

Branch Office Side:

Setup details: the same operation as done in Head Office side

Item	Function		Description
1	Connection Name		B-to-H
2	Local Network		
	Subnet		
	IP Address	192.168.0.0	
	Netmask	255.255.255.0	
3	Remote Gateway Address(Hostname)	69.121.1.3	
4	Remote Network		
	Subnet		
	IP Address	192.168.1.0	
	Netmask	255.255.255.0	
5	Proposal		
	Method	ESP	
	Authentication	MD5	
	Encryption	3DES	
	Prefer Forward Security	MODP 1024(group2)	
	Pre-shared Key	123456	

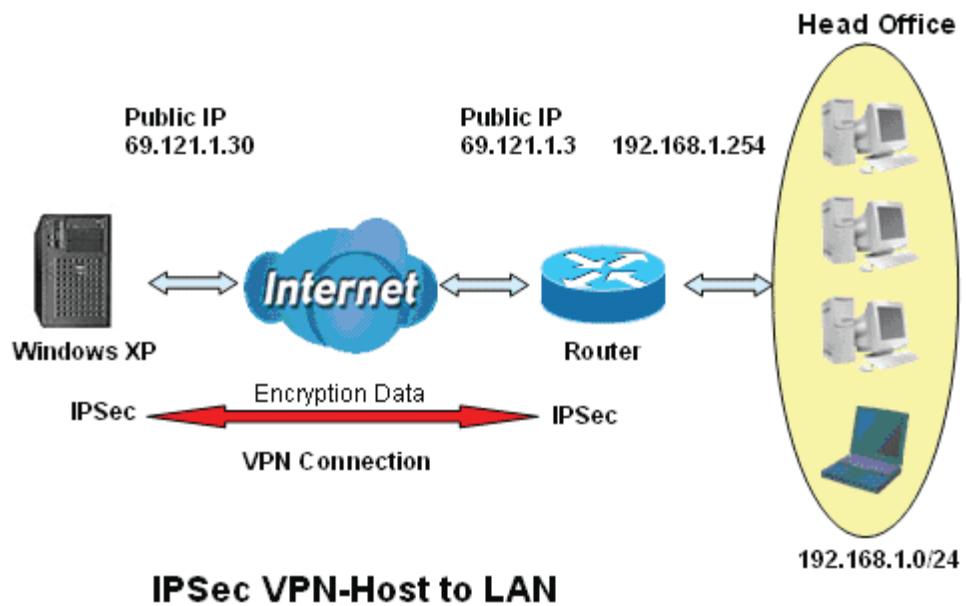
VPN

▼ IPSec

IPSec Settings					
L2TP over IPSec	<input type="checkbox"/> Enable				
Connection Name	B-to-H	WAN Interface	Default	IP Version	IPv4
Local Network	Subnet	IP Address	192.168.0.0	Netmask	255.255.255.0
Remote Security Gateway	69.121.1.3	<input type="checkbox"/> Anonymous			
Remote Network	Subnet	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			
Remote ID Type	Default	ID Content			
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	None	IPSec Lifetime	60	Minute(s) [60-1440]	
Keep Alive	DPD				
Detection Interval	180	Second(s) [180-86400]	Idle Timeout	5	Consecutive times [5-99]
MTU	1500	(0 : Default)			
<input type="button" value="Apply"/>					

1. 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
2	Local Network		
2	Subnet		Select Subnet
	IP Address	192.168.1.0	Head Office network
3	Netmask	255.255.255.0	
	Remote Gateway (Hostanme)	69.121.1.30	IP address of the Branch office router (on WAN side)
4	Remote Network		
4	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	

VPN

IPSec

IPSec Settings

L2TP over IPSec	<input type="checkbox"/> Enable				
Connection Name	Headoffice-to-HI	WAN Interface	Default	IP Version	IPv4
Local Network	Subnet	IP Address	192.168.1.0	Netmask	255.255.255.0
Remote Security Gateway	69.121.1.30	<input type="checkbox"/> Anonymous			
Remote Network	Single Address	IP Address	69.121.1.30	Netmask	255.255.255.0
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	Integrity Algorithm	MD5
DH Group	MODP1024(DH2)	SA Lifetime	480 Minute(s) [60-1440]

Phase 2

Encryption Algorithm	3DES	Integrity Algorithm	MD5
DH Group	None	IPSec Lifetime	60 Minute(s) [60-1440]
Keep Alive	DPD		
Detection Interval	180 Second(s) [180-86400]	Idle Timeout	5 Consecutive times [5-99]
MTU	1500 (0 : Default)		

VPN Account

PPTP L2TP and OpenVPN server share the same account database set in VPN Account page.

Name	Username	Tunnel	Enable	Disable
<input type="text"/>	<input type="text"/>	<input type="password"/>	<input checked="" type="radio"/>	<input type="radio"/>
Connection Type	<input checked="" type="radio"/> Remote Access <input type="radio"/> LAN to LAN	Peer Netmask	<input type="text"/>	
Peer Network IP	<input type="text"/>			
<input type="button" value="Add"/> <input type="button" value="Edit / Delete"/>				

Name: A user-defined name for the connection.

Tunnel: Select **Enable** to activate the account. PPTP(L2TP/OpenVPN) 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.

Exceptional Rule Group

Exceptional Rule is dedicated to giving or blocking PPTP/L2TP server access to some specific IP or IPs(range). Users are allowed to set 8 different exceptional rule groups at most. In each group, user can add specific IP or IP range.

Group Index	Group Name	Default Action	Exceptional Rule IP Range	Edit
1	Group1	Allow		<input type="button" value="Edit"/>
2	Group2	Allow		<input type="button" value="Edit"/>
3	Group3	Allow		<input type="button" value="Edit"/>
4	Group4	Allow		<input type="button" value="Edit"/>
5	Group5	Allow		<input type="button" value="Edit"/>
6	Group6	Allow		<input type="button" value="Edit"/>
7	Group7	Allow		<input type="button" value="Edit"/>
8	Group8	Allow		<input type="button" value="Edit"/>

Press **Edit** to set the exceptional IP (IP Range).

Group Name: Group1
Default Action: Allow
Apply
Exceptional Rule IP Range:
IP Address Range: -
Add Edit / Delete

Default Action: Please first set the range to make “**Default Action**” setting available. Set “Allow” to ban the listed IP or IPs to access the PPTP and L2TP server.

Check “Block” to grant access to the listed IP or IPs to the PPTP and L2TP server.

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

Exceptional Rule 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 to block IP range of 172.16.1.102-172.16.1.106 from accessing your PPTP and L2TP server, you can add this IP range and valid it.

The screenshot shows a software interface titled 'Configuration' with a 'Exceptional Rule Group' section. Under 'Parameters', 'Group Name' is set to 'Group1' and 'Default Action' is set to 'Allow'. An 'Apply' button is present. Below this is a table for 'Exceptional Rule IP Range' with two entries: 'Block' action for ranges '172.16.1.102 ~ 172.16.1.106' and '172.16.1.108 ~ 172.16.1.108'. Each entry has an 'Edit' link, an 'Action' column ('Block'), an 'IP Address Range' column, and a 'Delete' checkbox.

Edit	Action	IP Address Range	Delete
Edit	Block	172.16.1.102 ~ 172.16.1.106	<input type="checkbox"/>
Edit	Block	172.16.1.108 ~ 172.16.1.108	<input type="checkbox"/>

PPTP

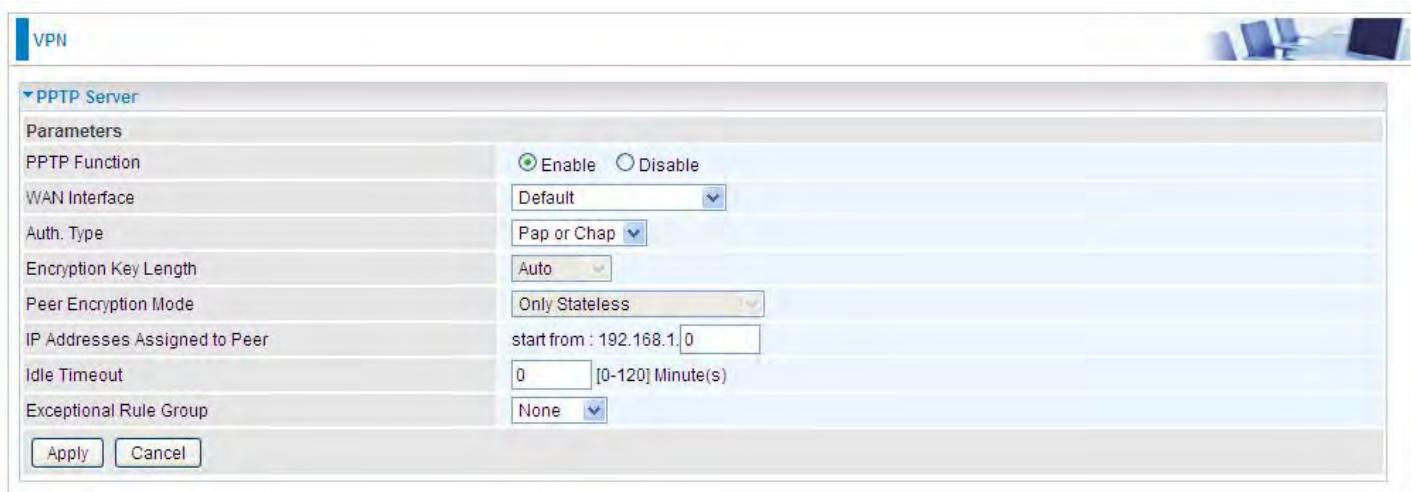
The **Point-to-Point Tunneling Protocol** (PPTP) is a Layer2 tunneling protocol for implementing virtual private networks through IP network. PPTP uses an enhanced GRE (Generic Routing Encapsulation) mechanism to provide a flow- and congestion-controlled encapsulated datagram service for carrying PPP 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 constitutes the PPTP Server setting.



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.

Exceptional Rule Group: Select to grant or block access to a group of IPs to the PPTP server. See [Exceptional Rule Group](#). If there is not any restriction, select none.

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 software interface titled 'VPN' with a sub-section 'PPTP Client'. Under 'Parameters', there are several fields: 'Name' (empty), 'WAN Interface' (set to 'Default'), 'Username' (empty), 'Password' (empty), 'Auth. Type' (set to 'Pap or Chap'), 'PPTP Server Address' (empty), 'Connection Type' (radio button selected for 'Remote Access'), 'Time to Connect' (radio button selected for 'Always'), 'Peer Network IP' (empty), and 'Peer Netmask' (empty). At the bottom left are 'Add' and 'Edit / Delete' buttons.

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.

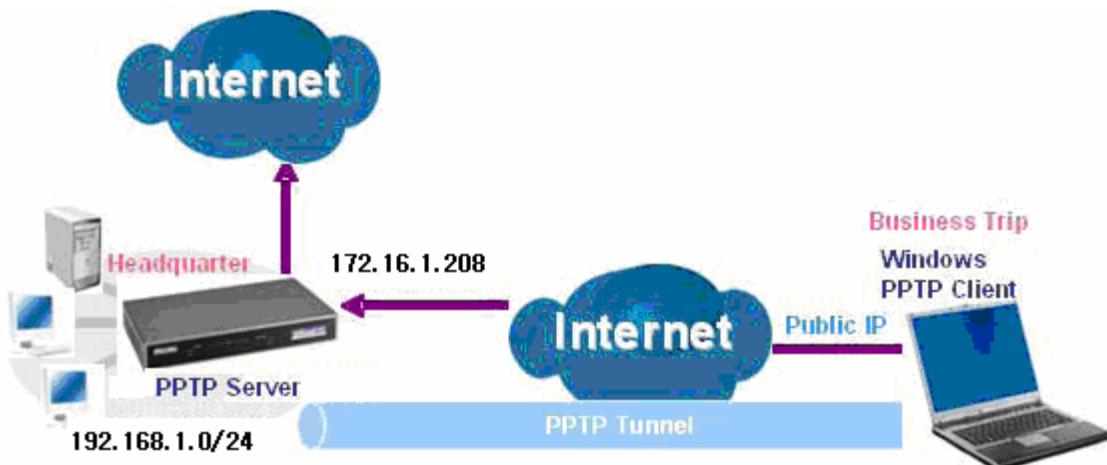
Peer Netmask: Please input the Netmask for server peer.

Click **Add** button to save your changes.

Example: PPTP Remote Access with Windows series

(**Note:** 1. inside test with 172.16.1.208, just an example for illustration

2. Here is a configuration example on Windows 7; Windows series including Windows 10/ 8/ 7 vista/ also supports the application with similar steps.)



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 : 192.168.1.00

Idle Timeout: 10 [0-120] Minute(s)

Exceptional Rule Group: None

Apply Cancel

2. Create a PPTP Account "test".

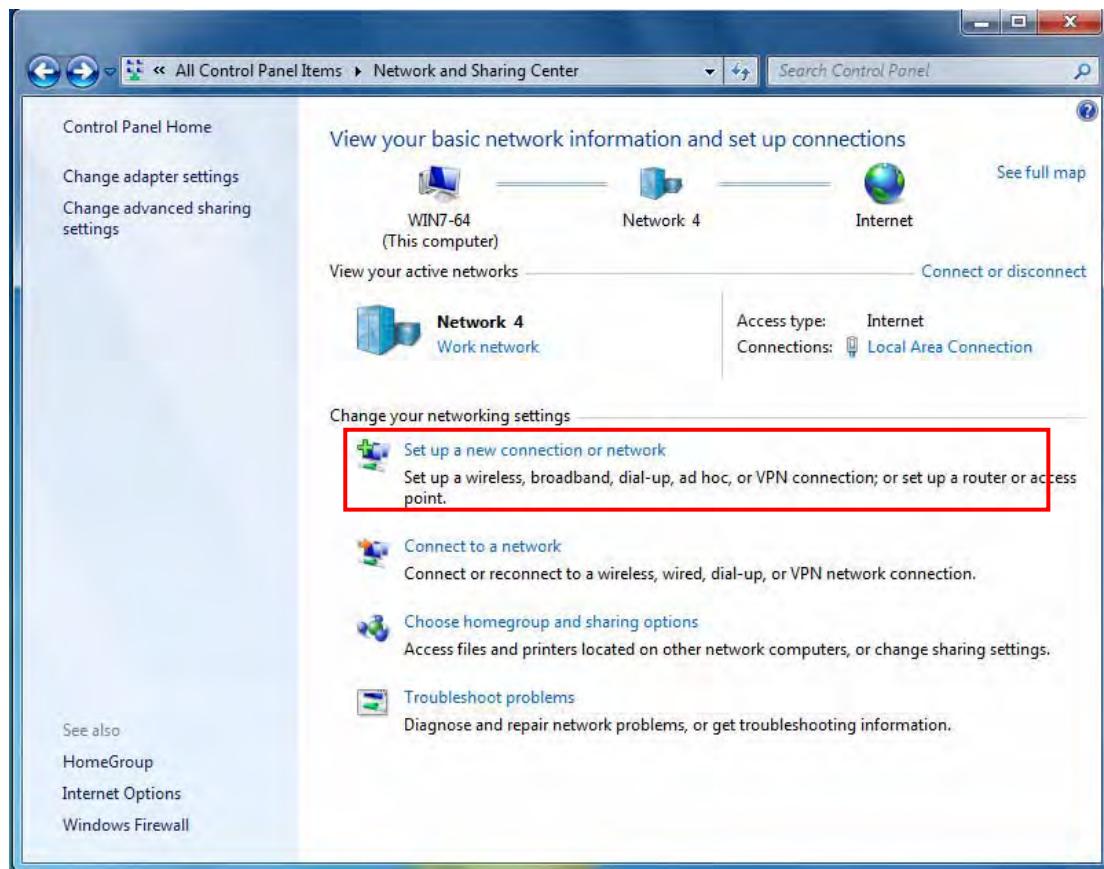
The screenshot shows a software interface for managing VPN accounts. At the top, there's a header bar with tabs like 'VPN' and 'Network'. Below it, a section titled 'VPN Account' displays a message: 'VPN Account applied to PPTP/L2TP/OpenVPN Server.' Under this, there's a 'Parameters' section with fields for 'Name', 'Username', 'Connection Type' (set to 'Remote Access'), 'Peer Network IP', 'Tunnel' (checkboxes for 'Enable' and 'Disable' are checked), 'Password', and 'Peer Netmask'. Below these are 'Add', 'Edit / Delete' buttons, and a table of accounts:

Edit	Name	Tunnel	Connection Type	Peer Network IP	Peer Netmask	Delete
<input type="radio"/>	test	Enable	Remote Access			<input type="checkbox"/>

Client Side: Windows series

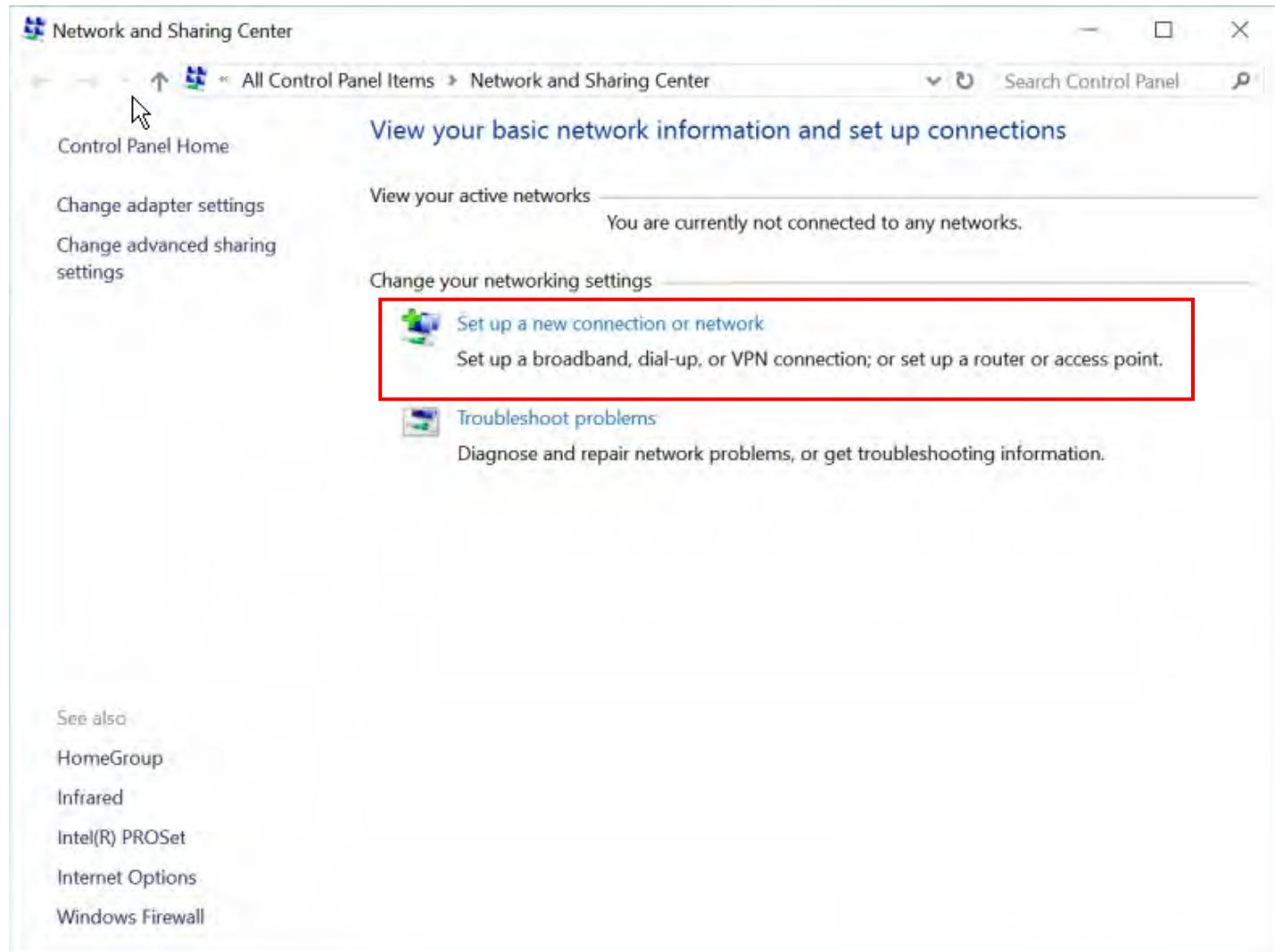
Note: Here is a configuration example on Windows 7; Windows series including Windows 10/ vista/ 8/ 7 also supports the application with similar steps.

