DrayTek

Vigor 3300 Series
Application Notes

Version : 2.0

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Table of Contents

Chapter 1 . High Availability Function

This chapter shows how to setup high availability function.

This chapter is divided into the following sections,

Section 1.1: Introduction

Section 1.2: Examples and Web Configurations

1.1 Introduction

The basic application graph is shown in Figure 1-1. There are two Vigor 3300V routers connected to the Internet. One is as Master and the other one is as Slave. Both are connected to a subnet – 192.168.1.x from the LAN port. For the further more settings, please refer to the next section.

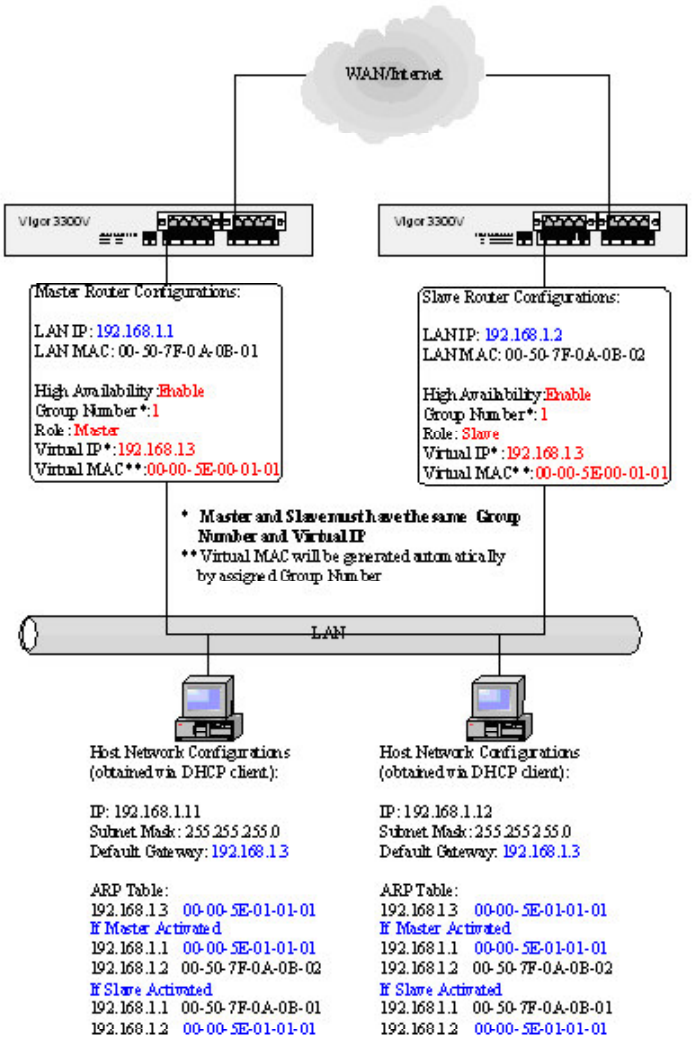


Figure 1-1. A Scenario of High Availability

1.2 Examples and Web Configurations

At first, we need to configure High Availability in the Master device. Please refer to the Figure 1-2.

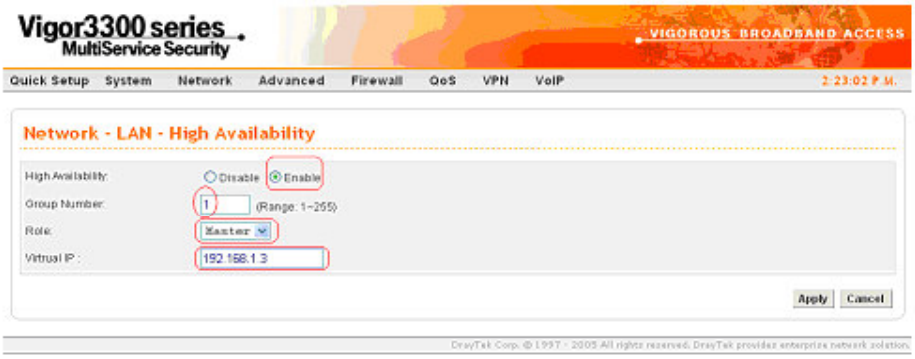


Figure 1-2. Web settings of the Master

Then, we have to configure High Availability in the Slave device. Please refer to the Figure 1-3.

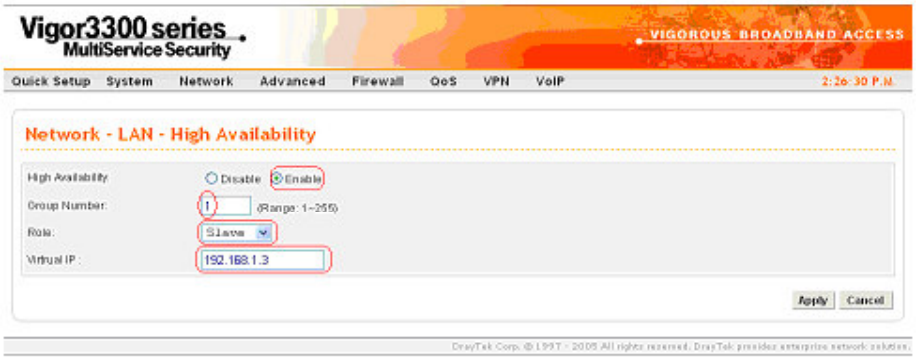


Figure 1-3. Web settings of the Slave

The most important points are as below –

Both the Master and Slave must share the same Group number value.

The “Role” value of the Master device is different from that of the Slave device.

Both the Master and Slave must share the same Virtual IP value.

Master Failure / Shutdown

Once the Master unit is shut down or fails, Slave would be switched from idle state to active state after 3 to 4 seconds and then take over Master.

Master Restart

Once Master is back to normal, and then Slave will be restored to be idleness.

Multiple Slaves

There should be only one Master, but multiple Slaves are allowed. Generally speaking, the Slave with the greater LAN IP address will have higher priority to play the role of Master if the original Master is shut down or fails. For example, the IP address 192.168.1.4 will have higher priority over 192.168.1.3.

Reference

The HA function was developed based on VRRP (Virtual Router Redundancy Protocol). For further detailed information about VRRP, please refer to RFC 2338.

Chapter 2 . VPN Function

This chapter is divided into the following sections,

Section 2.1: VPN Dial-in Function

Section 2.2: VPN Dial-out Function

Section 2.3: VPN Three Parts Communication

Section 2.4: IPSec Host to LAN (Smart VPN Client) – DHCP over IPSec

Section 2.5: VPN PPTP Host-to LAN by Smart VPN Client

2.1 VPN Dial-in Function

2.1.1 Introduction

The first example is to establish a LAN to LAN VPN Tunnel. The basic form of LAN to LAN VPN is to let both routers' internal networks can connect with to each other. In this example since only one site has a fixed IP address, the VPN tunnel must be established in one direction .(from dynamic-IP site to fixed-IP site). If you do want both sites can always to initiate the connection automatically, the router with the dynamic IP must be always online. Otherwise, only one direction can work normally. In this example, only Vigor 3300V has a fixed IP address, so when the VPN Tunnel is dropped, Vigor 3300V cannot initiate a connection to Vigor 2900V.

Suppose the Headquarters in Taipei uses a Vigor 3300V, while the branch office in Shanghai uses a Vigor2900V. The network administrator requires the employees in branch office to access the database in the headquarters through the encrypted VPN tunnels. The purpose is to avoid leakage of relevant confidential information which is important. Please refer to Figure 2-1.

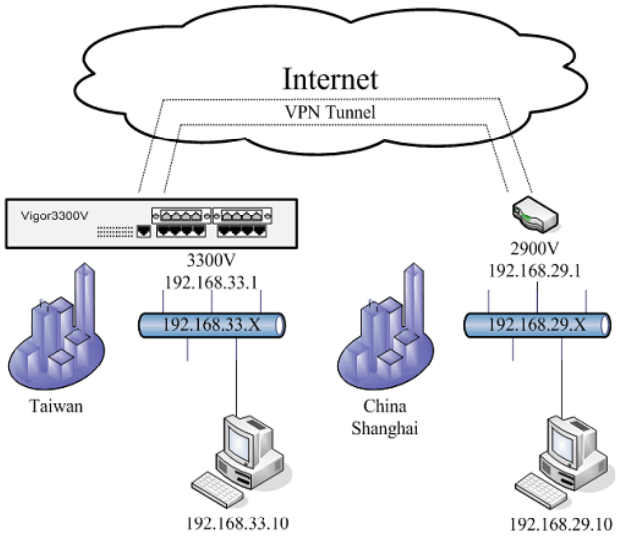


Figure 2-1. A scenario of VPN in dial-in from Vigor 2900V

There Below is a configuration table as below between Vigor 3300V and Vigor 2900V.

	Vigor 3300V Headquarters	**Vigor 2900V** Branch Office
WAN IP	220.135.240.207 PPPoE, fixed IP	61.31.167.135 PPPoE, dynamic IP
LAN IP	192.168.33.1	192.168.29.1
Internal Network	192.168.33.X	192.168.29.X
Encryption Method	DES-SHA1	
Preshared Key	**3300**	

2.1.2 Examples and Web Configurations

2.1.2.1 Configurations in Vigor 3300V

Step 1

Suppose the subnet of Vigor 3300V internal network is 192.168.33.X, for detailed setup instructions please refer to the LAN Setup chapter. Enter VPN\IPSec\Policy Table, click 1, and then press Edit. Please refer to Figure 2-2.

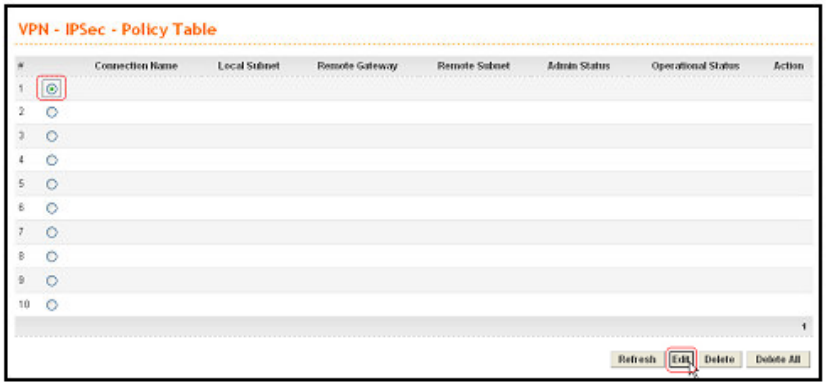


Figure 2-2. Edit of policy table1

Step 2

First you should enter the **Default** page. There are three fields on this page.

Basic

It deals with basic settings, including profile name, authentication type, preshared key, etc.

Name

You can specify a name to this profile. To facilitate easy management and differentiation, please type "**2900V"**.

Preshared Key

Type "**3300"** (It must be identical with 2900V's).

Admin Status

Use the default settings (**Enable**).

Local Gateway

It deals with relevant settings of the local router, including selection of the WAN and internal network, etc.

WAN Interface

Vigor 3300V has 4 WAN ports. In this example, we choose **WAN1** to establish the VPN tunnel.

Network IP / Subnet Mask

It is the internal network of Vigor 3300V. Please enter **192.168.33.0 /24** (/24 = Mask 255.255.255.0).

Remote Gateway

It deals with relevant settings of the remote router, including WAN IP and internal network, etc.

Security Gateway

It is about the WAN IP of Vigor2900V. In this example it is not fixed, so please enter **0.0.0.0.**

Network IP / Subnet Mask

It is the internal network of Vigor2900V. Please enter **192.168.29.0 /24** (/24 = Mask 255.255.255.0).

Please refer to Figure 2-3.

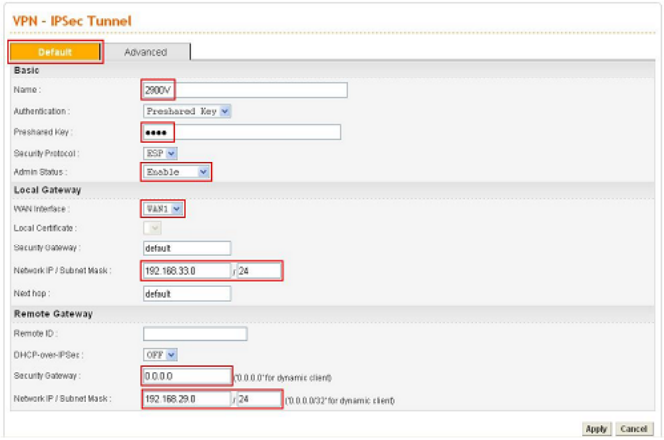


Figure 2-3. Web settings of Vigor 3300V

Step 3

Advanced page

In this example since the connection is initiated by Vigor 2900V, the encryption method is determined by Vigor 2900V. By default Vigor 3300V allows des-md5, des-sha1, 3des-md5 and 3des-sha1, so no change is required. Just press the Apply button to finish the configuration. Please refer to Figure 2-4.

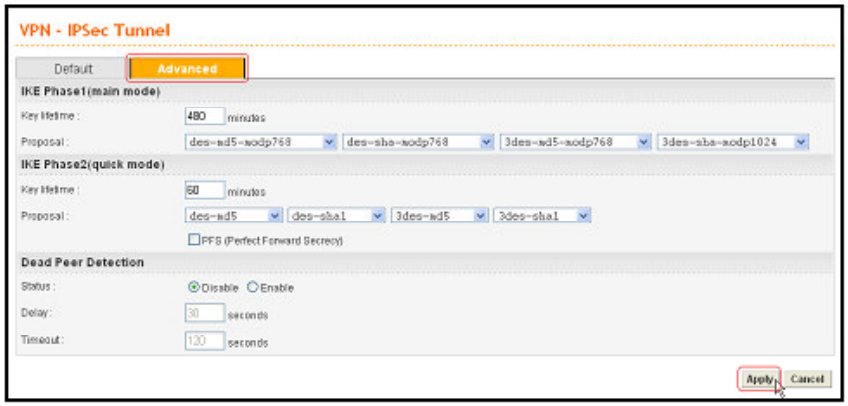


Figure 2-4. Advanced settings of Vigor 3300V

Step 4

After configuration, the router will jump switch to the VPN - IPSec - Policy Table page. Confirm if the settings are correct. Now the setup for 3300Vconfiguration is completed. Please refer to Figure 2-5.

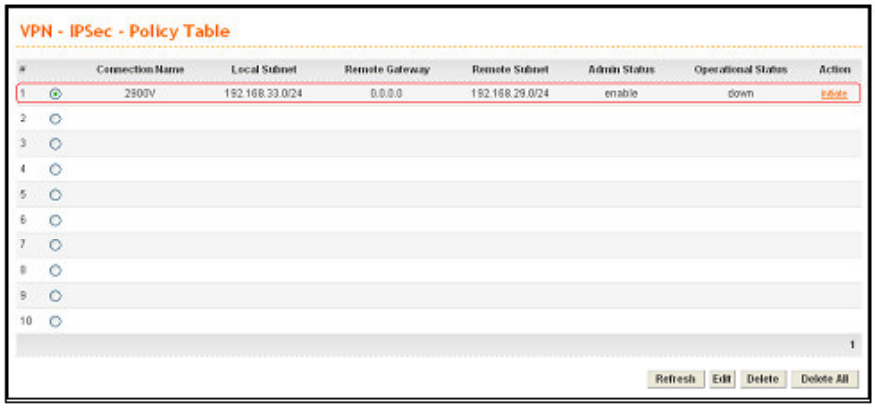


Figure 2-5. Policy table of Vigor 3300V

2.1.2.2 Configurations in Vigor2900V

There are some setup procedures as below.

Step 1

Enter the web page of Vigor2900V, and click the **VPN and Remote Access Setup** link. Please refer to Figure 2-6.

Figure 2-6. VPN web of Vigor2900V

Step 2

Click the **LAN-to-LAN** Profile Setup link. Please refer to 11-7.

Figure 2-7. LAN to LAN settings of Vigor2900V

Step 3

Click **Index 1**, and enter relevant settings of the VPN tunnel connected to Vigor 3300V. Please refer to Figure 2-8.

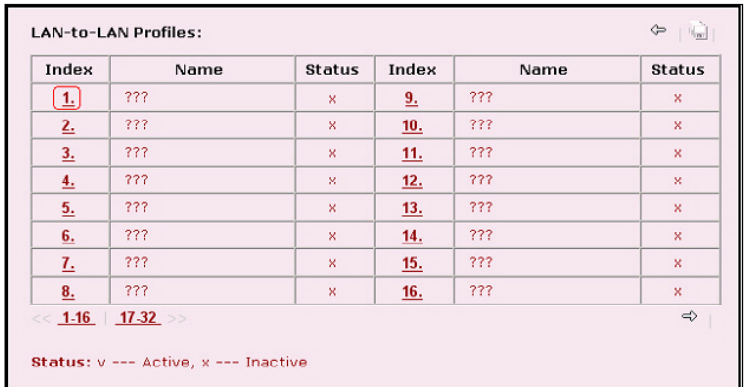


Figure 2-8. LAN to LAN profiles of Vigor2900V

Step 4

Common Setting

It deals with basic settings, including profile name, enable or disable the profile, call direction, etc.

Profile Name

Specify a name to this profile. To facilitate easy management and differentiation, please type “3300V”.

Call Direction

Specify the call direction to this profile. In this example the connection is initiated from Vigor 2900V to Vigor 3300V, so please select Dial-Out. In this example V3300V is not allowed to dial in.

Idle Timeout

By default, it is 300 seconds. If the profile connection is idle over the threshold of the timer, the router will drop the connection.

Please refer to Figure 2-9.

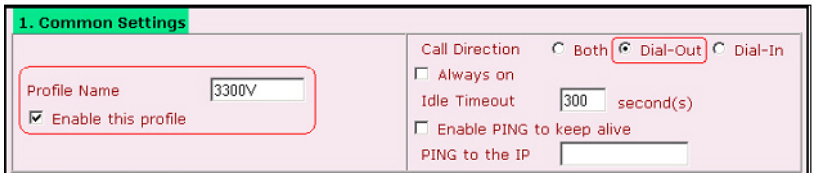


Figure 2-9. Common settings of Vigor2900V

Dial-Out Setting

It deals with relevant settings of Dial-Out connection, including encryption method, preshared key and remote site's WAN IP.

Select **IPSec Tunnel** and enter the WAN IP **220.135.240.207** of Vigor 3300V**.** Press the **IKE Pre-Shared Key** button, and then a window will pop up. Just type **3300** (It must be identical to 3300V's). Press finish the configuration of IKE Pre-Shared Key. Then click **High (ESP)** and select **DES with Authentication** (default is DES without Authentication).

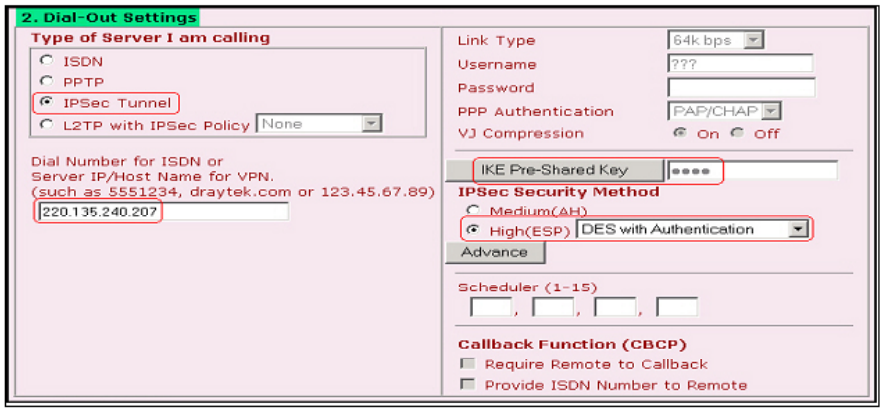


Figure 2-10. Dial-out settings of Vigor 2900V

Dial-in Setting

It deals with relevant settings of Dial-In connection. In this example you do not need to configure this part.

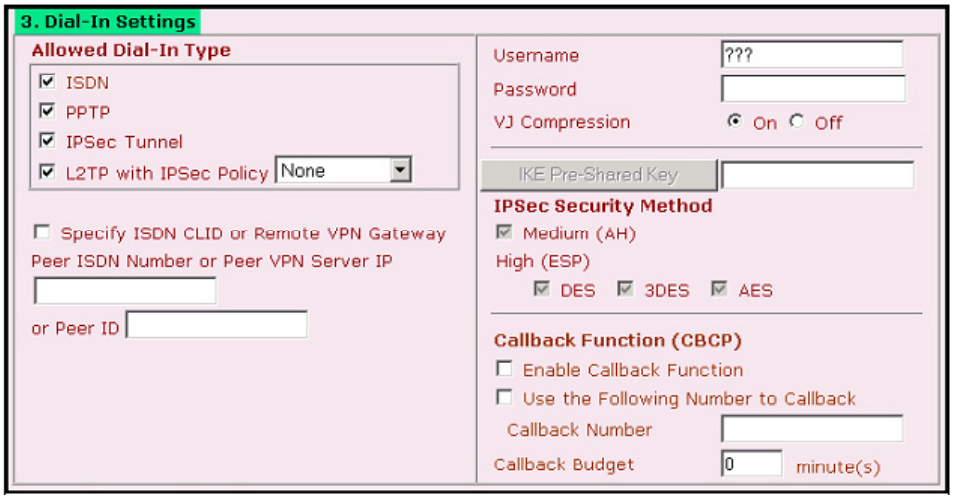


Figure 2-11. Dial-in settings of Vigor 2900V

TCP/IP Network Settings

It deals with the internal network of the remote site, etc.

In the **Network IP** and **Mask** field, enter **192.168.33.0** and **255.255.255.0** respectively, and then press "OK" to finish the configuration. Please refer to Figure 2-12.

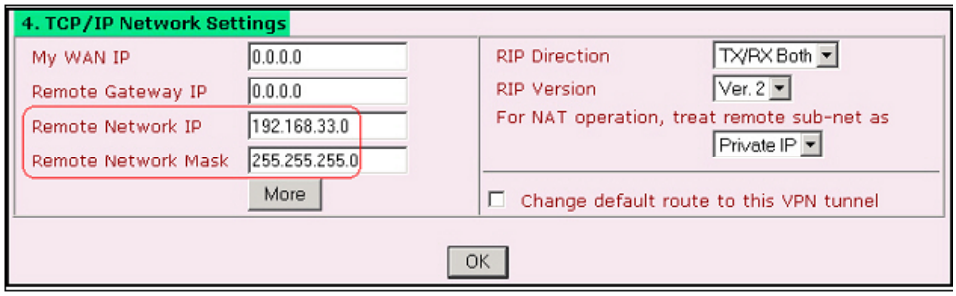


Figure 2-12. TCP/IP network settings of Vigor2900V

Step 5

After configuration, the router will automatically switch to the **LAN-to-LAN Profiles Setup** page. Confirm if the settings are correct. Now the setup configuration for of Vigor2900V is completed. Please refer to Figure 2-13.

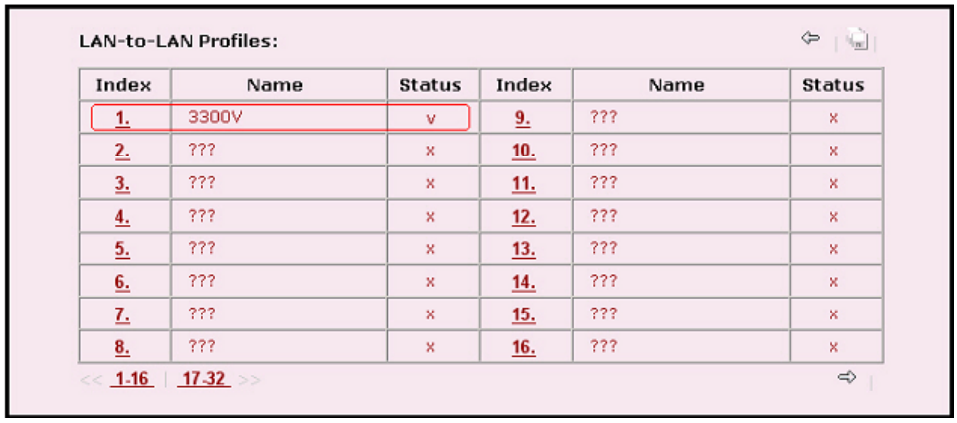


Figure 2-13. Created profiles of Vigor2900V

Step 6

Enter the main page of Vigor2900V and click the **VPN Connection Management** link**.** From the pull-down menu, select **(3300V) 220.135.240.207**, and then press "Dial". Vigor 2900V will initiate the VPN connection to Vigor 3300V. Please refer to Figure 2-14.

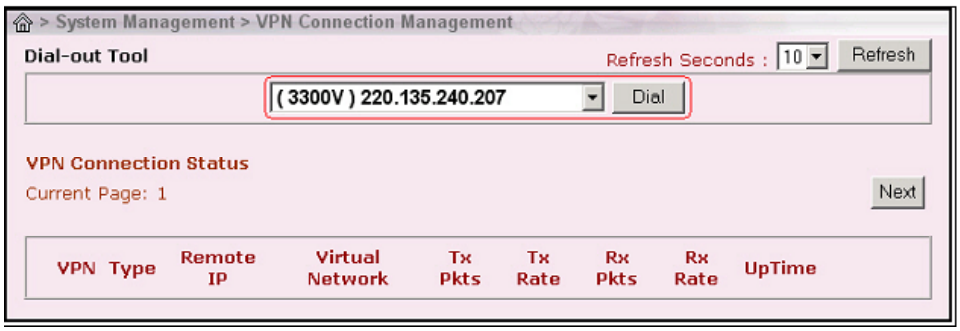


Figure 2-14. Connection settings of Vigor2900V

Step 7

Please wait about 5~10 seconds, you will find the VPN tunnel has been established. Please refer to Figure 2-15.

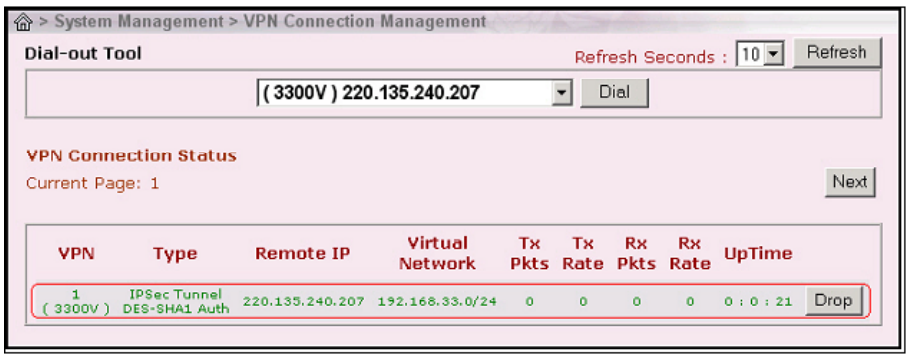


Figure 2-15. Connection status of Vigor2900V

Step 8

Please enter the CLI and try to **ping 192.168.33.1** (Vigor 3300V) to see if there is any response. Please refer to Figure 2-16.

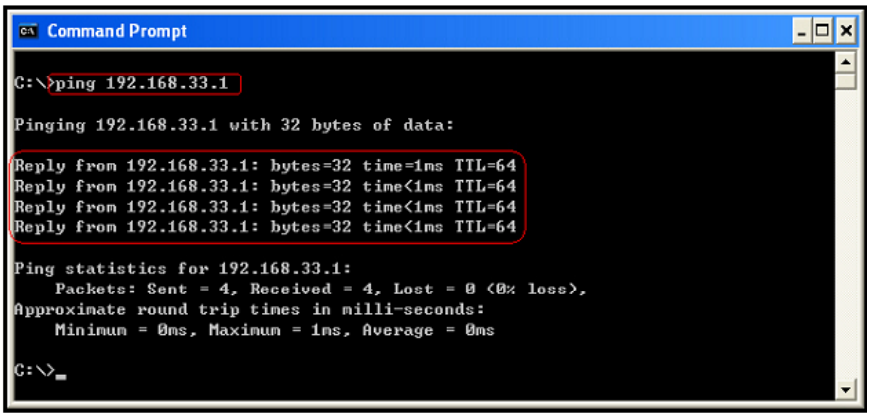


Figure 2-16. Ping status

Step 9

If the numbers of Tx Pkts & Rx Pkts increase, it means there is traffic through the VPN tunnel. Please refer to Figure 2-17.

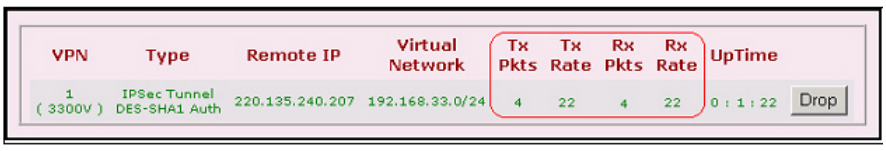


Figure 2-17. Statistics status

Step 10

Enter the page of Vigor 3300V Web and enter **VPN\IPSec\Status**, and then you will find the VPN tunnel has been established. Please refer to Figure 2-18.

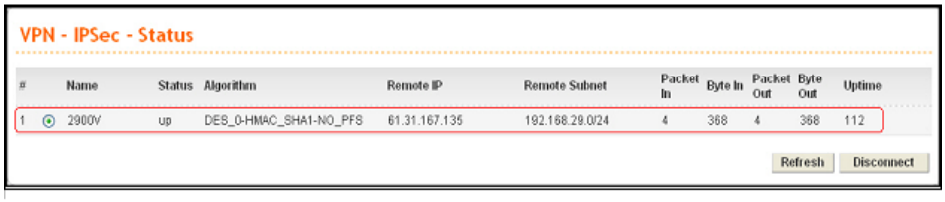


Figure 2-18. IPSec status

Step 11

Enter the CLI and attempt to **ping 192.168.29.1** (Vigor 2900V) to see if there is any response. Please refer to Figure 2-19.

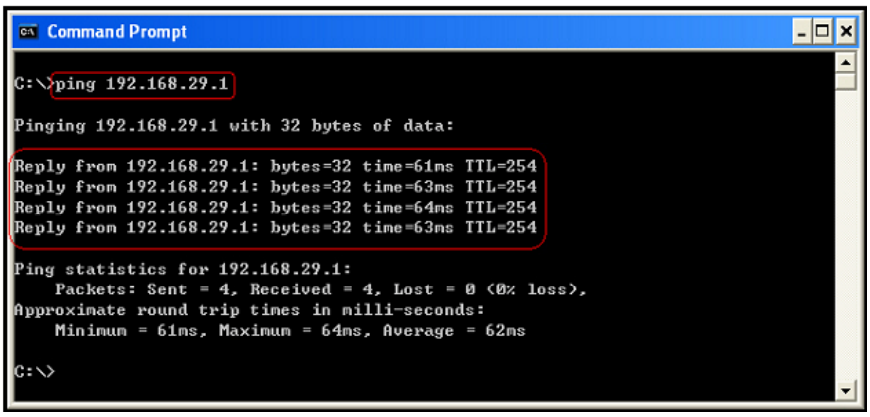


Figure 2-19. Ping status

Step 12

If the numbers of Packet In & Packet Out increase, it means there are packets passing is traffic through the VPN tunnel.

Now the VPN tunnel has been successfully established.

2.2 VPN Dial-out Function

2.2.1 Introduction

This case is based on example 1. The difference is that both sites have a fixed IP address and the connection is initiated from Vigor 3300V (Dial-Out) to Vigor 2900V (Dial-In).

Suppose the Headquarters in Taipei use a Vigor 3300V, while the branch office in Shanghai uses a Vigor 2900V. The network administrator requires the employees in branch office to access the database in the headquarters through the encrypted VPN tunnel. The purpose is to avoid leakage of confidential information.

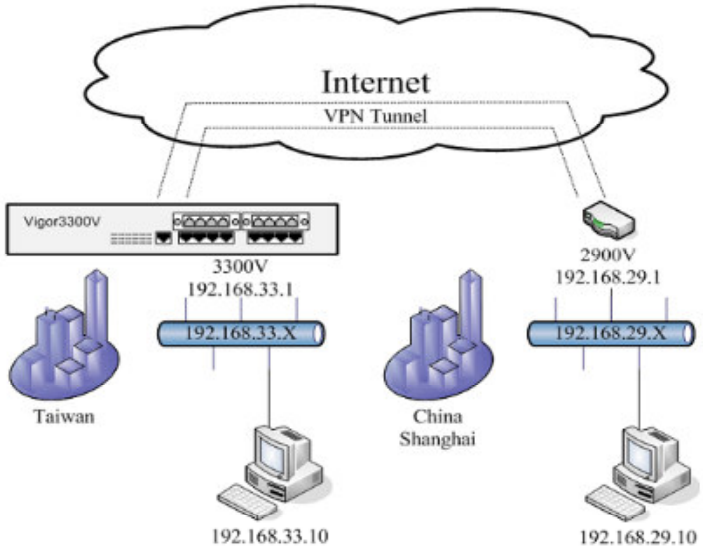


Figure 2-20. A scenario architecture graph

Below is a configuration table between Vigor 3300V and Vigor 2900V.

