P-660 series

Support Notes

(For P-660R/H/HW-T1/T3/T7)

Version1.0
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ZyNOS FAQ

1. What is ZyNOS?

ZyNOS is ZyXEL's proprietary Network Operating System. It is the platform on all Prestige routers that delivers network services and applications. It is designed in a modular fashion so it is easy for developers to add new features. New ZyNOS software upgrades can be easily downloaded from our FTP sites as they become available.

2. How do I access the Prestige SMT menu?

The SMT interface is a menu driven interface, which can be accessed via a RS232 console or a Telnet connection. To access the Prestige via SMT console port, a computer equipped with communication software such as HyperTerminal must be configured with the following parameters.

- VT100 terminal emulation
- 9600bps baud rate
- N81 data format (No Parity, 8 data bits, 1 stop bit)

The default console port baud rate is 9600bps, you can change it to 115200bps in Menu 24.2.2 to speed up the SMT access.

3. What is the default console port baud rate? Moreover, how do I change it?

The default console port baud rate is 9600bps. When configuring the SMT, please make sure the terminal baud rate is also 9600bps. You can change the console baud rate from 9600bps to 115200bps in SMT menu 24.2.2.

4. How do I update the firmware and configuration file?

You can upload the firmware and configuration file to Prestige using console port, FTP or TFTP client software. You CAN NOT upload the firmware and configuration file via Telnet because the Telnet connection will be dropped during uploading the firmware. Please do not power off the router right after the FTP or TFTP uploading is finished, the router will upload the firmware to its flash at this moment.

5. How do I upload the ZyNOS firmware code via console?

The procedure for uploading ZyNOS via console is as follows.

a. Enter debug mode when powering on the Prestige using a terminal emulator
b. Enter 'ATUR' to start the uploading
c. Use X-modem protocol to transfer the ZyNOS code
d. Enter 'ATGO' to restart the Prestige

6. How do I upgrade/backup the ZyNOS firmware by using TFTP client program via LAN?

The Prestige allows you to transfer the firmware to Prestige by using TFTP program via LAN. The procedure for uploading ZyNOS via TFTP is as follows.

a. Use the TELNET client program in your PC to login to your Prestige.
b. Enter CI command **'sys stdio 0'** in menu 24.8 to disable console idle timeout
c. To upgrade firmware, use TFTP client program to put firmware in file **'ras'** in the Prestige. After data transfer is finished, the Prestige will program the upgraded firmware into FLASH ROM and reboot itself.
d. To backup your firmware, use the TFTP client program to get file **'ras'** from the Prestige.

7. How do I upload ROMFILE via console port?

In some situations, you may need to upload the ROMFILE, such as losing the system password, or the need of resetting SMT to factory default.

The procedure for uploading ROMFILE via the console port is as follows.

a. Enter debug mode when powering on the Prestige using a terminal emulator
b. Enter **'ATLC'** to start the uploading
c. Use X-modem protocol to transfer ROMFILE
d. Enter **'ATGO'** to restart the Prestige

8. How do I restore SMT configurations by using TFTP client program via LAN?

a. Use the TELNET client program in your PC to login to your Prestige.
b. Enter CI command **'sys stdio 0'** in menu 24.8 to disable console idle timeout.
c. To backup the SMT configurations, use TFTP client program to get file **'rom-0'** from the Prestige.
d. To restore the SMT configurations, use the TFTP client program to put your configuration in file **rom-0** in the Prestige.

9. What should I do if I forget the system password?

In case you forget the system password, you can erase the current configuration and restore factory defaults in three way.

a. Use the Web Configurator.
b. Use the **RESET button** on the rear panel of P-660 to reset the router. After the router is reset, the LAN IP address and the SMT password will be reset to **'192.168.1.1'** and **'1234'**. So now you can reach the router through console port or telnet again.
c. Upload the default ROMFILE via console port to reset the SMT to factory default. After uploading ROMFILE, the default system password is **'1234'**.

10. How to use the Reset button?

a. Turn your Prestige off and then on. Make sure the **SYS** led is on (not blinking)
b. Press the **RESET** button for five seconds and then release it. If the **SYS** LED begins to blink, the defaults have been restored and the Prestige restarts.

11.What is SUA? When should I use SUA?

SUA (Single User Account) is a unique feature supported by Prestige router which allows multiple people to access Internet concurrently for the cost of a single user account.

When Prestige acting as SUA receives a packet from a local client destined for the outside Internet, it replaces the source address in the IP packet header with its own address and the source port in the TCP or UDP header with another value chosen out of a local pool. It then recomputes the appropriate header checksums and forwards the packet to the Internet as if it is originated from Prestige using the IP address assigned by ISP. When reply packets from the external Internet are received by Prestige, the original IP source address and TCP/UDP source port numbers are written into the destination fields of the packet (since it is now moving in the opposite direction), the checksums are recomputed, and the packet is delivered to its true destination. This is because SUA keeps a table of the IP addresses and port numbers of the local systems currently using it.

12. What is the difference between SUA and Multi-NAT?

SUA (Single User Account) in previous ZyNOS versions is a NAT set with 2 rules, Many-to-One and Server. The P-660 now has **Full Feature** NAT support to map global IP addresses to local IP addresses of clients or servers. With multiple global IP addresses, multiple severs of the same type (e.g., FTP servers) are allowed on the LAN for outside access. In previous ZyNOS versions that supported SUA 'visible' servers had to be of different types. The P-660 supports NAT sets on a remote node basis. They are reusable, but only one set is allowed for each remote node. The P-660 supports 8 sets since there are 8 remote node. The default SUA (Read Only) Set in menu 15.1.255 is a convenient, pre-configured, read only, Many-to-One mapping set, sufficient for most purposes and helpful to people already familiar with SUA in previous ZyNOS versions.

13. Is it possible to access a server running behind SUA from the outside Internet? If possible, how?

Yes, it is possible because P-660 delivers the packet to the local server by looking up to a SUA server table. Therefore, to make a local server accessible to the outside users, the port number and the inside IP address of the server must be configured in Menu 15.2.1 - **NAT Server Setup**.

14. When do I need Multi-NAT?

- Make local server accessible from outside Internet

When NAT is enabled the local computers are not accessible from outside. You can use Multi-NAT to make an internal server accessible from outside.

- Support Non-NAT Friendly Applications

Some servers providing Internet applications such as some mIRC servers do not allow users to login using the same IP address. Thus, users on the same network can not login to the same server simultaneously. In this case it is better to use Many-to-Many No Overload or One-to-One NAT mapping types, thus each user login to the server using a unique global IP address.

15. What IP/Port mapping does Multi-NAT support?

NAT supports five types of IP/port mapping. They are: One to One, Many to One, Many to Many Overload, Many to Many No Overload and Server. The details of the mapping between ILA and IGA are described as below. Here we define the local IP addresses as the Internal Local Addresses (ILA) and the global IP addresses as the Inside Global Address (IGA),

1. **One to One**

In One-to-One mode, the P-660 maps one ILA to one IGA.

2. **Many to One**

In Many-to-One mode, the P-660 maps multiple ILA to one IGA. This is equivalent to SUA (i.e., PAT, port address translation), ZyXEL's Single User Account feature that previous ZyNOS routers supported (the SUA only option in today's routers).

3. **Many to Many Overload**

In Many-to-Many Overload mode, the P-660 maps the multiple ILA to shared IGA.

4. **Many One-to-One**

In Many One-to-One mode, the P-660 maps each ILA to unique IGA.

5. **Server**

In Server mode, the P-660 maps multiple inside servers to one global IP address. This allows us to specify multiple servers of different types behind the NAT for outside access. Note, if you want to map each server to one unique IGA please use the One-to-One mode.

The following table summarizes these types.

NAT Type	IP Mapping
One-to-One	ILA1<--->IGA1

Many-to-One (SUA/PAT)	ILA1<--->IGA1
	ILA2<--->IGA1
	...

Many-to-Many Overload	ILA1<--->IGA1
	ILA2<--->IGA2
	ILA3<--->IGA1
	ILA4<--->IGA2
	...

Many
One-to-One
	ILA1<--->IGA1
	ILA2<--->IGA2
	ILA3<--->IGA3
	ILA4<--->IGA4
	...

Server	Server 1 IP<--->IGA1 Server 2 IP<--->IGA1

16. How many network users can the SUA/NAT support?

The Prestige does not limit the number of the users but the number of the sessions. The P-660 supports 1024/2048 sessions that you can use the **'ip nat iface wanif0 st'** command in menu 24.8 to view the current active sessions.

17. What are Device filters and Protocol filters?

In ZyNOS, the filters have been separated into two groups. One group is called 'device filter group', and the other is called 'protocol filter group'. Generic filters belong to the 'device filter group', TCP/IP and IPX filters belong to the 'protocol filter group'.

18. Why can't I configure device filters or protocol filters?

In ZyNOS, you can not mix different filter groups in the same filter set.

19. How can I protect against IP spoofing attacks?

The Prestige's filter sets provide a means to protect against IP spoofing attacks. The basic scheme is as follows:

For the input data filter:

- Deny packets from the outside that claim to be from the inside
- Allow everything that is not spoofing us

Filter rule setup:

- Filter type =TCP/IP Filter Rule
- Active =Yes
- Source IP Addr =a.b.c.d
- Source IP Mask =w.x.y.z
- Action Matched =Drop
- Action Not Matched =Forward

Where a.b.c.d is an IP address on your local network and w.x.y.z is your netmask:

For the output data filters:

- Deny bounceback packet
- Allow packets that originate from us

Filter rule setup:

- Filter Type =TCP/IP Filter Rule
- Active =Yes
- Destination IP Addr =a.b.c.d
- Destination IP Mask =w.x.y.z
- Action Matched =Drop
- Action No Matched =Forward

Where a.b.c.d is an IP address on your local network and w.x.y.z is your netmask.

General FAQ

1. How can I manage P-660?

- Menu driven user interface for easy network management Local and remote console management
- Web configurator
- Telnet remote management
- TFTP (Trivial File Transfer Protocol) and FTP firmware upgrade and configuration backup and restore

2. What is the default user name and password to loging web configurator?

The default user name is **'admin'** and password is **'1234'**. You can change the password when login to web configurator in the Advanced Setup->Password menu. **Please record your new password whenever you change it. The system will lock you out if you have forgotten your password.**

3. How do I know the P-660's WAN IP address assigned by the ISP?

You can view **"My WAN IP <from ISP> : 200.1.1.1"** shown in menu 24.1 to check this IP address.

4. What is the micro filter or splitter used for?

Generally, the voice band uses the lower frequency ranging from 0 to 4KHz, while ADSL data transmission uses the higher frequency. The micro filter acts as a low-pass filter for your telephone set to ensure that ADSL transmissions do not interfere with your voice transmissions. For the details about how to connect the micro filter please refer to the user's manual.

5. The P-660 supports Bridge and Router mode, what's the difference between them ?

When the ISP limits some specific computers to access Internet, that means only the traffic to/from these computers will be forwarded and the other will be filtered. In this case, we use bridge mode which works as an ADSL modem to connect to the ISP. The ISP will generally give one Internet account and limit only one computer to access the Internet.

For most Internet users having multiple computers want to share an Internet account for Internet access, they have to add another Internet sharing device, like a router. In this case, we use the router mode which works as a general Router plus an ADSL Modem.

6. How do I know I am using PPPoE?

PPPoE requires a user account to login to the provider's server. If you need to configure a user name and password on your computer to connect to the ISP you are probably using PPPoE. If you are simply connected to the Internet when you turn on your computer, you probably are not. You can also check your ISP or the information sheet given by the ISP. Please choose PPPoE as the encapsulation type in the P-660 if the ISP uses PPPoE.

7. Why does my provider use PPPoE?

PPPoE emulates a familiar Dial-Up connection. It allows your ISP to provide services using their existing network configuration over the broadband connections. Besides, PPPoE supports a broad range of existing applications and service including authentication, accounting, secure access and configuration management.

8. What is DDNS?

The Dynamic DNS service allows you to alias a dynamic IP address to a static hostname, allowing your computer to be more easily accessed from various locations on the Internet. To use the service, you must first apply an account from several free Web servers such as http://www.dyndns.org/.

Without DDNS, we always tell the users to use the WAN IP of the P-660 to reach our internal server. It is inconvenient for the users if this IP is dynamic. With DDNS supported by the P-660, you apply a DNS name (e.g., www.zyxel.com.tw) for your server (e.g., Web server) from a DDNS server. The outside users can always access the web server using the www.zyxel.com.tw regardless of the WAN IP of the P-660.

When the ISP assigns the P-660 a new IP, the P-660 updates this IP to DDNS server so that the server can update its IP-to-DNS entry. Once the IP-to-DNS table in the DDNS server is updated, the DNS name for your web server (i.e., www.zyxel.com.tw) is still usable.

9. When do I need DDNS service?

When you want your internal server to be accessed by using DNS name rather than using the dynamic IP address we can use the DDNS service. The DDNS server allows to alias a dynamic IP address to a static hostname. Whenever the ISP assigns you a new IP, the P-660 sends this IP to the DDNS server for its updates.

10. What is DDNS wildcard? Does the P-660 support DDNS wildcard?

Some DDNS servers support the wildcard feature which allows the hostname, *.yourhost.dyndns.org, to be aliased to the same IP address as yourhost.dyndns.org. This feature is useful when there are multiple servers inside and you want users to be able to use things such as www.yourhost.dyndns.org and still reach your hostname.

Yes, the P-660 supports DDNS wildcard that http://www.dyndns.org/ supports. When using wildcard, you simply enter yourhost.dyndns.org in the Host field in Menu 1.1 Configure Dynamic DNS.

11. Can the P-660's SUA handle IPSec packets sent by the IPSec gateway?

Yes, the P-660's SUA can handle IPSec ESP Tunneling mode. We know when packets go through SUA, SUA will change the source IP address and source port for the host. To pass IPSec packets, SUA must understand the ESP packet with protocol number 50, replace the source IP address of the IPSec gateway to the router's WAN IP address. However, SUA should not change the source port of the UDP packets which are used for key managements. Because the remote gateway checks this source port during connections, the port thus is not allowed to be changed.

12. How do I setup my P-660 for routing IPSec packets over SUA?

For outgoing IPSec tunnels, no extra setting is required.

For forwarding the inbound IPSec ESP tunnel, A 'Default' server set in menu 15.2.1 is required. It is because SUA makes your LAN appear as a single machine to the outside world. LAN users are invisible to outside users. So, to make an internal server for outside access, we must specify the service port and the LAN IP of this server in Menu 15. Thus SUA is able to forward the incoming packets to the requested service behind SUA and the outside users access the server using the P-660's WAN IP address. So, we have to configure the internal IPsec as a default server (unspecified service port) in menu 15.2.1 when it acts a server gateway.

13. What is Traffic Shaping?

Traffic Shaping is a feature in the P-660. It allocates the bandwidth to WAN dynamically and aims at boosting the efficiency of the bandwidth. If there are serveral VCs in the P-660 but only one VC activated at one time, the P-660 allocates all the Bandwidth to the VC and the VC gets full bandwidth. If another VCs are avtivated later, the bandwidth is yield to other VCs after ward.

14. What do the parameters (PCR, SCR, MBS) mean?

Traffic shaping parameters (PCR, SCR, MBS) can be set in Menu 4 and Menu 11.6 and is valid for both incoming and outgoing direction since G.shdsl is symmetric.
Peak Cell Rate(PCR): The maximum bandwidth allocated to this connection. The VC connection throughput is limited by PCR.
Sustainable Cell Rate(SCR): The least guaranteed bandwidth of a VC. When there are multi-VCs on the same line, the VC throughput is guaranteed by SCR.
Maximum Burst Size(MBS): The amount of cells transmitted through this VC at the Peak Cell Rate before yielding to other VCs. Total bandwidth of the line is dedicated to single VC if there is only one VC on the line. However, as the other VC asking the bandwidth, the MBS defines the maximum number of cells transmitted via this VC with Peak Cell rate before yielding to other VCs.

The P-660 holds the parameters for shaping the traffic among its virtual channels. If you do not need traffic shaping, please set SCR = 0, MBS = 0 and PCR as the maximum value according to the line rate (for example, 2.3 Mbps line rate will result PCR as 5424 cell/sec.)

15.Why do we perform traffic shaping in the P-660 ?

The P-660 must manage traffic fairly and provide bandwidth allocation for different sorts of applications, such as voice, video, and data. All applications have their own natural bit rate. Large data transactions have a fluctuating natural bit rate. The P-660 is able to support variable traffic among different virtual connections. Certain traffic may be discarded if the virtual connection experiences congestion. Traffic shaping defines a set of actions taken by the P-660 to avoid congestion; traffic shaping takes measures to adapt to unpredictable fluctuations in traffic flows and other problems among virtual connections.

ADSL FAQ

1. **How does ADSL compare to Cable modems?**

ADSL provides a dedicated service over a single telephone line; cable modems offer a dedicated service over a shared media. While cable modems have greater downstream bandwidth capabilities (up to 30 Mbps), that bandwidth is shared among all users on a line, and will therefore vary, perhaps dramatically, as more users in a neighborhood get online at the same time. Cable modem upstream traffic will in many cases be slower than ADSL, either because the particular cable modem is inherently slower, or because of rate reductions caused by contention for upstream bandwidth slots. The big difference between ADSL and cable modems, however, is the number of lines available to each. There are no more than 12 million homes passed today that can support two-way cable modem transmissions, and while the figure also grows steadily, it will not catch up with telephone lines for many years. Additionally, many of the older cable networks are not capable of offering a return channel; consequently, such networks will need significant upgrading before they can offer high bandwidth services.

2. What is the expected throughput?

In our test, we can get about 1.6Mbps data rate on 15Kft using the 26AWG loop. The shorter the loop, the better the throughput. Besides, please do not stay in menu 24.1 it will slow down the throughput.

3. What is the micro filter used for?

Generally, the voice band uses the lower frequency ranging from 0 to 4KHz, while ADSL data transmission uses the higher frequency. The micro filter acts as a low-pass filter for your telephone set to ensure that ADSL transmissions do not interfere with your voice transmissions. For the details about how to connect the micro filter please refer to the user's manual.

4. How do I know the ADSL line is up?

You can see the DSL LED on the P-660's front panel is on when the ADSL physical layer is up.

5. How does the P-660 work on a noisy ADSL?

Depending on the line quality, the P-660 uses "Fall Back" and "Fall Forward" to automatically adjust the date rate.

6. Does the VC-based multiplexing perform better than the LLC-based multiplexing?

Though the LLC-based multiplexing can carry multiple protocols over a single VC, it requires extra header information to identify the protocol being carried on the virtual circuit (VC). The VC-based multiplexing needs a separate VC for carrying each protocol but it does not need the extra headers. Therefore, the VC-based multiplexing is more efficient.

7. How do I know the details of my ADSL line statistics?

You can use the following CI commands to check the ADSL line statistics.

```
CI> wan adsl perfdata
CI> wan adsl status
CI> sys log disp
CI> wan adsl linedata far
CI> wan adsl linedata near
```

8.What are the possible reasons when the ADSL link is down?

The physical ADSL line may not be up if:

(1) The DSLAM is not Alcatel.
(2) If it is Alcatel, the firmware version should be above 3.1.

9.What are the signaling pins of the ADSL connector?

The signaling pins on the P-660's ADSL connector are pin 3 and pin 4. The middle two pins for a RJ11 cable.

Firewall FAQ (For P-660 H/HW Only)

General

1. What is a network firewall?

A firewall is a system or group of systems that enforces an access-control policy between two networks. It may also be defined as a mechanism used to protect a trusted network from an untrusted network. The firewall can be thought of two mechanisms. One to block the traffic, and the other to permit traffic.

2. What makes P-660 secure?

The P-660 is pre-configured to automatically detect and thwart Denial of Service (DoS) attacks such as Ping of Death, SYN Flood, LAND attack, IP Spoofing, etc. It also uses stateful packet inspection to determine if an inbound connection is allowed through the firewall to the private LAN. The P-660supports Network Address Translation (NAT), which translates the private local addresses to one or multiple public addresses. This adds a level of security since the clients on the private LAN are invisible to the Internet.

3. What are the basic types of firewalls?

Conceptually, there are three types of firewalls:

1. Packet Filtering Firewall
2. Application-level Firewall
3. Stateful Inspection Firewall

Packet Filtering Firewalls generally make their decisions based on the header information in individual packets. These headers information include the source, destination addresses and ports of the packets.

Application-level Firewalls generally are hosts running proxy servers, which permit no traffic directly between networks, and which perform logging and auditing of traffic passing through them. A proxy server is an application gateway or circuit-level gateway that runs on top of general operating system such as UNIX or Windows NT. It hides valuable data by requiring users to communicate with secure systems by mean of a proxy. A key drawback of this device is performance.

Stateful Inspection Firewalls restrict access by screening data packets against defined access rules. They make access control decisions based on IP address and protocol. They also 'inspect' the session data to assure the integrity of the connection and to adapt to dynamic protocols. The flexible nature of Stateful Inspection firewalls generally provides the best speed and transparency, however, they may lack the granular application level access control or caching that some proxies support.

4. What kind of firewall is the P-660?

1. The P-660's firewall inspects packets contents and IP headers. It is applicable to all protocols, that understands data in the packet is intended for other layers, from network layer up to the application layer.
2. The P-660's firewall performs stateful inspection. It takes into account the state of connections it handles so that, for example, a legitimate incoming packet can be matched with the outbound request for that packet and allowed in. Conversely, an incoming packet masquerading as a response to a nonexistent outbound request can be blocked.
3. The P-660's firewall uses session filtering, i.e., smart rules, that enhance the filtering process and control the network session rather than control individual packets in a session.
4. The P-660's firewall is fast. It uses a hashing function to search the matched session cache instead of going through every individual rule for a packet.
5. The P-660's firewall provides email service to notify you for routine reports and when alerts occur.

5. Why do you need a firewall when your router has packet filtering and NAT built-in?

With the spectacular growth of the Internet and online access, companies that do business on the Internet face greater security threats. Although packet filter and NAT restrict access to particular computers and networks, however, for the other companies this security may be insufficient, because packets filters typically cannot maintain session state. Thus, for greater security, a firewall is considered.

6. What is Denials of Service (DoS) attack?

Denial of Service (DoS) attacks are aimed at devices and networks with a connection to the Internet. Their goal is not to steal information, but to disable a device or network so users no longer have access to network resources.

There are four types of DoS attacks:

1. Those that exploits bugs in a TCP/IP implementation such as Ping of Death and Teardrop.
2. Those that exploits weaknesses in the TCP/IP specification such as SYN Flood and LAND Attacks.
3. Brute-force attacks that flood a network with useless data such as Smurf attack.

4. IP Spoofing

7. What is Ping of Death attack?

Ping of Death uses a 'PING' utility to create an IP packet that exceeds the maximum 65535 bytes of data allowed by the IP specification. The oversize packet is then sent to an unsuspecting system. Systems may crash, hang, or reboot.

8. What is Teardrop attack?

Teardrop attack exploits weakness in the reassemble of the IP packet fragments. As data is transmitted through a network, IP packets are often broken up into smaller chunks. Each fragment looks like the original packet except that it contains an offset field. The Teardrop program creates a series of IP fragments with overlapping offset fields. When these fragments are reassembled at the destination, some systems will crash, hang, or reboot.

9. What is SYN Flood attack?

SYN attack floods a targeted system with a series of SYN packets. Each packet causes the targeted system to issue a SYN-ACK response, While the targeted system waits for the ACK that follows the SYN-ACK, it queues up all outstanding SYN-ACK responses on what is known as a backlog queue. SYN-ACKs are moved off the queue only when an ACK comes back or when an internal timer (which is set a relatively long intervals) terminates the TCP three-way handshake. Once the queue is full, the system will ignore all incoming SYN requests, making the system unavailable for legitimate users.

10. What is LAND attack?

In a LAN attack, hackers flood SYN packets to the network with a spoofed source IP address of the targeted system. This makes it appear as if the host computer sent the packets to itself, making the system unavailable while the target system tries to respond to itself.

11 What is Brute-force attack?

A Brute-force attack, such as 'Smurf' attack, targets a feature in the IP specification known as directed or subnet broadcasting, to quickly flood the target network with useless data. A Smurf hacker flood a destination IP address of each packet is the broadcast address of the network, the router will broadcast the ICMP echo request packet to all hosts on the network. If there are numerous hosts, this will create a large amount of ICMP echo request packet, the resulting ICMP traffic will not only clog up the 'intermediary' network, but will also congest the network of the spoofed source IP address, known as the 'victim' network. This flood of broadcast traffic consumes all available bandwidth, making communications impossible.

12. What is IP Spoofing attack?

Many DoS attacks also use IP Spoofing as part of their attack. IP Spoofing may be used to break into systems, to hide the hacker's identity, or to magnify the effect of the DoS attack. IP Spoofing is a technique used to gain unauthorized access to computers by tricking a router or firewall into thinking that the communications are coming from within the trusted network. To engage in IP Spoofing, a hacker must modify the packet headers so that it appears that the packets originate from a trusted host and should be allowed through the router or firewall.

13. What are the default ACL firewall rules in P-660?

There are two default ACLs pre-configured in the P-660, one allows all connections from LAN to WAN and the other blocks all connections from WAN to LAN except of the DHCP packets.

Configuration

1. How do I configure the firewall?

P-660 supports a embedded web server so that you can use the web browser to configure it from any OS platform.

2. How do I prevent others from configuring my firewall?

There are several ways to protect others from touching the settings of your firewall.

1. Change the default password since it is required when setting up the firewall using Telnet, Console or Web browser.
2. Limit who can Telnet to your router. You can enter the IP address of the secured LAN host in SMT Menu 24.11 to allow Telnet to your P-660. The default value in this field is 0.0.0.0, which means you do not care which host is trying to Telnet your P-660.

3. Can I use a browser to configure my P-660?

Yes, you can use a web browser to configure the P-660.

4. Why can't I configure my router using Telnet over WAN?

There are five reasons that Telnet from WAN is blocked.

1. When the firewall is turned on, all connections from WAN to LAN are blocked by the default ACL rule. To enable Telnet from WAN, you must turn the firewall off (Menu 21.2) or create a firewall rule to allow Telnet connection from WAN. The WAN-to-LAN ACL summary will look like as shown below.

   Source IP= Telnet host
   Destination IP= router' WAN IP
   Service= TCP/23
   Action=Forward

2. You have disabled Telnet service in Menu 24.11.
3. Telnet service is enabled but your host IP is not the secured host entered in Menu 24.11. In this case, the error message ***'Client IP is not allowed!'*** is appeared on the Telnet screen.
4. The default filter rule 3 (Telnet_FTP_WAN) is applied in the Input Protocol field in menu 11.5.
5. The console port is in use.

5. Why can't I upload the firmware and configuration file using FTP over WAN?

1. When the firewall is turned on, all connections from WAN to LAN are blocked by the default ACL rule. To enable FTP from WAN, you must turn the firewall off (Menu 21.2) or create a firewall rule to allow FTP connection from WAN. The WAN-to-LAN ACL summary will look like as shown below.

   Source IP= FTP host
   Destination IP= P-660's WAN IP
   Service= FTP TCP/21, TCP/20
   Action=Forward

2. You have disabled FTP service in Menu 24.11.
3. The default filter rule 3 (Telnet_FTP_WAN) is applied in the Input Protocol field in menu 11.5.

Log and Alert

1. When does the P-660 generate the firewall log?

The P-660 generates the log immediately when the packet match, doesn't match (or both) a firewall rule. The log for Default Permit (LAN to WAN, WAN to LAN) is generated automatically. To generate the log for custom rules, the ***Log*** option in Web Configurator must be set to ***Not Match***, ***Match***, or ***Both***. The ***Reason*** column for the default permit shown in the log will be ***'default permit, <1, 00> or <2, 00>'***. Here ***<1, 00>*** means the LAN-to-WAN default ACL set, ***<2, 00>*** means the WAN-to-LAN default ACL set.

2. What does the log show to us?

The log supports up to 128 entries. There are 2 rows and 5 columns for each entry. Please see the example shown below.

```
#  Time       Packet Information                 Reason          Action

127|Mar 15 0 |From:192.168.1.34 To:202.132.155.93 |default permit |forward
   | 03:03:54|ICMP     type:00008     code:00000      |<1,00>          |
```

Where <X,Y> stands for ***<Set number, Rule number>***. X=1,2 ; Y=00~10. There are two policy sets, set 1 for rules checking connections from LAN to WAN and set 2 for rules checking connections from WAN to LAN. So, X=1 means set 1 and X=2 means set 2.

Y means the rule in the set. Because we can configure up to 10 rules in a set, so Y can be from 1 to 10. If the rule number shows 00, it means the **Default Rule**.

3. How do I view the firewall log?

The log keeps 128 entries, the new entries will overwrite the old entries when the log has over 128 entries.

After V3.52, all logs generated in P-660, including firewall logs, IPSec logs, system logs are migrated to centralized logs. So you can view firewall logs in Centralized logs.

Before you can view firewall logs there are two steps you need to do,

1. Enable log function in Centralized logs setup via either one of the following methods,

- Web configuration: **Advanced/Logs/Log Settings**, check **Access Control** and **Attacks** options depending on your real situation.
- CI command: **sys logs category [access | attack]**

2. Enable log function in firewall default policy or in firewall rules.

After the above two steps, you can view firewall logs via

1. Web Configurator: **Advanced/Logs**

2. View the log by CI command: **sys logs disp**

You can also view Centralized logs via **mail** or **syslog**, please configure mail server or Unix Syslog server in **Advanced/Logs/Log Settings**.

4. When does the P-660 generate the firewall alert?

The P-660 generates the alert when an attack is detected by the firewall and sends it via Email. So, to send the alert you must configure the mail server and Email address using Web Configurator. You can also specify how frequently you want to receive the alert via Web Configurator.

5. What does the alert show to us?

The alert shown in the Email is actually the evens of the attack. So, the ***Reason*** column shows ***Attack*** and the ***attack type***. Please see the example shown below.

```
#   Time      Packet Information              Reason    Action

127|Mar 15 0 |From:192.168.1.1 To:192.168.1.1   |attack   |block
   | 03:04:54|ICMP     type:00008     code:00000 |land      |
```

6. What is the difference between the log and alert?

A log entry is just added to the log inside the P-660 and e-mailed together with all other log entries at the scheduled time as configured. An alert is e-mailed immediately after an attacked is detected.

General Application Notes

1. Internet Access Using P-660 under Bridge mode

- Setup your workstation
- Setup your P-660 under bridge mode

If the ISP limits some specific computers to access Internet, that means only the traffic to/from these computers will be forwarded and the other will be filtered. In this case, we use P-660 which works as an ADSL bridge modem to connect to the ISP. The ISP will generally give one Internet account and limit only one computer to access the Internet. See the figure below for this setup.

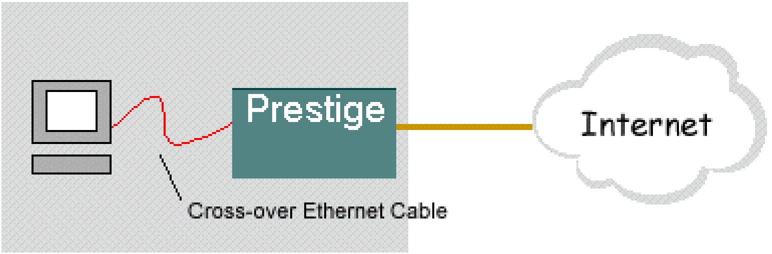


Figure: Internet Access Using Modem Mode

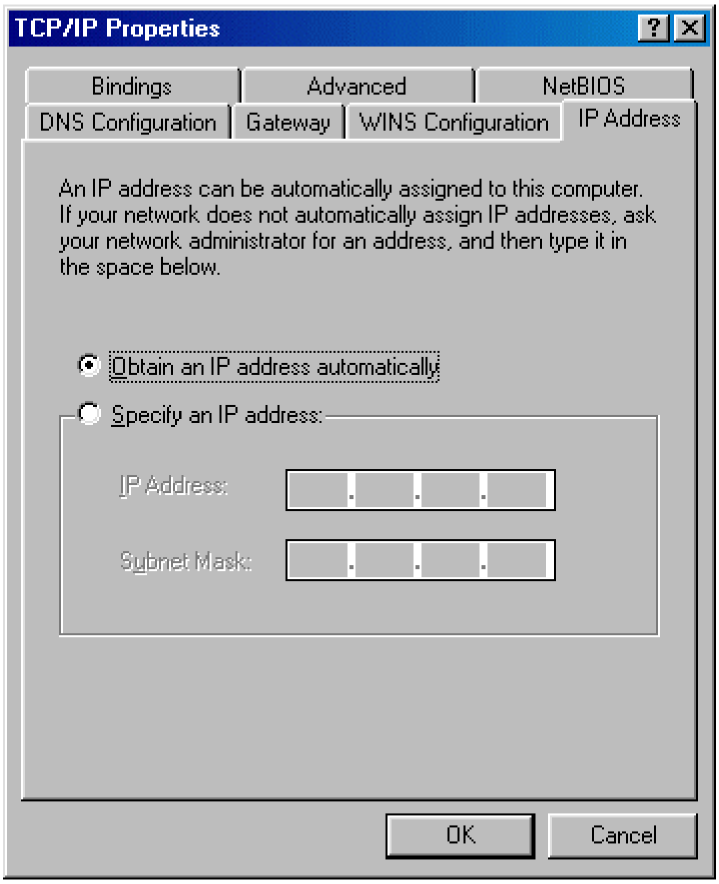
Set up your workstation

1. Ethernet connection

To connect your computer to the P-660's LAN port, the computer must have an Ethernet adapter card installed. For connecting a single computer to the P-660, we use a ***cross-over*** Ethernet cable.

2. TCP/IP configuration

In most cases, the IP address of the computer is assigned by the ISP dynamically so you have to configure the computer as a DHCP client which obtains the IP from the ISP using DHCP protocol. The ISP may also provide the gateway, DNS via DHCP if they are available. Otherwise, please enter the static IP addresses for all that the ISP gives to you in the network TCP/IP settings. For Windows, we check the option ***'Obtain an IP address automatically'*** in its TCP/IP setup, please see the example shown below.



An IP address can be automatically assigned to this computer. If your network does not automatically assign IP addresses, ask your network administrator for an address, and then type it in the space below.

● Obtain an IP address automatically

○ Specify an IP address:

Setup your P-660 under bridge mode

The following procedure shows you how to configure your P-660 as an ADSL Modem for bridging traffic. We will use SMT menu to guide you through the related menu. You can use console or Telnet for finishing these configurations.

1. Configure P-660 as bridge mode in Menu 1 General Setup.

```
                Menu 1  –  General setup

              System name=P-660
              Location=
              Contact Person's Name=
              Domain Name=
              Edit Dynamic DNS= No
              Route IP= No
              Bridge= Yes
```

2. Configure a LAN IP for the P-660 and turn off DHCP Server in Menu 3.2-TCP/IP Ethernet Setup. We use 192.168.1.1 in this case.

```
Menu 3.2 - TCP/IP and DHCP Setup

 DHCP Setup
      DHCP= None
      Client IP Pool Starting Address= N/A
      Size of Client IP Pool= N/A
      Primary DNS Server= N/A
      Secondary DNS Server= N/A
      Remote DHCP Server= N/A
   TCP/IP Setup:
      IP Address= 192.168.1.1
      IP Subnet Mask= 255.255.255.0
      RIP Direction= None
        Version= N/A
      Multicast= None
      IP Policies=
      Edit IP Alias= No
```

3. Configure for Internet setup in Menu 11-Remote Node Profile.

```
  Menu 11.1 - Remote Node Profile

         Rem Node Name= Bridge         Route= None
         Active= Yes                   Bridge= Yes
         Encapsulation= RFC 1483       Edit IP/Bridge= No
         Multiplexing= LLC-based       Edit ATM Options= No
         Service Name= N/A             Edit Advance Options= No
         Incoming:                            Telco Option:
           Rem Login= N/A              Allocated Budget(min)= N/A
           Rem Password= N/A           Period(hr)= N/A
         Outgoing:                      Schedule Sets= N/A
           My Login= N/A                Nailed-Up Connection= N/A
           My Password= N/A              Session Options:
           Authen= N/A                  Edit Filter Sets= No
                                        Idle Timeout(sec)= N/A
```

Key Settings:

Option	Description
Encapsulation	Select the correct Encapsulation type that your ISP supports. For example, RFC 1483.
Multiplexing	Select the correct Multiplexing type that your ISP supports. For example, LLC.
Router/ Bridge	Disable routing mode and enable bridge mode, Bridge = Yes.

4. Configure ATM setting in Menu 11.6-Remote Node ATM Layer Options. In Menu 11.1, setup "Edit ATM Options= Yes" to enter Menu 11.6 sub-Menu.

```
Menu 11.6 - Remote Node ATM Layer Options

    VPI #= 0
    VCI #= 33
    ATM QoS Type= CBR
    Peak Cell Rate (PCR)= 0
    Sustain Cell Rate (SCR)= 0
    Maximum Burst Size (MBS)= 0
```

Key Settings:

Option	**Description**
VPI & VCI number	Specify a VPI (Virtual Path Identifier) and a VCI (Virtual Channel Identifier) given to you by your ISP.