1. In Windows7, click **Start > Control Panel > Network and Sharing Center**, Click **Set up a new connection network**.

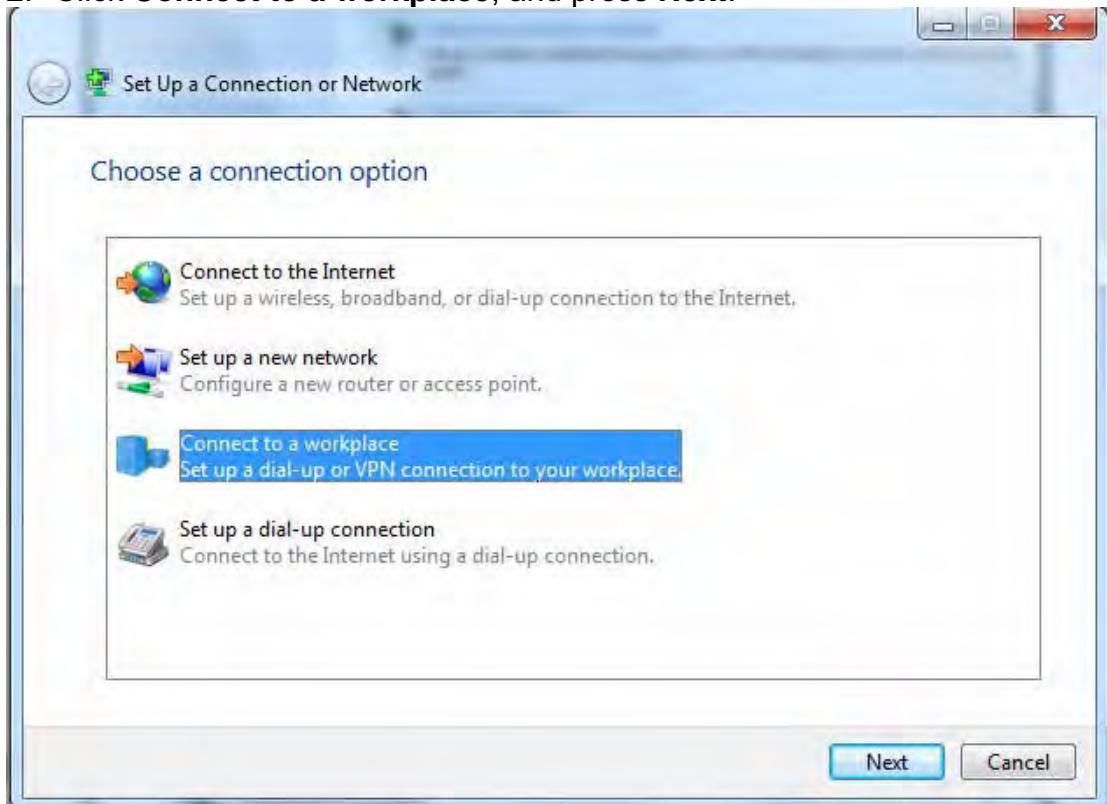


(Windows 7)

For Windows 10, Users can click **Start > Settings**; or right click the mouse when it points at Windows ICON (**Start**), then click **Control Panel > Network and Sharing Center**, then **Set up a new connection network**.



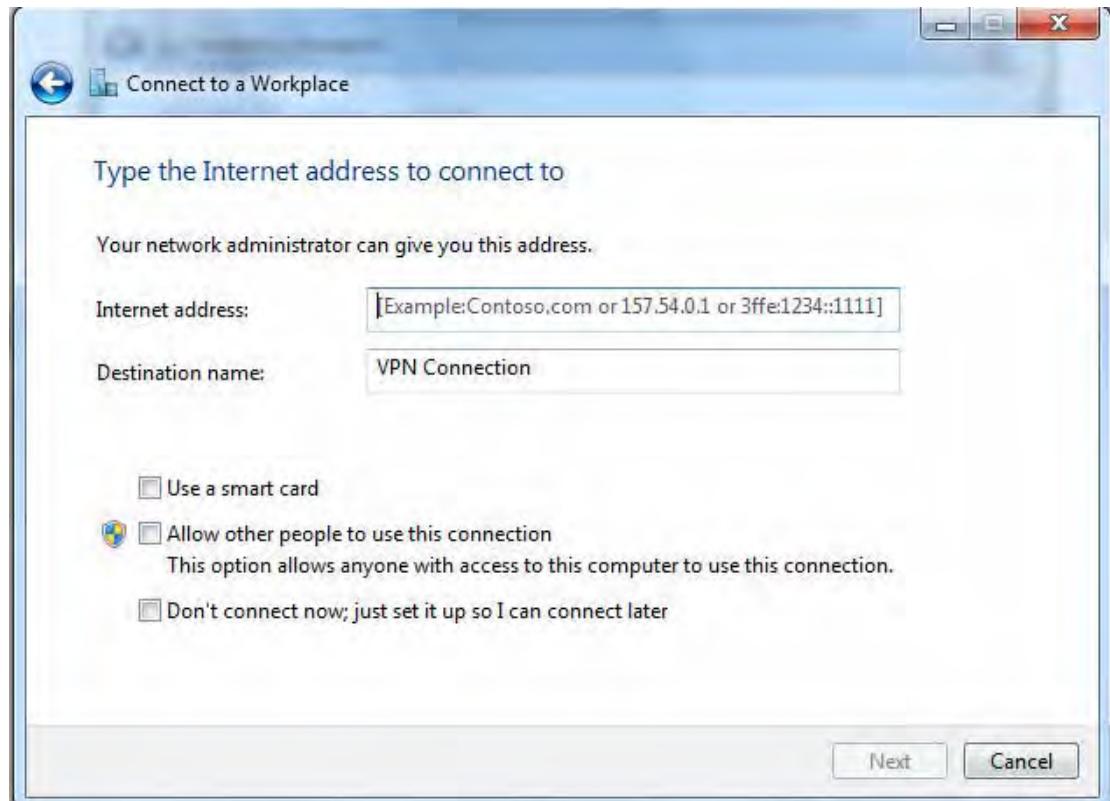
2. Click **Connect to a workplace**, and press **Next**.



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**.

Type your user name and password

User name:

Password: Show characters Remember this password

Domain (optional):

Create **Cancel**

Type your user name and password

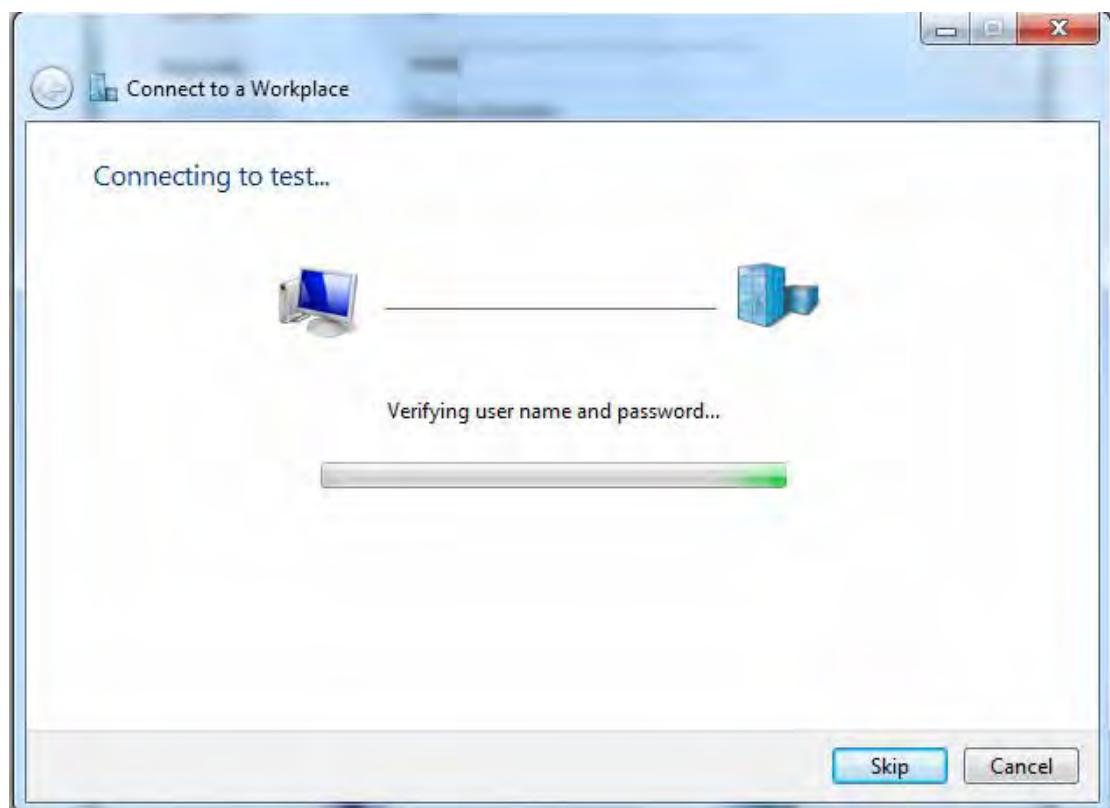
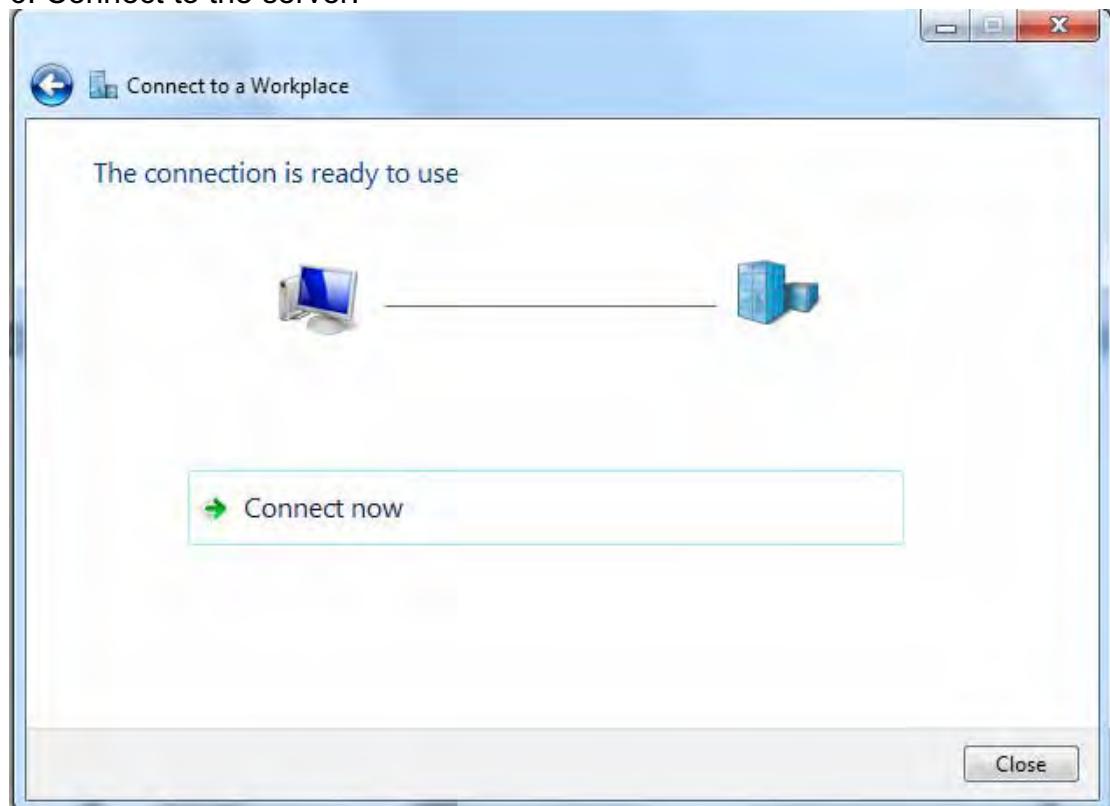
User name: test

Password: Show characters Remember this password

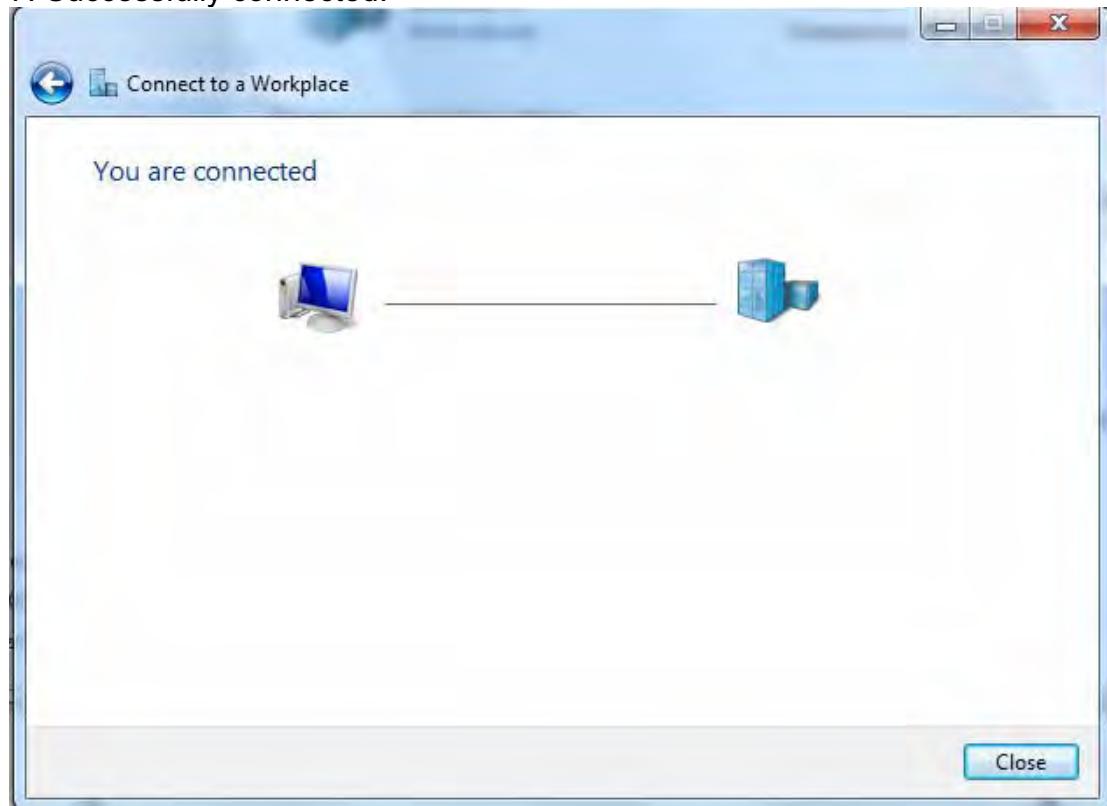
Domain (optional):

Create **Cancel**

6. Connect to the server.

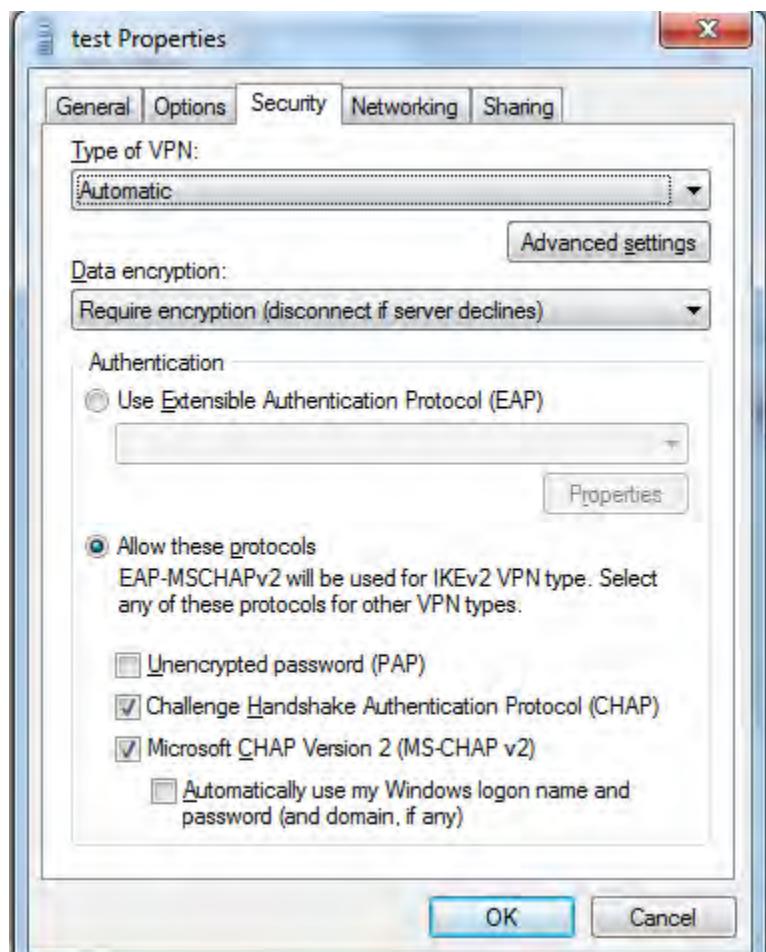


7. Successfully connected.



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)