	3300V Headquarters	**2900V** Branch Office
WAN IP	220.135.240.207 PPPoE, fixed IP	61.31.167.135 PPPoE, fixed IP
LAN IP	192.168.33.1	192.168.29.1
Internal Network	192.168.33.X	192.168.29.X
Encryption Method	DES-SHA1	
Preshared Key	**3300**	

2.2.2 Examples and Web Configurations

2.2.2.1 Configurations in Vigor 2900V

There are some procedures as below.

Step 1

Enter Vigor 2900V'sthe web page of Vigor 2900V, click the **VPN and Remote Access Setup** link.

Figure 2-21. Vigor 2900V web configuration

Step 2

Click the **LAN-to-LAN Profile Setup** link.

Figure 2-22. LAN-to-LAN profile setup

Step 3

Click **Index 1** and enter relevant settings for the VPN tunnel to Vigor 3300V. Please refer to Figure 12-4.

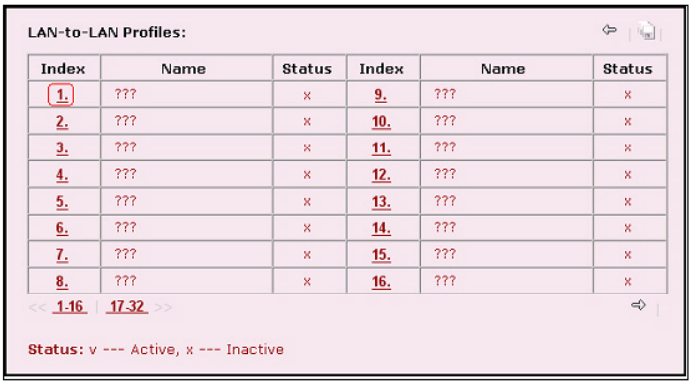


Figure 2-23. Enter relevant VPN setup

Step 4

On this page there are four sections for relevant VPN setup as below.

Common Settings

These are basic settings, including profile name, enable or disable the profile, call direction, etc.

Profile Name

Specify a name to this profile. To facilitate easy management and differentiation, please type **3300V.**

Call Direction

Specify the call direction to this profile. In this example the connection is initiated from V3300V to Vigor 2900V, so please select **Dial-In.**

Idle Timeout

By default, it is 300 seconds. If the profile connection is idle over the threshold of the timer, the router will drop the connection.

Please refer to Figure 12-5.

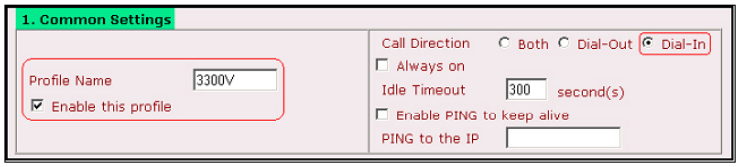


Figure 2-24. Common settings in Vigor 2900V

Dial-Out Settings

It deals with relevant settings of Dial-Out connection. In this example, we do not need to configure this part.

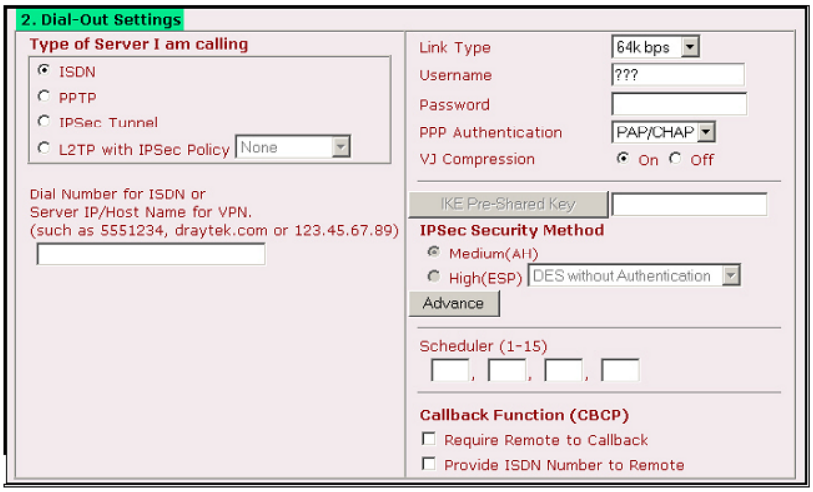


Figure 2-25. Dial-Out settings in Vigor 2900V

Dial-In Settings

It deals with relevant settings of Dial-In connection, including encryption method, preshared key and the WAN IP of remote site.

Select **IPSec Tunnel** and enter the WAN IP **220.135.240.207** of Vigor 2900V**.** Press the IKE Pre-Shared Key button, and then a window will pop up. Type **3300** (It must be identical with 3300V's). Press the "Confirm" button to finish the configuration of IKE Pre-Shared Key. Please refer to Figure 12-7.

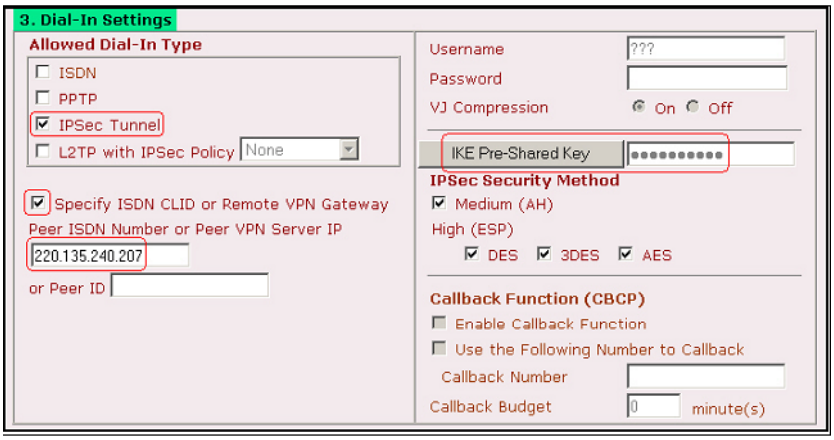


Figure 2-26. Dial-In settings in Vigor 2900V

TCP/IP Network Settings

It deals with the internal network of the remote site, etc.

In the **Network IP** and **Mask** fields, enter **192.168.33.0** and **255.255.255.0** respectively, and then press "OK" to finish the configuration. Please refer to Figure 2-27.

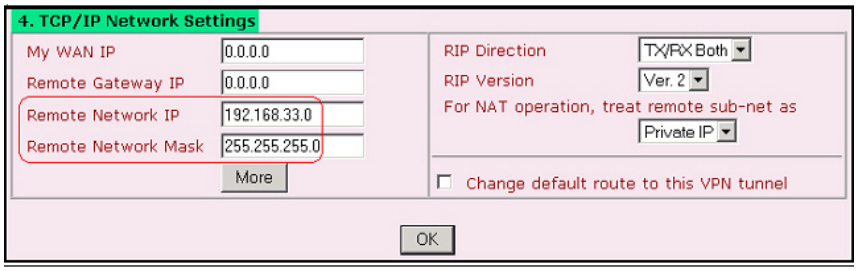


Figure 2-27. VPN setup- TCP/IP network settings

Step 5

After configuration, the router will automatically switch to the LAN-to-LAN Profiles Setup page. Confirm if the settings are correct. Now the configuration of Vigor 2900V is completed. Please refer to Figure 2-28.

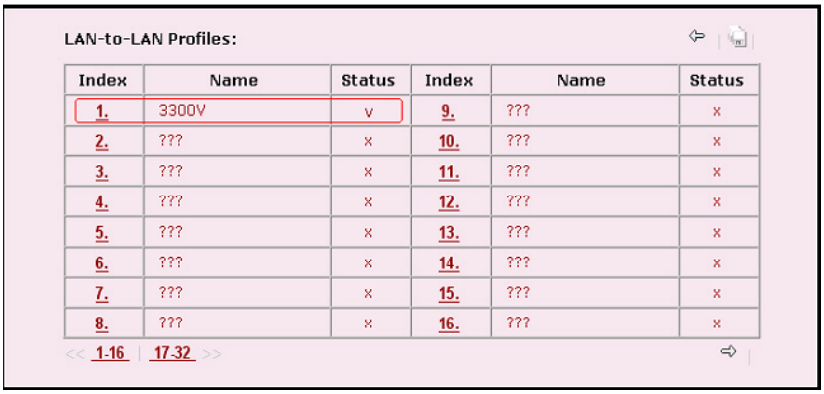


Figure 2-28. Table of LAN-to-LAN settings in Vigor 2900V

2.2.2.2 Configurations in Vigor 3300V

There are some procedures as below.

Step1

Suppose the internal network inside Vigor 3300V is 192.168.33.X, for detailed setup instructions please refer to the **LAN Setup** chapter. Enter **VPN \IPSec\Policy Table**, and click 1. Then press “Edit”. Please refer to Figure 2-29.

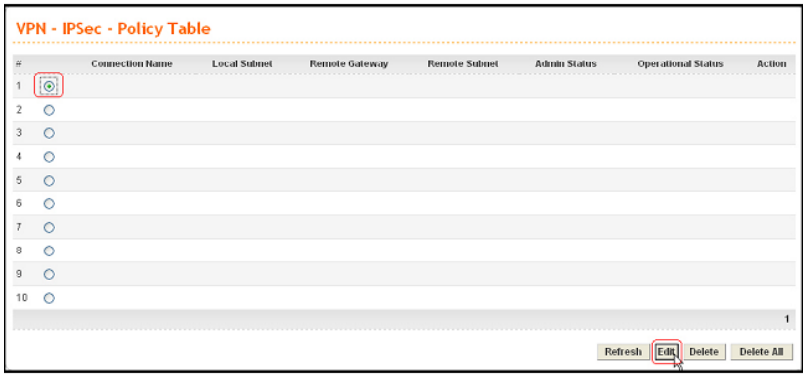


Figure 2-29. IPSec policy table

Step 2

First you should configure the **Default** page. In Basic settings, there are three parts users need to configure.

Basic

It deals with basic settings, including profile name, authentication type, preshared key, etc.

Name

You can specify a name to this profile. To facilitate easy management and differentiation, please type **2900V**.

Preshared Key

Type **3300** (It must be identical with 2900V's).

Admin Status

Use the default settings (**Enable**).

Local Gateway

It deals with relevant settings of the local router, including selection of the WAN and internal network, etc.

WAN Interface

Vigor 3300V has 4 WAN ports. In this example, we choose **WAN1** to establish the VPN tunnel.

Network IP / Subnet Mask

It is the internal network of Vigor 3300V. Please enter **192.168.33.0 /24** (/24 = Mask 255.255.255.0)

Remote Gateway

It deals with relevant settings of the remote router, including WAN IP and internal network, etc.

Security Gateway

The WAN IP of Vigor 2900V. Please enter **61.31.167.135.**

Network IP / Subnet Mask

The internal network of Vigor 2900V. Please enter **192.168.29.0 /24** (/24 = Mask 255.255.255.0).

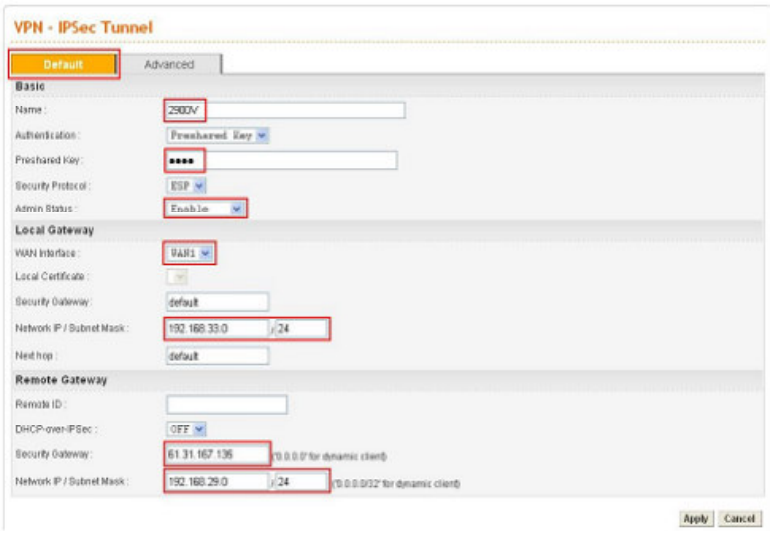


Figure 2-29. Default page setup

Step 3

Advanced page

By default, Vigor 3300V allows des-md5, des-sha1, 3des-md5 and 3des-sha1. Change the sequence of des-md5 and des-sha1 so that des-sha1 is in first place. Press "Apply" to finish the configuration.

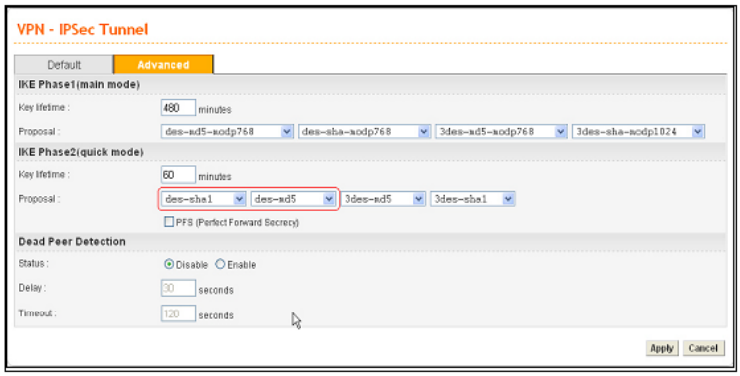


Figure 2-30. Advanced page setup

Step 4

After configuration, the router will switch to the **VPN - IPSec - Policy Table** page. Click "**Initiate"**.

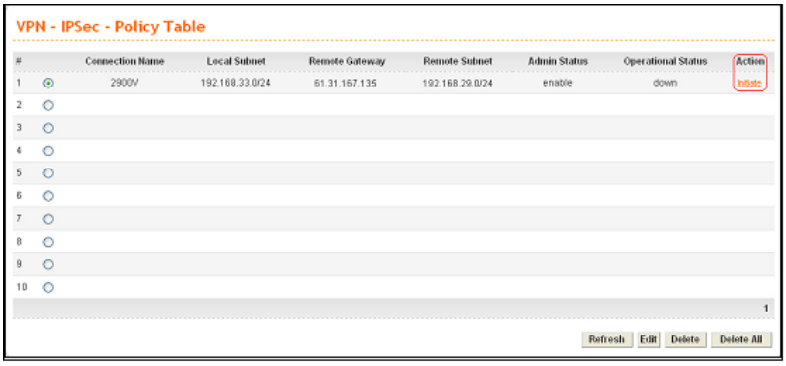


Figure 12-31. IPSec policy table

Step 5

A window for this Dial-Out connection will pop up. Press "OK" to initiate this tunnel.

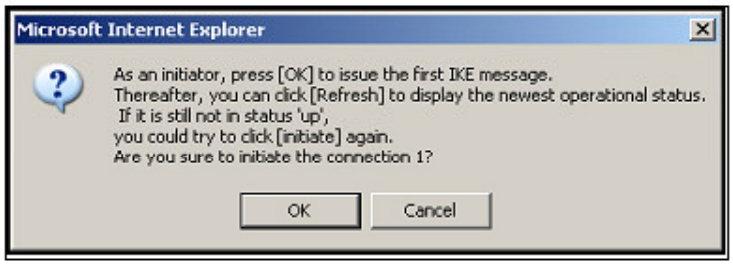


Figure 2-32. The confirmation window

Step 6

Please wait for 30~60 seconds, and then enter the **VPN - IPSec – Status** page of Vigor 3300V. You will find that this VPN tunnel has been established.

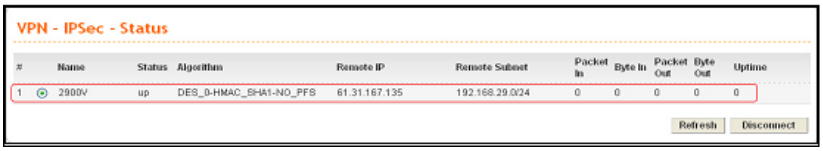


Figure 2-33. VPN - IPSec - Status page

Step 7

Please enter the CLI and **ping 192.168.29.1**(2900V) to see if there is any response.

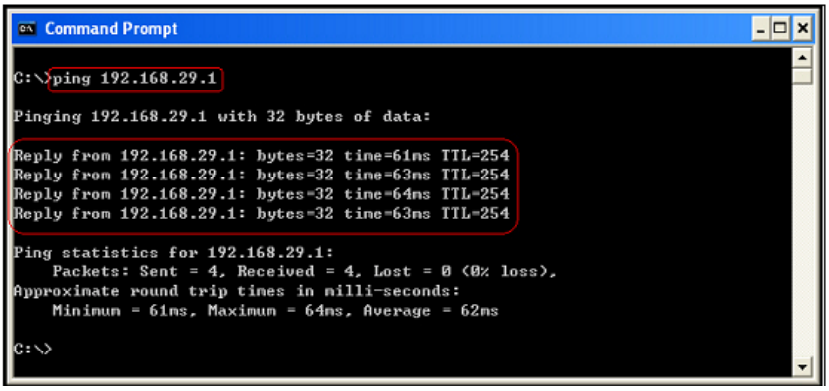


Figure 2-34. Command prompt

Step 8

If the numbers of Packet In & Packet Out increase, it means there is traffic through the VPN tunnel.

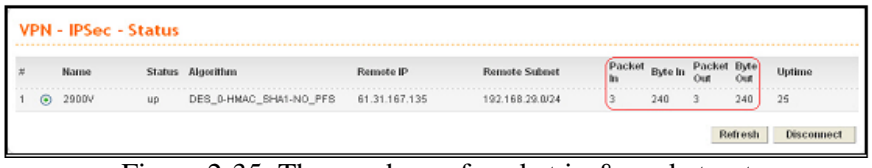


Figure 2-35. The numbers of packet in & packet out

Step 9

Please enter the main page of Vigor 2900V and click "**VPN Connection Management".** And then you will find this VPN tunnel has been established.

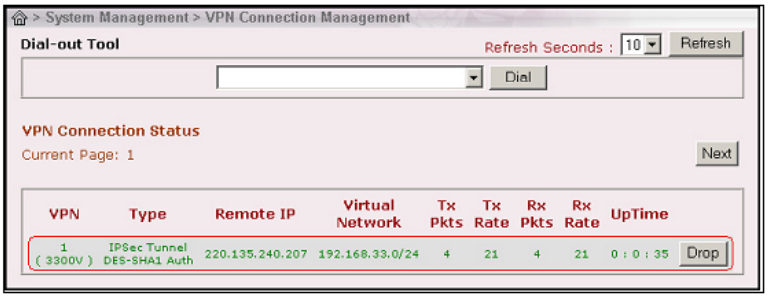


Figure 2-36. VPN connection management

Step 10

Enter the CLI and ping 192.168.33.1(3300V) to see if there is any response.

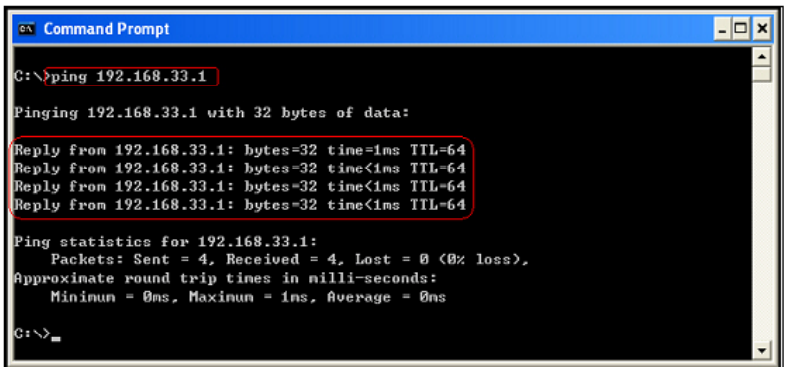


Figure 2-37. Command prompt

Step 11

If the numbers of Tx Pkts & Rx Pkts increase, it means there is traffic through the VPN tunnel.

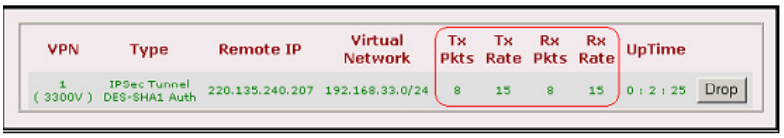


Figure 2-38. The numbers of Tx Pkts & Rx Pkts

Now the VPN tunnel has been successfully established.

If you want to keep a permanent connection, please refer to the step 2 the configuration of Vigor 3300V and change "Admin Status" from Enable to **Always-On.** Before the connection is established Vigor 3300V will continuously attempt to initiate VPN tunnel every 20 seconds.

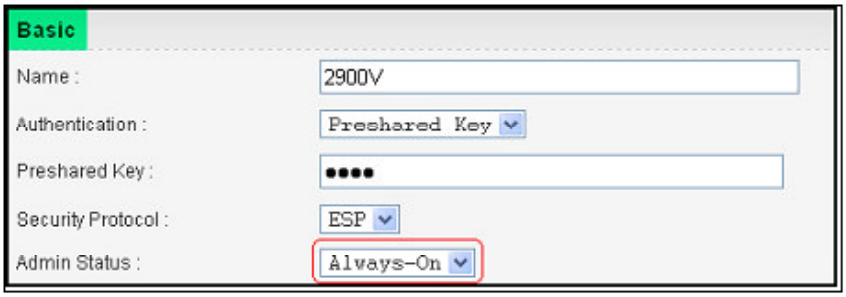


Figure 2-39. The admin status

2.3. VPN Three Parts Communication

2.3.1 Introduction

The second example is to configure 2 LAN to LAN VPN Tunnels. So that all three routers' internal networks can connect to each other through one of the router. In this example, since only one site (Vigor 3300V) has a fixed IP address, to maintain stable connections the other two routers (Vigor 2900V and Vigor 2200V) using dynamic IP addresses must enable “Always On”. Vigor 3300V is set as the central site accepting incoming VPN connections from the other two routers. The VPN traffic between Vigor 2900V and Vigor 2200V are all passed through the Vigor 3300V. These 3 sites' internal networks must be within the same subnet (192.168.X.X). The subnet of the VPN's configuration of Vigor 3300V must fall into 192.168.0.0/16.

Suppose the headquarters in Taipei uses Vigor 3300V, while the branch office in Shanghai uses a Vigor 2900V. The teleworkers in Beijing use a Vigor 2200V. The network administrator requires 3 sites to communicate with each other through the encrypted VPN tunnel. The purpose is to avoid leakage of confidential information.

Since only the headquarters have confidential fixed IP address, teleworkers have to access the resources in the branch office through the headquarters. All the VPN traffic from Vigor 2900V and Vigor 2200V is firstly directed to the headquarters. To avoid overload of the lines, Vigor 3300V uses WAN1 to establish the VPN tunnel with the branch offices and uses WAN2 to establish the VPN tunnel with teleworkers.

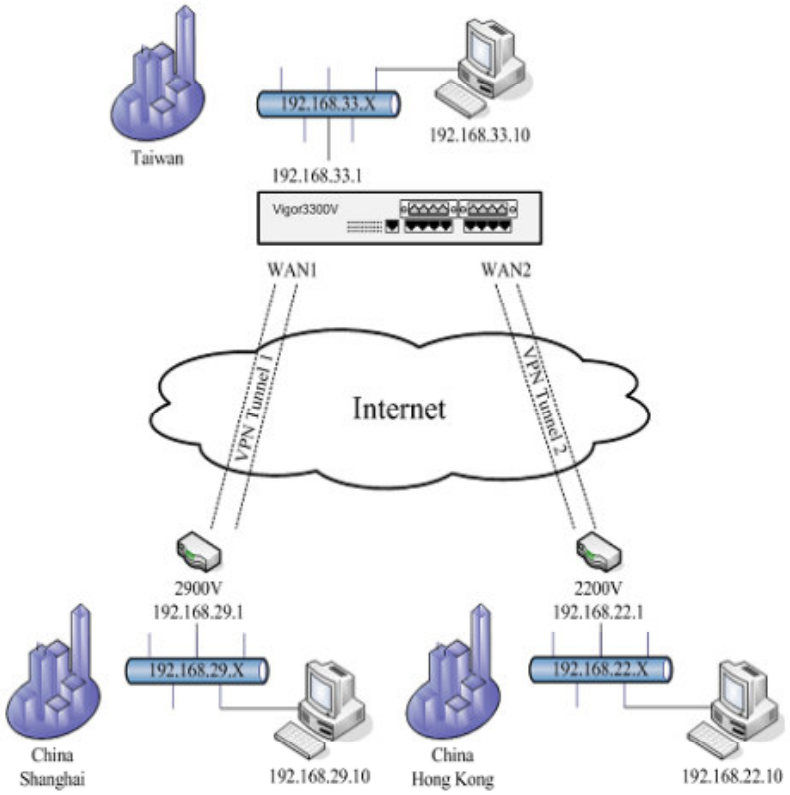


Figure 2-40. Setup 2 LAN to LAN VPN tunnels

	3300V Headquarters	**2900V** Branch Offices	**2200V** Teleworker
WAN IP	220.135.240.207 PPPoE, fixed IP	61.31.167.135 PPPoE, dynamic IP	
	219.81.160.206 PPPoE, fixed IP		61.230.207.146 PPPoE, dynamic IP
LAN IP	192.168.33.1	192.168.29.1	192.168.22.1
Internal Network	192.168.33.X	192.168.29.X	192.168.22.X
Encryption Method	DES-SHA1		
Preshared Key	**3300**	**3300**	
	1234		**1234**

In this example since only Vigor 3300V has fixed IP address, to maintain a stable connection between Vigor 2900V and Vigor 2200V, you must enable “Always ON” in the VPN profiles of Vigor 2900V and Vigor 2200V.

2.3.2 Examples and Web Configurations

2.3.2.1 Configurations in Vigor 3300V

Step 1

Suppose the internal network of Vigor 3300V is 192.168.33.X, for detailed instructions please refer to the LAN Setup chapter. Enter VPN \IPSec\Policy Table, and click 1. Then press “Edit”.

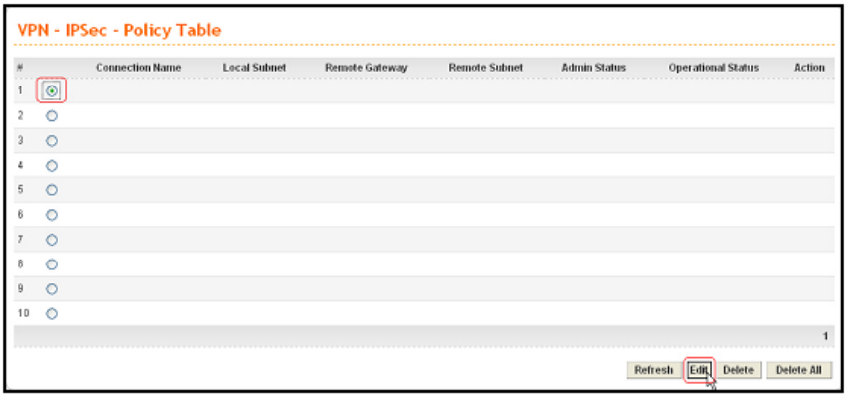


Figure 2-41. IPSec policy table

Step 2

First you should enter the **Default** page. There are three fields on this page.

Basic

It deals with basic settings, including profile name, authentication type, preshared key, etc.

Name

You can specify a name to this profile. To facilitate easy management and differentiation please type **2900V**.

Preshared Key

Type **3300** (It must be identical with 2900V's).

Admin Status

Use the default settings (**Enable**).

Local Gateway

It deals with relevant settings of the local router, including selection of the WAN and internal network, etc.

WAN Interface

Vigor 3300V has 4 WAN ports. In this example, we choose **WAN1** to establish the VPN tunnel.

Network IP / Subnet Mask

The internal network of Vigor 2900V. Please enter **192.168.0.0 /16** (/16 = Mask 255.255.0.0).

Remote Gateway

It deals with relevant settings of the remote router, including WAN IP and internal network, etc.

Security Gateway

The WAN IP of Vigor 2900V. In this example it isn't fixed, so please enter 0.0.0.0**.**

Network IP / Subnet Mask

The internal network of Vigor 2900V. Please enter **192.168.29.0 /24** (/24 = Mask 255.255.255.0).

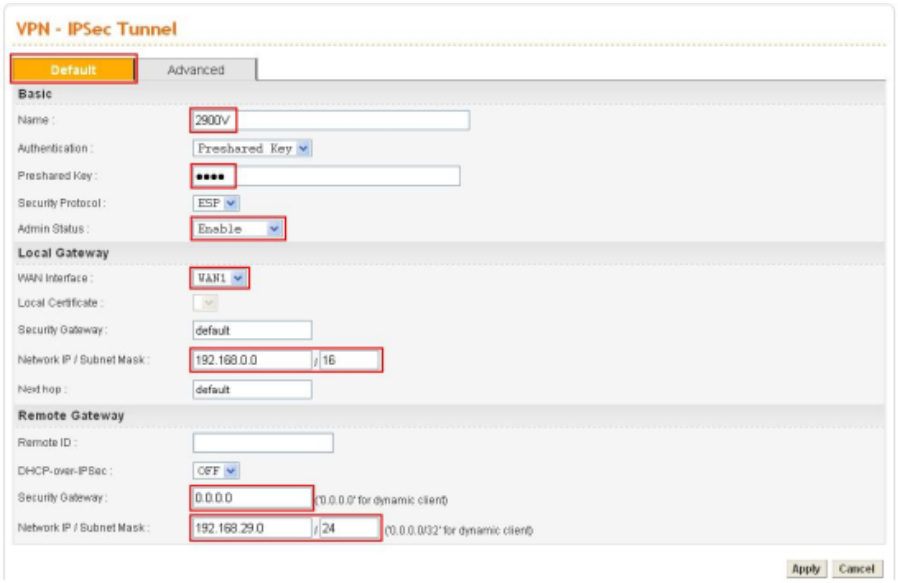


Figure 2-42. VPN – IPSec tunnel - Default page setup

Step 3

Advanced page

In this example since the connection is initiated by Vigor 2900V, the encryption method is determined by Vigor 2900V. By default Vigor 3300V allows des-md5, des-sha1, 3des-md5 and 3des-sha1, so no change is required. Just press the Apply button to finish the configuration.

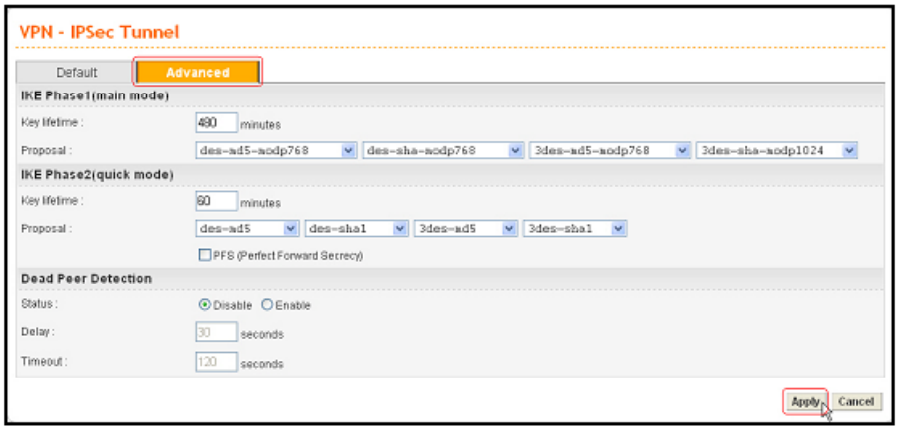


Figure 2-43. VPN - IPSec tunnel - Advanced page setup

Step 4

After configuration, the router will automatically switch to the **VPN - IPSec - Policy Table** page. Click 2, and then press Edit.

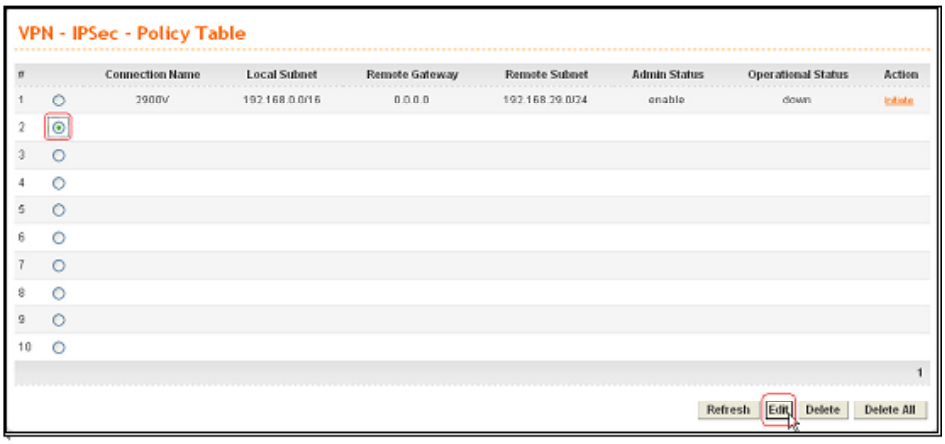


Figure 2-44. VPN - IPSec - Policy table (edit 2)

Step 5

Firstly you should enter the **Default** page. There are three fields on this page.

