if you know which type the server is using. When using PAP, the password is sent unencrypted, whilst CHAP encrypts the password before sending, and also allows for challenges at different periods to ensure that an intruder has not replaced the client.

**L2TP Server Address:** Enter the IP address of the L2TP server.

**Connection Type:** Select Remote Access for single user, Select LAN to LAN for remote gateway.

**Peer Network IP:** Please input the subnet IP for Server.

**Peer Netmask:** Please input the Netmask for server.

**Tunnel Authentication:** Select whether to enable L2TP tunnel authentication, if the server side enables this feature, please follow.

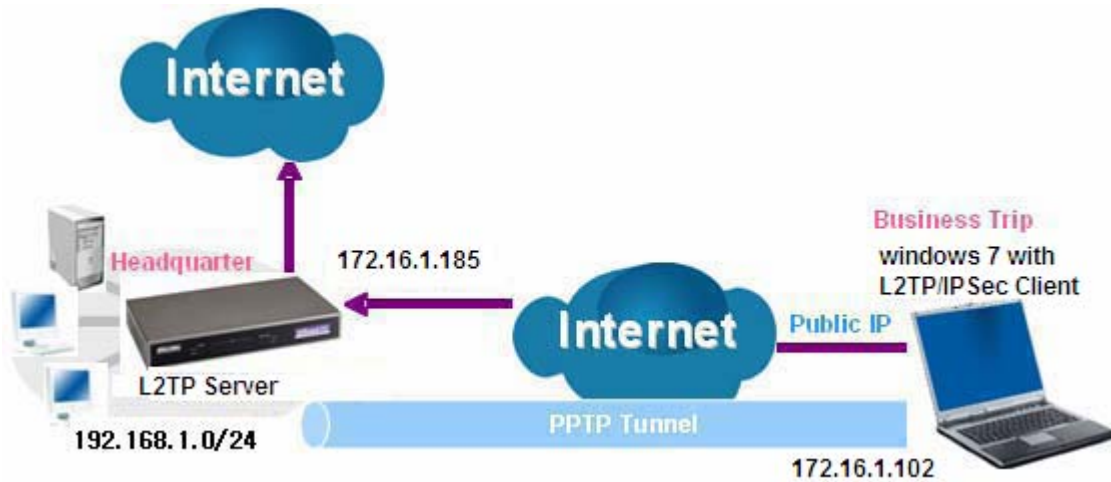
**Secret:** Enter the set secret password in the server side.

**Remote Host Name:** Enter the remote host name featuring the destination of the L2TP tunnel.

**Local Host Name:** Enter the local host name featuring the source of the L2TP tunnel.

Click **Add** button to save your changes.

**Example: L2TP over IPsec Remote Access with Windows7**  
 (Note: inside test with 172.16.1.185, just an example for illustration)



**Server Side:**

1. **Configuration > VPN > L2TP** and Enable the L2TP function, Click **Apply**.

The screenshot shows the 'VPN' configuration page for the 'L2TP Server'. The 'L2TP' checkbox is checked (Enable). The 'WAN Interface' is set to 'Default or IPsec Tunnel' and 'IPsec' is selected. The 'Auth. Type' is set to 'Chap'. The 'IP Addresses Assigned to Peer' field is set to 'start from : 192.168.1.10'. There are 'Apply' and 'Cancel' buttons at the bottom.

**The IPsec for L2TP rule**

The screenshot shows the 'VPN' configuration page for 'IPsec Settings'. The 'L2TP over IPsec' checkbox is checked (Enable). The 'WAN Interface' is set to 'Default' and 'IP Version' is set to 'IPv4'. The 'Remote Security Gateway' is checked (Anonymous). The 'Key Exchange Method' is set to 'IKE' and 'IPsec Protocol' is set to 'ESP'. The 'Pre-Shared Key' is set to '123456'. There is an 'Apply' button at the bottom.



## 2. Create a L2TP Account "test1".

The screenshot shows the Windows VPN configuration window. At the top, it says "VPN Account applied to PPTP Server and L2TP Server." Below this, there are several input fields and options:

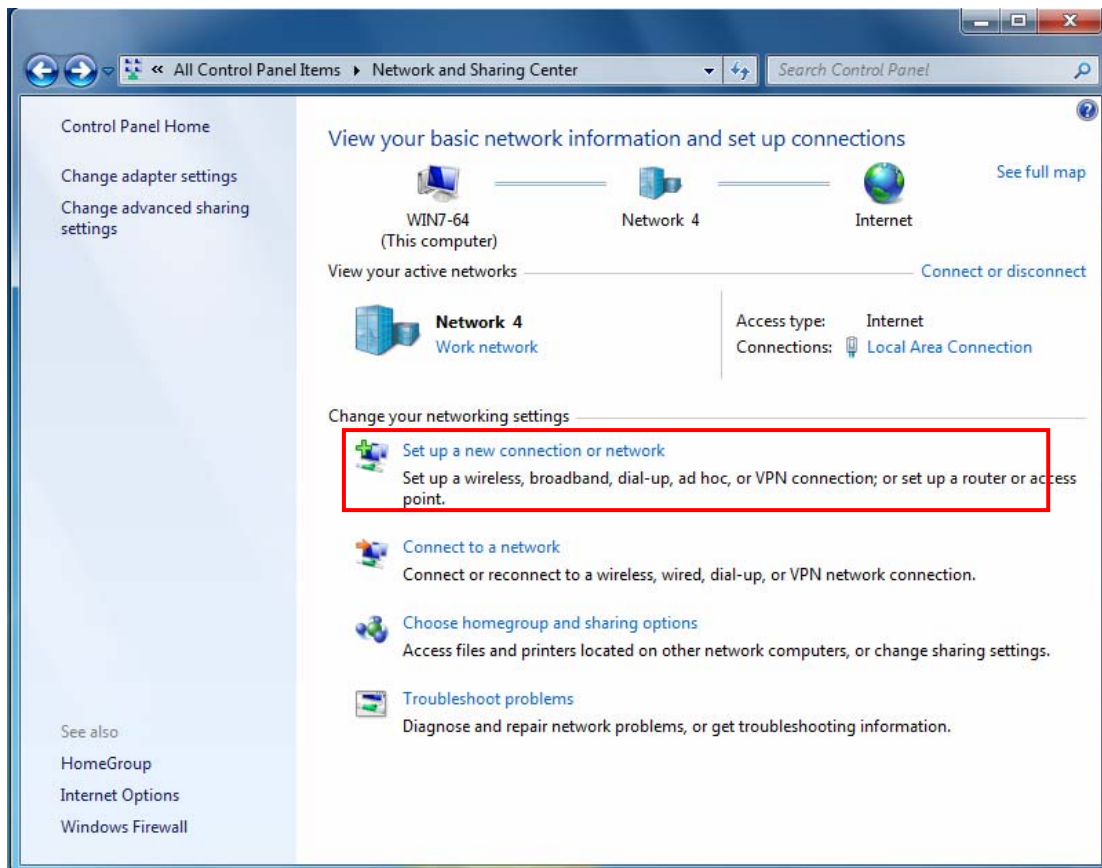
- Name:** test1
- Username:** test1
- Connection Type:** Remote Access (selected), LAN to LAN
- Tunnel:** Enable (selected), Disable
- Password:** [masked with dots]
- Peer Network IP:** [empty field]
- Peer Netmask:** [empty field]

There are "Add" and "Edit / Delete" buttons. Below the form is a table listing the configured VPN accounts:

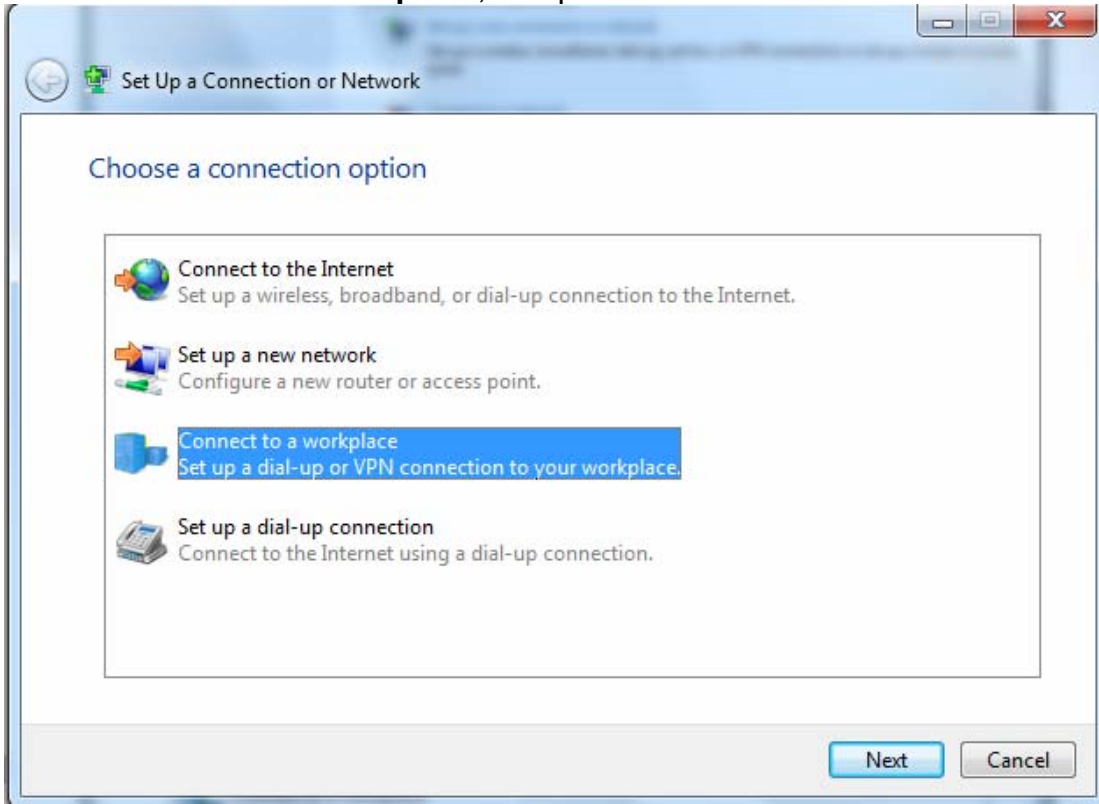
Edit	Name	Tunnel	Connection Type	Peer Network IP	Peer Netmask	Delete
<input checked="" type="checkbox"/>	test1	Enable	Remote Access			<input type="checkbox"/>

### Client Side:

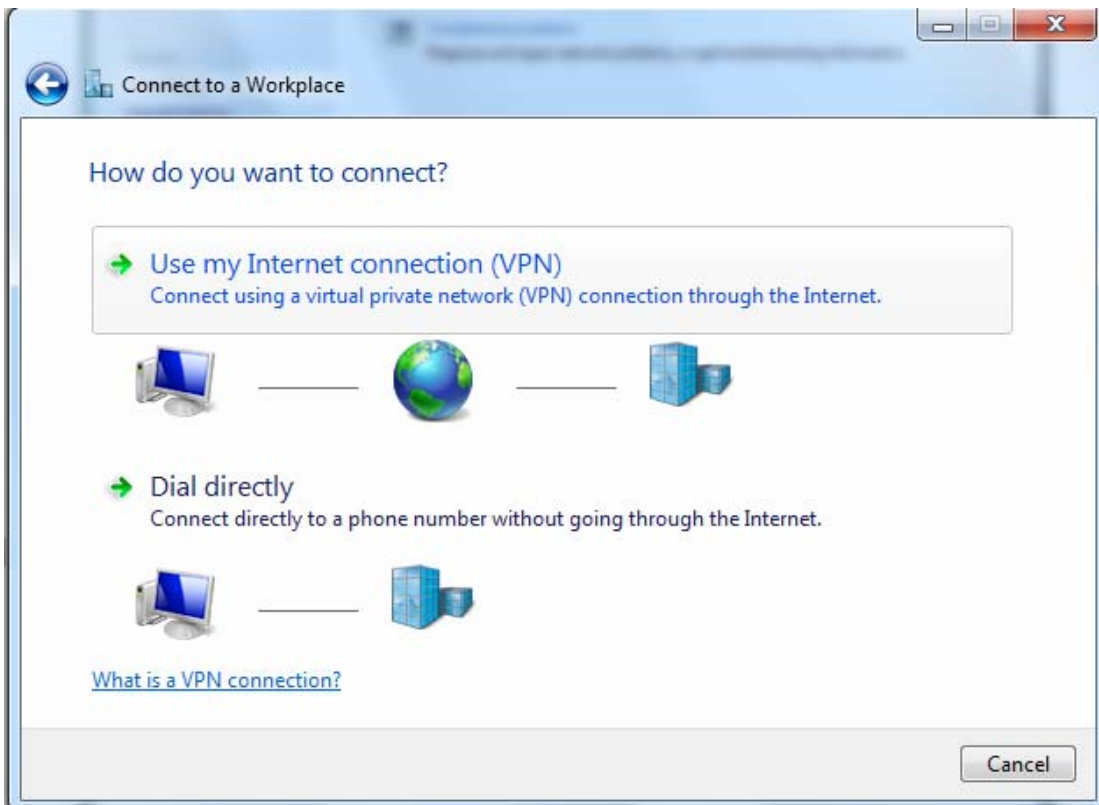
1. In Windows7 click **Start > Control Panel> Network and Sharing Center**, Click **Set up a new connection network**.



2. Click **Connect to a workplace**, and press **Next**.



3. Select **Use my Internet connection (VPN)** and press **Next**.



4. Input **Internet address** and **Destination name** for this connection and press **Next**.

Connect to a Workplace

Type the Internet address to connect to

Your network administrator can give you this address.

Internet address: [Example:Contoso.com or 157.54.0.1 or 3ffe:1234::1111]

Destination name: VPN Connection

Use a smart card

Allow other people to use this connection  
This option allows anyone with access to this computer to use this connection.

Don't connect now; just set it up so I can connect later

Next Cancel

Connect to a Workplace

Type the Internet address to connect to

Your network administrator can give you this address.

Internet address: 172.16.1.185

Destination name: L2TP\_IPSec

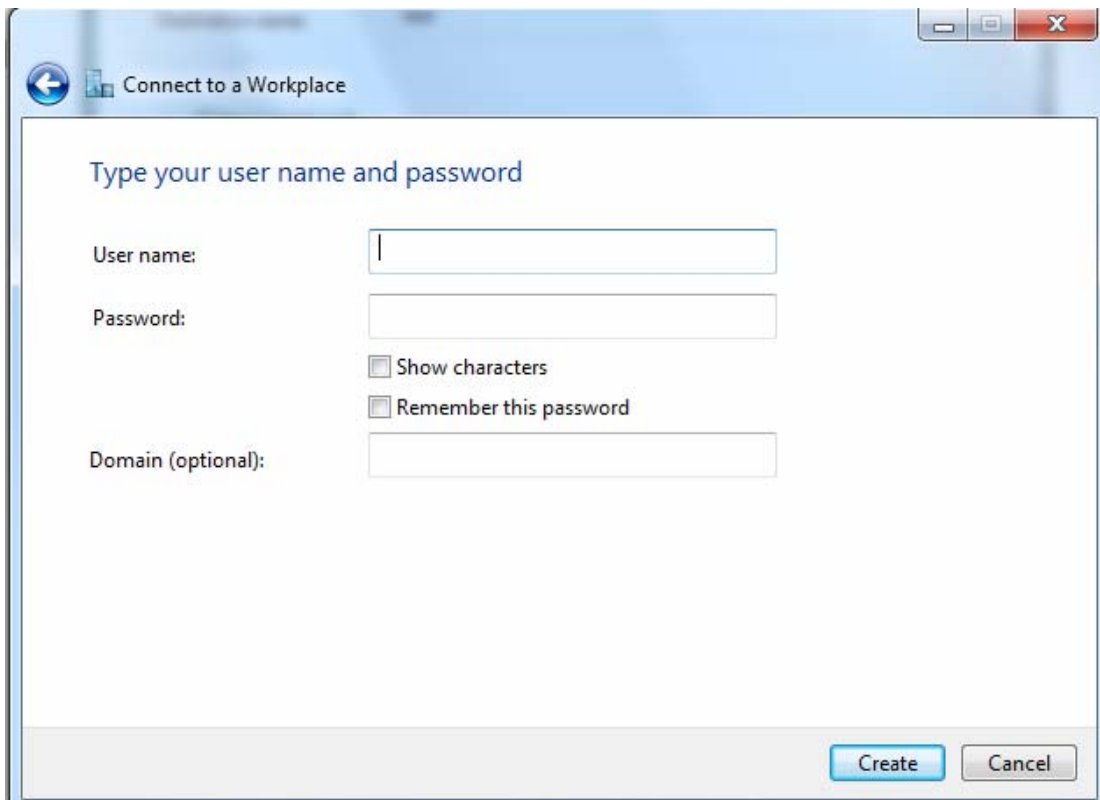
Use a smart card

Allow other people to use this connection  
This option allows anyone with access to this computer to use this connection.