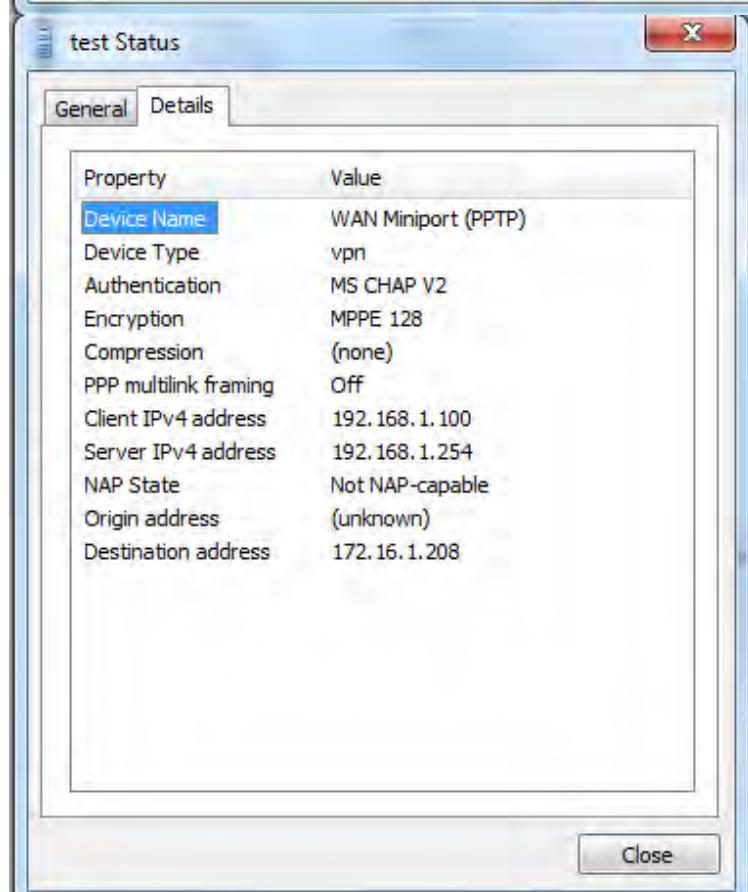


test Status

General Details

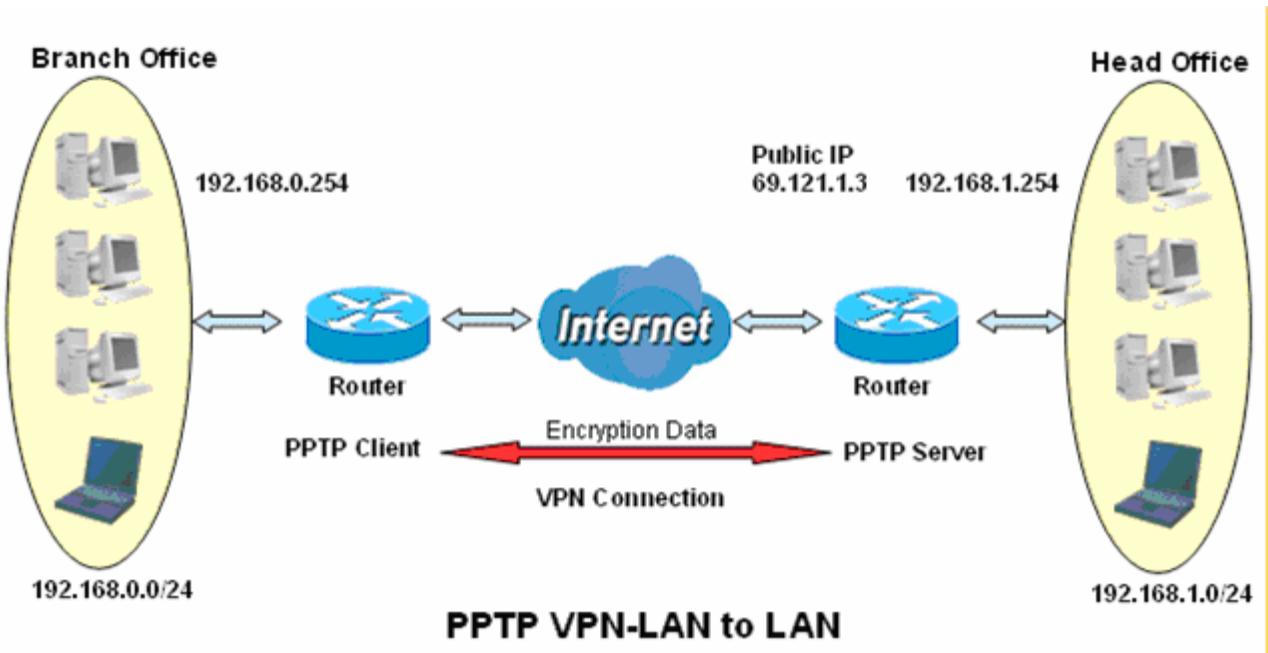
Property	Value
Device Name	WAN Miniport (PPTP)
Device Type	vpn
Authentication	MS CHAP V2
Encryption	MPPE 128
Compression	(none)
PPP multilink framing	Off
Client IPv4 address	192.168.1.100
Server IPv4 address	192.168.1.254
NAP State	Not NAP-capable
Origin address	(unknown)
Destination address	172.16.1.208

Close

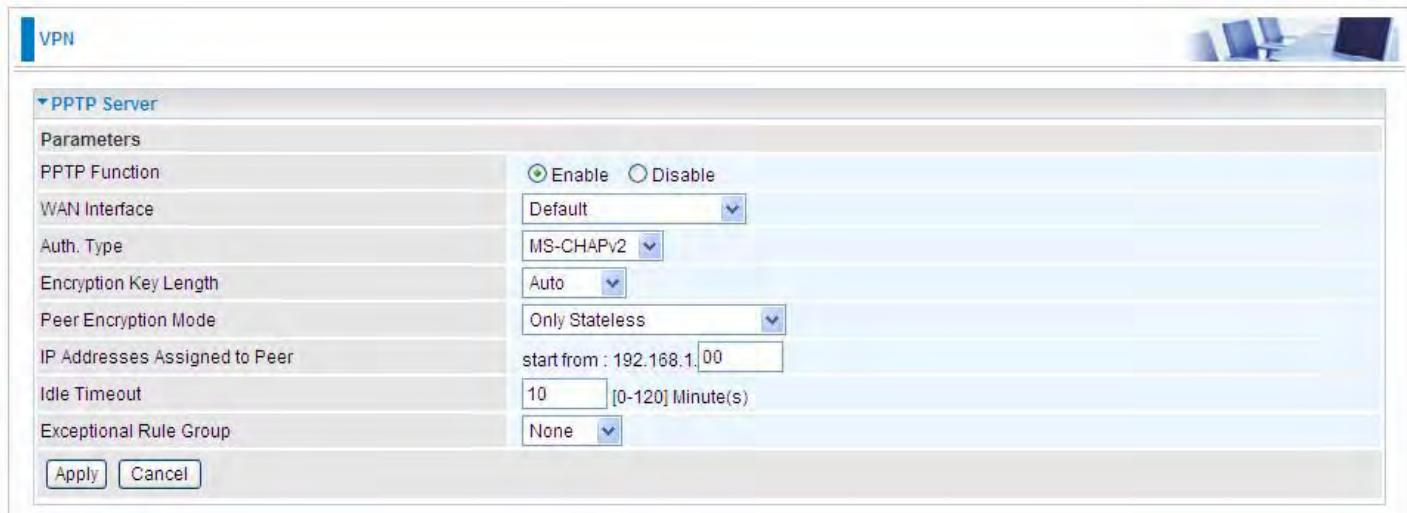


Example: Configuring a LAN-to-LAN PPTP VPN Connection

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 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.

Edit	Name	Tunnel	Connection Type	Peer Network IP	Peer Netmask	Delete
<input checked="" type="radio"/>	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.

Edit	Enable	Default Gateway	Name	Time to Connect	PPTP Server Address	Connection Type	Peer Network IP	Peer Netmask	Delete
<input checked="" type="radio"/>	<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.

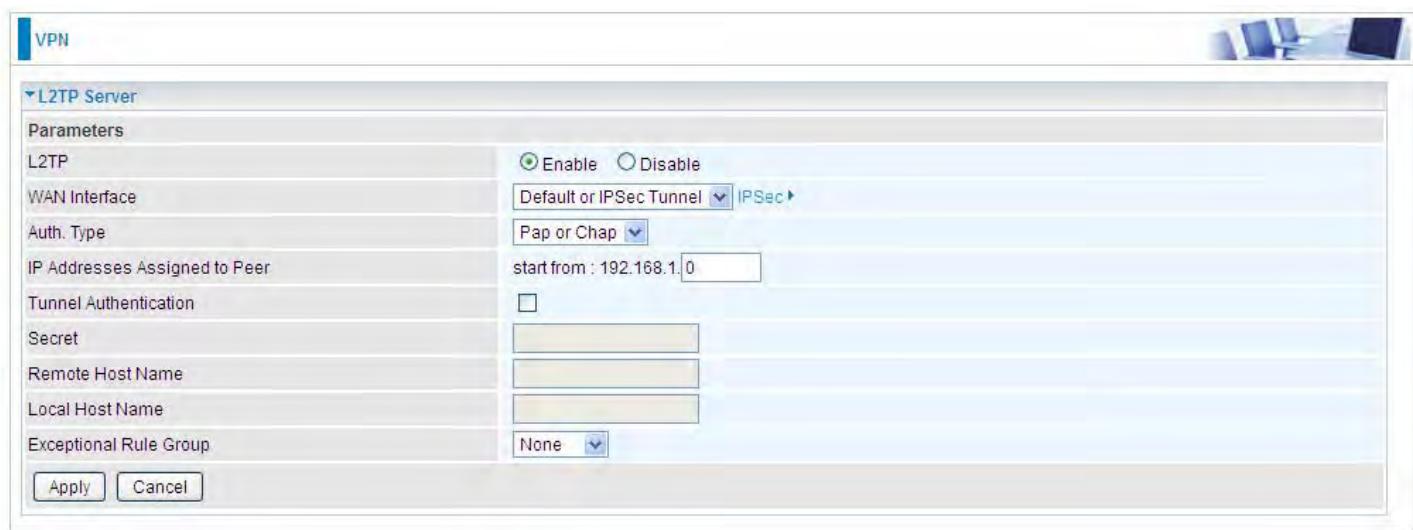
L2TP does not provide confidentiality or strong authentication by itself. IPsec is often used to secure L2TP packets by providing confidentiality, authentication and integrity. The combination of these two protocols is generally known as L2TP/IPsec.

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.



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.
- ② **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.

Exceptional Rule Group: Select to grant or block access to a group of IPs to the L2TP server. See [Exceptional Rule Group](#). If there is not any restriction, select none.

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.

This screenshot shows the 'L2TP Client' configuration page under the 'VPN' section. The 'Parameters' tab is selected. The form fields include:

Name	[Input Field]	L2TP over IPsec	<input type="checkbox"/> Enable
WAN Interface	Default	Username	[Input Field]
Auth. Type	Pap or Chap	Password	[Input Field]
Connection Type	<input checked="" type="radio"/> Remote Access <input type="radio"/> LAN to LAN	L2TP Server Address	[Input Field]
Peer Network IP	[Input Field]	Peer Netmask	[Input Field]
Tunnel Authentication	<input type="checkbox"/>	Secret	[Input Field]
Remote Host Name	[Input Field]	Local Host Name	[Input Field]

Buttons at the bottom: Add, Edit / Delete.

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.

Enable

This screenshot shows the same 'L2TP Client' configuration page, but the 'Enable' checkbox is now checked (indicated by a green checkmark). The rest of the fields and layout are identical to 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.

i Disable

L2TP Client			
Parameters			
Name		L2TP over IPSec	<input type="checkbox"/> Enable
WAN Interface	Default	Username	Password
Auth. Type	Pap or Chap	L2TP Server Address	
Connection Type	<input checked="" type="radio"/> Remote Access <input type="radio"/> LAN to LAN	Peer Network IP	Peer Netmask
Peer Network IP		Secret	
Tunnel Authentication	<input type="checkbox"/>	Local Host Name	
Remote Host Name			

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.

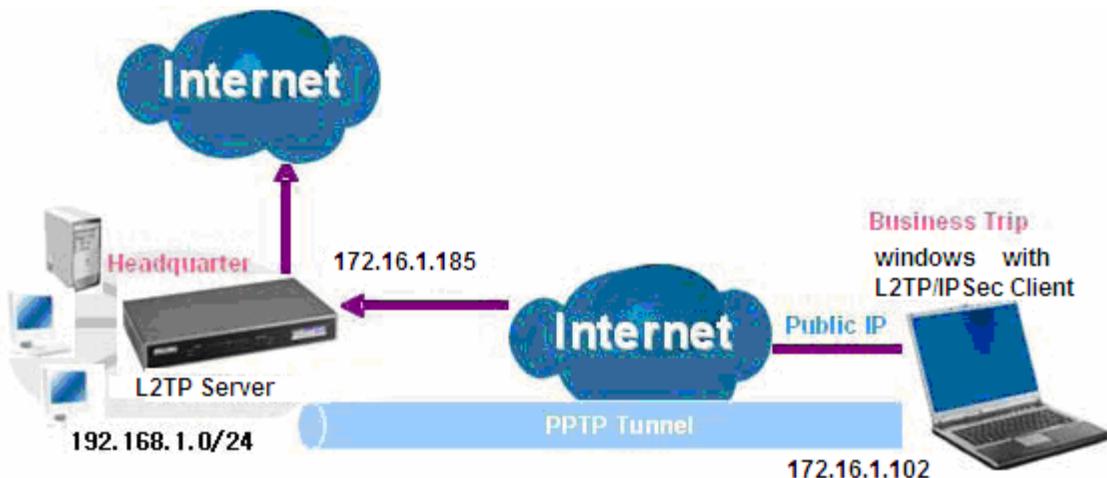
Local Host Name: Enter the local host name featuring the source of the L2TP tunnel.

Click **Add** button to save your changes.

Example: L2TP over IPSec Remote Access with Windows series

(Note: 1. inside test with 172.16.1.185, just an example for illustration

2. Here is a configuration example on Windows 7; Windows series including Windows 10/ 8/ 7 vista/ also supports the application with similar steps.)



Server Side:

1. Configuration > VPN > L2TP and Enable the L2TP function, Click **Apply**.

Parameters	
L2TP	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
WAN Interface	Default or IPSec Tunnel
Auth. Type	Chap
IP Addresses Assigned to Peer	start from : 192.168.1.10
Tunnel Authentication	<input checked="" type="checkbox"/>
Secret	[]
Remote Host Name	[]
Local Host Name	[]
Exceptional Rule Group	None
<input type="button" value="Apply"/> <input type="button" value="Cancel"/>	

The IPSec for L2TP rule

IPSec Settings	
L2TP over IPSec	<input checked="" type="checkbox"/> Enable
Connection Name	[]
WAN Interface	Default
Remote Security Gateway	[]
Key Exchange Method	IKE
IPsec Protocol	ESP
Pre-Shared Key	123456
<input type="button" value="Apply"/>	

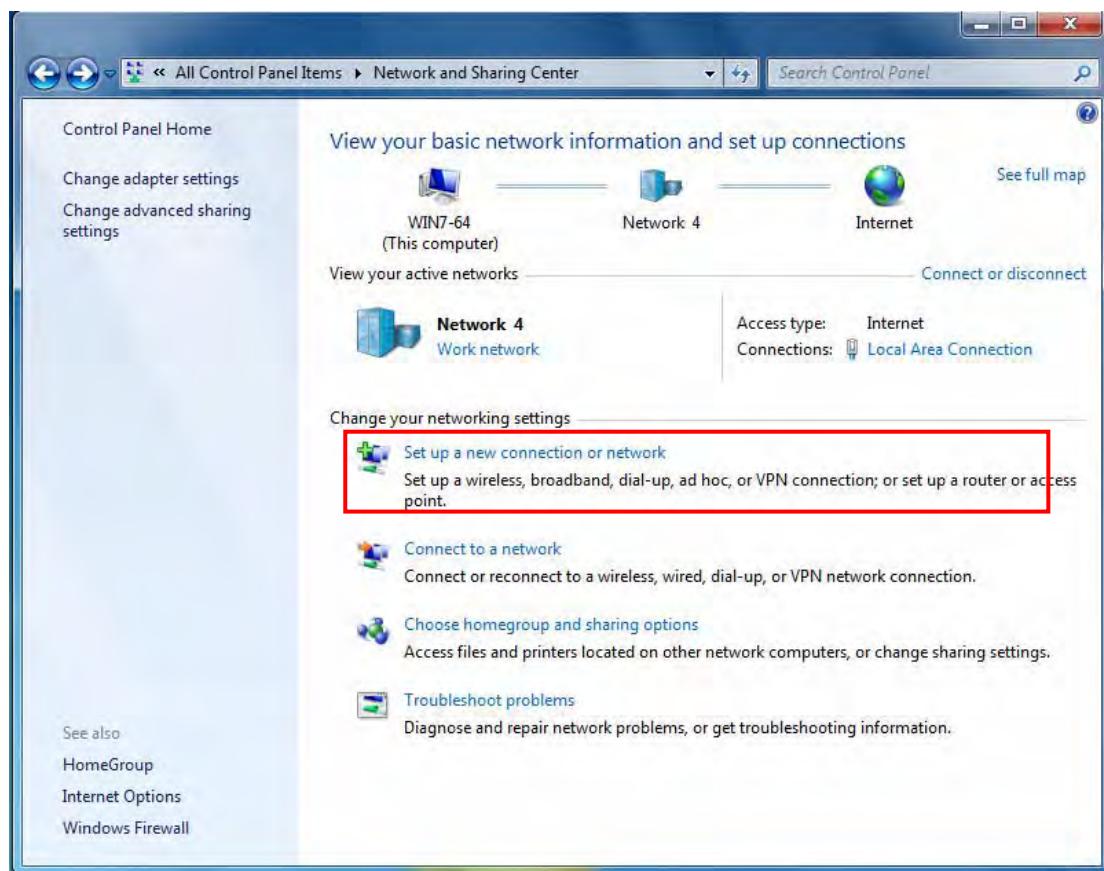
2. Create a L2TP Account "test1".

The screenshot shows a software interface for managing VPN accounts. At the top, there's a header bar with the word 'VPN'. Below it, a section titled 'VPN Account' displays a message: 'VPN Account applied to PPTP/L2TP/OpenVPN Server.' Under this, a 'Parameters' section contains fields for 'Name' (set to 'test1'), 'Tunnel' (radio button selected), 'Enable' (checked), 'Username' (set to 'test1'), 'Password' (a masked password), 'Connection Type' (radio button selected for 'Remote Access'), 'Peer Network IP' (a masked IP address), and 'Peer Netmask' (a masked IP address). Below these fields are 'Add' and 'Edit / Delete' buttons. A table below lists existing accounts: 'Edit' column has a link for 'test1'; 'Name' column shows 'test1'; 'Tunnel' column shows 'Enable'; 'Connection Type' column shows 'Remote Access'; 'Peer Network IP' and 'Peer Netmask' columns are empty; and a 'Delete' column has a checkbox.