Basic

It deals with basic settings, including profile name, authentication type, preshared key, etc.

Name

You can specify a name to this profile. To facilitate easy management and differentiation please type **2200V**.

Preshared Key

Type **1234** (It must be identical with 2200V's).

Admin Status

Use the default settings (**Enable**).

Local Gateway

It deals with relevant settings of the local router, including selection of the WAN and internal network, etc.

WAN Interface

Vigor 3300V has 4 WAN ports. In this example, we choose **WAN2** to establish the VPN tunnel.

Network IP / Subnet Mask

The internal network of Vigor 3300V. Please enter **192.168.0.0 /16** (/16 = Mask 255.255.0.0).

Remote Gateway

It deals with relevant settings of the remote router, including WAN IP and internal network, etc.

Security Gateway

The WAN IP of Vigor 2900V. In this example it is not fixed, so please enter **0.0.0.0.**

Network IP / Subnet Mask

It is the internal network of Vigor 2900V. Please enter **192.168.22.0 /24** (/24 = Mask 255.255.255.0).

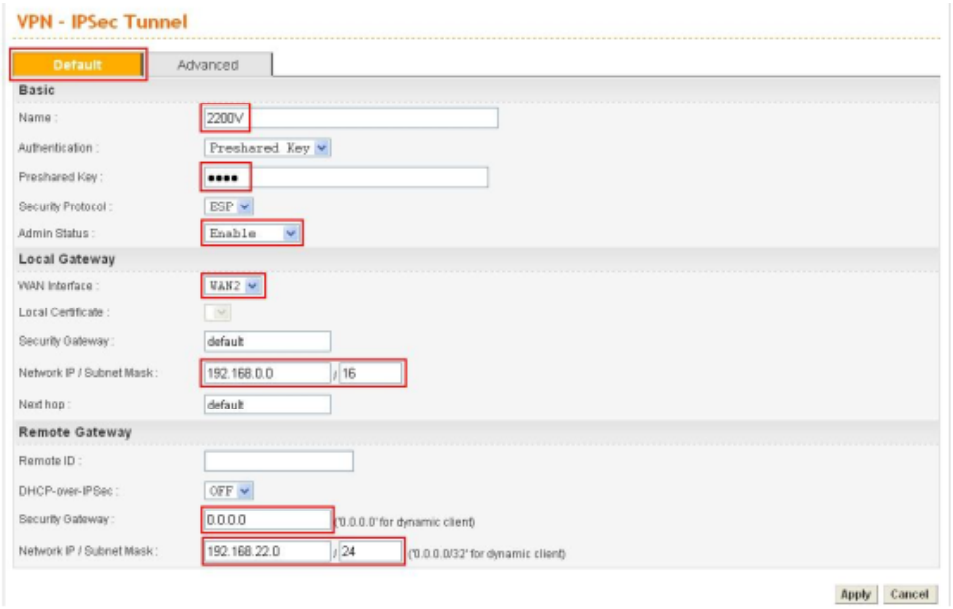


Figure 2-45. VPN - IPSec tunnel - Default page setup

Step 6

Advanced page

In this example since the connection is initiated by Vigor 2200V, the encryption method is determined by Vigor 2200V. By default Vigor 3300V allows des-md5, des-sha1, 3des-md5 and 3des-sha1, so no change is required. Just press the Apply button to finish the configuration.

Figure 2-46. VPN - IPSec tunnel - Advanced page setup

Step 7

After configuration, the router will switch to the **VPN - IPSec - Policy Table** page. Confirm if the settings are correct. Now the configuration of Vigor 3300V is completed.

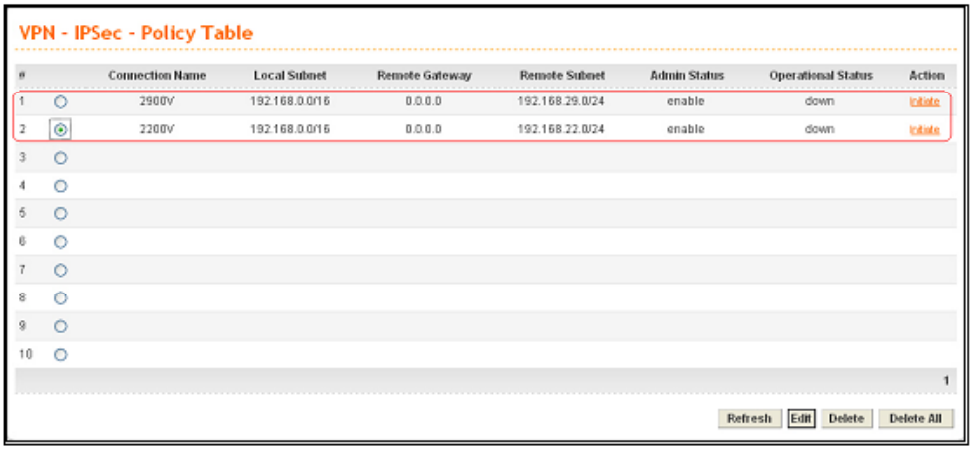


Figure 2-47. The setup for 3300V is completed

2.3.2.2 Configurations in Vigor 2900V

Step 1

Enter the web page of Vigor 2900V, and click the VPN and Remote Access Setup link.

Figure 2-48. 2900V web configuration

Step 2

Click the LAN-to-LAN Profile Setup link. Please refer to Figure13-10.

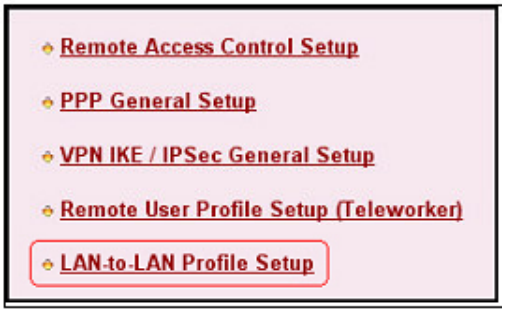


Figure 2-49. LAN-to-LAN profile setup

Step 3

Click **Index 1,** and enter relevant settings of the VPN tunnel connected to Vigor 3300V.

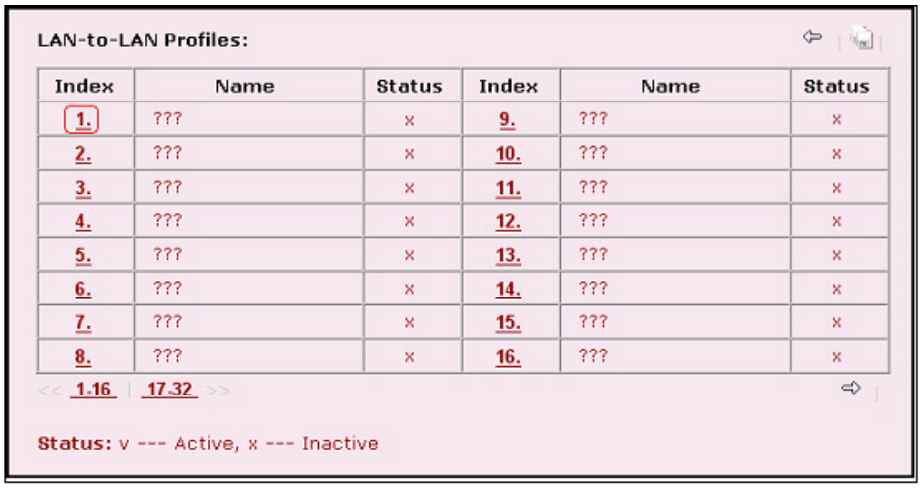


Figure 2-50. Enter relevant VPN setup

Step 4

On this page there are four sections regarding VPN configuration.

Common Setting

It deals with basic settings, including profile name, enable or disable the profile, call direction, etc.

Profile Name

You can specify a name to this profile. To facilitate easy management and differentiation, please type **3300V**.

Call Direction

You can specify the call direction to this profile. In this example the connection is initiated from Vigor 2900V to Vigor 3300V, so please select **Dial-Out**. In this example Vigor 3300V is not allowed to dial in.

Idle Timeout

By default, it is 300 seconds. If the profile connection is idle over the threshold of the timer, the router will drop the connection.

Always On

If the VPN connection is terminated, the router will continuously attempt to establish the VPN.

PING to Keep Alive

To avoid the situation in which the connection goes down unexpectedly, Vigor uses "Ping to keep alive" method to detect if the peer router is reachable. Enable this feature and enter “192.168.33.1” in the “PING to the IP” field.

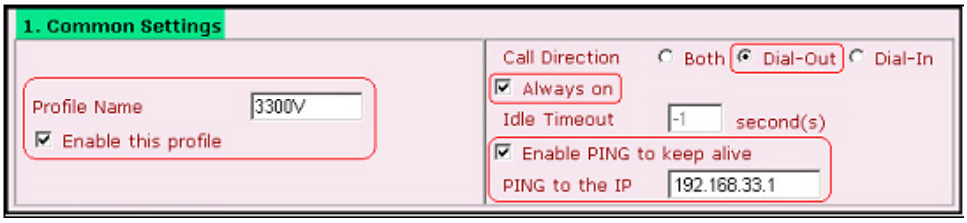


Figure 2-51. VPN setup - Common settings

Dial-Out Setting

It deals with relevant settings of Dial-Out connection, including encryption method, preshared key and WAN IP of the remote site.

Select **IPSec Tunnel** and enter the WAN IP **220.135.240.207** of Vigor 2900V. Press the IKE Pre-Shared Key button, and then a window will popup Type **3300** (It must be identical with 3300V's). Press the “Confirm” button to finish the configuration of IKE Pre-Shared Key. Then click **High (ESP)** and select **DES with Authentication** (default is DES without Authentication).

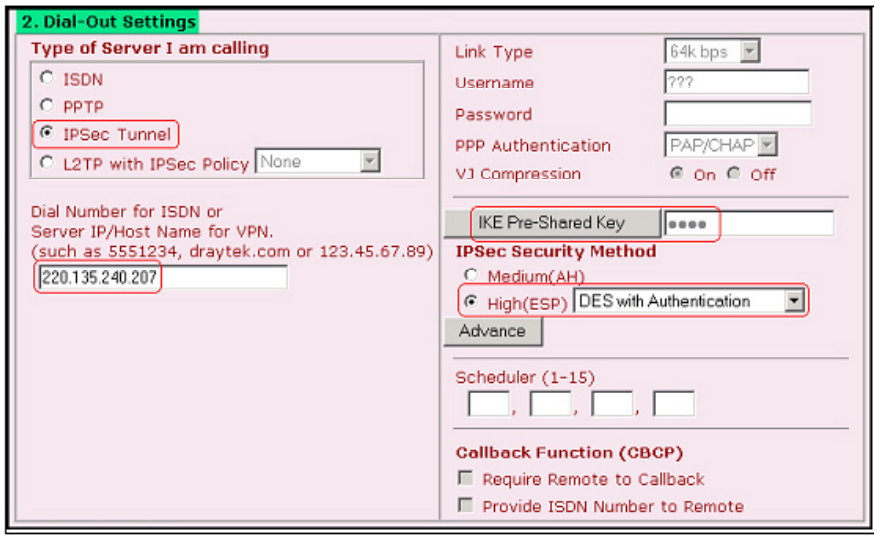


Figure 2-52. VPN setup - Dial-out settings

Dial-in Setting

It deals with relevant settings of Dial-In connection. In this example, there is no need to configure this part.

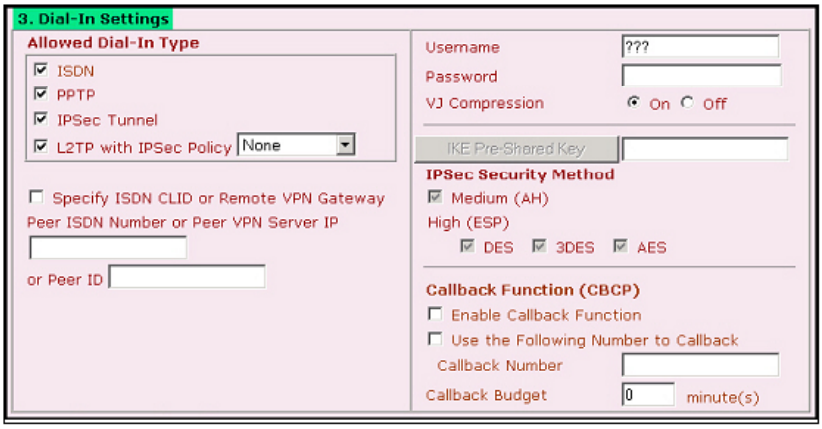


Figure 2-53. VPN setup - Dial-in settings

TCP/IP Network Settings

The internal network of the remote site, etc.

In the **Network IP** and **Mask** fields, enter **192.168.0.0** and **255.255.0.0** respectively, and then press "OK" to finish the configuration.

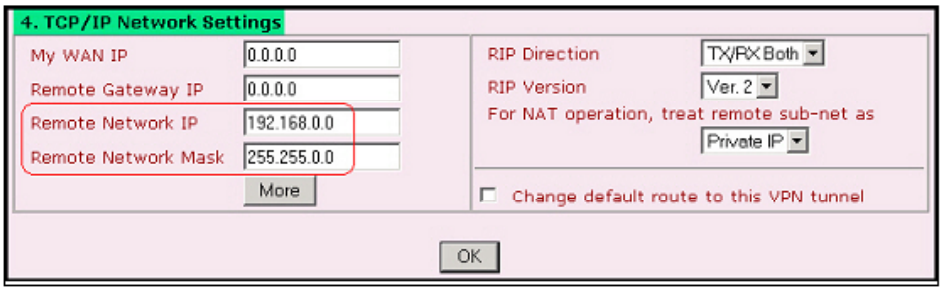


Figure 2-54. VPN setup - TCP/IP network settings

Step 5

After configuration, the router will automatically switch to the **LAN-to-LAN Profiles Setup** page. Confirm if the settings are correct. Now the configuration of Vigor 2900V is completed.

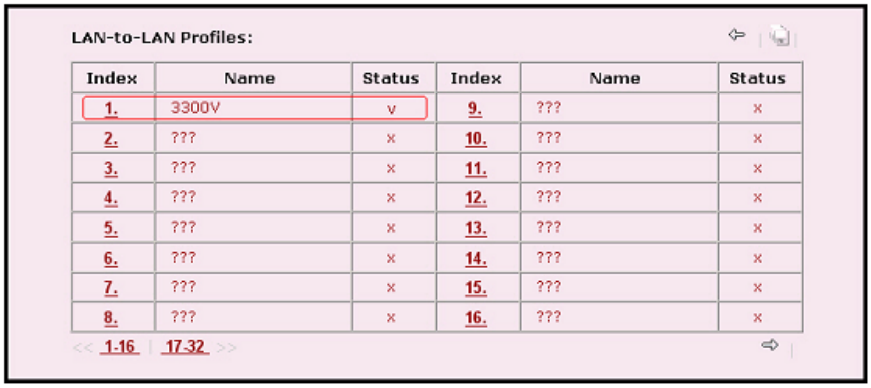


Figure 2-55. The setting status for Vigor 2900V is completed

Step 6

Enter the main page of Vigor 2900V, click **VPN Connection Management**. Since "Always On" is enabled, the VPN connection has been established.

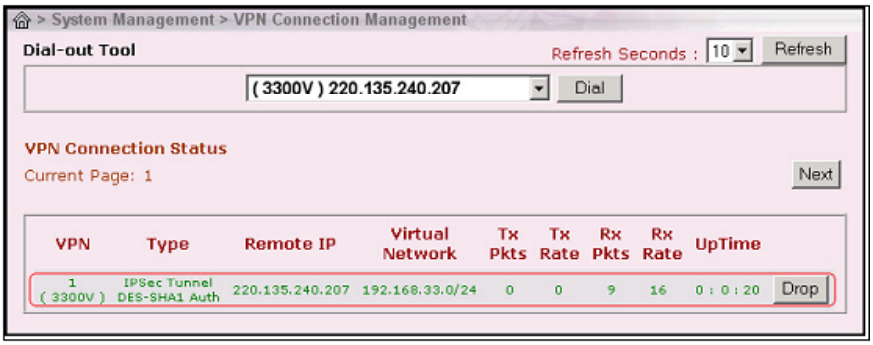


Figure 2-56. VPN connection management

Step 7

Enter the CLI and try to **ping 192.168.33.1**(3300V) to see if there is any response.

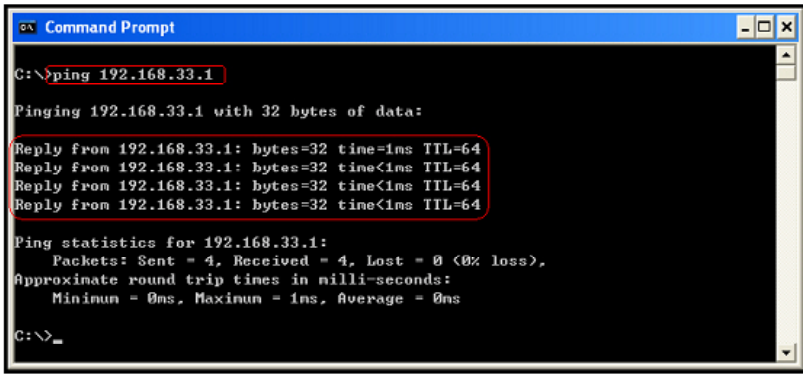


Figure 2-57. Command prompt

Step 8

If the numbers of Tx Pkts & Rx Pkts increase, it means there is traffic through the VPN tunnel.

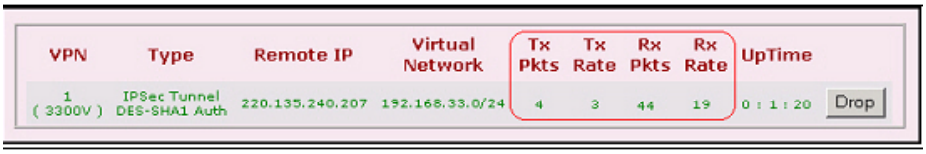


Figure 2-58. The numbers of Tx Pkts & Rx Pkts

2.3.2.3 Configurations in Vigor 2200V

Step 1

Enter the web page of Vigor 2200V. Click the VPN and Remote Access link.

Figure 2-59. Vigor 2200V web configuration

Step 2

Click the **LAN-to-LAN Profiles** link**.** Click **Index 1** and enter relevant settings of the VPN tunnel of Vigor 3300V.

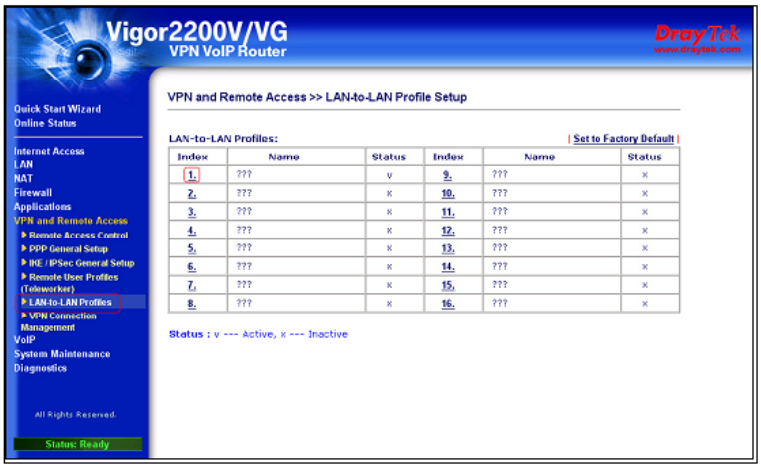


Figure 2-60. LAN-to-LAN profiles setup

Step 3

On this page there are four sections regarding VPN configuration.

Common Setting

It deals with basic settings, including profile name, enable or disable the profile, call direction, etc.

Profile Name

You can specify a name to this profile. To facilitate easy management and differentiation, please type **3300V.**

Call Direction

Specify the call direction to this profile. In this example the connection is initiated from Vigor 2200V to Vigor 3300V, so please select **Dial-Out.** In this example Vigor 3300V is not allowed to dial in.

Always On

If the VPN connection is terminated, the router will continuously attempt to establish the VPN.

PING to Keep Alive

To avoid the situation in which the connection goes down unexpectedly, Vigor uses "Ping to keep alive" method to detect if the peer router is reachable. Enable this feature and enter “192.168.33.1” in the “PING to the IP” field.

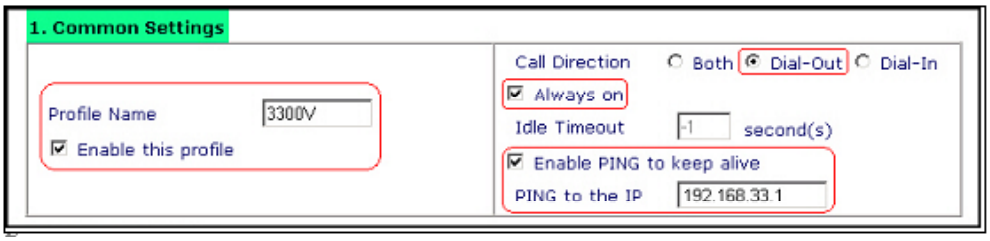


Figure 2-61. VPN setup - Common settings

Dial-Out Setting

It deals with relevant settings of Dial-Out connection, including encryption method, preshared key and the WAN IP of remote site.

Select **IPSec Tunnel** and enter the WAN IP **219.81.160.206** of Vigor 2900V. Press IKE Pre-Shared Key button and a window will pop-up, type **1234** (It must be identical with 3300V's). Press Confirm to finish the configuration of IKE Pre-Shared Key. Then click **High (ESP)** and select **DES with Authentication** (default is DES without Authentication).

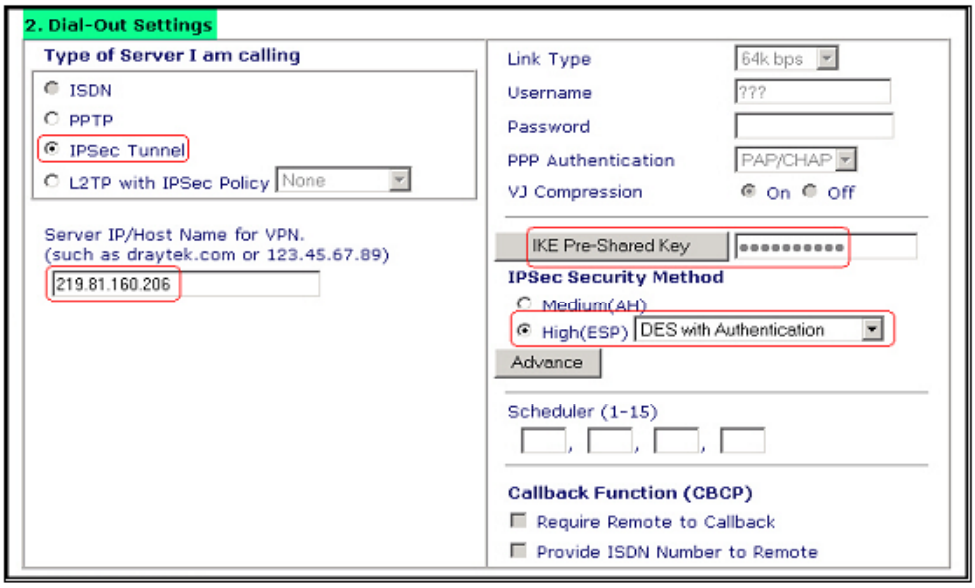


Figure 2-62. VPN setup - Dial-out settings

Dial-in Setting

It deals with relevant settings of Dial-In connection. In this example, there is no need to configure this part.

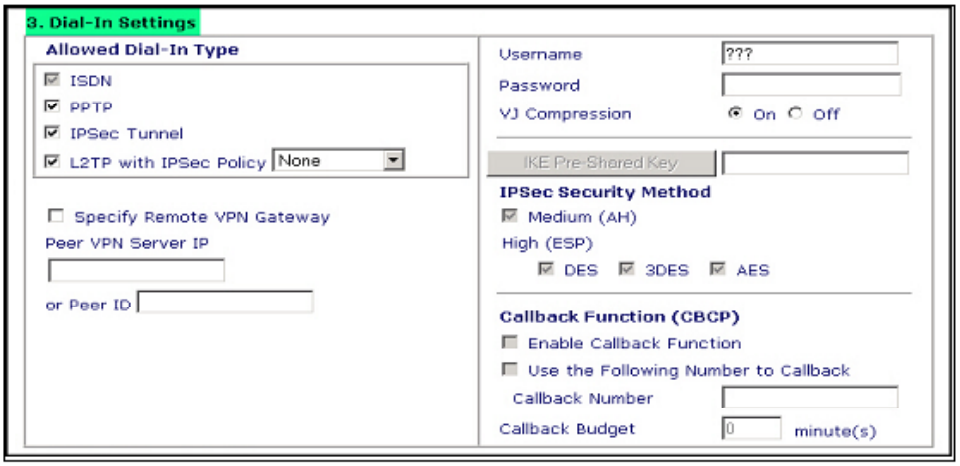


Figure 2-63. VPN setup - Dial-In settings

TCP/IP Network Settings

The internal network of the remote site, etc.

In the **Network IP** and **Mask** fields, enter **192.168.0.0** and **255.255.0.0** respectively, and then press "OK" to finish the configuration.

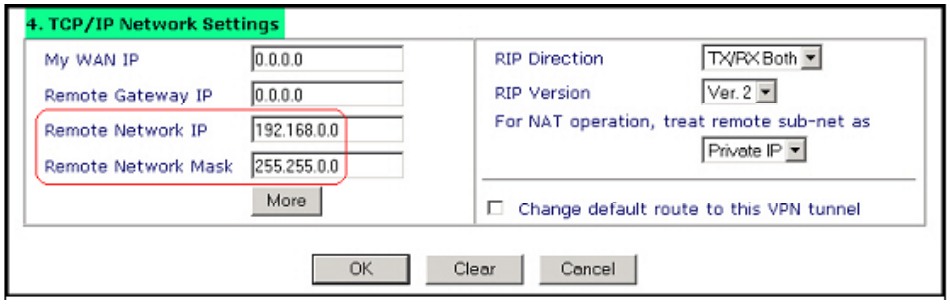


Figure 2-64. VPN setup - TCP/IP network settings

Step 4

After configuration, the router will automatically switch to the **LAN-to-LAN Profiles Setup** page. Confirm if the settings are correct. Now the configuration of Vigor 2200V is completed.

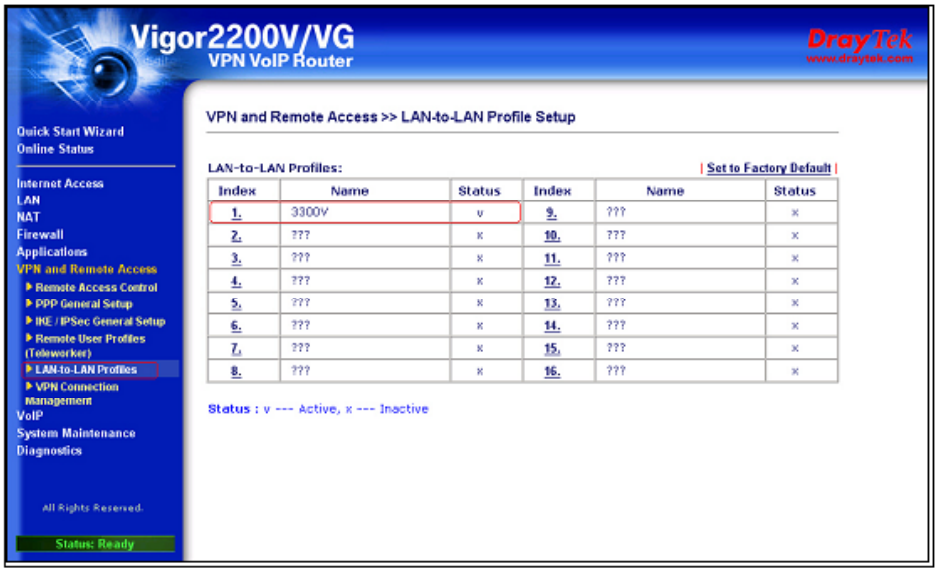


Figure 2-65. The setting status for Vigor 2200V is completed

Step 5

Enter the main page of Vigor 2200V, click **VPN Connection Management.** Since "Always On" is enabled, the VPN connection has been established.

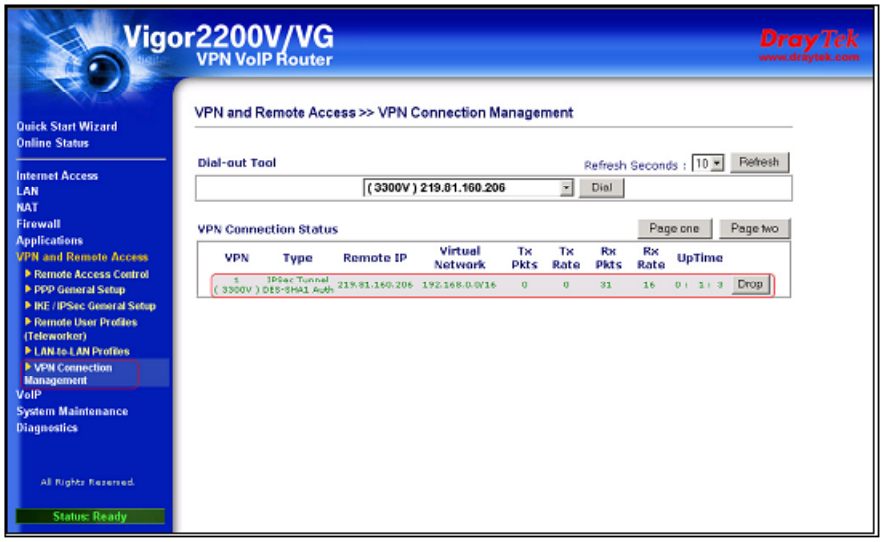


Figure 2-66. VPN connection management

Step 6

You may attempt to **ping 192.168.33.1**(Vigor 3300V) and **ping 192.168.29.1**(Vigor 2900V) to see if there is any response.

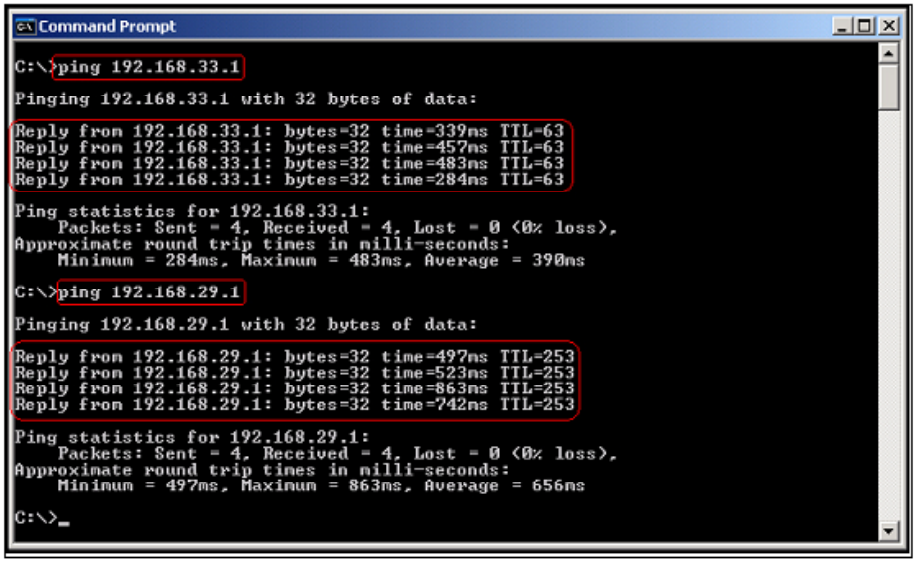


Figure 2-67. Command prompt

Step 7

Enter the web page of Vigor 3300V and enter **VPN\IPSec\Status**, you will see two VPN tunnels have been established.