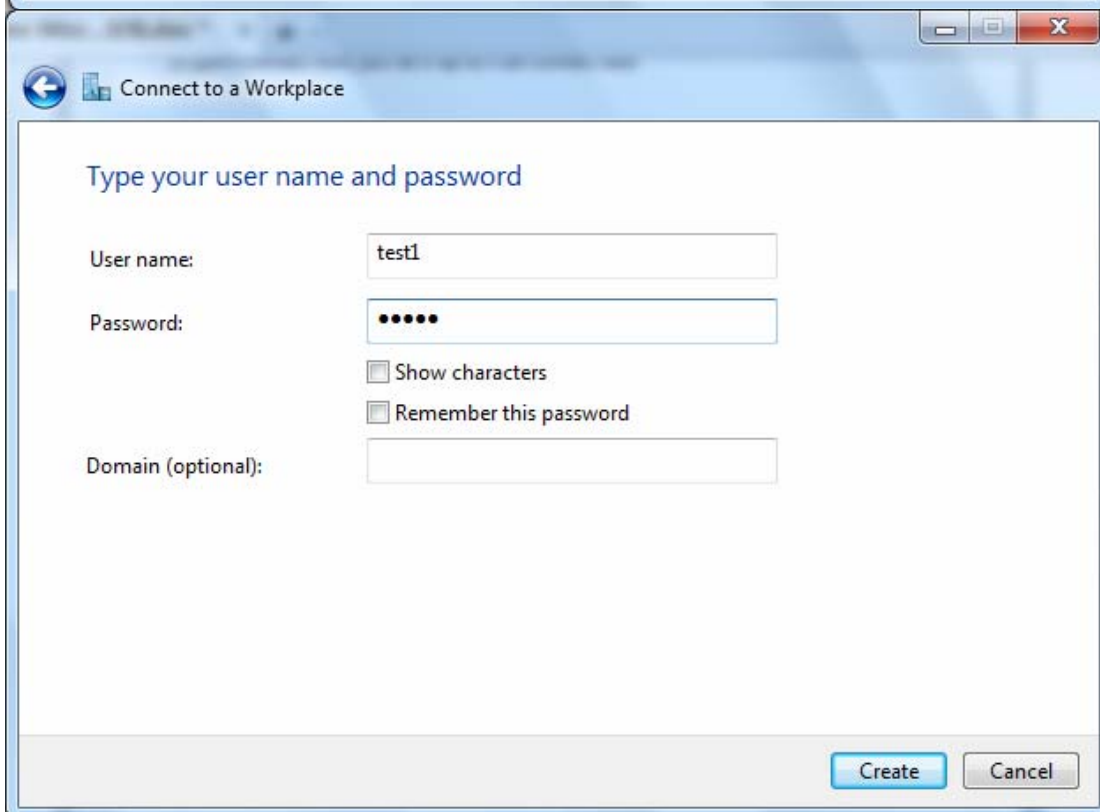
Don't connect now; just set it up so I can connect later

Next Cancel

5. Input the account (**user name** and **password**) and press **Create**.

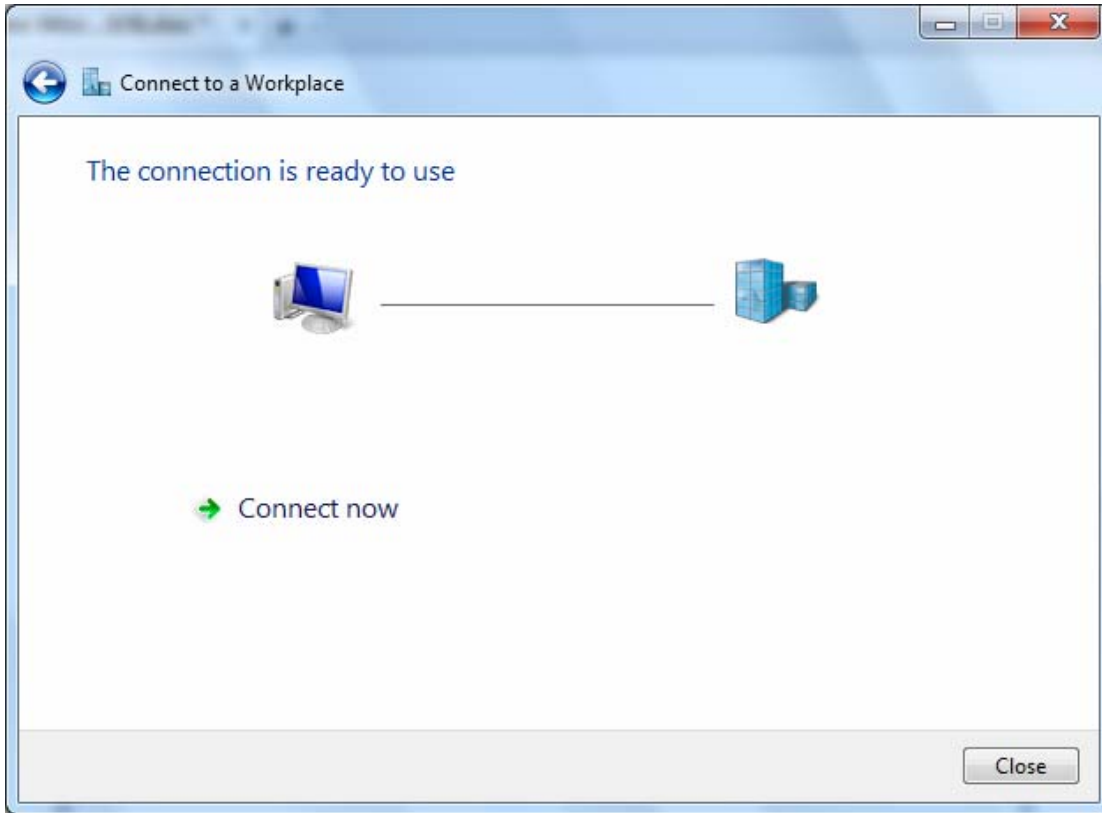


The screenshot shows a dialog box titled "Connect to a Workplace". The main heading is "Type your user name and password". There are four input fields: "User name:", "Password:", "Domain (optional):", and a checkbox area containing "Show characters" and "Remember this password". The "User name" field contains a single vertical bar cursor. The "Password" field is empty. The "Domain (optional)" field is empty. At the bottom right, there are two buttons: "Create" and "Cancel".

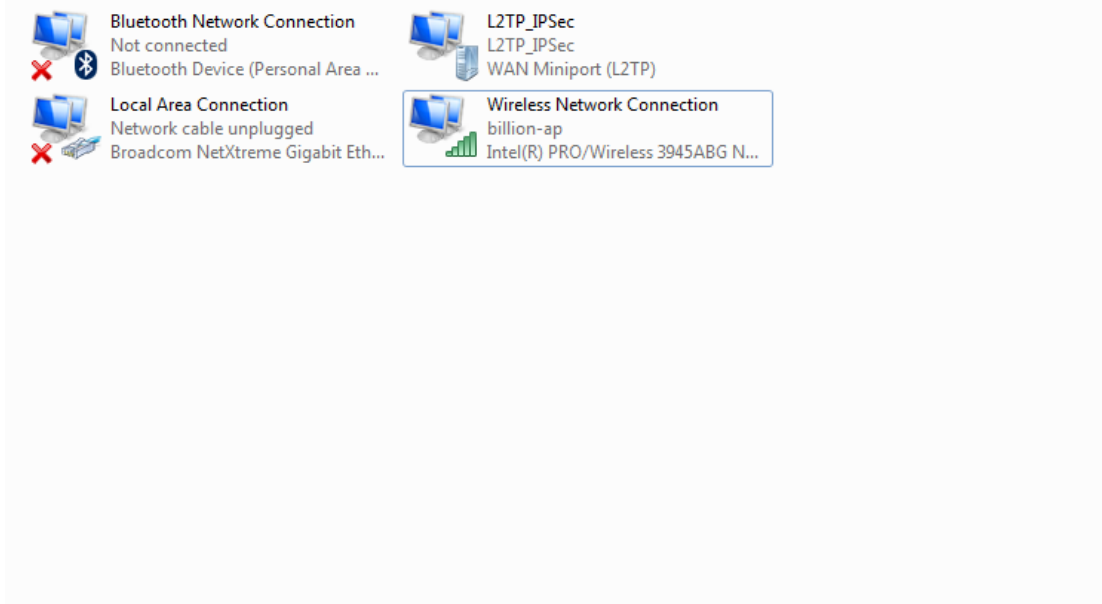


The screenshot shows the same "Connect to a Workplace" dialog box. The "User name" field now contains the text "test1". The "Password" field contains five black dots, indicating a masked password. The "Domain (optional)" field remains empty. The "Show characters" and "Remember this password" checkboxes are still unchecked. The "Create" and "Cancel" buttons are visible at the bottom right.

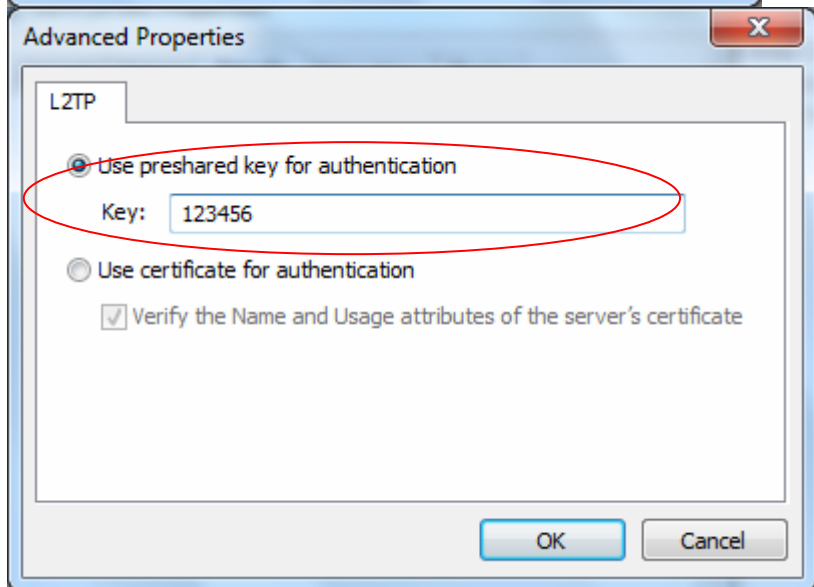
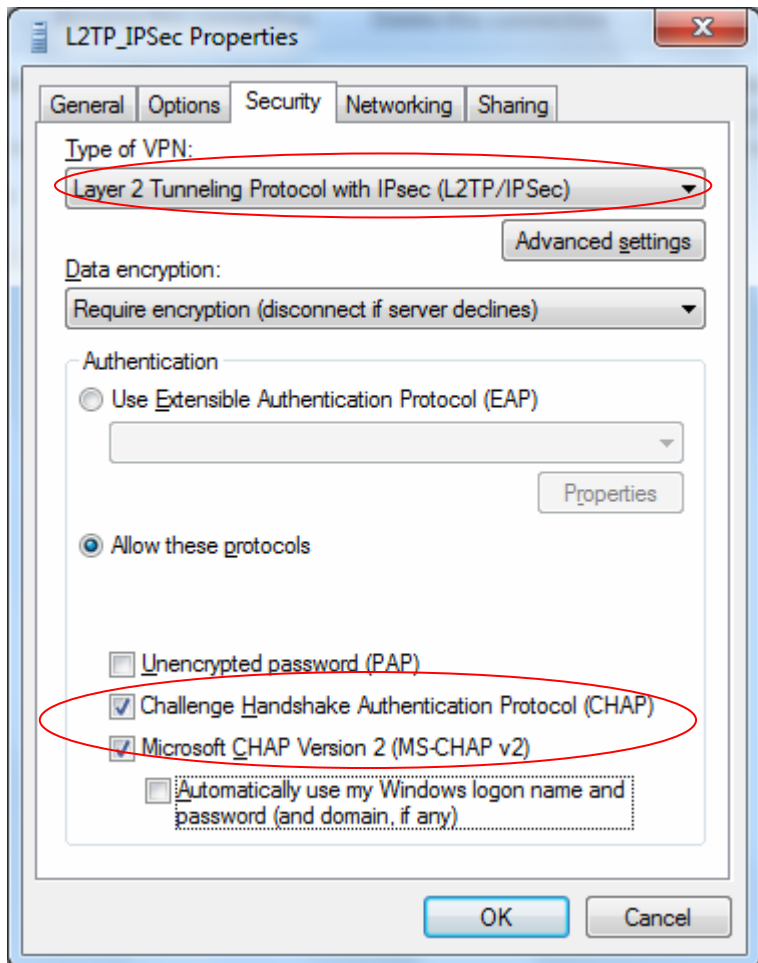
6. Connection created. Press **Close**.



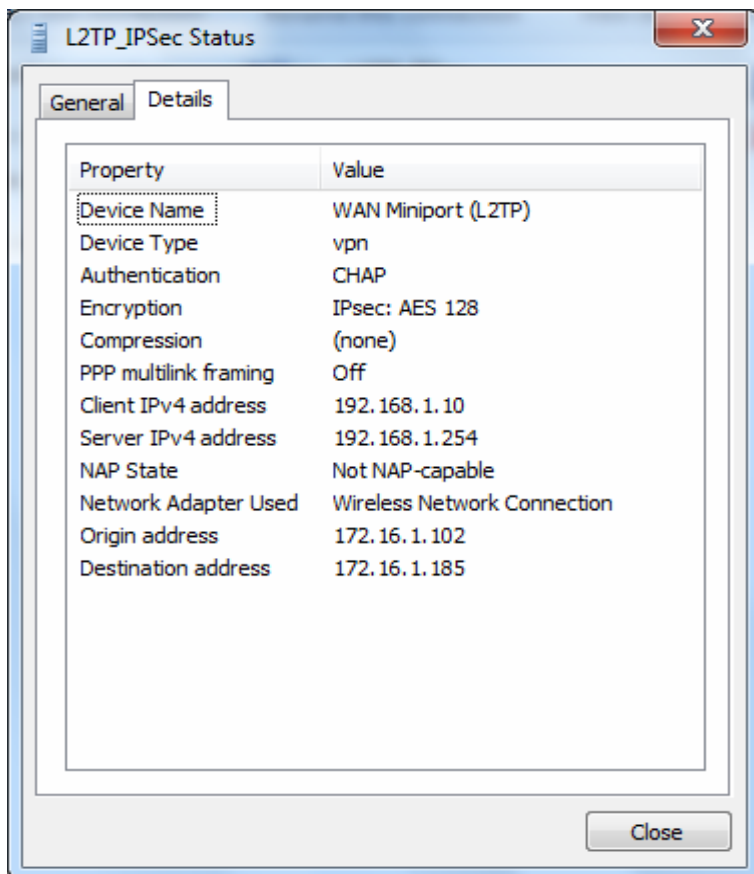
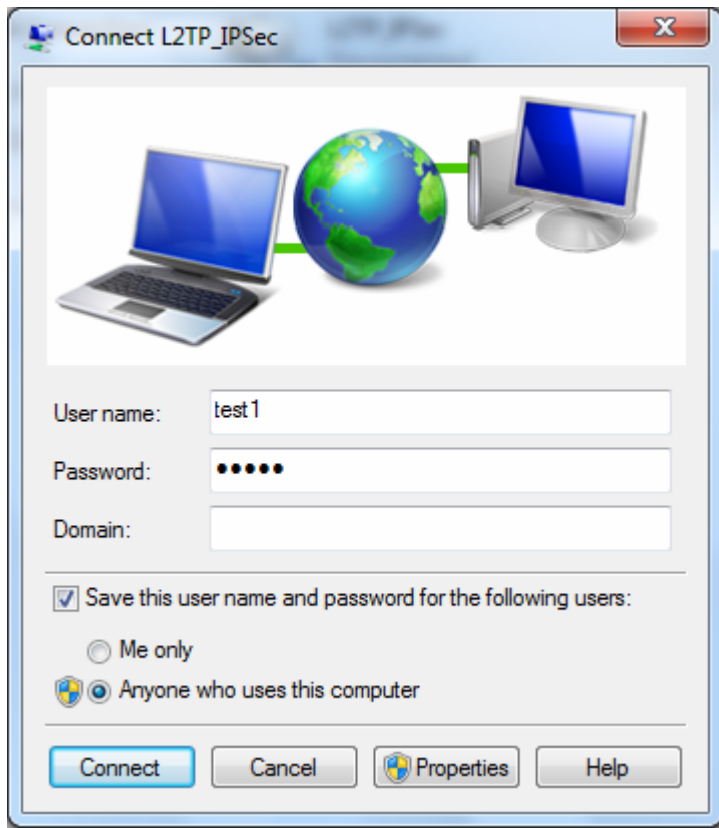
7. Go to **Network Connections** shown below to check the detail of the connection. Right click "L2TP\_IPSec" icon, and select "**Properties**" to change the security parameters.



8. Change the type of VPN to “**Layer 2 Tunneling Protocol with IPsec (L2TP/IPSec)**” and Click Advanced Settings to set the pre-shared (set in IPsec) key for authentication.