2. Internet Access Using P-660 under Router mode

For most Internet users having multiple computers want to share an Internet account for Internet access, they have to install an Internet sharing device, like a router. In this case, we use the P-660 which works as a general Router plus an ADSL Modem. See the figure below for this setup.

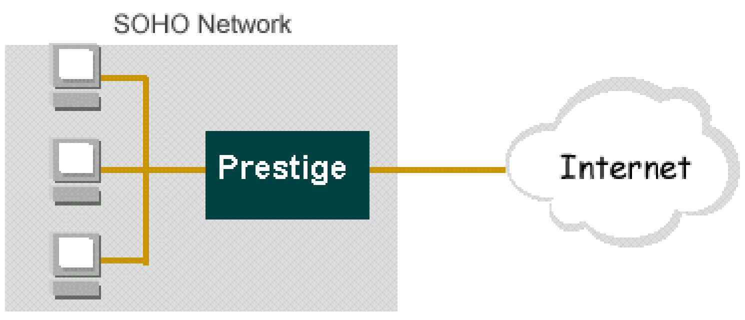


Figure: Internet Access Using P652

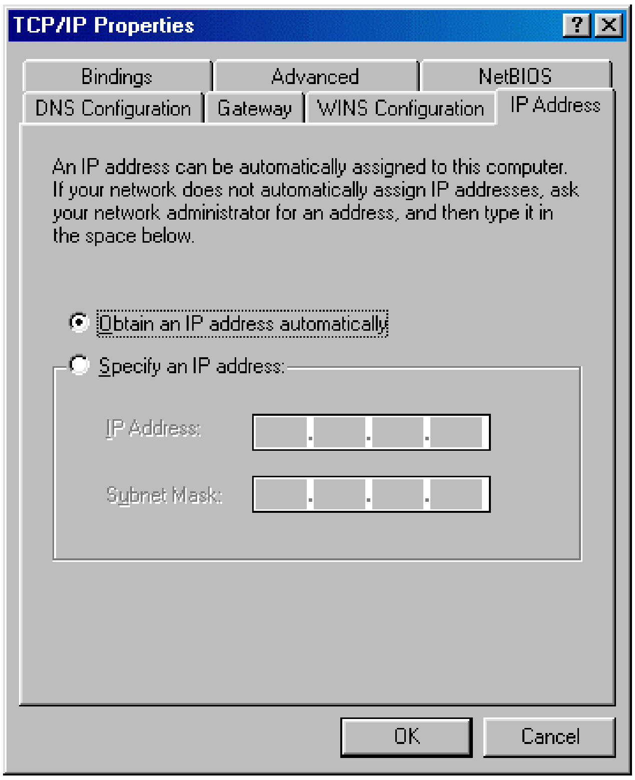
Set up your workstation

1. Ethernet connection

Connect the LAN ports of all computers and the P-660 to a HUB using a straight Ethernet cable.

2. TCP/IP configuration

Since the P-660 is set to DHCP server as default, so you need only to configure the workstations as the DHCP clients in the networking settings. In this case, the IP address of the computer is assigned by the P-660. The P-660 can also provide the DNS to the clients via DHCP if it is available. For this setup in Windows, we check the option '***Obtain an IP address automatically***' in its TCP/IP setup. Please see the example shown below.



An IP address can be automatically assigned to this computer. If your network does not automatically assign IP addresses, ask your network administrator for an address, and then type it in the space below.

● Obtain an IP address automatically

○ Specify an IP address:

Set up your P-660

The following procedure shows you how to configure your P-660 as Router mode for routing traffic. We will use SMT menu to guide you through the related menu. You can use console or Telnet for finishing these configurations.

1. Configure P-660 as router mode in Menu 1 General Setup.

```
                         Menu 1– General Setup

                         System Name= P-660
                         Location=
Contact Person's Name=
  Domain Name=
   Edit Dynamic DNS= No
  Route IP= Yes
   Bridge= No
```

2. Configure a LAN IP for the P-660 and the DHCP settings in Menu 3.2-TCP/IP Ethernet Setup. The settings except of the DNS addresses shown below are the pre-configured defaults.

```
Menu 3.2 - TCP/IP and DHCP Setup
DHCP Setup
          DHCP= Server
          Client IP Pool Starting Address= 192.168.1.33
          Size of Client IP Pool= 6
          Primary DNS Server= 168.95.1.1
          Secondary DNS Server= 168.95.192.1
          Remote DHCP Server= N/A
TCP/IP Setup:
          IP Address= 192.168.1.1
          IP Subnet Mask= 255.255.255.0
          RIP Direction= Both
          Version= RIP-1
          Multicast= None
          IP Policies=
          Edit IP Alias= No
```

3. Configure for Internet setup in Menu 4-Internet Access Setup.

```
   Menu 4 - Internet Access Setup

ISP's Name= CHT
Encapsulation= PPPoE
Multiplexing= LLC-based
VPI #= 0
VCI #= 33
ATM QoS Type= CBR
    Peak Cell Rate (PCR)= 0
    Sustain Cell Rate (SCR)= 0
    Maximum Burst Size (MBS)= 0
My Login= cso@hinet.net
```

```
          My Password= ********
          Idle Timeout (sec)= 0
          IP Address Assignment= Dynamic
            IP Address= N/A
          Network Address Translation= SUA Only
            Address Mapping Set= N/A

         Press ENTER to Confirm or ESC to Cancel:
```

Key Settings:

Option	Description
Encapsulation	Select the correct Encapsulation type that your ISP supports. For example, RFC 1483.
Multiplexing	Select the correct Multiplexing type that your ISP supports. For example, LLC.
VPI & VCI number	Specify a VPI (Virtual Path Identifier) and a VCI (Virtual Channel Identifier) given to you by your ISP.
Single User Account	Set to **Yes** if you only have a single IP account for sharing with local computers.
IP Address Assignment	Set to **Dynamic** if the ISP provides the IP for the P-660 dynamically. Otherwise, set to **Static** and enter the IP in the following **IP Address** field.
IP Address	This field can not be configured if the ISP provides the IP for the P-660 dynamically. Otherwise, enter the IP that the ISP gives to you.

3. Setup the P-660 as a DHCP Relay

What is DHCP Relay?

DHCP stands for Dynamic Host Configuration Protocol. In addition to the DHCP server feature, the P-660 supports the DHCP relay function. When it is configured as DHCP server, it assigns the IP addresses to the LAN clients. When it is configured as DHCP relay, it is responsible for forwarding the requests and responses negotiating between the DHCP clients and the server. See figure 1.

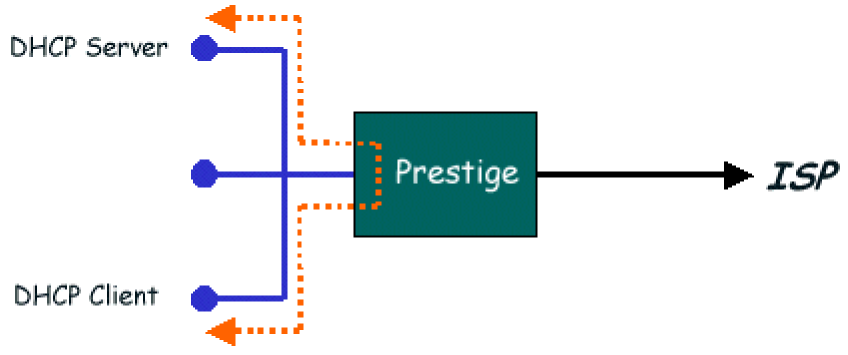


Figure1: Prestige as a DHCP Relay

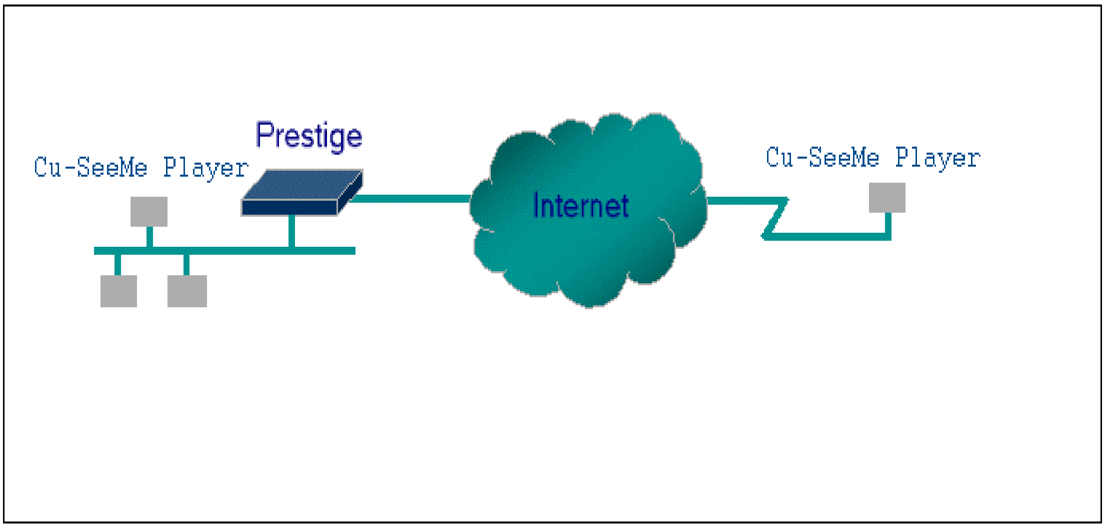
Setup the P-660 as a DHCP Client

1. Toggle the DHCP to Relay in menu 3.2 and enter the IP address of the DHCP server in the **'Relay Server Address'** field.

```
                    Menu 3.2 - TCP/IP and DHCP Ethernet Setup

          DHCP Setup
            DHCP= Relay
            Client IP Pool Starting Address= N/A
            Size of Client IP Pool= N/A
            Primary DNS Server= N/A
            Secondary DNS Server= N/A
            Relay Server Address= 192.168.1.2

          TCP/IP Setup:
            IP Address= 192.168.1.1
            IP Subnet Mask= 255.255.255.0
            RIP Direction= Both
              Version= RIP-1
            Multicast= None
            IP Policies=
            Edit IP Alias= No
            Press ENTER to Confirm or ESC to Cancel:
```

4. SUA Notes

Tested SUA/NAT Applications (e.g., Cu-SeeMe, ICQ, NetMeeting)



Introduction

Generally, SUA makes your LAN appear as a single machine to the outside world. LAN users are invisible to outside users. However, some applications such as Cu-SeeMe, and ICQ will need to connect to the local user behind the P-660. In such case, a SUA server must be entered in menu 15.2.1 to forward the incoming packets to the true destination behind SUA. Generally, we do not need extra settings of menu 15.2.1 for an outgoing connection. But for some applications we need to configure the menu 15.2.1 to make the outgoing connection work. After the required menu 15.2.1 settings are completed the internal server or client applications can be accessed by using the P-660's ***WAN IP*** address.

SUA Supporting Table

The following are the required menu 15.2.1 settings for the various applications running SUA mode.

ZyXEL SUA Supporting Table[1]

Application	Required Settings in Menu 15.2.1 Port/IP	
	Outgoing Connection	Incoming Connection
HTTP	None	80/client IP
FTP	None	21/client IP
TELNET	None	23/client IP (and remove Telnet filter in WAN port)
POP3	None	110/client IP
SMTP	None	25/client IP
mIRC	None for Chat. For DCC, please set Default/Client IP	

Windows PPTP	None	1723/client IP
ICQ 99a	None for Chat. For DCC, please set: ICQ -> preference -> connections -> firewall and set the firewall time out to 80 seconds in firewall setting.	Default/client IP
ICQ 2000b	None for Chat	None for Chat
ICQ Phone 2000b	None	6701/client IP
Cornell 1.1 Cu-SeeMe	None	7648/client IP
White Pine 3.1.2 Cu-SeeMe[2]	7648/client IP & 24032/client IP	Default/client IP
White Pine 4.0 Cu-SeeMe	7648/client IP & 24032/client IP	Default/client IP
Microsoft NetMeeting 2.1 & 3.01[3]	None	1720/client IP 1503/client IP
Cisco IP/TV 2.0.0	None	
RealPlayer G2	None	
VDOLive	None	
Quake1.06[4]	None	Default/client IP
QuakeII2.30[5]	None	Default/client IP
QuakeIII1.05 beta	None	
StartCraft	6112/client IP	
Quick Time 4.0	None	
pcAnywhere 8.0	None	5631/client IP 5632/client IP 22/client IP
IPsec (ESP tunneling mode)	None (one client only)	Default/Client
Microsoft Messenger Service 3.0	6901/client IP	6901/client IP
Microsoft Messenger Service 4.6/ 4.7/ 5.0 (none UPnP)[6]	None for Chat, File transfer ,Video and Voice	None for Chat, File transfer, Video and Voice
Net2Phone	None	6701/client IP
Network Time Protocol (NTP)	None	123 /server IP
Win2k Terminal Server	None	3389/server IP
Remote Anything	None	3996 - 4000/client IP

Virtual Network Computing (VNC)	None	5500/client IP 5800/client IP 5900/client IP
AIM (AOL Instant Messenger)	None for Chat and IM	None for Chat and IM
e-Donkey	None	4661 - 4662/client IP
POLYCOM Video Conferencing	None	Default/client IP
iVISTA 4.1	None	80/server IP
Microsoft Xbox Live[7]	None	N/A

[1] Since SUA enables your LAN to appear as a single computer to the Internet, it is not possible to configure similar servers on the same LAN behind SUA.

[2] Because White Pine Cu-SeeMe uses dedicate ports (port 7648 & port 24032) to transmit and receive data, therefore only one local Cu-SeeMe is allowed within the same LAN.

[3] In SUA mode, only one local NetMeeting user is allowed because the outsiders can not distinguish between local users using the same internet IP.

[4] Certain Quake servers do not allow multiple users to login using the same unique IP, so only one Quake user will be allowed in this case. Moreover, when a Quake server is configured behind SUA, P-660 will not be able to provide information of that server on the internet.

[5] Quake II has the same limitations as that of Quake I.

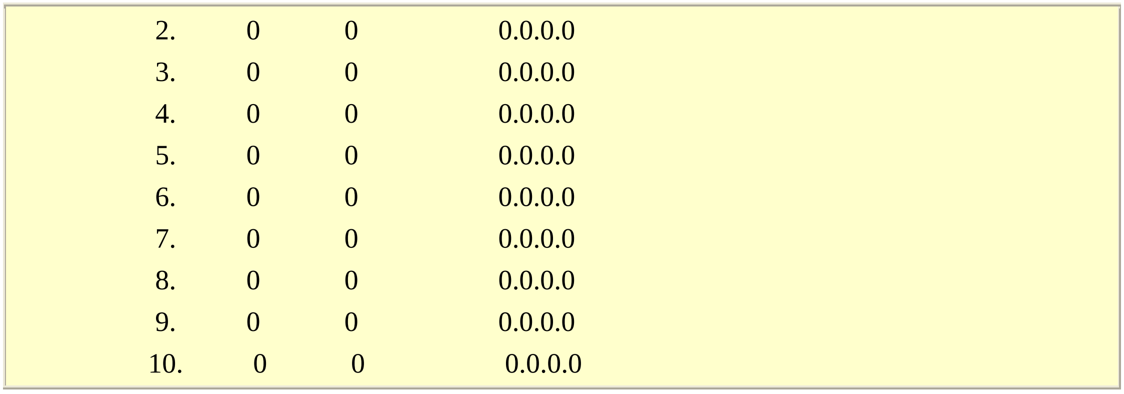
[6] P-660 support MSN Messenger 4.6/ 4.7/ 5.0 video/ voice pass-through NAT since new firmware version. In addition, for the Windows OS supported UPnP (Universal Plug and Play), such as Windows XP and Windows ME, UPnP supported in P-660 is an alternative solution to pass through MSN Messenger video/ voice traffic. For more detail, please refer to UPnP application note.

[7] P-660 support Microsoft Xbox Live since the new firmware version. If your P-660 firmware is too old to support such function, you may have a work-around solution, please refer to ZyXEL website -> Support -> Xbox Live service http://www.zyxel.com/support/xbox.htm

Configurations

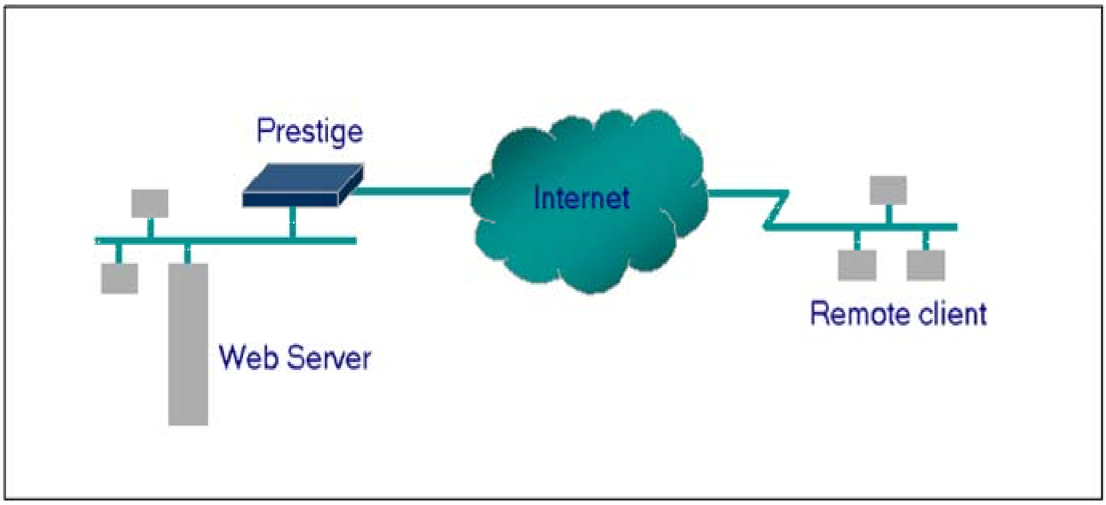
For example, if the workstation operating Cu-SeeMe has an IP of 192.168.1.34, then the default SUA server must be set to 192.168.1.34. The peer Cu-SeeMe user can reach this workstation by using P-660's ***WAN IP*** address which can be obtained from menu 24.1.

```
      Menu 15.2.1 - NAT Server Setup (Used for SUA Only)


     Rule Start Port No. End Port No. IP Address
    ---------------------------------------------------
      1.    Default      Default      192.168.1.34
```



```
          2.      0      0         0.0.0.0
          3.      0      0         0.0.0.0
          4.      0      0         0.0.0.0
          5.      0      0         0.0.0.0
          6.      0      0         0.0.0.0
          7.      0      0         0.0.0.0
          8.      0      0         0.0.0.0
          9.      0      0         0.0.0.0
         10.      0      0         0.0.0.0
```

Configure an Internal Server Behind SUA



Introduction

If you wish, you can make internal servers (e.g., Web, ftp or mail server) accessible for outside users, even though SUA makes your LAN appear as a single machine to the outside world. A service is identified by the port number. Also, since you need to specify the IP address of a server in the P-660, a server must have a fixed IP address and not be a DHCP client whose IP address potentially changes each time it is powered on.

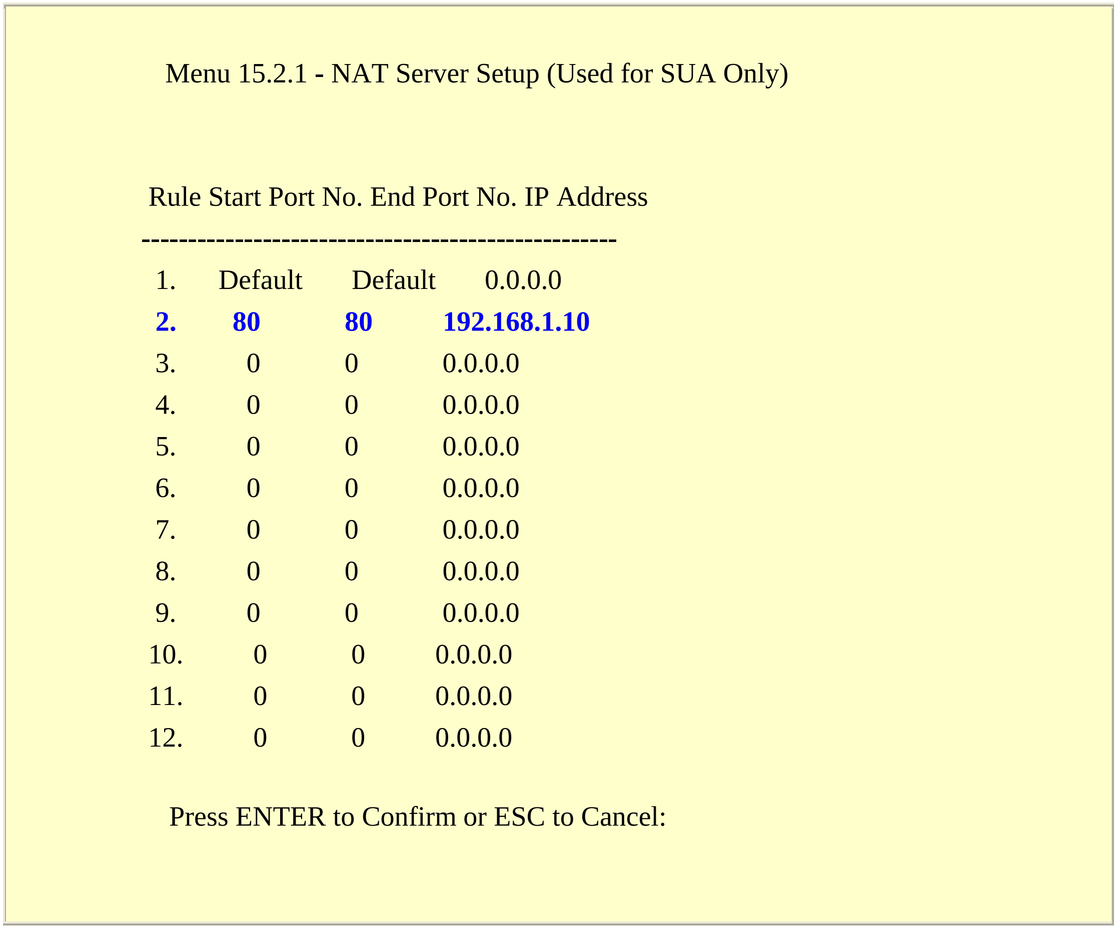
In addition to the servers for specific services, SUA supports a default server. A service request that does not have a server explicitly designated for it is forwarded to the default server. If the default server is not defined, the service request is simply discarded.

Configuration

To make a server visible to the outside world, specify the port number of the service and the inside address of the server in 'Menu 15.2.1', Multiple Server Configuration.

The outside users can access the local server using the P-660's ***WAN IP*** address which can be obtained from menu 24.1.

For example (Configuring an internal Web server for outside access) :



```
          Menu 15.2.1 - NAT Server Setup (Used for SUA Only)


        Rule Start Port No. End Port No. IP Address
      ---------------------------------------------------
         1.     Default      Default      0.0.0.0
         2.        80           80        192.168.1.10
         3.        0            0         0.0.0.0
         4.        0            0         0.0.0.0
         5.        0            0         0.0.0.0
         6.        0            0         0.0.0.0
         7.        0            0         0.0.0.0
         8.        0            0         0.0.0.0
         9.        0            0         0.0.0.0
        10.         0            0        0.0.0.0
        11.         0            0        0.0.0.0
        12.         0            0        0.0.0.0

          Press ENTER to Confirm or ESC to Cancel:
```

Port numbers for some services

Service	**Port Number**
FTP	21
Telnet	23
SMTP	25
DNS (Domain Name Server)	53
www-http (Web)	80

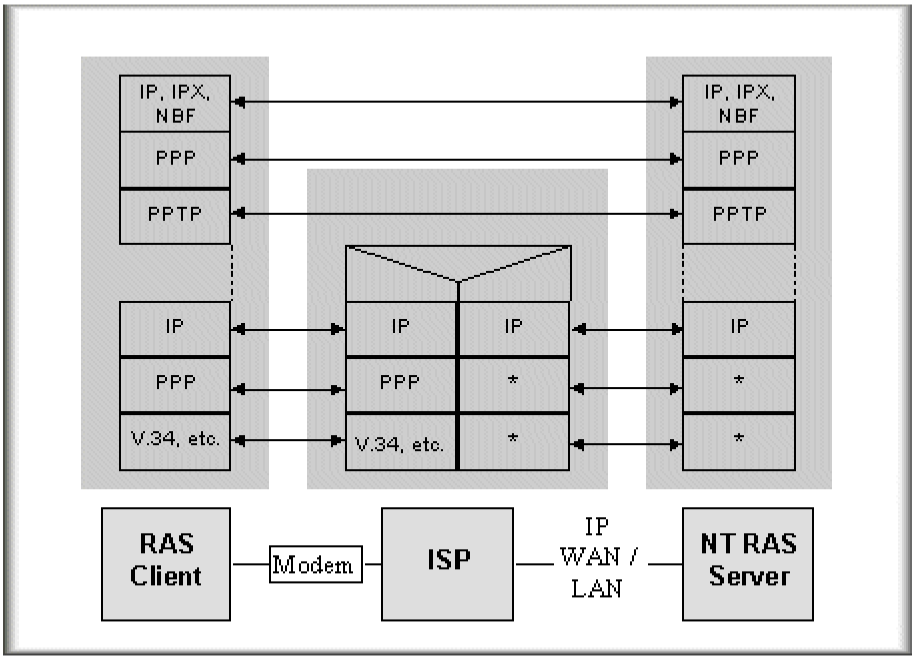
Configure a PPTP server behind SUA

Introduction

PPTP is a tunneling protocol defined by the PPTP forum that allows PPP packets to be encapsulated within Internet Protocol (IP) packets and forwarded over any IP network, including the Internet itself.

In order to run the Windows 9x PPTP client, you must be able to establish an IP connection with a tunnel server such as the Windows NT Server 4.0 Remote Access Server.

Windows Dial-Up Networking uses the Internet standard Point-to-Point (PPP) to provide a secure, optimized multiple-protocol network connection over dial-up telephone lines. All data sent over this connection can be encrypted and compressed, and multiple network level protocols (TCP/IP, NetBEUI and IPX) can be run correctly. Windows NT Domain Login level security is preserved even across the Internet.



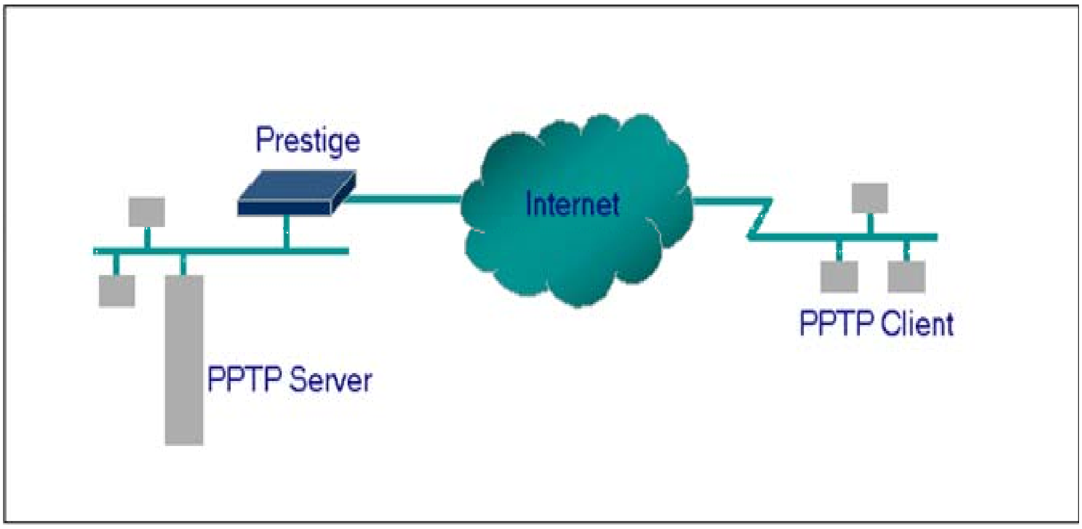
Window98 PPTP Client / Internet / NT RAS Server Protocol Stack

PPTP appears as new modem type (Virtual Private Networking Adapter) that can be selected when setting up a connection in the Dial-Up Networking folder. The VPN Adapter type does not appear elsewhere in the system. Since PPTP encapsulates its data stream in the PPP protocol, the VPN requires a second dial-up adapter. This second dial-up adapter for VPN is added during the installation phase of the Upgrade in addition to the first dial-up adapter that provides PPP support for the analog or ISDN modem.

The PPTP is supported in Windows NT and Windows 98 already. For Windows 95, it needs to be upgraded by the Dial-Up Networking 1.2 upgrade.

Configuration

This application note explains how to establish a PPTP connection with a remote private network in the P-660 SUA case. In ZyNOS, all PPTP packets can be forwarded to the internal PPTP Server (WinNT server) behind SUA. The port number of the PPTP has to be entered in the SMT Menu 15 for P-660 to forward to the appropriate private IP address of Windows NT server.



Example

The following example shows how to dial to an ISP via the P-660 and then establish a tunnel to a private network. There will be three items that you need to set up for PPTP application, these are PPTP server (WinNT), PPTP client (Win9x) and the P-660.

1. PPTP server setup (WinNT)

- Add the VPN service from Control Panel>Network
- Add an user account for PPTP logged on user
- Enable RAS port
- Select the network protocols from RAS such as IPX, TCP/IP NetBEUI
- Set the Internet gateway to P-660

2. PPTP client setup (Win9x)

- Add one VPN connection from Dial-Up Networking by entering the correct username & password and the IP address of the P-660's Internet IP address for logging to NT RAS server.
- Set the Internet gateway to the router that is connecting to ISP

3. P-660 router setup

- Before making a VPN connection from Win9x to WinNT server, you need to connect P-660 router to your ISP first.
- Enter the IP address of the PPTP server (WinNT server) and the port number for PPTP as shown below.

```
    Menu 15.2.1 - NAT Server Setup (Used for SUA Only)


  Rule Start Port No. End Port No. IP Address
 -------------------------------------------------
  1.     Default      Default      0.0.0.0
  2.      1723        1723        192.168.1.10
  3.       0           0         0.0.0.0
  4.       0           0         0.0.0.0
  5.       0           0         0.0.0.0
  6.       0           0         0.0.0.0
  7.       0           0         0.0.0.0
  8.       0           0         0.0.0.0
  9.       0           0         0.0.0.0
  10.       0           0         0.0.0.0
  11.       0           0         0.0.0.0
  12.       0           0         0.0.0.0

    Press ENTER to Confirm or ESC to Cancel:
```

When you have finished the above settings, you can ping to the remote Win9x client from WinNT.   This ping command is used to demonstrate that remote the Win9x can be reached across the Internet. If the Internet connection between two LANs is achievable, you can place a VPN call from the remote Win9x client.

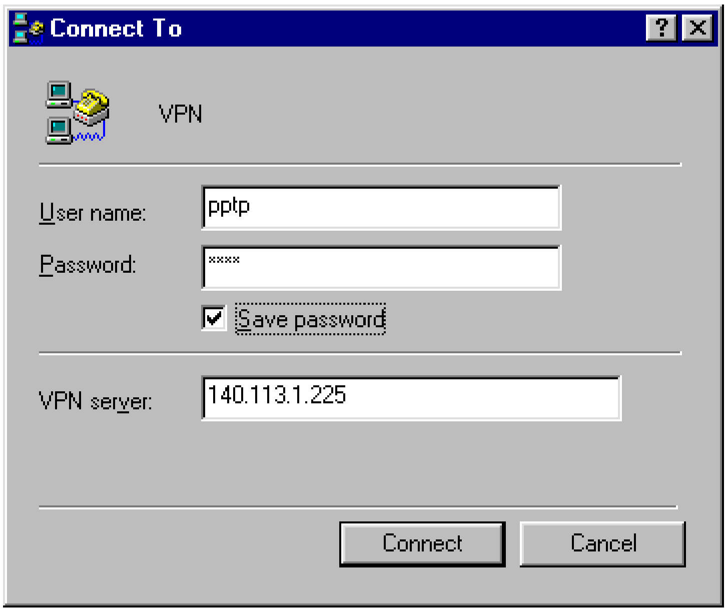
For example: C:\ping 203.66.113.2

When a dial-up connection to ISP is established, a default gateway is assigned to the router traffic through that connection. Therefore, the output below shows the default gateway of the Win9x client after the dial-up connection has been established.

Before making a VPN connection from the Win9x client to the NT server, you need to know the exact Internet IP address that the ISP assigns to P-660 router in SUA mode and enter this IP address in the VPN dial-up dialog box. You can check this Internet

IP address from PNC Monitor or SMT Menu 24.1. If the Internet IP address is a fixed IP address provided by ISP in SUA mode, then you can always use this IP address for reaching the VPN server.

In the following example, the IP address '140.113.1.225' is dynamically assigned by ISP. You must enter this IP address in the 'VPN Server' dialog box for reaching the PPTP server. After the VPN link is established, you can start the network protocol application such as IP, IPX and NetBEUI.



User name: pptp
Password: ****
☑ Save password
VPN server: 140.113.1.225

5. Using Multi-NAT

What is Multi-NAT?

NAT (Network Address Translation-NAT RFC 1631) is the translation of an Internet Protocol address used within one network to a different IP address known within another network. One network is designated the *inside* network and the other is the outside. Typically, a company maps its local inside network addresses to one or more global outside IP addresses and "unmaps" the global IP addresses on incoming packets back into local IP addresses. The IP addresses for the NAT can be either fixed or dynamically assigned by the ISP. In addition, you can designate servers, e.g., a web server and a telnet server, on your local network and make them accessible to the outside world. If you do not define any servers, NAT offers the additional benefit of firewall protection. In such case, all incoming connections to your network will be filtered out by the P-660, thus preventing intruders from probing your network.

The SUA feature that the P-660 supports previously operates by mapping the private IP addresses to a global IP address. It is only one subset of the NAT. The P-660 with ZyNOS V3.40 supports the most of the features of the NAT based on RFC 1631, and we call this feature as **'Multi-NAT'**. For more information on IP address translation, please refer to RFC 1631, ***The IP Network Address Translator (NAT).***

How NAT works

If we define the local IP addresses as the Internal Local Addresses (ILA) and the global IP addresses as the Inside Global Address (IGA), see the following figure. The term 'inside' refers to the set of networks that are subject to translation. NAT operates by mapping the ILA to the IGA required for communication with hosts on other networks. It replaces the original IP source address (and TCP or UDP source port numbers) and then forwards each packet to the Internet ISP, thus making them appear as if they had come from the NAT system itself (e.g., the P-660 router). The P-660 keeps track of the original addresses and port numbers so incoming reply packets can have their original values restored.

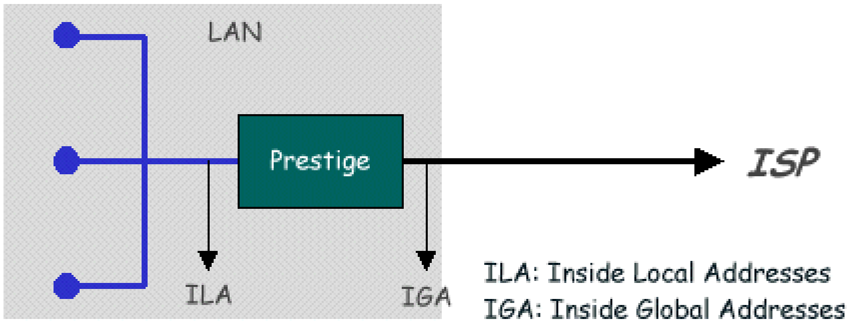


Figure1: Local/Global IP Addresses

NAT Mapping Types

NAT supports five types of IP/port mapping. They are:

One to One

In One-to-One mode, the P-660 maps one ILA to one IGA.

Many to One

In Many-to-One mode, the P-660 maps multiple ILA to one IGA. This is equivalent to SUA (i.e., PAT, port address translation), ZyXEL's Single User Account feature that previous ZyNOS routers supported (the SUA only option in today's routers).

Many to Many Overload

In Many-to-Many Overload mode, the P-660 maps the multiple ILA to shared IGA.

Many to Many No Overload

In Many-to-Many No Overload mode, the P-660 maps each ILA to unique IGA.

Server

In Server mode, the P-660 maps multiple inside servers to one global IP address. This allows us to specify multiple servers of different types behind the NAT for outside access. Note, if you want to map each server to one unique IGA please use the One-to-One mode.

The following table summarizes these types.