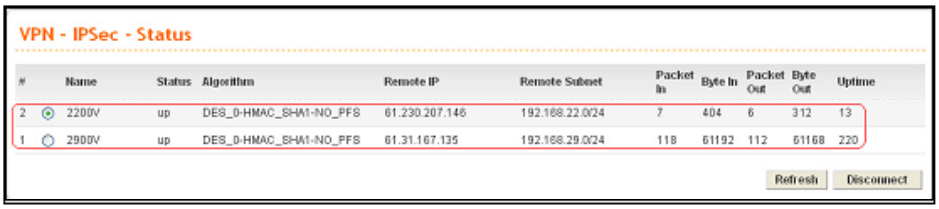


Figure 2-68. VPN - IPSec – Status

Step 8

Enter the CLI and attempt to **ping 192.168.29.1** (Vigor 2900V) and **ping 192.168.22.1**(Vigor 2200V) to see there is any response.

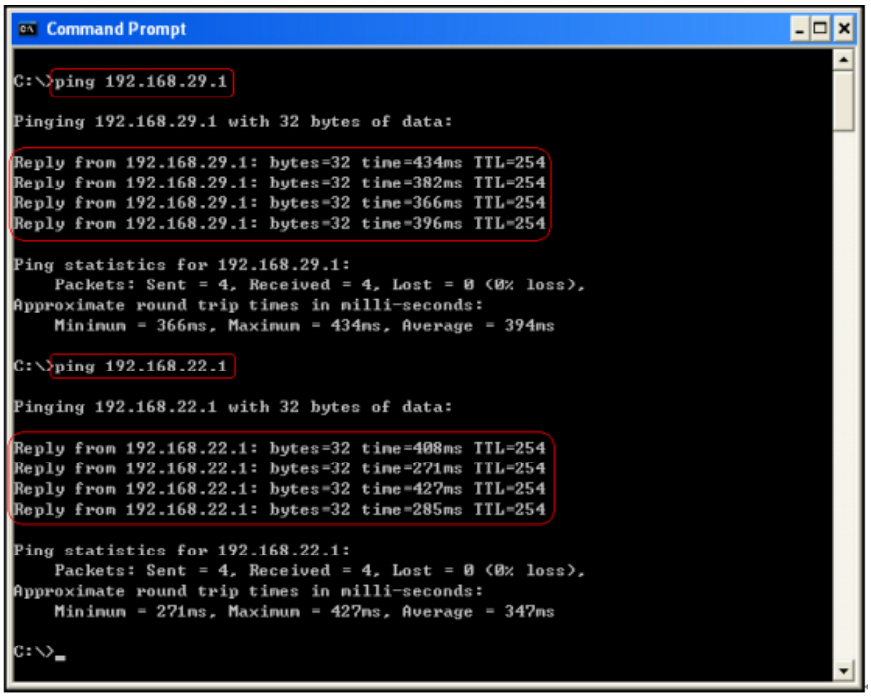


Figure 2-69. Command prompt

Now all these 3 sites can connect to each other.

Note

Please note all the VPN traffic will be passed through the 3300V. If there is much data flow between Vigor 2200V and Vigor 2900V, the bandwidth of Vigor 3300V, especially the upstream one will be heavily consumed accordingly.

2.4 IPSec Host-to-LAN (Smart VPN Client) --- DHCP over IPSec

2.4.1 Introduce

Vigor 3300 series router supports two kinds of VPN type – PPTP & IPSec.

It supports only Host-to-LAN and a maximum of 16 tunnels in all for PPTP connection; while it supports both Host-to-LAN & LAN-to-LAN VPN, and a maximum of 200 tunnels for IPSec.

Hence, when deploying a large-scale network, the IPSec tunnel is recommended.

However, there is a limitation for IPSec tunnel:

For traditional IPSec VPN, the dial-in side cannot obtain a private IP address from the peer side, which is different from PPTP VPN (for PPTP, there will be a PPP virtual interface for the remote dial-in side.). So there is only a one-way access for the tunnel – "dial-in side→central server side", while the backward is not available.

Nevertheless, we DrayTek have built a unique technique – "DHCP over IPSec" to overcome such limitation.

To implement this feature, we'll add a virtual NIC on the PC, thus, while connecting to the server via IPSec tunnel, PC will obtain an IP address from the remote side through DHCP protocol, which is quite similar with PPTP.

The following document describes the detailed configuration steps for this application.

2.4.2 Configuration on Server

Which is different to the Vigor2x00 series router, Vigor 3300 does not distinguish the Remote Teleworker and LAN-to-LAN Setup. That is, the settings in policy table operates on both Host-to-LAN & LAN-to-LAN tunnel.

Note:

- Vigor 3300 does not require the remote dial-in user should own a fixed IP, a dynamic IP address can also be OK.
- The remote dial-in user can be directly on the Internet (public IP), but also can be behind the NAT.
- However, if the user is behind the NAT, that NAT router should support IPSec VPN pass-through.
- If the remote user is behind the NAT, then other hosts within the same subnet cannot connect to the VPN server. That is, only one host can dial IPSec to the VPN server at the same time if behind the NAT.

1. In **VPN - IPSec - Policy Table** page, select certain index and press **Edit**

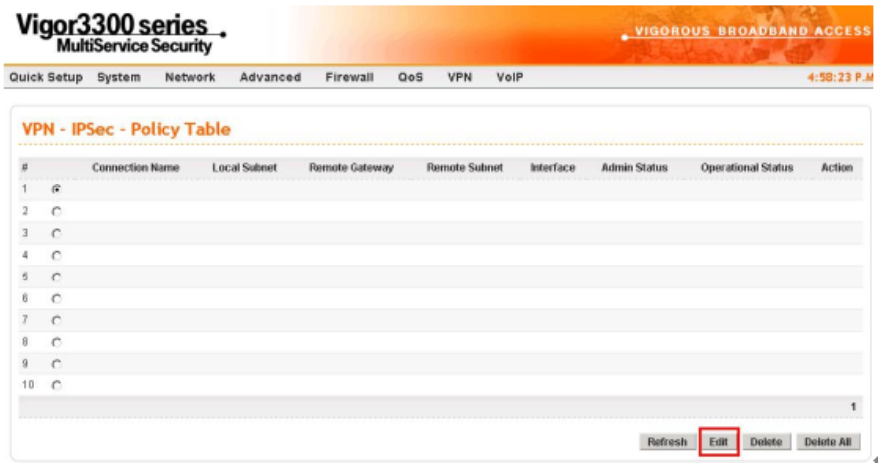


Figure 2-70

2. In the following page, configure as the picture below:

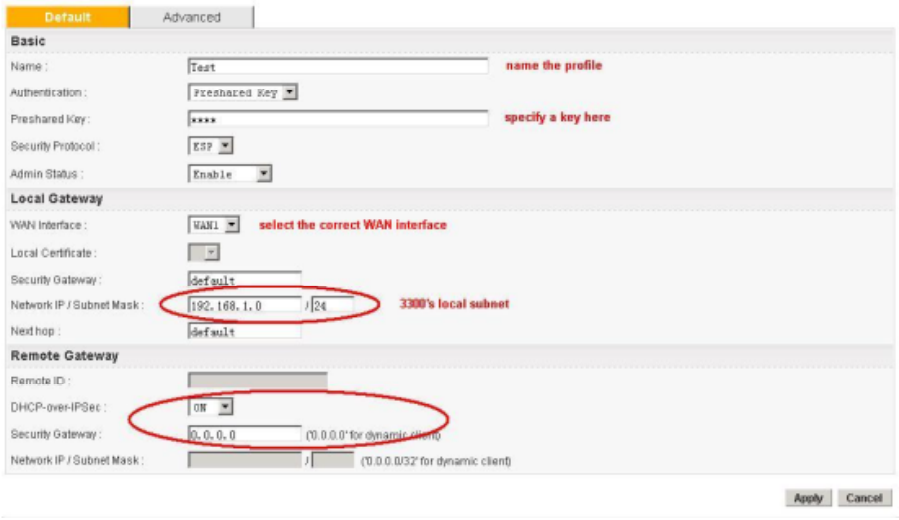


Figure 2-71

Please enable the **DHCP over IPSec**, you'll see **Network IP / Subnet Mask** field is grayed.

Besides, if the dial-in user has a fixed IP, then enter the IP in the **Security Gateway** field. But if the remote user just owns a dynamic IP, then type 0.0.0.0 there.

3. In the Advance page, you may make some detailed settings for the two IKE phases.

Figure 2-72

Note:

- *Since 3300 series router has multiple WAN interface, if the security gateway was set as 0.0.0.0, then each WAN interface can only owns one Pre-Shared Key. In other words, suppose you've set 3 policies which all uses WAN1 as WAN interface, and 0.0.0.0 as security gateway, then only the Pre-Shared Key of the last policy will be regarded as valid and can be used for WAN1's IPSec tunnel.*
- *In above scenario, if the security gateway of 3 policies was configured as certain fixed IP addresses, then you may set a different Pre-Shared Key for each policy, while there will be no conflict among them.*

2.4.3 Configuration on Smart VPN Client

1. Download the Smart VPN Client from our website http://www.draytek.com/support/download.php and install it. During the installation, a virtual NIC can be installed on your PC. If you want to use DHCP over IPSec feature, you MUST install it.

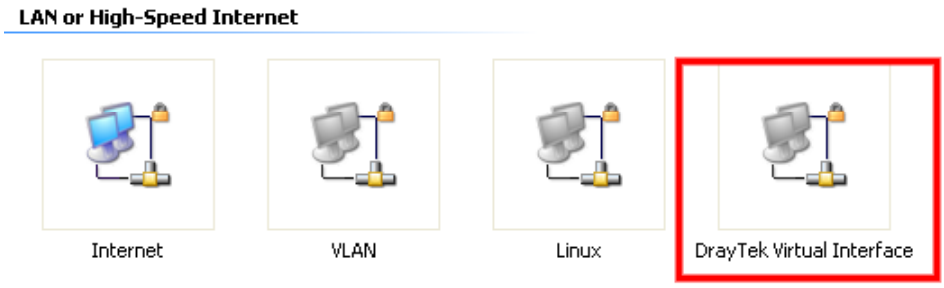


Figure 2-73

2. Run the **Start → All Programs → Draytek Smart VPN Client→ Smart VPN Client**, and press **Insert** button.

Figure 2-74

3. Then a new VPN profile will be created. Please enter the 3300's WAN IP (be sure to select the correct WAN interface), and tick the **IPSec Tunnel** box, then press OK.

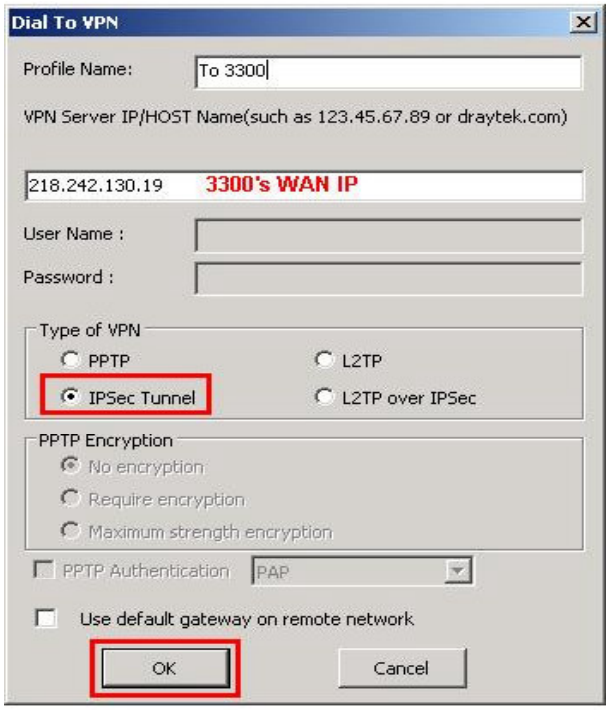


Figure 2-75

4. I n the coming up configuration page, tick the **Virture IP** box. You may **Obtain an IP address automatically** or **Specify an IP address** as your wish.
   As for the security settings (including Security Method and Pre-Shared Key etc.), you MUST make sure they are exactly the same with the server sides.

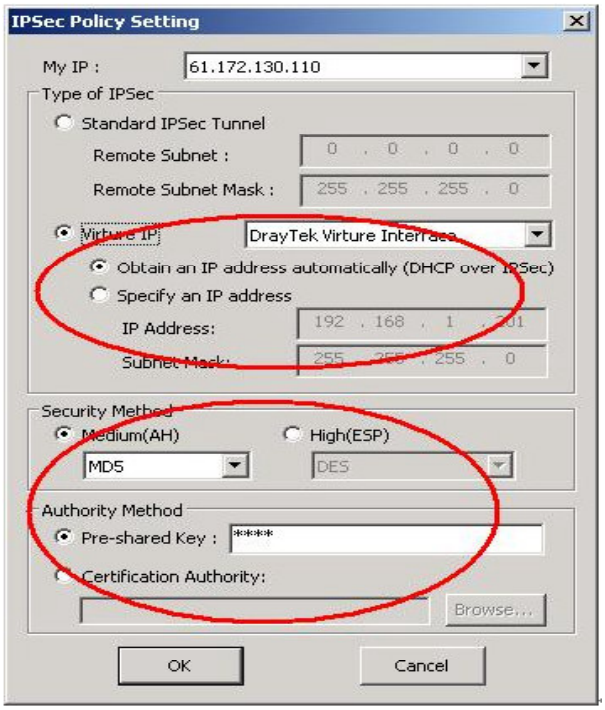


Figure 2-76

*Note: If you're running multiple NICs on the PC, please be sure to select the correct one for **My IP** field.*

5. Press OK, after you finish the configuration. And then activate the IPSec tunnel.

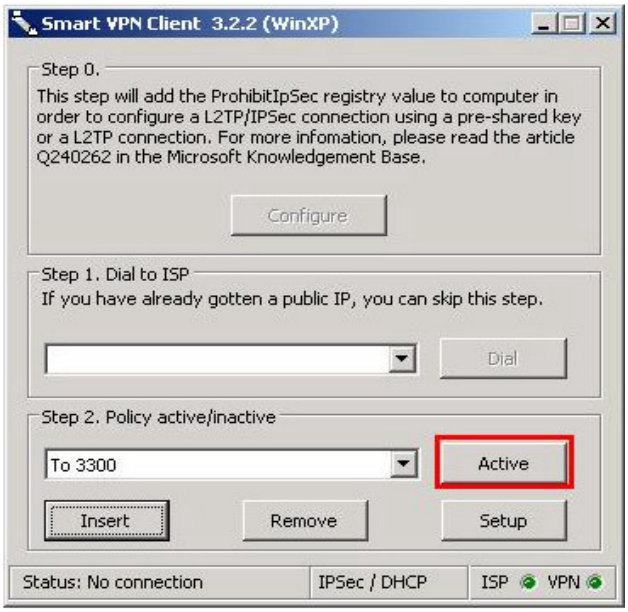


Figure 2-77

6.

Figure 2-78

7. You may try pinging the remote private IP so as to check if the connection is up.

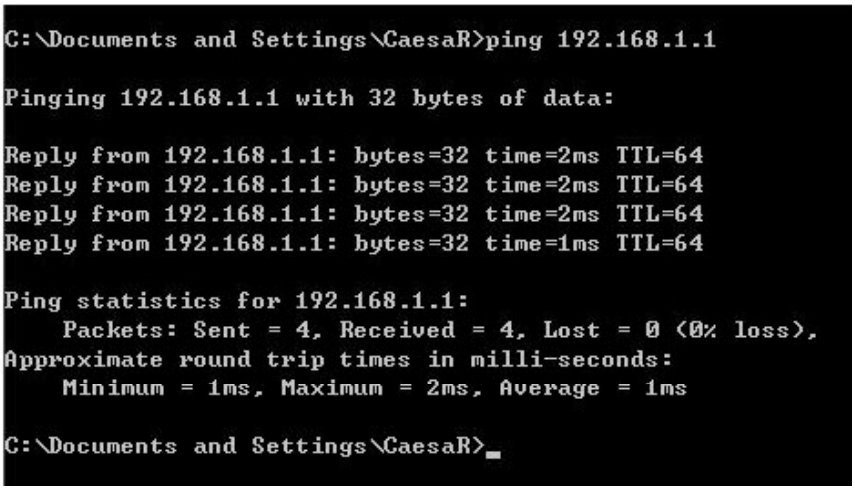


Figure 2-79

2.5 VPN PPTP Host-to-LAN by Smart VPN Client

2.5.1 Introduction

This document describes how to establish a PPTP tunnel from the Smart VPN Client to Vigor 3300 series router.

Suppose the network environment is as below:

	Vigor 3300V Headquarters	Smart VPN Client
WAN IP	218.242.130.19 (Static IP)	58.33.150.31 (Dynamic IP)
LAN IP	192.168.1.1	/
Local Network	192.168.1.*/28	/

2.5.2 Configuration

2.5.2.1 Server Side

Step 1

Enter **VPN - PPTP - General Setup**, activate the setup, and select corresponding Authentication and Encryption settings for PPTP. The **User Authentication** should use the default value “Local”.

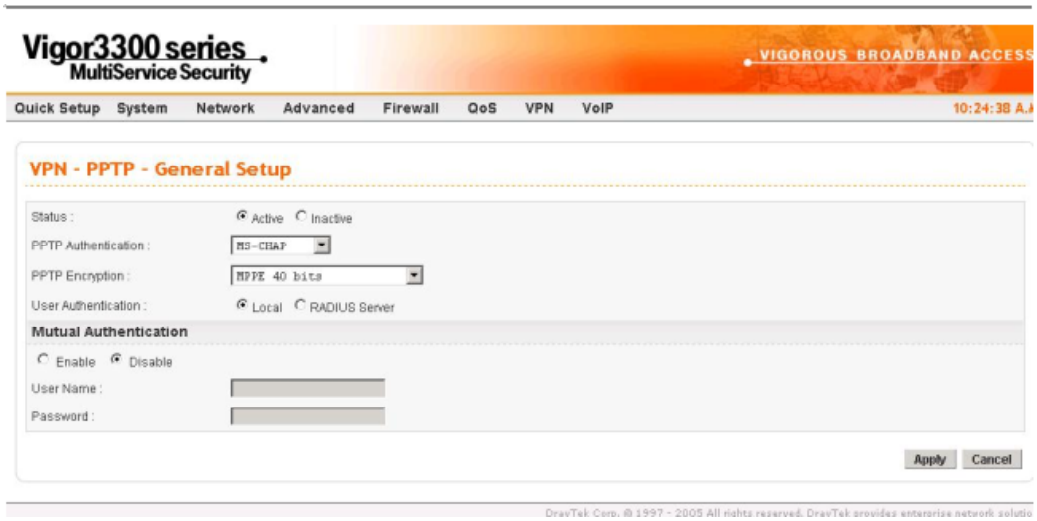


Figure 2-80. PPTP general setup

Step 2

Enter **VPN - PPTP - Group Table**. And you can specify the IP range that be allocated to the remote hosts (**Star IP**), and the local IP range which is accessible to the remote hosts (**Accessed IP**).

There're 4 groups of IP range in the Group Table as following Figure 2-81.

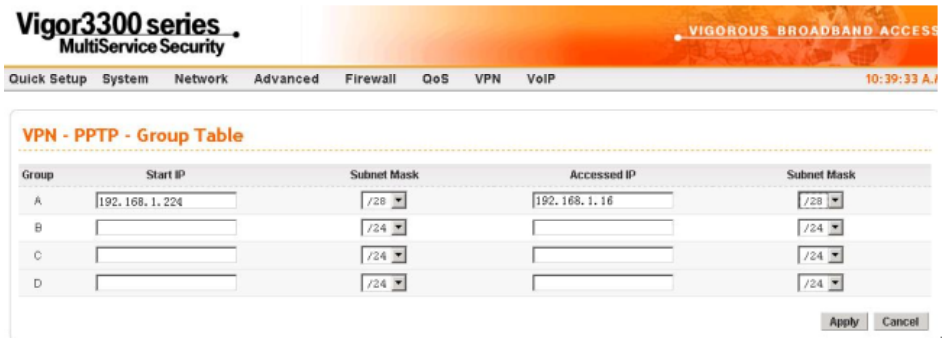


Figure 2-81. PPTP group table

Note:

If you leave the Accessed IP field empty, then the whole local subnet is fully accessible to the remote dial-in user.

And the Start IP field MUST be configured; Otherwise, the tunnel will not be established.

Step 3

Go to **VPN - PPTP – Authentication,** and select a related entry, then click **Edit** to modify the entry.

Figure 2-82. PPTP authentication

Step 4

In the following page, please type in the **User Name** & **User Password**, and select a group.

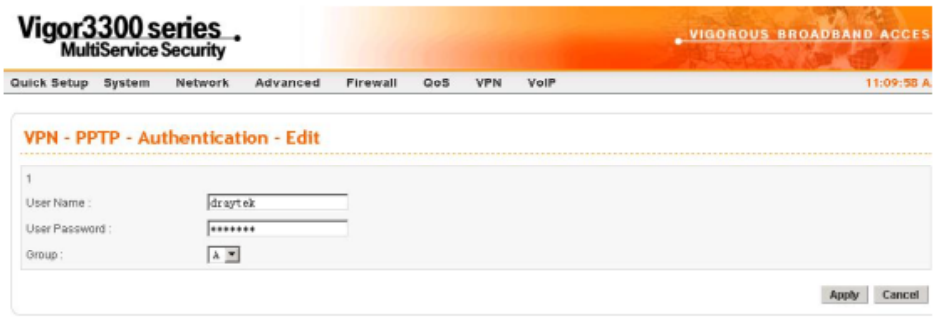


Figure 2-83. PPTP authentication – Edit

Step 5

After the tunnel is created, you can check the tunnel status on **VPN - PPTP – Status** as below Figure 2-84.

Figure 2-84. PPTP status

2.5.2.2 Client Side

Step 1

Download the latest Smart VPN Client from our web site -

http://www.draytek.com/support/download.php, and install it.

Step 2

Go to Start \ All Programs \ DrayTek Smart VPN, and click the **Smart VPN Client**.

Figure 2-85. The location of Smart VPN Client

Step 3

Press click **Insert** to create a new VPN profile.

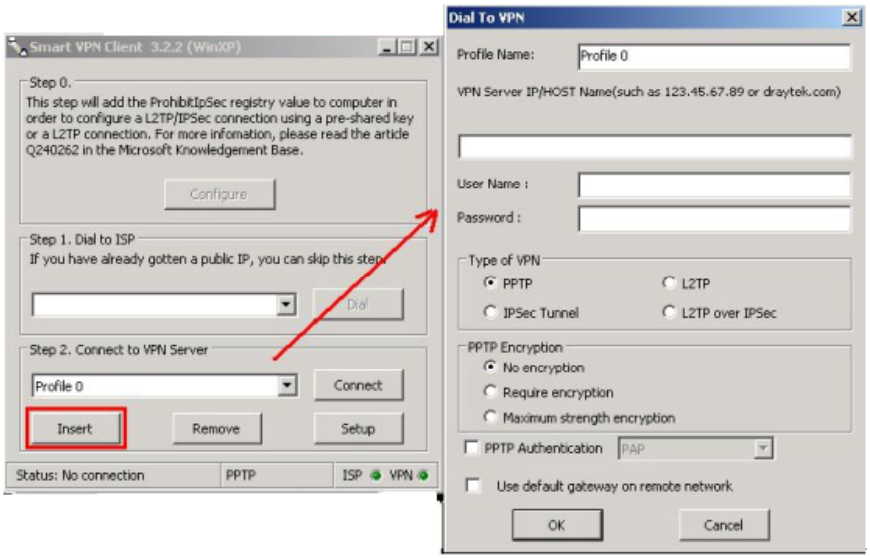


Figure 2-85. Create a new VPN profile

Step 4

Specify a name for this profile (surely you may leave this option as default), type 218.242.130.19 (WAN interface IP address in 3300) in the VPN server IP field, enter the username/password, and select PPTP in the Type of VPN. Please be sure to enter the identical Authentication and Encryption settings that you set in Vigor 3300. And you do not have to click "**Use default gateway on remote network**", unless you want all the traffic to be routed via the remote network.

Figure 2-86. Dial to VPN

Step 5

Click **OK** then click **Connect** to the Vigor 3300.

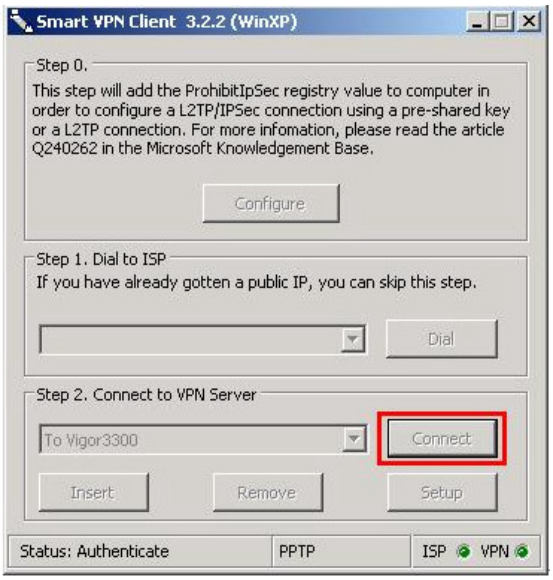


Figure 2-87. Connect to VPN server

Step 6

After the tunnel is established, you may see the status is "**Connected**".

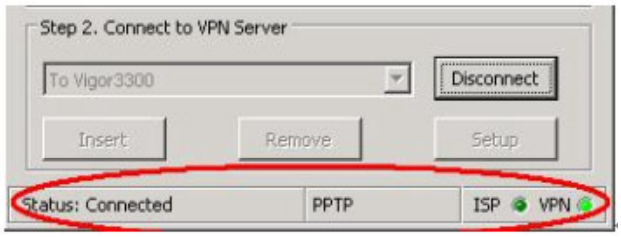


Figure 2-88. Check the tunnel status

Also you may try to ping the remote private network, to check whether the VPN PPTP tunnel is created or not.

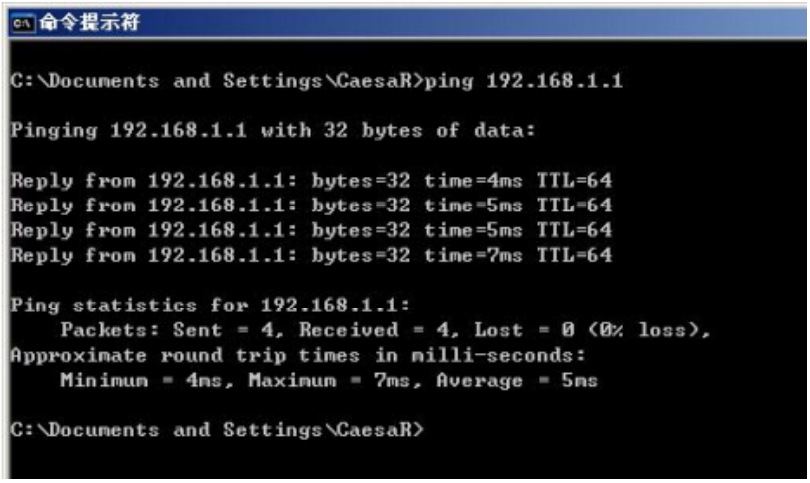


Figure 2-89. Ping status

29. VoIP Example 1
(Basic Configuration and Registration)

This chapter shows how to set up a practical example to use VoIP function.

This chapter is divided into the following sections.

Section 29.1: Basic Configuration and Registration

Section 29.2: 3300V Configuration Example

Section 29.3: 2900V Configuration Example

There are many different kinds of applications about VoIP function, most of VoIP callings must be via a VoIP Server by registering, except we can dial VoIP number by the IP address directly. We will set up a basic configuration and registration as an example 1. The other examples might be revised based on this example.

The VoIP function mainly depends on the requirement and application. All the examples are based on example 1 to revise configuration in accordance with the usage requirement and application.

Example 1

Basic Configuration and Registration

Example 2

Basic Dialing Mode

Example 3

VoIP over VPN

Example 4

Practical Application of FXS

Example 5

Practical Application of FXO

Example 6

Register with Private IP Address

Chapter 3. VoIP Function

This chapter is divided into the following sections,

Section 3.1: VoIP Example 1 - Basic Configuration and Registration

Section 3.2: VoIP Example 2 - Basic Calling Method

Section 3.3: VoIP Example 3 - VoIP over VPN

Section 3.4: VoIP Example 4 - Practical Application of FXS

Section 3.5: VoIP Example 5 - Practical Application of FXO

Section 3.6: VoIP Example 6 - Register with Private IP Address

Section 3.7: Asterisk Application

3.1 VoIP Example 1 - Basic Configuration and Registration

In this case, Vigor 3300V uses a FXS card and a FXO card with four groups of “iptel” numbers and “fwd” numbers respectively. The codec is G.729A. WAN IP address is 220.135.240.207.

Vigor 2900V has two VoIP Ports with an iptel number and the fwd number respectively. The Codec is G.729A/B. WAN IP is 61.1.1.1.

Table 3-1. Example1-basic settings in Vigor 3300V and Vigor 2900V

	WAN IP	Port Number	Phone Number	Proxy	Codec
3300V	220.135.240.207	Port1(FXS)	888833	iptel	G.729A
		Port2(FXS)	888834	iptel	G.729A
		Port3(FXS)	660533	fwd	G.729A
		Port4(FXS)	660534	fwd	G.729A
		Port5(FXO)	888835	iptel	G.729A
		Port6(FXO)	888836	iptel	G.729A
		Port7(FXO)	660525	fwd	G.729A
		Port8(FXO)	660526	fwd	G.729A
2900V	61.31.167.135	Port1(FXS)	888829	iptel	G.729A
		Port2(FXS)	660529	fwd	G.729A

Table 3-2. Example1-basic settings in Vigor 3300V and Vigor 2900V

	Proxy	Domain	Port
iptel	iptel.org	iptel.org	5060
fwd	fwd.pulver.com	fwd.pulver.com	5060

3.1.1 Vigor 3300V Configuration Example

Step 1

Enter **VoIP - Protocol** page and configure related settings on SIP Configuration.

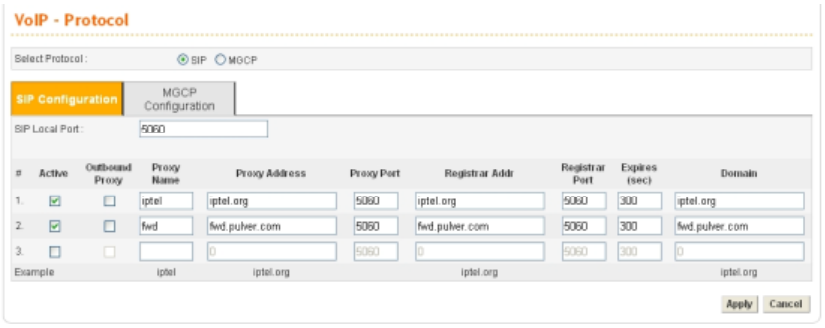


Figure 3-1. SIP configuration of protocol in Vigor 3300V

Step 2

Enter **VoIP - Port Settings** page, click the **Edit** icon of port1.

Figure 3-2. Edit of port1

Step 3

Enter the **Port1** page. This page falls into six sections.

- **Port1 (FXS)**

  Display the port type, **enable** or **disable** the port, setup the account, etc.

  Disable or Enable

  By default is **Enable**.

  Username & Password

  Type the registrar's account **888833** and password.

  Display Name

Display incoming call's information. To facilitate ease differentiation please type **3300V_Port1_iptel.**

Proxy Server

Select the SIP Server used for registration from the pull-down menu. There are **None** and three SIP Servers available, which are set in the **VoIP- Protocol** page. Please select **iptel**.

- **FXO**

  Dedicated settings for FXO card.

  Incoming Pre-Set Number: The transfer number auto dialed after the FXO receives a call from the Internet.

Figure 3-3. Port1 setting page

- Codec

  Setup the voice compression mode and transfer rate, etc.

  Preferred Codec

  Preferred voice compression mode. It will affect voice quality and transferred data size. By default is G.729A – 8kbps.

  Codec Rate

  Transfer rate of the voice packets. By default is **20ms**.

  Codec VAD

  This feature can reduce the number of transmitted bits and packets during silence periods. But it may slightly affect the voice quality. By default is **Disable**.

- **CAS**

  Adjust the volume of the conversation.

  RX Gain

  The default value is **0.**

  TX Gain

  The default value is **0**.

- **FAX**

Relevant settings used for FAX over VoIP.

FAX Mode

Compression mode used for transferring FAX. By default is **T.38 Relay**.

FAX Bypass Codec

Select the compression mode when FAX Mode selects Bypass.

FAX Bypass Codec Rate

Select the transfer rate of voice packets when FAX Mode selects Bypass.

- **DTMF**

  DTMF are the audible sounds you hear when you press keys on your phone.

  DTMF Relay

  By default is **RFC2833**.

  After configuration, click Apply to save the settings. Router will auto jump to the **VoIP - Port Settings** page.

VoIP - Port Settings page.