Client Side: Windows series

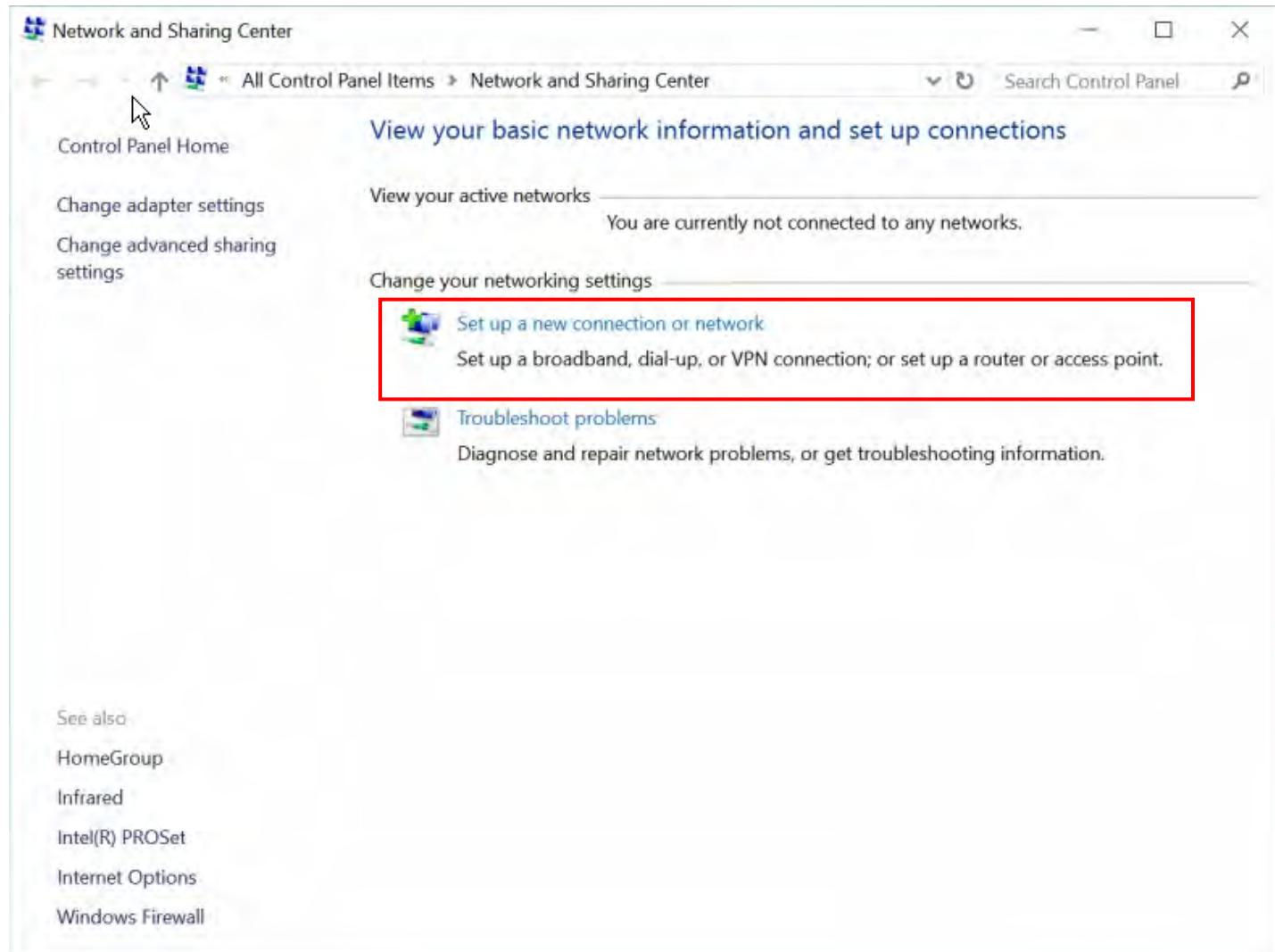
Note: Here is a configuration example on Windows 7; Windows series including Windows 10/ vista/ 8/ 7 also supports the application with similar steps.

1. In Windows7, click **Start > Control Panel > Network and Sharing Center**, Click **Set up a new connection network**.



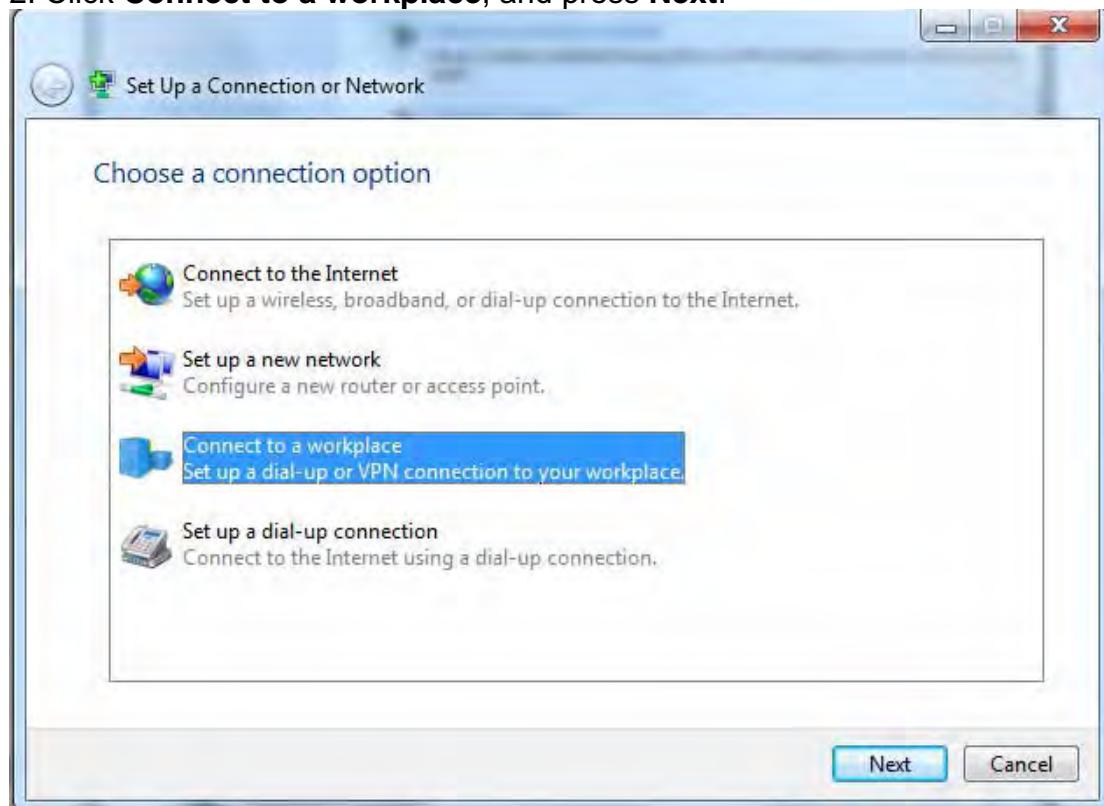
(Windows 7)

For Windows 10, Users can click **Start > Settings**; or right click the mouse when it points at Windows ICON (**Start**), then click **Control Panel > Network and Sharing Center**, then **Set up a new connection network**.



(Windows 10)

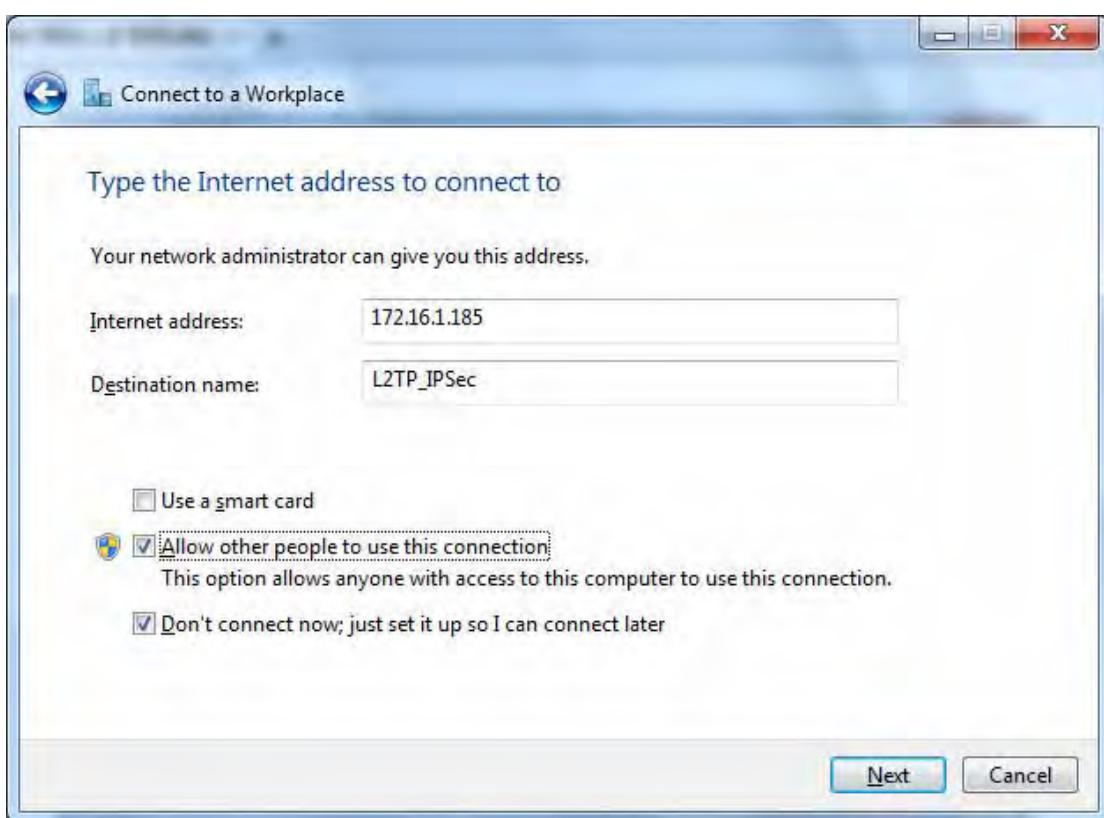
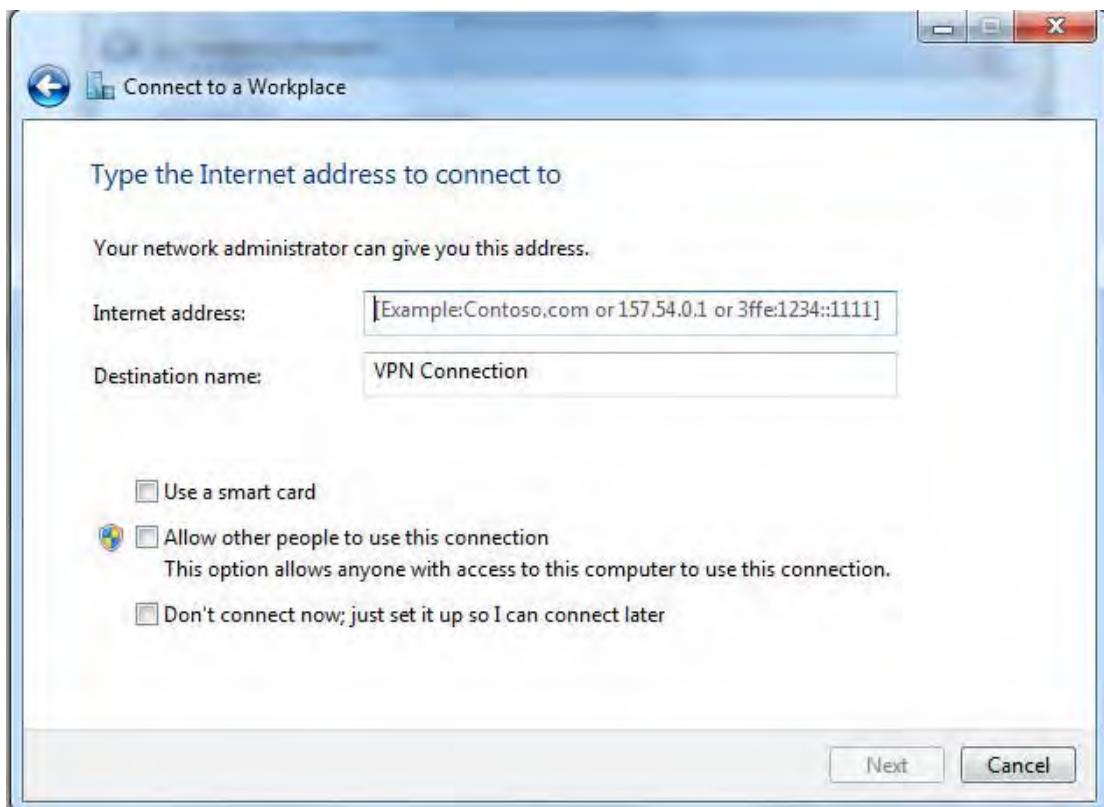
2. Click **Connect to a workplace**, and press **Next**.



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**.

Type your user name and password

User name:

Password: Show characters Remember this password

Domain (optional):

Create **Cancel**

Type your user name and password

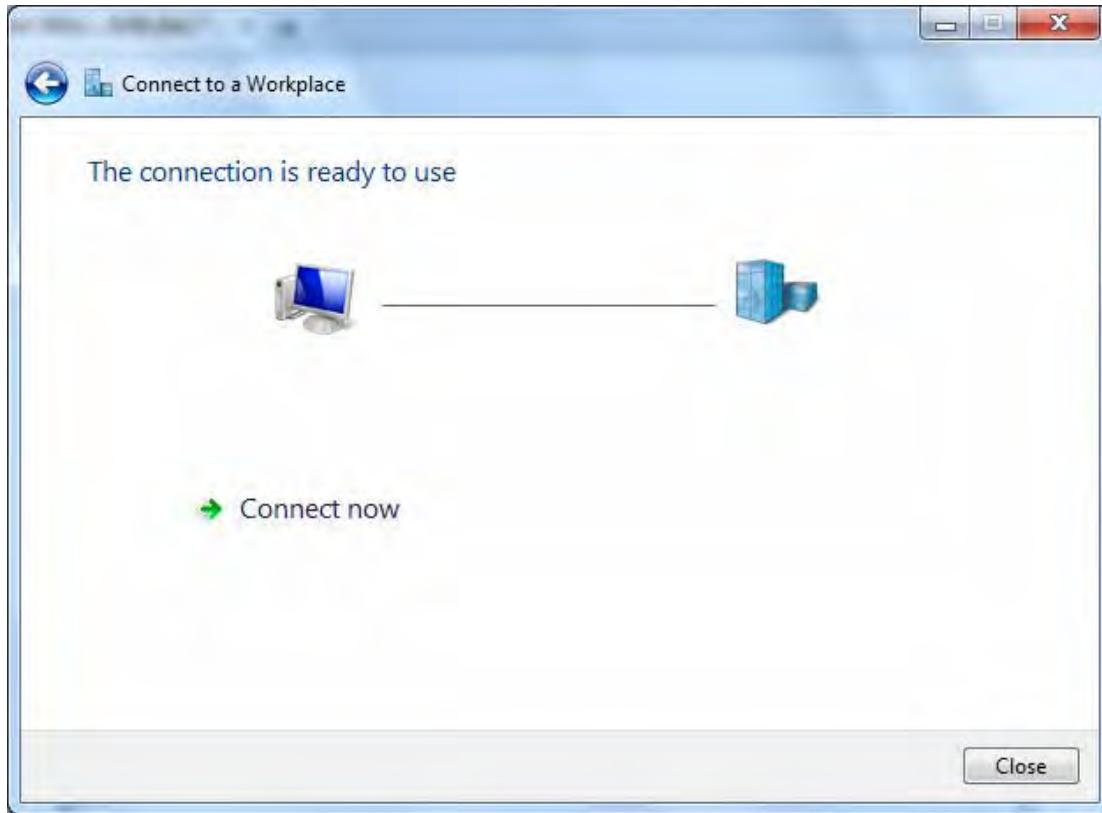
User name:

Password: Show characters Remember this password

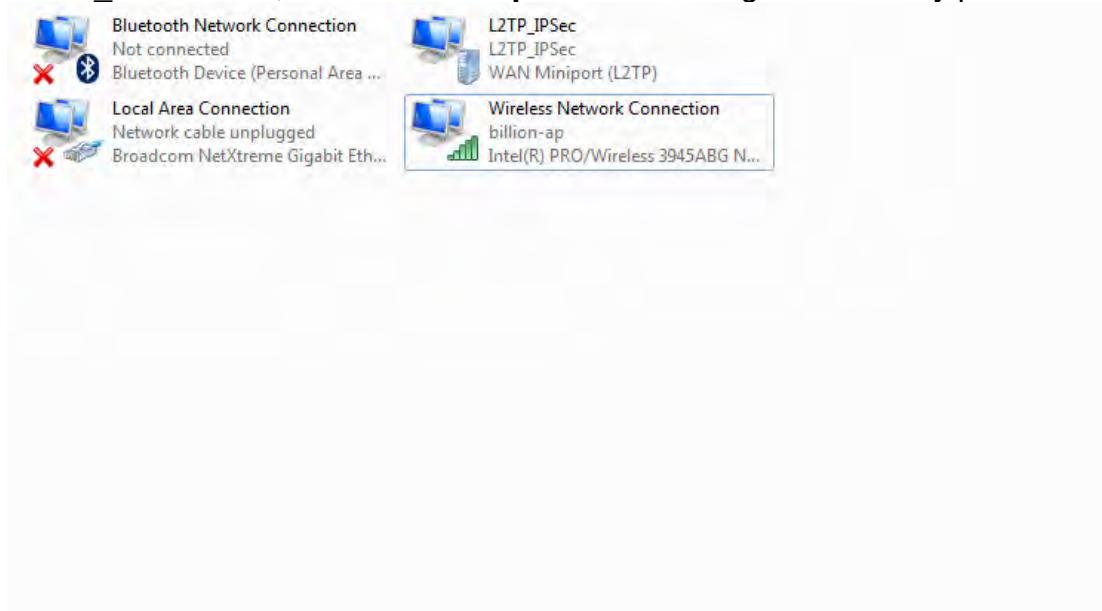
Domain (optional):

Create **Cancel**

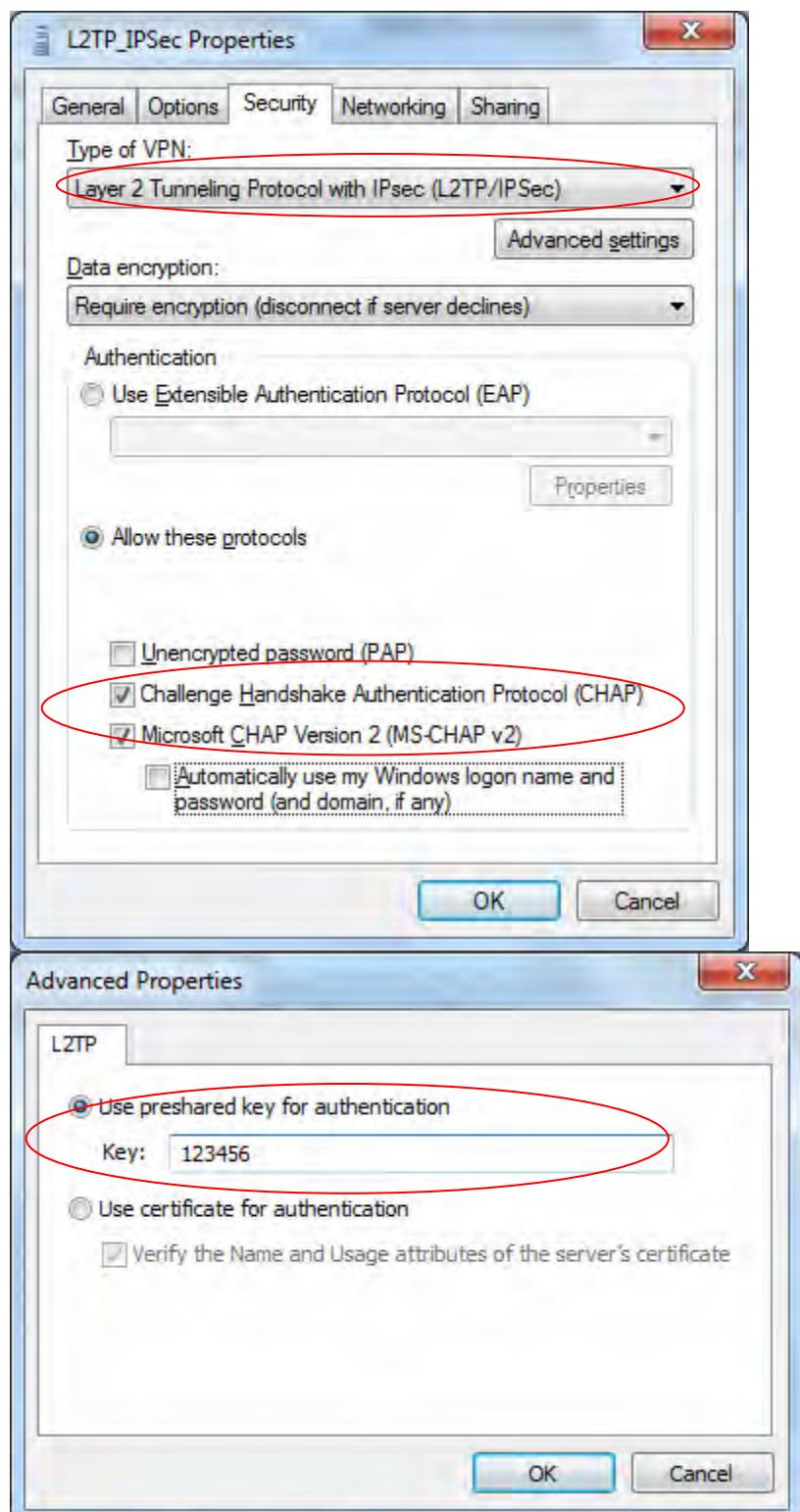
6. Connection created. Press **Close**.