NAT Type	IP Mapping	Mapping Direction
One-to-One	ILA1<--->IGA1	Both
Many-to-One (SUA/PAT)	ILA1---->IGA1 ILA2---->IGA1 ...	Outgoing
Many-to-Many Overload	ILA1---->IGA1 ILA2---->IGA2 ILA3---->IGA1 ILA4---->IGA2 ...	Outgoing
Many-to-Many No Overload (Allocate by Connections)	ILA1---->IGA1 ILA2---->IGA3 ILA3---->IGA2 ILA4---->IGA4 ...	Outgoing
Server	Server 1 IP<----IGA1 Server 2 IP<----IGA1	Incoming

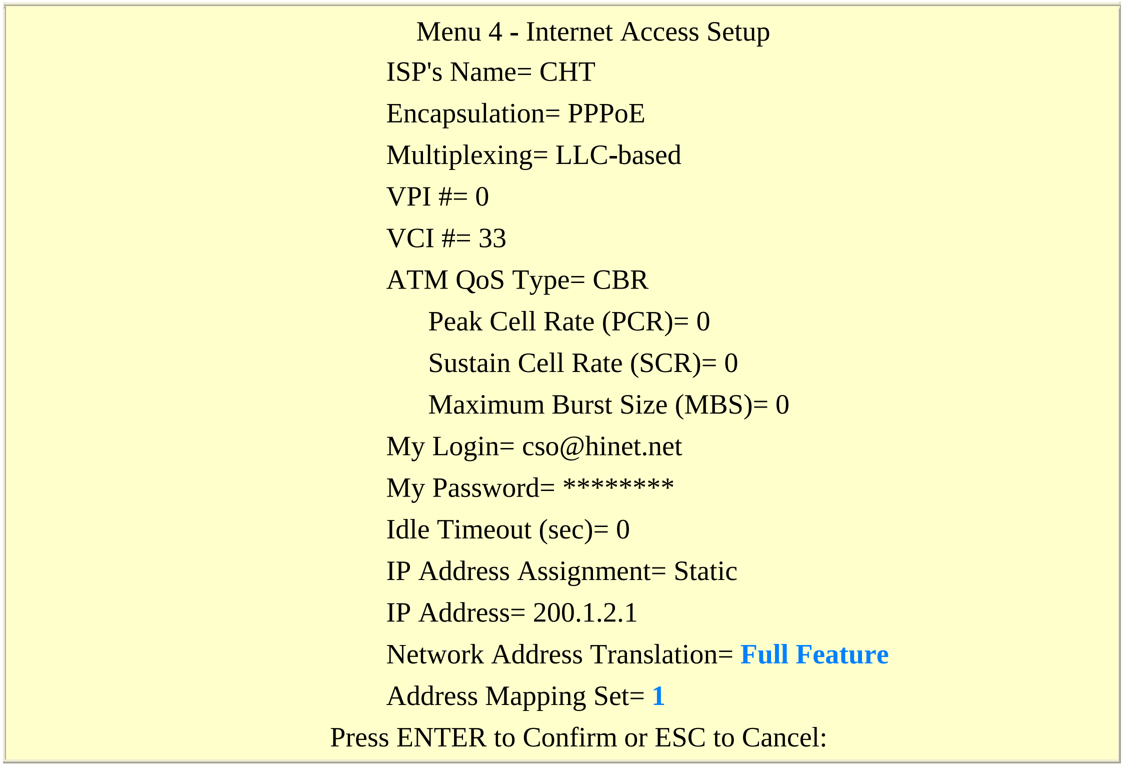
SUA Versus NAT

SUA (Single User Account) in previous ZyNOS versions is a NAT set with 2 rules, Many-to-One and Server. The P-660 now has **Full Feature** NAT support to map global IP addresses to local IP addresses of clients or servers. With multiple global IP addresses, multiple severs of the same type (e.g., FTP servers) are allowed on the LAN for outside access. In previous ZyNOS versions (that supported SUA 'visible' servers had to be of different types. The P-660 supports NAT sets on a remote node basis. They are reusable, but only one set is allowed for each remote node. The P-660 supports 8 sets since there are 8 remote node. The default SUA (Read Only) Set in menu 15.1 is a convenient, pre-configured, read only, Many-to-One mapping set, sufficient for most purposes and helpful to people already familiar with SUA in previous ZyNOS versions.

SMT Menus

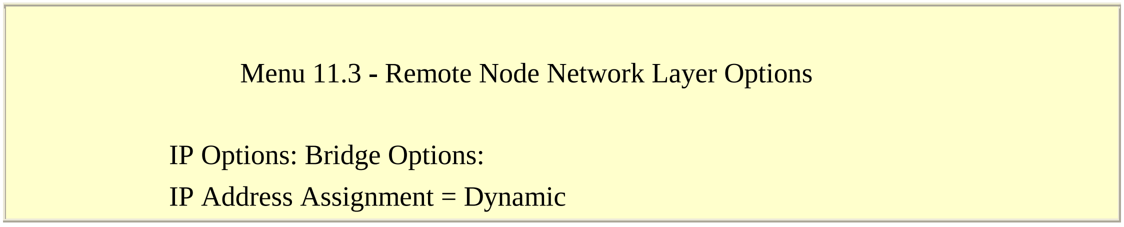
Applying NAT in the SMT Menus

You apply NAT via menus 4 and 11.3 as displayed next. The next figure how you apply NAT for Internet access in menu 4. Enter 4 from the Main Menu to go to Menu 4-**Internet Access Setup**.



```
          Menu 4 - Internet Access Setup
        ISP's Name= CHT
        Encapsulation= PPPoE
        Multiplexing= LLC-based
        VPI #= 0
        VCI #= 33
        ATM QoS Type= CBR
           Peak Cell Rate (PCR)= 0
           Sustain Cell Rate (SCR)= 0
           Maximum Burst Size (MBS)= 0
        My Login= cso@hinet.net
        My Password= ********
        Idle Timeout (sec)= 0
        IP Address Assignment= Static
        IP Address= 200.1.2.1
        Network Address Translation= Full Feature
        Address Mapping Set= 1
    Press ENTER to Confirm or ESC to Cancel:
```

The following figure shows how you apply NAT to the remote node in menu 11.3.



```
          Menu 11.3 - Remote Node Network Layer Options

    IP Options: Bridge Options:
    IP Address Assignment = Dynamic
```

```
Rem IP Addr = 0.0.0.0
Rem Subnet Mask= 0.0.0.0
My WAN Addr= N/A
NAT= Full Feature
Address Mapping Set= 1
Metric= 2
Private= No
RIP Direction= None
  Version= RIP-1
Multicast= None
IP Policies=



     Enter here to CONFIRM or ESC to CANCEL:
```

Step 1. Enter 11 from the Main Menu.
Step 2. Move the cursor to the Edit IP field, press the [SPACEBAR] to toggle the default **No** to **Yes**, then press [ENTER] to bring up Menu 11.3-**Remote Node Network Layer Options**.

The following table describes the options for Network Address Translation.

Field	Options	Description
Network Address Translation	**Full Feature**	When you select this option the SMT will use Address Mapping Set 1 (Menu 15.1-see later for further discussion).
	None	NAT is disabled when you select this option.
	SUA Only	When you select this option the SMT will use Address Mapping Set 255 (Menu 15.1-see later for further discussion). This option use basically Many-to-One Overload mapping. Select **Full Feature** when you require other mapping types. It is a convenient, pre-configured, read only, Many-to-One mapping set, sufficient for most purposes and helpful to people already familiar with SUA in previous ZyNOS versions. Note that there is also a **Server** type whose IGA is **0.0.0.0** in this set.

Table: Applying NAT in Menu 4 and Menu 11.3

Configuring NAT

To configure NAT, enter 15 from the Main Menu to bring up the following screen.

```
                    Menu 15 - NAT Setup

                 1. Address Mapping Sets
                 2. NAT Server Sets
```

Address Mapping Sets and NAT Server Sets

Use the Address Mapping Sets menus and submenus to create the mapping table used to assign global addresses to LAN clients. Each remote node must specify which NAT Address Mapping Set to use. The P-660 has 8 remote nodes and so allows you to configure 8 NAT Address Mapping Set. You can see nine NAT Address Mapping sets in Menu 15.1. You can only configure from Set 1 to Set 8. Set 255 is used for SUA. When you select **Full Feature** in menu 4 or 11.3, you must enter correct NAT Set as well. When you select **SUA Only**, the SMT will use Set 255.

The NAT Server Set is a list of LAN side servers mapped to external ports. To use this set (one set for the P-660), a server rule must be set up inside the NAT Address Mapping set. Please see NAT Server Sets for further information on these menus.

Enter 1 to bring up Menu 15.1-Address Mapping Sets

```
           Menu 15.1 - Address Mapping Sets

             1.
             2.
             3.
             4.
             5.
             6.
             7.
             8.
           255. SUA (Read Only)


                Enter Set Number to Edit:
```

Let's first look at Option 255. Option 255 is equivalent to SUA in previous ZyXEL routers. The fields in this menu cannot be changed. Entering 255 brings up this screen.

```
                Menu 15.1.255 - Address Mapping Rules

  Set Name= SUA (Read Only)

 Idx   Local Start IP    Local End IP      Global Start IP   Global End IP     Type
 ---   ---------------   ---------------   ---------------   ---------------   ------
  1.   0.0.0.0           255.255.255.255   0.0.0.0                             M-1
  2.                                       0.0.0.0                             Serve+
  3.
  4.
  5.
  6.
```

The following table explains the fields in this screen. Please note that the fields in this menu are read-only.

Field	Description	Option/Example
Set Name	This is the name of the set you selected in Menu 15.1 or enter the name of a new set you want to create.	SUA
Idx	This is the index or rule number.	1
Local Start IP	This is the starting local IP address (ILA).	0.0.0.0 for the Many-to-One type.
Local End IP	This is the starting local IP address (ILA). If the rule is for all local IPs, then the Start IP is 0.0.0.0 and the End IP is 255.255.255.255.	255.255.255.255
Global Start IP	This is the starting global IP address (IGA). If you have a dynamic IP, enter 0.0.0.0 as the Global Start IP.	0.0.0.0
Global End IP	This is the ending global IP address (IGA).	N/A
Type	This is the NAT mapping types.	Many-to-One and Server

Please note that the fields in this menu are read-only. However, the settings of the server set 1 can be modified in menu 15.2.1.

Now let's look at Option 1 in Menu 15.1. Enter 1 to bring up this menu.

```
              Menu 15.1.1 - Address Mapping Rules
Set Name= ?
Idx   Local Start IP    Local End IP      Global Start IP   Global End IP     Type
---   ---------------   ---------------   ---------------   ---------------   ------
  1.
  2.
  3.
  4.
  5.
  6.
  7.
  8.
  9.
  10.
             Action= Edit         , Select Rule= 0

              Press ENTER to Confirm or ESC to Cancel:
```

We will just look at the differences from the previous menu. Note that, this screen is not read only, so we have extra Action and Select Rule fields. Not also that the [?] in the Set Name field means that this is a required field and you must enter a name for the set. The description of the other fields is as described above. The Type, Local and Global Start/End IPs are configured in Menu 15.1.1 (described later) and the values are displayed here.

Field	**Description**	**Option**
Set Name	Enter a name for this set of rules. This is a required field. **Please note that if this field is left blank, the entire set will be deleted.**	Rule1
Action	They are 4 actions. The default is **Edit**. **Edit** means you want to edit a selected rule (see following field). **Insert Before** means to insert a new rule before the rule selected. The rule after the selected rule will then be moved down by one rule. **Delete** means to delete the selected rule and then all the rules after the selected one will be advanced one rule. **Save Set** means to save the whole set (note when you choose this action the Select Rule item will be disabled).	Edit Insert Before Delete Save Set
Select Rule	When you choose **Edit**, **Insert Before** or **Save Set** in the previous field the cursor jumps to this field to allow you to select the rule to apply the action in question.	1

Note: **Save Se**t in the **Action** field means to save the whole set. You must do this if you make any changes to the set-including deleting a rule. No changes to the set take place until this action is taken. Be careful when ordering your rules as each rule is executed in turn beginning from the first rule.

Selecting **Edit** in the **Action** field and then selecting a rule brings up the following menu, **Menu 15.1.1.1-Address Mapping Rule** in which you can edit an individual rule and configure the Type, Local and Global Start/End IPs displayed in Menu 15.1.1.

```
  Menu 15.1.1.1 -   - Rule 1
Type: One-to-One
Local IP:
  Start= 0.0.0.0
  End   = N/A
Global IP:
  Start= 0.0.0.0
  End   = N/A
Press ENTER to Confirm or ESC to Cancel:
```

The following table describes the fields in this screen.

Field		Description	Option/Example
Type		Press [SPACEBAR] to toggle through a total of 5 types. These are the mapping types discussed above plus a server type. Some examples follow to clarify these a little more.	One-to-One Many-to-One Many-to-Many Overload Many-to-Many No Overload Server
Local IP	Start	This is the starting local IP address (ILA)	0.0.0.0
	End	This is the ending local IP address (ILA). If the rule is for all local IPs, then put the Start IP as 0.0.0.0 and the End IP as 255.255.255.255. This field is **N/A** for **One-to-One** type.	255.255.255.255
Global IP	Start	This is the starting global IP address (IGA). If you have a dynamic IP, enter 0.0.0.0 as the **Global Start IP**.	0.0.0.0
	End	This is the ending global IP address (IGA). This field is **N/A** for **One-to-One**, **Many-to-One** and **Server** types.	200.1.1.64

Note: For all Local and Global IPs, the End IP address must begin after the IP Start address, i.e., you cannot have an End IP address beginning before the Start IP address.

NAT Server Sets

The NAT Server Set is a list of LAN side servers mapped to external ports (similar to the old SUA menu of before). If you wish, you can make inside servers for different services, e.g., Web or FTP, visible to the outside users, even though NAT makes your network appears as a single machine to the outside world. A server is identified by the port number, e.g., Web service is on port 80 and FTP on port 21.

As an example (see the following figure), if you have a Web server at 192.168.1.36 and a FTP server at 192.168.1.33, then you need to specify for port 80 (Web) the server at IP address 192.168.1.36 and for port 21 (FTP) another at IP address 192.168.1.33.

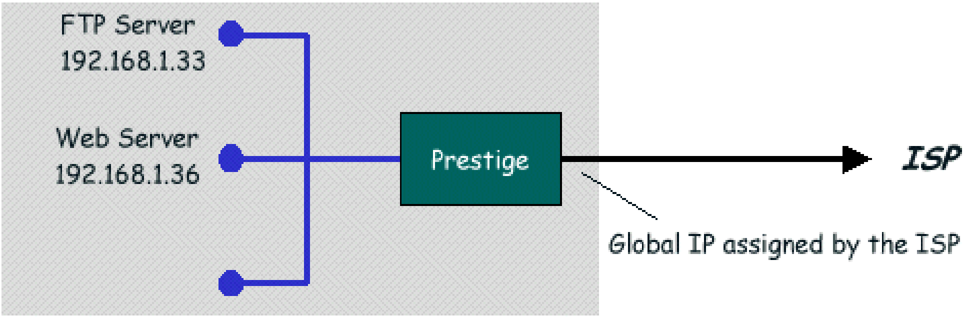


Figure: Configure Multiple Servers behind NAT

Please note that a server can support more than one service, e.g., a server can provide both FTP and Mail service, while another provides only Web service.

The following procedures show how to configure a server behind NAT.

Step 1. Enter 15 in the Main Menu to go to **Menu 15-NAT Setup**.
Step 2. Enter 2 to go to **Menu 15.2.1-NAT Server Setup**.
Step 3. Enter the service port number in the **Port#** field and the inside IP address of the server in the **IP Address** field.
Step 4. Press [SPACEBAR] at the 'Press ENTER to confirm...' prompt to save your configuration after you define all the servers or press ESC at any time to cancel.

```
  Menu 15.2.1 - NAT Server Setup (Used for SUA Only)
 Rule Start Port No. End Port No. IP Address
------------------------------------------------
 1.     Default      Default      0.0.0.0
 2.     21           21           192.168.1.33
 3.     80           80           192.168.1.36
```

```
         4.      0       0      0.0.0.0
         5.      0       0      0.0.0.0
         6.      0       0      0.0.0.0
         7.      0       0      0.0.0.0
         8.      0       0      0.0.0.0
         9.      0       0      0.0.0.0
        10.      0       0      0.0.0.0
        11.      0       0      0.0.0.0
        12.      0       0      0.0.0.0

          Press ENTER to Confirm or ESC to Cancel:
```

The most often used port numbers are shown in the following table. Please refer RFC 1700 for further information about port numbers.

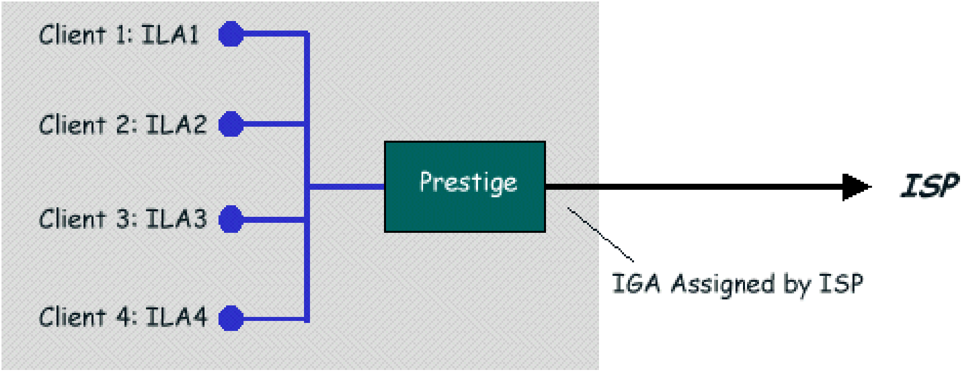
Service	Port Number
FTP	21
Telnet	23
SMTP	25
DNS (Domain Name Server)	53
www-http (Web)	80
PPTP (Point-to-Point Tunneling Protocol)	1723

Examples

- Internet Access Only
- Internet Access with an Internal Server
- Using Multiple Global IP addresses for clients and servers
- Support Non NAT Friendly Applications

1. Internet Access Only

In our Internet Access example, we only need one rule where all our ILAs map to one IGA assigned by the ISP. See the following figure.

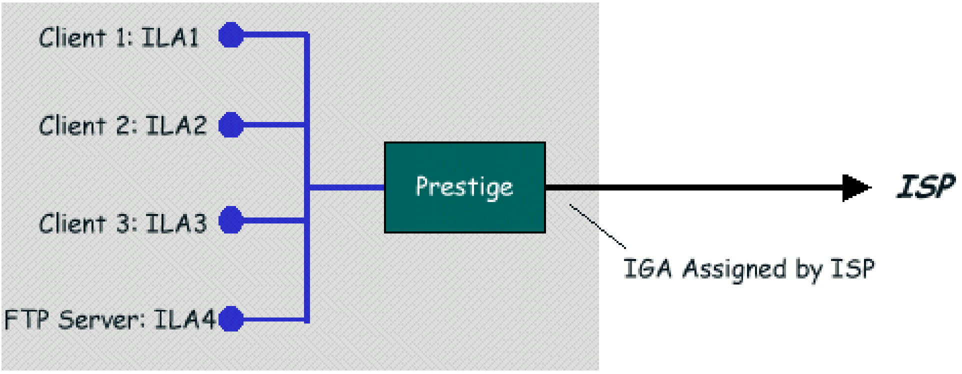


Internet Access Using NAT Many-to-One Mapping

```
                 Menu 4 - Internet Access Setup

                ISP's Name= CHT
                Encapsulation= PPPoE
                Multiplexing= LLC-based
                VPI #= 0
                VCI #= 33
                ATM QoS Type= CBR
                   Peak Cell Rate (PCR)= 0
                   Sustain Cell Rate (SCR)= 0
                   Maximum Burst Size (MBS)= 0
                My Login= cso@hinet.net
                My Password= ********
                Idle Timeout (sec)= 0
                IP Address Assignment= Dynamic
                IP Address= N/A
                Network Address Translation= SUA Only
                Address Mapping Set= N/A

             Press ENTER to Confirm or ESC to Cancel :
```

From Menu 4 shown above simply choose the **SUA Only** option from the **NAT** field. This is the **Many-to-One** mapping discussed earlier. The SUA read only option from the NAT field in menu 4 and 11.3 is specifically pre-configured to handle this case.

2. Internet Access with an Internal Server

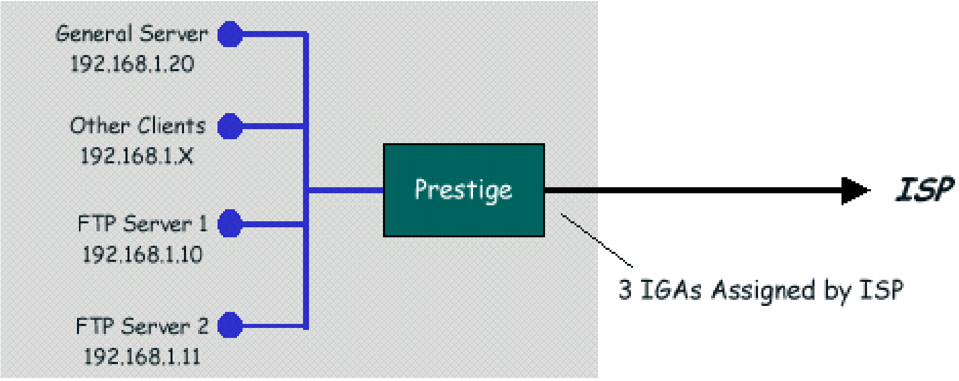


Internet Access using NAT Many-to-One plus a Server Set

In this case, we do exactly as above (use the convenient pre-configured SUA Only set) and also go to Menu 15.2.1-**NAT Server Setup (Used for SUA Only)** to specify the Internet Server behind the NAT as shown in the NAT as shown below.

```
      Menu 15.2.1 - NAT Server Setup (Used for SUA Only)


     Rule Start Port No. End Port No. IP Address
    ---------------------------------------------------
      1.     Default     Default     0.0.0.0
      2.       21          21        192.168.1.33
      3.        0           0        0.0.0.0
      4.        0           0        0.0.0.0
      5.        0           0        0.0.0.0
      6.        0           0        0.0.0.0
      7.        0           0        0.0.0.0
      8.        0           0        0.0.0.0
      9.        0           0        0.0.0.0
     10.         0           0        0.0.0.0
     11.         0           0        0.0.0.0
     12.         0           0        0.0.0.0

       Press ENTER to Confirm or ESC to Cancel:
```

3. Using Multiple Global IP addresses for clients and servers (One-to-One, Many-to-One, Server Set mapping types are used)



Mapping Multiple IGAs for clients and servers

In this case we have 3 IGAs (IGA1, IGA2 and IGA3) from the ISP. We have two very busy internal FTP servers and also an internal general server for the web and mail. In this case, we want to assign the 3 IGAs by the following way using 4 NAT rules.

- Rule 1 (One-to-One type) to map the FTP Server 1 with ILA1 (192.168.1.10) to IGA1.
- Rule 2 (One-to-One type) to map the FTP Server 2 with ILA2 (192.168.1.11) to IGA2.
- Rule 3 (Many-to-One type) to map the other clients to IGA3.
- Rule 4 (Server type) to map a web server and mail server with ILA3 (192.168.1.20) to IGA3. Type **Server** allows us to specify multiple servers, of different types, to other machines behind NAT on the LAN.

Step 1:

In this case, we need to configure Address Mapping Set 1 from **Menu 15.1-Address Mapping Sets**. Therefore we must choose the **Full Feature** option from the **NAT** field in menu 4 or menu 11.3, and assign IGA3 to P-660 WAN IP Address.

```
                Menu 4 - Internet Access Setup

         ISP's Name= CHT
         Encapsulation= PPPoE
         Multiplexing= LLC-based
         VPI #= 0
         VCI #= 33
         ATM QoS Type= CBR
            Peak Cell Rate (PCR)= 0
            Sustain Cell Rate (SCR)= 0
            Maximum Burst Size (MBS)= 0
         My Login= N/A
         My Password= N/A
         ENET ENCAP Gateway= N/A
         IP Address Assignment= Static
         IP Address= IGA3
         Network Address Translation= Full Feature
         Address Mapping Set= 1

     Press ENTER to Confirm or ESC to Cancel:
```

Step 2:

Go to menu 15.1 and choose 1 (not 255, SUA this time) to begin configuring this new set. Enter a **Set Name**, choose the **Edit Action** and then select 1 from **Select Rule** field. Press [ENTER] to confirm. See the following setup for the four rules in our case.

Rule 1 Setup: Select **One-to-One** type to map the FTP Server 1 with ILA1 (192.168.1.10) to IGA1.

```
  Menu 15.1.1.1 -   - Rule 1
Type: One-to-One
Local IP:
Start= 192.168.1.10
End   = N/A
Global IP:
  Start= [Enter IGA1]
  End   = N/A

Press ENTER to Confirm or ESC to Cancel:
```

Rule 2 Setup: Selecting **One-to-One** type to map the FTP Server 2 with ILA2 (192.168.1.11) to IGA2.

```
Menu 15.1.1.2 -   - Rule 2

Type: One-to-One

Local IP:
  Start= 192.168.1.11
  End   = N/A

Global IP:
  Start= [Enter IGA2]
  End   = N/A

Press ENTER to Confirm or ESC to Cancel:
```

Rule 3 Setup: Select **Many-to-One** type to map the other clients to IGA3.

```
Menu 15.1.1.3 -   - Rule 3

Type: Many-to-One

Local IP:
  Start= 0.0.0.0
  End   = 255.255.255.255

Global IP:
  Start= [Enter IGA3]
  End   = N/A


Press ENTER to Confirm or ESC to Cancel:
```

Rule 4 Setup: Select **Server type** to map our web server and mail server with ILA3 (192.168.1.20) to IGA3.

```
            Menu 15.1.1.4 -   - Rule 4

          Type: Server

          Local IP:
            Start= N/A
            End   = N/A

          Global IP:
            Start=[Enter IGA3]
            End   = N/A


          Press ENTER to Confirm or ESC to Cancel:
```

When we have configured all four rules Menu 15.1.1 should look as follows.

```
          Menu 15.1.1 - Address Mapping Rules

  Set Name= Example3

Idx   Local Start IP    Local End IP     Global Start IP   Global End IP     Type
---   ---------------   ---------------   ---------------   ---------------   ------
  1.   192.168.1.10                        [IGA1]                               1-1
  2.   192.168.1.11                        [IGA2]                               1-1
  3.   0.0.0.0            255.255.255.255   [IGA3]                               M-1
  4.                                       [IGA3]                               Server
  5.
  6.
  7.
  8.
  9.
10.


               Press ESC or RETURN to Exit:
```

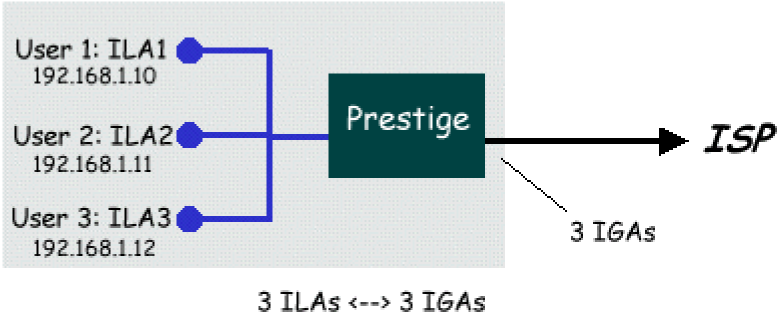
Step 3:

Now we configure all other incoming traffic to go to our web server aand mail server from **Menu 15.2.2 - NAT Server Setup** (not Set 1, Set 1 is used for SUA Only case).

```
                Menu 15.2.2 - NAT Server Setup


          Rule Start Port No. End Port No. IP Address
         ---------------------------------------------------
           1.     Default      Default      0.0.0.0
           2.       80           80       192.168.1.20
           3.       25           25       192.168.1.20
           4.        0            0       0.0.0.0
           5.        0            0       0.0.0.0
           6.        0            0       0.0.0.0
           7.        0            0       0.0.0.0
           8.        0            0       0.0.0.0
           9.        0            0       0.0.0.0
          10.        0            0        0.0.0.0
          11.        0            0        0.0.0.0
          12.        0            0        0.0.0.0

            Press ENTER to Confirm or ESC to Cancel:
```

4. Support Non NAT Friendly Applications

Some servers providing Internet applications such as some mIRC servers do not allow users to login using the same IP address. In this case it is better to use Many-to-Many No Overload or One-to-One NAT mapping types, thus each user login to the server using a unique global IP address. The following figure illustrates this.



3 ILAs map to 3 IGAs using Many-to-Many No Overload or One-to-One type

One rule configured for using **Many-to-Many No Overload** mapping type is shown below.

```
Menu 15.1.1.1 -   - Rule 1
Type: Many-to-Many No Overload
Local IP:
  Start= 192.168.1.10
  End   = 192.168.1.12
Global IP:
  Start= [Enter IGA1]
  End   = [Enter IGA3]
 Press ENTER to Confirm or ESC to Cancel:
```

The three rules configured for using **One-to-One** mapping type is shown below.

```
   Menu 15.1.1.1 -   - Rule 1
Type: One-to-One
Local IP:
  Start= 192.168.1.10
  End   = N/A
Global IP:
    Start= [Enter IGA1]
    End   = N/A
     Press ENTER to Confirm or ESC to Cancel:
```

```
   Menu 15.1.1.2 -   - Rule 2
```

```
            Type: One-to-One
             Local IP:
                Start= 192.168.1.11
                End   = N/A
             Global IP:
                Start= [Enter IGA2]
                End   = N/A
        Press ENTER to Confirm or ESC to Cancel:
```

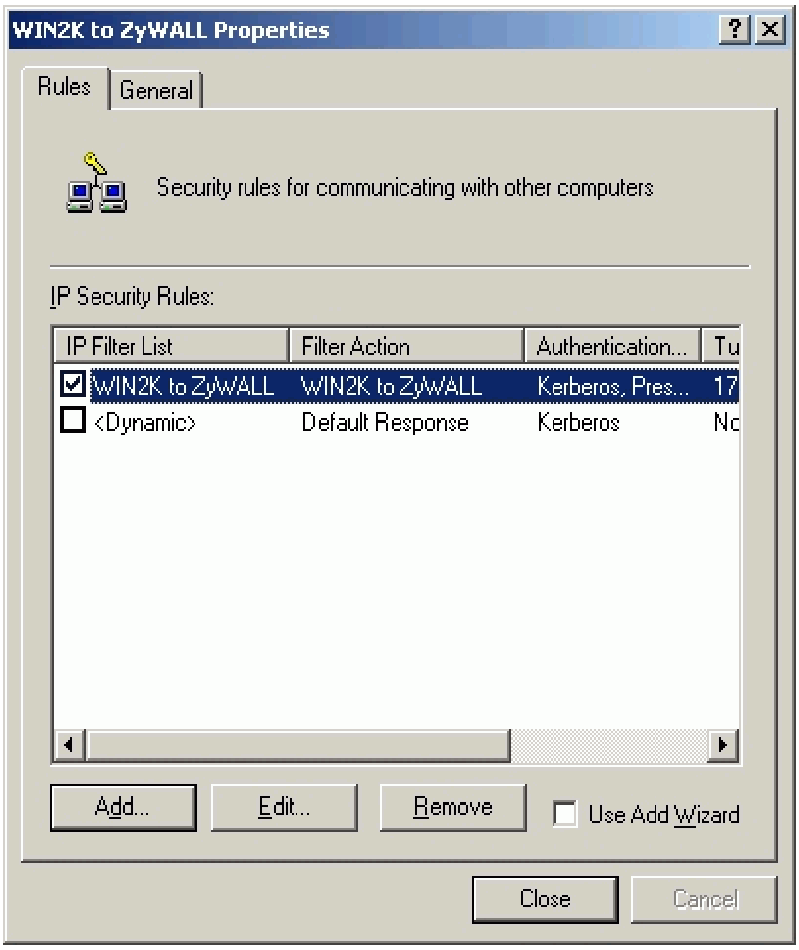
```
              Menu 15.1.1.3 -   - Rule 3
          Type: One-to-One
           Local IP:
                Start= 192.168.1.12
                End   = N/A
           Global IP:
                Start= [Enter IGA3]
                End   = N/A
             Press ENTER to Confirm or ESC to Cancel:
```

6. About Filter & Filter Examples

How does ZyXEL filter work?

Filter Structure

The P-660 allows you to configure up to twelve filter sets with six rules in each set, for a total of 72 filter rules in the system. You can apply up to four filter sets to a particular port to block multiple types of packets. With each filter set having up to six rules, you can have a maximum of 24 rules active for a single port. The following diagram illustrates the logic flow when executing a filter rule.


WIN2K to ZyWALL Properties
Rules
General
Security rules for communicating with other computers
Add...
Edit...
Remove
□ Use Add Wizard
Close
Cancel

IP Security Rules:

	IP Filter List	Filter Action	Authentication...	Tu
☑	WIN2K to ZyWALL	WIN2K to ZyWALL	Kerberos, Pres...	17
□	<Dynamic>	Default Response	Kerberos	Nc

Filter Types and SUA

Conceptually, there are two categories of filter rules: **device** and **protocol**. The Generic filter rules belong to the device category; they act on the raw data from/to LAN and WAN. The IP and IPX filter rules belong to the protocol category; they act on the IP and IPX packets.

In order to allow users to specify the local network IP address and port number in the filter rules with SUA connections, the TCP/IP filter function has to be executed before SUA for WAN outgoing packets and after the SUA for WAN incoming IP packets. But at the same time, the Generic filter rules must be applied at the point when the P-660 is receiving and sending the packets; i.e. the ISDN interface. So, the execution sequence has to be changed. The logic flow of the filter is shown in Figure 1 and the sequence of the logic flow for the packet from LAN to WAN is:

- LAN device and protocol input filter sets.
- WAN protocol call and output filter sets.
- If SUA is enabled, SUA converts the source IP address from 192.168.1.33 to 203.205.115.6 and port number from 1023 to 4034.

- WAN device output and call filter sets.

The sequence of the logic flow for the packet from WAN to LAN is:

WAN device input filter sets.

If SUA is enabled, SUA converts the destination IP address from 203.205.115.6 to 92.168.1.33 and port number from 4034 to 1023.

WAN protocol input filter sets.

LAN device and protocol output filter sets.

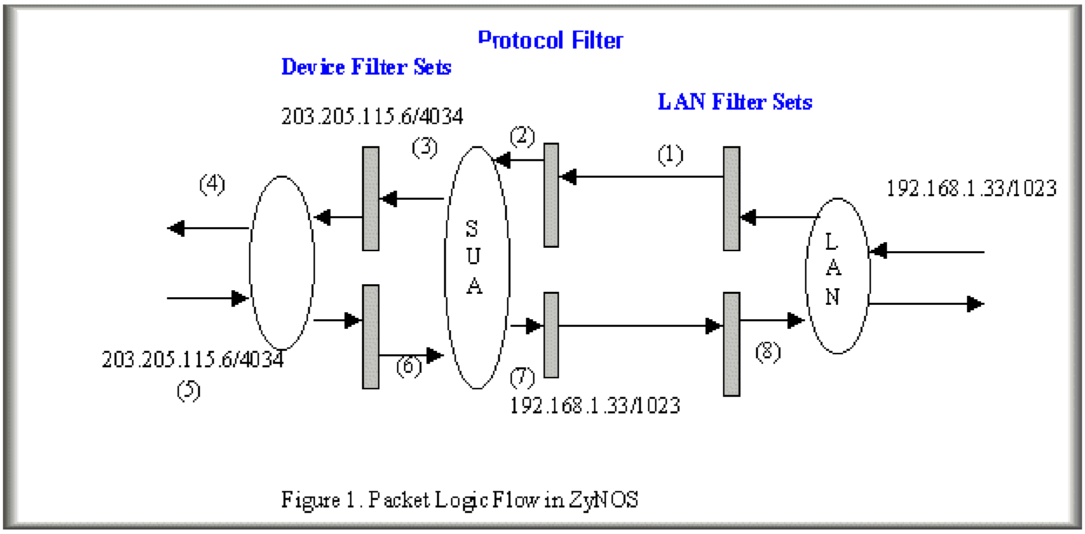


Figure 1. Packet Logic Flow in ZyNOS

Generic and **TCP/IP (and IPX)** filter rules are in different filter sets. The SMT will detect and prevent the mixing of different category rules within any filter set in Menu 21. In the following example, you will receive an error message '**Protocol and device filter rules cannot be active together**' if you try to activate a TCP/IP (or IPX) filter rule in a filter set that has already had one or more active Generic filter rules. You will receive the same error if you try to activate a Generic filter rule in a filter set that has already had one or more active TCP/IP (or IPX) filter rules.