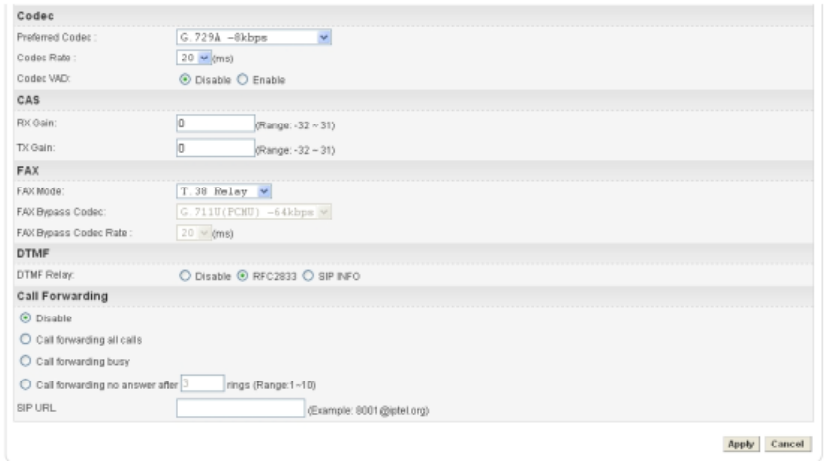


Figure 3-4. Page of port settings

Step 4

Set Port2~Port8 one by one in turn.

Type

Port1~Port4 are **FXS**, Port5~Port8 are **FXO**.

Active

Port1~Port8 are all **active** (√=Enable).

Group

Port1~Port8 are **Group1~Group8** independently.

Username

Phone Number of Port1~Port8.

Proxy

Port1, 2, 5, and 6 are registered to **iptel** Proxy, and Port3, 4, 7, 8 are registered to **fwd** Proxy.

Codec

Port1~Port8 all prior use **G.729A - 8kbps**.

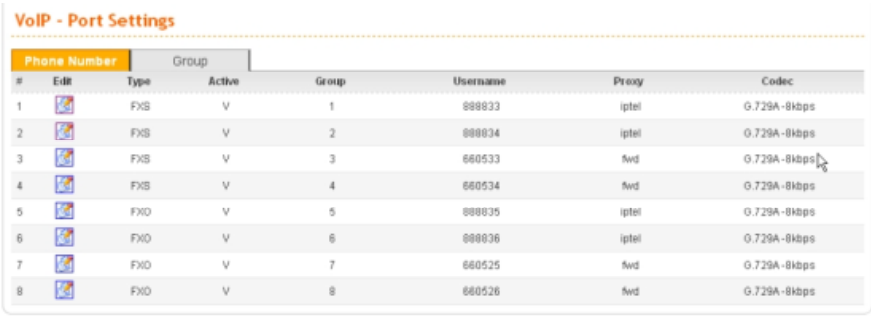


Figure 3-5. Port2~Port8 Settings

Step 5

Enter the **VoIP - Status** page, wait one or two minutes (The time depends on SIP Server's response speed and the network condition).

Register Status

Display the register information from Port1~Port8**. OK** means this port is registered successfully.

Call Status

Display calling information from Port1~Port8. **Idle** means there is no conversations on Port1~Port8.

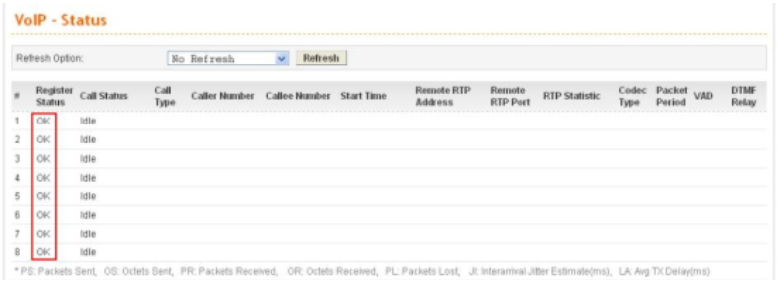


Figure 3-6. Status of Vigor 3300V

Note

This page will automatically refresh every 6 second, so as to display the latest status. You may click Refresh button to renew immediately.

3.1.2 Vigor 2900V Configuration Example

Step 1

Open the Web of 2900V and click **VoIP Setup**.

Figure 3-7. VoIP web page of Vigor 2900V

Step 2

Click **SIP Related Functions Setup.**

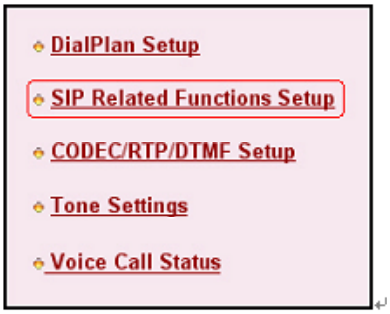


Figure 3-8. SIP related function setting of Vigor 2900V

Step 3

Setup Port1 and Port2. This page falls into two sections,

- SIP: Setup relevant SIP Servers used for registration respectively.
- Ports: Type account and password.

After configuration please click OK to save the settings. 2900V will go to VoIP – Setup page automatically.

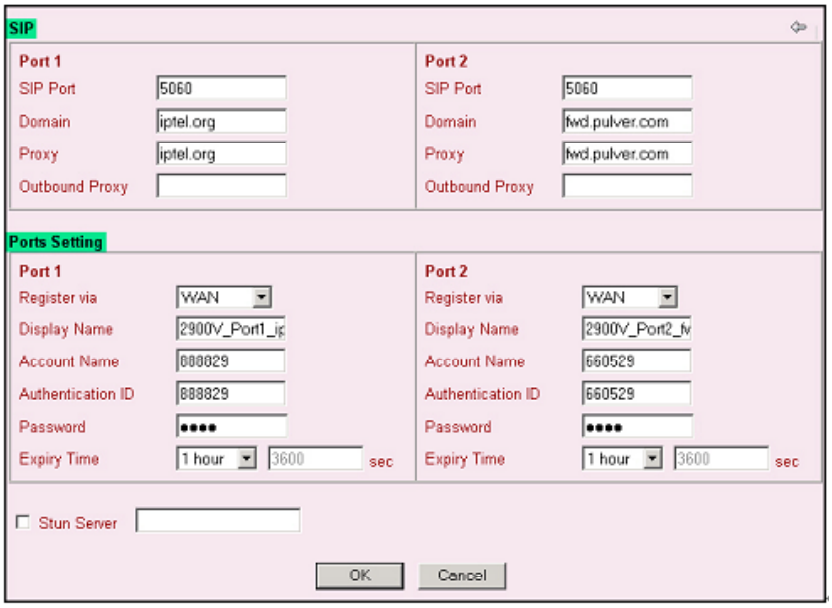


Figure 3-9. Setup port1 and port2 of Vigor 2900V

Step 4

Click **Voice Call Status.**

Figure 3-10. Voice call status of Vigor 2900V

Step 5

Wait one or two minutes (The time depends on SIP Server's response speed and the network condition)

Channel

R means Port1 and Port2 register successfully**.**

Status

IDLE means there is no conversations on Port1~Port8.

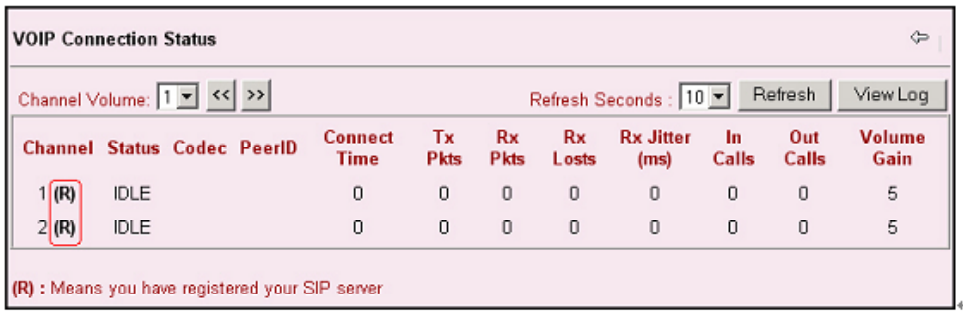


Figure 3-11. VoIP connection status of Vigor 2900V

Now the configuration is completed.

3.2 VoIP Example 2 - Basic Calling Method

We will introduce three basic VoIP calling methods, involving Direct IP Call, Intercommunication with one SIP Proxy Server and Intercommunication with different SIP Proxy Servers. All the settings are based on the VoIP Example 1(Basic Configuration and Registration).

3.2.1 Direct IP Call (Call with each other without registration)

Connect a telephone into Vigor 3300V's Port1 and Vigor 2900V's Port1 respectively. They can call with each other directly with IP addresses if only Vigor 3300V and Vigor 2900V both have public IP addresses and have set up the Phone Numbers.

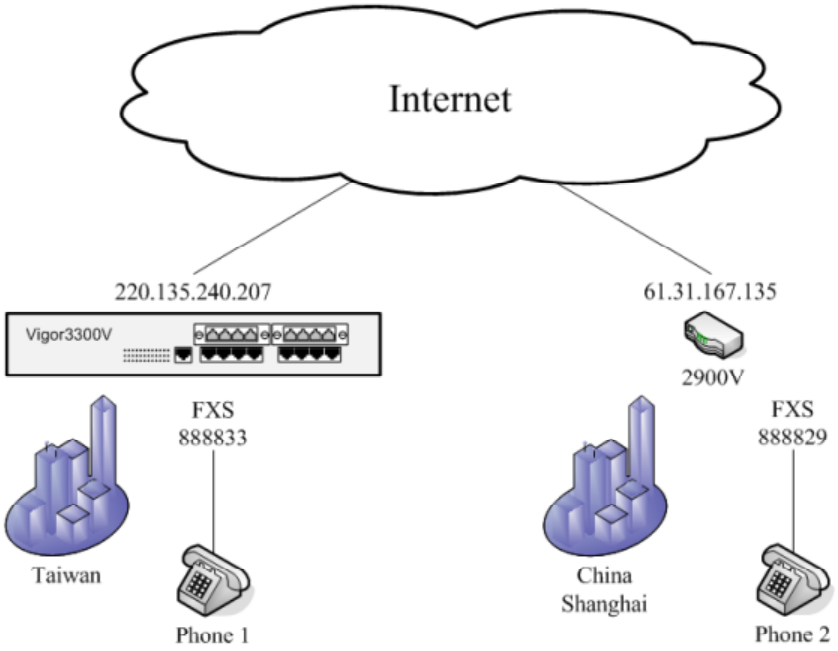


Figure 3-12. A scenario architecture graph

Table 3-3. Configuration table

	WAN IP	Port Number	Phone Number	Proxy	Codec
3300V	220.135.240.207	Port1(FXS)	888833	iptel	G.729A
2900V	61.31.167.135	Port1(FXS)	888829	iptel	G.729A

Furthermore, do **NOT** enable the **Outbound Proxy** feature when you set up 3300V and 2900V to use Direct IP Call. (It isn't **active** in the Example 1; please see Figure 3-2 shown below) Otherwise even if you dial the IP address, the call is still sent to the SIP Proxy Server always. And if the SIP Proxy Server doesn't forward the call to remote VoIP user's WAN IP, you can't do this action

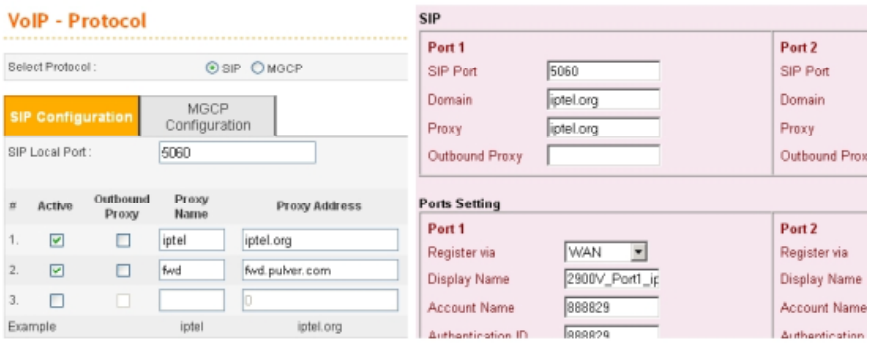


Figure 3-13. Outbound proxy feature

3.2.1.1 Vigor 3300V Configuration Example

Step 1

Enter **VoIP - Speed Dial** page, configure relevant settings for Vigor 2900V's Port1.

Speed Dial Phone Number: type **2901**.

Speed Dial Destination: Cal lee's **Number@IP**, type **888829@61.31.167.135**.

Memo: To facilitate ease differentiation please type **2900V_Port1_IP**.

Click **Apply** to save the settings and finish the configuration.

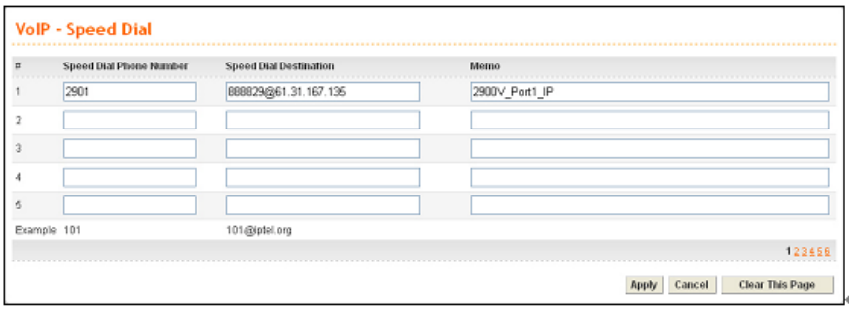


Figure 3-14. Speed dial port1 setting

3.2.1.2 2900V Configuration Example

Step 1

Click **DialPlan Setup** in the **VoIP Setup** page.

Figure 3-15. DialPlan setting of Vigor 2900V

Step 2

Click **Index1.**

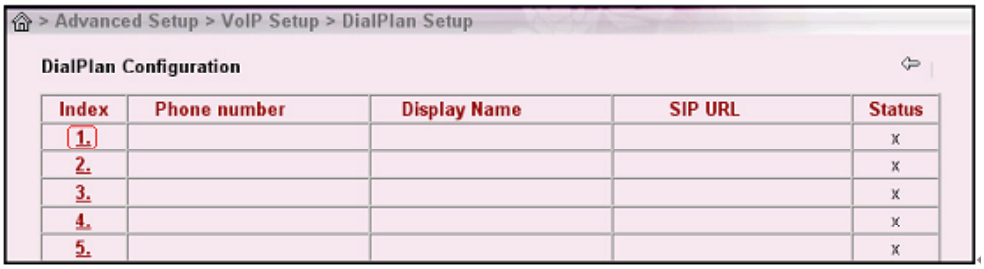


Figure 3-16. DialPlan configuration of Vigor 2900V

Step 3

Enter relevant settings for Vigor 3300V's Port1. Click **OK** to save the settings.

Enable: click (√) to activate the entry.

Phone Number : type **3301**.

Display Name : To facilitate ease differentiation please type **3300V_Port1_IP.**

SIP URL : Cal lee's **Number@IP**, please type **888833@220.135.240.207**.

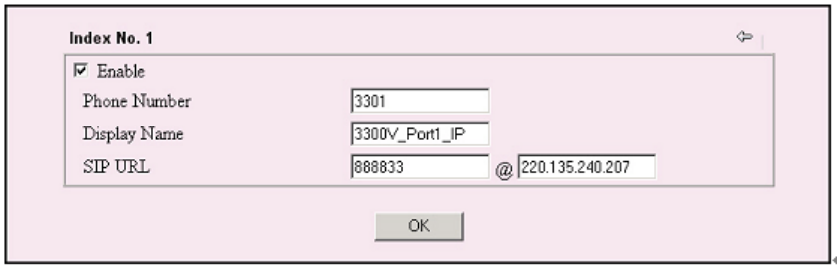
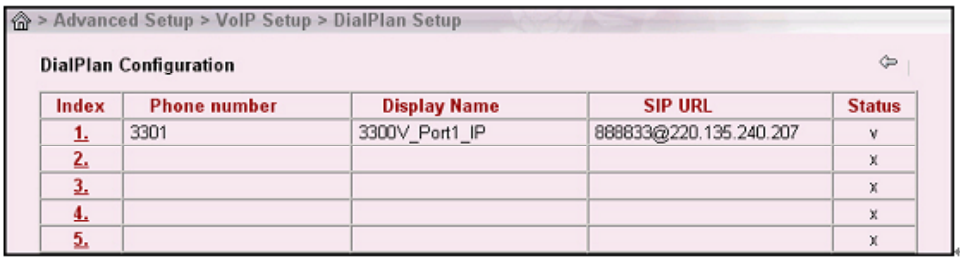


Figure 3-17. Enter relevant settings of index1

Step 4

Confirm the settings are correct, and then finish the configuration.



Index	Phone number	Display Name	SIP URL	Status
1.	3301	3300V_Port1_IP	888833@220.135.240.207	v
2.				x
3.				x
4.				x
5.				x

Figure 3-18. Finish DialPlan configuration

Start to dial by using telephones

Phone1 calls **Phone2**

Press **2901#** or **888829*61*31*167*135#**.

Phone2 calls **Phone1**

Press **3301#**.

Note

 # indicates termination of the phone number. After pressing #, VoIP is immediately called out. Or you may wait 3 seconds if you do not press #.

With 2900V you can't only dial alphanumeric addresses or @ symbols. To dial an IP address, start and end it with a # (hash) replace the dots with * (star). In this example you have to press #220*135*240*207#. But 3300V can only receive the format of Number@IP. So it is required to setup 3300V's number (**888833@220.135.240.207**) in the DialPlan entry.

3.2.2 Intercommunication with one SIP Proxy Server (registration)

Connect telephones into Vigor 3300V's Port1 & Port3 and Vigor 2900V's Port1 & Port2 respectively. Each port needs to register in the SIP Server.

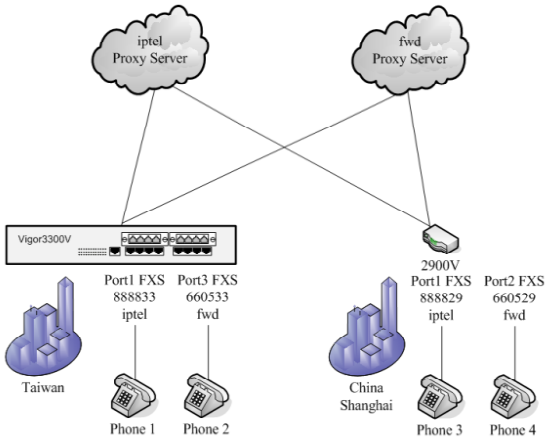


Figure 3-19. A scenario architecture graph

Table 3-4. Configurations between Vigor 3300V and Vigor 2900V

	WAN IP	Port Number	Phone Number	Proxy	Codec
3300V	220.135.240.207	Port1(FXS)	888833	iptel	G.729A
		Port3(FXS)	660533	fwd	G.729A
2900V	61.31.167.135	Port1(FXS)	888829	iptel	G.729A
		Port2(FXS)	660529	fwd	G.729A

You can also add Speed Dial numbers in **Speed Dial** to speed up the dialing, or to accommodate the setup of company's extension numbers.

3.2.2.1 Vigor 3300V Configuration Example

Step 1

Enter the **VoIP - Speed Dial** page and add the second and third group of Speed Dial number. Then click **Apply** to save the settings and finish the configuration.

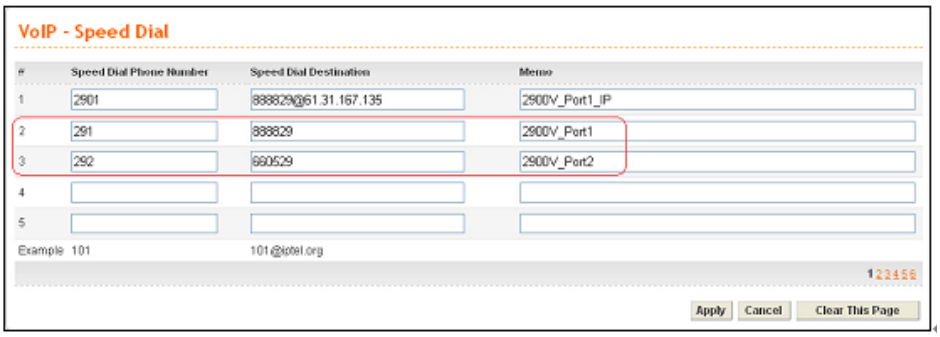


Figure 3-20. Speed dial port2 and port3 settings

Start to dial by using telephones

Phone1 call **Phone3**

Press **888829#** or **291#**.

Phone2 call **Phone4**

Press **660529#** or **292#.**

Phone3 call **Phone1**

Press **888833#.**

Phone4 call **Phone2**

Press **660533#.**

Note

 # indicates termination of the phone number. After pressing #, VoIP is immediately called out. Or you may wait 3 seconds if you do not press #.

3.2.3 Intercommunication with different SIP Proxy Servers

Connect telephones into 3300V's Port1 & Port3 and 2900V's Port1 & Port2 respectively. Each phone registers to the SIP Server. The settings and scenario are the same as the above example. But they must be set up in conjunction with the Speed Dial.

3.2.3.1 Vigor 3300V Configuration Example

Step 1

Enter the **VoIP - Speed Dial** page and add the 4th and 5th group of Speed Dial number. Then press Apply to save the settings and finish the configuration.

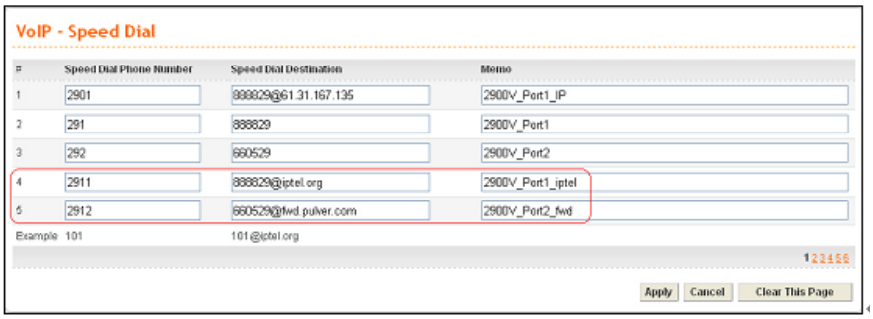


Figure 3-21. Speed dial port4 and port5 settings

3.2.3.2 Vigor 2900V Configuration Example

Step 1

Click **DialPlan Setup** in the **VoIP Setup** page. Then add the second and third group of Speed Dial number.

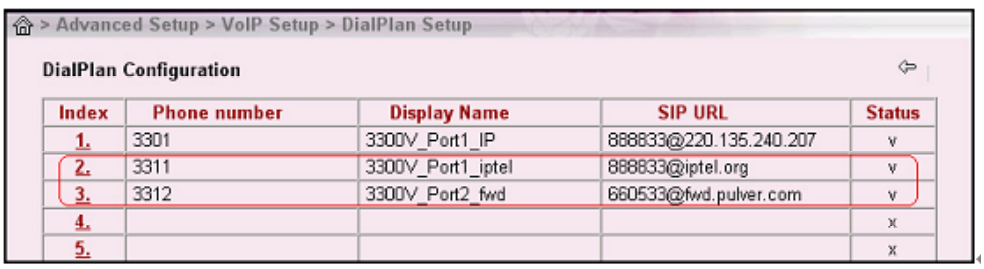


Figure 3-22. DialPlan configuration of index2 and index3

Start to dial by using telephone

Phone1 call **Phone4**

Press **2912#.**

Phone2 call **Phone3**

Press **2911#.**

Phone3 call **Phone1**

Press **3312#.**

Phone4 call **Phone2**

Press **3311#.**

Note

 # indicates termination of the phone number. After pressing #, VoIP is immediately called out. Or you may wait 3 seconds if you do not press #.

3.3 VoIP Example 3 - VoIP over VPN

Based on the **VoIP Example 1 (Basic Configuration and Registration)**, we will introduce how to dial the VoIP call through an encrypted VPN tunnel.

In this example Vigor 3300V acts as a bridge accepting incoming VPN connections from the other two routers (Vigor 2900V and Vigor 2200V). The VPN traffic between Vigor 2900V and Vigor 2200V are all passed through Vigor 3300V. These three sites internal networks must be within the same subnet (192.168.X.X). Either site can ping the other two routers. Then you can make a VoIP call through the encrypted VPN tunnel by directly dialing remote router's LAN IP.

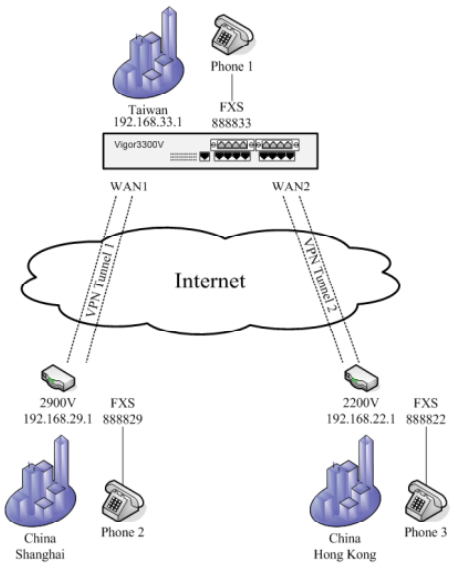


Figure 3-23. A scenario architecture graph

Table 3-5. Configuration table

	3300V Headquarters	**2900V Branch Offices**	**2200V Teleworker**
WAN IP	220.135.240.207 PPPoE, fixed IP	61.31.167.135 PPPoE, dynamic IP	
	219.81.160.206 PPPoE, fixed IP		61.230.207.146 PPPoE, dynamic IP
LAN IP	192.168.33.1	192.168.29.1	192.168.22.1
Internal network	192.168.33.X	192.168.29.X	192.168.22.X
Encryption method	DES-SHA1		
Preshared Key	**3300**		
	1234		**1234**

Table 3-6. Configuration table

	WAN IP	**Port Number**	**Phone Number**	**Proxy**	**Codec**
3300V	220.135.240.207	Port1(FXS)	888833		G.729A
2900V	61.31.167.135	Port1(FXS)	888829		G.729A
2200V	61.230.207.146	Port1(FXS)	888822		G.729A

About the VPN configurations please refer to **VPN Example 3(three part communication)**. About VoIP basic configuration please refer to **VoIP Example 1(Basic Configuration and Registration)**.

The following examples are modified based on these two examples.

3.3.1 Vigor 3300V Configuration Example

Step 1

Enter the **VoIP － Protocol** page; Disable all the **Active** entries by removing the (√) box. After configuration please click **Apply** to save the settings.

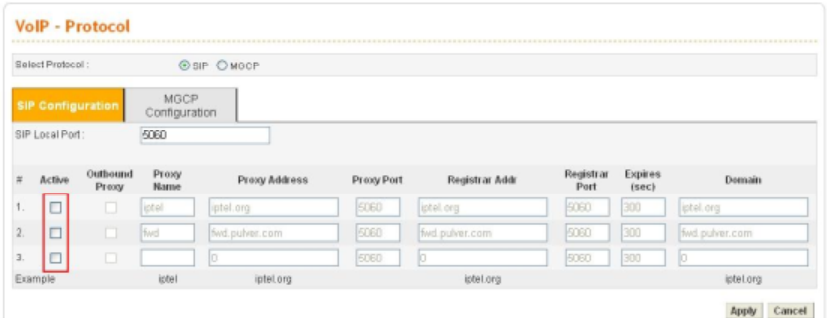


Figure 3-24. Protocol settings of 3300V

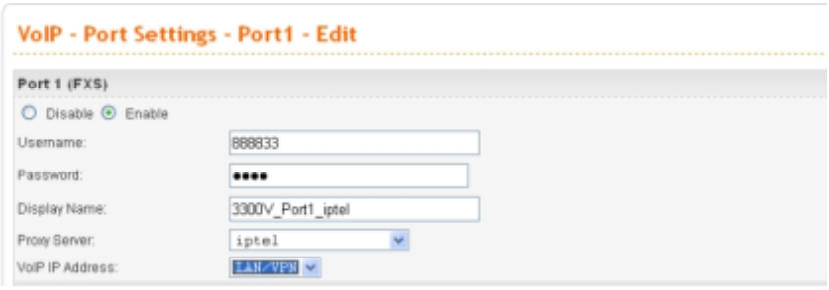


Figure 3-25. Edit of port1 settings

Note

In Vigor 3300V firmware v2.5.5 you can only choose WAN or LAN/VPN. And the call can be received or dialed just in one direction (WAN or LAN/VPN).

Or select **none** as Proxy Server for each Port.

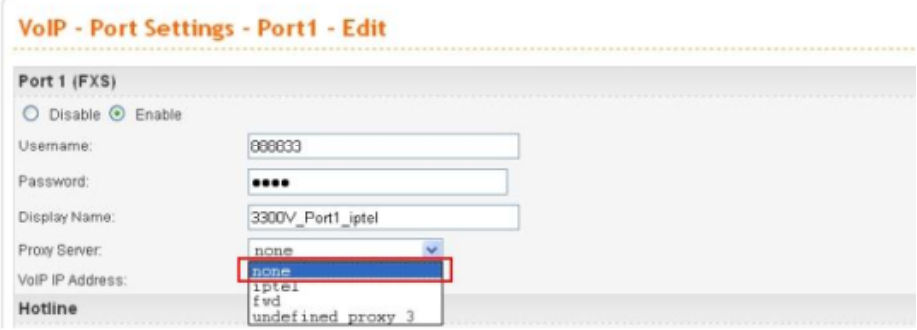


Figure 3-26. Edit of port1 settings

Step 2

Enter the **VoIP - Port Settings** page, now the Proxy entries all display Disable. (If you select **none** as Proxy Server for each Port, the Proxy entries are blank.)

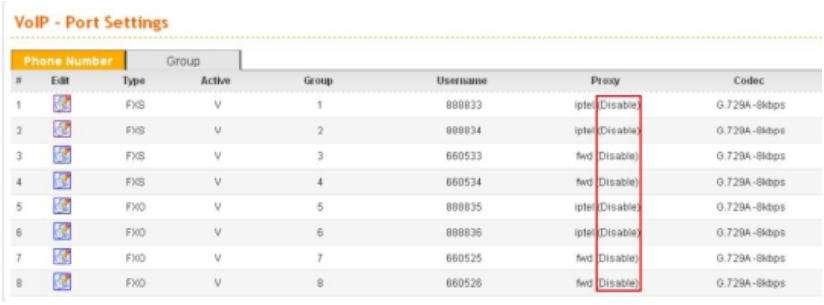


Figure 3-27. Display of proxy

Step 3

Enter the **VoIP - Speed Dial** page and input the first and second group of Speed Dial Phone Number. Click **Apply** to save the settings.

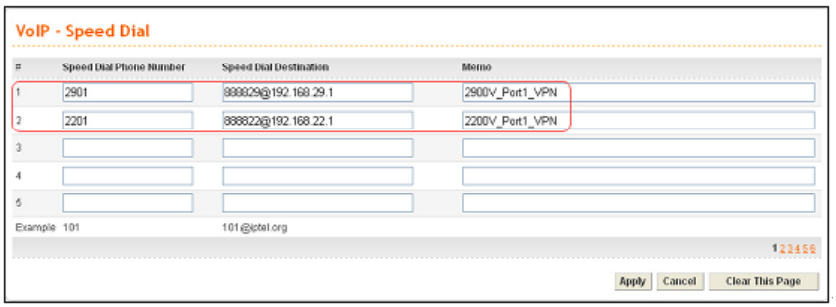


Figure 3-28. Speed dial phone number settings

3.3.2 Vigor 2900V Configuration Example

Step 1

Enter **VoIP Setup - SIP Related Functions Setup** page and change **Register via** from WAN to **LAN/VPN** for Port1 and Port2. Press OK to save the settings.

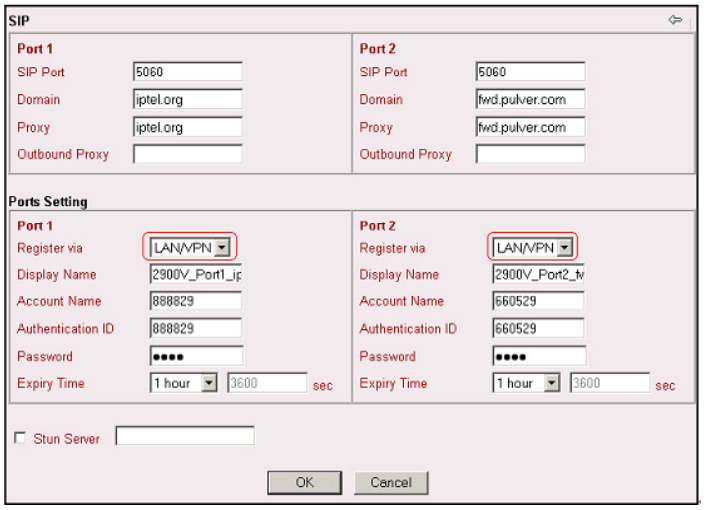


Figure 3-29. SIP related functions settings of Vigor 2900V

Note

Do not set up the Outbound Proxy and Stun Server when calling through VPN.