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.

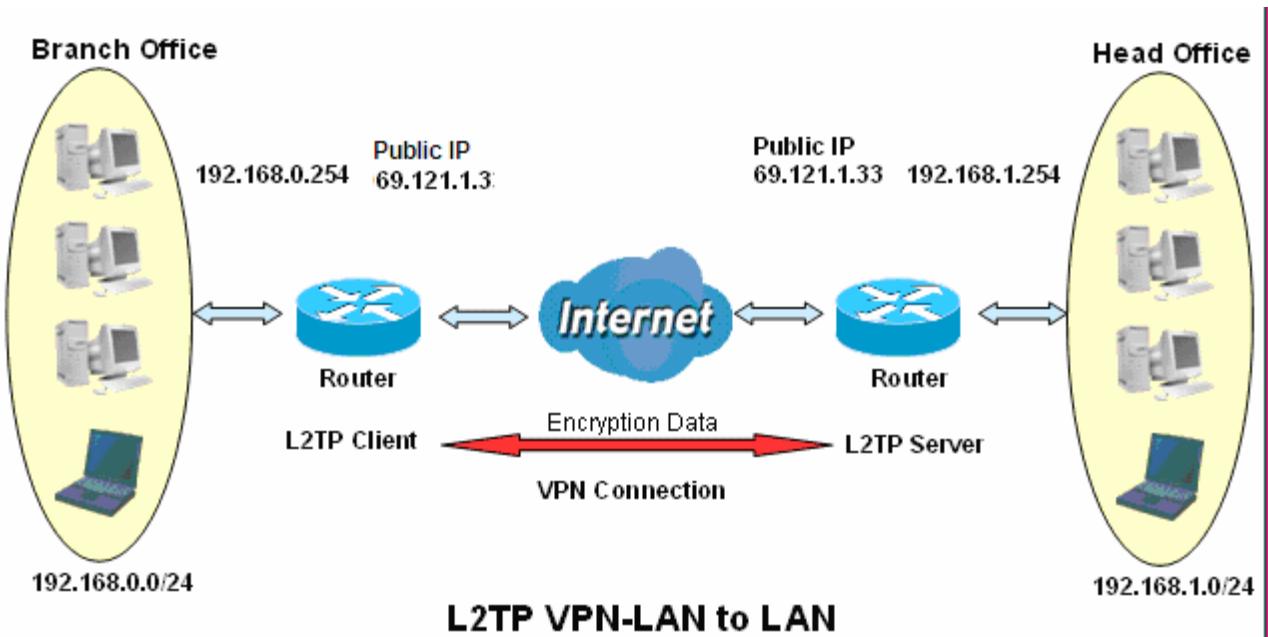


Property	Value
Device Name	WAN Miniport (L2TP)
Device Type	vpn
Authentication	CHAP
Encryption	IPsec: AES 128
Compression	(none)
PPP multilink framing	Off
Client IPv4 address	192.168.1.10
Server IPv4 address	192.168.1.254
NAP State	Not NAP-capable
Network Adapter Used	Wireless Network Connection
Origin address	172.16.1.102
Destination address	172.16.1.185

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

L2TP Server Configuration:

Parameters	
L2TP	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
WAN Interface	Default or IPSec Tunnel <input type="button" value="IPSec"/>
Auth. Type	Chap <input type="button"/>
IP Addresses Assigned to Peer	start from : 192.168.1.10
Tunnel Authentication	<input type="checkbox"/>
Secret	<input type="text"/>
Remote Host Name	<input type="text"/>
Local Host Name	<input type="text"/>
Exceptional Rule Group	None <input type="button"/>
<input type="button" value="Apply"/> <input type="button" value="Cancel"/>	

IPSec Settings:

IPSec Settings					
L2TP over IPSec	<input checked="" type="checkbox"/> Enable				
Connection Name	test2	WAN Interface	Default	IP Version	IPv4
Remote Security Gateway	<input type="text"/>	<input checked="" type="checkbox"/> Anonymous			
Key Exchange Method	IKE	IPsec Protocol	ESP		
Pre-Shared Key	<input type="text"/> 123456				
<input type="button" value="Apply"/>					

Tunnel Mode Connections:

Active	L2TP	Connection Name	Local Network	Remote Network	Remote Security Gateway	Remove	Edit
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	test2			Anonymous	<input type="checkbox"/>	<input type="button" value="Edit"/>
<input type="button" value="Add"/> <input type="button" value="Remove"/>							

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.

The screenshot shows a web-based administrative interface for managing VPN accounts. The top navigation bar has a 'VPN' tab selected. Below it, a section titled 'VPN Account' is expanded, with a sub-instruction: 'VPN Account applied to PPTP/L2TP/OpenVPN Server.' The main configuration area is labeled 'Parameters' and contains the following fields:

Name	HO	Tunnel	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
Username	test2	Password	*****
Connection Type	<input type="radio"/> Remote Access <input checked="" type="radio"/> LAN to LAN		
Peer Network IP	192.168.0.0	Peer Netmask	255.255.255.0

Below these fields are two buttons: 'Add' and 'Edit / Delete'. A table below lists existing accounts:

Edit	Name	Tunnel	Connection Type	Peer Network IP	Peer Netmask	Delete
<input checked="" type="radio"/>	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 L2TP server, and can also set the tunnel as the default route for all outgoing traffic.

The screenshot shows a 'VPN' interface with a 'L2TP Client' section. The 'Parameters' table contains the following information:

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	

Below the table are 'Add' and 'Edit / Delete' buttons. A table at the bottom lists existing tunnels:

Edit	Enable	Default Gateway	Name	L2TP Server Address	Connection Type	Peer Network IP	Peer Netmask	Delete
<input checked="" type="radio"/>	<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.

OpenVPN

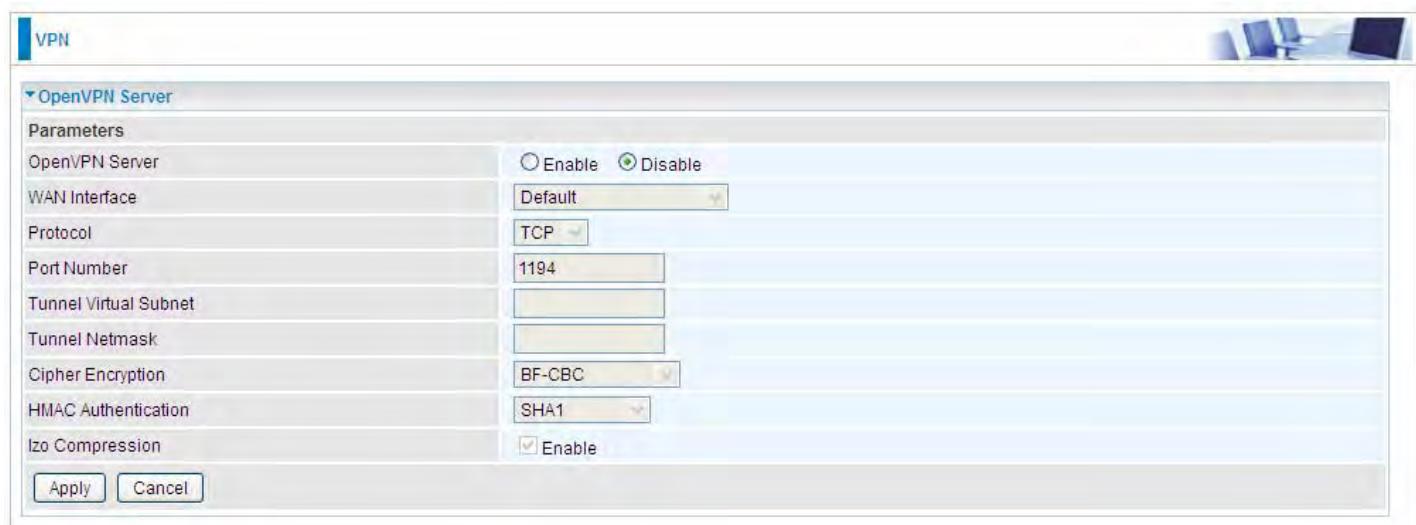
OpenVPN is an open source software application that implements virtual private network (VPN) techniques for creating secure point-to-point or site-to-site connections in routed or bridged configurations and remote access facilities. It uses a custom security protocol that utilizes SSL/TLS for key exchange. It is capable of traversing network address translation (NAT) and firewalls.

OpenVPN allows peers to authenticate each other using a pre-shared secret key, certificates, or username/password. When used in a multiclient-server configuration, it allows the server to release an authentication certificate for every client, using signature and Certificate authority. It uses the OpenSSL encryption library extensively, as well as the SSLv3/TLSv1 protocol, and contains many security and control features.

OpenVPN is good at portability. OpenVPN has been ported and embedded to several systems.

OpenVPN Server

Users can set the basic parameters(source/destination address, protocol/port, authentication, encryption, etc) for OpenVPN Server.



OpenVPN Server: Select **Enable** to activate OpenVPN Server.

WAN Interface: Select the exact WAN interface configured as source for the tunnel. Select Default to use the now-working WAN interface for the tunnel.

Protocol: OpenVPN can run over User Datagram Protocol (UDP) or Transmission Control Protocol (TCP) transports. Select the protocol.

Port Number: Port 1194 is the official assigned port number for OpenVPN

Tunnel Virtual Subnet: Set the tunnel virtual subnet IP for OpenVPN server.

Tunnel Network: Set the tunnel virtual subnet mask.

Cipher Encryption: OpenVPN uses all the ciphers available in the OpenSSL package to encrypt both the data and channels. Select the encryption method.

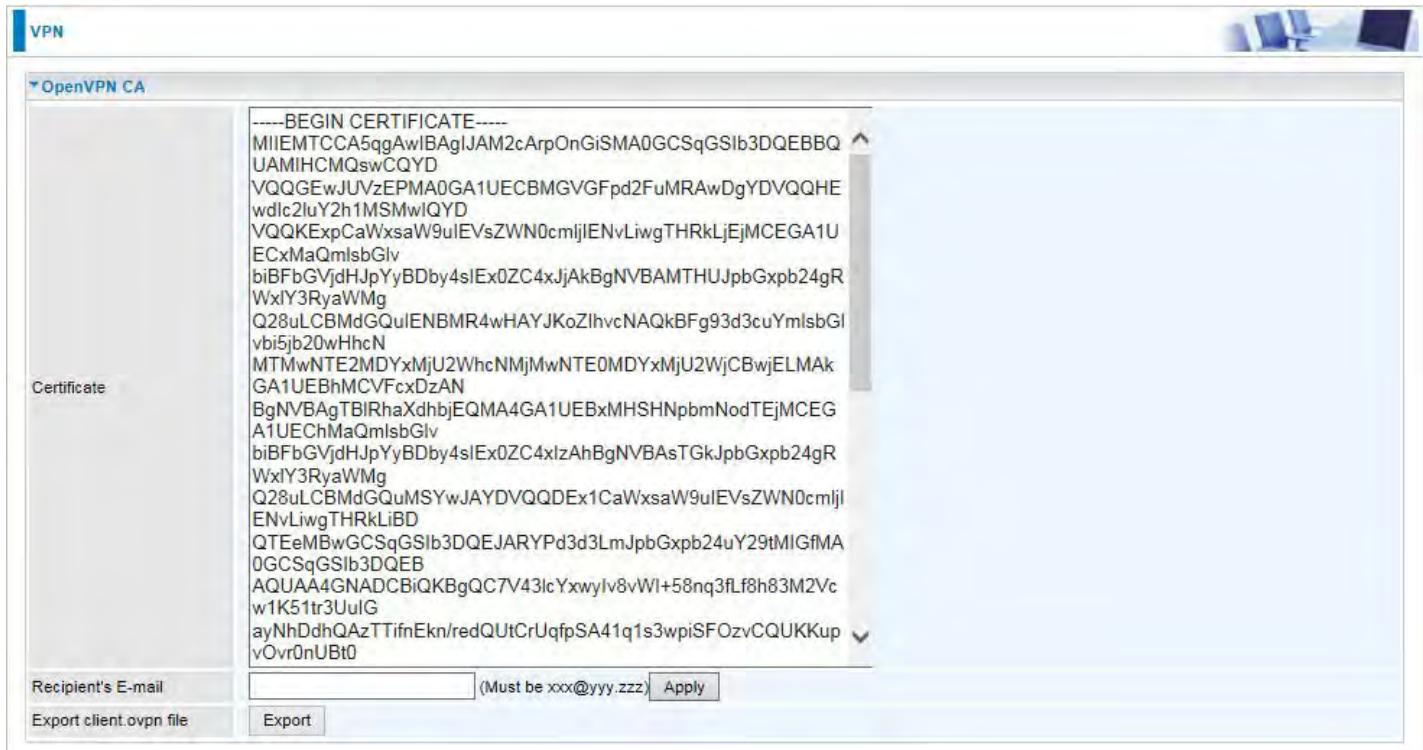
HMAC Authentication: OpenVPN support [HMAC](#) authentication, please select authentication item from the list.

Lzo Compression: Enable to use the LZO compression library to compress the data stream.

Click **Apply** to submit your OpenVPN Server basic settings.

OpenVPN CA

OpenVPN offers pre-shared keys, certificate-based, and username/password-based authentication, with certificate-based being the most robust. Generally, the part offers the billion factory-defined authentication certificate.



Recipient's Email: Set the recipient's email address to send the trusted CA to the OpenVPN client. OpenVPN server and client need matched certificate to establish trusted VPN tunnel, on client side, please import this certificate in [Trusted CA](#).



(Client side CA)

OpenVPN Client

OpenVPN client can help you dial-in the OpenVPN server to establish a trusted OpenVPN tunnel over Internet.

The screenshot shows a configuration interface for an OpenVPN client. The main section is titled "OpenVPN Client" under the "Parameters" tab. It includes fields for Name, Username, OpenVPN Server Address, Protocol (set to TCP), Cipher Encryption (set to BF-CBC), HMAC Authentication (set to SHA1), and Lzo Compression (checkbox checked). There are dropdowns for WAN Interface (set to Default) and Port Number (set to 1194). A "Certificate Authority" dropdown shows "CA-billion" selected, with "Trusted CA" highlighted. At the bottom left are "Add" and "Edit / Delete" buttons.

Name: user-defined name for identification.

WAN Interface: Select the exact WAN interface configured as source for the tunnel. Select Default to use the now-working WAN interface for the tunnel.

Username: Enter the username provided by your OpenVPN Server.

Password: Enter the password provided by your OpenVPN Server.

OpenVPN Server Address: Enter the WAN IP address of the OpenVPN server.

Protocol: The protocol, same as set in server side.

Port Number: 1194.

Cipher Encryption: Be consistent with what set on server side.

HMAC Authentication: Be consistent with what set on server side.

Lzo Compression: Enable to use the LZO compression library to compress the data stream

Certificate Authority: Select your trusted CA from your server side to establish the trusted VPN tunnel with server.

Click **Add** button to save your changes.

How to establish OpenVPN tunnel

1. Remote Access OpenVPN

(If the client wants to remotely access the OpenVPN Server, on client side, users had better install an OpenVPN client application/installer and connect to server accordingly. Here only give the configuration on server side.)

Server side on router

1. Set up parameters (WAN interface, port, tunnel virtual subnet IP/mask, encryption, authentication, etc) on OpenVPN server side.

The screenshot shows the 'OpenVPN Server' configuration page. It includes fields for enabling/disabling the service, selecting a WAN interface (Default), specifying a port number (1194), defining a tunnel virtual subnet (192.168.2.0/255.255.255.0), choosing cipher encryption (BF-CBC), HMAC authentication (SHA1), and enabling Izo Compression. Buttons for 'Apply' and 'Cancel' are at the bottom.

OpenVPN Server	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
WAN Interface	Default
Protocol	TCP
Port Number	1194
Tunnel Virtual Subnet	192.168.2.0
Tunnel Netmask	255.255.255.0
Cipher Encryption	BF-CBC
HMAC Authentication	SHA1
Izo Compression	<input checked="" type="checkbox"/> Enable

Buttons: Apply, Cancel

2. Create an account for the OpenVPN tunnel for client to connect in.

The screenshot shows the 'VPN Account' configuration page. It allows creating accounts for PPTP/L2TP/OpenVPN Server. A table lists existing accounts with columns for Name, Tunnel, Connection Type, Peer Network IP, and Peer Netmask. An 'Edit / Delete' button is available for each row.