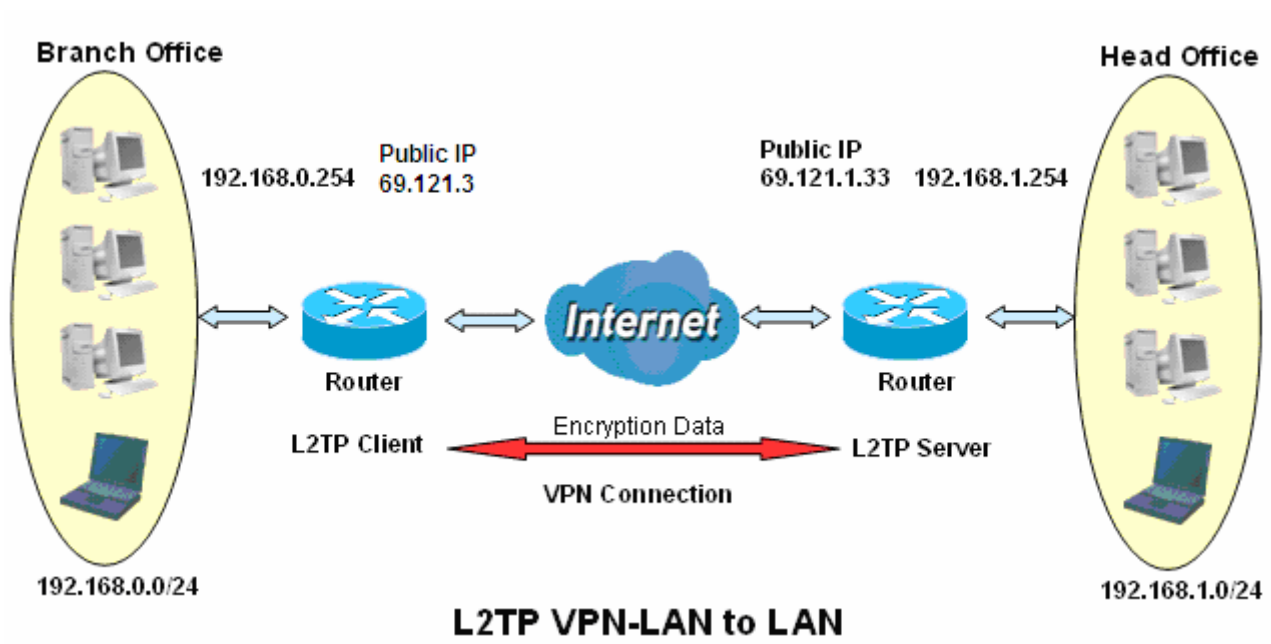
9. Go to **Network connections**, enter username and password to connect L2TP\_IPSec and check the connection status.



## Example: Configuring L2TP LAN-to-LAN VPN Connection

The branch office establishes a L2TP VPN tunnel with head office to connect two private networks over the Internet. The routers are installed in the head office and branch office accordingly.

**Note:** Both office LAN networks must be in different subnets with the LAN-LAN application.



### Server side: Head Office

VPN

**L2TP Server**

Parameters

L2TP  Enable  Disable

WAN Interface

Auth. Type

IP Addresses Assigned to Peer

Tunnel Authentication

Secret

Remote Host Name

Local Host Name

VPN

**IPSec**

IPSec Settings

L2TP over IPsec  Enable

Connection Name  WAN Interface  IP Version

Remote Security Gateway   Anonymous

Key Exchange Method  IPsec Protocol

Pre-Shared Key

Encryption Algorithm  Integrity Algorithm

DH Group  IPsec Lifetime  Minute(s) [60-1440]



Tunnel Mode Connections							
Active	L2TP	Connection Name	Local Network	Remote Network	Remote Security Gateway	Remove	Edit
<input checked="" type="checkbox"/>	✓	test1			Anonymous	<input type="checkbox"/>	<a href="#">Edit</a>
<input type="checkbox"/>	✓	test2			69.121.1.3	<input type="checkbox"/>	<a href="#">Edit</a>

The above is the commonly setting for L2TP Server, set as you like for authentication and encryption. The settings in Client side should be in accordance with settings in Server side.

Then account the L2TP Account.

VPN

**VPN Account**

VPN Account applied to PPTP Server and L2TP Server.

Parameters

Name	<input type="text" value="HO"/>	Tunnel	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
Username	<input type="text" value="test2"/>	Password	<input type="password" value="*****"/>
Connection Type	<input type="radio"/> Remote Access <input checked="" type="radio"/> LAN to LAN		
Peer Network IP	<input type="text" value="192.168.0.0"/>	Peer Netmask	<input type="text" value="255.255.255.0"/>

Edit	Name	Tunnel	Connection Type	Peer Network IP	Peer Netmask	Delete
<input checked="" type="checkbox"/>	HO	Enable	LAN to LAN	192.168.0.0	255.255.255.0	<input type="checkbox"/>

## Client Side: Branch Office

The client user can set up a tunnel connecting to the PPTP server, and can also set the tunnel as the default route for all outgoing traffic.

VPN

▼ L2TP Client

Parameters

Name	BO	L2TP over IPSec	<input checked="" type="checkbox"/> Enable
IPSec Tunnel	test2	IPSec	
Username	test2	Password	.....
Auth. Type	Chap	L2TP Server Address	69.121.1.33
Connection Type	<input type="radio"/> Remote Access <input checked="" type="radio"/> LAN to LAN		
Peer Network IP	192.168.1.0	Peer Netmask	255.255.255.0
Tunnel Authentication	<input type="checkbox"/>	Secret	
Remote Host Name		Local Host Name	

Add Edit / Delete

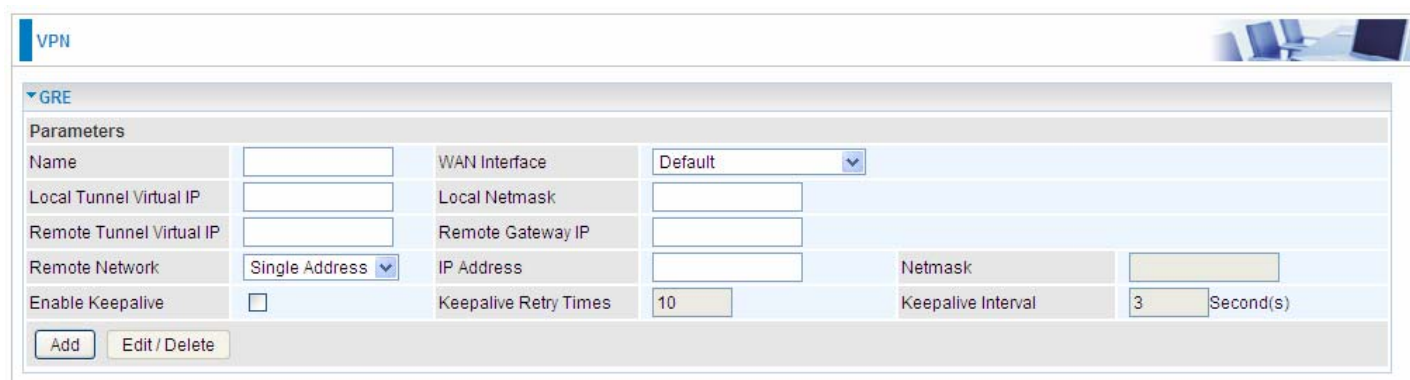
Edit	Enable	Default Gateway	Name	L2TP Server Address	Connection Type	Peer Network IP	Peer Netmask	Delete
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	BO	69.121.1.33	LAN to LAN	192.168.1.0	255.255.255.0	<input type="checkbox"/>

**Note:** users can see the “Default Gateway” item in the bar, and user can check to select the tunnel as the default gateway (default route) for traffic. If selected, all outgoing traffic will be forwarded to this tunnel and routed to the next hop.

## GRE

**Generic Routing Encapsulation (GRE)** is a tunneling protocol that can encapsulate a wide variety of network layer protocol packets inside virtual point-to-point links over an Internet Protocol (IP) network. And the common use can be GRE over IPsec.

**Note:** up to 8 tunnels can be added, but only 4 can be activated.



The screenshot shows a web-based configuration interface for a VPN. At the top left, there is a 'VPN' tab. Below it, a 'GRE' section is expanded. The 'Parameters' section contains the following fields:

Name	<input type="text"/>	WAN Interface	Default
Local Tunnel Virtual IP	<input type="text"/>	Local Netmask	<input type="text"/>
Remote Tunnel Virtual IP	<input type="text"/>	Remote Gateway IP	<input type="text"/>
Remote Network	Single Address	IP Address	<input type="text"/>
Enable Keepalive	<input type="checkbox"/>	Netmask	<input type="text"/>
		Keepalive Retry Times	10
		Keepalive Interval	3 Second(s)

At the bottom of the form, there are two buttons: 'Add' and 'Edit / Delete'.

**Name:** User-defined identification.

**WAN Interface:** Select the exact WAN interface configured for the tunnel as the source tunnel IP. Select Default to use the now-working WAN interface for the tunnel.

**Local Tunnel Virtual IP:** Please input the virtual IP for the local tunnel.

**Local Netmask:** Input the netmask for the local tunnel.

**Remote Tunnel Virtual IP:** Please input the virtual destination IP for tunnel.

**Remote Gateway IP:** Set the destination IP for the tunnel.

**Remote Network:** Select the peer topology, Single address (client) or Subnet.

**IP Address:** Set the IP address if the peer is a client. If the peer is a subnet, please enter the IP and netmask.

**Enable Keepalive:** Normally, the tunnel interface is always up. Enable keepalive to determine when the tunnel interface is to be closed. The local router sends keepalive packets to the peer router, if keepalive response is not received from peer router within the allowed time ('retry time' multiply 'interval', based on default settings, the time interval can be 30 seconds), the local router will shut up its tunnel interface.

**Keepalive Retry Times:** Set the keepalive retry times, default is 10.

**Keepalive Interval:** Set the keepalive Interval, unit in seconds. Default is 3 seconds.

# Advanced Setup

There are sub-items within the System section: [Routing](#), [DNS](#), [Static ARP](#), [UPnP](#), [Certificate](#), [Multicast](#), [Management](#), and [Diagnostics](#).

▶ Status
▪ Quick Start
▶ Configuration
▶ VPN
▼ Advanced Setup
▶ Routing
▶ DNS
▪ Static ARP
▪ UPnP
▶ Certificate
▪ Multicast
▶ Management
▶ Diagnostics

# Routing

## Default Gateway

Advanced Setup

▼ Default Gateway

Default Gateway Interface List

Only one default gateway interface will be used according to the priority with the first being the highest and the last one the lowest priority if the WAN interface is connected.



Selected Default Gateway Interfaces		Available Routed WAN Interfaces
ppp0.1	-> <-	

Preferred WAN Interface As The System Default IPv6 Gateway

Selected WAN Interface: pppoe\_0\_0\_35/ppp0.1

Apply Cancel

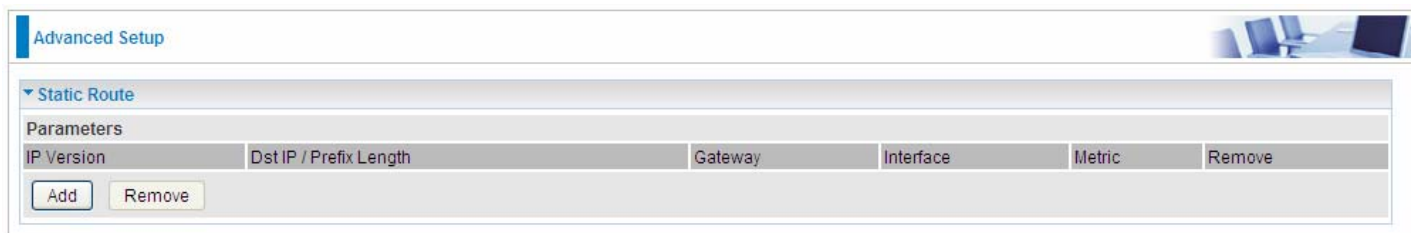
**WAN port:** Select the port this gateway applies to.

To set **Default Gateway** and **Available Routed WAN Interface**. This interfaces are the ones you have set in WAN section, here select the one you want to be the default gateway by moving the interface via  or . And select a Default IPv6 Gateway from the drop-down menu.

**Note:** Only one default gateway interface will be used according to the priority with the first being the highest and the last one the lowest priority if the WAN interface is connected.

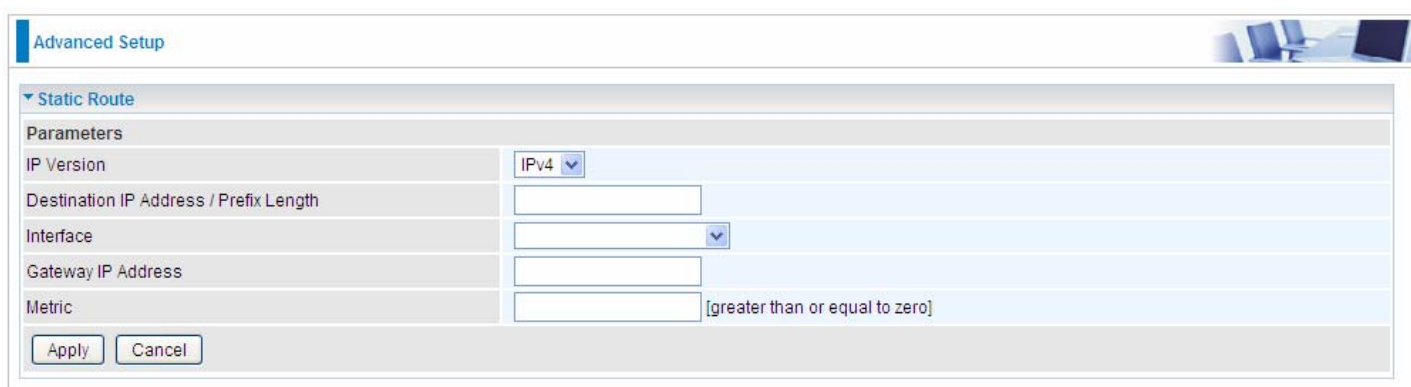
## Static Route

With static route feature, you can control the routing of all the traffic across your network. With each routing rule created, you can specifically assign the destination where the traffic will be routed.



The screenshot shows the 'Advanced Setup' interface with a 'Static Route' section. Below the section title is a table with the following columns: 'IP Version', 'Dst IP / Prefix Length', 'Gateway', 'Interface', 'Metric', and 'Remove'. Below the table are two buttons: 'Add' and 'Remove'.

Above is the static route listing table, click **Add** to create static routing.



The screenshot shows the 'Advanced Setup' interface with a 'Static Route' configuration form. The form has the following fields: 'IP Version' (dropdown menu set to 'IPv4'), 'Destination IP Address / Prefix Length' (text input), 'Interface' (dropdown menu), 'Gateway IP Address' (text input), and 'Metric' (text input with a note '[greater than or equal to zero]'). At the bottom are two buttons: 'Apply' and 'Cancel'.

**IP Version:** Select the IP version, IPv4 or IPv6.

**Destination IP Address / Prefix Length:** Enter the destination IP address and the prefix length. For IPv4, the prefix length means the number of '1' in the submask, it is another mode of presenting submask. One IPv4 address, 192.168.1.0/24, submask is 255.255.255.0. While in IPv6, IPv6 address composes of two parts, thus, the prefix and the interface ID, the prefix is like the net ID in IPv4, and the interface ID is like the host ID in IPv4. The prefix length is to identify the net ID in the address. One IPv6 address, 3FFE:FFFF:0:CD30:0:0:0:0 / 64, the prefix is 3FFE:FFFF:0:CD3.


**Interface:** Select an interface this route associated.

**Gateway IP Address:** Enter the gateway IP address.

**Metric:** Metric is a policy for router to commit router, to determine the optimal route. Enter one number greater than or equal to 0.

Click **Apply** to apply this route and it will be listed in the route listing table.

In listing table you can remove the one you don't want by checking the checking box and press **Remove** button.

Advanced Setup 

▼ Static Route

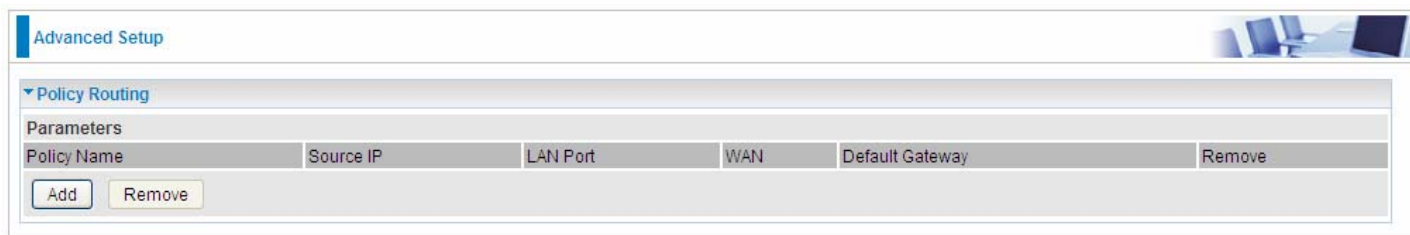
Parameters

IP Version	Dst IP/Prefix Length	Gateway	Interface	Metric	Remove
4	192.168.1.0/24		ppp0	1	<input checked="" type="checkbox"/>

## Policy Routing

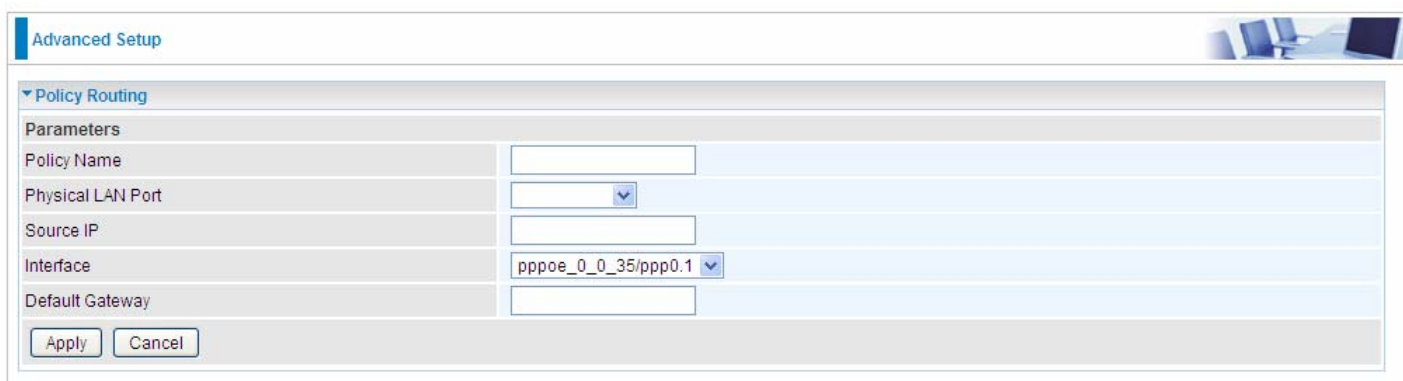
Here users can set a route for the host (source IP) in a LAN interface to access outside through a specified Default Gateway or a WAN interface.