Step 2

Click **DialPlan Setup** in the **VoIP Setup** page and add the first and second group of Speed Dial Phone Number.

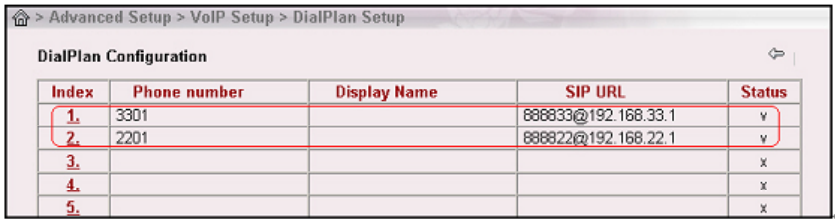


Figure 3-30. Add index1 and index2 speed dial phone number

Note

Do not set up the Display Name when calling through the VPN with 2900V firmware v2.5.6. Otherwise you can't get ring back and communicate with remote user after getting through.

3.3.3 Vigor 2200V Configuration Example

Step 1

Enter Vigor 2200V's Web and click **VoIP - SIP Related Function** page.

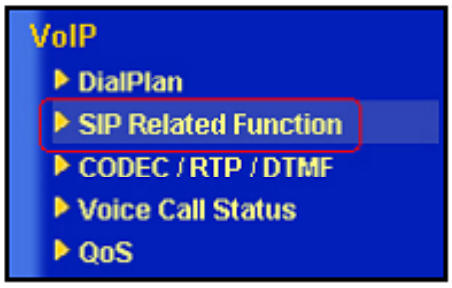


Figure 3-31. SIP related function of Vigor 2200V

Step 2

Setup Port 1. This page falls into two sections,

- SIP: Set up the SIP Server used for registration.
- Ports: Set up the account details.

After configuration please click **OK** to save the settings.

Figure 3-32. Port1 setting

Note

Do not set up the Proxy and Stun Server when calling through VPN. While in 2200V firmware v2.5.5.4, the Proxy will be active if Use Registrar is enabled. So make sure not click Use Registrar.

Step 3

Enter **VoIP - DialPlan** page and the first and second group of Speed Dial Phone Number.

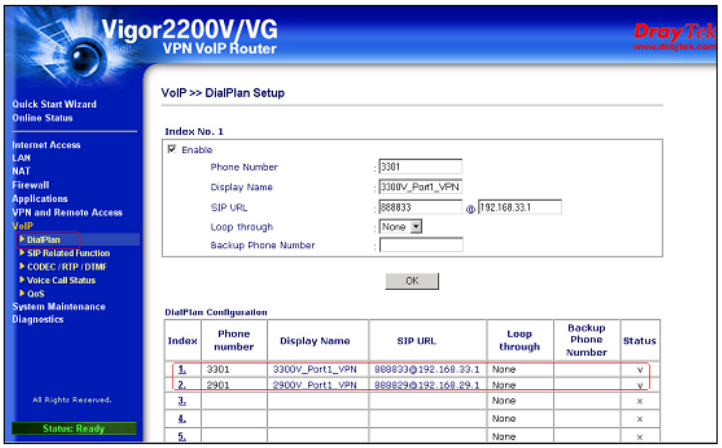


Figure 3-33. Add index1 and index2 speed dial phone number

After configuration, please confirm that the VPNs are established and they can communicate with each other. (Please refer to VPN - IPSec - LAN to LAN Usage Example 2).

Start to dial by using telephones

Phone1 call Phone2

Press **2901#** or **888829*192*168*29*1#.**

Phone1 call Phone3

Press **2201#** or **888822*192*168*22*1#.**

Phone2 call Phone1

Press **3301#.**

Phone2 call Phone3

Press **2201#** or **#192*168*22*1#.**

Phone3 call Phone1

Press **3301#.**

Phone3 call Phone2

Press **2901#** or **#192*168*29*1#.**

Note

 # indicates termination of the phone number. After pressing #, VoIP is immediately called out. Or you may wait 3 seconds if you do not press #.

3.4 VoIP Example 4 - Practical Application of FXS

Based on the **VoIP Example 1(Basic Configuration and Registration)**, we will introduce the practical application of FXS.

Generally the practical application of FXS falls into the following two sections.

Connect the telephones (Please refer to VoIP Example 1). Two VoIP equipments call with each other.

Connect PBX's Outside Lines. The usage is the same as that of PSTN line. Different PBX has its own settings and required configuration by you.

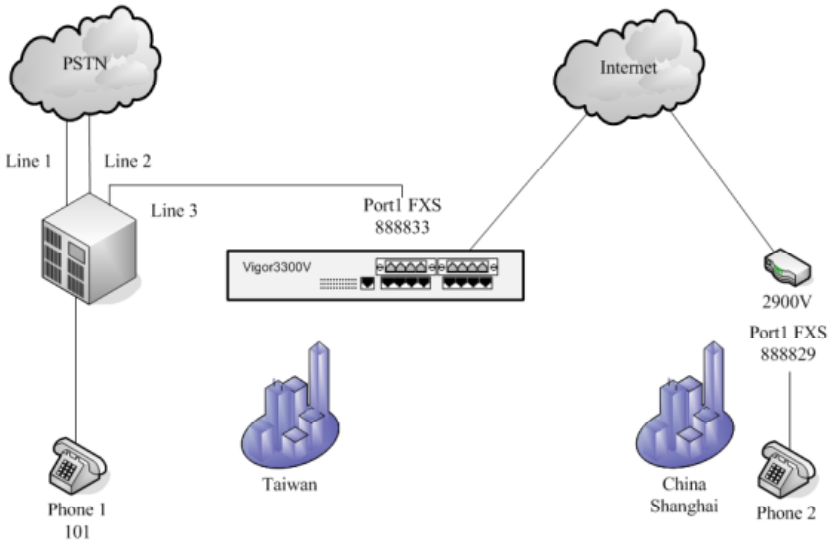


Figure 3-34. A scenario architecture graph

Table 3-7. Configuration table between Vigor 3300V and Vigor 2900V

	WAN IP	Port Number	Phone Number	Proxy	Codec
3300V	220.135.240.207	Port1(FXS)	888833	iptel	G.729A
2900V	61.31.167.135	Port1(FXS)	888829	iptel	G.729A

Suppose there are two PSTN lines connected to PBX's Outside Lines. The third Outside Line is connected to 3300V's FXS Port1. The Inside Line is connected to a telephone with the extension 101. If the extension wants to dial VoIP using Line3, you must firstly press 3, and then dial the phone number.

Table 3-8. Example of lines connections

	PBX	Phone Number
Line3(3)	Outside Lines	888833
Phone1	Inside Lines	101

Start to dial by using telephones

Phone1 calls **Phone2**

Press **3**, after hearing the dial tone press VoIP number **888829#**.

Phone2 calls **Phone1**

Press **888833#**, after getting through you will hear the auto reply from the PBX. Then press the extension **101**.

Note

 # indicates termination of the phone number. After pressing #, VoIP is immediately called out. Or you may wait 3 seconds if you do not press #.

This example is the intercommunication with one SIP Proxy Server. For the applications of Direct IP Call and Intercommunication with different SIP Proxy Servers please refer to **VoIP Example 2(Basic Calling Method)**. The VoIP call can also wok with VPN, please refer to **VoIP Example 3(VoIP over VPN)**.

Also you can set up the Speed Dial entry. To accommodate the extension please set up 888829 to **291**, 888833 to **331**. You may refer to the figures shown below and **VoIP Example 2(Basic Calling Method)**.

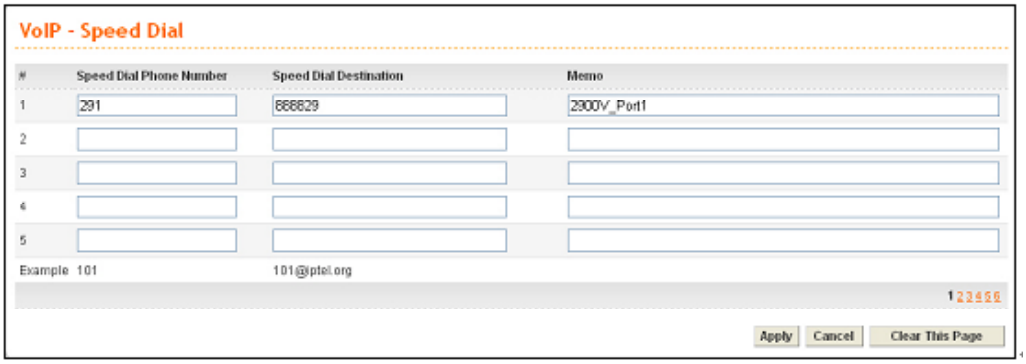


Figure 3-35. Speed dial phone number settings

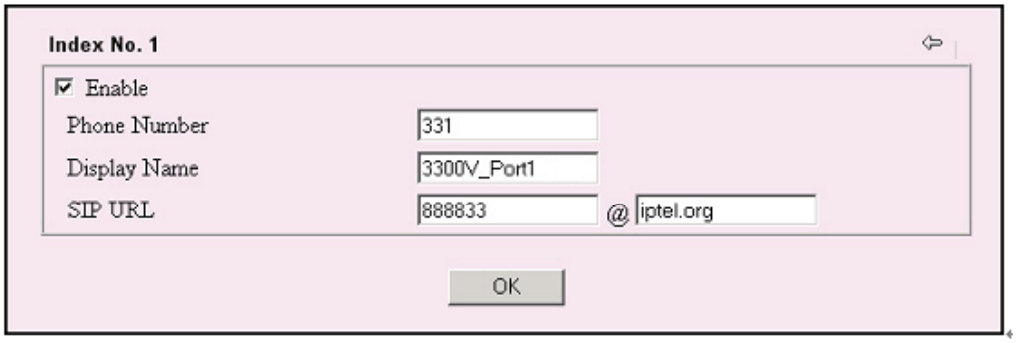


Figure 3-36. Edit of index1

3.5 VoIP Example 5 - Practical Application of FXO

Based on the **VoIP Example 1(Basic Configuration and Registration)**, we will introduce the practical application of FXO.

Generally the practical application of FXO falls into the following two sections,

Connect to PSTN line

By connecting 3300V's FXO Port5 to a PSTN line VoIP is seamlessly integrated to PSTN line, allow you to call not only the remote VoIP user, but also the remote PSTN user. Also the PSTN user can call the VoIP user.

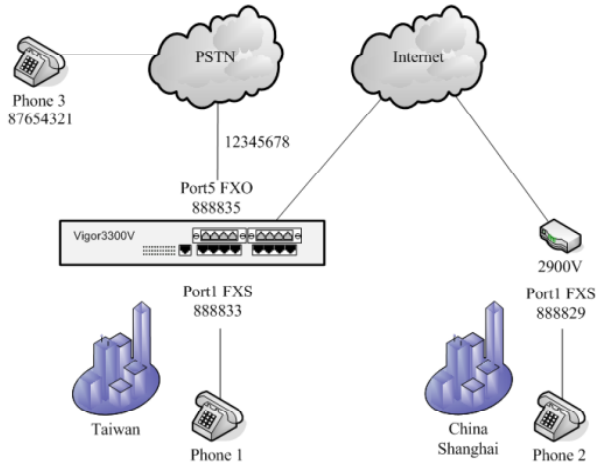


Figure 3-37. A scenario architecture graph

Table 3-9. Configuration table between 3300V and 2900V

	WAN IP	Port Number	Phone Number	Proxy	Codec
3300V	220.135.240.207	Port1(FXS)	888833	iptel	G.729A
		Port5(FXO)	888835	iptel	G.729A
2900V	61.31.167.135	Port1(FXS)	888829	iptel	G.729A

The number of the PSTN line connected into the FXO Port5 on the 3300V is 12345678. The number of another PSTN line is 87654321.

About VoIP basic settings please refer to **VoIP Example 1(Basic configuration and registration)**

Start to dial by using telephones

Phone1 calls **Phone3**

Press **888835#.** After getting through you will hear the dial tone, then press the PSTN number **87654321#**.

Phone2 calls **Phone3**

Press **888835#**. After getting through you will hear the Dial tone, then press the PSTN number **87654321#**.

Phone3 calls **Phone2**

Press **12345678**. After getting through you will hear the Dial tone, then press the VoIP number **888829#**.

Phone3 calls **Phone1**

Press **12345678.** After getting through you will hear the Dial tone, then press the VoIP number **888833#**.

Note

 # indicates termination of the phone number. After pressing #, VoIP is immediately called out. Or you may wait 3 seconds if you do not press #.

- Connect PBX's Inside Lines. The usage is the same as that of common extension. Different PBX has its own settings and required configuration by you.

By connecting 3300V's FXO Port5 to PBX's Inside Line VoIP is seamlessly integrated to PBX's inside lines, allow you to call not only the VoIP, but also the PSTN line and PBX's extension. Also the remote user can call you from the PSTN line and PBX's extension.

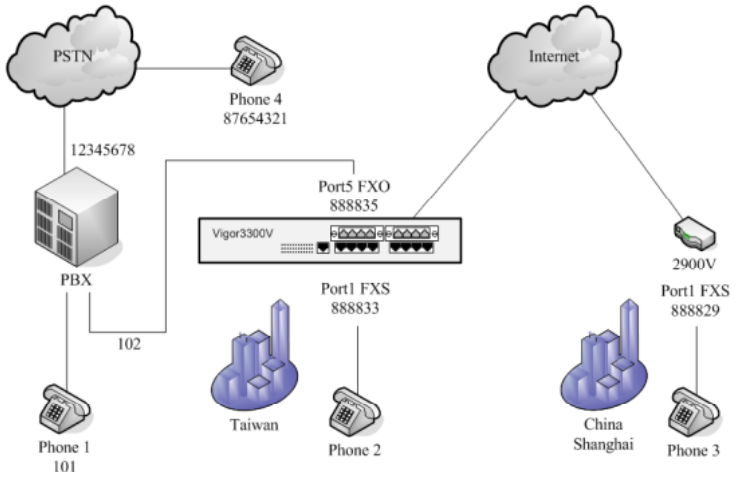


Figure 3-38. A scenario architecture graph

Table 3-10. Configuration table between Vigor 3300V and Vigor 2900V

	WAN IP	Port Number	Phone Number	Proxy	Codec
3300V	220.135.240.207	Port1(FXS)	888833	iptel	G.729A
		Port5(FXO)	888835	iptel	G.729A
2900V	61.31.167.135	Port1(FXS)	888829	iptel	G.729A

Suppose the number of PBX's Outside Line is 12345678. One Inside Line is connected to a telephone with the extension 101. If you want to use PSTN from the extension, you must firstly press 0, and then dial the phone number.

The FXO Port5 on the 3300V is connected to PBX's Inside Line with the number 102. The number of another PSTN line is 87654321.

About VoIP basic settings please refer to **VoIP Example 1. (Basic configuration and registration)**

Start to dial by using telephones

Phone1calls **Phone2**

Press extension **102**. After getting through you will hear the dial tone, then press the VoIP number **888833#**.

Phone1calls **Phone3**

Press extension **102**. After getting through you will hear the Dial tone, then press the VoIP number **888829#**.

Phone2 calls **Phone1**

Press **888835#**. After getting through you will hear the Dial tone, then press the extension **101**.

Phone2 calls **Phone4**

Press **888835#**. After getting through you will hear the Dial tone. Press outside line **0**, then press **87654321**.

Phone3 calls **Phone1**

Press **888835#**. After getting through you will hear the Dial tone, then press the extension **101**.

Phone3 call **Phone4**

Press **888835#**. After getting through you will hear the Dial tone. Press outside line **0**, then press **87654321**.

Phone4 calls **Phone2**

Press **12345678**. After getting through you will hear the auto reply from the PBX, then press the extension **102**. After getting through you will hear the Dial tone, then press the VoIP number **888833#**.

Phone4 calls **Phone3**

Press **12345678**. After getting through you will hear the auto reply from the PBX, then press the extension **102**. After getting through you will hear the Dial tone, then press the VoIP number **888829#**.

Note

 # indicates termination of the phone number. After pressing #, VoIP is immediately called out. Or you may wait 3 seconds if you do not press #.

This example is intercommunication with one SIP Proxy Server. For the applications of Direct IP Call and Intercommunication with different SIP Proxy Servers please refer to **VoIP Example 2(Basic Calling Method)**. The VoIP call can also wok with VPN, please refer to **VoIP Example 3(VoIP over VPN)**.

3.6 VoIP Example 6 - Register with Private IP Address

Based on the **VoIP Example 1(Basic Configuration and Registration)**, we will introduce how to register with the SIP Server when Vigor 3300V has no Public IP address but a Private IP address.

When Vigor 3300V's WAN uses a Private IP, the VoIP traffic must pass through the upper-layer NATs. Now STUN feature should be enabled so that VoIP can work normally.

In this example Vigor 3300V is connected in the LAN of Vigor 2600V. It obtains a private IP address from the Vigor 2600V and accesses the Internet through the Vigor 2600V. Vigor 3300V uses this private IP to register with the SIP Server because it doesn't

know Vigor 2600V's WAN IP, which results in that SIP Server can't find Vigor 3300V. But if Vigor 3300V uses STUN, it can discover Vigor 2600V's WAN IP and will use this IP as SIP content to identify its location. When SIP Server contacts with Vigor 3300V, the packets are firstly sent to Vigor 2600V, and then forwarded by Vigor 2600V to Vigor 3300V.

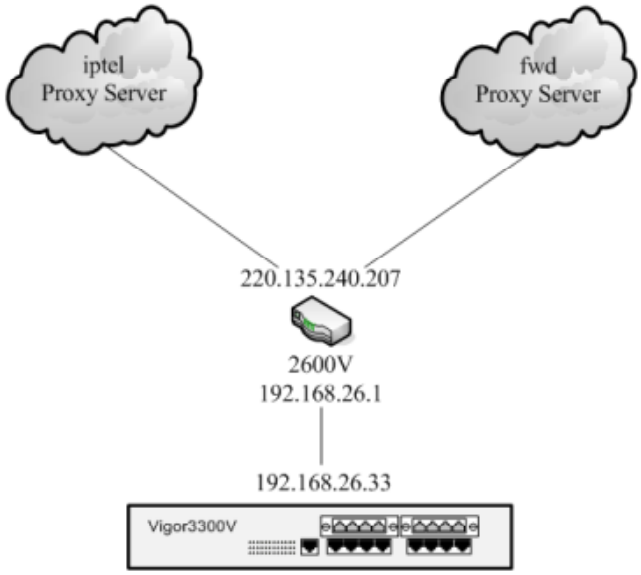


Figure 3-39. A scenario architecture graph

Table 3-12. Configuration table between Vigor 3300V and Vigor 2600V

	WAN IP	Port Number	Phone Number	Proxy	Codec
3300V	192.168.26.33	Port1(FXS)	888833	iptel	G.729A
		Port3(FXS)	660533	fwd	G.729A
2600V	220.135.240.207	Port1(FXS)	888829	iptel	G.729A

Vigor 2600V's internal network is 192.168.26.X, Vigor 3300V uses Static IP 192.168.26.33. For VoIP basic settings please refer to **VoIP Example 1(Basic Configuration and Registration).**

3.6.1 Vigor 2600V Configuration Example

Step 1

Enter 2600V via Web and click **NAT Setup** page.

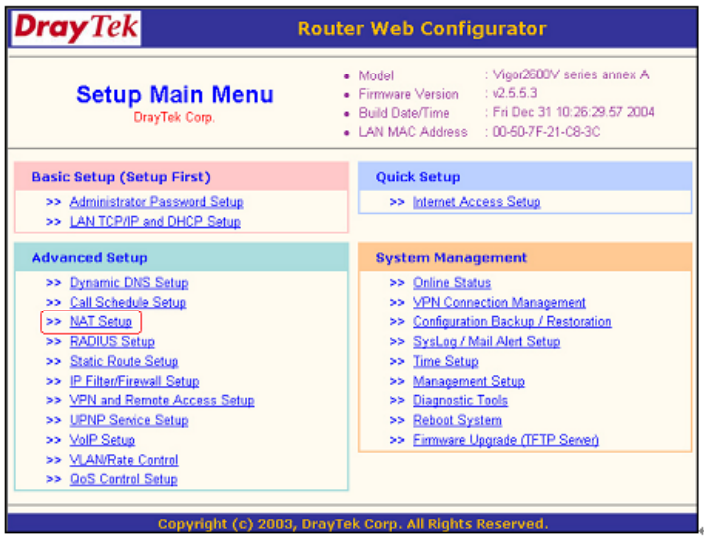


Figure 3-40. NAT setup of Vigor 2600V

Step 2

click **Open Ports Setup**.

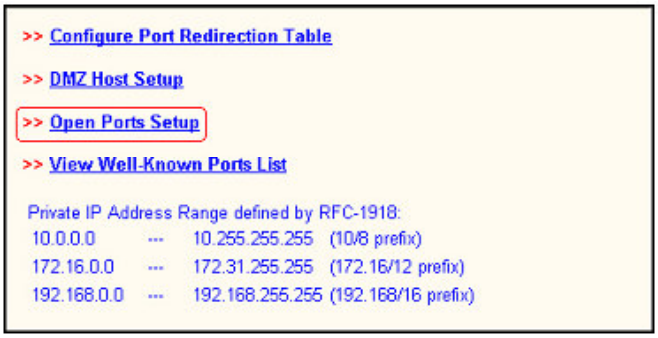


Figure 3-41. Open ports settings of Vigor 2600V

Step 3

Click **Index1**.

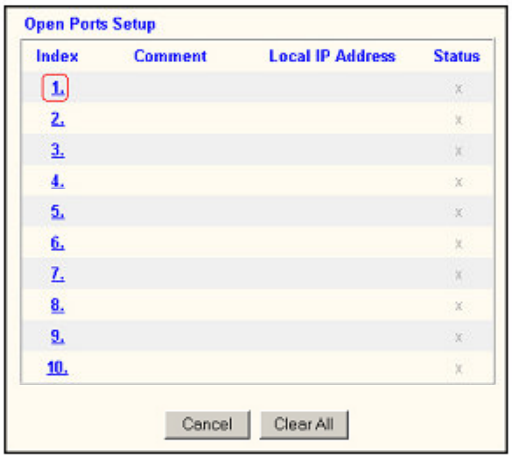


Figure 3-42. Open ports profile Index1

Step 4

Forward the packets sent to **UDP 5060, 13456~13470** and **49170~49184** to Vigor 3300V's WAN IP **192.168.26.33**. Press OK to save the settings.

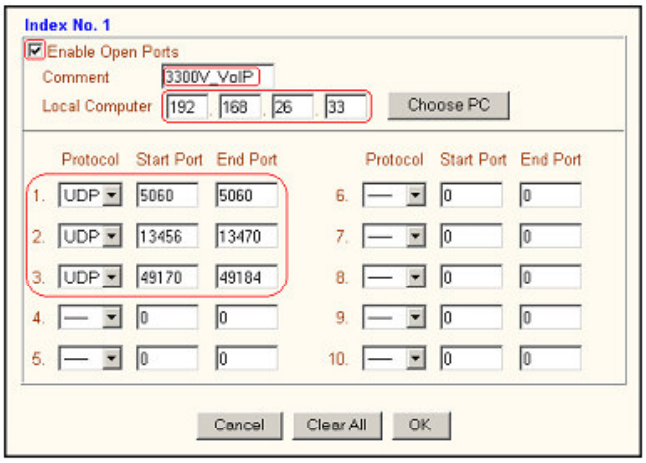


Figure 3-43. Settings of Index1

Step 5

After configuration it will automatically jump to **Open Ports Setup** page. Confirm the settings to be correct. The setup is completed.

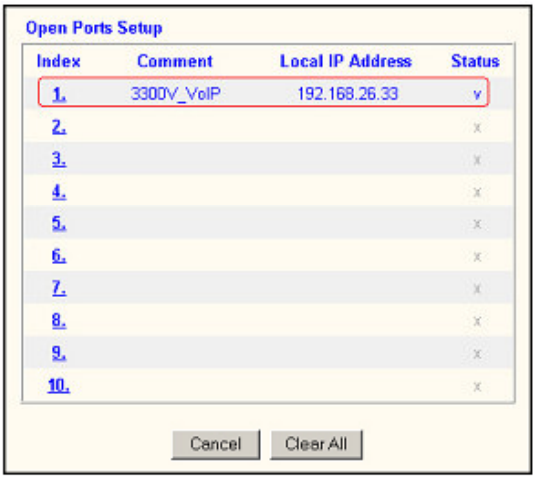


Figure 3-44. Index1 configuration

3.6.2 Vigor 3300V Configuration Example

Step 1

Enter the **VoIP - NAT Traversal** page and enable the STUN function. Then click **Apply** to save the setting.

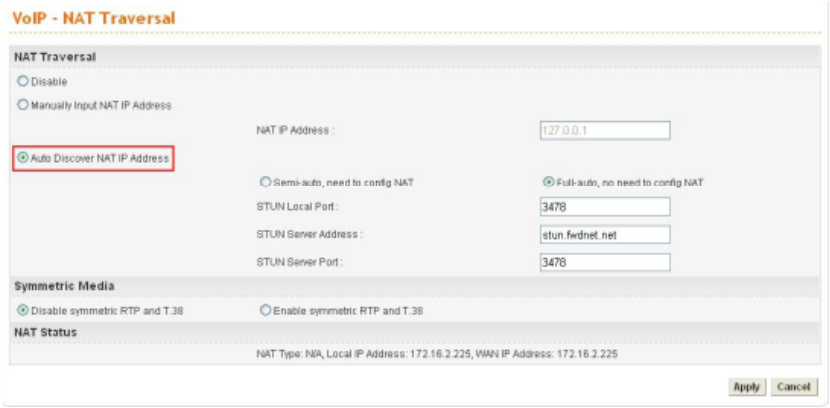


Figure 3-35. NAT Traversal of Vigor 3300V

Step 2

Enter **VoIP - Status** page, wait one or two minutes (The time depends on SIP Server's response speed and the network condition). When you see the Register Status is OK, the registration is successful.

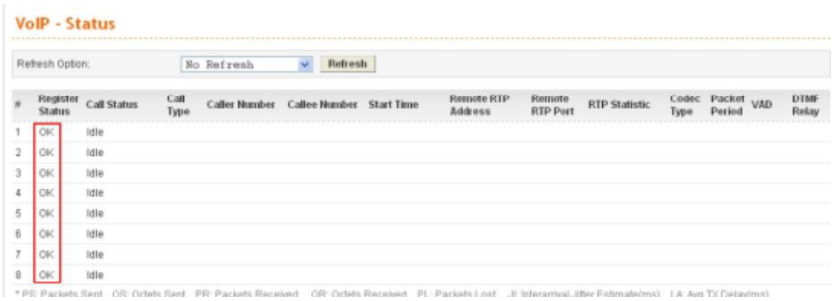


Figure 3-36. Status of Vigor 3300V

Note

Iptel SIP Server itself supports STUN function, so 3300V can register without STUN enabled.

At present the above configuration has a precondition that Vigor 2600's VoIP isn't active. If VoIP function is enabled, the packets on UDP 5060 will be received by Vigor 2600V and not forwarded to Vigor 3300V. So you have to change Vigor 3300V's Local Port from 5060 to **5061**.

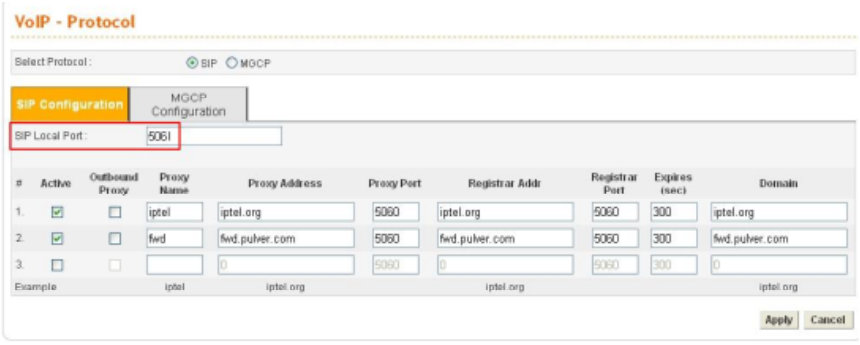


Figure 3-37. Protocol of Vigor 3300V

The Open Ports setup in Vigor 2600V also must be changed to **5061.**

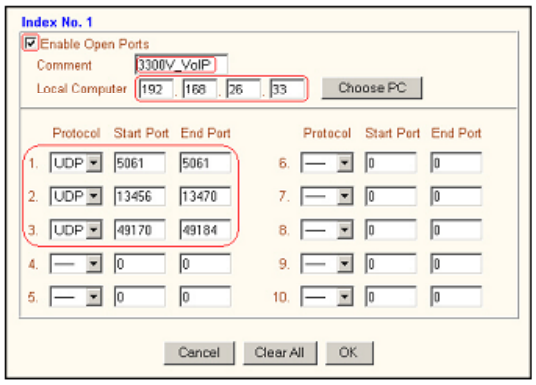


Figure 3-38. Open port setup

3.7 Asterisk Application

3.7.1 Introduce

In this chapter, we offer the application shows that it is convenient and cost saving to implement the free IP-PBX using Asterisk and Vigor 3300V when users want to use the Soft Phone or IP Phone instead of traditional telephone in the company.

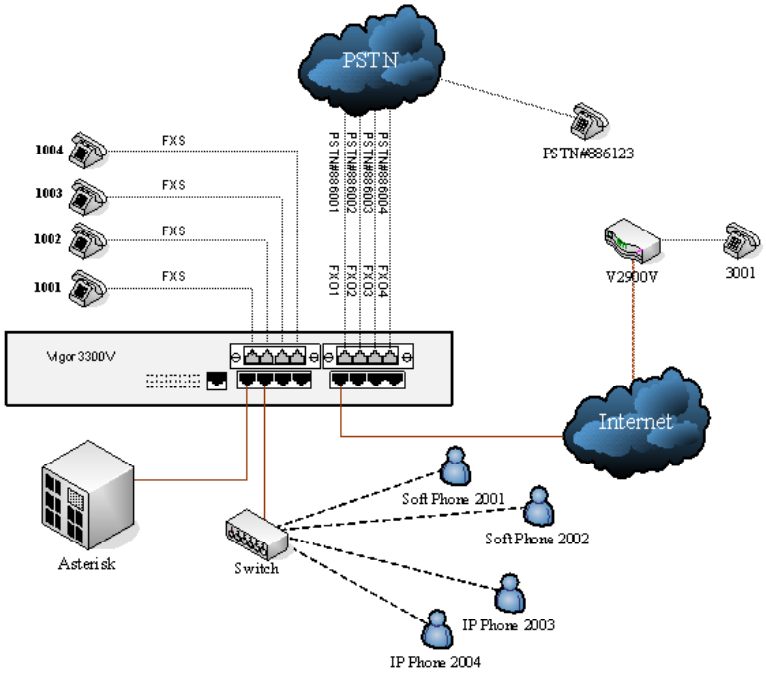


Figure 3-40. The scenario

In the figure using FXO port of Vigor 3300V to connect to PSTN. So, users do not need the other equipment to as the IP-PBX. The way that we work normally with the FXO of Vigor 3300V is that we could make a call from extension of IP-PBX which is the telephones connected with FXS of Vigor 3300V, Soft Phone or IP Phone to PSTN Network. We also could make a call from PSTN to the IP-PBX, there are four PSTN line (the maximum is 8), then forwarding the call to any extension of IP-PBX, or make a call from extensions to remote peer user through VPN in the Internet, or reverse direction call.

Another application is workable that putting the Asterisk to the Internet for branch office communication.

3.7.1.1 Configuration

IP Address List:

Asterisk – 172.16.2.234

Vigor 3300V – 172.16.2.237

SoftPhone 2001 – 172.16.2.201

SoftPhone 2002 – 172.16.2.202

SoftPhone 2003 – 172.16.2.203

SoftPhone 2004 – 172.16.2.204

Vigor 2900V (VPN) – 172.16.2.205

3.7.1.2 Installing Asterisk

1. Download Asterisk from the Asterisk website page http://www.asterisk.org/.
2. Install the Asterisk and refer to the installation guide from the Asterisk website.

3.7.2 Configuring Asterisk

sip.conf

Modify the sip.conf, the file is usually placed on the location /etc/asterisk.