Name	Tunnel	Connection Type	Peer Network IP	Peer Netmask
test4	<input checked="" type="radio"/> Enable	Remote Access		
tes4	<input type="radio"/> Disable	LAN to LAN		

Buttons: Add, Edit / Delete

3. Set the OpenVPN client's E-mail address to receive trusted CA from server to establish a trusted OpenVPN tunnel.

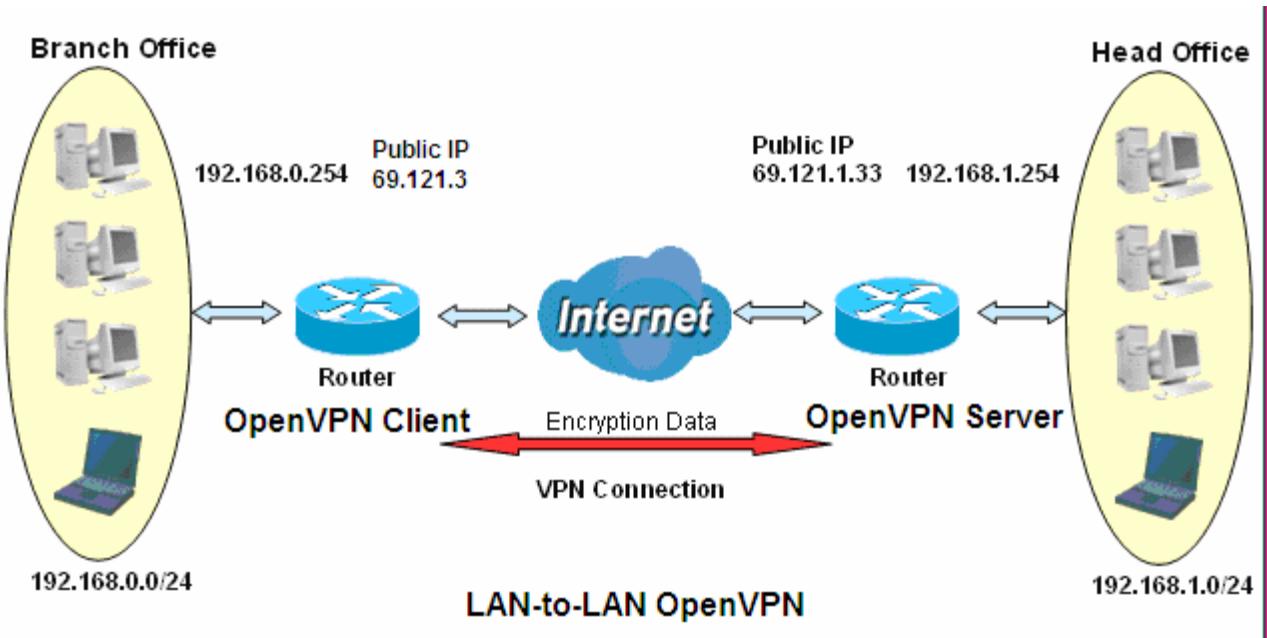
-----BEGIN CERTIFICATE-----
MIIEMTCCA5qAwIBAgIJAM2cArpOnGISMA0GCSqGSIb3DQEBCQUAM
HCMQswCQYD
VQQGEwJUVzEPMA0GA1UECBMGVGFPd2FuMRAwDgYDVQQHEwdlc
2IuY2h1MSMwQYD
VQQKExpCaWwsaW9ulEVsZWN0cmlijENvLiwgTHRkLjEjMCEGA1UECxM
aQmlsbGlv
bIBFbGVjdHJpYyBDby4sIEx0ZC4xJjAkBgNVBAMTHUJpbGxpB24gRWxIY
3RyaWMg
Q28uLCBMdGQuENBMR4wHAYJKoZlhcNAQkBFG93d3cuYmlsbGlvbI5
b20wHhcN
MTMwNTE2MDYxMjU2WhcNMjMwNTE0MDYxMjU2WjCBwjELMAkGA1U
EBhMCVFcxDzAN
BgNVBAgTBIRhaXdhbjEQMA4GA1UEBxMHSHNpbmNodTEjMCEGA1UE
ChMaQmlsbGlv
bIBFbGVjdHJpYyBDby4sIEx0ZC4xIzAhBgNVBAsTGkJpbGxpB24gRWxIY
3RyaWMg
Q28uLCBMdGQuMSYwJAYDVQQDEx1CaWwsaW9ulEVsZWN0cmlijENv
LiwgTHRkLIBD
QTeeMBwGCSqGSIb3DQEJARYPd3d3LmJpbGxpB24uY29tMIGfMA0G
CSqGSIb3DQEBr
AQUAA4GNADCBiQKBgQC7V43lcYxwlv8vWI+58nq3fLf8h83M2Vcw1K
51tr3UUIG
ayNhDdhQAzTTifnEkn/redQUtCrUqfpSA41q1s3wpiSFOzvCQUKKupvOv
r0nUBt0
qByy42KrPv5b9rOaLL3Qko5yoSSaSK/yA6OtufX4jrz

Recipient's E-mail (Must be xxx@yyy.zzz)

2. LAN-to-LAN OpenVPN

The branch office establishes a OpenVPN tunnel with head office to connect two private networks over the Internet. The routers are installed in the head office and branch office accordingly. Configured in this way, head office and branch office can access each other.

Note: Both office LAN networks must be in different subnets with the LAN-to-LAN application.



Server side: Head Office

1. Set up parameters (WAN interface, port, tunnel virtual subnet IP/mask, encryption, authentication, etc) on OpenVPN server side.

A screenshot of a web-based configuration interface for an OpenVPN server. The top navigation bar shows "VPN" and "OpenVPN Server". The main section is titled "Parameters" and contains the following settings:

OpenVPN Server	<input checked="" type="radio"/> Enable <input type="radio"/> Disable
WAN Interface	Default
Protocol	TCP
Port Number	1194
Tunnel Virtual Subnet	192.168.2.0
Tunnel Netmask	255.255.255.0
Cipher Encryption	BF-CBC
HMAC Authentication	SHA1
Izo Compression	<input checked="" type="checkbox"/> Enable

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

2. Create an account for client to connect in

The screenshot shows a 'VPN Account' configuration page. The 'Name' field is set to 'test3'. The 'Tunnel' section has 'Enable' selected. The 'Connection Type' is set to 'LAN to LAN'. The 'Peer Network IP' is '192.168.0.0' and the 'Peer Netmask' is '255.255.255.0'. Below this, a table lists the account details: Name (test3), Tunnel (Enable), Connection Type (LAN to LAN), Peer Network IP (192.168.0.0), Peer Netmask (255.255.255.0), and a 'Delete' checkbox which is unchecked.

3. Set the OpenVPN client's E-mail address to receive trusted CA from server to establish a trusted OpenVPN tunnel.

The screenshot shows an 'OpenVPN CA' configuration page. On the left, there is a large text area containing a certificate in PEM format. On the right, there is a form to set the recipient's email. The 'Recipient's E-mail' field contains 'gangel@gmail.com' and the 'Apply' button is visible. Below this, there is a link to 'Export client.ovpn file' with an 'Export' button.

Client Side: Branch Office

1. Import your trusted certificate from server side, which is used to authenticate between client and server for establishing trusted OpenVPN tunnel.

Advanced Setup

Trusted CA – Import CA certificate

Parameters

Name: CA-billion

-----BEGIN CERTIFICATE-----
MIEMTCCA5ggAwIBAgIJAM2cArpOnGISMA0GCSqGSIb3DQE
BBQUAMiHCMQswCQYD
VQQGEwJVUzEPMA0GA1UECBMGVGFPd2FuMRAwDgYDVQ
QHEwdic2luY2h1MSMwIjQYD
VQQKExpCaWxaW9uEVsZWNN0cmlijENVLiwgTHRkLjEjMCEG
A1UECxMaQmIlsbGIV
biBFbGVjdHJpYyBDby4sIEx0ZC4xJAKBgNVBAMTHUJpbGxp
24gRWxIY3RyaWMg
Q28uLCBMdGQuENBMR4wHAYJKoZlhcNAQkBf9g3d3cuYm
IsbGlvb15jb20wHhcN
MTMWNTExMDYxMjU2WhcNMjMwNTE0MDYxMjU2WjCBwjELM
AkGA1UEBhMCVFcxDzAN
BgNVBAgTBIRhaXdhbjEQMA4GA1UEBxMHSHNpbmNodTEjM
CEGA1UEChMaQmIlsbGIV
biBFbGVjdHJpYyBDby4sIEx0ZC4xJzAhBgNVBAsTGkJpbGxp
24gRWxIY3RyaWMg
Q28uLCBMdGQuMSYwJAYDVQQDEx1CaWxaW9uEVsZWN
0cmlijENVLiwgTHRkLIBD
QTEeMNBGSqGSIb3DQEJARYPd3d3LmJpbGxp24uY29tM
GfMA0GCSqGSIb3DQE
AQUAA4GNADCBiQKBgQC7V43lcYxwylv8vWI+58nq3fLf8h83
M2Vcw1K51tr3UulG
ayNhDdhQAzTTifnEkn/redQUtCrUqfpSA41q1s3wpISFOzvCQU
KKUpvOvr0nUBt0
qByy42KRpV5b9rOaLL3Qko5yoSSaSK/yA6OtufX4jbrz
-----END CERTIFICATE-----

Apply

2. On the OpenVPN client side, fill in the parameters the same as set for OpenVPN server.

VPN

OpenVPN Client

Parameters

Name: test3

Username: test3

OpenVPN Server Address: 69.121.1.33

Protocol: TCP

Cipher Encryption: BF-CBC

Izo Compression: Enable

WAN Interface: Default

Password: *****

Port Number: 1194

HMAC Authentication: SHA1

Certificate Authority: CA-billion Trusted CA

Add Edit / Delete

VPN

OpenVPN Client

Parameters

Edit	Enable	Name	WAN Interface	OpenVPN Server Address	Protocol	Port Number	Delete
<input type="radio"/>	<input checked="" type="checkbox"/>	test3	default	69.121.1.33	TCP	1194	<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 software interface for configuring a GRE tunnel. The top navigation bar includes 'VPN' and 'GRE'. The 'GRE' section is expanded, showing the 'Parameters' configuration. The fields include:

Name	WAN Interface	Default
Local Tunnel Virtual IP	Local Netmask	
Remote Tunnel Virtual IP	Remote Gateway IP	
Remote Network	IP Address	Netmask
Enable Keepalive	Keepalive Retry Times	Keepalive Interval

Buttons at the bottom left include '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.

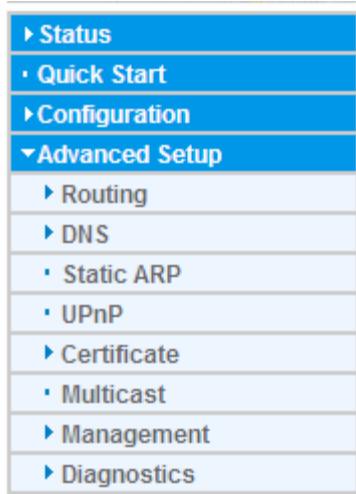
Enable Keepalive: Normally, the tunnel interface is always up. Enable keepalive to determine when the tunnel interface is to be closed. The local router sends keepalive packets to the peer router, if keepalive response is not received from peer router within the allowed time ('retry time' multiply 'interval', 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**.



Routing

Default Gateway



WAN port: Select the port this gateway applies to.

To set **Default Gateway** and **Available Routed WAN Interface**. These 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.

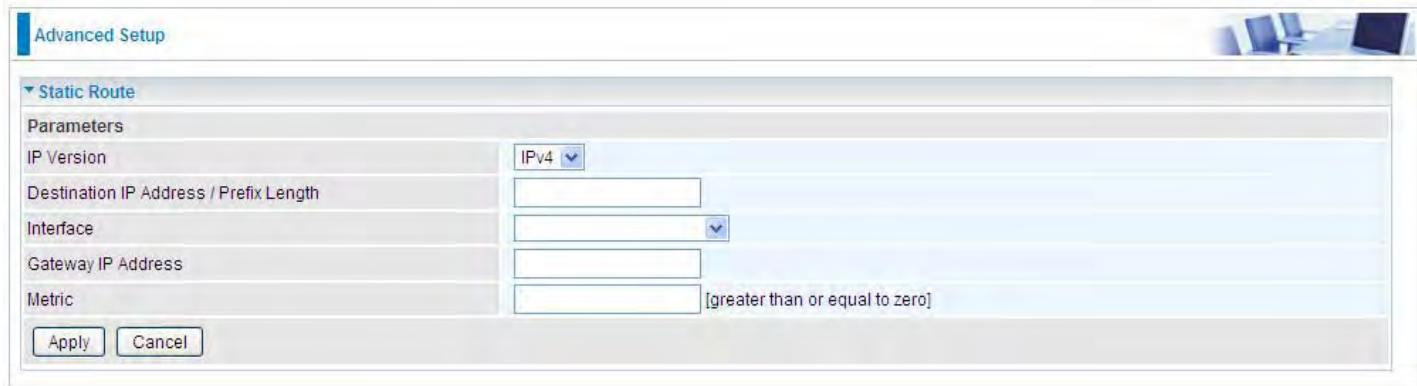
Note: Only one default gateway interface will be used according to the priority with the first being the highest and the last one the lowest priority if the WAN interface is connected.

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.



Above is the static route listing table, click **Add** to create static routing.



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: The exit interface of local router to the next hop.

Gateway IP Address: Enter the gateway IP address/ the entry address of the next hop, .

Metric: Metric is the hops from local to destination, which signals the quality of the link, 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.

The screenshot shows a software interface titled "Advanced Setup" with a sub-section "Static Route". A table titled "Parameters" lists static route entries. The columns are: IP Version, Dst IP/Prefix Length, Gateway, Interface, Metric, and Remove. There is a red circle around the "Remove" column header. A single row is shown with values: IP Version 4, Dst IP/Prefix Length 192.168.1.0/24, Gateway empty, Interface ppp0, Metric 1, and Remove checked (indicated by a green checkmark). Below the table are two buttons: "Add" and "Remove", with "Remove" also having a red circle around it.

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"/>

Add Remove

Policy Routing

Here users can set a route for the host (source IP) in a LAN to access outside through a specified a WAN interface to the next hop.

The following is the policy Routing listing table.

Advanced Setup					
▼ Policy Routing					
Parameters					
Policy Name	Source IP	LAN Port	WAN	Default Gateway	Remove
<input type="button" value="Add"/>	<input type="button" value="Remove"/>				

Click **Add** to create a policy route.

Advanced Setup					
▼ Policy Routing					
Parameters					
Policy Name	<input type="text"/>	Physical LAN Port	<input type="button" value="▼"/>	Source IP	<input type="text"/>
Interface	<input type="text"/>	pppoe_0_0_35/ppp0.1	<input type="button" value="▼"/>	Default Gateway	<input type="text"/>
<input type="button" value="Apply"/>	<input type="button" value="Cancel"/>				

Policy Name: User-defined name.

Physical LAN Port: Select the LAN port.

Source IP: Enter the Host Source IP.

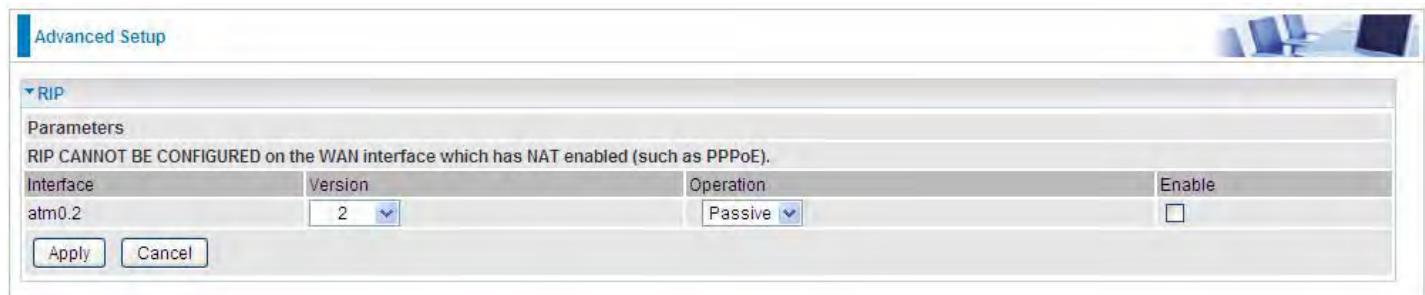
Interface: Select the WAN interface (exit interface) of local router to the next hop.

Default Gateway: Enter the gateway IP address/ the entry address of the next hop,

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.



Interface: The interface the rule applies to.

Version: Select the RIP version, RIP-1, RIP-2 and both.

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.
- ② **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

The screenshot shows the 'DNS' configuration page. It includes sections for 'Parameters', 'Selected DNS Server Interfaces' (containing 'ppp0.1' and 'USB3G0'), 'Available WAN Interfaces' (empty), and 'Primary DNS server' and 'Secondary DNS server' fields. Below this, there are options for IPv6 DNS: 'WAN Interface selected' (set to 'pppoe_0_8_35/ppp0.1'), 'Primary IPv6 DNS server' (empty), and 'Secondary IPv6 DNS server' (empty). At the bottom are 'Apply' and 'Cancel' buttons.

➤ 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.
- ② **User the following Static DNS IP address:** To specify DNS server manually by entering your primary and secondary DNS server addresses.
- ③ **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.

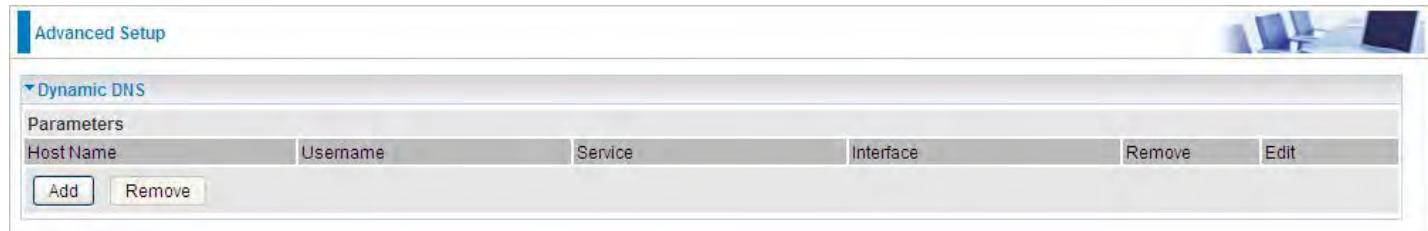
Use the following Static IPv6 DNS address

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

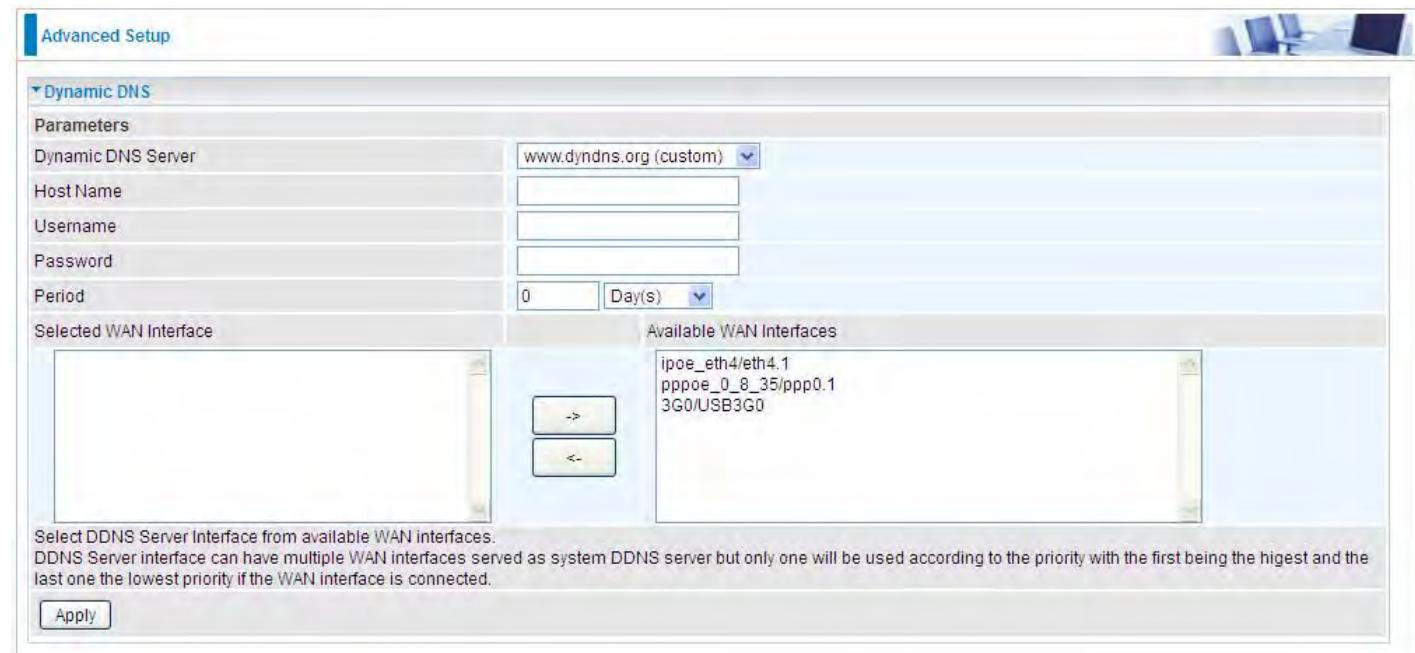
Dynamic DNS

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).