The following is the policy Routing listing table.



The screenshot shows the 'Advanced Setup' interface with the 'Policy Routing' section expanded. Below the section header is a 'Parameters' table with the following columns: Policy Name, Source IP, LAN Port, WAN, Default Gateway, and Remove. At the bottom of the table are two buttons: 'Add' and 'Remove'.

Click **Add** to create a policy route.



The screenshot shows the 'Advanced Setup' interface with the 'Policy Routing' section expanded. The configuration form contains the following fields: Policy Name (text input), Physical LAN Port (dropdown menu), Source IP (text input), Interface (dropdown menu with 'pppoe\_0\_0\_35/ppp0.1' selected), and Default Gateway (text input). At the bottom of the form are two buttons: 'Apply' and 'Cancel'.

**Policy Name:** User-defined name.

**Physical LAN Port:** Select the LAN port.

**Source IP:** Enter the Host Source IP.

**Interface:** Select the WAN interface which you want the Source IP to access outside through.

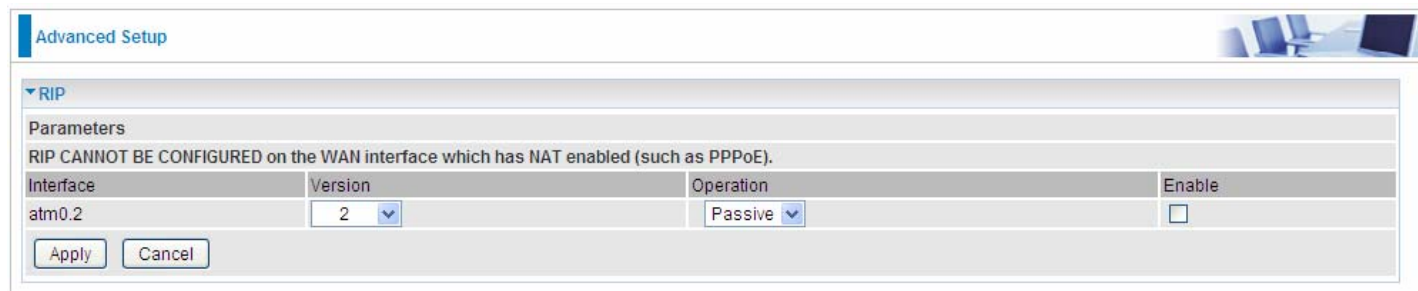
**Default Gateway:** Enter the default gateway which you want the Source IP to access outside through.

Click **Apply** to apply your settings. And the item will be listed in the policy Routing listing table. Here if you want to remove the route, check the remove checkbox and press **Remove** to delete it.



## RIP

RIP, Router Information Protocol, is a simple Interior Gateway Protocol (IGP). RIP has two versions, RIP-1 and RIP-2.



Advanced Setup

▼ RIP

Parameters

RIP CANNOT BE CONFIGURED on the WAN interface which has NAT enabled (such as PPPoE).

Interface	Version	Operation	Enable
atm0.2	2	Passive	<input type="checkbox"/>

Apply Cancel

**Interface:** the interface the rule applies to.

**Version:** select the RIP version, there are two versions, RIP-1 and RIP-2.

**Operation:** RIP has two operation mode.

- ① **Passive:** only receive the routing information broadcasted by other routers and modifies its routing table according to the received information.
- ① **Active:** working in this mode, the router sends and receives RIP routing information and modifies routing table according to the received information.

**Enable:** check the checkbox to enable RIP rule for the interface.

**Note:** RIP can't be configured on the WAN interface which has NAT enabled (such as PPPoE).

Click **Apply** to apply your settings.

# DNS

DNS, Domain Name System, is a distributed database of TCP/IP application. DNS provides translation of Domain name to IP.

## DNS

**Parameters**  
Select DNS Server Interface from available WAN interfaces OR enter static DNS server IP addresses OR IP addresses provided by Parental Control Provider for the system. In ATM mode, if only a single PVC with IPoA or static IPoE protocol is configured, Static DNS server IP addresses must be entered. DNS Server Interfaces can have multiple WAN interfaces served as system dns servers but only one will be used according to the priority with the first being the highest and the last one the lowest priority if the WAN interface is connected. Priority order can be changed by removing all and adding them back in again.

Select DNS Server Interface from available WAN interfaces

Selected DNS Server Interfaces	Available WAN Interfaces
ppp0.1 USB3G0	

Use the following Static DNS IP address

Primary DNS server:   
Secondary DNS server:

Use the IP Addresses provided by Parental Control Provider

Note that selecting a WAN interface for IPv6 DNS server will enable DHCPv6 Client on that interface.

Obtain IPv6 DNS info from a WAN interface

WAN interface selected: pppoe\_0\_8\_35/ppp0.1

Use the following Static IPv6 DNS address

Primary IPv6 DNS server:   
Secondary IPv6 DNS server:

Apply Cancel

### ➤ IPv4

#### Three ways to set an IPv4 DNS server

- ① **Select DNS server from available WAN interfaces:** Select a desirable WAN interface as the IPv4 DNS server.
- ① **User the following Static DNS IP address:** To specify DNS server manually by entering your primary and secondary DNS server addresses.
- ① **Use the IP address provided by Parental Control Provider:** If user registers and gets an 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:

IPv6 DNS Server's operation is similar to IPv4 DNS server. There are two modes to get DNS server address: Auto and Static mode.

#### Obtain IPv6 DNS info from a WAN interface

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

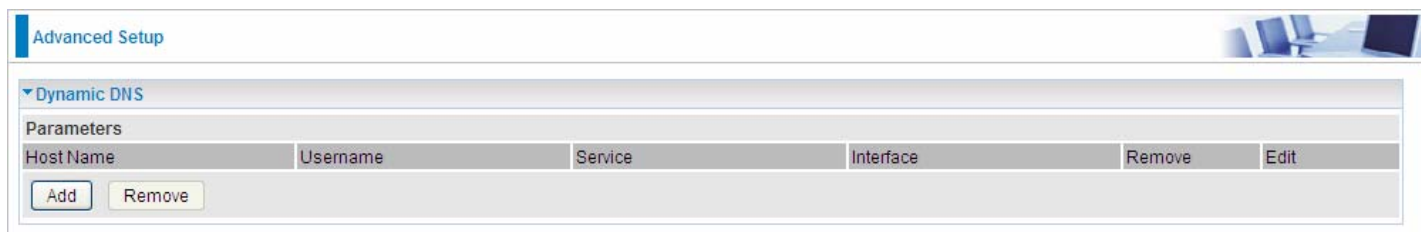
#### Use the following Static IPv6 DNS address

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

## Dynamic DNS

The Dynamic DNS function allows you to alias a dynamic IP address to a static hostname, allowing users whose ISP does not assign them a static IP address to use a domain name. This is especially useful for hosting servers via your ADSL connection, so that anyone wishing to connect to you may use your domain name, rather than having to use your dynamic IP address, which changes from time to time. This dynamic IP address is the WAN IP address of the router, which is assigned to you by your ISP.

Here users can register different WAN interfaces with different DNS(es).



Advanced Setup

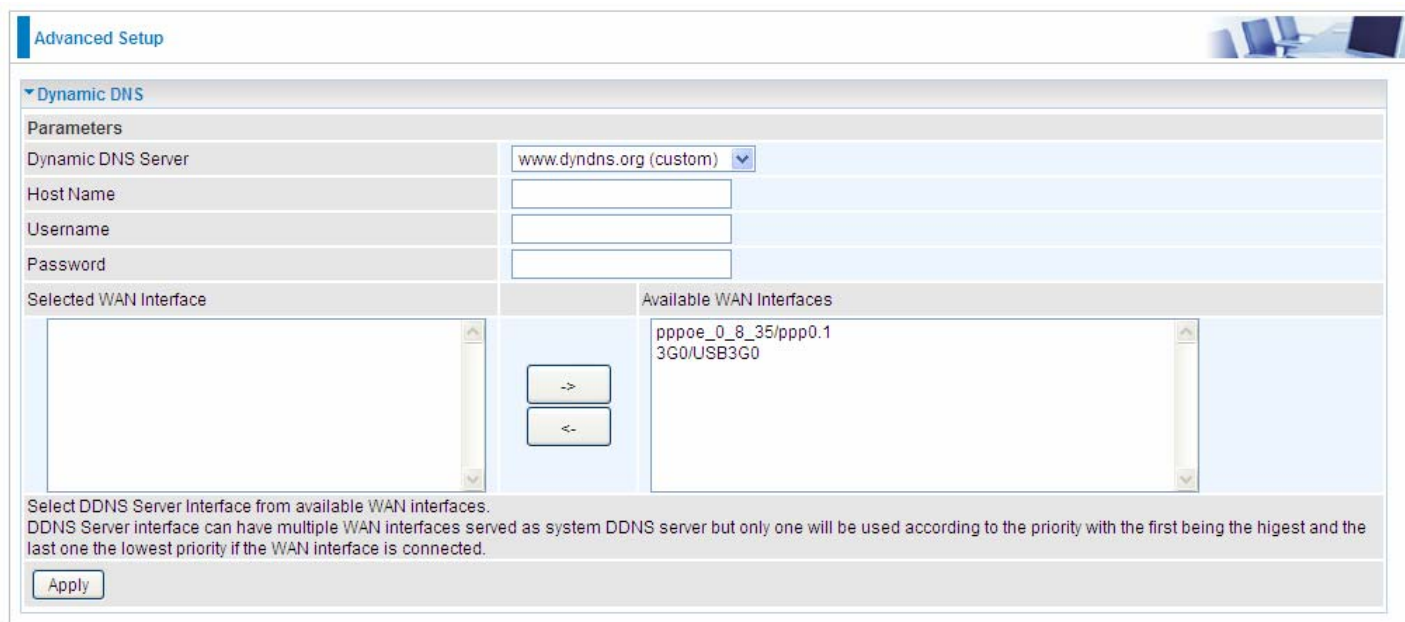
Dynamic DNS

Parameters

Host Name	Username	Service	Interface	Remove	Edit
-----------	----------	---------	-----------	--------	------

Add Remove

Click **Add** to register a WAN interface with the exact DNS.



Advanced Setup

Dynamic DNS

Parameters

Dynamic DNS Server: www.dyndns.org (custom)

Host Name:

Username:

Password:

Selected WAN Interface:

Available WAN Interfaces: pppoe\_0\_8\_35/ppp0.1, 3G0/USB3G0

Select DDNS Server Interface from available WAN interfaces.  
DDNS Server interface can have multiple WAN interfaces served as system DDNS server but only one will be used according to the priority with the first being the highest and the last one the lowest priority if the WAN interface is connected.

Apply

You will first need to register and establish an account with the Dynamic DNS provider using their website, for example <http://www.dyndns.org/>

**Dynamic DNS Server:** Select the DDNS service you have established an account with.

**Host Name, Username and Password:** Enter your registered domain name and your username and password for this service.

**Selected WAN Interface:** Select the Interface that is bound to the registered Domain name.

## User can register different DDNS to different interfaces.

Examples: **Note** first users have to go to the Dynamic DNS registration service provider to register an account.

User **test** register two Dynamic Domain Names in DDNS provider <http://www.dyndns.org/>.

1. pppoe\_0\_8\_35 with DDNS: [www.hometest.com](http://www.hometest.com) using username/password test/test

Advanced Setup

Dynamic DNS

Parameters

Dynamic DNS Server:

Host Name:

Username:

Password:

Selected WAN Interface:

Available WAN Interfaces:

-->

<--

Select DDNS Server Interface from available WAN interfaces.  
DDNS Server interface can have multiple WAN interfaces served as system DDNS server but only one will be used according to the priority with the first being the highest and the last one the lowest priority if the WAN interface is connected.

Advanced Setup

Dynamic DNS

Parameters

Host Name	Username	Service	Interface	Remove	Edit
www.hometest.com	test	dyndns-custom	ppp0.1	<input type="checkbox"/>	<input type="button" value="Edit"/>

2. ipoe\_eth0 with DDNS: [www.hometest1.com](http://www.hometest1.com) using username/password test/test.

Advanced Setup

Dynamic DNS

Parameters

Dynamic DNS Server:

Host Name:

Username:

Password:

Selected WAN Interface:

Available WAN Interfaces:

->

<-

Select DDNS Server interface from available WAN interfaces.  
DDNS Server interface can have multiple WAN interfaces served as system DDNS server but only one will be used according to the priority with the first being the highest and the last one the lowest priority if the WAN interface is connected.

Advanced Setup

Dynamic DNS

Host Name	Username	Service	Interface	Remove	Edit
www.hometest.com	test	dyndns-custom	ppp0.1	<input type="checkbox"/>	<input type="button" value="Edit"/>
www.hometest1.com	test	dyndns-custom	eth0.1	<input type="checkbox"/>	<input type="button" value="Edit"/>

## DNS Proxy

DNS proxy is used to forward request and response message between DNS Client and DNS Server. Hosts in LAN can use router serving as a DNS proxy to connect to the DNS Server in public to correctly resolve Domain name to access the internet.



The screenshot shows a web interface for configuring DNS Proxy. The page title is "Advanced Setup". Under the "DNS Proxy" section, there are three main parameters:

Parameters	
DNS Proxy	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
Host name of the Broadband Router	<input type="text" value="home.gateway"/>
Domain name of the LAN network	<input type="text" value="home.gateway"/>

At the bottom of the configuration area, there are two buttons: "Apply" and "Cancel".

**DNS Proxy:** Select whether to enable or disable DNS Proxy function, default is enabled.

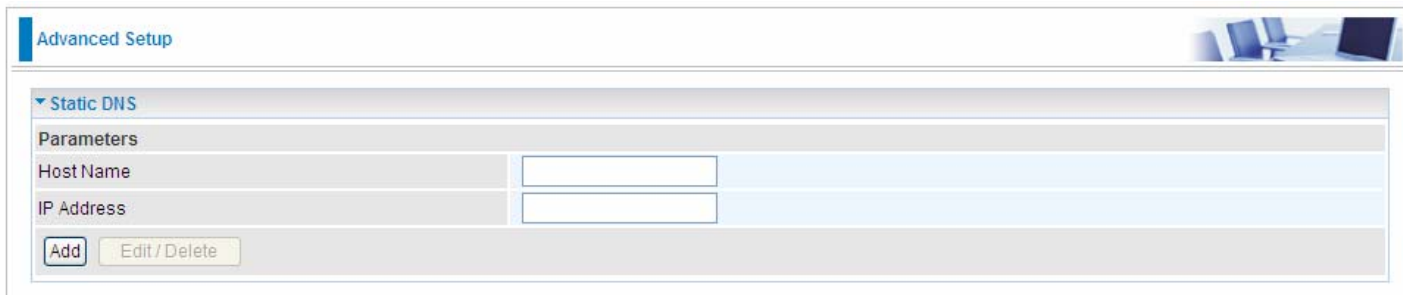
**Host name of the Broadband Router:** Enter the host name of the router. Default is home.gateway.

**Domain name of the LAN network:** Enter the domain name of the LAN network. home.gateway.

## Static DNS

Static DNS is a concept relative to Dynamic DNS; in static DNS system, the IP mapped is static without change.

You can map the specific IP to a user-friendly domain name. In LAN, you can map a PC to a domain name for convenient access. Or you can set some well-known Internet IP mapping item so your router will response quickly for your DNS query instead of querying from the ISP's DNS server.



The screenshot shows a web interface for 'Advanced Setup'. Under the 'Static DNS' section, there is a 'Parameters' table with two rows: 'Host Name' and 'IP Address', each with an empty text input field. Below the table are two buttons: 'Add' and 'Edit/Delete'.

Parameters	
Host Name	<input type="text"/>
IP Address	<input type="text"/>

**Host Name:** Type the domain name (host name) for the specific IP .

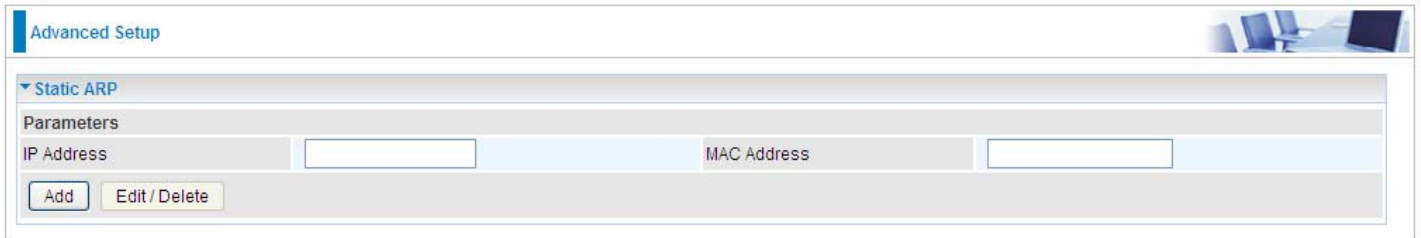
**IP Address:** Type the IP address bound to the set host name above.

Click **Add** to save your settings.



## Static ARP

ARP (Address Resolution Protocol) is a TCP/IP protocol that allows the resolution of network layer addresses into the link layer addresses. And “Static ARP” here allows user to map manually the layer-3 MAC (Media Access Control) address to the layer-2 IP address of the device.