[general] Setting in sip.conf

Modify the realm value to 172.16.2.234 for digest authentication.

```
realm=172.16.2.234        ; Realm for digest authentication
```

Modify the tos value, users could choose one kind of type. There are “lowdelay”, “throughput”, “reliability”, “mincost” and “none”. It is depend on the network status.

```
Tos=lowdelay
```

Modify the defaultexpiry value for registration.

```
Defaultexpiry=300         ; Default length of incoming/outgoing registration
```

Modify the codec settings.

```
disallow=all              ; First disallow all codecs
allow=ulaw                ; Allow codecs in order of preference
```

```
allow = alaw
allow=g729
allow=g726
```

Modify the language value for all users.

```
language=en                ; Default language setting for all users/peers
```

Modify the rtptimeout value for RTP activity.

```
rtptimeout=60              ; Terminate call if 60 seconds of no RTP activity
```

Modify the dtmfmode value.

```
dtmfmode = rfc2833; Set default dtmfmode for sending DTMF. Default:
rfc2833
                    ; Other options:
                    ; info : SIP INFO messages
                    ; inband : Inband audio (requires 64 kbit codec -alaw, ulaw)
                    ; auto : Use rfc2833 if offered, inband otherwise
```

Add Phone Number

Add phone setting for each phone number.

```
[1001]
type=friend
nat=no
canreinvite=yes
host=dynamic
defaultip=172.16.2.237
username=1001
secret=0000
dtmfmode=info ; Choices are inband, rfc2833, or info
call-limit=1
mailbox=1000 ; Mailbox for message waiting indicator
context=sip
callerid="1001" <1001>
disallow=all
```

```
allow=ulaw
allow=g729
allow=g723.1



[1002]
type=friend
nat=no
canreinvite=yes
host=dynamic
defaultip=172.16.2.237
username=1002
secret=0000
dtmfmode=info ; Choices are inband, rfc2833, or info
call-limit=1
mailbox=1000 ; Mailbox for message waiting indicator
context=sip
callerid="1002" <1002>
disallow=all
allow=ulaw
allow=g729
allow=g723.1

[1003]
type=friend
nat=no
canreinvite=yes
host=dynamic
defaultip=172.16.2.237
username=1003
secret=0000
dtmfmode=info ; Choices are inband, rfc2833, or info
call-limit=1
mailbox=1000 ; Mailbox for message waiting indicator
context=sip
```

```
callerid="1003" <1003>
disallow=all
allow=ulaw
allow=g729
allow=g723.1

[1004]
type=friend
nat=no
canreinvite=yes
host=dynamic
defaultip=172.16.2.237
username=1004
secret=0000
dtmfmode=info ; Choices are inband, rfc2833, or info
call-limit=1
mailbox=1000 ; Mailbox for message waiting indicator
context=sip
callerid="1004" <1004>
disallow=all
allow=ulaw
allow=g729
allow=g723.1

[2001]
type=friend
nat=no
canreinvite=yes
host=dynamic
defaultip=172.16.2.201
username=2001
secret=2001
dtmfmode=info ; Choices are inband, rfc2833, or info
call-limit=1
mailbox=1000 ; Mailbox for message waiting indicator
```

```
context=sip
callerid="2001" <2001>
disallow=all
allow=ulaw
allow=g729
allow=g723.1

[2002]
type=friend
nat=no
canreinvite=yes
host=dynamic
defaultip=172.16.2.202
username=2002
secret=2002
dtmfmode=info ; Choices are inband, rfc2833, or info
call-limit=1
mailbox=1000 ; Mailbox for message waiting indicator
context=sip
callerid="2002" <2002>
disallow=all
allow=ulaw
allow=g729
allow=g723.1

[2003]
type=friend
nat=no
canreinvite=yes
host=dynamic
defaultip=172.16.2.203
username=2003
secret=2003
dtmfmode=info ; Choices are inband, rfc2833, or info
call-limit=1
```

```
mailbox=1000 ; Mailbox for message waiting indicator
context=sip
callerid="2003" <2003>
disallow=all
allow=ulaw
allow=g729
allow=g723.1

[2004]
type=friend
nat=no
canreinvite=yes
host=dynamic
defaultip=172.16.2.204
username=2004
secret=2004
dtmfmode=info ; Choices are inband, rfc2833, or info
call-limit=1
mailbox=1000 ; Mailbox for message waiting indicator
context=sip
callerid="2004" <2004>
disallow=all
allow=ulaw
allow=g729
allow=g723.1

[3001]
type=friend
nat=no
canreinvite=yes
host=dynamic
defaultip=172.16.2.205
username=3001
secret=3001
dtmfmode=info ; Choices are inband, rfc2833, or info
```

```
call-limit=1
mailbox=1000 ; Mailbox for message waiting indicator
context=sip
callerid="3001" <3001>
disallow=all
allow=ulaw
allow=g729
allow=g723.1

[fxo1]
type=friend
secret=1234
context=sip
disallow=all
allow=ulaw
allow=g729
allow=g723.1
dtmfmode=info
canreinvite=no
host=dynamic
defaultip=172.16.2.237

[fxo2]
type=friend
secret=1234
context=sip
disallow=all
allow=ulaw
allow=g729
allow=g723.1
dtmfmode=info
canreinvite=no
host=dynamic
defaultip=172.16.2.237
```

```
[fxo3]
type=friend
secret=1234
context=sip
disallow=all
allow=ulaw
allow=g729
allow=g723.1
dtmfmode=info
canreinvite=no
host=dynamic
defaultip=172.16.2.237

[fxo4]
type=friend
secret=1234
context=sip
disallow=all
allow=ulaw
allow=g729
allow=g723.1
dtmfmode=info
canreinvite=no
host=dynamic
defaultip=172.16.2.237
```

mgcp.conf

Modify the mgcp.conf, the file is usually placed on the location /etc/asterisk.

[general] Setting in mgcp.conf

Modify the Call Agent port value to 2727 for Vigor 3300V.

```
port = 2727
```

Add Endpoint for MGCP

Modify the port value to 2727 for Call Agent.

```
[172.16.2.237]
host = 172.16.2.237
context = mgcp
line => aaln/1
line => aaln/2
line => aaln/3
line => aaln/4
line => aaln/5
line => aaln/6
line => aaln/7
line => aaln/8

[172.16.2.201]
host = 172.16.2.201
context = mgcp
line => aaln/1

[172.16.2.202]
host = 172.16.2.202
context = mgcp
line => aaln/1

[172.16.2.203]
host = 172.16.2.203
context = mgcp
line => aaln/1

[172.16.2.204]
host = 172.16.2.204
context = mgcp
line => aaln/1
```

```
[172.16.2.205]
host = 172.16.2.205
context = mgcp
line => aaln/1
```

extensions.conf

Add extensions for SIP.

```
[sip]
exten => 1001,1,Dial(SIP/1001,20,tr)
exten => 1002,1,Dial(SIP/1002,20,tr)
exten => 1003,1,Dial(SIP/1003,20,tr)
exten => 1004,1,Dial(SIP/1004,20,tr)
exten => 2001,1,Dial(SIP/2001,20,tr)
exten => 2002,1,Dial(SIP/2002,20,tr)
exten => 2003,1,Dial(SIP/2003,20,tr)
exten => 2004,1,Dial(SIP/2004,20,tr)
exten => 3001,1,Dial(SIP/3001,20,tr)
exten => 1,1,Dial(SIP/fxo1,20,tr)
exten => 2,1,Dial(SIP/fxo2,20,tr)
exten => 3,1,Dial(SIP/fxo3,20,tr)
exten => 4,1,Dial(SIP/fxo4,20,tr)
```

Add extensions for MGCP.

```
[mgcp]
exten => 1001,1,Dial(MGCP/aaln/1@172.16.2.237)
exten => 1002,1,Dial(MGCP/aaln/2@172.16.2.237)
exten => 1003,1,Dial(MGCP/aaln/3@172.16.2.237)
exten => 1004,1,Dial(MGCP/aaln/4@172.16.2.237)
exten => 1,1,Dial(MGCP/aaln/5@172.16.2.237)
exten => 2,1,Dial(MGCP/aaln/6@172.16.2.237)
exten => 3,1,Dial(MGCP/aaln/7@172.16.2.237)
exten => 4,1,Dial(MGCP/aaln/8@172.16.2.237)
exten => 2001,1,Dial(MGCP/aaln/1@172.16.2.201)
exten => 2002,1,Dial(MGCP/aaln/1@172.16.2.202)
exten => 2003,1,Dial(MGCP/aaln/1@172.16.2.203)
```

```
exten => 2004,1,Dial(MGCP/aaln/1@172.16.2.204)
exten => 3001,1,Dial(MGCP/aaln/1@172.16.2.205)
```

3.7.3 Configuring Vigor 3300V

3.7.3.1 SIP Configuration

1. SIP Proxy

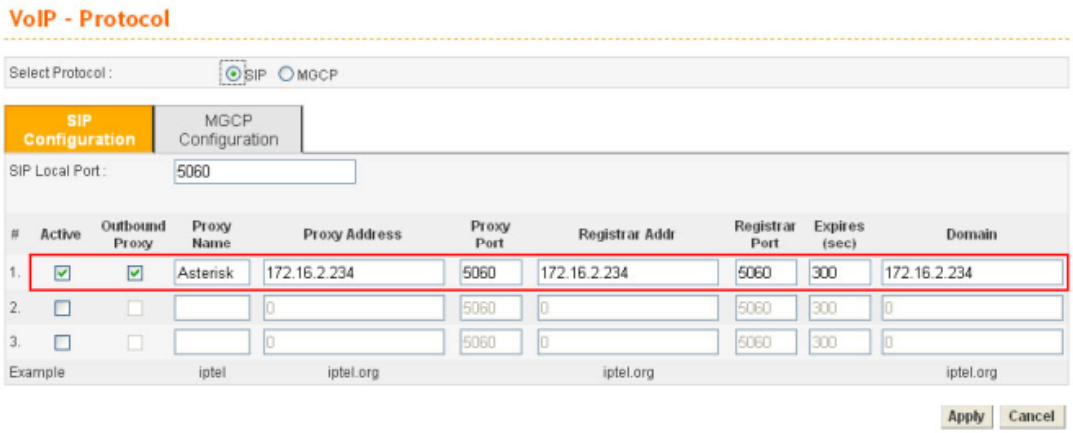


Figure 3-41. SIP configuration

2. Port Setting

Configure each port in Vigor 3300V. For example, the setting for port 1 shows as below. Input the correct data to Username, Password, Display Name, Authentication ID and Proxy Server. The VoIP IP Address should be selected to LAN1/VPN in the scenario, because the Asterisk server is placed on LAN.

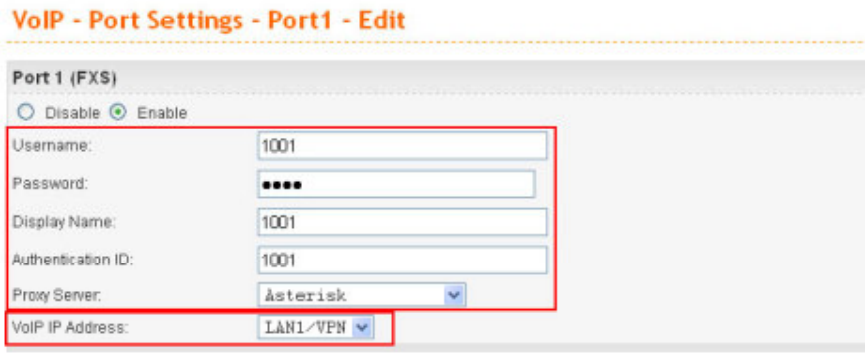
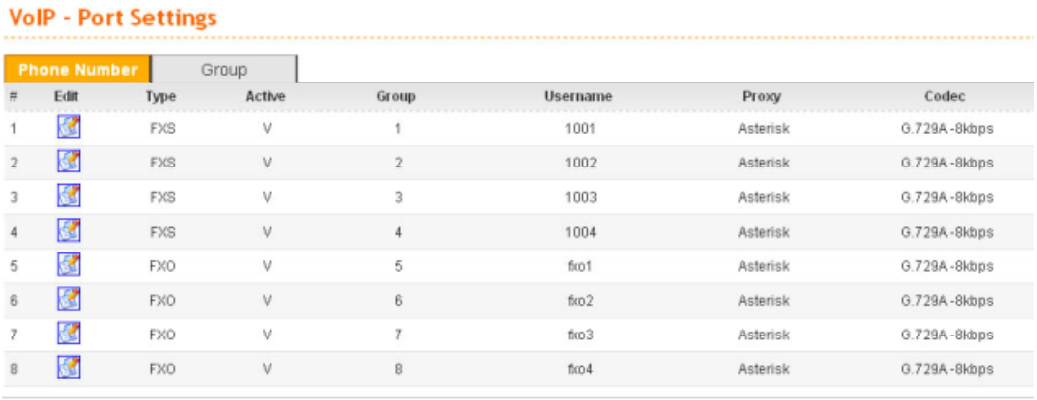


Figure 3-42. Port setting-edit

Choose the “SIP INFO” for DTMF Mode to meet the Asterisk setting.

Figure 3-43. DTMF mode



#	Edit	Type	Active	Group	Username	Proxy	Codec
1		FXS	V	1	1001	Asterisk	G.729A-8kbps
2		FXS	V	2	1002	Asterisk	G.729A-8kbps
3		FXS	V	3	1003	Asterisk	G.729A-8kbps
4		FXS	V	4	1004	Asterisk	G.729A-8kbps
5		FXO	V	5	fxo1	Asterisk	G.729A-8kbps
6		FXO	V	6	fxo2	Asterisk	G.729A-8kbps
7		FXO	V	7	fxo3	Asterisk	G.729A-8kbps
8		FXO	V	8	fxo4	Asterisk	G.729A-8kbps

Figure 3-44. Port setting configuration

3.7.3.2 MGCP Configuration

1. Configure VoIP IP Address to LAN1/VPN for each port in the scenario, because the Asterisk server is placed on LAN.

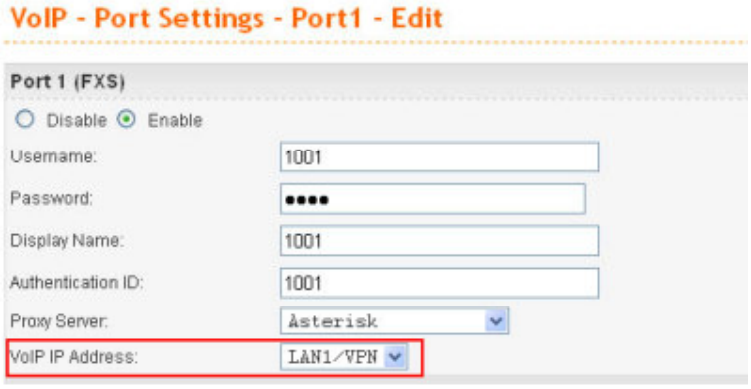


Figure 3-45. VoIP IP address

2. Configuring the Call Agent IP address.

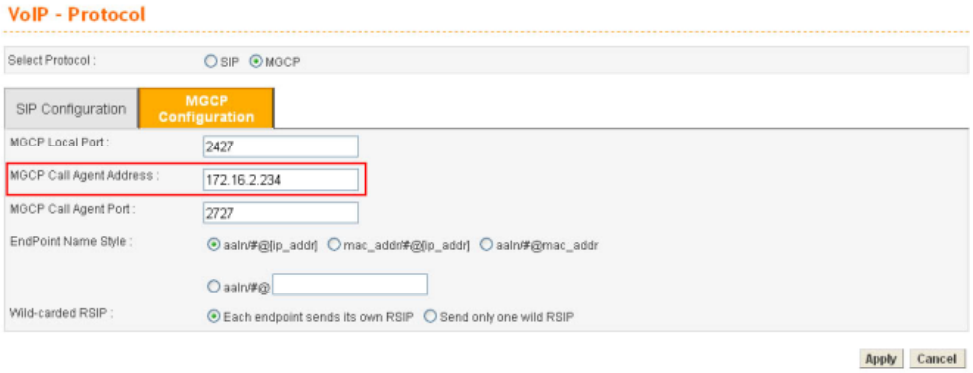


Figure 3-46. MGCP call agent address

Chapter 4. Load Balance Policy

This chapter is divided into the following sections,

Section 4.1: Introduction

Section 4.2: Examples and Web Configurations

4.1 Introduction

This feature allows specific outgoing traffic (defined by IP, port or protocol) to be always sent to through fixed WAN interface which is available.

4.2 Examples and Web Configurations

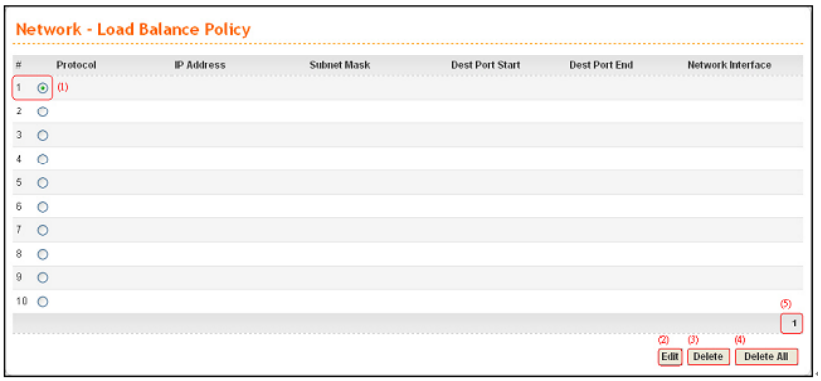


Figure 4-1. Load balance policy of network

(1) After clicking the appropriate index number, you can edit or delete the corresponding entry.

(2)The Network - Load Balance Policy – Edit page appears after you click the Edit button. Click the Apply button to save the current settings.

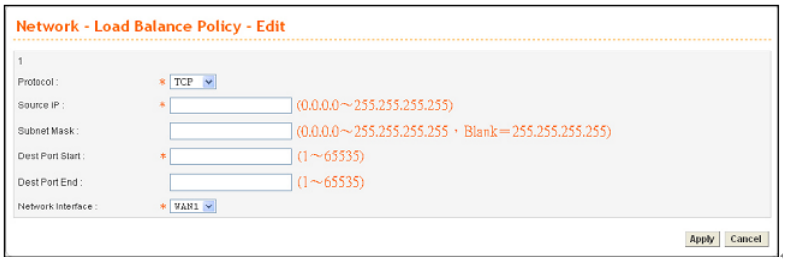


Figure 4-2. Edit item

Note

Fields with * are required to be filled in. The letters in ( ) indicate the range and style of the value you can type.

If the select **TCP** or **UDP** protocol, you need to enter the port numbers in the **Dest Port Start** field. When you select other protocols from Protocol's pull-down menu, the **Dest**

Port Range will be gray marked. It is because these protocols have been pre-defined as follows. Please refer to Table 4-1.

Table 4-1. Selected protocol

	Protocol	Port
FTP	TCP	21
TFTP	UDP	69
HTTP	TCP	80
SMTP	TCP	25
POP3	TCP	110

Load Balance Policy will compare the packets by the rules from the first item. When one entry coincides with another entry, the one which has the smallest index number takes precedence over all other identical entries.

(3) Click the **Delete** button to remove the specified entry. You will see the following window as Figure 4-3.

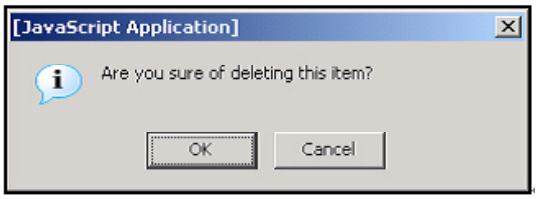


Figure 4-3. Delete item

(4) Click the **Delete All** button to delete all entries. You will see the following window as Figure 4-4.

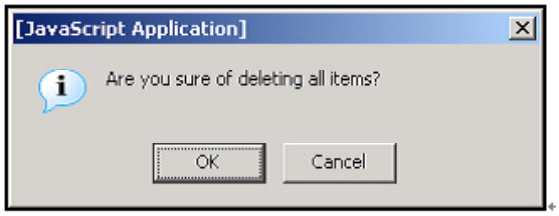


Figure 4-4. Delete all item

(5) It shows the current page number. There are ten entries in one page. The **2** appears after the 10th entry is set up.

Figure 4-5. Second page

Click on **2** to jump to the second page, and so on. We recommend setting up to 50 entries at most to ensure a good performance in Vigor 3300 router.

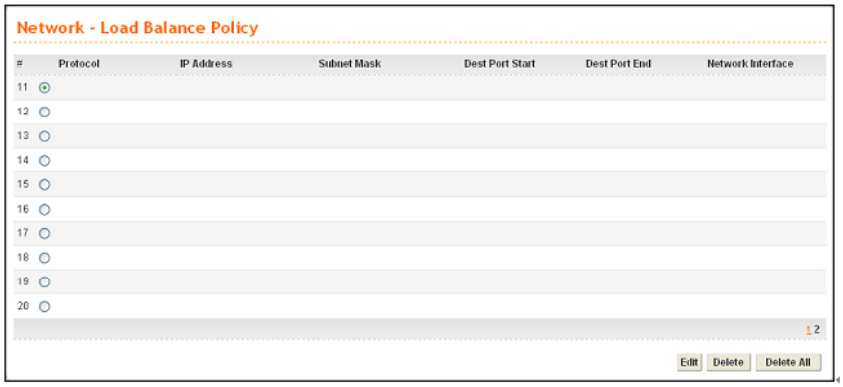


Figure 4-6. Second page

Load Balance Policy – Configuration Example

Suppose the subnets of the company are listed in the Table 4-2 below (Please refer to **Multiple WAN** for detailed configuration). MIS has the following requests. Web sites (HTTP Protocol) or Servers are applied to WAN1, Directors or MIS are applied to WAN2, other departments or DHCP clients are applied to WAN3. FTP sites (FTP Protocol) are applied to WAN3. The Mail Server is always applied to WAN1.

Table 4-2. Subnets of the company

IP Address	Subnet Mask	User	IP Number
192.168.33.0	255.255.255.0	This Network	255
192.168.33.11	255.255.255.255	Mail Server	1
192.168.33.16~31	255.255.255.240	Administrator	16
192.168.33.32～63	255.255.255.224	MIS	32
192.168.33.64～95	255.255.255.224	Accounting Department	32
192.168.33.96～127	255.255.255.224	Business Department	32
192.168.33.128～191	255.255.255.192	RD Department	64
192.168.33.192～254	255.255.255.192	DHCP	63

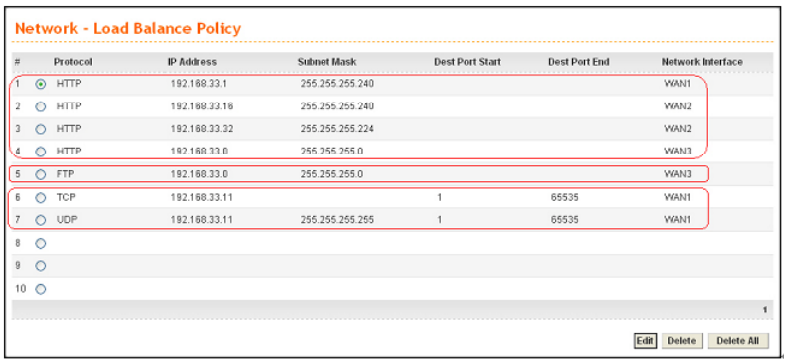


Figure 4-7. The settings of Load Balance Policy

Policy 1

For computers (Server) with IP range from 192.168.33.1 to 192.168.33.15, with HTTP protocol traffics are applied to WAN1 interface.

Policy 2

For computers (Directors) with IP range from 192.168.33.16 to 192.168.33.31, with HTTP protocol traffics are applied to WAN2 interface.

Policy 3

For computers (MIS) with IP range from 192.168.33.32 to 192.168.33.63, with HTTP protocol traffics are applied to WAN2 interface.

Policy 4

For other computers with IP range from 192.168.33.0 to 192.168.33.255, with HTTP traffics are applied to WAN3 interface. (The network set in this policy covers the network set in Policy1~ Policy3). And the protocol is also the HTTP protocol. However the Load Balance Policy will compare the traffics with the policy rules item by item from the smallest index number rule. So although the settings are overlapped, actually these policies can work normally. For an easy management you may set separate IP range for each policy.

Policy 5

For all the computers with IP range from 192.168.33.0 to 192.168.33.255, with FTP protocol traffics are applied to WAN3 interface.

Policy 6

For a computer (Mail Server) with IP address 192.168.33.11, with TCP Port 1~65535 are applied to WAN1 interface (The Subnet Mask is empty to be equal to 255.255.255.255).

Policy 7

For a computer (Mail Server) with IP range 192.168.33.11, with UDP Port 1~65535 are applied to WAN1 interface.

Chapter 5. 802.1Q VLAN

5.1 VLAN Overview

Virtual LANs (VLANs) are logical, independent workgroups within a network. These workgroups communicate as if they had a physical connection to the network. However, VLANs are not limited by the hardware constraints that physically connect traditional LAN segments to a network. As a result, VLANs allow the network manager to segment the network with a logical, hierarchical structure. VLANs can define a network by application or department. For instance, in the enterprise, a company might create one VLAN for multimedia users and another for e-mail users; or a company might have one VLAN for its Engineering Department, another for its Marketing Department, and another for its guest who can only use Internet not Intranet. VLANs can also be set up according to the organization structure within a company. For example, the company president might have his own VLAN, his executive staff might have a different VLAN, and the remaining employees might have yet a different VLAN. VLANs can also set up according to different company in the same building to save the money and reduce the device establishment.

The Figure 5-1 shows the IEEE 802.1Q tag frame and its insertion point within the Ethernet and 802.3 frames. The 802.1Q tag contains 3 priority bits and 12 VLAN ID bits. The 3 priority bits are for 802.1P. Ethernet switches and endpoints must be capable of interpreting the 802.1Q tag to make use of the tag. If an Ethernet switch or an endpoint cannot interpret the 802.1Q tag, the presence of the tag may cause problems.

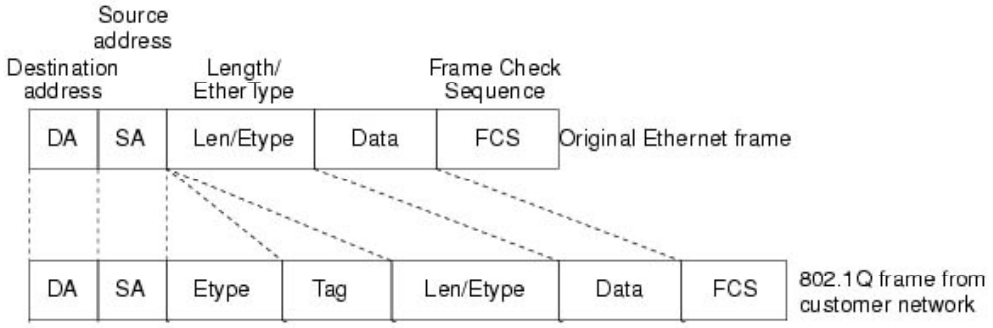


Figure 5-1. Untagged and 802.1Q-Tagged Ethernet frames

5.2 VLAN Trunk

A more efficient approach to combine multiple VLAN in a port to allow connect more switches spreading the network. A VLAN trunk consolidates the traffic of multiple VLANs across a single physical port, as shown in Figure 5-2.

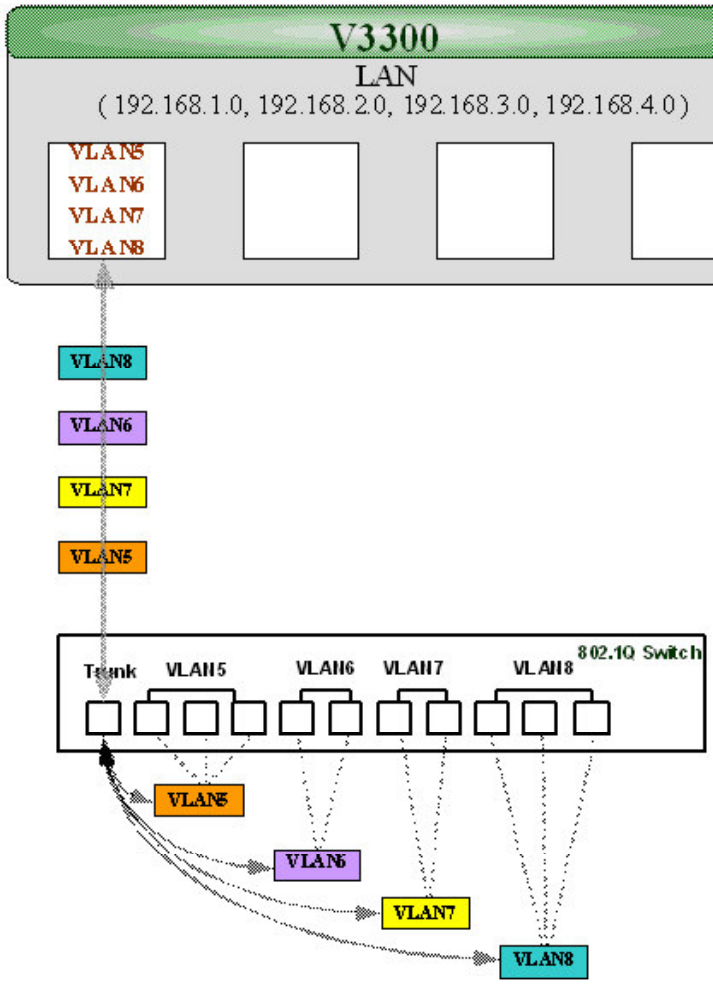


Figure 5-2. VLAN trunk

5.3 Why Use VLANs?

- **Security**

VLANs is a communication control. Once a user is assigned to a VLAN, the user only can communicate with the same VLAN group members.

- **Administrative Control for Flexibility and scalability**

Typically, subnets are defined by their physical location. Users have the same subnet in the same area. But VALNs allow each port on a router defines a different subnet. This results that users in the same departments but in different physical locations get the same subnet IP address.

- **Broadcast control for Performance Improvement**

TCP/IP network protocols and most other protocols broadcast frames periodically to advertise or discover network resources. This can have a significant impact on the network performance with a large number of end users. VLANs can prevent traffic from flooding the entire network. Nowadays, many virus attacks influence the network traffic. Using VLANs to avoid extending the virus.

5.4 LAN to LAN Communication

The Vigor 3300 allow users to setup the LAN to LAN communication. For instance, a company might create multiple subnet for employees and wish they can communicate with each other. The administrator should allow the LAN to LAN communication. On the other hand, a company does not allow communicate with different department. The administrator should block the LAN to LAN communication.

Configure firewall to allow or deny LAN to LAN communication. Add following setting to block different VLAN communication.

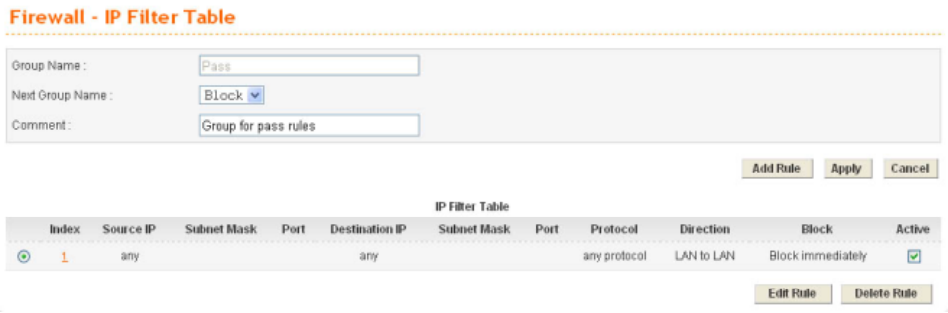


Figure 5-3. IP Filter table

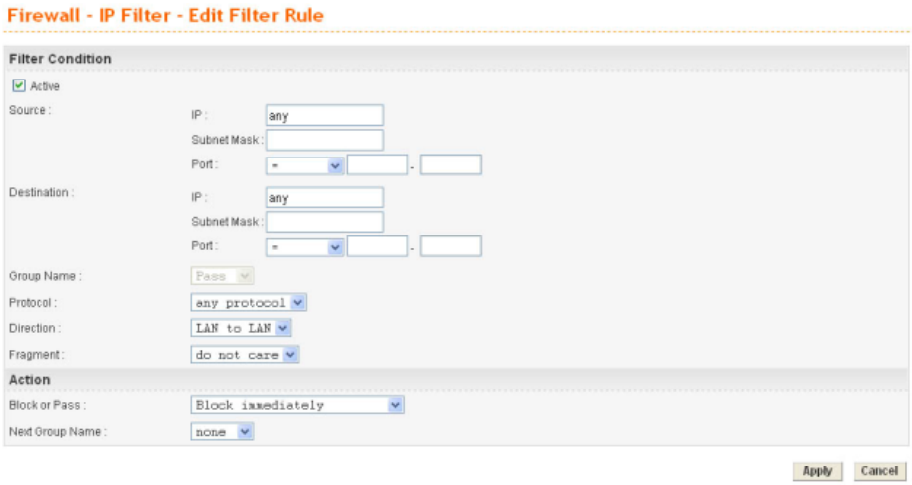


Figure 5-4. IP Filter setting

5.5 Management Port

The management port can help user to always communicate with router even though configuring the wrong setting in the 802.1Q VLAN. The management port is fixed on the P4 of LAN. We recommend that users enable the management port, unless users want to use the fourth VLAN and ensure the setting is correct.