Menu 21.1.1:

```
                Menu 21.1.1 - Generic Filter Rule

           Filter #: 1,1
           Filter Type= Generic Filter Rule
           Active= Yes
           Offset= 0
           Length= 0
           Mask= N/A
           Value= N/A
           More= No           Log= None
           Action Matched= Check Next Rule
           Action Not Matched= Check Next Rule
```

Menu 21.1.2:

```
              Menu 21.1.2 - TCP/IP Filter Rule

           Filter #: 1,2
           Filter Type= TCP/IP Filter Rule
           Active= Yes
           IP Protocol= 0    IP Source Route= No
           Destination: IP Addr= 0.0.0.0
                  IP Mask= 0.0.0.0
                  Port #= 0
                  Port # Comp= None
              Source: IP Addr= 0.0.0.0
                  IP Mask= 0.0.0.0
                  Port #= 0
                  Port # Comp= None
           TCP Estab= N/A
           More= No           Log= None
           Action Matched= Check Next Rule
           Action Not Matched= Check Next Rule

           Press ENTER to Confirm or ESC to Cancel:
Saving to ROM.   Please wait...
Protocol and device rule cannot be active together
```

To separate the device and protocol filter categories; two new menus, Menu 11.5 and Menu 13.1, have been added, as well as some changes made to the Menu 3.1, Menu 11.1, and Menu 13. The new fields are shown below.

Menu 3.1:

```
                    Menu 3.1 - General Ethernet Setup

                Input Filter Sets:
                  protocol filters=
                    device filters=
                Output Filter Sets:
                  protocol filters=
                    device filters=
```

Menu 11.1:

```


                        Menu 11.1 - Remote Node Profile

               Rem Node Name= LAN       Route= IP
               Active= Yes              Bridge= No

           Encapsulation= PPP          Edit PPP Options= No
           Incoming:                   Rem IP Addr= ?
           Rem Login= test             Edit IP/IPX/Bridge= No
           Rem Password= ********
           Outgoing:                   Session Options:
         My Login= testt             Edit Filter Sets= Yes
         My Password= *****
           Authen= CHAP/PAP
       Press ENTER to Confirm or ESC to Cancel:
```

Menu 11.5:

```
                    Menu 11.5 - Remote Node Filter
                  Input Filter Sets:
                  protocol filters=
                    device filters=
                Output Filter Sets:
                  protocol filters=
                    device filters=
```

SMT will also prevent you from entering a protocol filter set configured in Menu 21 to the **device filters** field in Menu 3.1, 11.5, or entering a device filter set to the **protocol filters** field. Even though SMT will prevent the inconsistency from being entered in ZyNOS, it is unable to resolve the intermixing problems existing in the filter sets that were configured before. Instead, when ZyNOS translates the old configuration into the new format, it will verify the filter rules and log the inconsistencies. Please check the system log (Menu 24.3.1) before putting your device into use.

In order to avoid operational problems later, the P-660 will disable its routing/bridging functions if there is an inconsistency among its filter rules.

Filter Examples

1. A filter for blocking the web service
2. A filter for blocking a specific client
3. A filter for blocking a specific MAC address
4. A filter for blocking the NetBIOS packets

A filter for blocking the web service

Configuration

Before configuring a filter, you need to know the following information:

1. The outbound packet type (protocol & port number)
2. The source IP address

Generally, the outbound packets for Web service could be as following:

a. HTTP packet, TCP (06) protocol with port number 80
b. DNS packet, TCP (06) protocol with port number 53 or
c. DNS packet, UDP (17) protocol with port number 53

For all workstation on the LAN, the source IP address will be 0.0.0.0. Otherwise, you have to enter an IP Address for the workstation you want to block. See the procedure for configuring this filter below.

1. Create a filter set in Menu 21, e.g., set 1

2. Create three filter rules in Menu 21.1.1, Menu 21.1.2, Menu 21.1.3

- Rule 1- block the HTTP packet, TCP (06) protocol with port number 80
- Rule 2- block the DNS packet, TCP (06) protocol with port number 53
- Rule 3- block the DNS packet, UDP (17) protocol with port number 53

3. Apply the filter set in menu 4

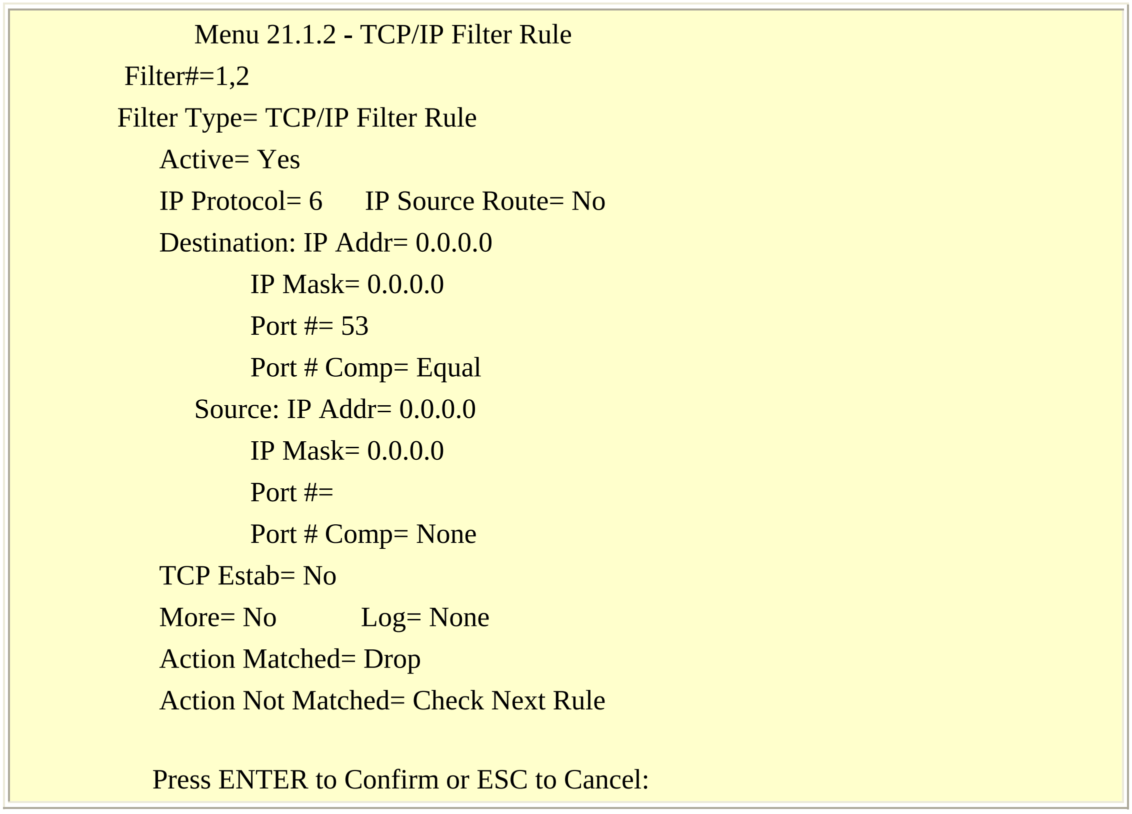
1. Create a filter set in Menu 21

```
                 Menu 21 - Filter Set Configuration
    Filter                              Filter
    Set #       Comments                 Set #       Comments
    ------   -----------------          ------   -----------------
      1      Web Request                  7      _________________
      2      _________________            8      _________________
      3      _________________            9      _________________
      4      _________________           10      _________________
      5      _________________           11      _________________
      6      _________________           12      _________________
                 Enter Filter Set Number to Configure= 1

               Edit Comments=

               Press ENTER to Confirm or ESC to Cancel:
```

2. Rule 1 for (a). http packet, TCP(06)/Port number 80

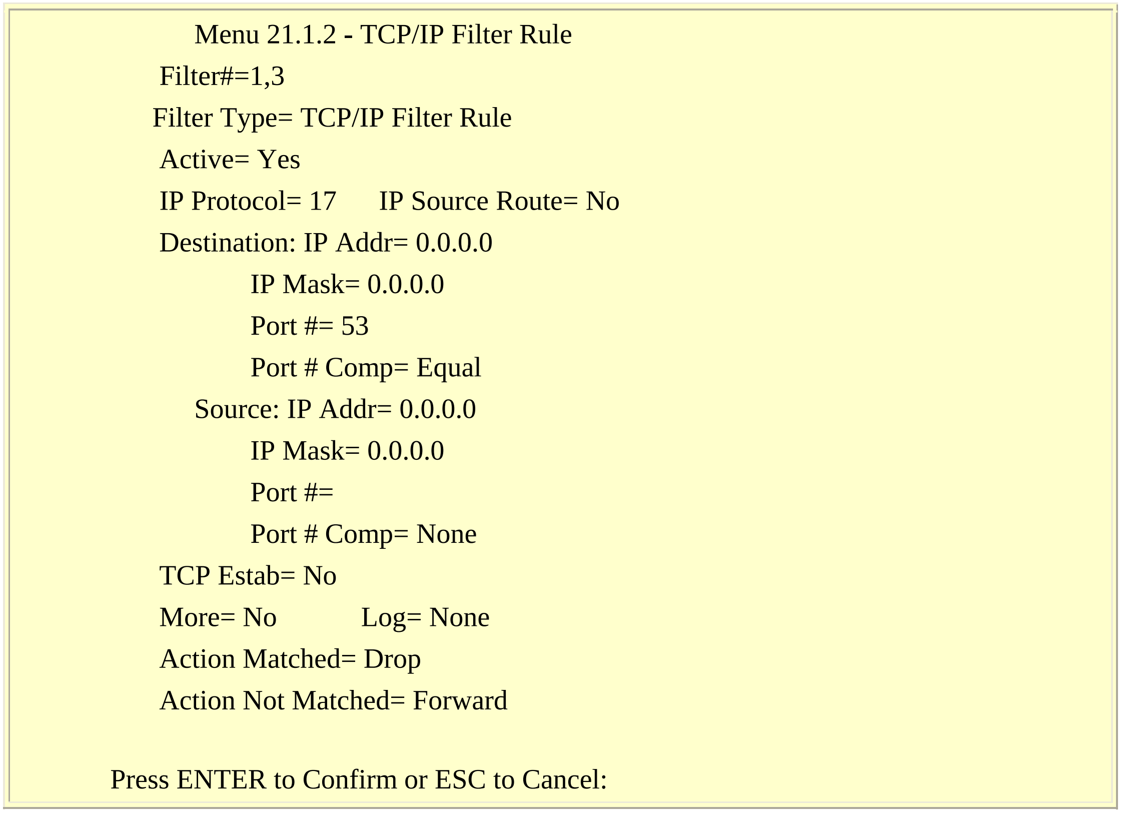
```
                  Menu 21.1.1 - TCP/IP Filter Rule

               Filter #: 1,1
               Filter Type= TCP/IP Filter Rule
               Active= Yes
               IP Protocol= 6      IP Source Route= No
               Destination: IP Addr= 0.0.0.0
                        IP Mask= 0.0.0.0
                        Port #= 80
                        Port # Comp= Equal
                  Source: IP Addr= 0.0.0.0
                        IP Mask= 0.0.0.0
                        Port #=
                        Port # Comp= None
               TCP Estab= No
               More= No            Log= None
               Action Matched= Drop
               Action Not Matched= Check Next Rule

               Press ENTER to Confirm or ESC to Cancel:
```

3.Rule 2 for (b).DNS request, TCP(06)/Port number 53



```
          Menu 21.1.2 - TCP/IP Filter Rule
 Filter#=1,2
Filter Type= TCP/IP Filter Rule
     Active= Yes
     IP Protocol= 6      IP Source Route= No
     Destination: IP Addr= 0.0.0.0
                  IP Mask= 0.0.0.0
                  Port #= 53
                  Port # Comp= Equal
          Source: IP Addr= 0.0.0.0
                  IP Mask= 0.0.0.0
                  Port #=
                  Port # Comp= None
     TCP Estab= No
     More= No           Log= None
     Action Matched= Drop
     Action Not Matched= Check Next Rule

    Press ENTER to Confirm or ESC to Cancel:
```

4. Rule 3 for (c). DNS packet UDP(17)/Port number 53



```
          Menu 21.1.2 - TCP/IP Filter Rule
     Filter#=1,3
    Filter Type= TCP/IP Filter Rule
     Active= Yes
     IP Protocol= 17      IP Source Route= No
     Destination: IP Addr= 0.0.0.0
                  IP Mask= 0.0.0.0
                  Port #= 53
                  Port # Comp= Equal
          Source: IP Addr= 0.0.0.0
                  IP Mask= 0.0.0.0
                  Port #=
                  Port # Comp= None
     TCP Estab= No
     More= No           Log= None
     Action Matched= Drop
     Action Not Matched= Forward

Press ENTER to Confirm or ESC to Cancel:
```

5. After the three rules are completed, you will see the rule summary in Menu 21.

```
                    Menu 21.1 - Filter Rules Summary

# A Type                 Filter Rules          M m n
- - ---- -------------------------------------- - - -
1 Y IP    Pr=6, SA=0.0.0.0, DA=0.0.0.0, DP=80     N D N
2 Y IP    Pr=6, SA=0.0.0.0, DA=0.0.0.0, DP=53     N D N
3 Y IP    Pr=17, SA=0.0.0.0, DA=0.0.0.0,DP=53     N D F
```

6. Apply the filter set to the **'Output Protocol Filter Set'** in the remote node setup

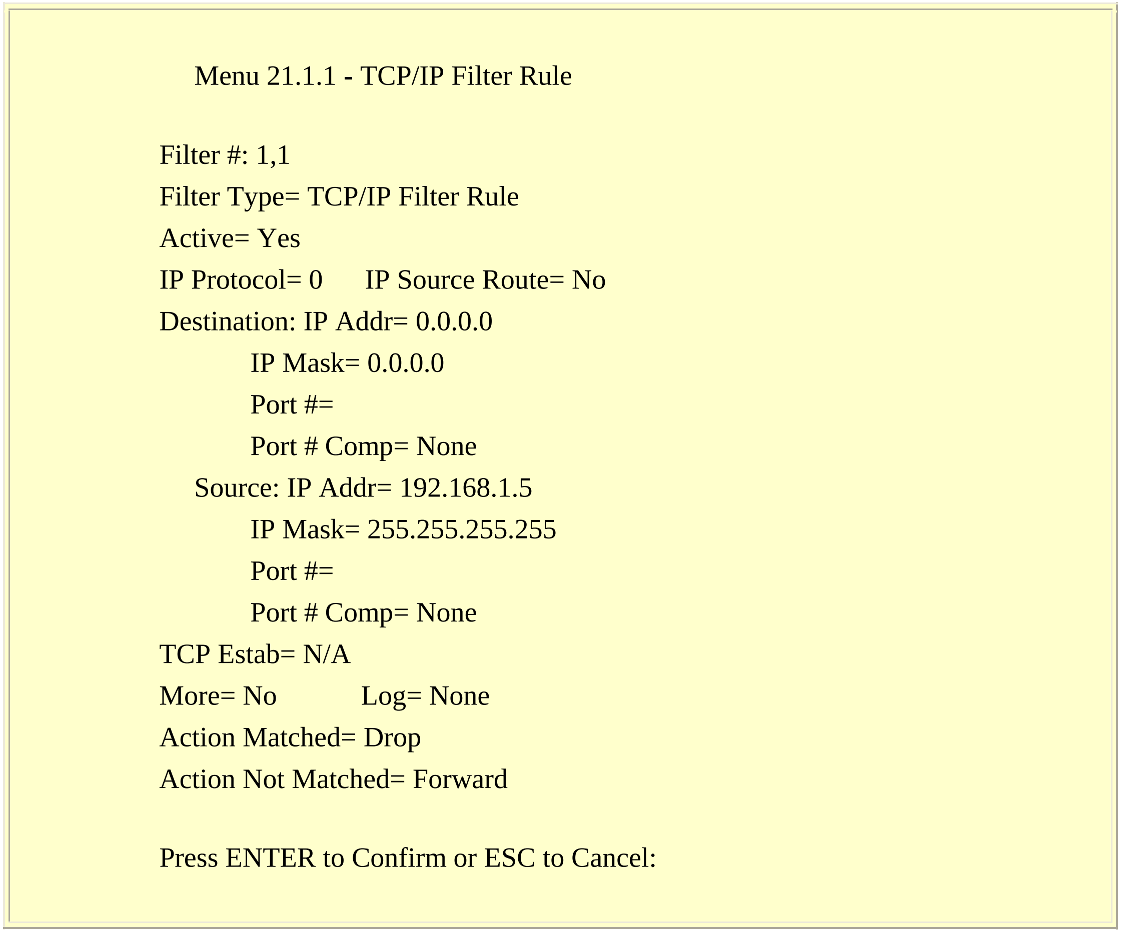
A filter for blocking a specific client

Configuration

1. Create a filter set in Menu 21, e.g., set 1

```
                    Menu 21 - Filter Set Configuration

    Filter                        Filter
    Set #      Comments              Set #      Comments
    ------   -----------------       ------   -----------------
      1      Block a client             7      ________________
      2      ________________           8      ________________
      3      ________________           9      ________________
      4      ________________          10      ________________
      5      ________________          11      ________________
      6      ________________          12      ________________



               Enter Filter Set Number to Configure= 0

               Edit Comments=

               Press ENTER to Confirm or ESC to Cancel:
```

2. One rule for blocking all packets from this client



```
          Menu 21.1.1 - TCP/IP Filter Rule

       Filter #: 1,1
       Filter Type= TCP/IP Filter Rule
       Active= Yes
       IP Protocol= 0      IP Source Route= No
       Destination: IP Addr= 0.0.0.0
                 IP Mask= 0.0.0.0
                 Port #=
                 Port # Comp= None
          Source: IP Addr= 192.168.1.5
                 IP Mask= 255.255.255.255
                 Port #=
                 Port # Comp= None
       TCP Estab= N/A
       More= No           Log= None
       Action Matched= Drop
       Action Not Matched= Forward

       Press ENTER to Confirm or ESC to Cancel:
```

Key Settings:

Source IP addr................Enter the client IP in this field
IP Mask..........................Here the IP mask is used to mask the bits of the IP address given in the **'Source IP Addr='** field, for one workstation it is 255.255.255.255.
Action Matched................Set to 'Drop' to drop all the packets from this client
Action Not Matched.........Set to 'Forward' to allow the packets from other clients

3. Apply the filter set number '1' to the **'Output Protocol Filter Set'** field in the remote node setup.

A filter for blocking a specific MAC address

This configuration example shows you how to use a Generic Filter to block a specific MAC address of the LAN.

Before you Begin

Before you configure the filter, you need to know the MAC address of the client first. The MAC address can be provided by the NICs. If there is the LAN packet passing through the P-660 you can identify the uninteresting MAC address from the P-660's LAN packet trace. Please have a look at the following example to know the trace of the LAN packets.

```
ras> sys trcp channel enet0 bothway
ras> sys trcp sw on

Now a client on the LAN is trying to ping Prestige………

ras> sys trcp sw off
ras> sys trcp disp

TIME:   37c060   enet0-RECV len:74 call=0
   0000: [00 a0 c5 01 23 45] [00 80 c8 4c ea 63] 08 00 45 00
   0010: 00 3c eb 0c 00 00 20 01 e3 ea ca 84 9b 5d ca 84
   0020: 9b 63 08 00 45 5c 03 00 05 00 61 62 63 64 65 66
   0030: 67 68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76
   0040: 77 61 62 63 64 65 66 67 68 69

TIME:   37c060   enet0-XMIT len:74 call=0
   0000: [00 80 c8 4c ea 63] [00 a0 c5 01 23 45] 08 00 45 00
   0010: 00 3c 00 07 00 00 fe 01 f0 ef ca 84 9b 63 ca 84
   0020: 9b 5d 00 00 4d 5c 03 00 05 00 61 62 63 64 65 66
   0030: 67 68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76
   0040: 77 61 62 63 64 65 66 67 68 69
```

The detailed format of the Ethernet Version II:

```
+ Ethernet Version II
     - Address: 00-80-C8-4C-EA-63 (Source MAC) ----> 00-A0-C5-23-45
       (Destination MAC)
     - Ethernet II Protocol Type: IP
+ Internet Protocol
     - Version (MSB 4 bits): 4
     - Header length (LSB 4 bits): 5
     - Service type: Precd=Routine, Delay=Normal, Thrput=Normal, Reli=Normal
     - Total length: 60 (Octets)
     - Fragment ID: 60172
```

```
    - Flags: May be fragmented, Last fragment, Offset=0 (0x00)
    - Time to live: 32 seconds/hops
    - IP protocol type: ICMP (0x01)
    - Checksum: 0xE3EA
    - IP address 202.132.155.93   (Source IP address) ---->
      202.132.155.99(Destination IP address)
    - No option
+ Internet Control Message Protocol
    - Type: 8 - Echo Request
    - Code: 0
    - Checksum: 0x455C
    - Identifier: 768
    - Sequence Number: 1280
    - Optional Data: (32 bytes)
```

Configurations

From the above first trace, we know a client is trying to ping request the P-660 router. And from the second trace, we know the P-660 router will send a reply to the client accordingly.   The following sample filter will utilize the 'Generic Filter Rule' to block the MAC address **[00 80 c8 4c ea 63]**.

1. First, from the incoming LAN packet we know the uninteresting source MAC address starts at the 7th Octet

```
TIME:   37c060   enet0-RECV len:74 call=0
  0000: [00 a0 c5 01 23 45] [00 80 c8 4c ea 63] 08 00 45 00
  0010: 00 3c eb 0c 00 00 20 01 e3 ea ca 84 9b 5d ca 84
  0020: 9b 63 08 00 45 5c 03 00 05 00 61 62 63 64 65 66
  0030: 67 68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76
  0040: 77 61 62 63 64 65 66 67 68 69
```

2. We are now ready to configure the 'Generic Filter Rule' as below.

```
              Menu 21.1.1 - Generic Filter Rule

               Filter #: 1,1
               Filter Type= Generic Filter Rule
               Active= Yes
               Offset= 6
               Length= 6
               Mask= ffffffffffff
               Value= 0080c84cea63
```

```
More= No          Log= None
Action Matched= Drop
Action Not Matched= Forward
```

Key Settings:

- Generic Filter Ruls
  Set the 'Filter Type' to 'Generic Filter Rule'

- Active
  Turn 'Active' to 'Yes'

- Offset (in bytes)
  Set to '6' since the source MAC address starts at 7th octets we need to skip the first octets of the destination MAC address.

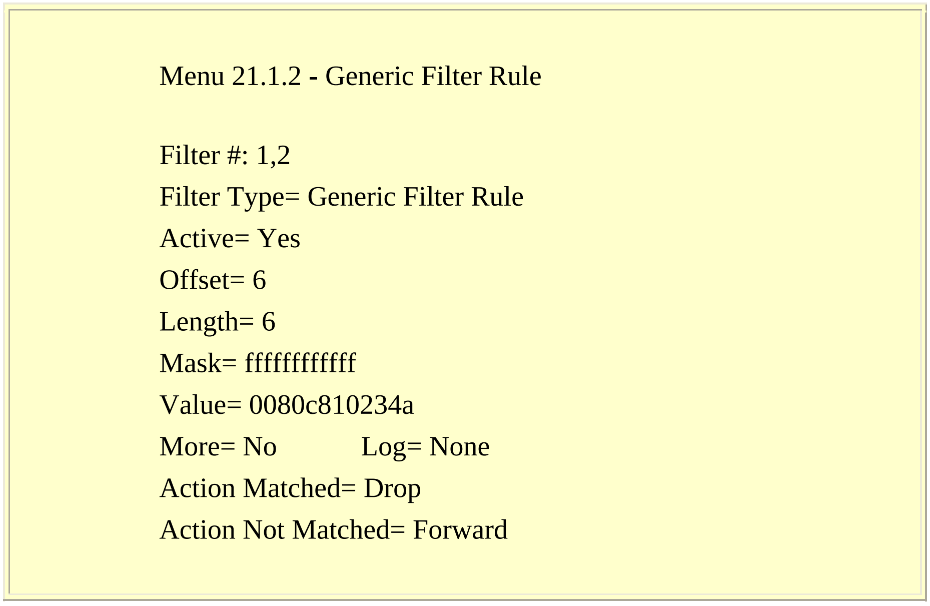
Length (in bytes)
Set to '6' since MAC address has 6 octets.

Mask (in hexadecimal)
Specify the value that the P-660 will logically qualify (logical AND) the data in the packet.
Since the Length is set to 6 octets the Mask for it should be 12 hexadecimal numbers. In this case, we intent to set to 'ffffffffffff' to mask the incoming source MAC address, [00 80 c8 4c ea 63].

- Value (in hexadecimal)
  Specify the MAC address **[00 80 c8 4c ea 63]** that the P-660 should use to compare with the masked packet. If the result from the masked packet matches the 'Value', then the packet is considered matched.

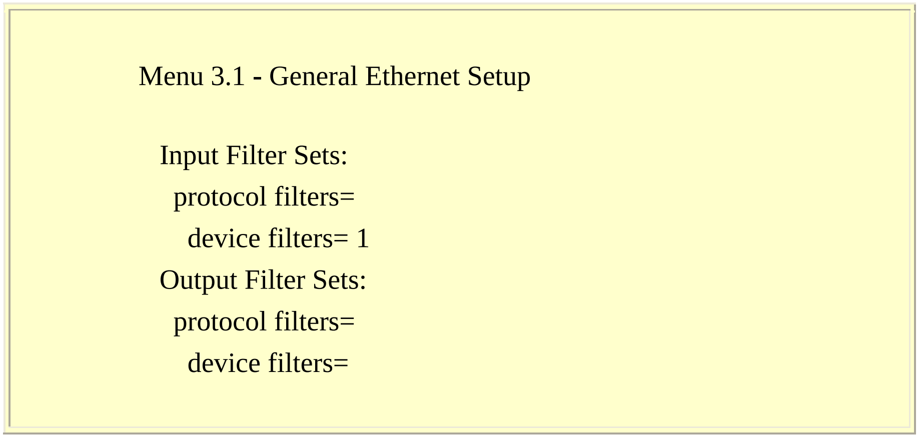
- Action Matched=
  Enter the action you want if the masked packet matches the 'Value'. In this case, we will drop it.

- Action Not Matched=
  Enter the action you want if the masked packet does not match the 'Value'. In this case, we will forward it. If you want to configure more rules please select 'Check Next Rule' to start configuring the next new rule. However, please note that the 'Filter Type' must be also 'Generic Filter Rule' but not others. Because the Generic and TCPIP (IPX) filter rules must be in different filter sets.



```
Menu 21.1.2 - Generic Filter Rule

Filter #: 1,2
Filter Type= Generic Filter Rule
Active= Yes
Offset= 6
Length= 6
Mask= ffffffffffff
Value= 0080c810234a
More= No          Log= None
Action Matched= Drop
Action Not Matched= Forward
```

You can now apply it to the **'General Ethernet Setup'** in Menu 3.1. Please note that the **'Generic Filter'** can only be applied to the **'Device Filter'** but not the **'Protocol Filter'** that is used for configuring the TCPIP and IPX filters.



```
Menu 3.1 - General Ethernet Setup

  Input Filter Sets:
    protocol filters=
      device filters= 1
  Output Filter Sets:
    protocol filters=
      device filters=
```

A filter for blocking the NetBIOS packets

Introduction

The NETBIOS protocol is used to share a Microsoft comupter of a workgroup. For the security concern, the NetBIOS connection to a outside host is blocked by P-660 router as factory defaults. Users can remove the filter sets applied to menu 3.1 and menu 4.1 for activating the NetBIOS services. The details of the filter settings are described as follows.

Configuration

The packets need to be blocked are as follows. Please configure two filter sets with 4 and 2 rules respectively based on the following packets in SMT menu 21.

Filter Set 1:

Rule 1-Destination port number 137 with protocol number 6 (TCP)

Rule 2-Destination port number 137 with protocol number 17 (UDP)

Rule 3-Destination port number 138 with protocol number 6 (TCP)

Rule 4-Destination port number 138 with protocol number 17 (UDP)

Rule 5-Destination port number 139 with protocol number 6 (TCP)

Rule 6-Destination port number 139 with protocol number 17 (UDP)

Filter Set 2:

Rule 1-Source port number 137, Destination port number 53 with protocol number 6 (TCP)

Rule 2-Source port number 137, Destination port number 53 with protocol number 17 (UDP)

Before starting to set the filter rules, please enter a name for each filter set in the 'Comments' field first.

```
                 Menu 21 - Filter Set Configuration

    Filter                              Filter
    Set #    Comments                    Set #    Comments
    ------   -----------------           ------   -----------------
      1      NetBIOS_WAN                   7      _______________
      2      NetBIOS_LAN                   8      _______________
      3      _______________               9      _______________
      4      _______________              10      _______________
      5      _______________              11      _______________
      6      _______________              12      _______________
                 Enter Filter Set Number to Configure= 1
               Edit Comments=
               Press ENTER to Confirm or ESC to Cancel:
```

Configure the first filter set 'NetBIOS_WAN' by selecting the Filter Set number 1.

- Rule 1-Destination port number 137 with protocol number 6 (TCP)

```
          Menu 21.1.1 - TCP/IP Filter Rule

 Filter #: 1,1
Filter Type= TCP/IP Filter Rule
Active= Yes
IP Protocol= 6      IP Source Route= No
Destination: IP Addr= 0.0.0.0
             IP Mask= 0.0.0.0
             Port #= 137
             Port # Comp= Equal
     Source: IP Addr= 0.0.0.0
             IP Mask= 0.0.0.0
             Port #= 0
             Port # Comp= None
TCP Estab= No
More= No            Log= None
Action Matched= Drop
Action Not Matched= Check Next Rule
```

- Rule 2-Destination port number 137 with protocol number 17 (UDP)

```
          Menu 21.1.2 - TCP/IP Filter Rule

Filter #: 1,2
Filter Type= TCP/IP Filter Rule
Active= Yes
IP Protocol= 17     IP Source Route= No
Destination: IP Addr= 0.0.0.0
             IP Mask= 0.0.0.0
             Port #= 137
             Port # Comp= Equal
     Source: IP Addr= 0.0.0.0
             IP Mask= 0.0.0.0
             Port #= 0
             Port # Comp= None
TCP Estab= N/A
More= No            Log= None
Action Matched= Drop
```

```
          Action Not Matched= Check Next Rule

          Press ENTER to Confirm or ESC to Cancel:
```

- Rule 3-Destination port number 138 with protocol number 6 (TCP)

```
             Menu 21.1.3 - TCP/IP Filter Rule

          Filter #: 1,3
          Filter Type= TCP/IP Filter Rule
          Active= Yes
          IP Protocol= 6      IP Source Route= No
          Destination: IP Addr= 0.0.0.0
                       IP Mask= 0.0.0.0
                       Port #= 138
                       Port # Comp= Equal
             Source: IP Addr= 0.0.0.0
                       IP Mask= 0.0.0.0
                       Port #= 0
                       Port # Comp= None
          TCP Estab= No
          More= No            Log= None
          Action Matched= Drop
          Action Not Matched= Check Next Rule

          Press ENTER to Confirm or ESC to Cancel:
```

- Rule 4-Destination port number 138 with protocol number 17 (UDP)

```
             Menu 21.1.4 - TCP/IP Filter Rule

          Filter #: 1,4
          Filter Type= TCP/IP Filter Rule
```

```
Active= Yes
IP Protocol= 17     IP Source Route= No
Destination: IP Addr= 0.0.0.0
             IP Mask= 0.0.0.0
             Port #= 138
             Port # Comp= Equal
     Source: IP Addr= 0.0.0.0
             IP Mask= 0.0.0.0
             Port #= 0
             Port # Comp= None
TCP Estab= N/A
More= No            Log= None
Action Matched= Drop
Action Not Matched= Check Next Rule

Press ENTER to Confirm or ESC to Cancel:
```

- Rule 5-Destination port number 139 with protocol number 6 (TCP)

```
     Menu 21.1.5 - TCP/IP Filter Rule

 Filter #: 1,5
Filter Type= TCP/IP Filter Rule
Active= Yes
IP Protocol= 6      IP Source Route= No
Destination: IP Addr= 0.0.0.0
             IP Mask= 0.0.0.0
             Port #= 139
             Port # Comp= Equal
     Source: IP Addr= 0.0.0.0
             IP Mask= 0.0.0.0
             Port #= 0
             Port # Comp= None
TCP Estab= No
More= No            Log= None
Action Matched= Drop
Action Not Matched= Check Next Rule

Press ENTER to Confirm or ESC to Cancel:
```

- Rule 6-Destination port number 139 with protocol number 17 (UDP)

```
                Menu 21.1.6 - TCP/IP Filter Rule
             Filter #: 1,6
            Filter Type= TCP/IP Filter Rule
            Active= Yes
            IP Protocol= 17     IP Source Route= No
            Destination: IP Addr= 0.0.0.0
                         IP Mask= 0.0.0.0
                         Port #= 139
                         Port # Comp= Equal
                 Source: IP Addr= 0.0.0.0
                         IP Mask= 0.0.0.0
                         Port #= 0
                         Port # Comp= None
            TCP Estab= N/A
            More= No           Log= None
            Action Matched= Drop
            Action Not Matched= Forward

            Press ENTER to Confirm or ESC to Cancel:
```

After the first filter set is finished, you will get the complete rules summary as below.

```
          Menu 21.2 - Filter Rules Summary

# A Type                  Filter Rules            M m n
 - - ---- --------------------------------------------- - - -
 1 Y IP    Pr=6,   SA=0.0.0.0, DA=0.0.0.0, DP=137        N D N
 2 Y IP    Pr=17, SA=0.0.0.0, DA=0.0.0.0, DP=137         N D N
 3 Y IP    Pr=6,   SA=0.0.0.0, DA=0.0.0.0, DP=138        N D N
 4 Y IP    Pr=17, SA=0.0.0.0, DA=0.0.0.0, DP=138         N D N
 5 Y IP    Pr=6,   SA=0.0.0.0, DA=0.0.0.0, DP=139        N D N
 6 Y IP    Pr=17, SA=0.0.0.0, DA=0.0.0.0, DP=139         N D F
```

Apply the first filter set 'NetBIOS_WAN' to the **'Output Protocol Filter'** in the remote node setup.

Configure the second filter set 'NetBIOS_LAN' by selecting the Filter Set number 2.

Rule 1-Source port number 137, Destination port number 53 with protocol number 6 (TCP)

```
     Menu 21.2.1 - TCP/IP Filter Rule
Filter #: 2,1
Filter Type= TCP/IP Filter Rule
Active= Yes
IP Protocol= 6      IP Source Route= No
Destination: IP Addr= 0.0.0.0
             IP Mask= 0.0.0.0
             Port #= 53
             Port # Comp= Equal
     Source: IP Addr= 0.0.0.0
             IP Mask= 0.0.0.0
             Port #= 137
             Port # Comp= Equal
TCP Estab= No
More= No          Log= None
Action Matched= Drop
Action Not Matched= Check Next Rule

Press ENTER to Confirm or ESC to Cancel:
```

1. Rule 2-Source port number 137, Destination port number 53 with protocol number 17 (UDP)

```
     Menu 21.2.2 - TCP/IP Filter Rule

Filter #: 2,2
Filter Type= TCP/IP Filter Rule
Active= Yes
IP Protocol= 17     IP Source Route= No
Destination: IP Addr= 0.0.0.0
             IP Mask= 0.0.0.0
             Port #= 53
             Port # Comp= Equal
     Source: IP Addr= 0.0.0.0
             IP Mask= 0.0.0.0
             Port #= 137
             Port # Comp= Equal
TCP Estab= N/A
More= No          Log= None
```

```
              Action Matched= Drop
              Action Not Matched= Forward

              Press ENTER to Confirm or ESC to Cancel:
```

2. After the first filter set is finished, you will get the complete rules summary as below.

```
          Menu 21.2 - Filter Rules Summary

# A Type            Filter Rules                M m n
- - ---- --------------------------------------------- - - -
1 Y IP    Pr=6,   SA=0.0.0.0, SP=137, DA=0.0.0.0, DP=53    N D N
2 Y IP    Pr=17, SA=0.0.0.0, SP=137, DA=0.0.0.0, DP=53    N D F
```

3. Apply the filter set 'NetBIOS_LAN' in the **'Input protocol filters='** in the Menu 3 for blocking the packets from LAN

```
          Menu 3.1 - General Ethernet Setup

              Input Filter Sets:
                protocol filters= 2
                  device filters=
              Output Filter Sets:
                protocol filters=
                  device filters=
```

7. Using the Dynamic DNS (DDNS)

- What is DDNS?

The DDNS service, an IP Registry provides a public central database where information such as email addresses, hostnames, IPs etc. can be stored and retrieved. This solves the problems if your DNS server uses an IP associated with dynamic IPs.

Without DDNS, we always tell the users to use the WAN IP of the P-660 to access the internal server. It is inconvenient for the users if this IP is dynamic. With DDNS supported by the P-660, you apply a DNS name (e.g., www.zyxel.com.tw) for your server (e.g., Web server) from a DDNS server. The outside users can always access the web server using the www.zyxel.com.tw regardless of the WAN IP of the P-660.

When the ISP assigns the P-660 a new IP, the P-660 must inform the DDNS server the change of this IP so that the server can update its IP-to-DNS entry. Once the IP-to-DNS table in the DDNS server is updated, the DNS name for your web server (i.e., www.zyxel.com.tw) is still usable.