The screenshot shows a web-based configuration interface for Static ARP. At the top, there is a tab labeled "Advanced Setup" and a small image of a computer workstation. Below this, a section titled "Static ARP" is expanded. Underneath, a "Parameters" section contains two input fields: "IP Address" and "MAC Address". Below the input fields are two buttons: "Add" and "Edit / Delete".

**IP Address:** Enter the IP of the device that the corresponding MAC address will be mapped to.

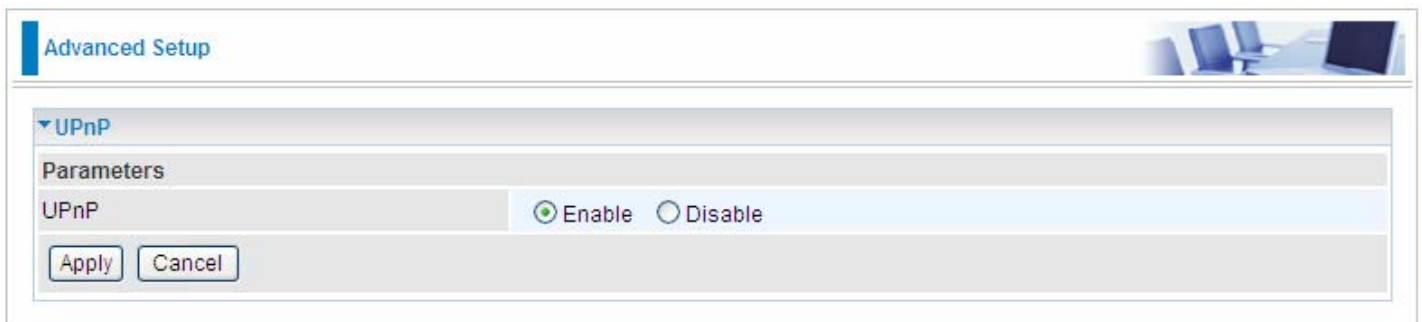
**MAC Address:** Enter the MAC address that corresponds to the IP address of the device.

Click **Add** to confirm the settings.

## UPnP

UPnP offers peer-to-peer network connectivity for PCs and other network devices, along with control and data transfer between devices. UPnP offers many advantages for users running NAT routers through UPnP NAT Traversal, and on supported systems makes tasks such as port forwarding much easier by letting the application control the required settings, removing the need for the user to control advanced configuration of their device.

Both the user's Operating System and the relevant application must support UPnP in addition to the router. Windows XP and Windows Me natively support UPnP (when the component is installed), and Windows 98 users may install the Internet Connection Sharing client from Windows XP in order to support UPnP. Windows 2000 does not support UPnP.



### UPnP:

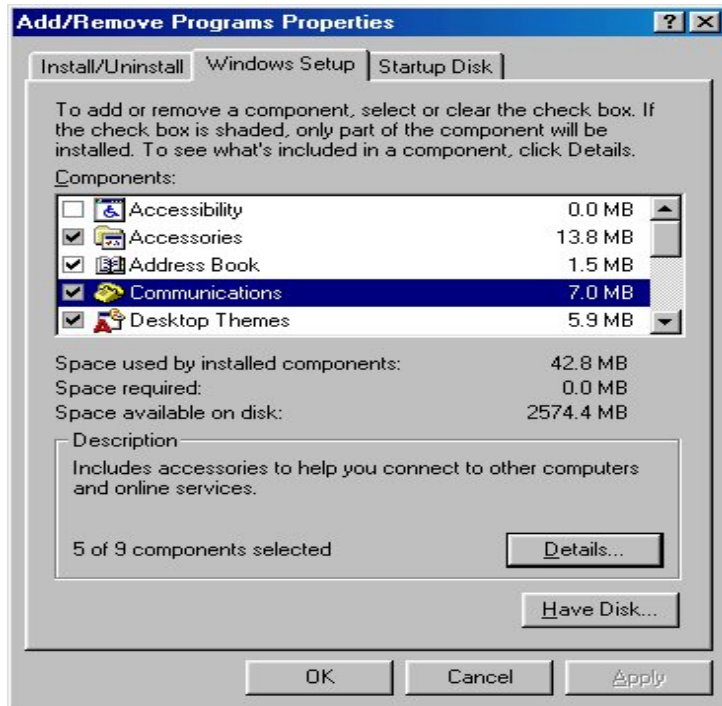
- ① **Enable:** Check to enable the router's UPnP functionality.
- ① **Disable:** Check to disable the router's UPnP functionality.

## Installing UPnP in Windows Example

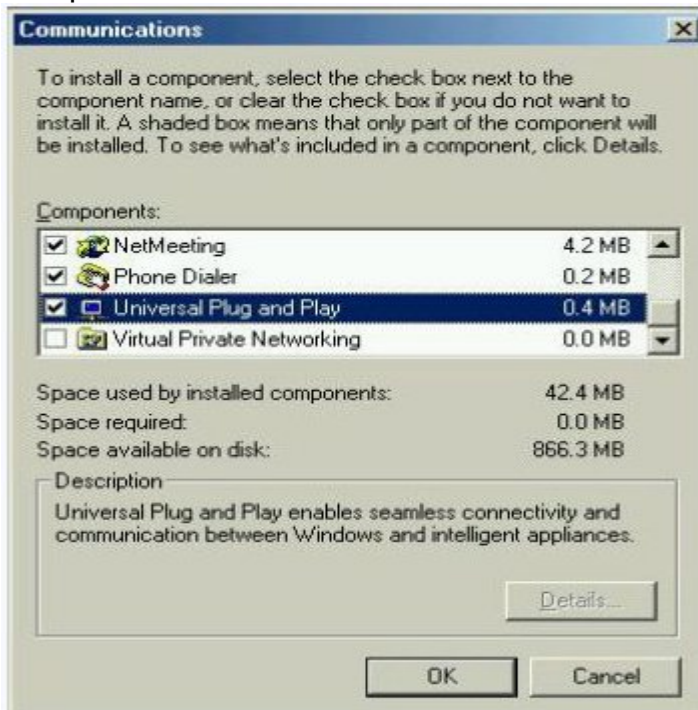
Follow the steps below to install the UPnP in Windows Me.

**Step 1:** Click Start and Control Panel. Double-click Add/Remove Programs.

**Step 2:** Click on the Windows Setup tab and select Communication in the Components selection box. Click Details.



**Step 3:** In the Communications window, select the Universal Plug and Play check box in the Components selection box.



**Step 4:** Click OK to go back to the Add/Remove Programs Properties window. Click Next.

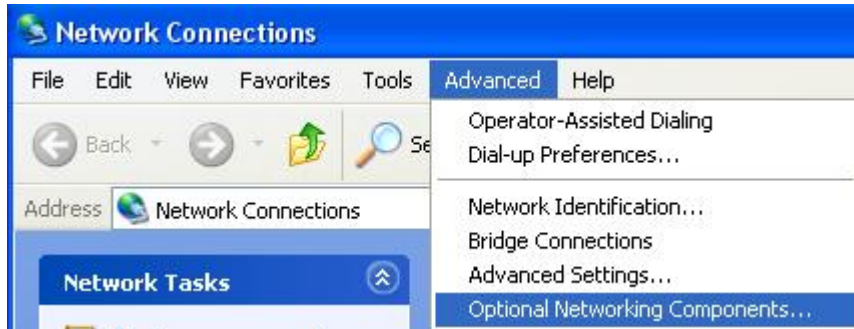
**Step 5:** Restart the computer when prompted.

**Follow the steps below to install the UPnP in Windows XP.**

**Step 1:** Click Start and Control Panel.

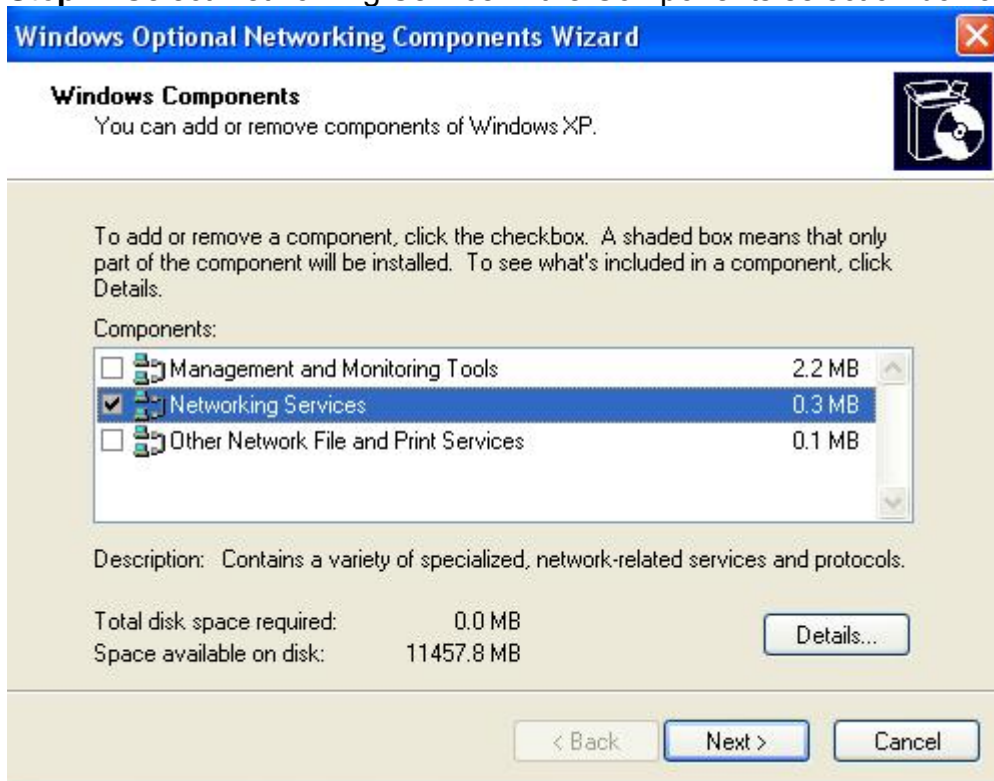
**Step 2:** Double-click Network Connections.

**Step 3:** In the Network Connections window, click Advanced in the main menu and select Optional Networking Components ....



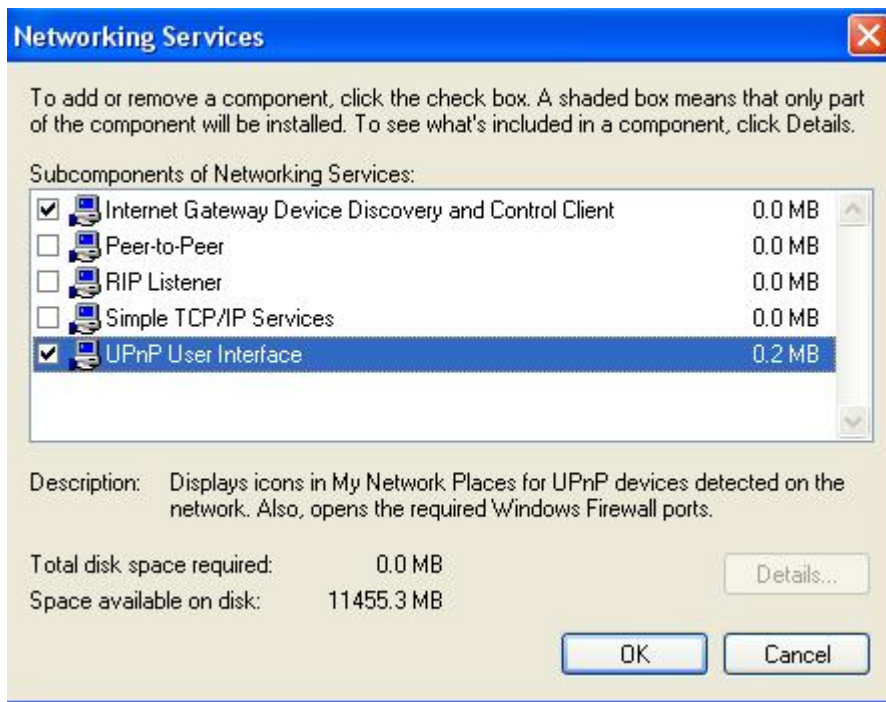
The Windows Optional Networking Components Wizard window displays.

**Step 4:** Select Networking Service in the Components selection box and click Details.



**Step 5:** In the Networking Services window, select the Universal Plug and Play check box.

**Step 6:** Click **OK** to go back to the Windows Optional Networking Component Wizard window and click **Next**.



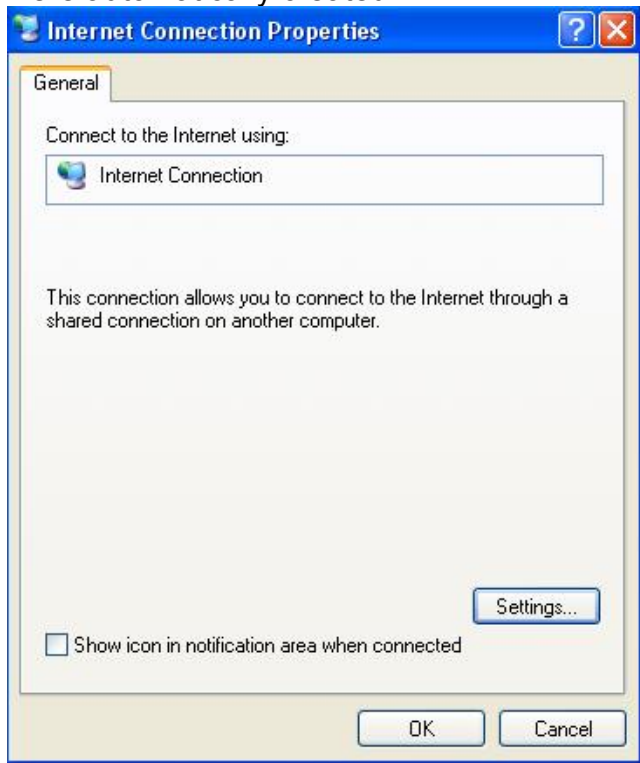
### Auto-discover Your UPnP-enabled Network Device

**Step 1:** Click start and Control Panel. Double-click Network Connections. An icon displays under Internet Gateway.

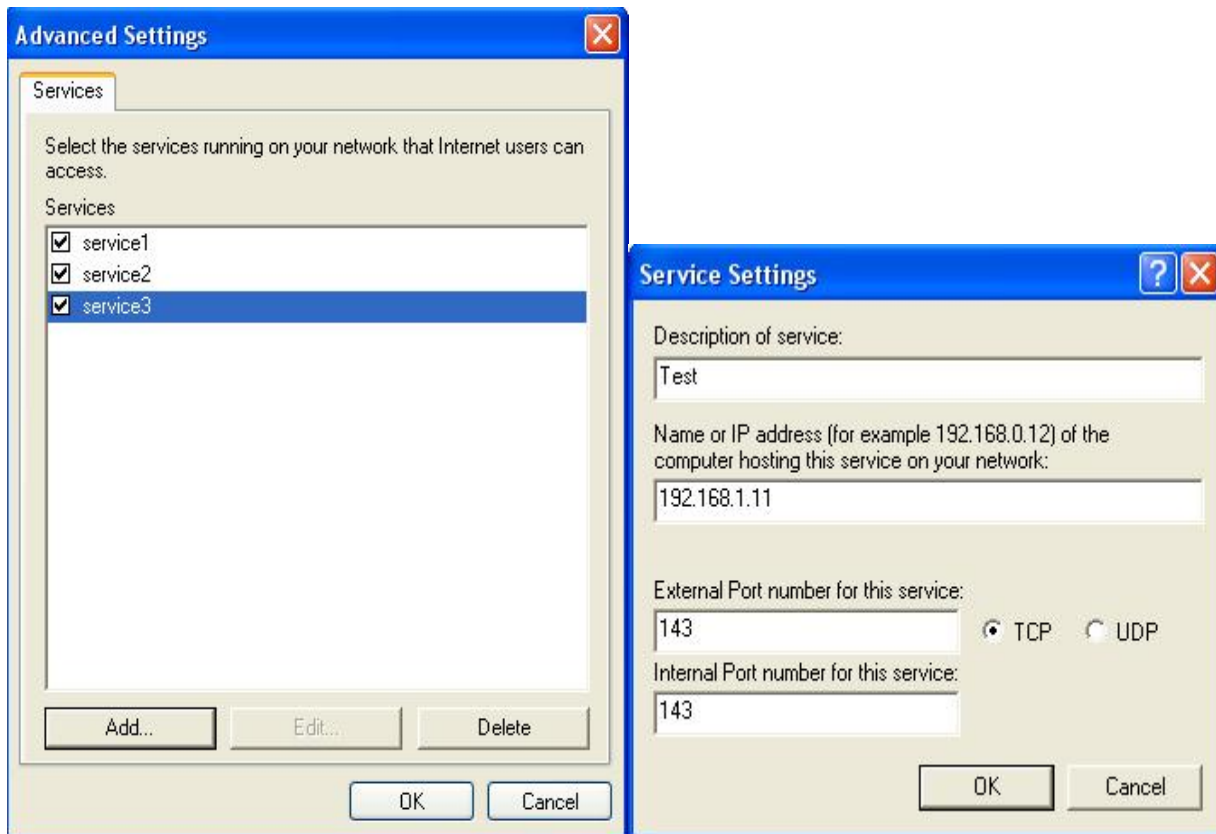
**Step 2:** Right-click the icon and select Properties.



**Step 3:** In the Internet Connection Properties window, click Settings to see the port mappings that were automatically created.