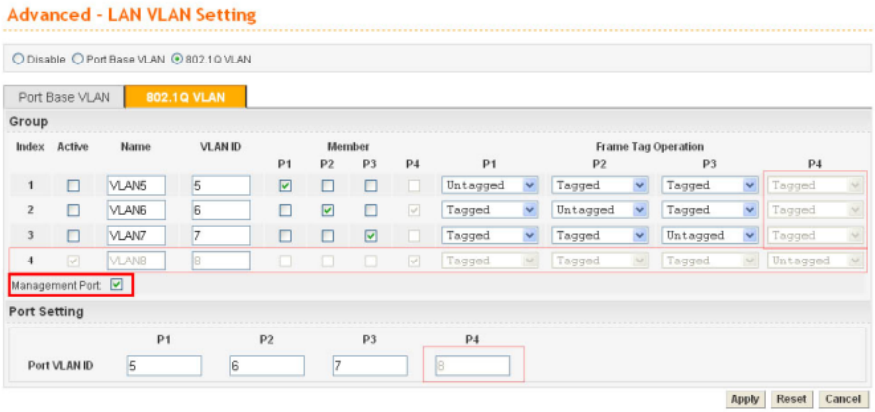


Figure 5-5. LAN VLAN setting

Application 1:

A company wants to separate the Engineer Department, Sales Department, Marketing Department and Other Department to limit their communication with each other to ensure the security. So, we defined four VLANs that are VLAN5, VLAN6, VLAN7 and VLAN8. The subnet of VLAN5 is 192.168.1.0, the subnet of VLAN6 is 192.168.2.0, the subnet of VLAN7 is 192.168.3.0, and the subnet of VLAN8 is 192.168.4.0. However, each PC in the company does not support 802.1Q.

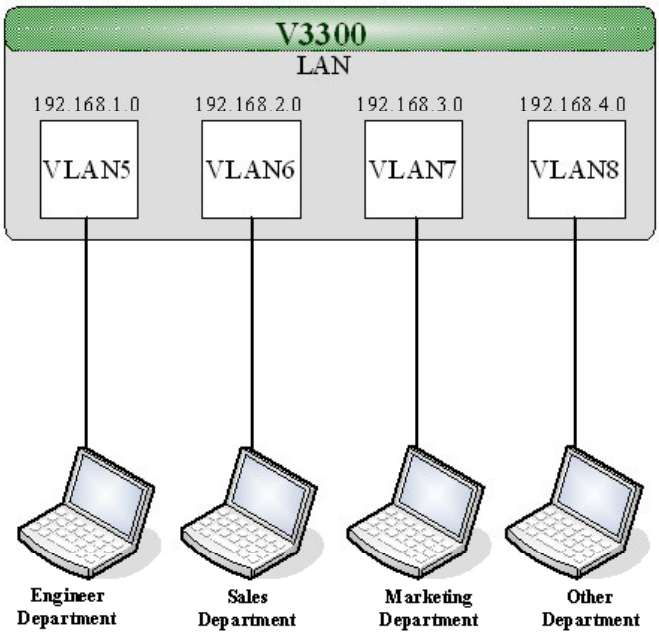


Figure 5-6. Application 1

Configuration:

1. Block LAN-to-LAN communication.
2. Create VLAN5, VLAN6, VLAN7 and VLAN8 Groups.
3. In the VLAN5, input “5” to VLAN ID. In the Member field, choose p1. Then choose the “Untagged” for Frame Tag Operation in p1. We should configure the PVID to “5”, because the device does not support 802.1Q VLAN.
4. In the VLAN6, input “6” to VLAN ID. In the Member field, choose p2. Then choose the “Untagged” for Frame Tag Operation in p2. We should configure the PVID to “6”, because the device does not support 802.1Q VLAN.
5. In the VLAN7, input “7” to VLAN ID. In the Member field, choose p3. Then choose the “Untagged” for Frame Tag Operation in p3. We should configure the PVID to “7”, because the device does not support 802.1Q VLAN.
6. In the VLAN8, input “8” to VLAN ID. In the Member field, choose p4. Then choose the “Untagged” for Frame Tag Operation in p4. We should configure the PVID to “8”, because the device does not support 802.1Q VLAN.
7. After applying the settings, the web page will be redirected to “reboot” web page. User can ignore it and continue to configure the Network setting. After Network setting, then you can do the reboot procedure.

Note

After rebooting, the tagged ports will only communicate with 802.1Q tagged devices.

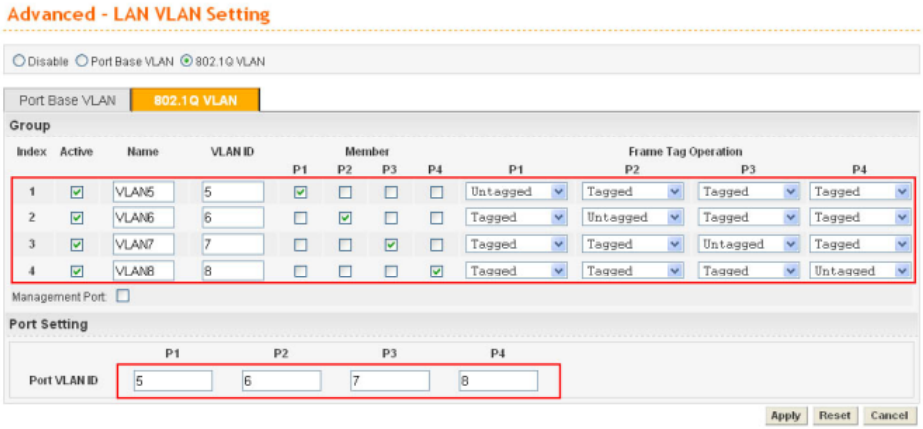


Figure 5-7. LAN VLAN configuration

8. In the Network setting, input the subnet 192.168.1.0 to LAN. For example, the VLAN5 LAN IP is 192.168.1.1 and Subnet Mask is 255.255.255.0. Then, users in the Engineer Department can set IP address from 192.168.1.2 to 192.168.1.254.

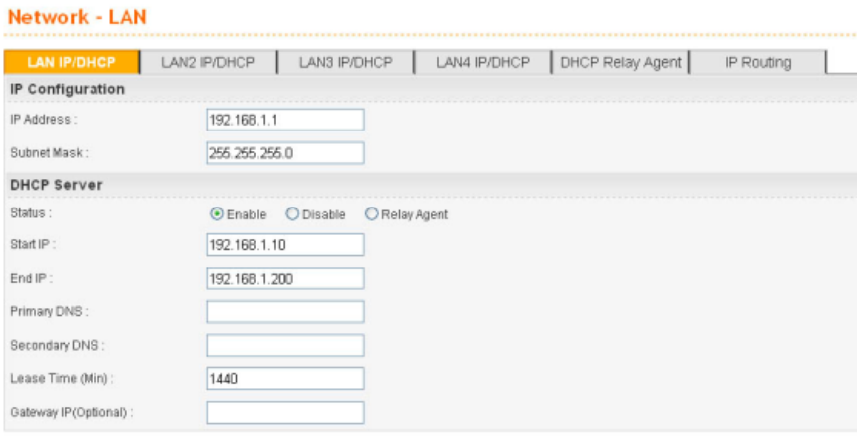


Figure 5-8. LAN IP configuration

9. In the Network setting, input the subnet 192.168.2.0 to LAN2. For example, the VLAN6 LAN IP is 192.168.2.1 and Subnet Mask is 255.255.255.0. Then, users in the Engineer Department can set IP address from 192.168.2.2 to 192.168.2.254.

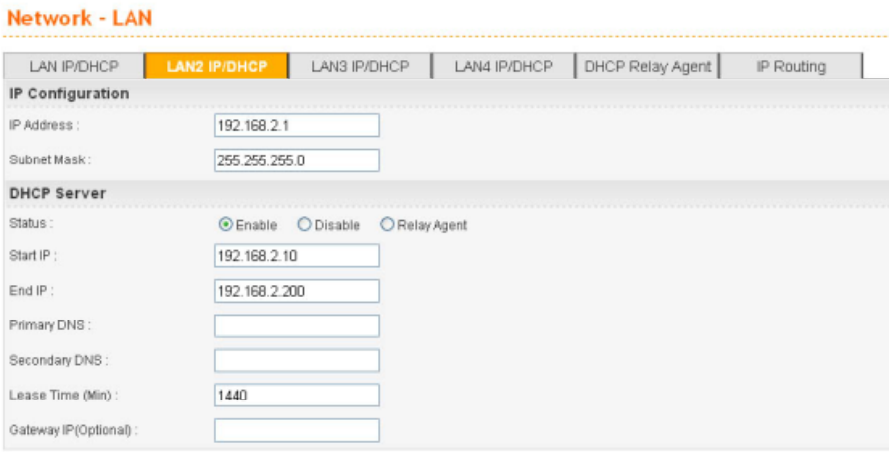


Figure 5-9. LAN2 IP configuration

10. In the Network setting, input the subnet 192.168.3.0 to LAN3. For example, the VLAN7 LAN IP is 192.168.3.1 and Subnet Mask is 255.255.255.0. Then, users in the Engineer Department can set IP address from 192.168.3.2 to 192.168.3.254.

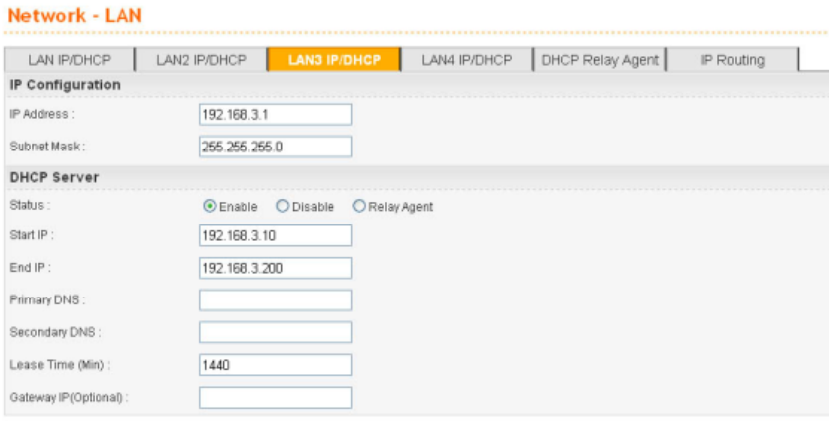


Figure 5-10. LAN3 IP configuration

11. In the Network setting, input the subnet 192.168.4.0 to LAN4. For example, the VLAN8 LAN IP is 192.168.4.1 and Subnet Mask is 255.255.255.0. Then, users in the Engineer Department can set IP address from 192.168.4.2 to 192.168.4.254.

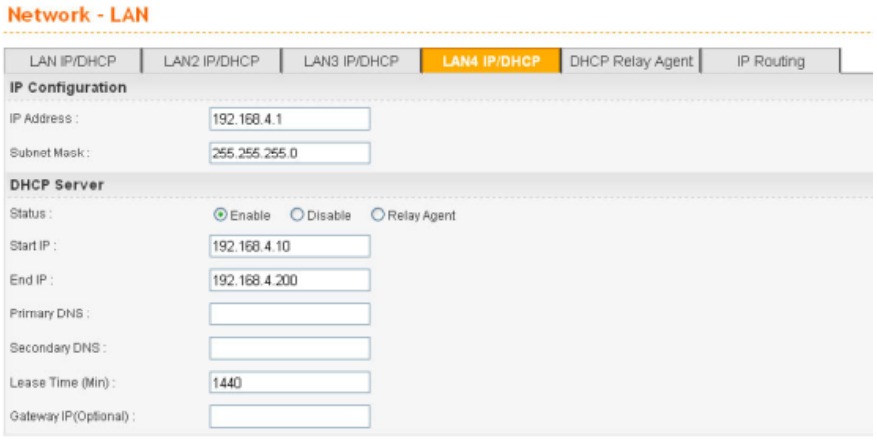


Figure 5-11. LAN4 IP configuration

Application 2:

A company wants to separate the Engineer Department and Other Departments to limit their communication to ensure the engineering data. So, we defined two VLANs that are VLAN5 and VLAN6, the subnet of VLAN5 is 192.168.1.0, and the subnet of VLAN6 is 192.168.2.0.

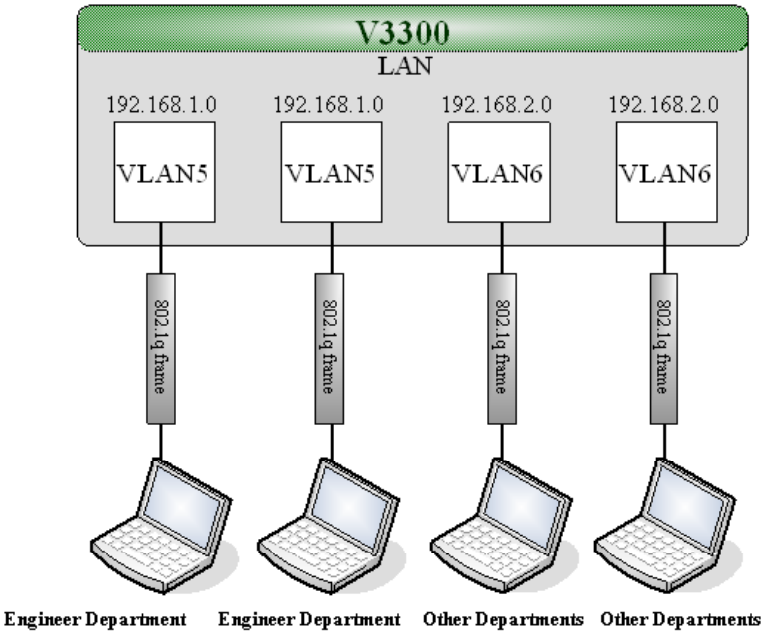


Figure 5-12. Application 2

Configuration:

1. Block LAN-to-LAN communication.
2. Create VLAN5 and VLAN6 Groups.
3. In the VLAN5, input "5" to VLAN ID. In the Member field, choose p1 and p2. Then choose the "Tagged" for Frame Tag Operation in p1 and p2. We can ignore the PVID (Port VLAN ID), because 802.1q tag will be inserted to the frame from the PC of Engineer Department.
4. In the VLAN6, input "6" to VLAN ID. In the Member field, choose p3 and p4. Then choose the "Tagged" for Frame Tag Operation in p3 and p4. We can ignore the PVID (Port VLAN ID), because 802.1q tag will be inserted to the frame from other departments.
5. After applying the settings, the web page will be redirected to "reboot" web page. User can ignore it and continue to configure the Network setting. After Network setting, then you can do the reboot procedure.

Note After rebooting, the tagged ports will only communicate with 802.1Q tagged devices.

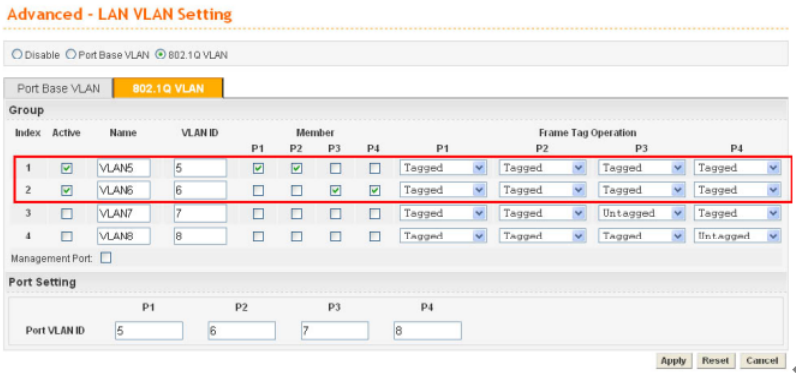


Figure 5-13. LAN VLAN configuration

6. In the Network setting, input the subnet 192.168.1.0 to LAN. For example, the VLAN5 LAN IP is 192.168.1.1 and Subnet Mask is 255.255.255.0. Then, users in the Engineer Department can set IP address from 192.168.1.2 to 192.168.1.254.

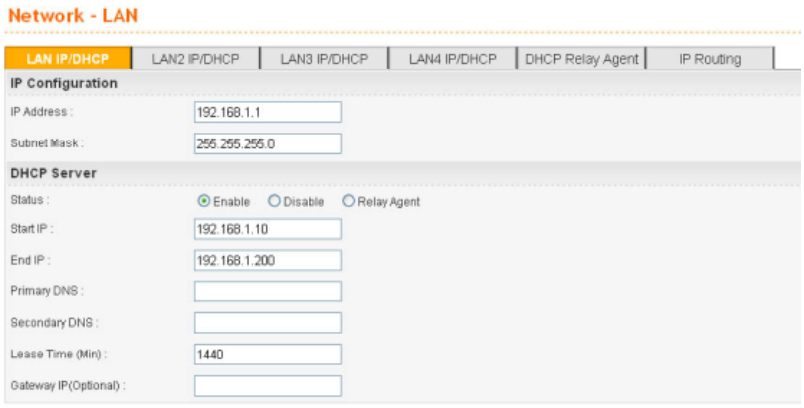


Figure 5-14. LAN IP configuration

7. In the Network setting, input the subnet 192.168.2.0 to LAN2. For example, the VLAN6 LAN IP is 192.168.2.1 and Subnet Mask is 255.255.255.0. Then, users in the other departments can set IP address from 192.168.2.2 to 192.168.2.254.

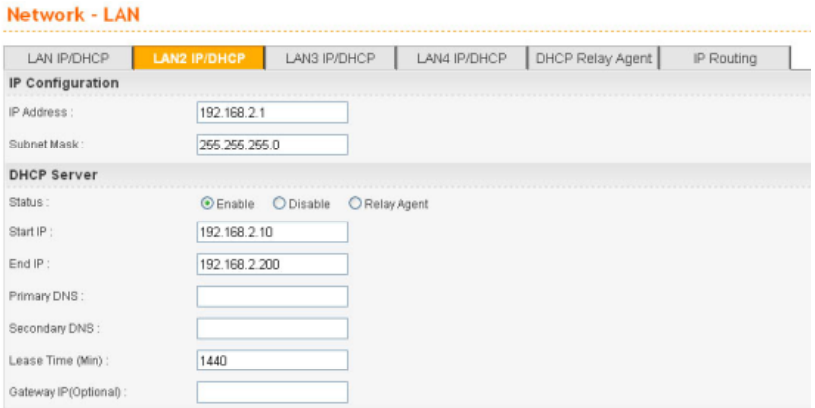


Figure 5-15. LAN2 IP configuration

Application 3:

There are four companies in the same building. They share the broadband network and use the Vigor 3300V router to achieve the load balance, security, and VoIP features. So, we defined four VLANs that are VLAN5, VLAN6, VLAN7 and VLAN8, the subnet of VLAN5 is 192.168.1.0, the subnet of VLAN6 is 192.168.2.0, the subnet of VLAN7 is 192.168.3.0, and the subnet of VLAN8 is 192.168.4.0.

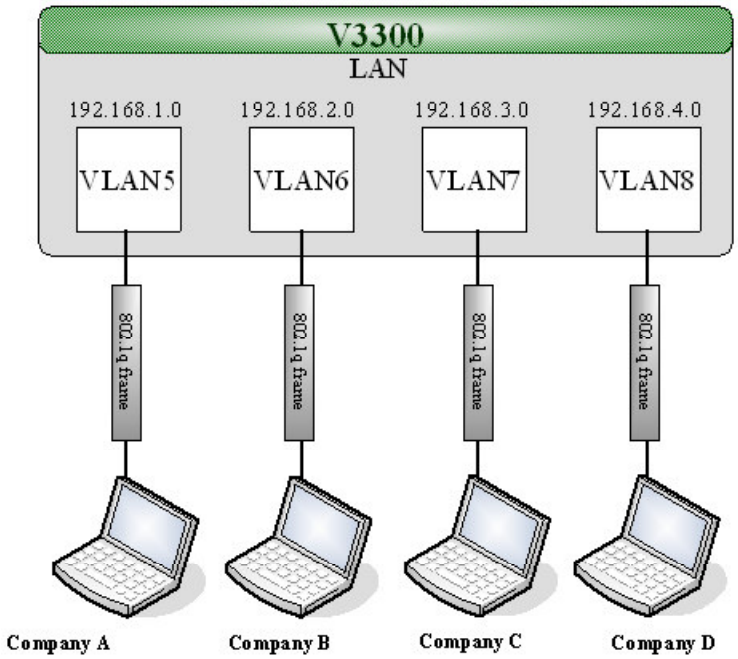


Figure 5-16. Application 3

Configuration:

1. Block LAN-to-LAN communication.
2. Create VLAN5, VLAN6, VLAN7 and VLAN8 Groups.
3. In the VLAN5, input “5” to VLAN ID. In the Member field, choose p1. Then choose the “Tagged” for Frame Tag Operation in p1. We can ignore the PVID (Port VLAN ID), because 802.1q tag will be inserted to the frame from the PC of company A.
4. In the VLAN6, input “6” to VLAN ID. In the Member field, choose p2. Then choose the “Tagged” for Frame Tag Operation in p2. We can ignore the PVID (Port VLAN ID), because 802.1q tag will be inserted to the frame from company B.
5. In the VLAN7, input “7” to VLAN ID. In the Member field, choose p3. Then choose the “Tagged” for Frame Tag Operation in p3. We can ignore the PVID (Port VLAN ID), because 802.1q tag will be inserted to the frame from the PC of company C.
6. In the VLAN8, input “8” to VLAN ID. In the Member field, choose p4. Then choose the “Tagged” for Frame Tag Operation in p4. We can ignore the PVID

(Port VLAN ID), because 802.1q tag will be inserted to the frame from company D.

7. After applying the settings, the web page will be redirect to “reboot” web page. User can ignore it and continue to configure the Network setting. After Network setting, then you can do the reboot procedure.

Note After rebooting, the tagged ports will only communicate with 802.1Q tagged devices.

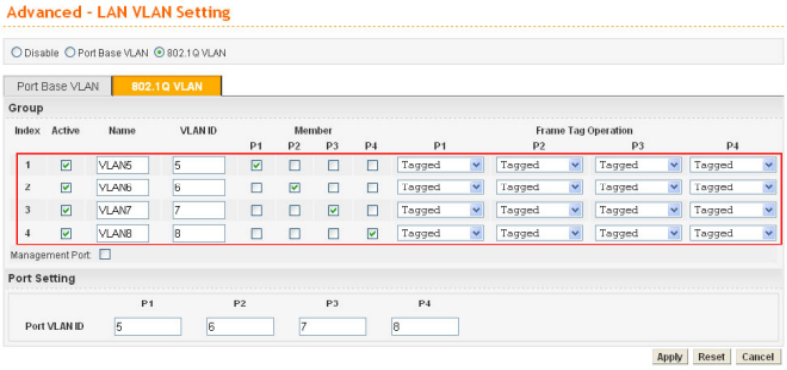


Figure 5-17. LAN VLAN setting

The network configuration is the same with application 1. Please refer to application 1 part.

Application 4:

A company wants to separate the Engineer Department, Sales Department, Marketing Department and guest to limit their communication with any department to ensure the security. So, we defined four VLANs that are VLAN5, VLAN6, VLAN7 and VLAN8, the subnet of VLAN5 is 192.168.1.0, the subnet of VLAN6 is 192.168.2.0, the subnet of VLAN7 is 192.168.3.0, and the subnet of VLAN8 is 192.168.4.0. However, the notebook of guest does not support 802.1Q.

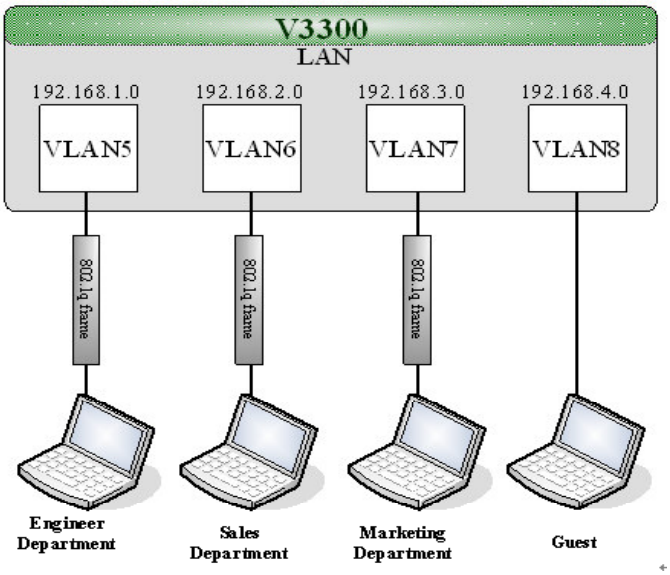


Figure 5-18. Application 4

Configuration:

1. Block LAN-to-LAN communication.
2. Create VLAN5, VLAN6, VLAN7 and VLAN8 Groups.
3. In the VLAN5, input “5” to VLAN ID. In the Member field, choose p1. Then choose the “Tagged” for Frame Tag Operation in p1. We can ignore the PVID (Port VLAN ID), because 802.1q tag will be inserted to the frame from the PC of Engineer Department.
4. In the VLAN6, input “6” to VLAN ID. In the Member field, choose p2. Then choose the “Tagged” for Frame Tag Operation in p2. We can ignore the PVID (Port VLAN ID), because 802.1q tag will be inserted to the frame from Engineer Department.
5. In the VLAN7, input “7” to VLAN ID. In the Member field, choose p3. Then choose the “Tagged” for Frame Tag Operation in p3. We can ignore the PVID (Port VLAN ID), because 802.1q tag will be inserted to the frame from the PC of Engineer Department.
6. In the VLAN8, input “8” to VLAN ID. In the Member field, choose p4. Then choose the “Untagged” for Frame Tag Operation in p4. We should configure the PVID to “8”, because the device does not support 802.1Q VLAN.
7. After applying the settings, the web page will be redirected to “reboot” web page. User can ignore it and continue to configure the Network setting. After Network setting, then you can do the reboot procedure.

Note After rebooting, the tagged ports will only communicate with 802.1Q tagged devices.

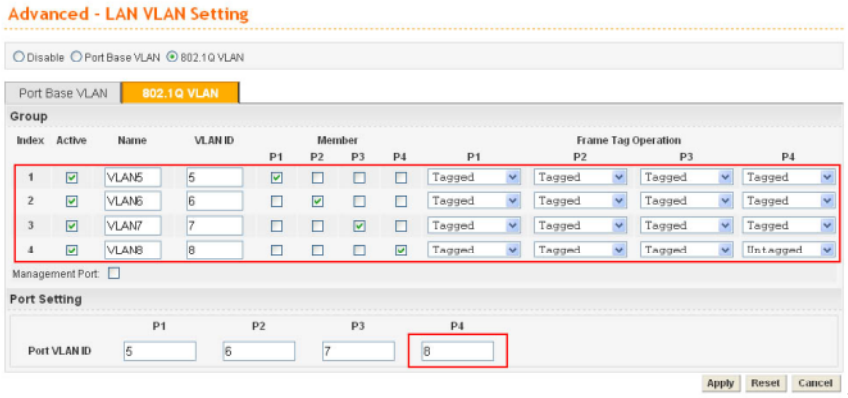


Figure 5-19. LAN VLAN setting

The network configuration is the same with application 1. Please refer to application 1 part.

Application 5:

A company wants to separate the Engineer Department, Sales Department, Marketing Department and other departments to limit their communication with each other to ensure the security. Many employees of the company use some switches supported 802.1Q

VLAN to expand the network. So, we defined four VLANs that are VLAN5, VLAN6, VLAN7 and VLAN8, each LAN port is Trunk port which supports multiple VLAN, the subnet of VLAN5 is 192.168.1.0, the subnet of VLAN6 is 192.168.2.0, the subnet of VLAN7 is 192.168.3.0, and the subnet of VLAN8 is 192.168.4.0.

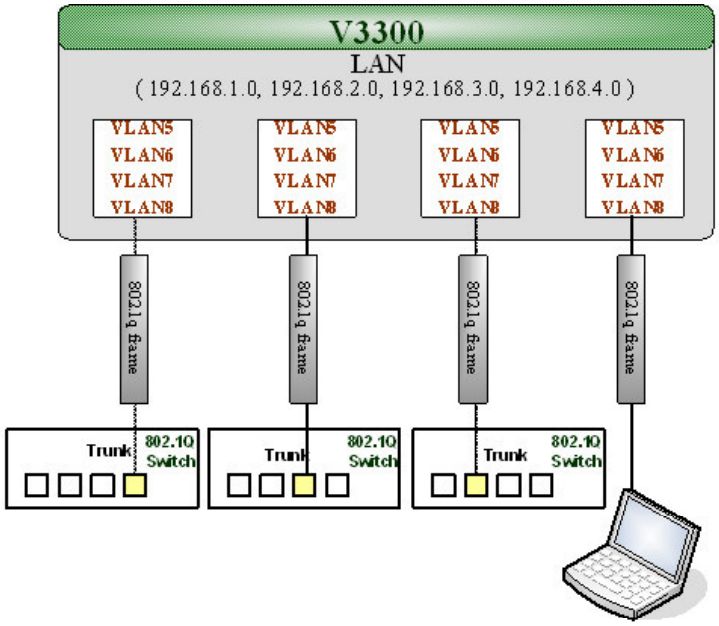


Figure 5-20. Application 5

Configuration:

1. Block LAN-to-LAN communication.
2. Create VLAN5, VLAN6, VLAN7 and VLAN8 Groups.
3. In the VLAN5, input “5” to VLAN ID. In the Member field, choose p1, p2, p3 and p4. Then choose the “Tagged” for Frame Tag Operation in p1, p2, p3 and p4. We can ignore the PVID (Port VLAN ID), because 802.1q tag will be inserted to the frame from the switch.
4. In the VLAN6, input “6” to VLAN ID. In the Member field, choose p1, p2, p3 and p4. Then choose the “Tagged” for Frame Tag Operation in p1, p2, p3 and p4. We can ignore the PVID (Port VLAN ID), because 802.1q tag will be inserted to the frame from switch.
5. In the VLAN7, input “7” to VLAN ID. In the Member field, choose p1, p2, p3 and p4. Then choose the “Tagged” for Frame Tag Operation in p1, p2, p3 and p4. We can ignore the PVID (Port VLAN ID), because 802.1q tag will be inserted to the frame from the switch.
6. In the VLAN8, input “8” to VLAN ID. In the Member field, choose p1, p2, p3 and p4. Then choose the “Tagged” for Frame Tag Operation in p1, p2, p3 and p4. We can ignore the PVID (Port VLAN ID), because 802.1q tag will be inserted to the frame from some users.
7. After applying the settings, the web page will be redirected to “reboot” web page. User can ignore it and continue to configure the Network setting. After Network setting, then you can do the reboot procedure.

Note After rebooting, the tagged ports will only communicate with 802.1Q tagged devices.

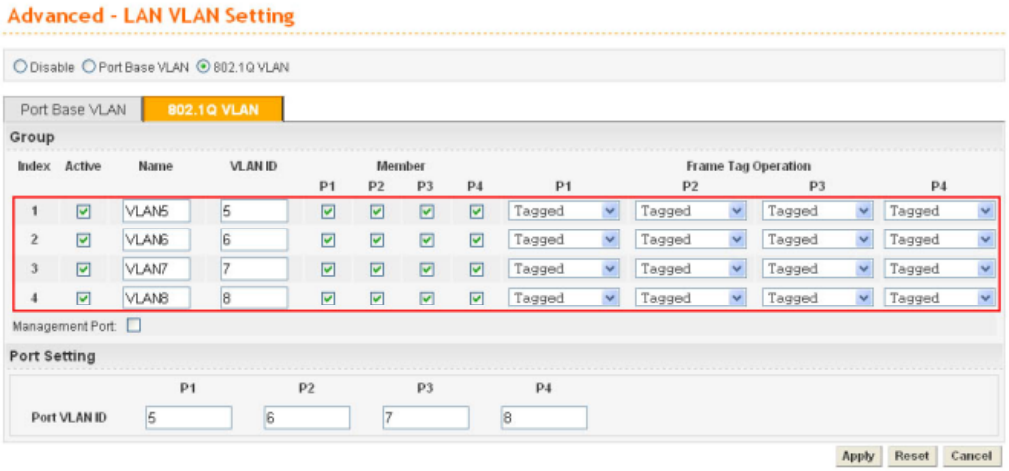


Figure 5-21. LAN VLAN setting

The network configuration is the same with application 1. Please refer to application 1 part.