The DDNS server stores password-protected email addresses with IPs and hostnames and accepts queries based on email addresses. So, there must be an email entry in the P-660 menu 1.

The DDNS servers the P-660 supports currently is WWW.DYNDNS.ORG where you apply the DNS from and update the WAN IP to.

- Setup the DDNS

1. Before configuring the DDNS settings in the P-660, you must register an account from the DDNS server such as WWW.DYNDNS.ORG first. After the registration, you have a hostname for your internal server and a password using to update the IP to the DDNS server.
2. Toggle **'Configure Dynamic DNS'** option to **'Yes'** and press ENTER for configuring the settings of the DDNS in menu 1.1.

```
Menu 1 - General Setup

  System Name= P-660
  Location=
  Contact Person's Name=
  Domain Name=
  Edit Dynamic DNS= Yes

  Route IP= Yes
  Bridge= No
  Menu 1.1 - Configure Dynamic DNS

 Service Provider= WWW.DynDNS.ORG
 Active= Yes
 Host= [the local server's host name]
 EMAIL= [your email address]
 User=
 Password= ********
 Enable Wildcard= No
```

Key Settings for using DDNS function:

Option	**Description**
Service Provider	Enter the DDNS server in this field. Currently, we support WWW.DYNDNS.ORG.
Active	Toggle to **'Yes'**.
Host	Enter the hostname you subscribe from the above DDNS server. For example, zyxel.com.tw.
EMAIL	Enter the email address you give to the DDNS server.
User	Enter the user name that
Password	Enter the password that the DDNS server gives to you.
Enable Wildcard	Enter the hostname for the wildcard function that the WWW.DYNDNS.ORG supports. Note that Wildcard option is available only when the provider is http://www.dyndns.org/.

8. Network Management Using SNMP

- SNMP Overview

The Simple Network Management Protocol (SNMP) is an applications-layer protocol used to exchange the management information between network devices (e.g., routers). By using SNMP, network administrators can more easily manage network performance, find and solve network problems. The SNMP is a member of the TCP/IP protocol suite, it uses the UDP to exchange messages between a management Client and an Agent, residing in a network node.

There are two versions of SNMP: Version 1 and Version 2. ZyXEL supports SNMPv1. Most of the changes introduced in Version 2 increase SNMP's security capabilities. SNMP encompasses three main areas:

1. A small set of management operations.
2. Definitions of management variables.
3. Data representation.

The operations allowed are: **Get**, **GetNext**, **Set**, and **Trap**. These functions operates on variables that exist in network nodes. Examples of variables include statistic counters, node port status, and so on. All of the SNMP management functions are carried out through these simple operations. No action operations are available, but these can be simulated by the setting of flag variables. For example, to reset a node, a counter variable named 'time to reset' could be set to a value, causing the node to reset after the time had elapsed.

SNMP variables are defined using the OSI Abstract Syntax Notation One (ASN.1). ASN.1 specifies how a variable is encoded in a transmitted data frame; it is very powerful because the encoded data is self-defining. For example, the encoding of a text string includes an indication that the data unit is a string, along with its length and value. ASN.1 is a flexible way of defining protocols, especially for network management protocols where nodes may support different sets of manageable variables.

The net of variables that each node supports is called the ***Management Information Base*** (MIB). The MIB is made up of several parts, including the Standard MIB, specified as part of SNMP, and Enterprise Specific MIB, which are defined by different manufacturer for hardware specific management.

The current Internet-standard MIB, MIB-II, is defined in RFC 1213 and contains 171 objects. These objects are grouped by protocol (including TCP, IP, UDP, SNMP, and other categories, including 'system' and 'interface.'

The Internet Management Model is as shown in figure 1. Interactions between the NMS and managed devices can be any of four different types of commands:

Reads

> Read is used to monitor the managed devices, NMSs read variables that are maintained by the devices.

Writes

> Write is used to control the managed devices, NMSs write variables that are stored in the managed devices.

Traversal operations

NMSs use these operations to determine which variables a managed device supports and to sequentially gather information from variable tables (such as IP routing table) in managed devices.

Traps

The managed devices to asynchronously report certain events to NMSs use trap.

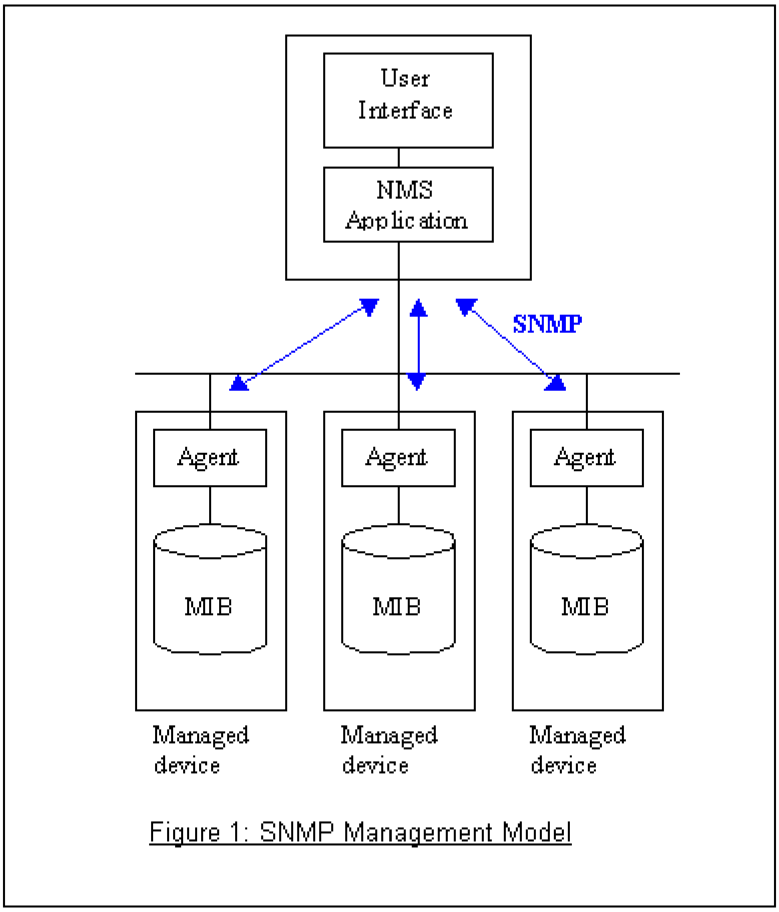


Figure 1: SNMP Management Model

- SNMPv1 Operations

SNMP itself is a simple request/response protocol. 4 SNMPv1 operations are defined as below.

- **Get**
  Allows the NMS to retrieve an object variable from the agent.
- **GetNext**
  Allows the NMS to retrieve the next object variable from a table or list within an agent. In SNMPv1, when a NMS wants to retrieve all elements of a table

from an agent, it initiates a Get operation, followed by a of GetNext operations.

- **Set**
  Allows the NMS to set values for object variables within an agent.
- **Trap**
  Used by the agent to inform the NMS of some events.

The SNMPv1 messages contains two part. The first part contains a version and a community name. The second part contains the actual SNMP protocol data unit (PDU) specifying the operation to be performed (Get, Set, and so on) and the object values involved in the operation. The following figure shows the SNMPv1 message format.

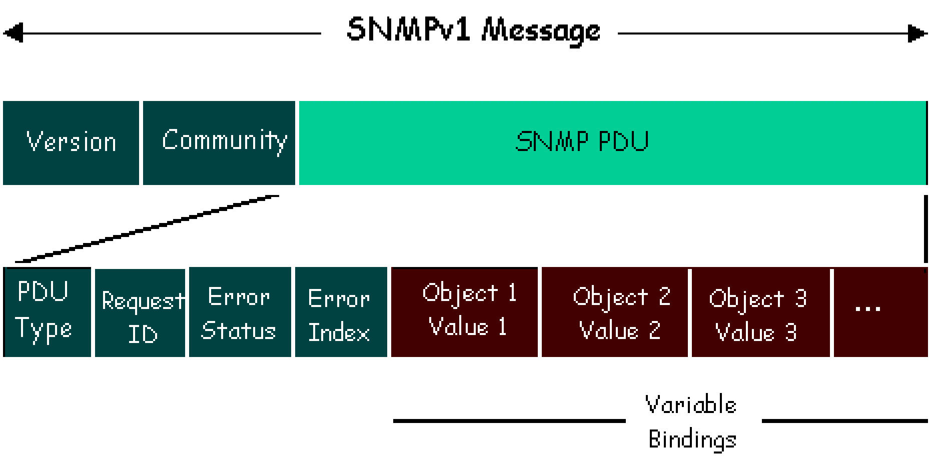


Figure 2: SNMPv1 Message Format

The SNMP PDU contains the following fields:

- **PDU type** Specifies the type of PDU.
- **Request ID** Associates requests with responses.
- **Error status** Indicates an error and an error type.
- **Error index** Associates the error with a particular object variable.
- **Variable-bindings** Associates particular object with their value.

- ZyXEL SNMP Implementation

ZyXEL currently includes SNMP support in some P-660 routers. It is implemented based on the SNMPv1, so it will be able to communicate with SNMPv1 NMSs. Further, users can also add ZyXEL's private MIB in the NMS to monitor and control additional system variables. The ZyXEL's private MIB tree is shown in figure 3. For

SNMPv1 operation, ZyXEL permits one community string so that the router can belong to only one community and allows trap messages to be sent to only one NMS manager.

Some traps are sent to the SNMP manager when anyone of the following events happens:

1. coldStart (defined in RFC-1215) :

   If the machine coldstarts, the trap will be sent after booting.

1. warmStart (defined in RFC-1215) :

   If the machine warmstarts, the trap will be sent after booting.

2. linkDown (defined in RFC-1215) :

   If any link of IDSL or WAN is down, the trap will be sent with the port number . The port number is its interface index under the interface group.

3. linkUp (defined in RFC-1215) :

   If any link of IDSL or WAN is up, the trap will be sent with the port number . The port number is its interface index under the interface group.

4. authenticationFailure (defined in RFC-1215) :

   When receiving any SNMP get or set requirement with wrong community, this trap is sent to the manager.

5. whyReboot (defined in ZYXEL-MIB) :

When the system is going to restart (warmstart), the trap will be sent with the reason of restart before rebooting.

(i) For intentional reboot :

In some cases (download new files, CI command "sys reboot", ...), reboot is done intentionally. And traps with the message "System reboot by user !" will be sent.

(ii) For fatal error :

System has to reboot for some fatal errors. And traps with the message of the fatal code will be sent.

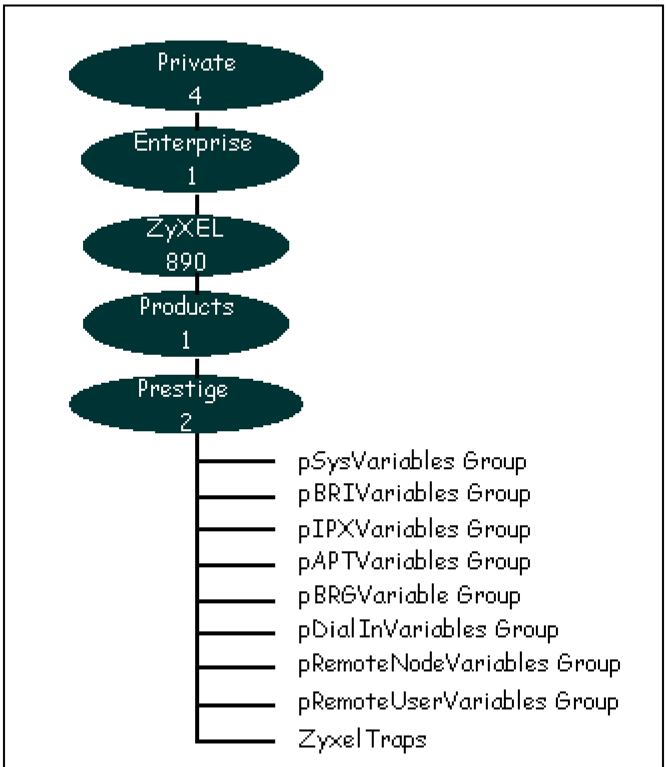
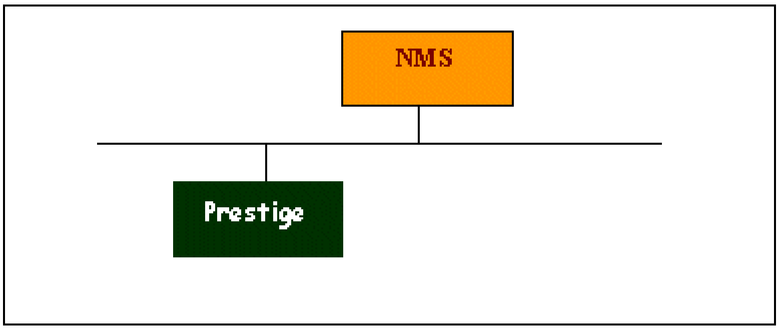


Figure 3: ZyXEL Private MIB Tree

- ***Downloading ZyXEL's private MIB***

- Configure the P-660 for SNMP



The SNMP related settings in P-660 are configured in menu 22, SNMP Configuration. The following steps describe a simple setup procedure for configuring all SNMP settings.

```
            Menu 22 - SNMP Configuration

        SNMP:
          Get Community= public
          Set Community= public
          Trusted Host= 192.168.1.33
          Trap:
            Community= public
            Destination= 192.168.1.33


        Press ENTER to Confirm or ESC to Cancel:
```

Key Settings:

Option	Descriptions
Get Community	Enter the correct Get Community. This Get Community must match the 'Get-' and 'GetNext' community requested from the NMS. The default is 'public'.
Set Community	Enter the correct Set Community. This Set Community must match the 'Set-community requested from the NMS. The default is 'public'.
Trusted Host	Enter the IP address of the NMS. The P-660 will only respond to SNMP messages coming from this IP address. **If 0.0.0.0 is entered, the P-660 will respond to all NMS managers.**
Trap Community	Enter the community name in each sent trap to the NMS. This Trap Community must match what the NMS is expecting. The default is 'public'.
Trap Destination	Enter the IP address of the NMS that you wish to send the traps to. **If 0.0.0.0 is entered, the P-660 will not send trap any NMS manager.**

9. Using syslog

- P-660 Setup
- UNIX Setup
- ZyXEL Syslog Message Format

P-660 Setup

```
  Menu 24.3.2 - System Maintenance - UNIX Syslog and Accounting

          UNIX Syslog:
          Active= Yes
          Syslog IP Address= 192.168.1.33
```

```
Log Facility= Local 1

Types:
CDR= No
Packet triggered= No
Filter log= No
PPP log= No
```

Configuration:

1. **Active**, use the space bar to turn on the syslog option.
2. **Syslog IP Address**, enter the IP address of the UNIX server that you wish to send the syslog.
3. **Log Facility,** use the space bar to toggle between the 7 different local options.
4. **Types**, use the space bar to toggle the logs we are going to record.

UNIX Setup

1. Make sure that your syslog starts with ***-r*** argument.

-r, this option will enable the facility to receive message from the network using an Internet domain socket with the syslog services. The default setting is not enabled.

2. Edit the file **/etc/syslog.conf** by adding the following line at the end of the **/etc/syslog.conf** file.

```
local1.*    /var/log/zyxel.log
```

Where /var/log/zyxel.log is the full path of the log file.

3. Restart syslogd.

ZyXEL Syslog Message Format

CDR	Call Detail Record (CDR) logs all data phone line activity if set to **Yes**.
Packet triggered	The first 48 bytes or octets and protocol type of the triggering packet is sent to the UNIX syslog server when this field is set to **Yes**.
Filter log	No filters are logged when this field is set to **No**. Filters with the individual filter Log field set to Yes are logged when this field is set to **Yes**.
PPP log	PPP events are logged when this field is set to **Yes**.

1. CDR log(call messages)

Format:

sdcmdSyslogSend(SYSLOG_CDR, SYSLOG_INFO, String);
String = board xx line xx channel xx, call xx, str
board = the hardware board ID
line = the WAN ID in a board
channel = channel ID within the WAN
call = the call reference number which starts from 1 and increments by 1 for each new call
str = C01 Outgoing Call dev xx ch xx (dev:device No. ch:channel No.)
C01 Incoming Call xxxxBps xxxxx (L2TP,xxxxx means Remote Call ID)
C01 Incoming Call xxxx (means connected speed) xxxxx (means Remote Call ID)
L02 Tunnel Connected(L2TP)
C02 OutCall Connected xxxx (means connected speed) xxxxx (means Remote Call ID)
C02 CLID call refused
L02 Call Terminated
C02 Call Terminated

Example:

```
Feb 14 16:57:17 192.168.1.1 ZyXEL Communications Corp.: board 0 line 0 channel 0, call 18,
C01 Incoming Call OK
Feb 14 17:07:18 192.168.1.1 ZyXEL Communications Corp.: board 0 line 0 channel 0, call 18,
C02 Call Terminated
```

2. Packet triggered log

Format:

sdcmdSyslogSend(SYSLOG_PKTTRI, SYSLOG_NOTICE, String);
String = Packet trigger: Protocol=xx Data=xxxxxxxxxx
Protocol: (1:IP 2:IPX 3:IPXHC 4:BPDU 5:ATALK 6:IPNG)
Data: We will send forty-eight Hex characters to the server

Example:

```
Jul 19 11:28:39 192.168.102.2 ZyXEL Communications Corp.: Packet Trigger: Protocol=1,
Data=4500003c100100001f010004c0a86614ca849a7b08004a5c020001006162636465666768696
a6b6c6d6e6f7071727374
Jul 19 11:28:56 192.168.102.2 ZyXEL Communications Corp.: Packet Trigger: Protocol=1,
Data=4500002c1b0140001f06b50ec0a86614ca849a7b0427001700195b3e00000000600220008cd
40000020405b4
```

3. Filter log

This message is available when the **'Log'** is enabled in the filter rule setting. The message consists of the packet header and the log of the filter rules.

Format:

sdcmdSyslogSend(SYSLOG_FILLOG, SYSLOG_NOTICE, String);
String = IP[Src=xx.xx.xx.xx Dst=xx.xx.xx.xx prot spo=xxxx dpo=xxxx]S04>R01mD
IP[...] is the packet header and S04>R01mD means filter set 4 (S) and rule 1 (R), match (m) drop (D).

Src: Source Address
Dst: Destination Address
prot: Protocol (TCP,UDP,ICMP)
spo: Source port
dpo: Destination port

Example:

```
Jul 19 14:44:09 192.168.1.1 ZyXEL Communications Corp.: IP[Src=202.132.154.1
Dst=192.168.1.33 UDP spo=0035   dpo=05d4]}S03>R01mF
Jul 19 14:44:13 192.168.1.1 ZyXEL Communications Corp.: IP[Src=192.168.1.33
Dst=202.132.154.1 ICMP]}S03>R01mF
```

4. PPP Log

Format:

sdcmdSyslogSend(SYSLOG_PPPLOG, SYSLOG_NOTICE, String);
String = ppp:Proto Starting / ppp:Proto Opening / ppp:Proto Closing / ppp:Proto Shutdown
Proto = LCP / ATCP / BACP / BCP / CBCP / CCP / CHAP/ PAP / IPCP /IPXCP

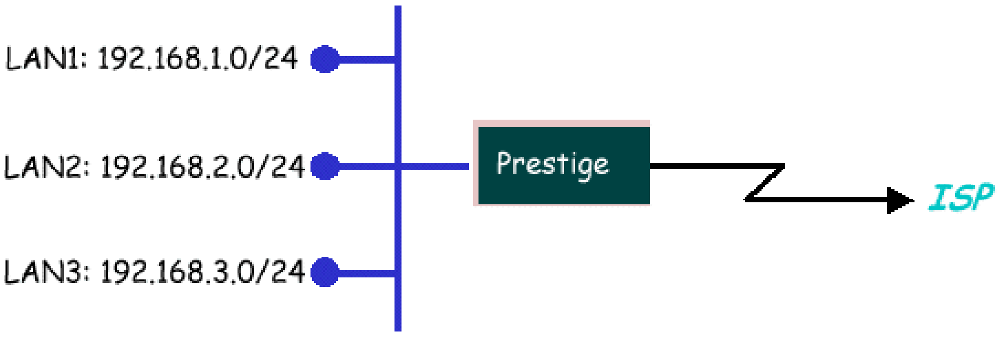
Example:

```
Jul 19 11:43:25 192.168.1.1 ZyXEL Communications Corp.: ppp:LCP Starting
Jul 19 11:43:29 192.168.1.1 ZyXEL Communications Corp.: ppp:IPCP Starting
Jul 19 11:43:34 192.168.1.1 ZyXEL Communications Corp.: ppp:CCP Starting
Jul 19 11:43:38 192.168.1.1 ZyXEL Communications Corp.: ppp:BACP Starting
Jul 19 11:43:43 192.168.1.1 ZyXEL Communications Corp.: ppp:IPCP Opening
Jul 19 11:43:51 192.168.1.1 ZyXEL Communications Corp.: ppp:CCP Opening
Jul 19 11:43:55 192.168.1.1 ZyXEL Communications Corp.: ppp:BACP Opening
Jul 19 11:44:00 192.168.1.1 ZyXEL Communications Corp.: ppp:LCP Closing
Jul 19 11:44:05 192.168.1.1 ZyXEL Communications Corp.: ppp:IPCP Closing
Jul 19 11:44:09 192.168.1.1 ZyXEL Communications Corp.: ppp:CCP Closing
Jul 19 11:44:14 192.168.1.1 ZyXEL Communications Corp.: ppp:BACP Closing
```

10. Using IP Alias

- What is IP Alias ?

In a typical environment, a LAN router is required to connect two local networks. The P-660 can connect three local networks to the ISP or a remote node, we call this function as **'IP Alias'**. In this case, an internal router is not required. For example, the network manager can divide the local network into three networks and connect them to the Internet using P-660's single user account. See the figure below.



The Prestige's IP Alias connects three local networks to the Internet

The P-660 supports three virtual LAN interfaces via its single physical Ethernet interface. The first network can be configured in menu 3.2 as usual. The second and third networks that we call **'IP Alias 1'** and **'IP Alias 2'** can be configured in menu 3.2.1-IP Alias Setup.

There are three internal virtual LAN interfaces for the P-660 to route the packets from/to the three networks correctly. They are **enif0** for the major network, **enif0:0** for the IP alias 1 and **enif0:1** for the IP alias 2. Therefore, three routes are created in the P-660 as shown below when the three networks are configured. If the P-660's DHCP is also enabled, the IP pool for the clients can be any of the three networks.

```
ras> ip ro st
Dest            FF Len Interface   Gateway         Metric stat Timer   Use
192.168.3.0     00 24   enif0:1     192.168.3.1       1     041b 0      0
192.168.2.0     00 24   enif0:0     192.168.2.1       1     041b 0      0
192.168.1.0     00 24   enif0      192.168.1.1       1     041b 0      0
ras>
```

Two new protocol filter interfaces in menu 3.2.1 allow you to accept or deny LAN packets from/to the IP alias 1 and IP alias 2 go through the P-660. The filter set in menu 3.1 is used for main network configured in menu 3.2.

- IP Alias Setup

1. Edit the first network in menu 3.2 by configuring the P-660's first LAN IP address.

```
          Menu 3.2 - TCP/IP and DHCP Setup

     DHCP Setup
          DHCP= Server
          Client IP Pool Starting Address= 192.168.1.33
          Size of Client IP Pool= 6
          Primary DNS Server= 168.95.1.1
          Secondary DNS Server= 168.95.192.1
          Remote DHCP Server= N/A
      TCP/IP Setup:
          IP Address= 192.168.1.1
          IP Subnet Mask= 255.255.255.0
          RIP Direction= Both
             Version= RIP-1
          Multicast= None
          IP Policies=
          Edit IP Alias= Yes

   Press ENTER to Confirm or ESC to Cancel:
```

Key Settings:

DHCP Setup	If the P-660's DHCP server is enabled, the IP pool for the clients can be any of the three networks.
TCP/IP Setup	Enter the first LAN IP address for the P-660. This will create the first route in the enif0 interface.

Edit IP Alias	Toggle to **'Yes'** to enter menu 3.2.1 for setting up the second and third networks.

2. Edit the second and third networks in menu 3.2.1 by configuring the P-660's second and third LAN IP addresses.

```
          Menu 3.2.1 - IP Alias Setup

        IP Alias 1= Yes
        IP Address= 192.168.2.1
        IP Subnet Mask= 255.255.255.0
        RIP Direction= None
        Version= RIP-1
        Incoming protocol filters=
        Outgoing protocol filters=
       IP Alias 2= Yes
        IP Address= 192.168.3.1
        IP Subnet Mask= 255.255.255.0
        RIP Direction= None
        Version= RIP-1
        Incoming protocol filters=
        Outgoing protocol filters=

       Enter here to CONFIRM or ESC to CANCEL:
```

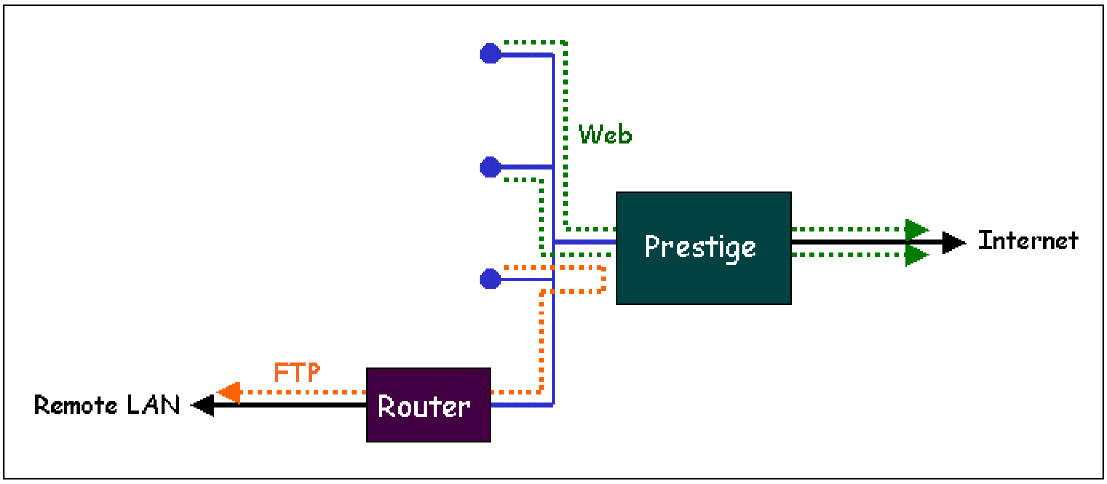
Key Settings:

IP Alias 1	Toggle to **'Yes'** and enter the second LAN IP address for the P-660. This will create the second route in the enif0:0 interface.
IP Alias 2	Toggle to **'Yes'** and enter the third LAN IP address for the P-660. This will create the third route in the enif0:1 interface.

11. Using IP Policy Routing

- What is IP Policy Routing (IPPR)?

Traditionally, routing is based on the destination address only and the router takes the shortest path to forward a packet. IP Policy Routing (IPPR) provides a mechanism to override the default routing behavior and alter the packet forwarding based on the policy defined by the network administrator. Policy-based routing is applied to incoming packets on a per interface basis, prior to the normal routing. Network administrators can use IPPR to distribute traffic among multiple paths. For example, if a network has both the Internet and remote node connections, we can route the Web packets to the Internet using one policy and route the FTP packets to the remote LAN using another policy. See the figure below.



Use IPPR to distribute traffic among multiple paths

- Benefits

Source-Based Routing - Network administrators can use policy-based routing to direct traffic from different users through different connections.

Quality of Service (QoS)- Organizations can differentiate traffic by setting the precedence or TOS (Type of Service) values in the IP header at the periphery of the network to enable the backbone to prioritize traffic.

Cost Savings- IPPR allows organizations to distribute interactive traffic on high-bandwidth, high-cost path while using low-path for batch traffic.

Load Sharing- Network administrators can use IPPR to distribute traffic among multiple paths.

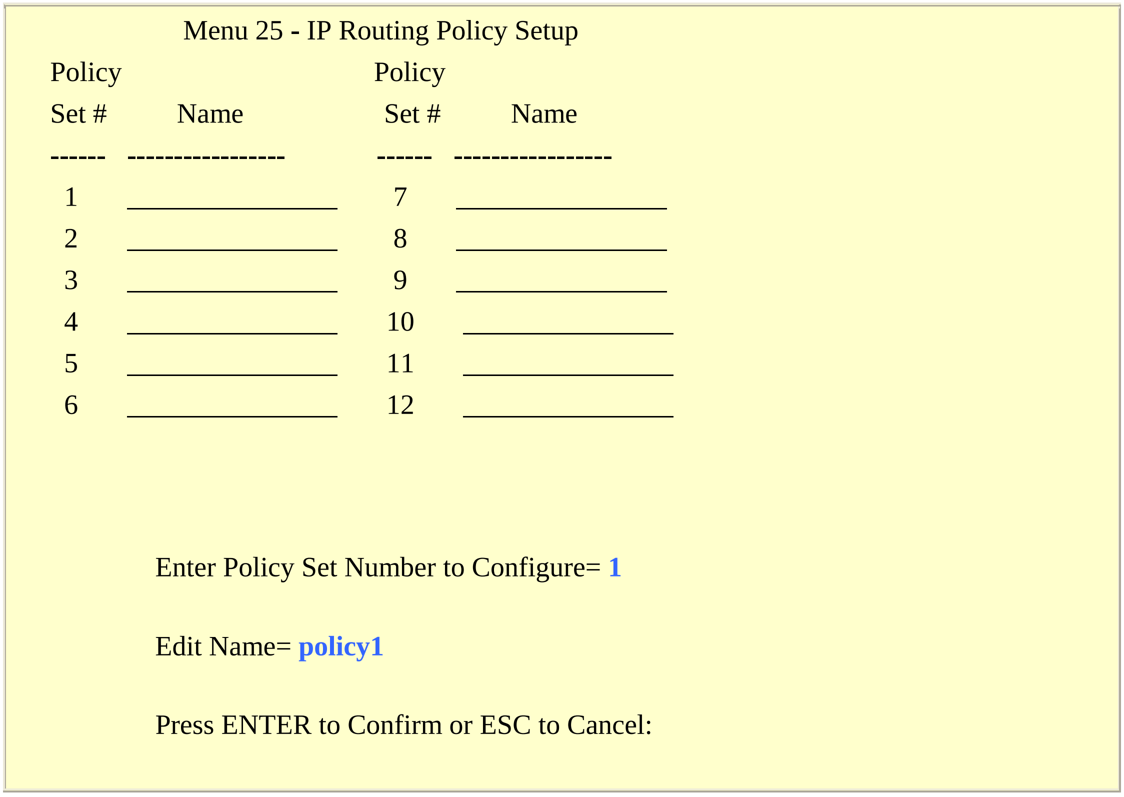
- How does the IPPR work?

A policy defines the matching criteria and the action to take when a packet meets the criteria. The action is taken only when all the criteria are met. The criteria include the source address and port, IP protocol (ICMP, UDP, TCP,etc), destination address and port,   TOS and precedence (fields in the IP header) and length. The inclusion of length criterion is to differentiate between interactive and bulk traffic. Interactive applications, e.g., Telnet, tend to have short packets, while bulk traffic, e.g., file transfer, tends to have large packets.

The actions that can be taken include routing the packet to a different gateway (and hence the outgoing interface) and the TOS and precedence fields in the IP header. IPPR follows the existing packet filtering facility of ZyNOS in style and in implementation. The policies are divided into sets, where related policies are grouped together. A use defines the policies before applying them to an interface or a remote node, in the same fashion as the filters. There are 12 policy sets with 6 policies in each set.

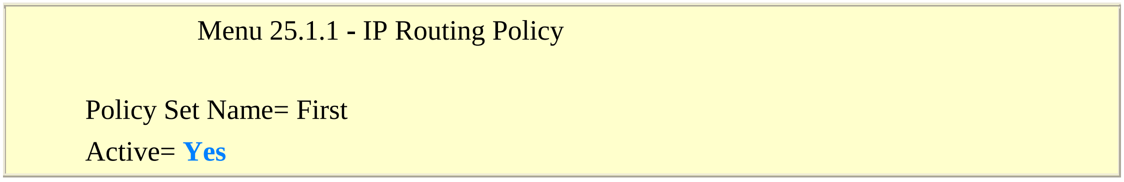
- Setup the IP Policy Routing

1. Create a routing policy set in menu 25



```
               Menu 25 - IP Routing Policy Setup
   Policy                      Policy
   Set #      Name              Set #      Name
   ------  ----------------     ------  ----------------
     1     ________________       7     ________________
     2     ________________       8     ________________
     3     ________________       9     ________________
     4     ________________      10     ________________
     5     ________________      11     ________________
     6     ________________      12     ________________



            Enter Policy Set Number to Configure= 1

            Edit Name= policy1

            Press ENTER to Confirm or ESC to Cancel:
```

2. Edit a rule or more for this set in menu 25.1.1. See an example below.



```
                Menu 25.1.1 - IP Routing Policy

      Policy Set Name= First
      Active= Yes
```

```
     Criteria:
       IP Protocol     = 6
       Type of Service= Don't Care       Packet length= 0
       Precedence      = Don't Care        Len Comp= N/A
       Source:
         addr start= 192.168.1.2          end= 192.168.1.20
         port start= 0                  end= N/A
       Destination:
         addr start= 0.0.0.0              end= N/A
         port start= 80                  end= 80
     Action= Matched
       Gateway addr    = 192.168.1.254       Log= No
       Type of Service= No Change
       Precedence      = No Change

               Press ENTER to Confirm or ESC to Cancel
```

This policy example forces the Web packets originated from the clients with IP addresses from 192.168.1.2 to 192.168.1.20 be routed to the remote LAN via the gateway 192.168.1.254.

4. A summary for this set is shown in menu 25.1.

```
                    Menu 25.1 - IP Routing Policy Setup

# A                      Criteria/Action
- - -----------------------------------------------------------------------
1 Y SA=192.168.1.2-192.168.1.20
    DP=80-80 P=6                              |GW=192.168.1.254
2 N ______________________________________________________________________
    ______________________________________________________________________
3 N ______________________________________________________________________
    ______________________________________________________________________
4 N ______________________________________________________________________
    ______________________________________________________________________
5 N ______________________________________________________________________
    ______________________________________________________________________
6 N ______________________________________________________________________
    ______________________________________________________________________


                Enter Policy Rule Number (1-6) to Configure:
```

4. There are two interfaces to apply the policy set, they are the LAN interface (menu 3.2) and WAN interface (menu 11.3). It depends where the gateway specified in the policy rule is located. If the gateway you specified is located on the local LAN you apply the policy set in menu 3.2 (LAN interface). If the gateway you specified is located on the remote WAN site you apply the policy set in menu 11.3 (WAN interface).

```
        Menu 3.2 - TCP/IP and DHCP Setup

    DHCP Setup
        DHCP= Server
        Client IP Pool Starting Address= 192.168.1.33
        Size of Client IP Pool= 32
        Primary DNS Server= 0.0.0.0
        Secondary DNS Server= 0.0.0.0
        Remote DHCP Server= N/A
     TCP/IP Setup:
        IP Address= 192.168.1.1
        IP Subnet Mask= 255.255.255.0
        RIP Direction= Both
           Version= RIP-1
        Multicast= None
        IP Policies= 1
        Edit IP Alias= No

  Press ENTER to Confirm or ESC to Cancel:
```

```
            Menu 11.3 - Remote Node Network Layer Options

    IP Options:                        Bridge Options:
      Rem IP Addr:                       Ethernet Addr Timeout(min)= N/A
      Rem Subnet Mask= 0.0.0.0
      My WAN Addr= 0.0.0.0
      NAT = None
        Address Mapping Set= N/A
      Metric= 2
      Private= No
      RIP Direction= Both
        Version= RIP-2B
      Multicast= IGMP-v2
      IP Policies= 1


                    Enter here to CONFIRM or ESC to CANCEL:
```

12. Using Call Scheduling

- What is Call Scheduling ?

Call scheduling enables the mechanism for the P-660 to run the remote node connection according to the pre-defined schedule. This feature is just like the scheduler ina video recorder which records the program according to the specified time. Users can apply at most 4 schedule sets in Menu 11 (Remote Node Setup), and configure each schedule in Menu 26(Schedule Setup). The remote node configured with the schedule set could be "Forced On", "Forced Down", "Enable Dial-On-Demand", or "Disable Dial-On-Demand" on specified date and time.