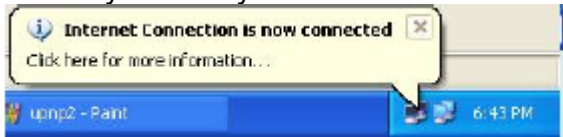


**Step 4:** You may edit or delete the port mappings or click Add to manually add port mappings.

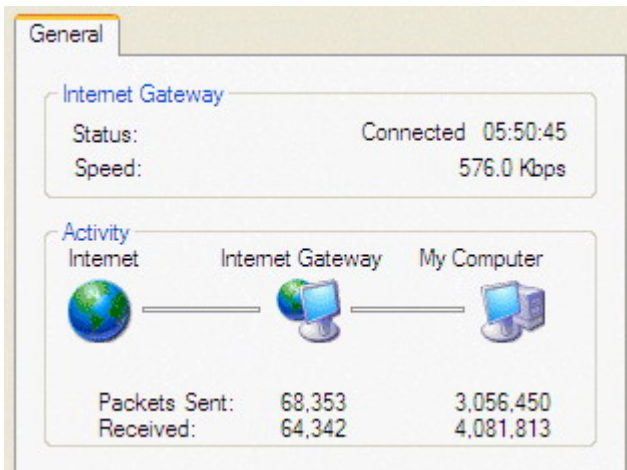


**Step 5:** Select Show icon in notification area when connected option and click OK. An icon displays

in the system tray



**Step 6:** Double-click on the icon to display your current Internet connection status.



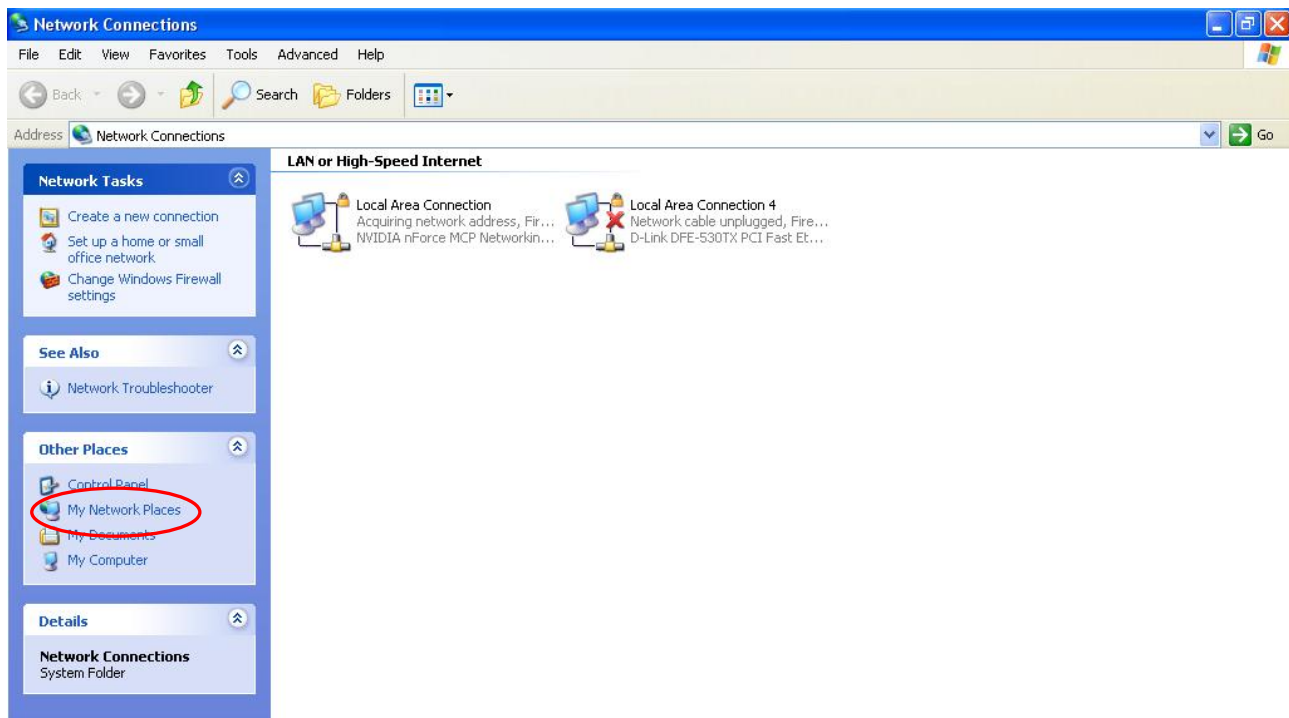
## Web Configurator Easy Access

With UPnP, you can access web-based configuration for the BiPAC 7800DX(L) without first finding out the IP address of the router. This helps if you do not know the router's IP address. Follow the steps below to access web configuration.

**Step 1:** Click Start and then Control Panel.

**Step 2:** Double-click Network Connections.

**Step 3:** Select My Network Places under Other Places.



**Step 4:** An icon describing each UPnP-enabled device shows under Local Network.

**Step 5:** Right-click on the icon of your BiPAC 7800DX(L) and select Invoke. The web configuration login screen displays.

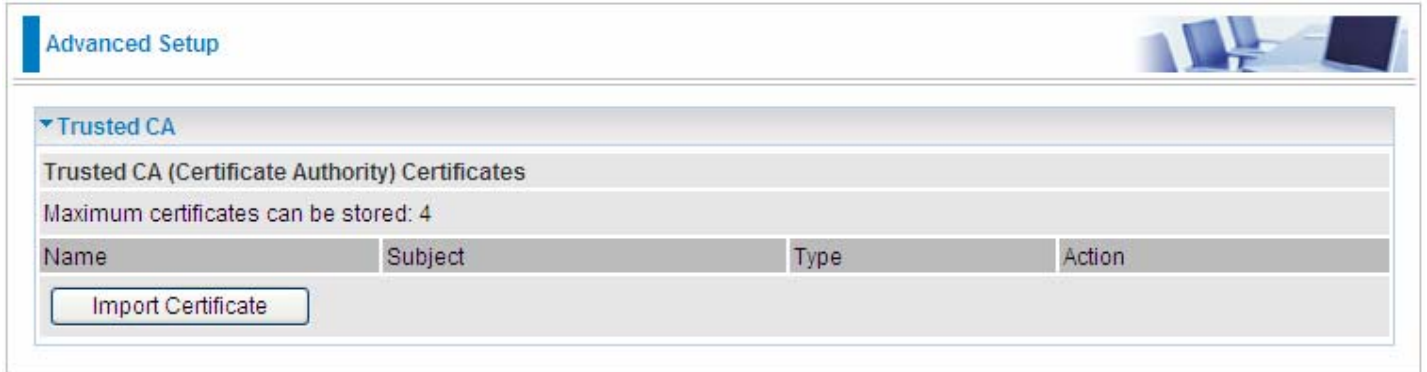
**Step 6:** Right-click on the icon of your BiPAC 7800DX(L) and select Properties. A properties window displays basic information about the 7800DX(L).



# Certificate

This feature is used for TR069 ACS Server authentication of the device using certificate, if necessary. If the imported certificate doesn't match the authorized certificate of the ACS Server, the device will have no access to the server.

## Trusted CA



**Certificate Name:** The certificate identification name.

**Subject:** The certificate subject.

**Type:** The certificate type information. "ca", indicates that the certificate is a CA-signed certificate. "self", indicates that the certificate is a certificate owner signed one.

"x.509", indicates the certificate is the one created and signed according to the definition of Public-Key System suggested by x.509.

**Action:**

- View: view the certificate.
- Remove: remove the certificate.

Click **Import Certificate** button to import your certificate.

Advanced Setup

Trusted CA -- Import CA certificate

Parameters

Name	<input type="text"/>
------	----------------------

Certificate

```
-----BEGIN CERTIFICATE-----  
<insert certificate here>  
-----END CERTIFICATE-----
```

Apply

Enter the certificate name and insert the certificate.

Advanced Setup

Trusted CA -- Import CA certificate

Parameters

Name	acscert
------	---------

Certificate

```
-----BEGIN CERTIFICATE-----  
MIICjDCCAfWgAwIBAgIEOUSLuTANBgkqhkiG9w0BAQUFADAmMQswCQYDVQQ  
GEwJD  
TjEXMBUGA1UEChMOQ0ZDQSBQb2xpY3kgQ0EwHhcNMDAwNjEyMDc0OTUyWhc  
NMjAw  
NjEyMDQzNzA2WjApMQswCQYDVQQGEwJDTjEaMBGGA1UEChMRQ0ZDQSBPcGV  
yYXRp  
b24gQ0EwgZ8wDQYJKoZIhvcNAQEBBQADgY0AMIGJAoGBANesUKqN1sWtSpN  
ZuTJD  
rSwXGjaexPnBie5zNJc70SPQYGvhn3Qv9+vIuU2jYFzF8qiDYPQBv7hFjI/  
Uu9be  
pUJBenxvYRgTImUfJ0PEy+SsRUpeDAPxTWNp4Efv8QEnM0JGEHAOtLHDY73  
/se+H  
jB7Wh9HhzCTF5QqZRL3o2ILXAgMBAAGjgcMwgcAwSAYDVROfBEEwPzA9oDu  
gOaQ3  
MDUxCzAJBgNVBAYTAKNOMRcwFQYDVQQKEw5DRkNBIFBvbG1jeSBBDQITENMA  
GA1UE  
AxMEQ1JMMTALBgNVHQ8EBAMCAQYwHwYDVROjBBgwFoAUL5Jufe7tBb/wveS  
FaAqX  
k1NC0tAwHQYDVRO0BBYEFMMnxjZoyCdlJIEvkdLJjMC5RrpMAwGA1UdEwQ
```

Apply

Click Apply to confirm your settings.

**Advanced Setup**

**Trusted CA**

Trusted CA (Certificate Authority) Certificates

Maximum certificates can be stored: 4

Name	Subject	Type	Action
acscert	C=CN/O=CFCA Operation CA	ca	<a href="#">View</a> <a href="#">Remove</a>

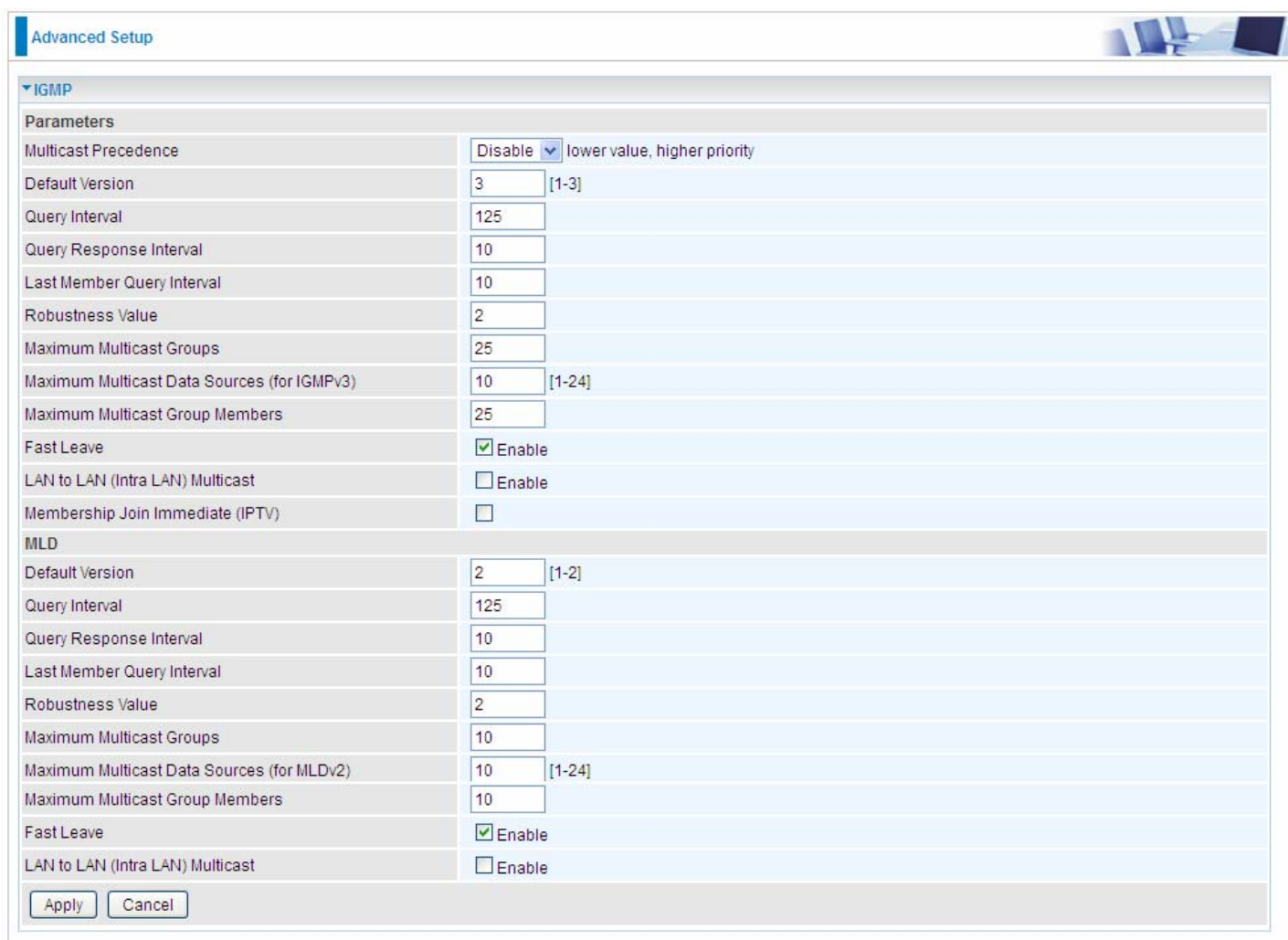
[Import Certificate](#)

# Multicast

Multicast is one of the three network transmission modes, Unicast, Multicast, Broadcast. It is a transmission mode that supports point-to-multipoint connections between the sender and the recipient. IGMP protocol is used to establish and maintain the relationship between IP host and the host directly connected multicast router.

IGMP stands for **Internet Group Management Protocol**, it is a communications protocols used to manage the membership of Internet Protocol multicast groups. IGMP is used by IP hosts and the adjacent multicast routers to establish multicast group members. There are three versions for IGMP, that is IGMPv1, IGMPv2 and IGMPv3.

MLD, short for **Multicast Listener Discovery** protocol, is a component if the Internet Protocol version 6(IPv6) suite. MLD is used by IPv6 to discover multicast listeners on a directly attached link, much as IGMP used in IPv4. The protocol is embedded in ICMPv6 instead of using a separate protocol. MLDv1 is similar to IGMPv2 and MLDv2 is similar to IGMPv3.



The screenshot shows a network configuration window titled "Advanced Setup" with a sub-section for "IGMP". The interface is divided into two main sections: "IGMP" and "MLD".

**IGMP Parameters:**

Multicast Precedence	Disable	lower value, higher priority
Default Version	3	[1-3]
Query Interval	125	
Query Response Interval	10	
Last Member Query Interval	10	
Robustness Value	2	
Maximum Multicast Groups	25	
Maximum Multicast Data Sources (for IGMPv3)	10	[1-24]
Maximum Multicast Group Members	25	
Fast Leave	<input checked="" type="checkbox"/>	Enable
LAN to LAN (Intra LAN) Multicast	<input type="checkbox"/>	Enable
Membership Join Immediate (IPTV)	<input type="checkbox"/>	

**MLD Parameters:**

Default Version	2	[1-2]
Query Interval	125	
Query Response Interval	10	
Last Member Query Interval	10	
Robustness Value	2	
Maximum Multicast Groups	10	
Maximum Multicast Data Sources (for MLDv2)	10	[1-24]
Maximum Multicast Group Members	10	
Fast Leave	<input checked="" type="checkbox"/>	Enable
LAN to LAN (Intra LAN) Multicast	<input type="checkbox"/>	Enable

At the bottom of the IGMP section, there are "Apply" and "Cancel" buttons.

## IGMP

**Multicast Precedence:** It is for multicast QoS. With lower multicast precedence, IGMP packets will be put into higher-priority queue. Default is set to disable.

**Default Version:** Enter the supported IGMP version, 1-3, default is IGMP v3.

**Query Interval:** Enter the periodic query interval time (sec) the multicast router sending the query message to hosts to understand the group membership information.

**Query Response Interval:** Enter the response interval time (sec).

**Last Member Query Interval:** Enter the interval time (sec) the multicast router query the specified group after it has received leave message.

**Robustness Value:** Enter the router robustness parameter, 2-7, the greater the robustness value, the more robust the Querier is.

**Maximum Multicast Groups:** Enter the Maximum Multicast Groups.

**Maximum Multicast Data Sources( for IGMP v3):** Enter the Maximum Multicast Data Sources,1-24.

**Maximum Multicast Group Members:** Enter the Maximum Multicast Group Members.

**Fast leave:** Check to determine whether to support fast leave. If this value is enabled, IGMP proxy removes the membership of a group member immediately without sending an IGMP membership query on downstream. This is very helpful if user wants fast channel (group change) changing in cases like IPTV environment.

**LAN to LAN (Intra 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 IGMP snooping enabled, then this LAN-to-LAN multicast feature should be enabled.

**Membership Join Immediate (IPTV):** When a host joins a multicast session, it sends unsolicited join report to its upstream router immediately. The Startup Query Interval has been set to 1/4 of the General Query value to enable the faster join at startup.

## MLD

**Default Version:** Enter the supported MLD version, 1-2, default is MLDv2.

**Query Interval:** Enter the periodic query interval time (sec) the multicast router sending the query message to hosts to understand the group membership information.

**Query Response Interval:** Enter the response interval time (sec).

**Last Member Query Interval:** Enter the interval time (sec) the multicast router query the specified group after it has received leave message.

**Robustness Value:** Enter the router robustness parameter, default is 2, the greater the robustness value, the more robust the Querier is.