Click Add to register a WAN interface with the exact DNS.



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.

Period: Set the time period between updates, for the Router to exchange information with the DDNS server. In addition to updating periodically as per your settings, the router will perform an update when your dynamic IP address changes.

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 using username/password test/test

Advanced Setup

Dynamic DNS

Parameters

Dynamic DNS Server	www.dyndns.org (custom)
Host Name	www.hometest.com
Username	test
Password	****
Period	25 Day(s)

Selected WAN Interface: pppoe_0_8_35/ppp0.1

Available WAN Interfaces: ipoe_eth4/eth4.1
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

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"/>

Add Remove

2. ipoe_eth4 with DDNS: www.hometest1.com using username/password test/test.

Advanced Setup

Dynamic DNS

Parameters

Dynamic DNS Server	www.dyndns.org (custom)
Host Name	www.hometest1.com
Username	test
Password	*****
Period	25 Day(s)

Selected WAN Interface

ipoe_eth4/eth4.1	->	<-	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.

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"/>
www.hometest1.com	test	dyndns-custom	eth4.1	<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.



DNS Proxy: Select whether to enable or disable DNS Proxy function, default is enabled.

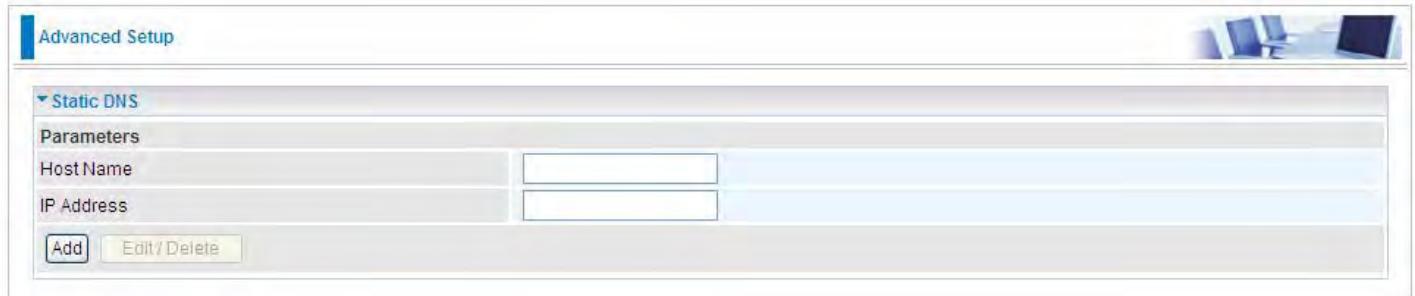
Host name of the Broadband Router: Enter the host name of the router. Default is home.gateway.

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.



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 software interface titled "Advanced Setup" with a sub-section "Static ARP". Under "Parameters", there are two input fields: "IP Address" and "MAC Address", each with a corresponding empty text box. Below these fields are two buttons: "Add" and "Edit / Delete". The interface has a light blue header and a white body with grey horizontal bars separating sections.

IP Address: Enter the IP of the device that the corresponding MAC address will be mapped to.

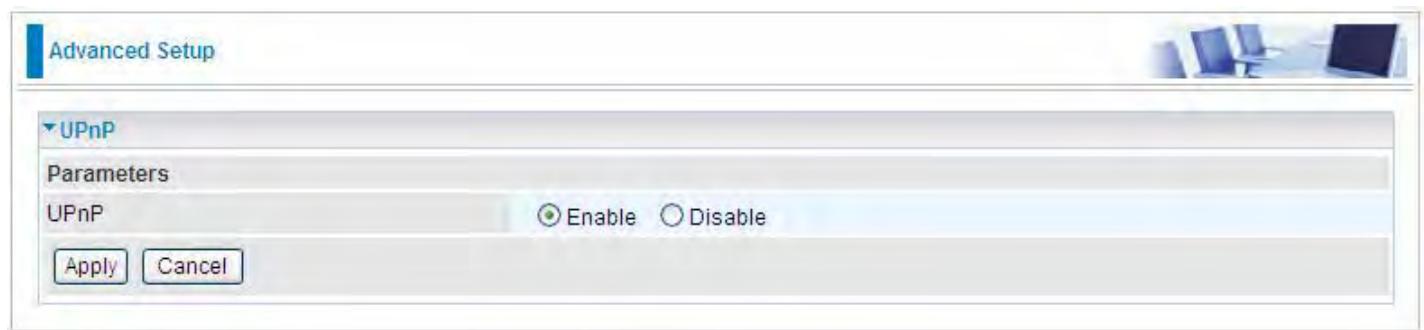
MAC Address: Enter the MAC address that corresponds to the IP address of the device.

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.
- ② **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.

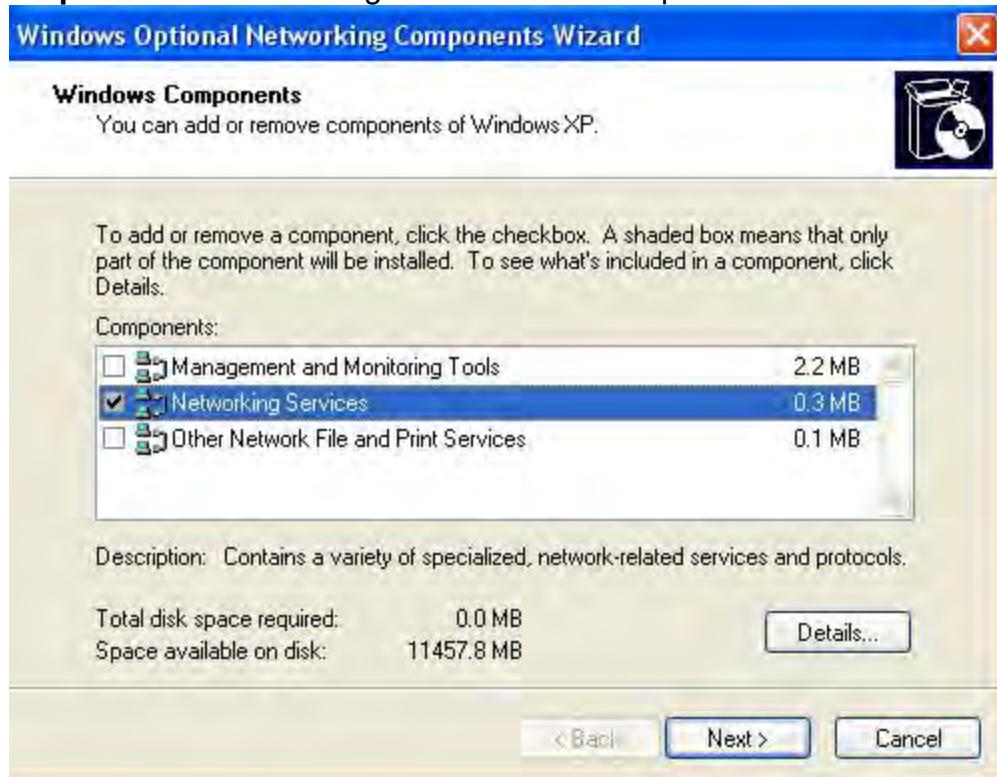
Step 2: Double-click Network Connections.

Step 3: In the Network Connections window, click Advanced in the main menu and select Optional Networking Components



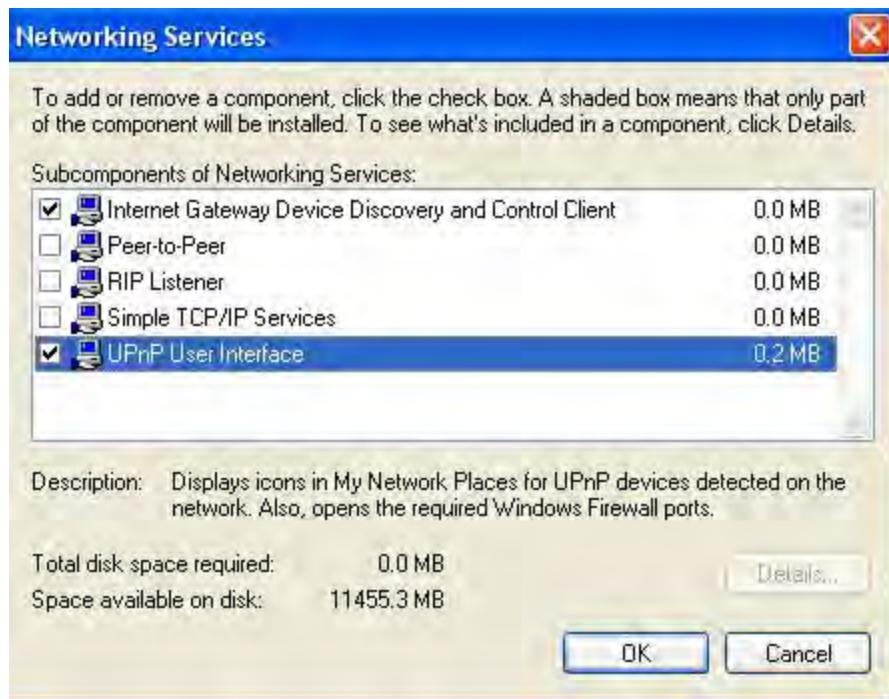
The Windows Optional Networking Components Wizard window displays.

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.

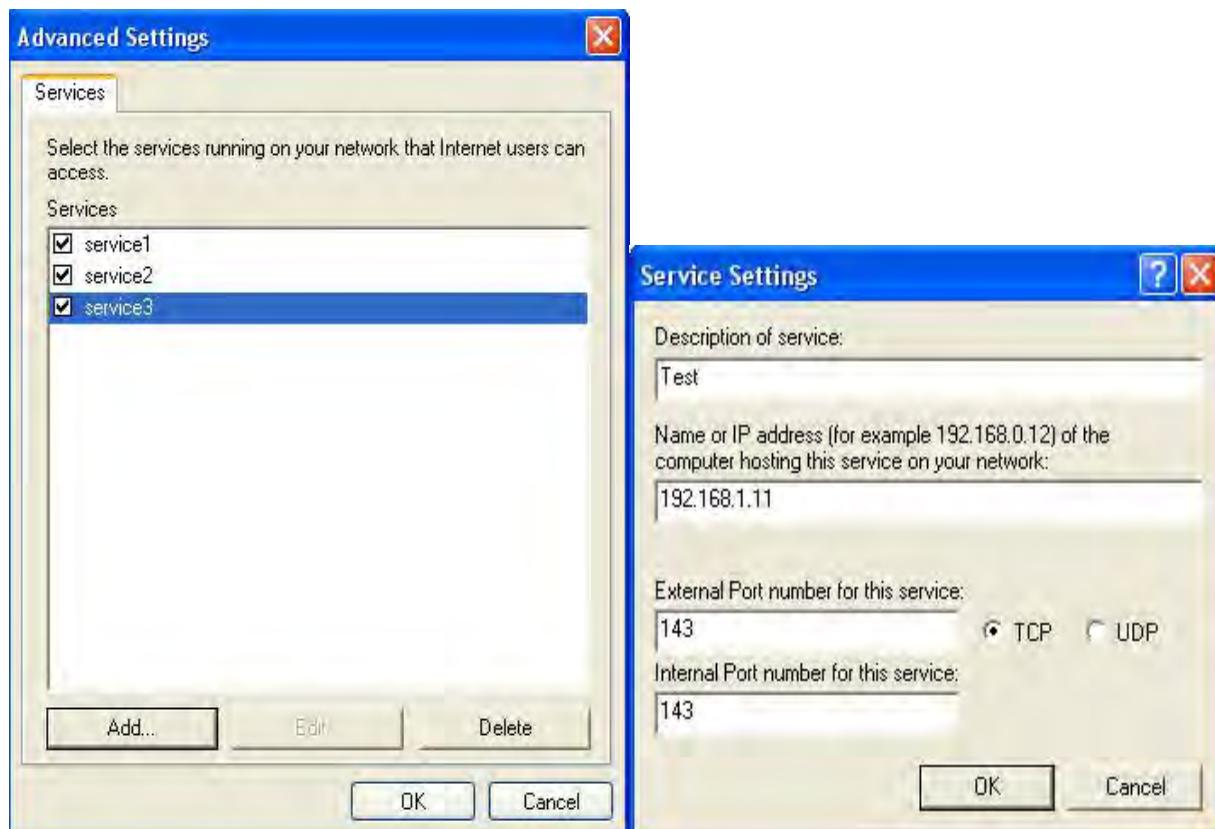
Step 2: Right-click the icon and select Properties.



Step 3: In the Internet Connection Properties window, click Settings to see the port mappings that were automatically created.

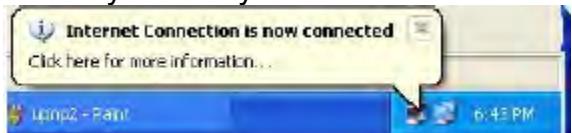


Step 4: You may edit or delete the port mappings or click Add to manually add port mappings.



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.



Certificate

This feature is used for TR069 ACS Server authentication of the device using certificate, if necessary. If the imported certificate does not match the authorized certificate of the ACS Server, the device will have no access to the server.

Trusted CA

The screenshot shows a software interface titled "Advanced Setup" with a sub-section titled "Trusted CA". The sub-section is described as "Trusted CA (Certificate Authority) Certificates" and notes that "Maximum certificates can be stored: 8". Below this, there is a table with columns labeled "Name", "Subject", "Type", and "Action". A button labeled "Import Certificate" is located at the bottom left of the table area. The background of the interface features a faint image of a computer workstation.

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.

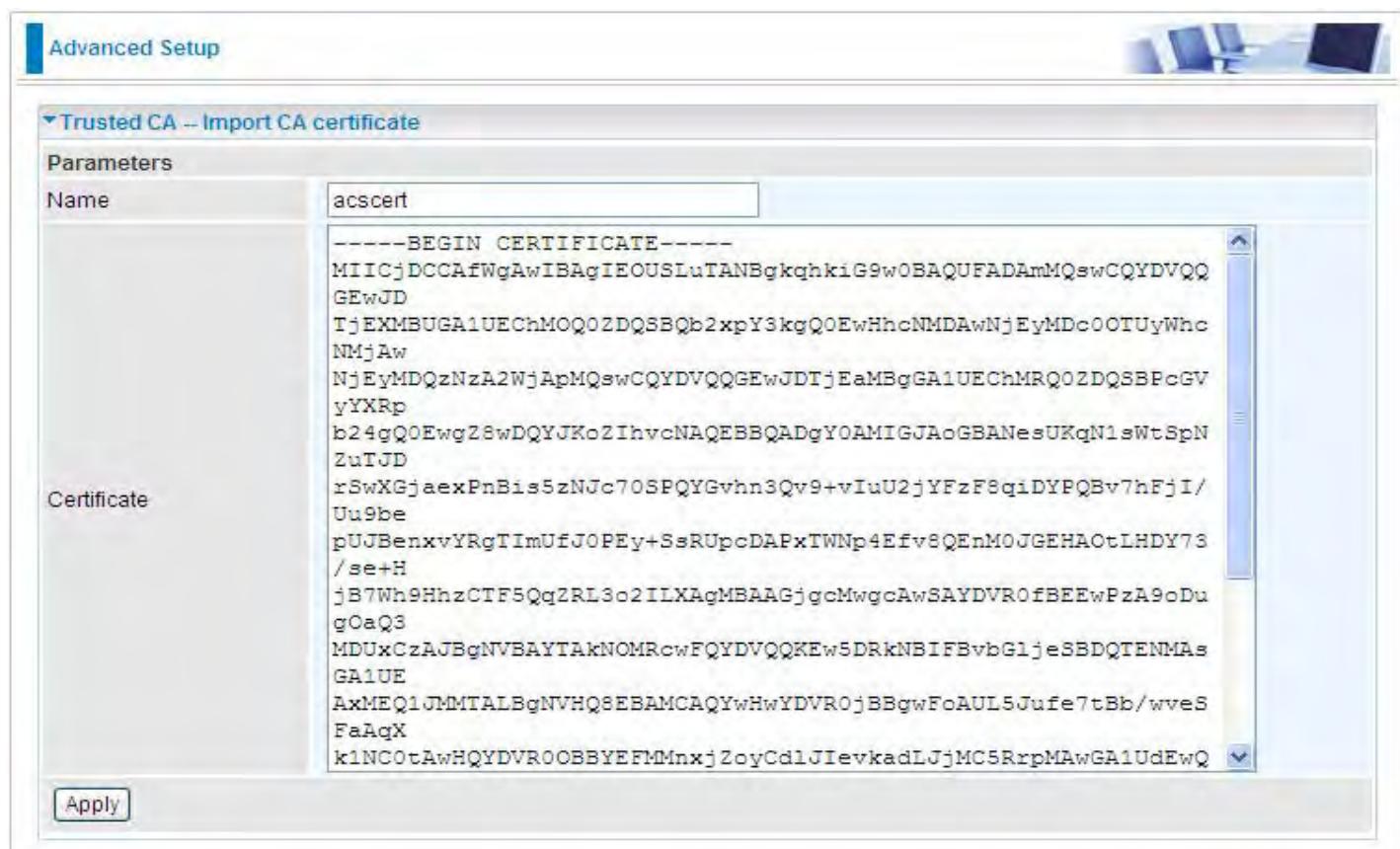
Action:

- View: view the certificate.
- Remove: remove the certificate.

Click **Import Certificate** button to import your certificate.



Enter the certificate name and insert the certificate.



Click Apply to confirm your settings.

Advanced Setup



▼ Trusted CA

Trusted CA (Certificate Authority) Certificates

Maximum certificates can be stored: 8

Name	Subject	Type	Action
acscert	C=CN/O=CFCA Operation CA	ca	View Remove

[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.

Advanced Setup

Multicast

Multicast Precedence	Disable <input type="button" value="▼"/> lower value, higher priority	
Multicast Strict Grouping Enforcement	Disable <input type="button" value="▼"/>	
IGMP		
Default Version	3 <input type="button" value="[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 <input type="button" value="[1-24]"/>	
Maximum Multicast Group Members	25	
Fast Leave	<input checked="" type="checkbox"/> Enable	
IGMP Group Exception List		
Group Address	Subnet Mask	Remove
224.0.0.0	255.255.255.0	<input type="checkbox"/>
239.255.255.250	255.255.255.255	<input type="checkbox"/>
224.0.255.135	255.255.255.255	<input type="checkbox"/>
<input type="button" value=" "/>	<input type="button" value=" "/>	Add <input type="button" value=" "/>
<input type="button" value="Remove"/>		
MLD		
Default Version	2 <input type="button" value="[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 <input type="button" value="[1-24]"/>	
Maximum Multicast Group Members	10	
Fast Leave	<input checked="" type="checkbox"/> Enable	
MLD Group Exception List		
Group Address	Subnet Mask	Remove
ff01::0000	ffff::0000	<input type="checkbox"/>
ff02::0000	ffff::0000	<input type="checkbox"/>
ff05::0001:0003	ffff:ffff:ffff:ffff:ffff:ffff	<input type="checkbox"/>
<input type="button" value=" "/>	<input type="button" value=" "/>	Add <input type="button" value=" "/>
<input type="button" value="Remove"/>		
<input type="button" value="Apply"/> <input type="button" value="Cancel"/>		

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.