- SMT Menu for Call Scheduling

1. Edit the Schedule sets in menu 26:

```
        Copyright (c) 1994 - 2005 ZyXEL Communications Corp.

                  Prestige 660 Main Menu

    Getting Started                Advanced Management
      1. General Setup               21. Filter Set Configuration
      2. WAN Backup Setup             22. SNMP Configuration
      3. LAN Setup                   23. System Password
     4. Internet Access Setup         24. System Maintenance
                                     25. IP Routing Policy Setup
    Advanced Applications             26. Schedule Setup
      11. Remote Node Setup
      12. Static Routing Setup
```

```
  14. Dial-in User Setup       99. Exit
 15. NAT Setup
                Enter Menu Selection Number:
```

2. Select a Schedule Set number and give it a name:

```
              Menu 26 - Schedule Setup

           Schedule                     Schedule
           Set # Name                     Set # Name
           ------ -----------------    ------ -----------------
           1 ZyXEL                     7 ________________
           2 ________________           8 ________________
           3 ________________           9 ________________
           4 ________________          10 ________________
           5 ________________          11 ________________
           6 ________________          12 ________________

              Enter Schedule Set Number to Configure= 1
              Edit Name= ZyXEL
              Press ENTER to Confirm or ESC to Cancel:
```

3. The Menu 26.1 Schedule Set Setup is as follows:

```
           Menu 26.1 Schedule Set Setup

     Active= Yes
     Start Date(yyyy-mm-dd)= 2002 - 01 - 01
     How Often= Once
     Once:
       Date(yyyy-mm-dd)= 2002 - 01 - 01
     Weekdays:
       Sunday= N/A
       Monday= N/A
       Tuesday= N/A
       Wednesday= N/A
       Thursday= N/A
       Friday= N/A
       Saturday= N/A
     Start Time(hh:mm)= 12 : 00
     Duration(hh:mm)= 16 : 00
```

```
        Action= Enable Dial-on-demand

        Press ENTER to Confirm or ESC to Cancel:
```

Key Settings:

Start Date	Start date of this schedule rule. It can be unmatched with weekday setting. For example, if Start Date is 2000/10/02(Monday), but Monday setting in weekday can be No.
How Often	If once is selected, all weekday settings will ne marked as N/A. After the rule is completely, it will be deleted automatically.
Forced On	The node will always keep up during the setting period. It is equivalent to diable the idel timeout.
Forced Down	The node will always keep doen during the setting period. The connected remote node will be dropped.
Enable Dial-On-Demand	The remote node accepts Dial-on-demand during this period.
Disable Dial-On-Demand	The remote node denies any demand dial during the period. For the existing connected nodes, it will be dropped after idle timeout and no triggered up.
Start Time/ Duration	Start Time and Duration of this schedule.

- Apply the schedule to the Remote node

Multiple scheduling rules can program in a Remote node, and they have priority. For example, if we program the sets as 1,2,3,4 in remote node, then the set 1 will override set 2,3,4. set 2 will override 3,4, and so on.

```
                         Menu 11.1 - Remote Node Profile

    Rem Node Name= CHT                     Route= IP
    Active= Yes                           Bridge= No

    Encapsulation= PPPoE                   Edit IP/Bridge= No
    Multiplexing= LLC-based                Edit ATM Options= No
    Service Name= N/A                    Edit Advance Options= No
    Incoming:                              Telco Option:
      Rem Login= N/A                         Allocated Budget(min)= 0
      Rem Password= N/A                      Period(hr)= 0
    Outgoing:                                Schedule Sets= 1, 2, 3, 4
      My Login= cso@hinet.net                 Nailed-Up Connection= No
      My Password= *******               Session Options:
```

```
                Authen= N/A                              Edit Filter Sets= No
                                                        Idle Timeout(sec)= 0
```

- Time Service in P-660

There is no RTC (Real-Time Clock) chip so the P-660 should launch a mechanism to get current time and date from external server in boot time. Time service is implemented by the **Daytime protocol(RFC-867)**, **Time protocol(RFC-868)**, and **NTP protocol(RFC-1305)**. You have to assign an IP address of a time server and then, the P-660 will get the date, time, and time-zone information from this server.

```
    Menu 24.10 - System Maintenance - Time and Date Setting


  Use Time Server when Bootup= Daytime (RFC-867)
  Time Server IP Address= 202.132.154.1

  Current Time: 00 : 11 : 38
  New Time (hh:mm:ss): 00 : 11 : 36

  Current Date: 2000 - 01 - 01
  New Date (yyyy-mm-dd): 2000 - 01 - 01

  Time Zone= GMT+0800

  Daylight Saving= No
  Start Date (mm-dd): 01 - 00
  End Date (mm-dd): 01 - 00


              Press ENTER to Confirm or ESC to Cancel:
```

13. Using IP Multicast

- What is IP Multicast ?

Traditionally, IP packets are transmitted in two ways - unicast or broadcast. Multicast is a third way to deliver IP packets to a group of hosts. Host groups are identified by class D IP addresses, i.e., those with "1110" as their higher-order bits. In dotted decimal notation, host group addresses range from 224.0.0.0 to 239.255.255.255. Among them, 224.0.0.1 is assigned to the permanent IP hosts group, and 224.0.0.2 is assigned to the multicast routers group.

IGMP (Internet Group Management Protocol) is the protocol used to support multicast groups. The latest version is version 2 (see RFC2236). IP hosts use IGMP to report their multicast group membership to any immediate-neighbor multicast routers so the multicast routers can decide if a multicast packet needs to be forwarded. At start up, the P-660 queries all directly connected networks to gather group membership.

After that, the P-660 updates the information by periodic queries. The P-660 implementation of IGMP is also compatible with version 1. The multicast setting can be turned on or off on Ethernet and remote nodes.

- IP Multicast Setup

Enable IGMP in P-660's LAN in menu 3.2:

```
      Menu 3.2 - TCP/IP and DHCP Setup

   DHCP Setup
      DHCP= Server
      Client IP Pool Starting Address= 192.168.1.33
      Size of Client IP Pool= 32
      Primary DNS Server= 0.0.0.0
      Secondary DNS Server= 0.0.0.0
      Remote DHCP Server= N/A
    TCP/IP Setup:
      IP Address= 192.168.1.1
      IP Subnet Mask= 255.255.255.0
      RIP Direction= Both
        Version= RIP-1
      Multicast= IGMP-v2
      IP Policies=
      Edit IP Alias= No

 Press ENTER to Confirm or ESC to Cancel:
```

Enable IGMP in P-660's remote node in menu 11.3:

```
         Menu 11.3 - Remote Node Network Layer Options

   IP Options:                        Bridge Options:
    Rem IP Addr:                        Ethernet Addr Timeout(min)= N/A
    Rem Subnet Mask= 0.0.0.0
```

```
       My WAN Addr= 0.0.0.0
       NAT = None
        Address Mapping Set= N/A
       Metric= 2
       Private= No
       RIP Direction= Both
         Version= RIP-2B
       Multicast= IGMP-v2
       IP Policies=


                   Enter here to CONFIRM or ESC to CANCEL:
```

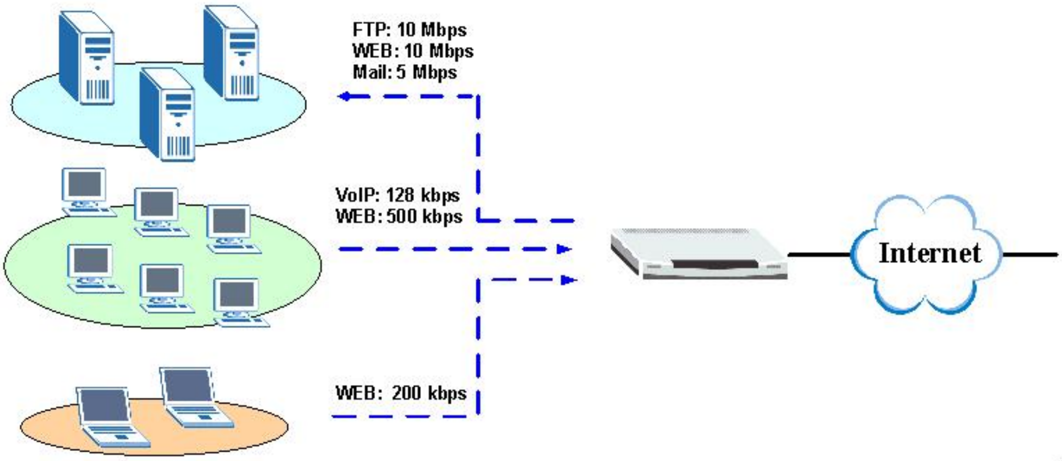
Key Settings:

Multicast	IGMP-v1 for IGMP version 1, IGMP-v2 for IGMP version 2.

14. Using Bandwidth Management

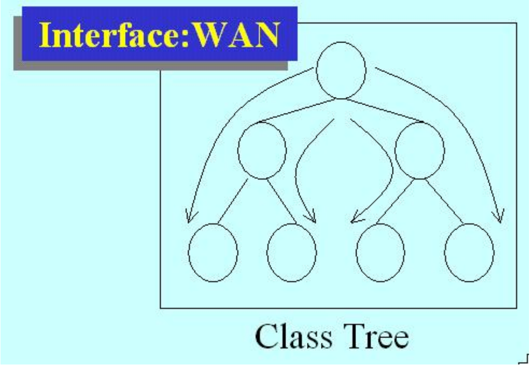
- Why Bandwidth Management (BWM)?

Nowadays, we have many different traffic types for Internet applications. Some traffic may consume high bandwidth, such as FTP (File Transfer Protocol), if you are downloading or uploading files with large size. Some other traffic may not require high bandwidth, but they requires stable supply of bandwidth, such as VoIP traffic. The VoIP quality would not be good, if all of the outgoing bandwidth is occupied via FTP. Additionally, chances are that you would like to grant higher bandwidth for some body special who is using specific IP address in your network. All of these are reasons why we need bandwidth management.



- How Bandwidth Management in Prestige?

P662 achieves BWM by classifying packets, and control when to send out the classified packets. Bandwidth Management of ZyXEL appliances operates on the IP layer. The major step to configure BWM is defining filter rules by fields of IP header or TCP/UDP port number. Then specify the volume of bandwidth you want to allocate to the filtered traffic.



- Using BWM

Go to **ADVANCED->BW MGMT->Summary**, activate bandwidth management on the interface you would like to manage. We enable the BWM function on WAN1 interface in this example.
Enter the total speed for this interface that you want to allocate using bandwidth management. This appears as the bandwidth budget of the interface’s root class.
Select how you want the bandwidth to be allocated. **Priority-Based** means bandwidth is allocated via priority, so the traffic with highest priority would be served first, then the second priority is served secondly and so on. If **Fairness-Based** is chosen, then the bandwidth is allocated by ratio. Which means if A class needs 300 kbps, B class needs 600 kbps, then the ratio of A and B's actual bandwidth is 1:2. So if we get 450 kbps in total, then A would get 150 kbps, B would get 300 kbps.

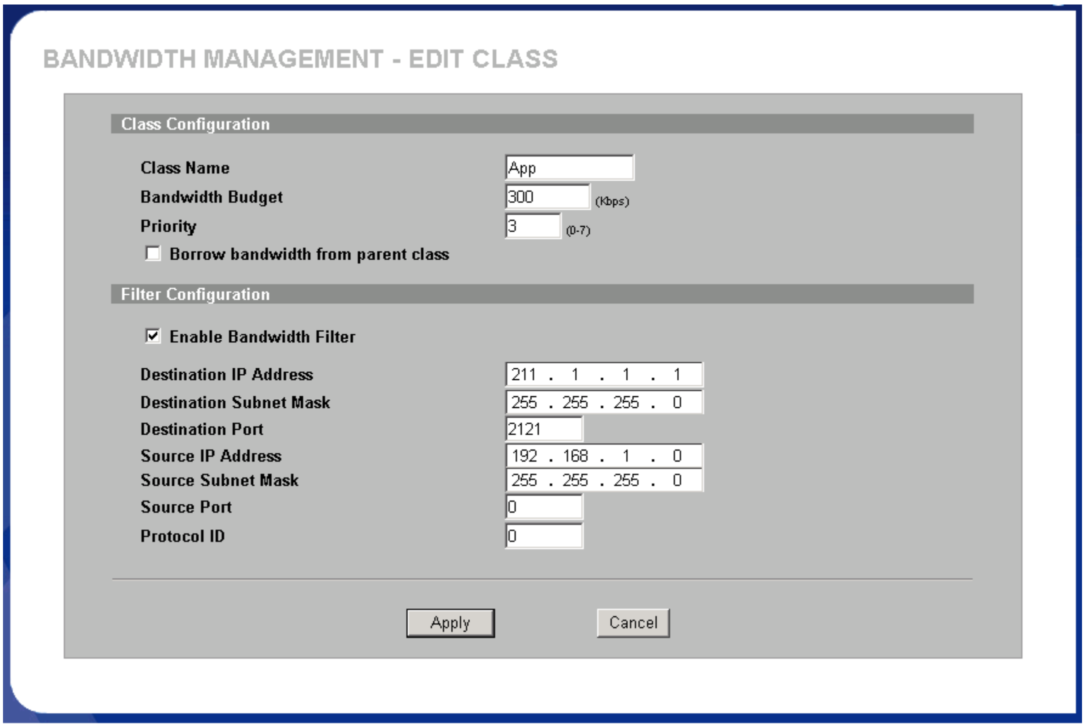
Key Settings:

Active	Check the box to enable BWM on the interface. Note that if you would like to manage traffic from **WAN to LAN**, you should apply BWM on **LAN** interface. If you would like to management traffic from **WAN to DMZ**, please apply BWM on **DMZ** interface.
Speed	Enter the total speed to manage on this interface. This value is the budget of the class tree's root.
Scheduler	Choose the principle to allocate bandwidth on this interface. **Priority-Based** allocates bandwidth via priority. **Fairness-Based** allocates bandwidth by ratio.
Maximize	Check this box if you would like to give residuary bandwidth from Interface to the

Bandwidth Usage	classes who need more bandwidth than configured amount. Do not select this if you want to reserve bandwidth for traffic that does not match a bandwidth class or you want to limit the bandwidth of each class at the configured value. (Please note that to meat the second condition, you should also disable bandwidth borrowing on the class.)

Go to **ADVANCED->BW MGMT->Class Setup**, select the interface on which you would like to setup the Class tree.

Click the radio button besides the **Root Class**, then press **'Add Sub-Class'**



BANDWIDTH MANAGEMENT - EDIT CLASS

Class Configuration

Class Name: App
Bandwidth Budget: 300 (Kbps)
Priority: 3 (0-7)
□ Borrow bandwidth from parent class

Filter Configuration

☑ Enable Bandwidth Filter

Destination IP Address: 211 . 1 . 1 . 1
Destination Subnet Mask: 255 . 255 . 255 . 0
Destination Port: 2121
Source IP Address: 192 . 168 . 1 . 0
Source Subnet Mask: 255 . 255 . 255 . 0
Source Port: 0
Protocol ID: 0

Key Settings:

Class Name	Give this class a name, for example, **'App'**
Bandwidth Budget	Configure the speed you would like to allocate to this class
Priority	Enter a number between 0 and 7 to set the priority of this class. The higher the number, the higher the priority. The default setting is 3.
Bandwidth Borrowing	Check this box if you would like to let this class to borrow bandwidth from it's parents when the required bandwidth is higher than the configured amount. Do not check this if you want to limit the bandwidth of this class at the configured value.(Please note that you should also disable **Maximize Bandwidth Usage** on the interface to meat the condition.)
Enable Bandwidth Filter	Check this to specify the traffic types via IP addresses/Port numbers.

Destination IP Address	Enter the IP address of destination that meats this class.
Destination Subnet Mask	Enter the destination subnet mask.
Destination Port	Enter the destination port number of the traffic.
Source IP Address	Enter the IP address of source that meats this class. Note that for traffic from **'LAN to WAN'**, since BWM is before NAT, you should use the IP address before NAT processing.
Source Subnet Mask	Enter the destination subnet mask.
Source Port	Enter the source port number of the traffic.
Protocol ID	Enter the protocol number for the traffic. 1 for ICMP, 6 for TCP or 17 for UDP

After configuration BWM, you can check current bandwidth of the configured traffic in **ADVANCED->BWM MGMT->Monitor.** The values in the column of **Current usage (kbps)** would display the actually number.

15. Using Zero-Configuration

- Zero-Configuration and VC auto-hunting

Zero-Configure feature can help customer to reduce the burden of setting efforts. Whenever system ADSL links up system will send out some probing patterns, system will analyze the packets returned from ISP, and decide which services the ISP may provide. Because ADSL is based on a ATM network, so system have to pre-configured a VPI/VCI hunting pool before Auto-Configure function begins to work.

The Zero-Configuration feature can hunt the encapsulation and VPI/VCI value, and system will automatically configure itself if the hunting result is successfully. This feature has two constraints:

1. It supports the ISP provides one kind of service (PPPoE/PPPoA..etc.) only, otherwise the hunting will get confusing and failed.
2. VC auto-hunting only supports dynamic WAN IP address. If the router is set a static WAN IP address. VC auto-hunting function will be disabled.

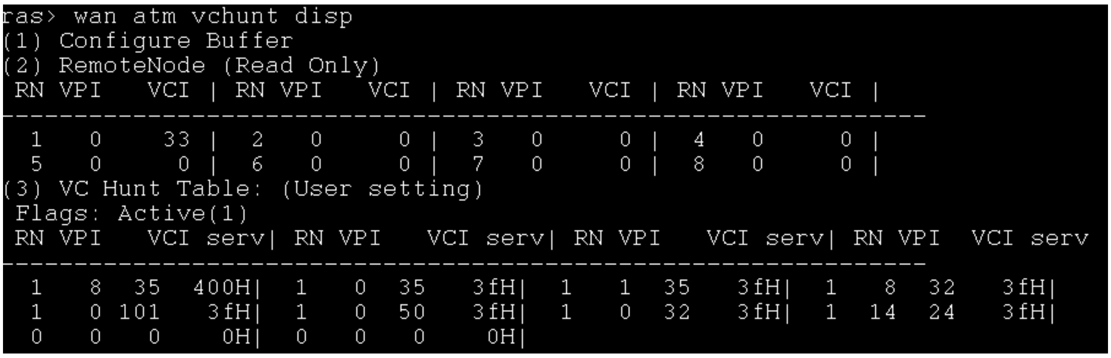
The entry of hunting pool must also contain the VPI, VCI, and which kinds of hunting patterns you wish to send. Whenever system send out all the probing patterns with specific VPI/VCI, system will wait for 5~10 seconds and get the response from ISP, the response patterns will decide which kinds of ADSL services of the line will be.

After that, system will save back the correct VPI, VCI and also services (encapsulation) type into profile of WAN interface.

- Configure the VC auto-hunting preconfigured table.

1. Display auto-haunting preconfigured table by using CI command from menu 24.8:

    wan atm vchunt disp



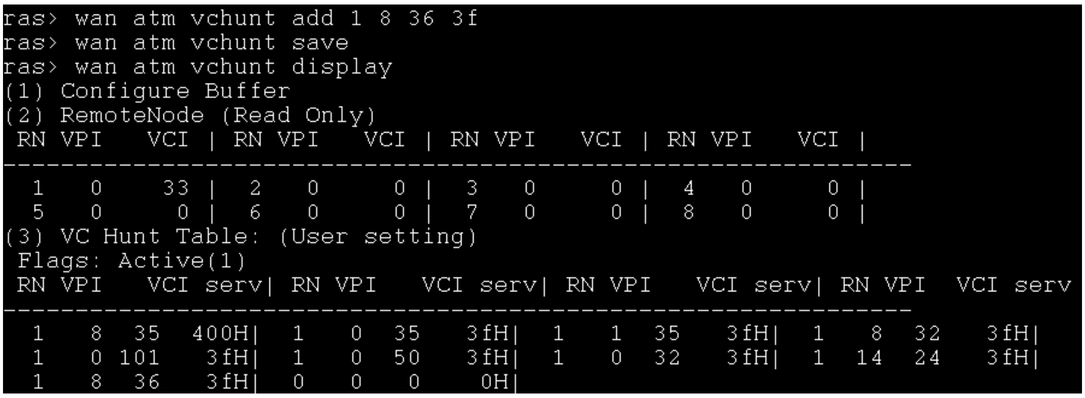
```
ras> wan atm vchunt disp
(1) Configure Buffer
(2) RemoteNode (Read Only)
 RN VPI   VCI | RN VPI   VCI | RN VPI   VCI | RN VPI   VCI |
---------------------------------------------------------------
  1   0    33 |  2   0     0 |  3   0     0 |  4   0     0 |
  5   0     0 |  6   0     0 |  7   0     0 |  8   0     0 |
(3) VC Hunt Table: (User setting)
 Flags: Active(1)
 RN VPI   VCI serv| RN VPI   VCI serv| RN VPI   VCI serv| RN VPI  VCI serv
---------------------------------------------------------------
  1   8  35  400H|  1   0  35   3fH|  1   1  35   3fH|  1   8  32   3fH|
  1   0 101   3fH|  1   0  50   3fH|  1   0  32   3fH|  1  14  24   3fH|
  0   0   0    0H|  0   0   0    0H|
```

2. Add items to the auto-haunting preconfigured table by useing CI commands:

```
wan atm vchunt add <remoteNodeIndex> <vpi> <vci> <service bit(hex)>
wan atm vchunt save
```

Note: <remote node> : input the remote node index 1-8
<vpi> : vpi value
<vci> : vci value
<service>: it’s a hex value, bit0:PPPoE/VC (1), bit1:PPPoE/LLC (2) , bit2:PPPoA/VC (4), bit3:PPPoA/LLC (8), bit4:Enet/VC (16), bit5 :Enet/LLC (32)
For examples:
If you need service PPPoE/LLC and Enet/LLC then the service bits will be 2+32 = 34 (decimal) = 22 (hex), you must input 22
If you want to enable all service for VC hunting, the service bits will be 1+2+4+8+16+32=63(decimal)= 3f (hex), you must input 3f

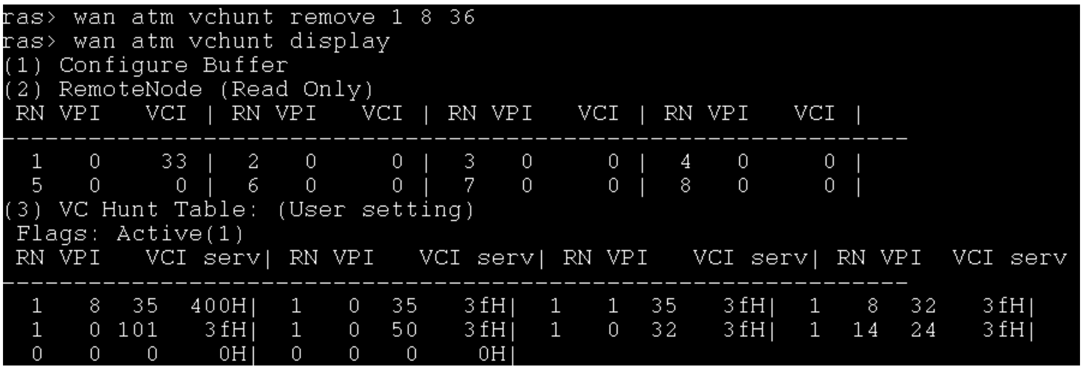
Need to perform save after this command.



```
ras> wan atm vchunt add 1 8 36 3f
ras> wan atm vchunt save
ras> wan atm vchunt display
(1) Configure Buffer
(2) RemoteNode (Read Only)
 RN VPI   VCI | RN VPI   VCI | RN VPI   VCI | RN VPI   VCI |
---------------------------------------------------------------
  1   0    33 |  2   0     0 |  3   0     0 |  4   0     0 |
  5   0     0 |  6   0     0 |  7   0     0 |  8   0     0 |
(3) VC Hunt Table: (User setting)
 Flags: Active(1)
 RN VPI   VCI serv| RN VPI   VCI serv| RN VPI   VCI serv| RN VPI  VCI serv
---------------------------------------------------------------
  1   8  35   400H|  1   0  35   3fH|  1   1  35   3fH|  1   8  32   3fH|
  1   0 101    3fH|  1   0  50   3fH|  1   0  32   3fH|  1  14  24   3fH|
  1   8  36    3fH|  0   0   0    0H|
```

3. Delete items from the auto-haunting preconfigured table by useing CI command:

wan atm vchunt remove   <remote node> <vpi> <vci>



```
ras> wan atm vchunt remove 1 8 36
ras> wan atm vchunt display
(1) Configure Buffer
(2) RemoteNode (Read Only)
 RN VPI   VCI | RN VPI   VCI | RN VPI   VCI | RN VPI   VCI |
---------------------------------------------------------------
  1   0    33 |  2   0     0 |  3   0     0 |  4   0     0 |
  5   0     0 |  6   0     0 |  7   0     0 |  8   0     0 |
(3) VC Hunt Table: (User setting)
 Flags: Active(1)
 RN VPI   VCI serv| RN VPI   VCI serv| RN VPI   VCI serv| RN VPI  VCI serv
---------------------------------------------------------------
  1   8  35   400H|  1   0  35   3fH|  1   1  35   3fH|  1   8  32   3fH|
  1   0 101    3fH|  1   0  50   3fH|  1   0  32   3fH|  1  14  24   3fH|
  0   0   0     0H|  0   0   0    0H|
```

5. The usage command argument is listed below suggest to use 3f which include all PPP possiblities.

Command				Description
wan	atm	vchunt		
			Add <remoteNodeIndex> <vpi> <vci> <service bit(hex)>	Add a entry to hunting pool <remote node> : input the remote node index 1-8 <vpi> : vpi value <vci> : vci value <service>: it’s a hex value, bit0:PPPoE/VC (1), bit1:PPPoE/LLC (2) , bit2:PPPoA/VC (4), bit3:PPPoA/LLC (8),

				bit4:Enet/VC (16), bit5 :Enet/LLC (32) For examples: If you need service PPPoE/LLC and Enet/LLC then the service bits will be 2+32 = 34 (decimal) = 22 (hex), you must input 22 Need to perform save after this command
			Remove <removeNodeId> <vpi> <vci>	Input remote node ID and vpi, vci value to remove the specific entry. System will save automatically.
			Active <yes|no>	Enable VC auto hunting featurer
			display	Display the hunt pool
			Clear	Clear the configure buffer
			Save	Save current setting into ROM file
			timer	The waiting time before checking the hunting table result
			Send	Send VC hunt pattern again
			result	Check the result of VC auto hunting

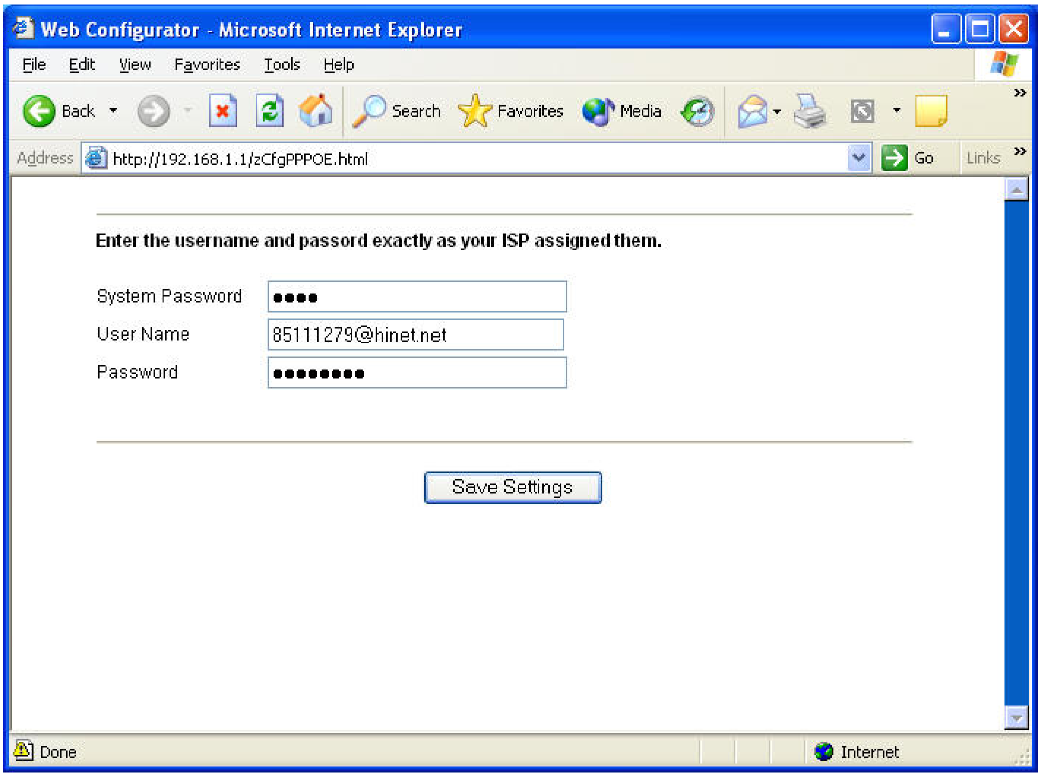
- Using Zero configuration.

1. After configure the auto-haunting preconfigured table. You just need a PC connected to the device LAN Ethernet port with the DSL sync up.

2. Open your web browser to access a Web site. It should prompt and request for your username password of your ISP account, if your ISP provide PPPoE or PPPoA service.

3. After key-in the correct info, it will than test the connection. If it is successful it will than close the browser and you can open a new browser to surf the Internet. If the connection test fail, it will go back to the page ask for user name and password.
The user name or password are incorrect. You need to keyin again to retry.

Basically the zero configuration only work on the VC that was preconigured in the auto-haunting preconfigured table.


Web Configurator - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://192.168.1.1/zCfgPPPOE.html Go Links
Done Internet

Enter the username and passord exactly as your ISP assigned them.

System Password ●●●●

User Name 85111279@hinet.net

Password ●●●●●●●●●

Save Settings

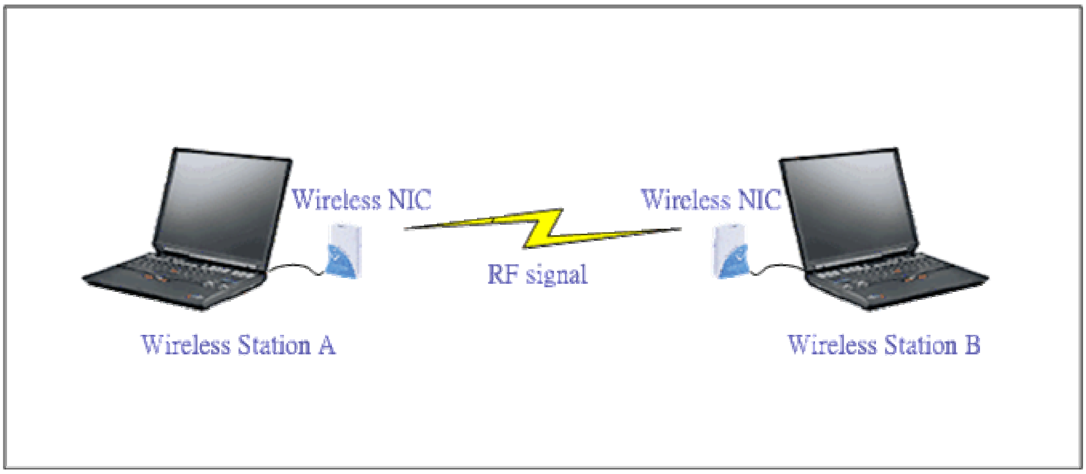
Wireless Application Notes (For P-660HW Only)

1. Configure a Wireless Client to Ad hoc mode

- Ad hoc Introduction
- Configuration for wireless station A
- Configuration for wireless station B

Ad hoc Introduction

What is Ad Hoc mode ?
Ad hoc mode is a wireless network consists of a number of stations without access points. Without using an access point or any connection to a wired network, a client unit in Ad hoc operation mode can communicate directly to other client units just as using a cross over Ethernet cable connecting 2 host together via a NIC card for direct connection when configured in Ad hoc mode without an access point being present. Ad hoc operation is ideal for small networks of no more than 2-4 computers. Larger networks would require the use of one, or perhaps several, access points.

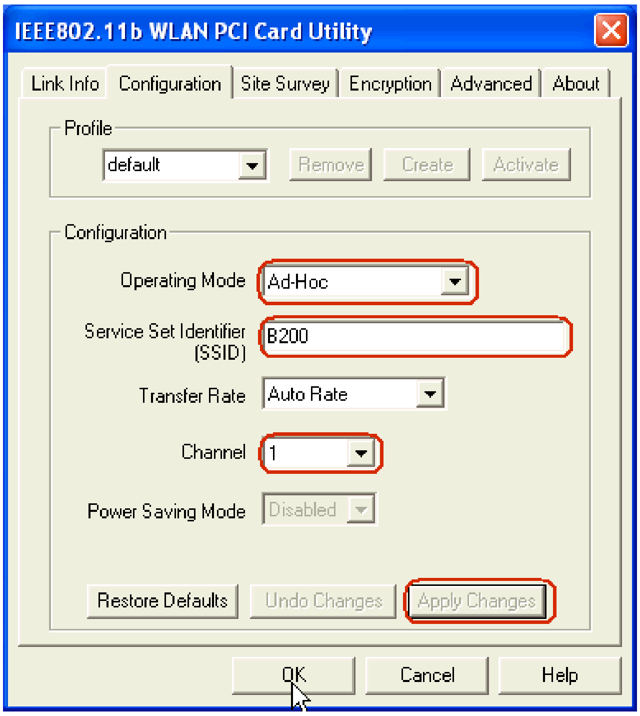


Configuration for Wireless Station A

To configure Ad hoc mode on   your ZyAIR B-100/B-200/B-300 wireless NIC card please follow the following step.

1. Double click on the utility icon in your windows task bar the utility will pop up on your windows screen.

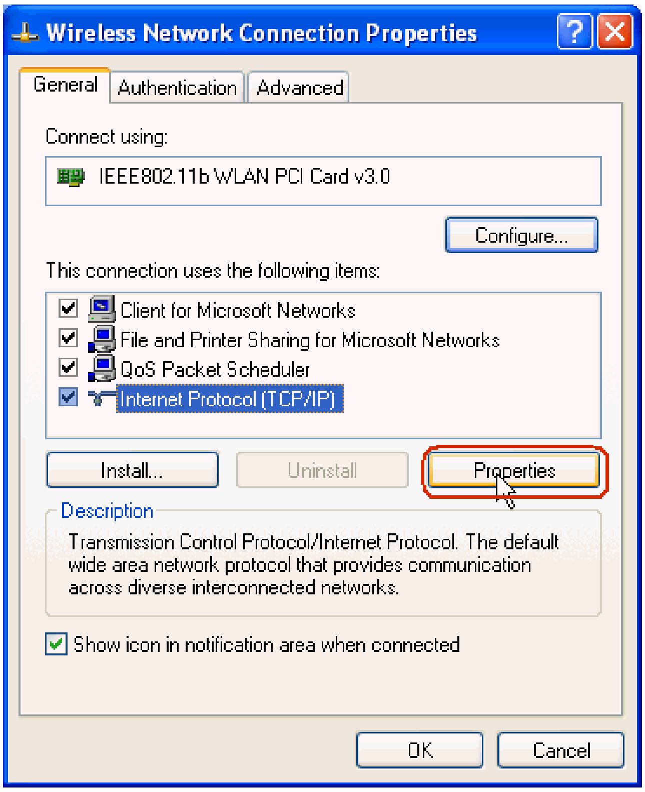
2. Select configuration tab.



Profile: default
Operating Mode: Ad-Hoc
Service Set Identifier (SSID): B200
Transfer Rate: Auto Rate
Channel: 1
Power Saving Mode: Disabled

3. Select Ad hoc from the operation mode pull down menu, fill you an SSID and select a channel you want to use than press OK to apply.

4. Since there is no DHCP server to give the host IP you must first designate a static IP for your station. From Windows Start select Control Panel >Network Connection>Wireless Network Connection.



Wireless Network Connection Properties

General | Authentication | Advanced

Connect using:

IEEE802.11b WLAN PCI Card v3.0

This connection uses the following items:

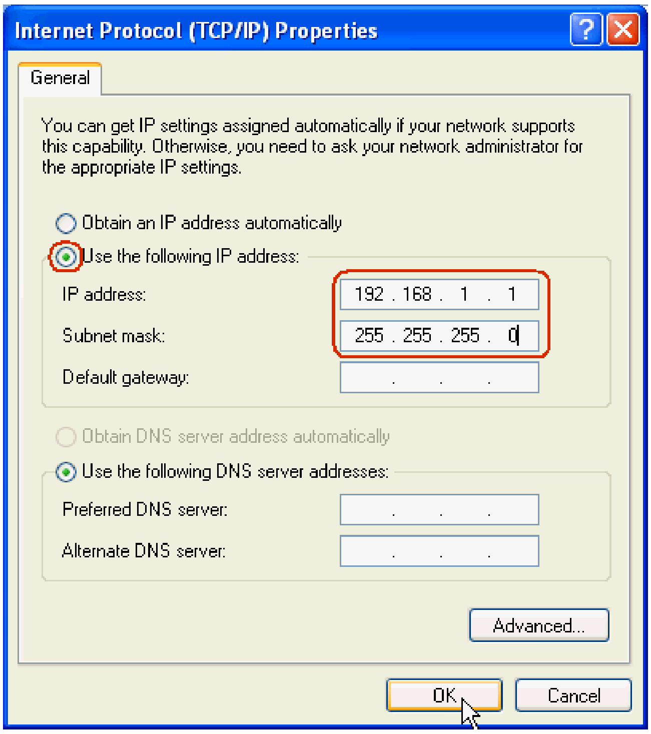
☑ Client for Microsoft Networks
☑ File and Printer Sharing for Microsoft Networks
☑ QoS Packet Scheduler
☑ Internet Protocol (TCP/IP)

Description

Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.