**Maximum Multicast Groups:** Enter the Maximum Multicast Groups.

**Maximum Multicast Data Sources( for MLDv2):** Enter the Maximum Multicast Data Sources,1-24.

**Maximum Multicast Group Members:** Enter the Maximum Multicast Group Members.

**Fast leave:** Check to determine whether to support fast leave. If this value is enabled, MLD proxy removes the membership of a group member immediately without sending an MLD membership query on downstream. This is very helpful if user wants fast channel (group change) changing in cases like IPTV environment.

**LAN to LAN (Intra 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.

# Management

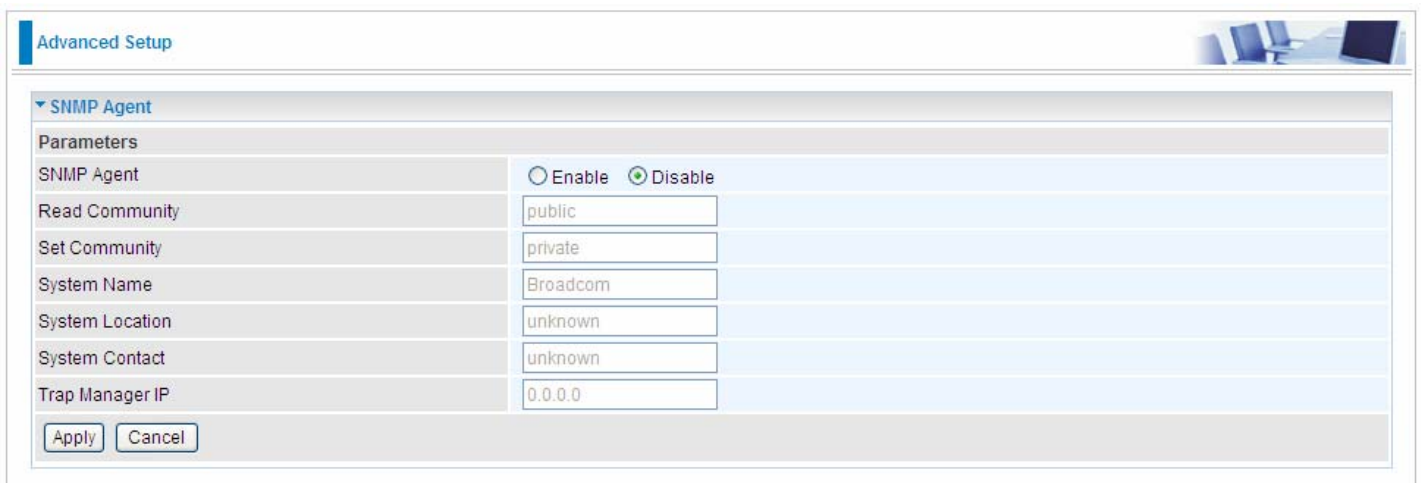
## SNMP Agent

SNMP, Simple Network Management Protocol, is the most popular one in network. It consists of SNMP Manager, SNMP Agent and MIB. Every network device supporting SNMP will have a SNMP Agent which is a management software running in the device.

SNMP Manager, the management software running on the server, it uses SNMP protocol to send GetRequest, GetNextRequest, SetRequest message to Agent to view and change the information of the device.

SNMP Agents, the management software running in the device, accepts the message from the manager, Reads or Writes the management variable in MIB accordingly and then generates Response message to send it to the manager. Also, agent will send Trap message to the manager when agent finds some exceptions.

Trap message, is the message automatically sent by the managed device without request to the manager about the emergency events.



The screenshot shows the 'Advanced Setup' page for the SNMP Agent configuration. The page has a blue header with the text 'Advanced Setup' and a small image of a server rack on the right. Below the header, there is a section titled 'SNMP Agent' with a dropdown arrow. Underneath, there is a 'Parameters' section with a table of configuration options. The 'SNMP Agent' option is set to 'Disable' (indicated by a checked radio button). Other parameters include 'Read Community' (public), 'Set Community' (private), 'System Name' (Broadcom), 'System Location' (unknown), 'System Contact' (unknown), and 'Trap Manager IP' (0.0.0.0). At the bottom of the configuration area, there are 'Apply' and 'Cancel' buttons.

Parameters	
SNMP Agent	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Read Community	<input type="text" value="public"/>
Set Community	<input type="text" value="private"/>
System Name	<input type="text" value="Broadcom"/>
System Location	<input type="text" value="unknown"/>
System Contact	<input type="text" value="unknown"/>
Trap Manager IP	<input type="text" value="0.0.0.0"/>

**SNMP Agent:** enable or disable SNMP Agent.

**Read Community:** Type the Get Community, which is the authentication for the incoming Get-and GetNext requests from the management station.

**Set Community:** Type the Set Community, which is the authentication for incoming Set requests from the management station.

**System Name:** here it refers to your router.

**System Location:** user-defined location.

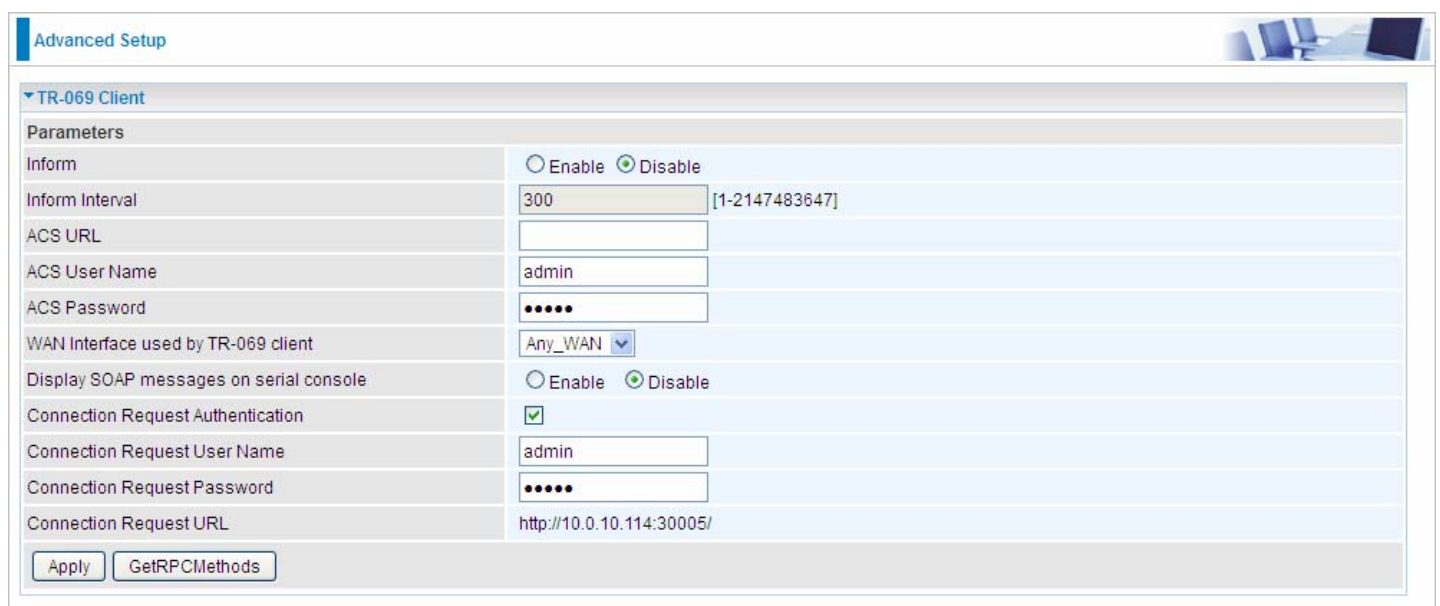
**System Contact:** user-defined contact message.

**Trap manager IP:** enter the IP address of the server receiving the trap sent by SNMP agent.

## TR- 069 Client

TR-069 (short for Technical Report 069) is a DSL Forum (which was later renamed as Broadband Forum) technical specification entitled CPE WAN Management Protocol (CWMP). It defines an application layer protocol for remote management of end-user devices.

As a bidirectional SOAP/HTTP based protocol it can provide the communication between customer premises equipment (CPE) and Auto Configuration Server (ACS). It includes both a safe configuration and the control of other CPE management functions within an integrated framework. In the course of the booming broadband market, the number of different internet access possibilities grew as well (e.g. modems, routers, gateways, set-top box, VoIP-phones). At the same time the configuration of this equipment became more complicated –too complicated for end-users. For this reason, TR-069 was developed. It provides the possibility of auto configuration of the access types. Using TR-069 the terminals can get in contact with the Auto Configuration Servers (ACS) and establish the configuration automatically and let ACS configure CPE automatically.



The screenshot shows the 'Advanced Setup' page for the 'TR-069 Client'. The page is titled 'Advanced Setup' and has a sub-section 'TR-069 Client'. Under 'Parameters', there are several fields and options:

Parameters	
Inform	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Inform Interval	300 [1-2147483647]
ACS URL	
ACS User Name	admin
ACS Password	•••••
WAN Interface used by TR-069 client	Any_WAN
Display SOAP messages on serial console	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Connection Request Authentication	<input checked="" type="checkbox"/>
Connection Request User Name	admin
Connection Request Password	•••••
Connection Request URL	http://10.0.10.114:30005/

At the bottom of the form, there are two buttons: 'Apply' and 'GetRPCMethods'.

**Inform:** select enable to let CPE be authorized to send Inform message to automatically connect to ACS.

**Inform Interval:** Specify the inform interval time (sec) which CPE used to periodically send inform message to automatically connect to ACS. When the inform interval time arrives, the CPE will send inform message to automatically connect to ACS.

**ACS URL:** Enter the ACS server login name.

**ACS User Name:** Specify the ACS User Name for ACS authentication to the connection from CPE.

**ACS password:** Enter the ACS server login password.

**WAN interface used by TR-069:** select the interface used by TR-069.

**Display SOAP message on serial console:** select whether to display SOAP message on serial console.

**Connection Request Authentication:** Check to enable connection request authentication feature.

**Connection Request User Name:** Enter the username for ACS server to make connection request.

**Connection Request User Password:** Enter the password for ACS server to make connection request.

**Connection Request URL:** Automatically match the URL for ACS server to make connection request.

**GetRPCMethods:** Supported by both CPE and ACS, display the supported RFC listing methods.

Click **Apply** to apply your settings.



## Remote Access

It is to allow remote access to the router to view or configure.

The screenshot shows the 'Advanced Setup' configuration page for a router. The 'Remote Access' section is expanded, showing the following settings:

- Parameters:**
  - Remote Access:  Enable
  - Enable Service:  HTTP  SSH  FTP  TELNET  SNMP
- Allowed Access IP Address Range:**
  - Valid:
  - IP Version: IPv4 (dropdown menu)
  - IP Address Range: [ ] ~ [ ]

Buttons: 'Apply', 'Add', 'Edit / Delete'.

**Remote Access:** Select "Enable" to allow management access from remote side (mostly from internet). If disabled, no remote access is allowed for any IPs even if you set allowed access IP address. So, please note that enabling remote access is an essential step before granting remote access to IPs.

**Enable Service:** Select to determine which service(s) is (are) allowed for remote access when remote access is enabled. By default (on condition that remote access is enabled), the web service (HTTP) is allowed for remote access.

Click **Apply** button to submit your settings.

"**Allowed Access IP Address Range**" was used to restrict which IP address could login to access system web GUI.

**Valid:** Enable/Disable Allowed Access IP Address Range

**IP Address Range:** Specify the IP address Range, IPv4 and IPv6 address range can be supported, users can set IPv4 and IPv6 address range individually.

Click **Add** to add an IP Range to allow remote access.

**Note: 1.** If user wants to grant remote access to IPs, first enable **Remote Access**.


### 2. Remote Access enabled:

- 1) Enable **Valid** for the specific IP(s) in the IP range to allow the specific IP(s) to remote access the router.
- 2) Disable **Valid** for all specific IP(s) in the IP range to allow any IP(s) to remote access the router.
- 3) No listing of IP range is to allow any IP(s) to remote access the router.

## Power Management

Power management is a feature of some electrical appliances, especially computers that turn off the power or switch to a low-power state when inactive.

Five main parameters are listed for users to check to manage the performance of the router.

Advanced Setup 

▼ Power Management

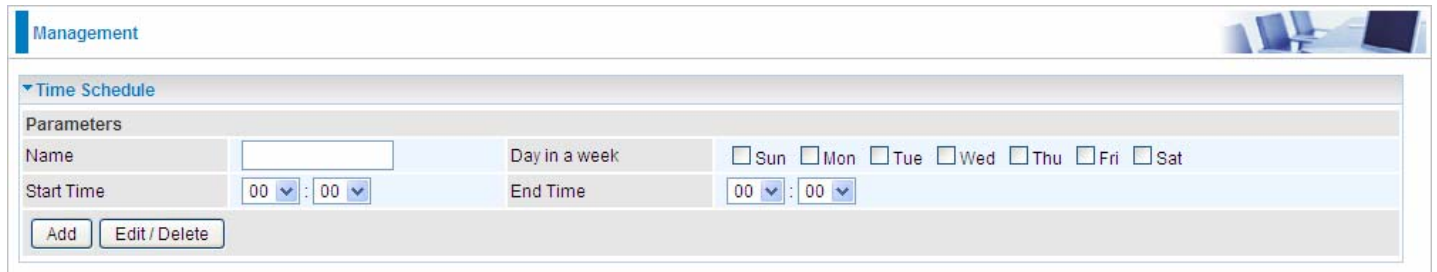
Parameters

Wait instruction when Idle	<input checked="" type="checkbox"/> Enable	Status	Enabled	
DRAM Self Refresh	<input checked="" type="checkbox"/> Enable	Status	Enabled	
Energy Efficient Ethernet	<input checked="" type="checkbox"/> Enable	Status	Enabled	
Ethernet Auto Power Down and Sleep	<input checked="" type="checkbox"/> Enable	Status	Enabled	Number of ethernet interfaces in: Powered up: 3 Powered down: 2
Adaptive Voltage Scaling	<input checked="" type="checkbox"/> Enable	Status	Enabled	

## Time Schedule

The Time Schedule supports up to **32** timeslots which helps you to manage your Internet connection. In each time profile, you may schedule specific day(s) i.e. Monday through Sunday to restrict or allowing the usage of the Internet by users or applications.

This Time Schedule correlates closely with router's time, since router does not have a real time clock on board; it uses the Simple Network Time Protocol (SNTP) to get the current time from an SNTP server from the Internet. Refer to [Internet Time](#) for details. Your router time should synchronize with NTP server.



Management

Time Schedule

Parameters

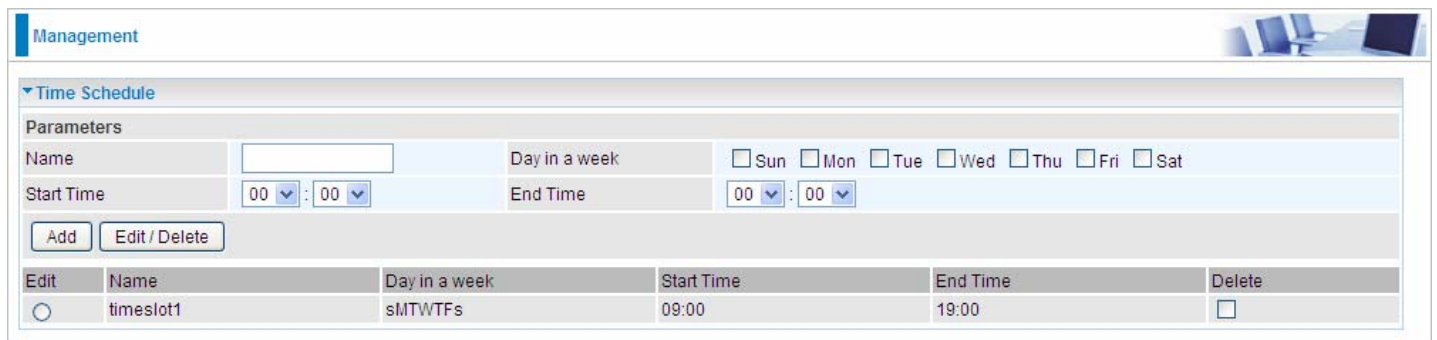
Name:

Day in a week:  Sun  Mon  Tue  Wed  Thu  Fri  Sat

Start Time: 00 : 00

End Time: 00 : 00

For example, user can add a timeslot named "timeslot1" features a period of 9:00-19:00 on every weekday.



Management

Time Schedule

Parameters

Name:

Day in a week:  Sun  Mon  Tue  Wed  Thu  Fri  Sat

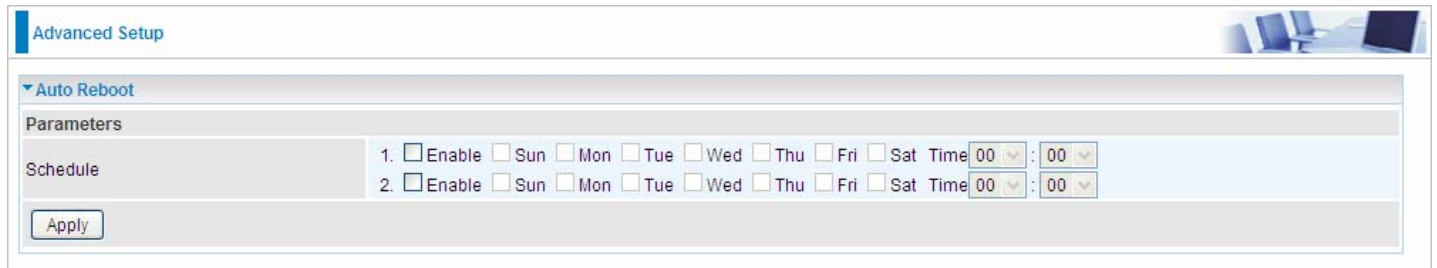
Start Time: 00 : 00

End Time: 00 : 00

Edit	Name	Day in a week	Start Time	End Time	Delete
<input type="radio"/>	timeslot1	sMTWTFs	09:00	19:00	<input type="checkbox"/>

## Auto Reboot

Auto reboot offers flexible rebooting service (reboot with the current configuration) of router for users in line with scheduled timetable settings.