[IGMP Exception List](#)

The multicast group(s) listed in the IGMP exception list will not be subject to IGMP snooping.

Here the pair of group address and the subnet mask indicates a multicast group range, and 224.0.1.0/255.255.255.0 is a multicast group range of 224.0.1.0 - 224.0.1.255.

Group Address: Set the exception multicast group address.

Subnet Mask: Set the multicast subnet mask

Remove: Select the group which is to be removed.

[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.

[MLD Exception List](#)

The multicast group(s) listed in the MLD exception list will not be subject to MLD snooping.

Group Address: Set the exception multicast group address.

Subnet Mask: Set the multicast subnet mask

Remove: Select the group which is to be removed.

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 a software interface titled "Advanced Setup" with a "SNMP Agent" section expanded. The "Parameters" group contains the following fields:

SNMP Agent	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Read Community	public
Set Community	private
System Name	Broadcom
System Location	unknown
System Contact	unknown
Trap Manager IP	0.0.0.0

At the bottom left are "Apply" and "Cancel" buttons.

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 provides 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 a software interface titled 'Advanced Setup' with a sub-section 'TR-069 Client'. The configuration parameters are listed in a table:

Parameter	Value
Inform	<input type="radio"/> Enable <input checked="" type="radio"/> Disable
Inform Interval	300 [1-2147483647]
ACS URL	[Empty]
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 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.

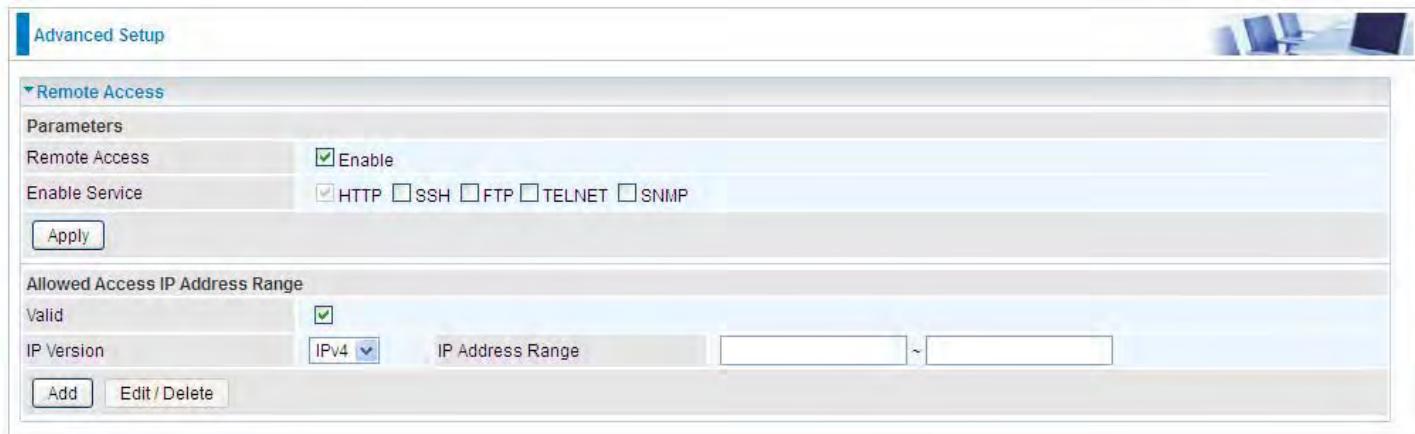
HTTP Port

The device equips user to change the embedded web server accessing port. Default is 80.



Remote Access

It is to allow remote access to the router to view or configure.



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.

The screenshot shows a web-based configuration interface for a router's advanced setup. The top navigation bar includes 'Advanced Setup' and a small graphic of a computer monitor. The main menu has a 'Power Management' option under 'Parameters'. The configuration table lists five parameters, each with an enable checkbox and a status indicator:

Parameter	Enable	Status	Value
MIPS CPU Clock divider when Idle	<input checked="" type="checkbox"/>	Status	Enabled
Wait instruction when Idle	<input checked="" type="checkbox"/>	Status	Enabled
DRAM Self Refresh	<input checked="" type="checkbox"/>	Status	Enabled
Energy Efficient Ethernet	<input checked="" type="checkbox"/>	Status	Enabled
Ethernet Auto Power Down and Sleep	<input checked="" type="checkbox"/>	Status	Enabled
Adaptive Voltage Scaling	<input checked="" type="checkbox"/>	Status	Enabled

A note on the right side of the table states: "Number of ethernet interfaces in:
Powered up: 1
Powered down: 4".

At the bottom left are 'Apply' and 'Refresh' buttons.

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. You router time should synchronize with NTP server.

This screenshot shows the 'Management' interface with the 'Time Schedule' tab selected. The 'Parameters' section includes fields for 'Name' (empty), 'Start Time' (00:00), 'End Time' (00:00), and checkboxes for days of the week (Sun, Mon, Tue, Wed, Thu, Fri, Sat). Below these are 'Add' and 'Edit / Delete' buttons.

For example, user can add a timeslot named "timeslot1" features a period of 9:00-19:00 on every weekday.

This screenshot shows the 'Advanced Setup' interface with the 'Time Schedule' tab selected. It includes the same parameters as the Management screen, plus a table for existing timeslots. The table has columns for Edit, Name, Sun, Mon, Tue, Wed, Thu, Fri, Sat, Start Time, End Time, and Delete. A single entry is shown: 'timeslot1' with a checkmark in the Sun column, and start/end times of 09:00 and 19:00 respectively.

Edit	Name	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Start Time	End Time	Delete
<input type="radio"/>	timeslot1	x	x	x	x	x	x		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.

The screenshot shows the 'Advanced Setup' interface with the 'Auto Reboot' section selected. Under 'Parameters', there are two 'Schedule' entries. Each entry has an 'Enable' checkbox, checkboxes for days of the week (Sun through Sat), and dropdowns for hour and minute. Both entries have their 'Enable' checkboxes unchecked and their times set to 00:00. An 'Apply' button is visible at the bottom left.

Enable to set the time schedule for rebooting.

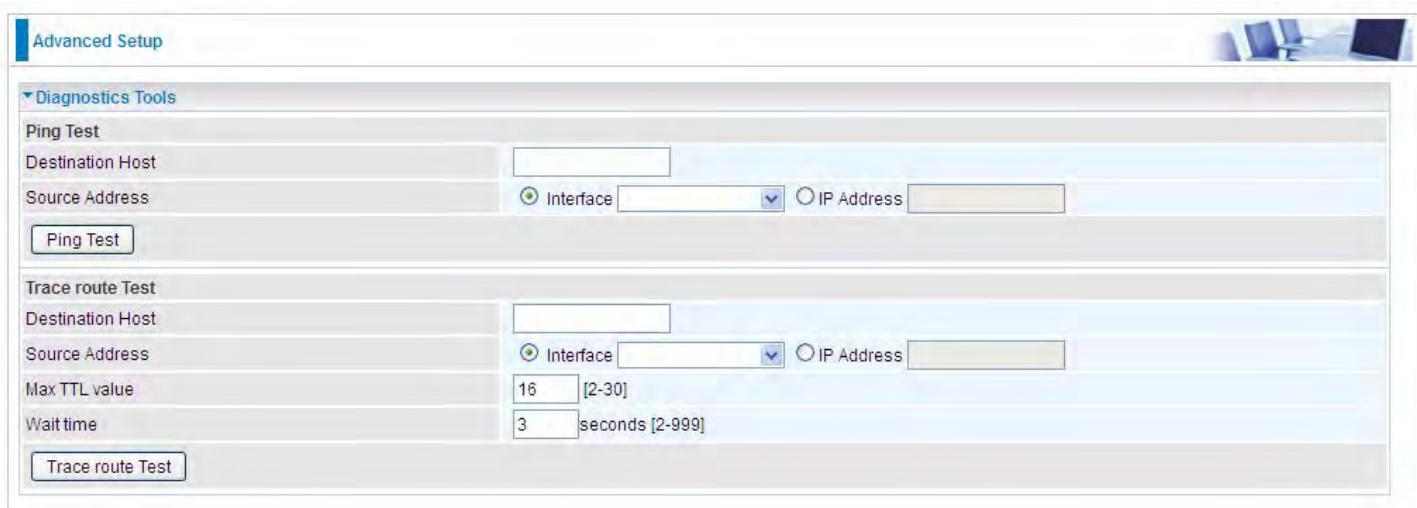
For example, the router is scheduled to reboot at 22:00 every single weekday, and to reboot at 9:00 on Saturday and Sunday. You can set as follows:

The screenshot shows the 'Advanced Setup' interface with the 'Auto Reboot' section selected. Under 'Parameters', there are two 'Schedule' entries. Both entries have their 'Enable' checkboxes checked. The first entry has checkboxes checked for Monday through Friday, and its time is set to 22:00. The second entry has checkboxes checked for Saturday and Sunday, and its time is set to 09:00. An 'Apply' button is visible at the bottom left.

Diagnostics

Diagnostics Tools

BiPAC 8700AX-1600 offers diagnostics tools including “Ping” and “Trace route test” tools to check for problems associated with network connections.



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.

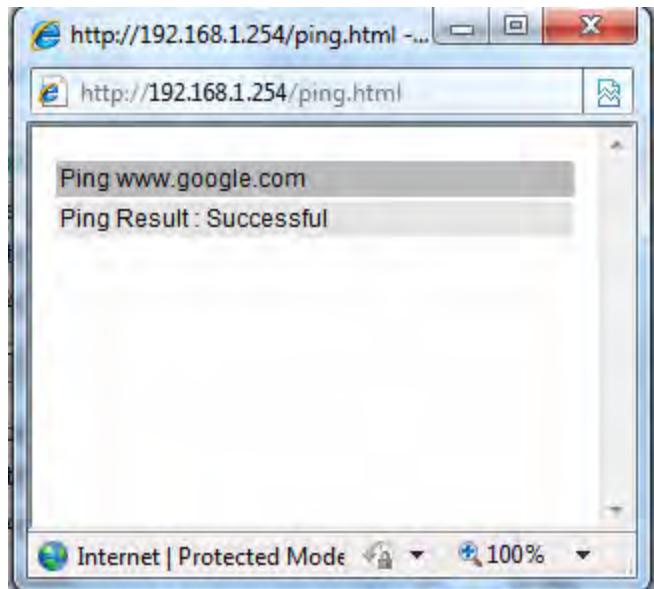
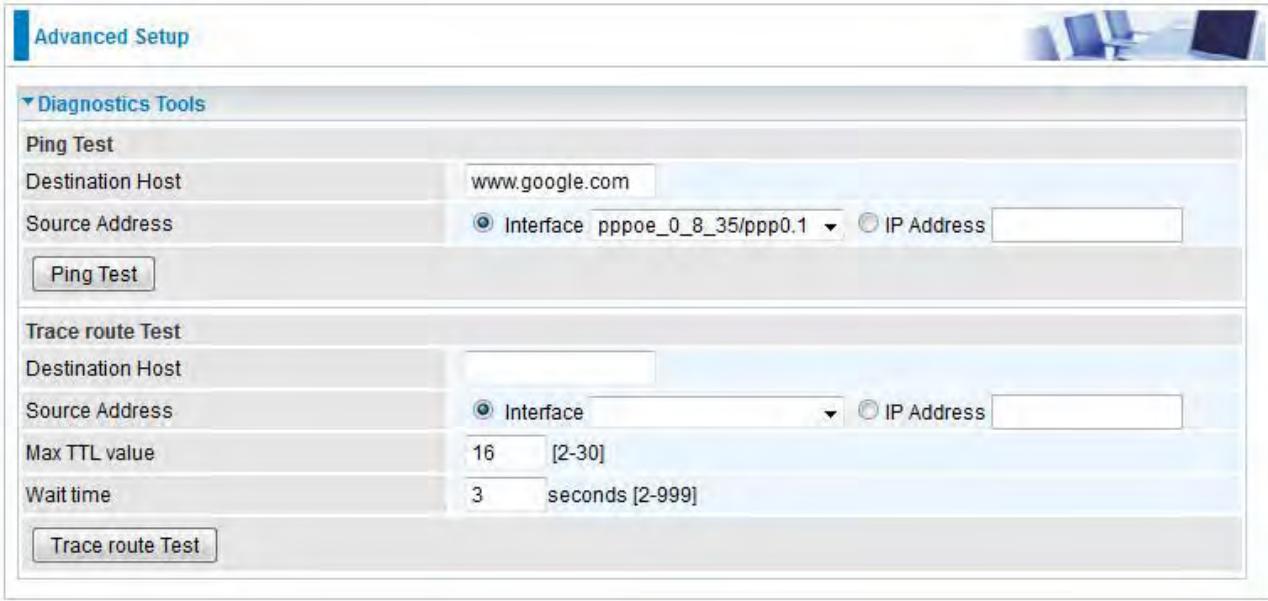
Destination Host: Set the destination host (IP, domain name) to be traced.

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



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.



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	Help
Test LAN Connection (P2)	FAIL	Help
Test LAN Connection (P1)	FAIL	Help
Test LAN Connection (P4)	FAIL	Help
Test your Wireless Connection	PASSPASS	Help

Test the connection to your DSL service provider

Test xDSL Synchronization	FAIL	Help
Test ATM OAM F5 segment ping	DISABLED	Help
Test ATM OAM F5 end-to-end ping	DISABLED	Help

Test the connection to your Internet service provider

Test PPP server connection	FAILFAIL	Help
Test authentication with ISP	FAILFAIL	Help
Test the assigned IP address	FAILFAIL	Help
Ping default gateway	PASS	Help
Ping primary Domain Name Server	PASS	Help

[Next Connection](#) [Test](#) [Test With OAM F4](#)

Ethernet OAM

8700AX-1600 offers industry standard OAM capabilities to enable network providers to provision and operate their networks with full visibility and control, simply and efficiently to minimize ongoing OPEX.

Both peers should be Ethernet-OAM-enabled.

There are two phases of how Ethernet OAM is usually realized:

1.) **Ethernet Link OAM:** Ethernet in the First Mile (EFM) Link OAM as defined in IEEE 802.3ah, Designed for testing and maintaining access links between EFM-OAM-enabled devices on L2. It includes a set of discovery, link monitoring, remote failure detection and remote loop-back protocols.

2). **Ethernet Service OAM (802.1ag/Y1.1731):** designed to detect and isolate connectivity faults within the customer service path and ensure a health service end to end.

802.1ag/CFM enable Ethernet services to be partitioned into maintenance domains with maintenance endpoints (MEP) and intermediate points (MIP) across which continuity check, link trace and loopback tests can be performed as needed to validate connection integrity.

Y1.1731 extends beyond CFM (802.1ag) to support performance monitoring and testing of key Ethernet service attributes including frame loss, frame delay, and frame delay variation, which are necessary for ensuring conformance to SLAs and verifying end to end service quality.



Ethernet Link OAM(802.3ah): Enable to activate Ethernet in the First Mile (EFM) Link OAM to do link fault management.

Ethernet Service OAM (802.1ag/Y1.1731): Enable to activate Ethernet Service OAM check mechanism, including connectivity fault management and performance monitoring..

Linktrace: Operators trigger linktrace protocol to perform path discovery and fault isolation in their networks. 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.

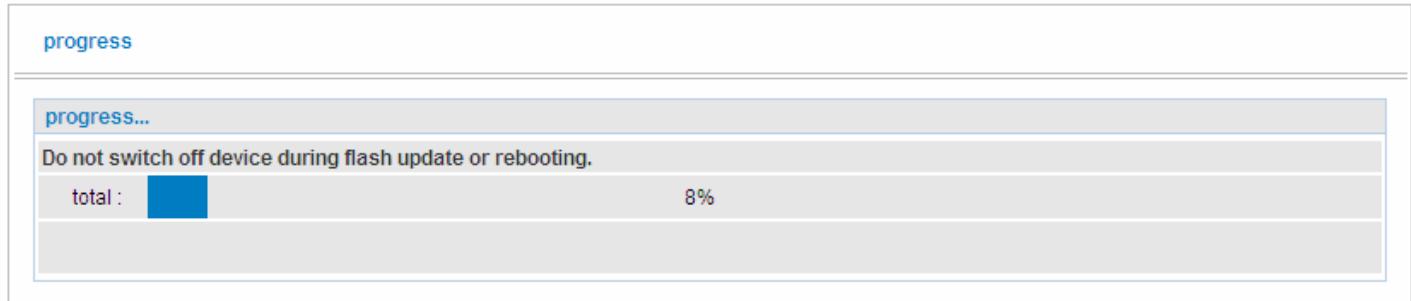
Loopback: Loopback protocol is used to verify and isolate connectivity faults. Loop-back messages otherwise known as Mac ping are Unicast frames that a MEP transmits, they are similar in concept to an Internet Control Message Protocol (ICMP) Echo (Ping) messages, sending Loop-back to successive MIPs can determine the location of a fault. Sending a high volume of Loop-back Messages can test bandwidth, reliability, or jitter of a service, which is similar to flood ping. A MEP can send a Loop-back 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.



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.



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
None of the LEDs is on when you turn on the router	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.
You have forgotten your login username or password	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
Frequent loss of ADSL line sync (disconnections)	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
Cannot PING any PC on LAN	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>

MAC OS is a registered Trademark of Apple Computer, Inc.

Windows XP, Windows Vista, Windows 7, Windows 8 and Windows 10 are registered Trademarks of Microsoft Corporation.

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

FCC Caution:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference

(2) This device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. . This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

Co-location statement

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This equipment complies with ACTA TIA/EIA/IS-968-B-1 and Part 68 of the FCC rules and the requirements adopted by the ACTA. On the base of this equipment is a label that contains, among other information, a product identifier in the format US: B12DL01ABEC8700AXL. If requested, this number must be provided to the telephone company.

This equipment uses the following USOC jacks: RJ11C.

A plug and jack used to connect this equipment to the premises wiring and telephone network must comply with the applicable FCC Part 68 rules and requirements adopted by the ACTA. A compliant telephone cord and modular plug is provided with this product. It is designed to be connected to a compatible modular jack that is also compliant. See installation instructions for details.

The REN is used to determine the number of devices that may be connected to a telephone line. Excessive RENs on a telephone line may result in the devices not ringing in response to an incoming call. In most but not all areas, the sum of RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to a line, as determined by the total REN, contact the local telephone company. The REN for this product is separately shown on the label and also part of the product identifier that has the format US: B12DL01ABEC8700AXL. The digits represented by ## are the REN without a decimal point (e.g., 03 is a REN of 0.3).

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required until the problem is resolved. But if advance notice is not practical, you will be notified

by the telephone company as soon as possible. You will be advised of your right to file a complaint with the FCC if you believe it is necessary. The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

The telephone company may ask that you disconnect this equipment from the network until the problem has been corrected or until you are sure that the equipment is not malfunctioning.

If you experience trouble with this equipment, or repair or warranty information, please contact the following address and phone number for information.

Billion Electric Co. Ltd.

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+886-2-29145665 ex.:221