☑ Show icon in notification area when connected

5. From general tab select TCP/IP and click property



Internet Protocol (TCP/IP) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically
● Use the following IP address:

IP address: 192 . 168 . 1 . 1
Subnet mask: 255 . 255 . 255 . 0
Default gateway: . . .

○ Obtain DNS server address automatically
● Use the following DNS server addresses:

Preferred DNS server: . . .
Alternate DNS server: . . .

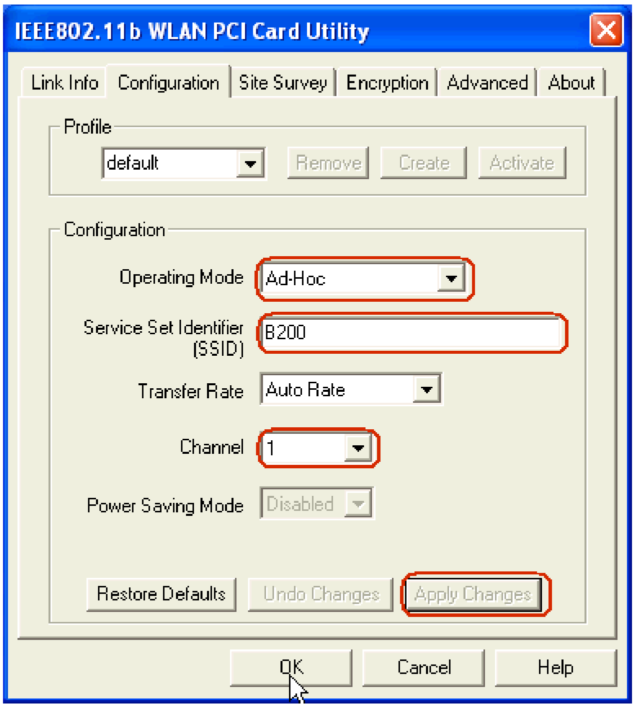
6. Fill in your network IP address and subnet mask and click OK to finish.

Configuration for Wireless Station B

To configure Ad hoc mode on your ZyAIR B-100/B-200/B-300 wireless NIC card please follow the following step.

1. Double click on the utility icon in your windows task bar the utility will pop up on your windows screen.

2. Select configuration tab.



IEEE802.11b WLAN PCI Card Utility

Profile: default

Configuration

Operating Mode: Ad-Hoc

Service Set Identifier (SSID): B200

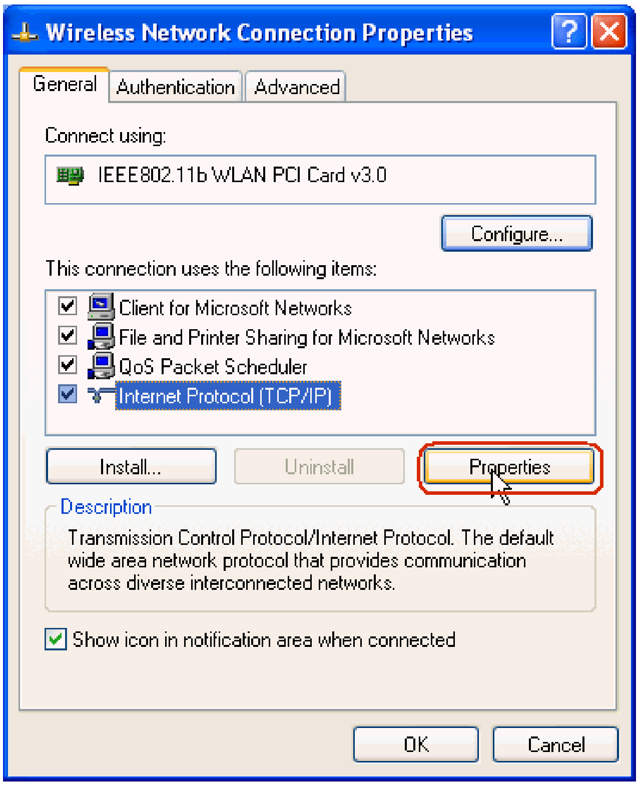
Transfer Rate: Auto Rate

Channel: 1

Power Saving Mode: Disabled

3. Select Ad hoc from the operation mode pull down menu, fill you an SSID and select a channel you want to use than press OK to apply.

4. Since there is no DHCP server to give the host IP you must first designate a static IP for your station. From Windows Start select Control Panel >Network Connection>Wireless Network Connection.



Wireless Network Connection Properties

Connect using:

IEEE802.11b WLAN PCI Card v3.0

This connection uses the following items:

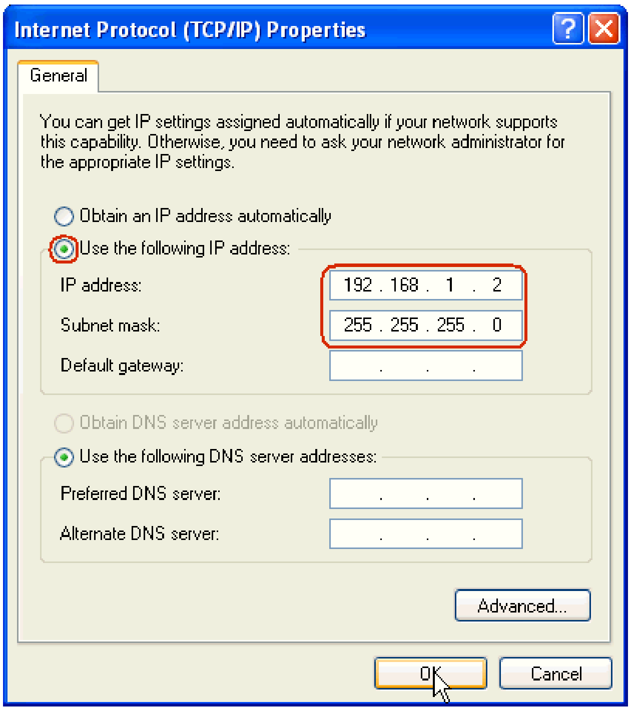
- ☑ Client for Microsoft Networks
- ☑ File and Printer Sharing for Microsoft Networks
- ☑ QoS Packet Scheduler
- ☑ Internet Protocol (TCP/IP)

Description

Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.

☑ Show icon in notification area when connected

5. From general tab select TCP/IP and click property



Internet Protocol (TCP/IP) Properties

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically

● Use the following IP address:

IP address:	192 . 168 . 1 . 2
Subnet mask:	255 . 255 . 255 . 0
Default gateway:	. . .

○ Obtain DNS server address automatically

● Use the following DNS server addresses:

Preferred DNS server:	. . .
Alternate DNS server:	. . .

6. Fill in your network IP address and subnet mask and click OK to finish.

7. Station A now are able to connect to Station B.

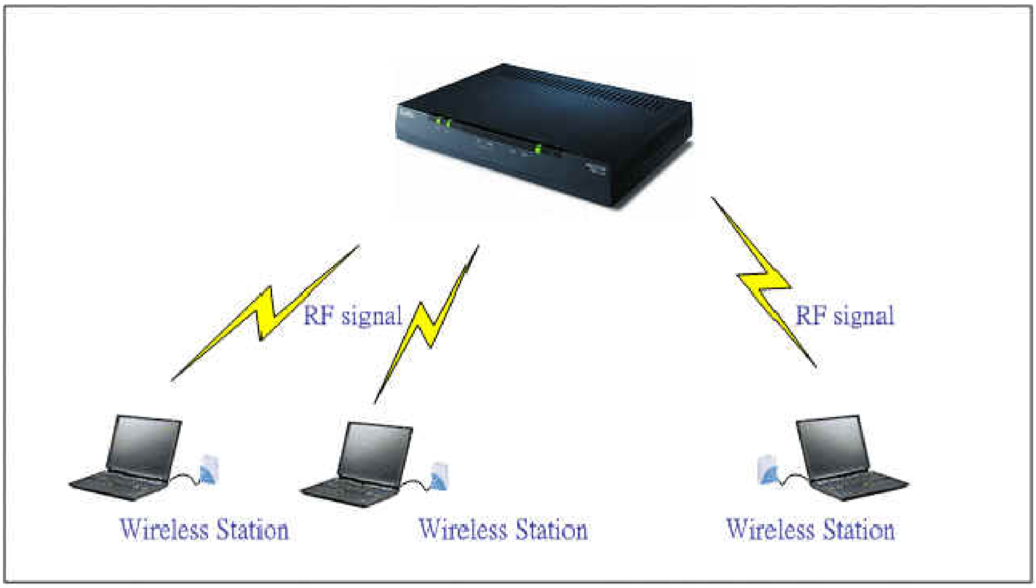
2. Configuring Infrastructure mode

- Infrastructure Introduction
- Configure wireless access point to Infrastructure mode with SMT
- Configure wireless access point to Infrastructure mode with Web configurator
- Configure wireless station to Infrastructure mode

Infrastructure Introduction

What is Infrastructure mode?

Infrastructure mode, sometimes referred to as Access Point mode, is an operating mode of an 802.11b/Wi-Fi client unit. In infrastructure mode, the client unit can associate with an 802.11b/Wi-Fi Access Point and communicate with other clients in infrastructure mode through that access point.



Configure Wireless Access Point to Infrastructure mode using SMT.

To configure Infrastructure mode of your P660HW-T1 wireless AP please follow the steps below.

1. From the SMT main menu, enter 3 to display Menu 3 ? LAN Setup.

2. Enter 5 to display Menu 3.5 ? Wireless LAN Setup.

```
          Menu 3.5 - Wireless LAN Setup
```

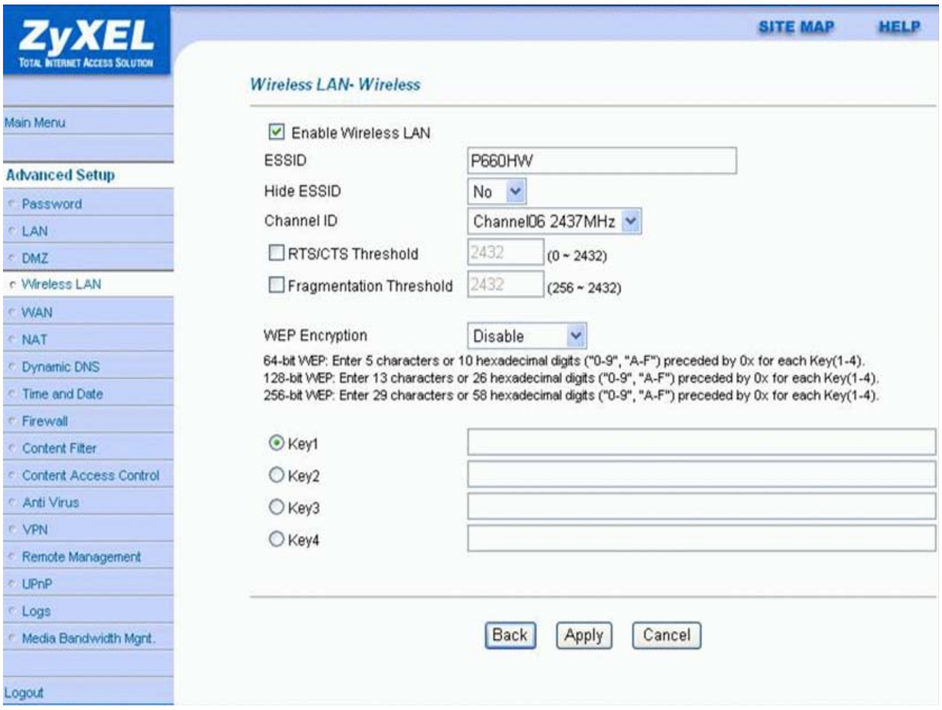
```
            ESSID= Wireless
            Hide ESSID= No
            Channel ID= CH01 2412MHz
            RTS Threshold= 0
            Frag. Threshold= 2432
            WEP= Disable
                Default Key= N/A
                Key1= N/A
                Key2= N/A
                Key3= N/A
                Key4= N/A
            Edit MAC Address Filter= No

         Press ENTER to Confirm or ESC to Cancel:
```

3. Configure ESSID, Channel ID, WEP, Default Key and Keys as you desire.

Configure Wireless Access Point to Infrastructure mode using Web configurator.

To configure Infrastructure mode of your P660HW-T1 wireless AP please follow the steps below.

1. From the web configurator   main menu, click advanced->Wireless Lanto display ?Wireless LAN.



Wireless LAN- Wireless

☑ Enable Wireless LAN

ESSID: P660HW

Hide ESSID: No

Channel ID: Channel06 2437MHz

□ RTS/CTS Threshold: 2432 (0 ~ 2432)

□ Fragmentation Threshold: 2432 (256 ~ 2432)

WEP Encryption: Disable

64-bit WEP: Enter 5 characters or 10 hexadecimal digits ("0-9", "A-F") preceded by 0x for each Key(1-4).
128-bit WEP: Enter 13 characters or 26 hexadecimal digits ("0-9", "A-F") preceded by 0x for each Key(1-4).
256-bit WEP: Enter 29 characters or 58 hexadecimal digits ("0-9", "A-F") preceded by 0x for each Key(1-4).

● Key1

○ Key2

○ Key3

○ Key4

2. Configure the desired configuration on P660HW-T1.

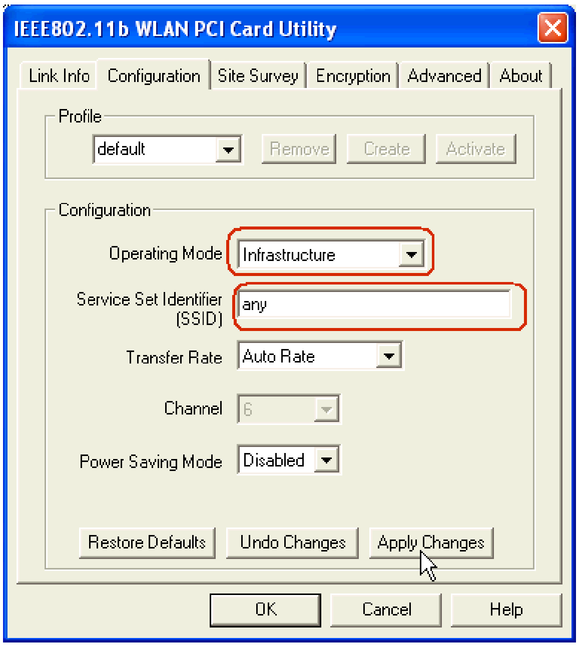
3. Finished.

Configuration Wireless Station to Infrastructure mode

To configure Infrastructure mode on your ZyAIR B-100/B-200/B-300 wireless NIC card please follow the following steps.

1. Double click on the utility icon in your windows task bar the utility will pop up on your windows screen.

2. Select configuration tab.



IEEE802.11b WLAN PCI Card Utility

Profile: default

Configuration

Operating Mode: Infrastructure

Service Set Identifier (SSID): any

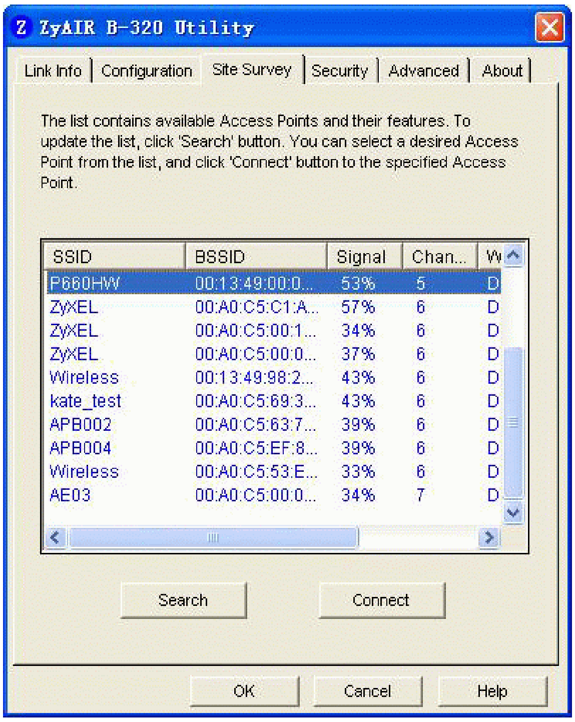
Transfer Rate: Auto Rate

Channel: 6

Power Saving Mode: Disabled

3. Select Infrastructure from the operation mode pull down menu, fill in an SSID or leave it as any if you wish to connect to any AP than press Apply Change to take effect.

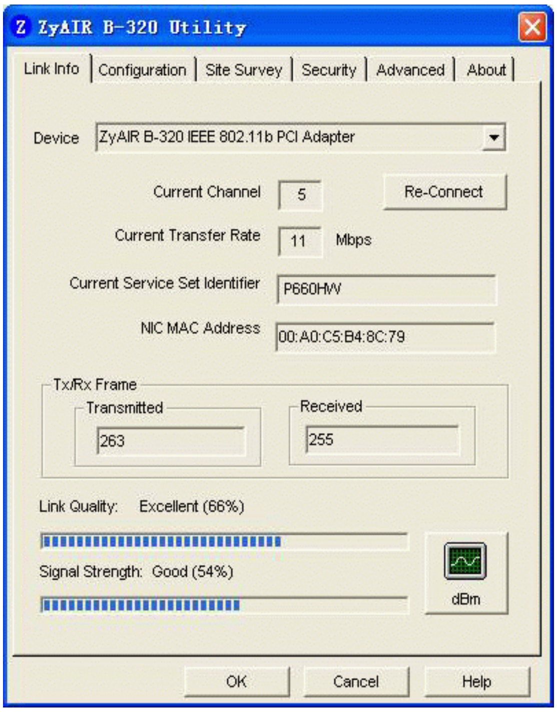
4. Click on Site Survey tab, and press search all the available AP will be listed.



The list contains available Access Points and their features. To update the list, click 'Search' button. You can select a desired Access Point from the list, and click 'Connect' button to the specified Access Point.

SSID	BSSID	Signal	Chan...	W
P660HW	00:13:49:00:0...	53%	5	D
ZyXEL	00:A0:C5:C1:A...	57%	6	D
ZyXEL	00:A0:C5:00:1...	34%	6	D
ZyXEL	00:A0:C5:00:0...	37%	6	D
Wireless	00:13:49:98:2...	43%	6	D
kate_test	00:A0:C5:69:3...	43%	6	D
APB002	00:A0:C5:63:7...	39%	6	D
APB004	00:A0:C5:EF:8...	39%	6	D
Wireless	00:A0:C5:53:E...	33%	6	D
AE03	00:A0:C5:00:0...	34%	7	D

5. Double click on the AP you want to associated with.



Device: ZyAIR B-320 IEEE 802.11b PCI Adapter

Current Channel: 5

Current Transfer Rate: 11 Mbps

Current Service Set Identifier: P660HW

NIC MAC Address: 00:A0:C5:B4:8C:79

Tx/Rx Frame

Transmitted: 263

Received: 255

Link Quality: Excellent (66%)

Signal Strength: Good (54%)

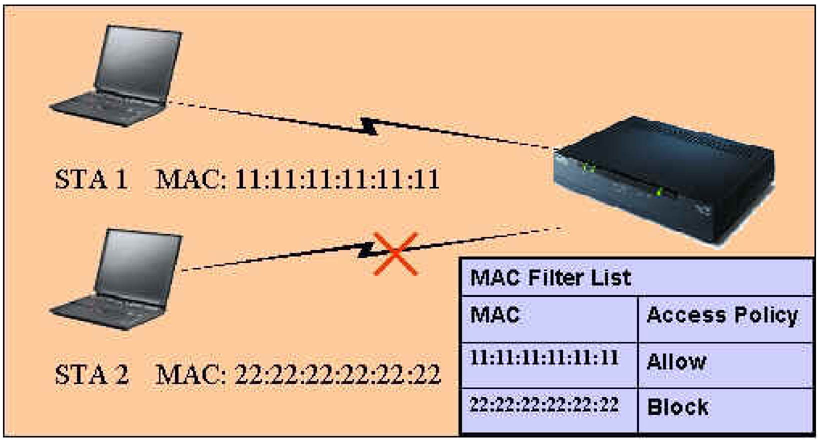
6. After the client have associated with the selected AP. The linked AP's channel, current linkup rate, SSID, link quality, and signal strength will show on the Link Info page. You now successfully associate with the selected AP with Infrastructure Mode.

3. MAC Filter

- MAC Filter Overview
- ZyXEL MAC Filter Implementation
- Configure the WLAN MAC Filter

MAC Filter Overview

Users can use MAC Filter as a method to restrict unauthorized stations from accessing the APs. ZyXEL's APs provide the capability for checking MAC address of the station before allowing it to connect to the network. This provides an additional layer of control layer in that only stations with registered MAC addresses can connect. This approach requires that the list of MAC addresses be configured.



MAC Filter List

MAC	Access Policy
11:11:11:11:11:11	Allow
22:22:22:22:22:22	Block

ZyXEL MAC Filter Implementation

ZyXEL's MAC Filter Implementation allows users to define a list to allow or block association from STAs. The filter set allows users to input 12 entries in the list. If Allow Association is selected, all other STAs which are not on the list will be denied. Otherwise, if Deny Association is selected, all other STAs which are not on the list will be allowed for association. Users can choose either way to configure their filter rule.

Configure the WLAN MAC Filter

The MAC Filter related settings in ZyXEL APs are configured in menu 3.5.1, WLAN MAC Address Filter Configuration. Before you configure the MAC filter, you need to know the MAC address of the client first. If not knowing what your MAC address is, please enter a command "**ipconfig /all**" after DOS prompt to get the MAC (physical) address of your wireless client.

If you use SMT management, the MAC Address Filter configurations are as shown below.

Enter the MAC Addresses of wireless cards in the filter set to allow or deny association from these cards.

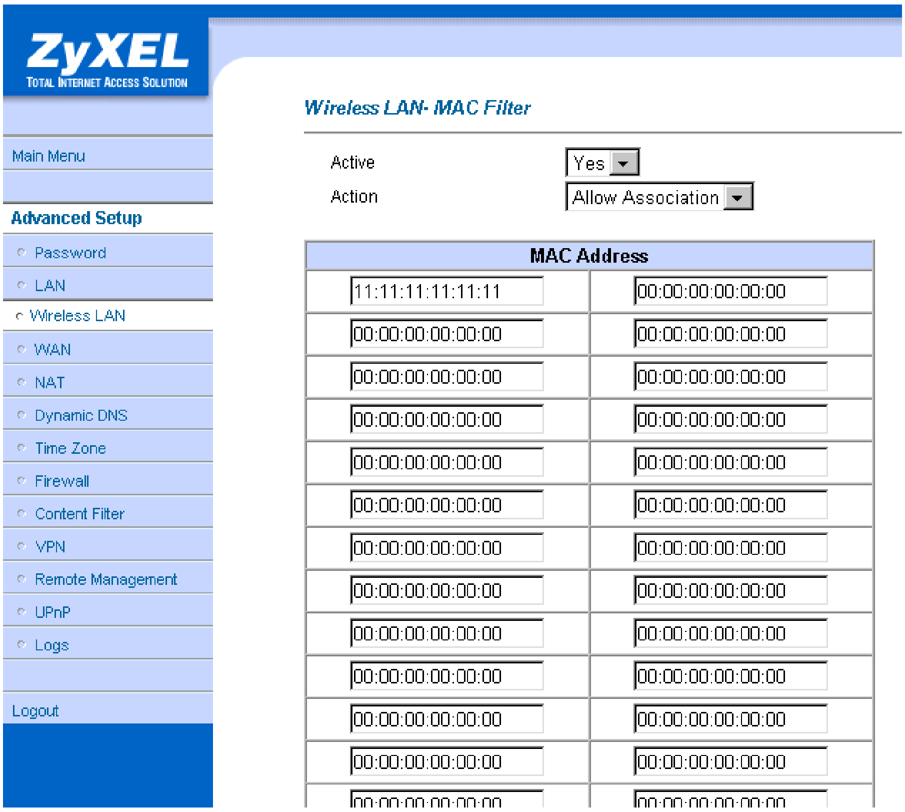
```
                Menu 3.5.1 - WLAN MAC Address Filter

   Active= Yes
   Filter Action= Allowed Association
   -----------------------------------------------------------------------------
   1= 11:11:11:11:11:11    13= 00:00:00:00:00:00    25= 00:00:00:00:00:00
   2= 00:00:00:00:00:00    14= 00:00:00:00:00:00    26= 00:00:00:00:00:00
   3= 00:00:00:00:00:00    15= 00:00:00:00:00:00    27= 00:00:00:00:00:00
   4= 00:00:00:00:00:00    16= 00:00:00:00:00:00    28= 00:00:00:00:00:00
   5= 00:00:00:00:00:00    17= 00:00:00:00:00:00    29= 00:00:00:00:00:00
   6= 00:00:00:00:00:00    18= 00:00:00:00:00:00    30= 00:00:00:00:00:00
   7= 00:00:00:00:00:00    19= 00:00:00:00:00:00    31= 00:00:00:00:00:00
   8= 00:00:00:00:00:00    20= 00:00:00:00:00:00    32= 00:00:00:00:00:00
   9= 00:00:00:00:00:00    21= 00:00:00:00:00:00
  10= 00:00:00:00:00:00    22= 00:00:00:00:00:00
  11= 00:00:00:00:00:00    23= 00:00:00:00:00:00
  12= 00:00:00:00:00:00    24= 00:00:00:00:00:00
-----------------------------------------------------------------------------



                ENTER here to CONFIRM or ESC to CANCEL:
```

Key Settings:

Option	Descriptions
Filter Action	Allow or block association from MAC addresses contained in this list. If **Allow Association** is selected in this field, hosts with MAC addresses configured in this list will be allowed to associate with AP. If **Deny Association** is selected in this field, hosts with MAC addresses configured in this list will be blocked.
MAC Address	This field specifies those MAC Addresses that you want to add in the list.

If you use WEB configuration, the MAC Address Filter configuration are as shown below.

1. Using a web browser, login AP by giving the LAN IP address of AP in URL field. Default LAN IP is **192.168.1.1**, default password to login web configurator is **1234**.
2. Click **Advanced**, and click **Wireless** tab on the left.
3. Click **MAC Filter** tab on the top and select **Yes** in the **Active** field to enable MAC Filter.
4. Select the **Filter Action** to allow or deny association from hosts in the list.
5. Enter the MAC Addresses which you may want to apply the filter to allow or block associations from.
6. Click **Apply** to make your setting work.



Wireless LAN- MAC Filter

Active: Yes

Action: Allow Association

MAC Address	
11:11:11:11:11:11	00:00:00:00:00:00
00:00:00:00:00:00	00:00:00:00:00:00
00:00:00:00:00:00	00:00:00:00:00:00
00:00:00:00:00:00	00:00:00:00:00:00
00:00:00:00:00:00	00:00:00:00:00:00
00:00:00:00:00:00	00:00:00:00:00:00
00:00:00:00:00:00	00:00:00:00:00:00
00:00:00:00:00:00	00:00:00:00:00:00
00:00:00:00:00:00	00:00:00:00:00:00
00:00:00:00:00:00	00:00:00:00:00:00
00:00:00:00:00:00	00:00:00:00:00:00
00:00:00:00:00:00	00:00:00:00:00:00
00:00:00:00:00:00	00:00:00:00:00:00

4. Setup WEP (Wired Equivalent Privacy)

- Introduction
- Setting up the Access Point
- Setting up the Station

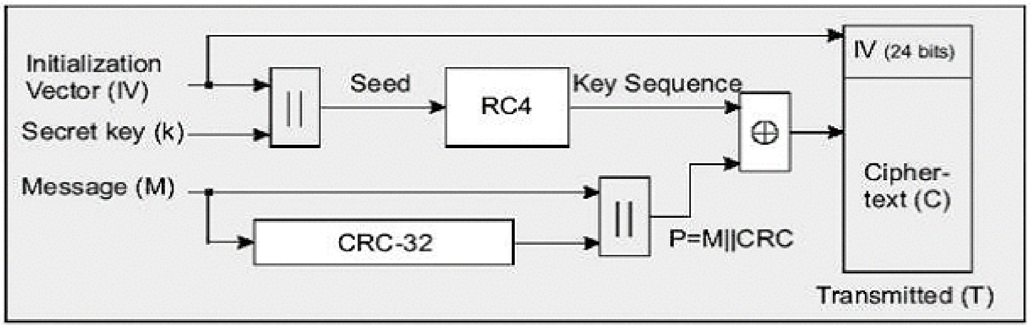
Introduction

The 802.11 standard describes the communication that occurs in wireless LANs.

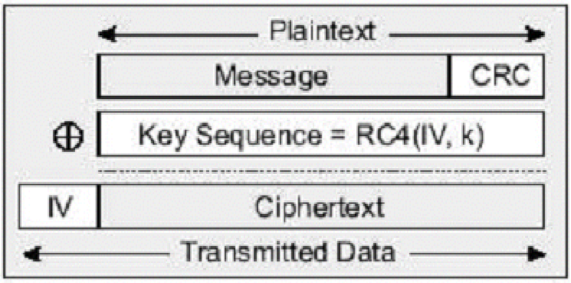
The Wired Equivalent Privacy (WEP) algorithm is used to protect wireless communication from eavesdropping, because wireless transmissions are easier to intercept than transmissions over wired networks, and wireless is a shared medium, everything that is transmitted or received over a wireless network can be intercepted.

WEP relies on a secret key that is shared between a mobile station (e.g. a laptop with a wireless Ethernet card) and an access point (i.e. a base station). The secret key is used to encrypt packets before they are transmitted, and an integrity check is used to ensure that packages are not modified during the transition. The standard does not discuss how the shared key is established. In practice, most installations use a single key that is shared between all mobile stations and access points APs.

WEP employs the key encryption algorithm, Ron's Code 4 Pseudo Random Number Generator (RC4 PRNG). The same key is used to encrypt and decrypt the data.



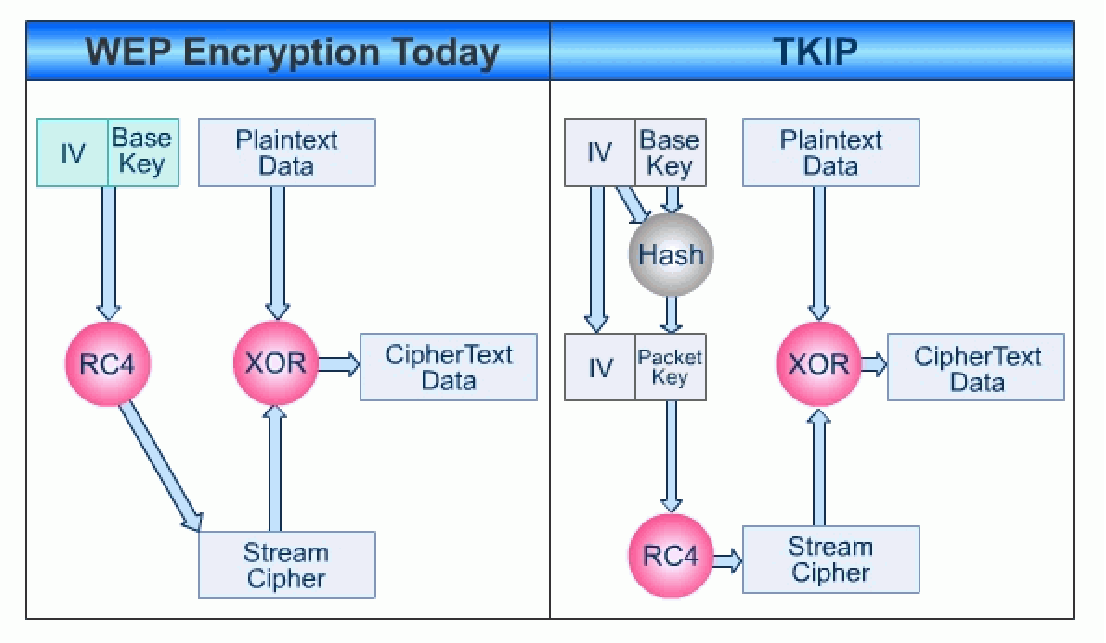
WEP has defensed against this attack. To avoid encrypting two cipher texts with the same key stream, an Initialisation Vector (IV) is used to augment the shared WEP key (secret key) and produce a different RC4 key for each packets, the IV is also included in the package. WEP key (secret key) are available in two types, 64-bits and 128-bits. Many times you will see them referenced as 40-bits and 104-bits instead. The reason for this misnomer is that the WEP key (40/104 bits) is concatenated with the initialisation vector (24 bits) resulting in a 64/128 bits total key size.



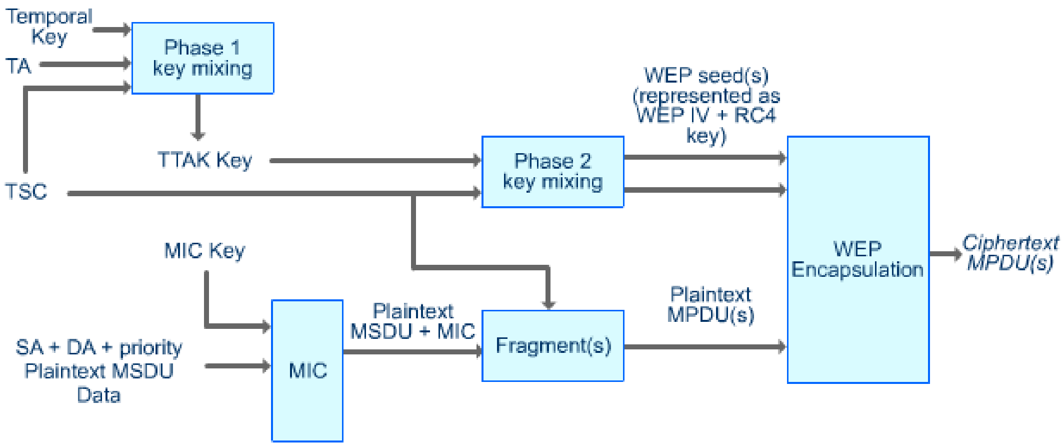
WiFi Protected Access (WPA) is the new security standard adopted by the WiFi Alliance consortium. WPA uses Temporal Key Integrity Protocol (TKIP). TKIP is designed to allow WEP to be upgraded. This means that all the main building blocks of WEP are present, but corrective measures have been added to address security problems. WPA (TKIP) provides much stronger security than WEP, addressing all the weaknesses and allowing compatibility and upgrades with older equipment.

802.11 WEP uses IV and base key to generate streaming encryption keys for data encryption this includes weak IV which could be compromised by a cracker if he have collected enough transmitted data frame.

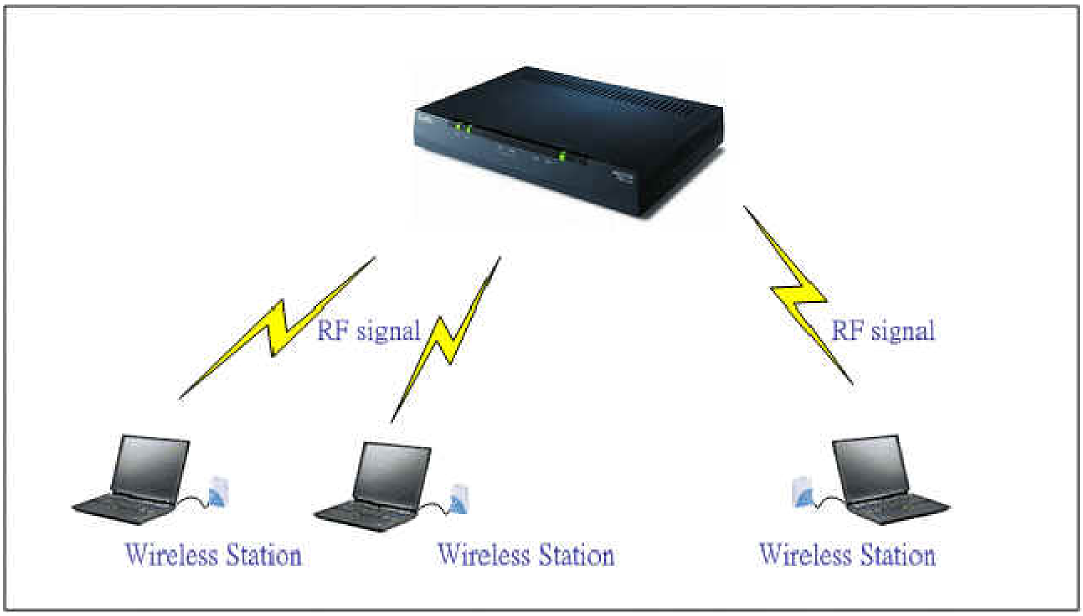
TKIP uses IV and base key to hash a new key for every packet



The length of the IV has been increased from 24bits to 48bits. Rollover of the counter is eliminated. Reuse of keys is less likely.