Advanced Setup

Auto Reboot

Parameters

Schedule

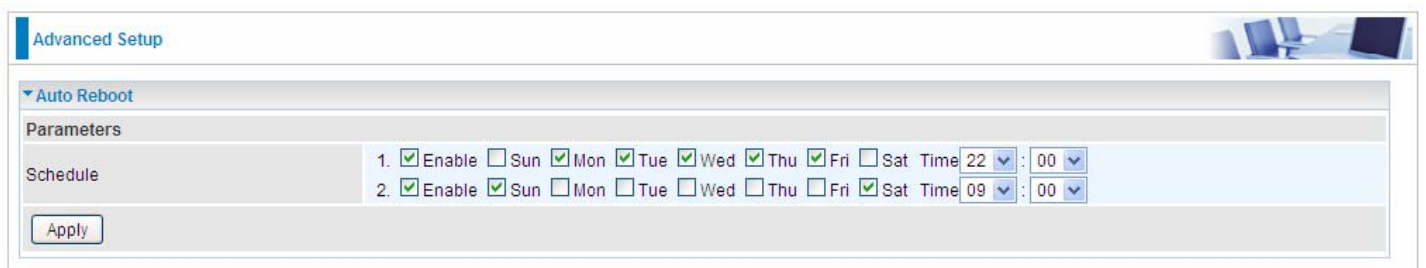
1.  Enable  Sun  Mon  Tue  Wed  Thu  Fri  Sat Time: 00:00

2.  Enable  Sun  Mon  Tue  Wed  Thu  Fri  Sat Time: 00:00

Apply

Enable to set the time schedule for rebooting.

For example, the router is scheduled to reboot at 22:00 every single weekday, and to reboot at 9:00 on Saturday and Sunday. You can set as follows:



Advanced Setup

Auto Reboot

Parameters

Schedule

1.  Enable  Sun  Mon  Tue  Wed  Thu  Fri  Sat Time: 22:00

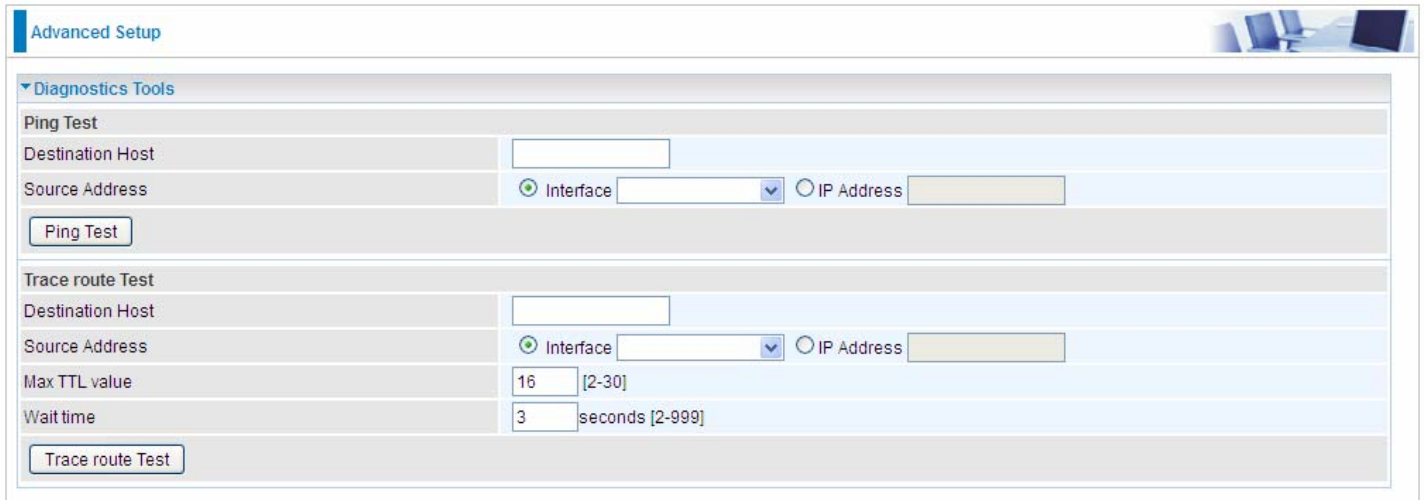
2.  Enable  Sun  Mon  Tue  Wed  Thu  Fri  Sat Time: 09:00

Apply

# Diagnostics

## Diagnostics Tools

BiPAC 7800DX(L) offers diagnostics tools including “Ping” and “Trace route test” tools to check for problems associated with network connections.



The screenshot shows the 'Advanced Setup' interface for the BiPAC 7800DX(L). Under the 'Diagnostics Tools' section, there are two main test configurations:

- Ping Test:** Includes fields for 'Destination Host', 'Source Address' (with radio buttons for 'Interface' and 'IP Address'), and a 'Ping Test' button.
- Trace route Test:** Includes fields for 'Destination Host', 'Source Address' (with radio buttons for 'Interface' and 'IP Address'), 'Max TTL value' (set to 16, range [2-30]), and 'Wait time' (set to 3, range [2-999] seconds), along with a 'Trace route Test' button.

**Ping Test:** to verify the connectivity between source and destination.

**Destination Host:** Enter the destination host (IP, domain name) to be checked for connectivity.

**Source Address:** Select or set the source address to test the connectivity from the source to the destination.

**Ping Test:** Press this button to proceed ping test.

**Trace route Test:** to trace the route to see how many hops (also see the exact hops) the packet of data has to take to get to the destination.

**Destination Host:** Set the destination host (IP, domain name) to be traced.

**Source Address:** Select or set the source address to trace the route from the source to the destination.

**Max TTL value:** Set the max Time to live (TTL) value.

**Wait time:** Set waiting time for each response in seconds.

## Example: Ping www.google.com

**Advanced Setup**

**▼ Diagnostics Tools**

**Ping Test**

Destination Host:

Source Address:  Interface   IP Address

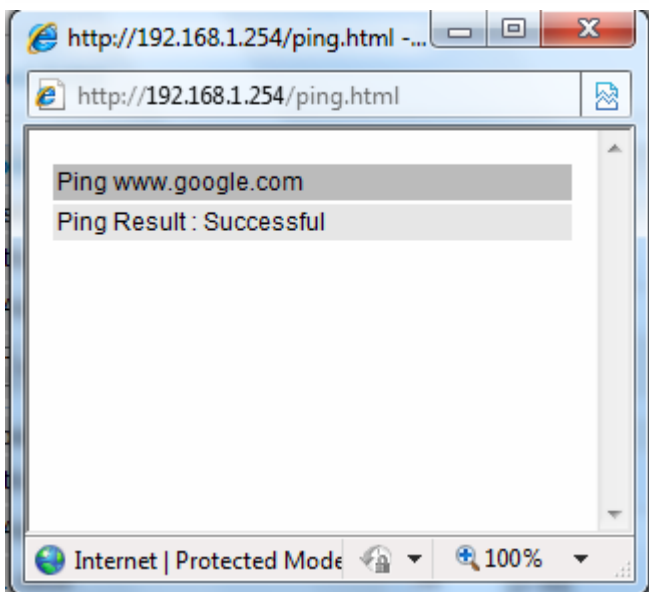
**Trace route Test**

Destination Host:

Source Address:  Interface   IP Address

Max TTL value:  [2-30]

Wait time:  seconds [2-999]



## Example: "trace" www.google.com

**Advanced Setup**

**▼ Diagnostics Tools**

**Ping Test**

Destination Host:

Source Address:  Interface   IP Address

**Trace route Test**

Destination Host:

Source Address:  Interface   IP Address

Max TTL value:  [2-30]

Wait time:  seconds [2-999]

http://192.168.1.254/tracert.html - Windows Intern...

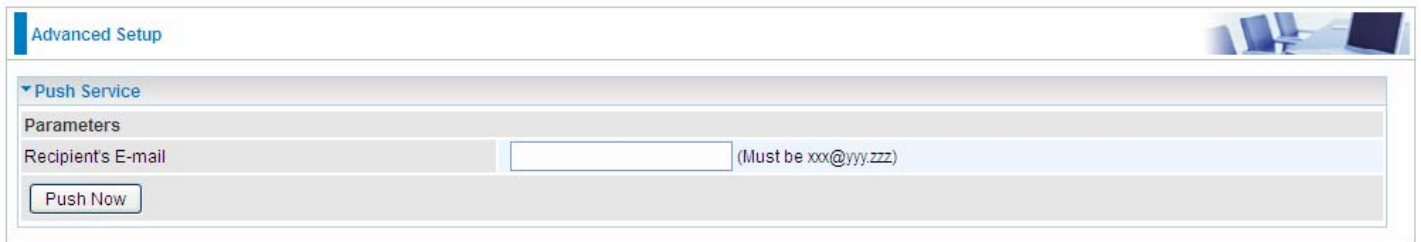
http://192.168.1.254/tracert.html

Trace www.google.com

No.	Route Address	Time
1	112.86.208.1	22.229 ms
2	221.6.9.93	20.352 ms
3	221.6.2.169	24.345 ms
4	219.158.24.41	52.837 ms
5	219.158.23.18	54.696 ms
6	219.158.19.190	54.904 ms
7	219.158.3.238	57.824 ms
8	72.14.215.130	58.851 ms
9	209.85.248.60	57.644 ms
10	209.85.250.122	81.242 ms
11	209.85.250.103	81.351 ms
12	*	**
13	173.194.72.147	79.753 ms

## Push Service

With push service, the system can send email messages with consumption data and system information.



The screenshot shows a web interface titled "Advanced Setup". Under the "Push Service" section, there is a "Parameters" area. It contains a text input field labeled "Recipient's E-mail" with a placeholder text "(Must be xxx@yyy.zzz)". Below the input field is a button labeled "Push Now".


**Recipient's E-mail:** Enter the destination mail address. The email is used to receive **system log** , **system configuration**, **security log** sent by the device when the **Push Now** button is pressed (information sent only when pressing the button ), but the mail address is not remembered.

**Note:** Please first set correct the SMTP server parameters in [Mail Alert](#).



## Diagnostics

Check the connections, including Ethernet connection, Internet Connection and wireless connection. Click **Help** link that can lead you to the interpretation of the results and the possible, simply troubleshooting.

Advanced Setup 

▼ Test the connection to your local network --- pppoe\_0\_8\_35

Test LAN Connection ( P3 )	FAIL	<a href="#">Help</a>
Test LAN Connection ( P2 )	PASS	<a href="#">Help</a>
Test LAN Connection ( P1 )	FAIL	<a href="#">Help</a>
Test LAN Connection ( P4/EWAN )	FAIL	<a href="#">Help</a>
Test your Wireless Connection	PASSPASS	<a href="#">Help</a>

▼ Test the connection to your DSL service provider

Test xDSL Synchronization	PASS	<a href="#">Help</a>
Test ATM OAM F5 segment ping	PASS	<a href="#">Help</a>
Test ATM OAM F5 end-to-end ping	PASS	<a href="#">Help</a>

▼ Test the connection to your Internet service provider

Test PPP server connection	PASS	<a href="#">Help</a>
Test authentication with ISP	PASS	<a href="#">Help</a>
Test the assigned IP address	PASS	<a href="#">Help</a>
Ping default gateway	PASS	<a href="#">Help</a>
Ping primary Domain Name Server	PASS	<a href="#">Help</a>

## Fault Management

IEEE 802.1ag Connectivity Fault Management (CFM) is a standard defined by IEEE. It defines protocols and practices for OAM (Operations, Administration, and Maintenance) for paths through 802.1 bridges and local area networks (LANs). Fault Management is to uniquely test the VDSL PTM connection; Push service

Advanced Setup

### 802.1ag Connectivity Fault Management

Parameters

This diagnostic is only used for xDSL PTM mode.

Maintenance Domain (MD) Level: 2

Destination MAC Address:

802.1Q VLAN ID: 0 [0-4095]

xDSL Traffic Type: Inactive

Test the connection to another Maintenance End Point (MEP)

Loopback Message (LBM):

Find Maintenance End Points (MEPs):

MEP Name	MD Level	MAC Address	IP Address

Linktrace Message (LTM):

Buttons: Set MD Level, Send Loopback, Send Linktrace


**Maintenance Domain (MD) Level:** Maintenance Domains (MDs) are management spaces on a network, typically owned and operated by a single entity. MDs are configured with Names and Levels, where the eight levels range from 0 to 7. A hierarchal relationship exists between domains based on levels. The larger the domain, the higher the level value.

**Maintenance End Point:** Points at the edge of the domain, define the boundary for the domain. A MEP sends and receives CFM frames through the relay function, drops all CFM frames of its level or lower that come from the wire side.

**Link Trace:** Link Trace messages otherwise known as Mac Trace Route are Multicast frames that a MEP transmits to track the path (hop-by-hop) to a destination MEP which is similar in concept to User Datagram Protocol (UDP) Trace Route. Each receiving MEP sends a Trace route Reply directly to the Originating MEP, and regenerates the Trace Route Message.

**Loop-back:** Loop-back messages otherwise known as MaC ping are Unicast frames that a MEP transmits, they are similar in concept to an Internet Control Message Protocol (ICMP) Echo (Ping) messages, sending Loopback to successive MIPs can determine the location of a fault. Sending a high volume of Loopback Messages can test bandwidth, reliability, or jitter of a service, which is similar to flood ping. A MEP can send a Loopback to any MEP or MIP in the service. Unlike CCMs, Loop back messages are administratively initiated and stopped.

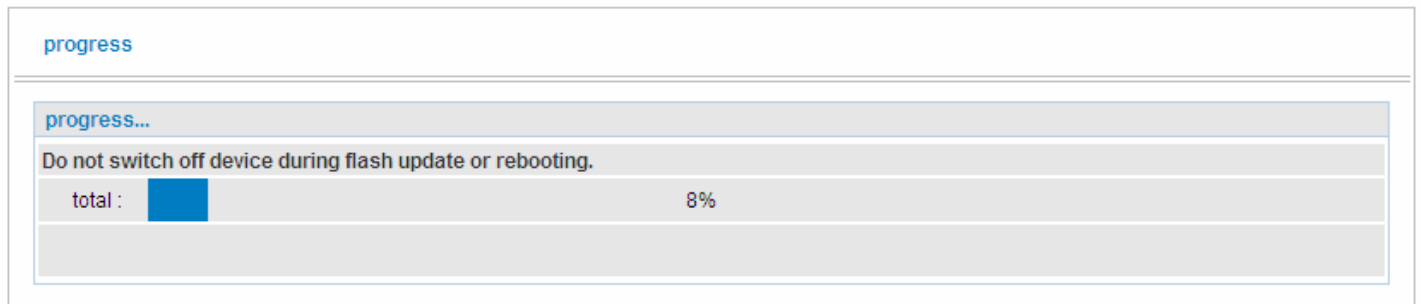
# Restart

This section lets you restart your router if necessary. Click  **Restart** in the low right corner of each configuration page.



The screenshot shows a configuration page with a 'Configuration' header. Below it is a 'Restart' section. The text reads: 'After restarting. Please wait for several seconds to let the system come up.' There are two radio button options: 'Factory Default Settings' and 'Current Settings'. The 'Current Settings' option is selected. A 'Restart' button is located at the bottom left of the section.

If you wish to restart the router using the factory default settings (for example, after a firmware upgrade or if you have saved an incorrect configuration), select Factory Default Settings to reset to factory default settings. Or you just want to restart after the current setting, the select the Current Settings, and Click Restart.



The screenshot shows a progress bar with the text 'progress' at the top left. Below it is a 'progress...' section. The text reads: 'Do not switch off device during flash update or rebooting.' There is a progress bar with a blue fill and the text 'total : 8%' to its right.

# Chapter 5: Troubleshooting

If your router is not functioning properly, please refer to the suggested solutions provided in this chapter. If your problems persist or the suggested solutions do not meet your needs, please kindly contact your service provider or Billion for support.

## Problems with the router

Problem	Suggested Action
<b>None of the LEDs is on when you turn on the router</b>	Check the connection between the router and the adapter. If the problem persists, most likely it is due to the malfunction of your hardware. Please contact your service provider or Billion for technical support.
<b>You have forgotten your login username or password</b>	Try the default username "admin" and password "admin". If this fails, you can restore your router to its factory settings by pressing the reset button on the device rear side.

## Problems with WAN interface

Problem	Suggested Action
<b>Frequent loss of ADSL line sync (disconnections)</b>	Ensure that all other devices connected to the same telephone line as your router (e.g. telephones, fax machines, analogue modems) have a line filter connected between them 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 ADSL 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.

## Problem with LAN interface

Problem	Suggested Action
<b>Cannot PING any PC on LAN</b>	Check the Ethernet LEDs on the front panel. The LED should be on for the port that has a PC connected. If it does not lit, check to see if the cable between your router and the PC is properly connected. Make sure you have first uninstalled your firewall program before troubleshooting.
	Verify that the IP address and the subnet mask are consistent for both the router and the workstations.

# Appendix: Product Support & Contact

If you come across any problems please contact the dealer from where you purchased your product.

## Contact Billion

### Worldwide:

<http://www.billion.com>

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