Setting up the Access Point



Most access points and clients have the ability to hold up to 4 WEP keys simultaneously. You need to specify one of the 4 keys as default Key for data encryption. To set up the Access Point, you will need to set the one of the following parameters:

- 64-bit WEP key (secret key) with 5 characters
- 64-bit WEP key (secret key) with 10 hexadecimal digits
- 128-bit WEP key (secret key) with 13 characters
- 128-bit WEP key (secret key) with 26 hexadecimal digits
- 256-bit WEP key (secret key) with 29 characters
- 256-bit WEP key (secret key) with 58 hexadecimal digits

You can set up the Access Point by SMT or Web configurator

- Setting up the Access Point from SMT Menu 3.5

P660HW-T1 hold up to 4 WEP Keys. You have to specify one of the 4 keys as default Key which be used to encrypt wireless data transmission.
For example,

```
              Menu 3.5 - Wireless LAN Setup

              ESSID= P660HW-T1
                             Hide ESSID= No
                            Channel ID= CH01 2412MHz
                            RTS Threshold= 0
                            Frag. Threshold= 2432
                            WEP= 64-bit WEP
                           Default Key= 3
                           Key1= 0x123456789A
                           Key2= 0x23456789AB
                          Key3= 0x3456789ABC
                           Key4= 0x456789ABCD
                     Edit MAC Address Filter= No
```

Key settings

Hexadecimal digits have to preceded by '**0x**',

WEP Key type	Example

64-bit WEP with 5 characters	Key1= 2e3f4
	Key2= 5y7js
	Key3= 24fg7
	Key4= 98jui

64-bit WEP with 10 hexadecimal digits ('0-9', 'A-F')	Key1= **0x**123456789A
	Key2= **0x**23456789AB
	Key3= **0x**3456789ABC
	Key4= **0x**456789ABCD

128-bit WEP with 13 characters	Key1= 2e3f4w345ytre
	Key2= 5y7jse8r4i038
	Key3= 24fg70okx3fr7
	Key4= 98jui2wss35u4

128-bit WEP with 26 hexadecimal digits ('0-9', 'A-F')	Key1= **0x**112233445566778899AABBCDEF
	Key2= **0x**2233445566778899AABBCCDDEE
	Key3= **0x**3344556677889900AABBCCDDFF
	Key4= **0x**44556677889900AABBCCDDEEFF

256-bit WEP with 29 characters	Key1= 2e3f4w345ytre1mg56f45jh45cg34
	Key2= 5y7jse8r4i038lk78124l5k9876b1
	Key3= 24fg70okx3fr7kjhg6vf12lazt1nt

	Key4= 98jui2wss35u456cty12k5l9800f5
128-bit WEP with 58 hexadecimal digits ('0-9', 'A-F')	Key1= **0x**1111112222223333444455556666777788889999AAAABBBBCCCDDDEEFFF Key2= **0x**2222223333444455556666777788889999AAAABBBBCCCCDDDDEEEEFFFF Key3= **0x**333333444444555555666677778888999900000AAAABBBBCCCCDDDDFFFF Key4= **0x**4444445555556666667777888899990000AAAABBBBCCCCDDDDEEEEFFFF

Select one of the WEP key as default Key +to encrypt wireless data transmission.
The receiver will use the corresponding key to decrypt the data.

For example, if access point use Key 3 to encrypt data, then station will use Key 3 to decrypt data.
So, the Key 3 of station has to equal to the Key 3 of access point.
Though access point use Key 3 as default key, but the station can use the other Key as its default key to encrypt wireless data transmission.

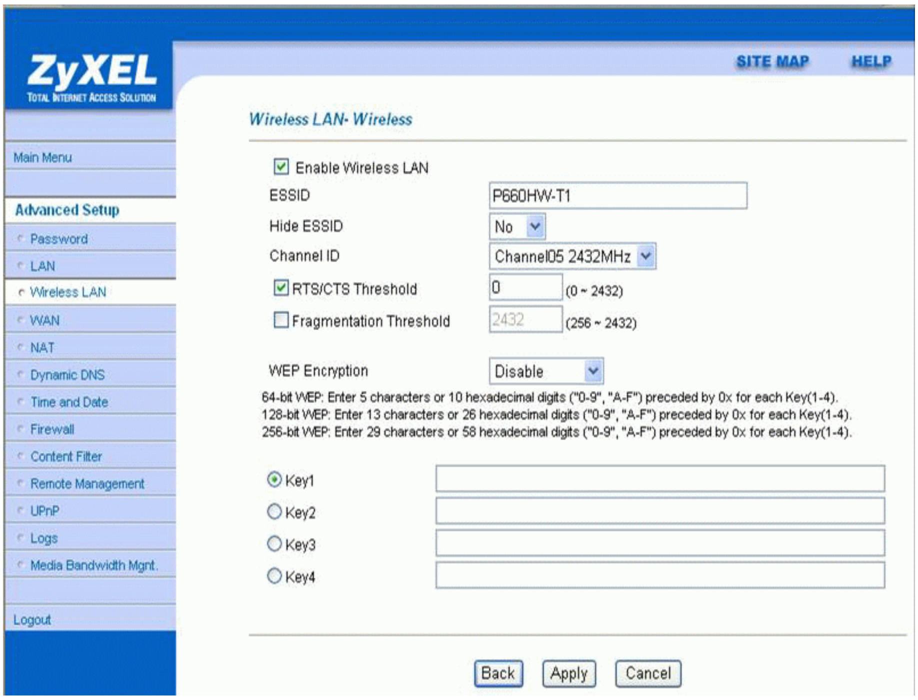
Access Point (encrypt data by Key 3) --------> Station (decrypt data by Key 3)

Access Point (decrypt data by Key 2) <-------- Station (encrypt data by Key 2)

In this case, access point transmits data to station which encrypt data by Key 3 of access point. The station will decrypt the data by its Key 3.

At the same time, when the station transmits data to access point which encrypt data by Key 2.
The access point will decrypt the data by its Key 2.

Setting up the Access Point with Web configurator



Wireless LAN- Wireless

☑ Enable Wireless LAN

ESSID: P660HW-T1

Hide ESSID: No

Channel ID: Channel05 2432MHz

☑ RTS/CTS Threshold: 0 (0 ~ 2432)

□ Fragmentation Threshold: 2432 (256 ~ 2432)

WEP Encryption: Disable

64-bit WEP: Enter 5 characters or 10 hexadecimal digits ("0-9", "A-F") preceded by 0x for each Key(1-4).
128-bit WEP: Enter 13 characters or 26 hexadecimal digits ("0-9", "A-F") preceded by 0x for each Key(1-4).
256-bit WEP: Enter 29 characters or 58 hexadecimal digits ("0-9", "A-F") preceded by 0x for each Key(1-4).

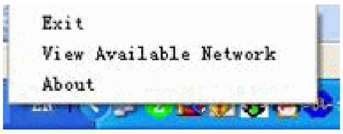
● Key1
○ Key2
○ Key3
○ Key4

Key settings

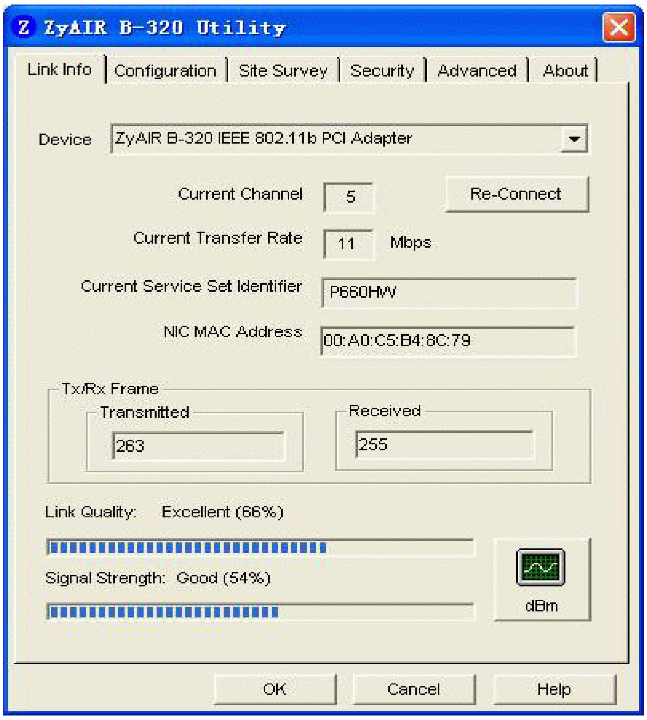
Select one WEP key as default key to encrypt wireless data transmission.

Setting up the Station

1. Double click on the utility icon in your windows task bar or right click the utility icon then select 'Show Config Utility'.



The utility will pop up on your windows screen.



ZyAIR B-320 Utility

Device: ZyAIR B-320 IEEE 802.11b PCI Adapter

Current Channel: 5

Current Transfer Rate: 11 Mbps

Current Service Set Identifier: P660HW

NIC MAC Address: 00:A0:C5:B4:8C:79

Tx/Rx Frame

Transmitted: 263

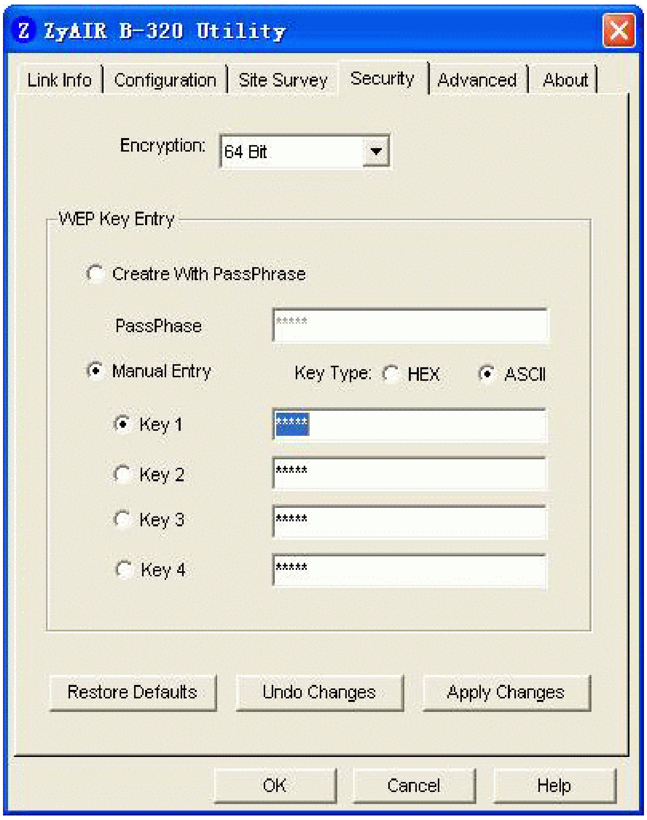
Received: 255

Link Quality: Excellent (66%)

Signal Strength: Good (54%)

Note: If the utility icon doesn't exist in your task bar, click Start -> Programs -> IEEE802.11b WLAN Card -> IEEE802.11b WLAN Card.

2. Select the 'Encryption' tab.
   Select encryption type corresponding with access point.
   Set up 4 Keys which correspond with the WEP Keys of access point.
   And select on WEP key as default key to encrypt wireless data transmission.



Encryption: 64 Bit

WEP Key Entry

○ Creatre With PassPhrase

PassPhase *****

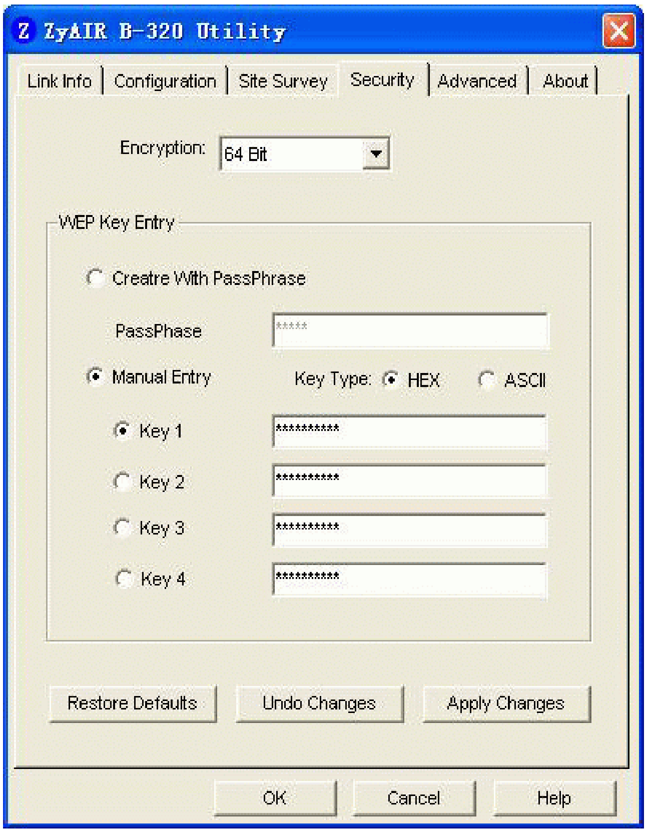
● Manual Entry Key Type: ○ HEX ● ASCII

● Key 1 *****

○ Key 2 *****

○ Key 3 *****

○ Key 4 *****



Encryption: 64 Bit

WEP Key Entry

○ Creatre With PassPhrase

PassPhase *****

● Manual Entry Key Type: ● HEX ○ ASCII

● Key 1 **********

○ Key 2 **********

○ Key 3 **********

○ Key 4 **********

Key settings

The WEP Encryption type of station has to equal to the access point.

Check 'ASCII' field for characters WEP key or **uncheck 'ASCII'** field for Hexadecimal digits WEP key.
Hexadecimal digits don't need to preceded by '0x'.
For example,

64-bits with characters WEP key :
Key1= 2e3f4
Key2= 5y7js
Key3= 24fg7
Key4= 98jui

64-bits with hexadecimal digits WEP key :
Key1= 123456789A
Key2= 23456789AB
Key3= 3456789ABC
Key4= 456789ABCD

5. Site Survey

- Site survey introduction
- Preparation
- Survey on site

Introduction

What is Site Survey?

An RF site survey is a MAP to RF contour of RF coverage in a particular facility. With wireless system it is very difficult to predict the propagation of radio waves and detect the presence of interfering signals. Walls, doors, elevator shafts, and other obstacles offer different degree of attenuation. This will cause the RF coverage pattern be irregular and hard to predict.

Site survey can help us overcome these problem and even provide us a map of RF coverage of the facility.

Preparation

Below are the steps to complete a simple site survey with simple tools.

1. First you will need to obtain a facility diagram, such as blueprints. This is for you to mark and take record on.

2. Visually inspect the facility, walk through the facility to verify the accuracy of the diagram and mark down any large obstacle you see that may effect the RF signal such as metal shelf, metal desk, etc on the diagram.

3. Identify user's area, when doing so ask a question where is wireless coverage needed and where does not, and note and take note on the diagram this is information is needed to determine the number of AP required.

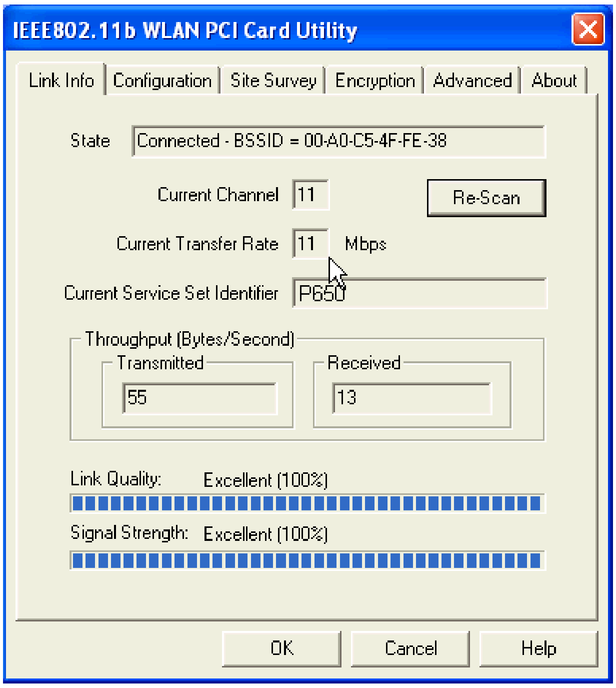
4. Determine the preliminary access point location on the facility diagram base on the service area needed, obstacles, power wall jack considerations.

Survey on Site

1. With the diagram with all information you gathered in the preparation phase. Now you are ready to make the survey.

2. Install an access point at the preliminary location.

3. Use a notebook with wireless client installed and run it's utility. An utility will provide information such as connection speed, current used channel, associated rate, link quality, signal strength and etc information as shown in utility below.



State: Connected - BSSID = 00-A0-C5-4F-FE-38

Current Channel: 11

Current Transfer Rate: 11 Mbps

Current Service Set Identifier: P650

Throughput (Bytes/Second)

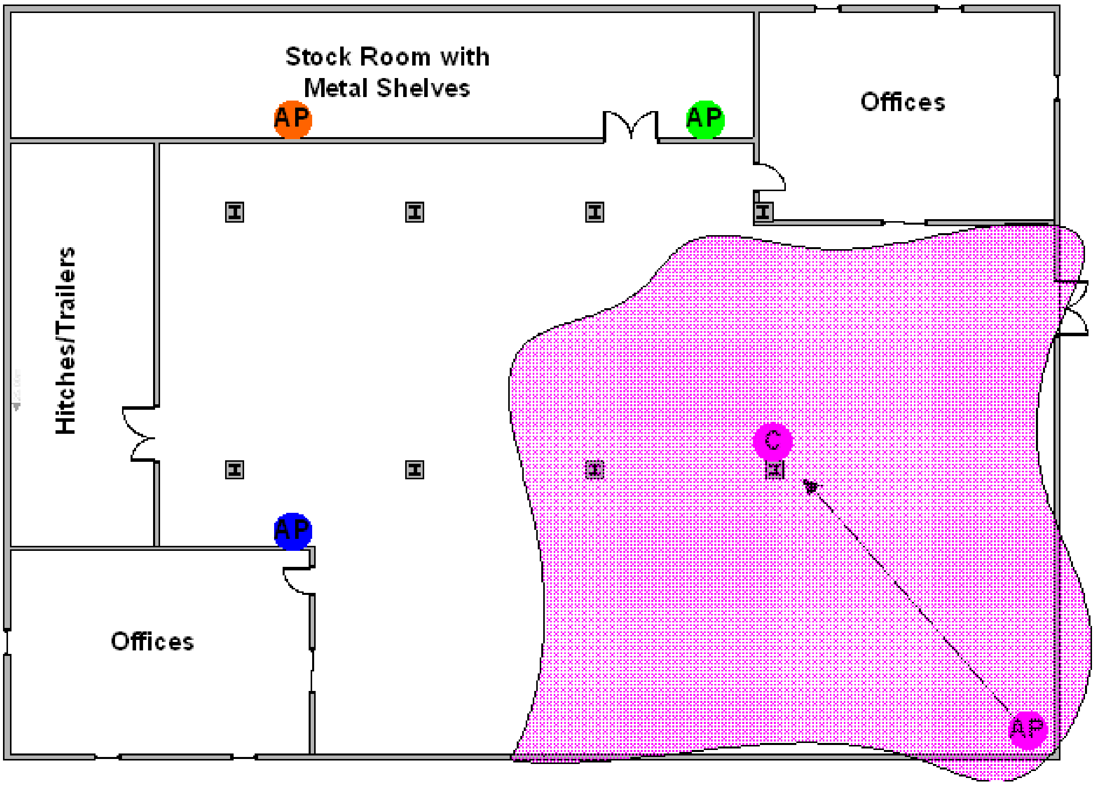
Transmitted: 55

Received: 13

Link Quality: Excellent (100%)

Signal Strength: Excellent (100%)

4. It's always a good idea to start with putting the access point at the corner of the room and walk away from the access point in a systematic manner. Record down the changes at point where transfer rate drop and the link quality and signal strength information on the diagram as you go alone.

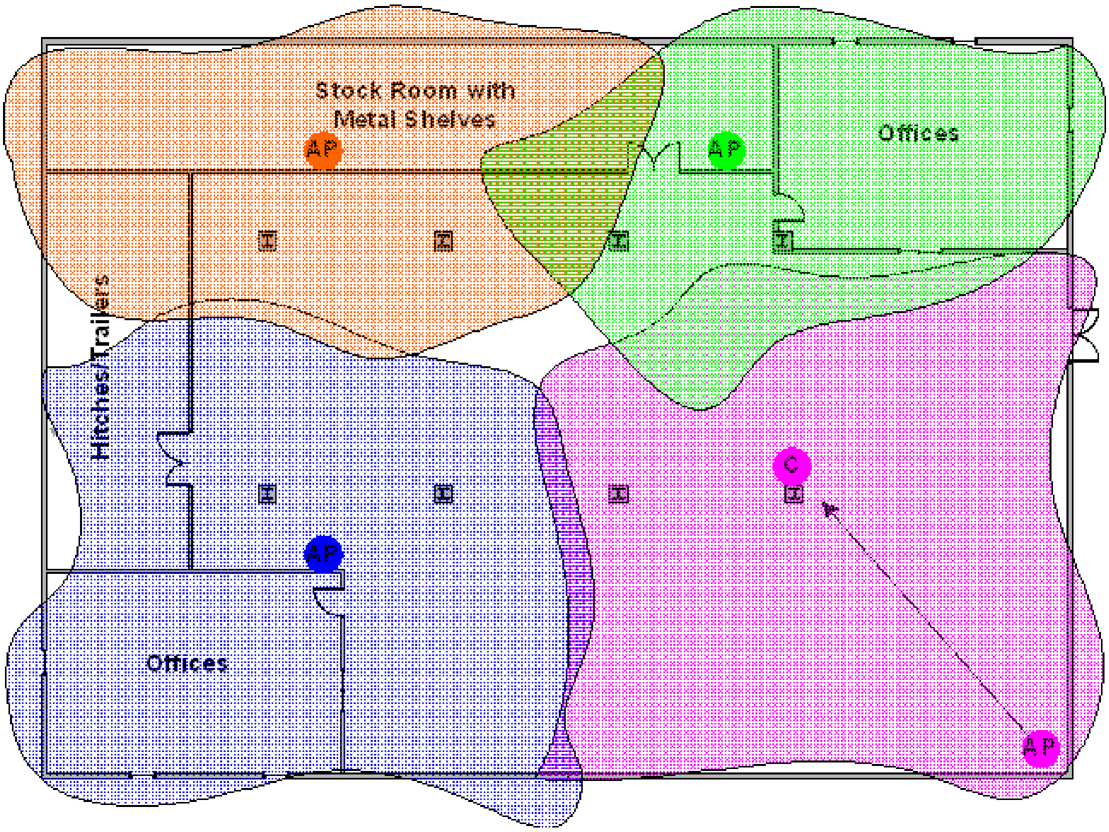


5. When you reach the farthest point of connection mark the spot. Now you move the access point to this new spot as have already determine the farthest point of the access point installation spot if wireless service is required from corner of the room.

6. Repeat step 1~5 and now you should be able to mark an RF coverage area as illustrated in above picutre.

7. You may need more than one access point is the RF coverage area have not cover all the wireless service area you needed.

8. Repeat step 1~6 of survey on site as necessary, upon completion you will have an diagram and information of site survey. As illustrated below.

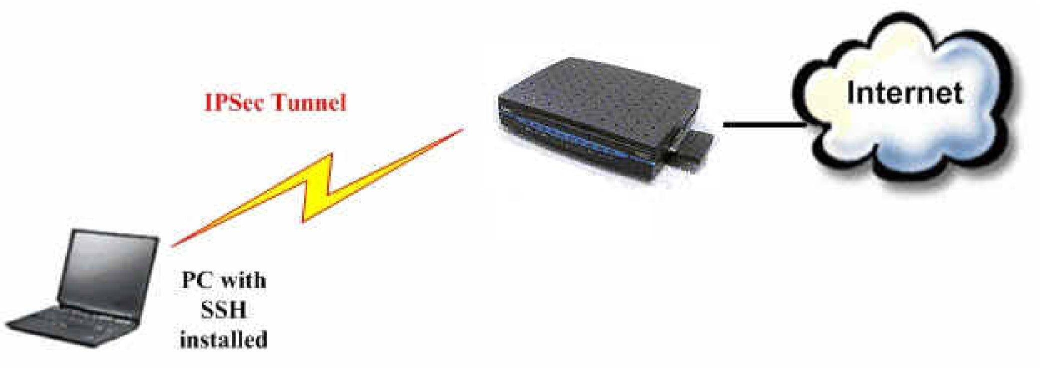


Note: If there are more than one access point is needed be sure to make the adjacent access point service area over lap one another. So the wireless station are able to roam. For more information please refer to roaming at

6. Using VPN over Wireless LAN

1. Setup Sentinel
2. Setup Prestige VPN

You can use IPsec to improve the security for your wireless connections. This document guides you how it works and how to configure VPN rules in both Prestige and your wireless station. The following diagram depicts the scenario. We can protect the wireless connection between the laptop and Prestige. So that all traffic between your Wireless LAN station and AP are encrypted, and thus get you free from eavesdropping in Wireless LAN environment. But for authentication purpose, please use 802.1x which is also provided in Prestige wireless solutions.



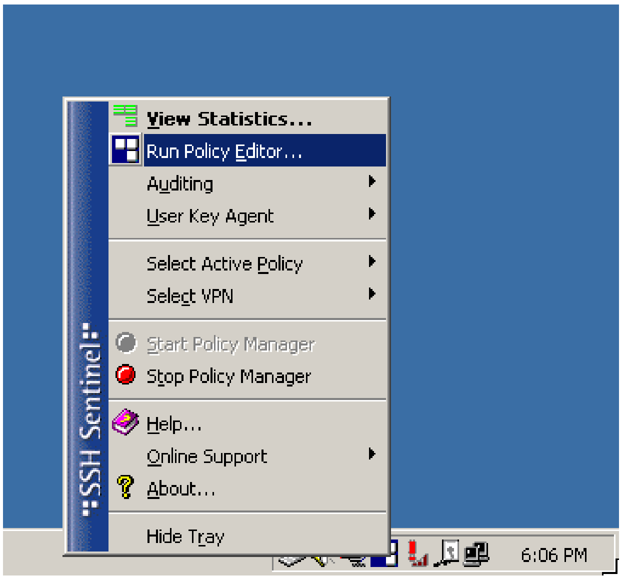
The IP addresses we use in this example are as shown below.

PC1	Prestige
192.168.1.33	LAN: 192.168.1.1 WAN: 172.21.1.252

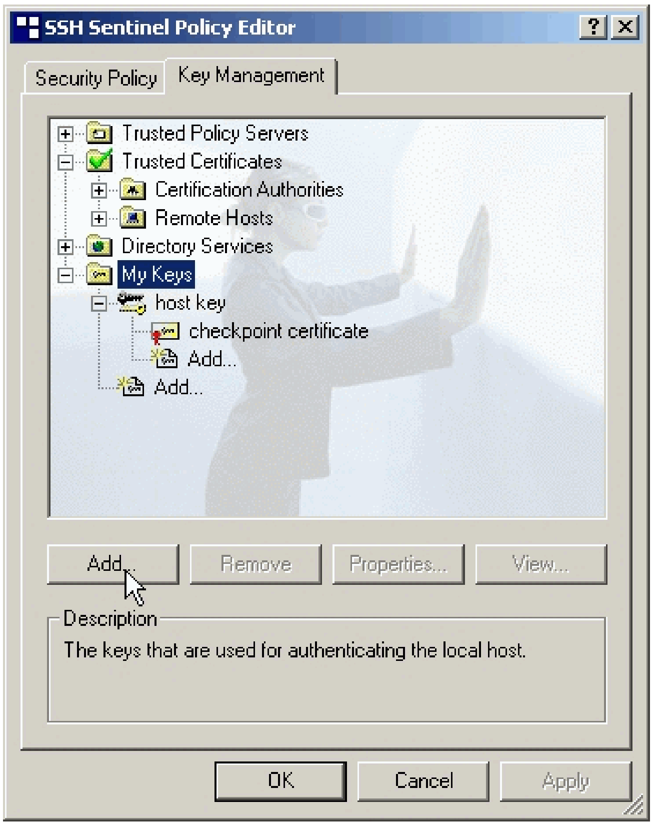
Before you continue, please note that in this document, we presume that you already complete the deployment of your Wireless LAN environment, including configuration in both your WLAN station and Prestige WLAN. If you have not complete them yet, please go back to application notes for how to configure WLAN in Infrastructure Mode.

1. Setup Sentinel

1. From Tool Tray of Windows system, right click on your SSH/Sentinel icon, and then choose **Run Policy Editor**.



2. Choose **Key Management**. Select **My Keys**, then press **Add...** button.

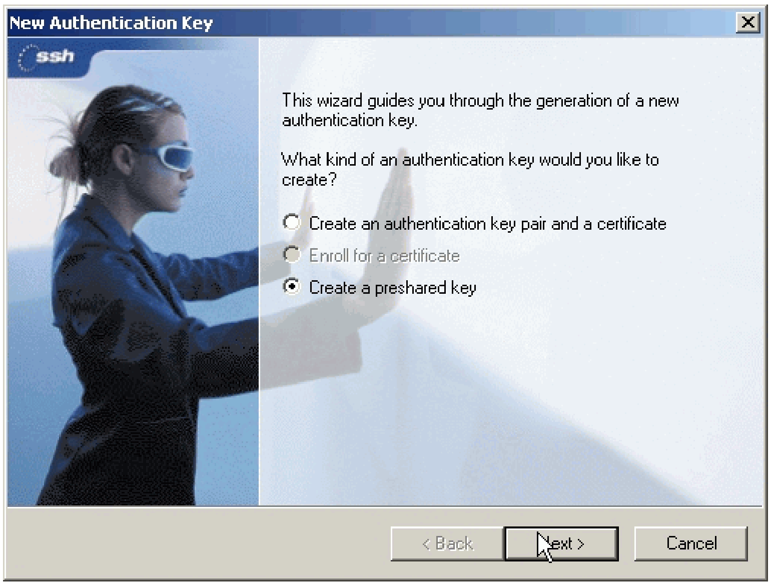


SSH Sentinel Policy Editor

Description

The keys that are used for authenticating the local host.

3. Select **Create a preshared key**, and press **Next**.



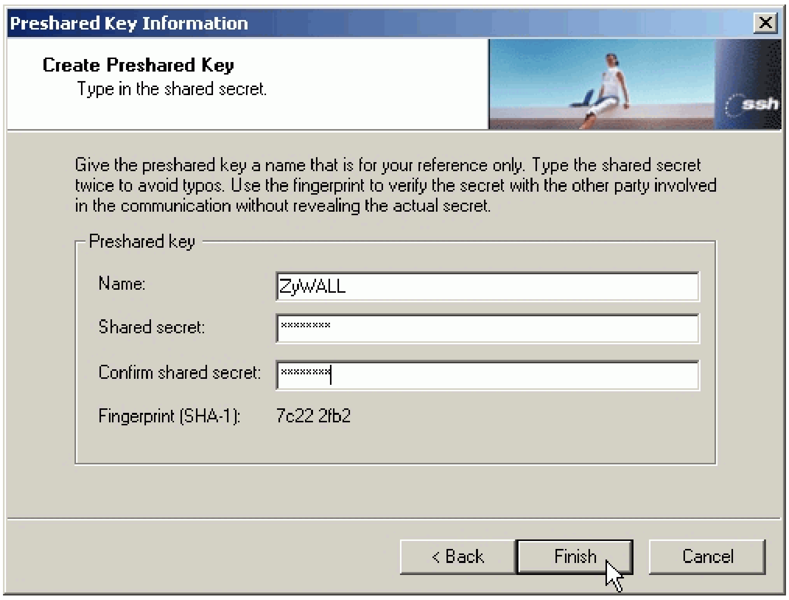
New Authentication Key

This wizard guides you through the generation of a new authentication key.

What kind of an authentication key would you like to create?

○ Create an authentication key pair and a certificate
○ Enroll for a certificate
● Create a preshared key

4. Give this preshared key a name, **ZyWALL**. And then enter the preshared key **"12345678"** in both **Shared secret** and **Confirm shared secret** fields. Finally press **Finish**.



Preshared Key Information

Create Preshared Key

Type in the shared secret.

Give the preshared key a name that is for your reference only. Type the shared secret twice to avoid typos. Use the fingerprint to verify the secret with the other party involved in the communication without revealing the actual secret.

Preshared key

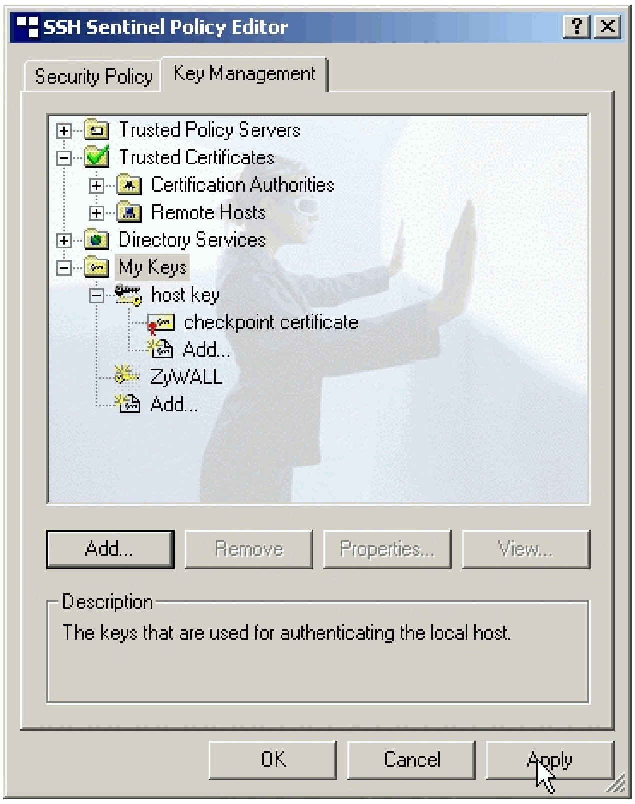
Name: ZyWALL

Shared secret: ********

Confirm shared secret: ********

Fingerprint (SHA-1): 7c22 2fb2

5. Press **Apply** in Main menu to save the above settings for latter use.

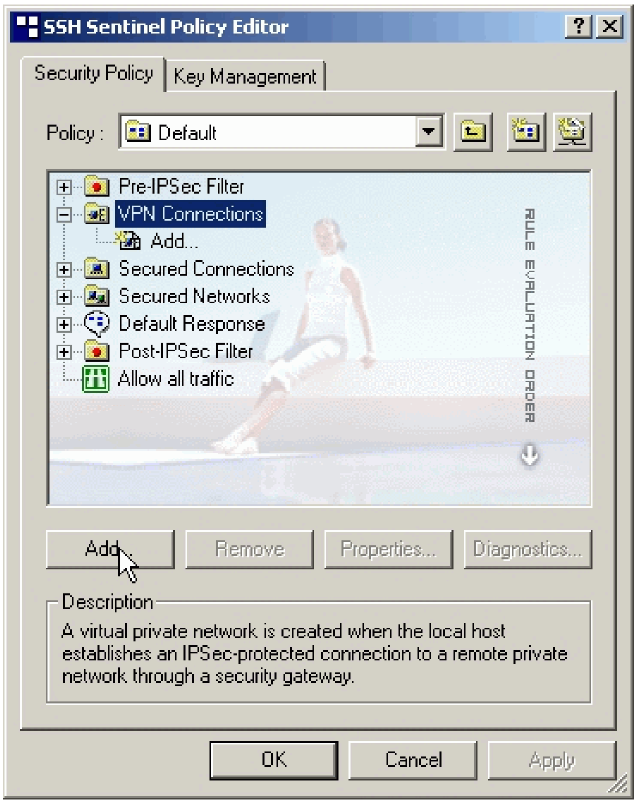


SSH Sentinel Policy Editor

Description

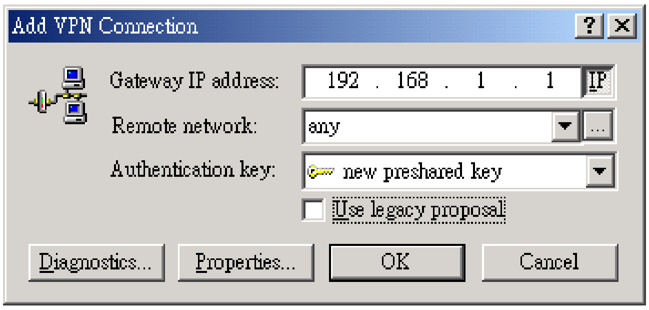
The keys that are used for authenticating the local host.

6. Switch to **Security Policy** tab. Choose **VPN connections**, and then press **Add...**



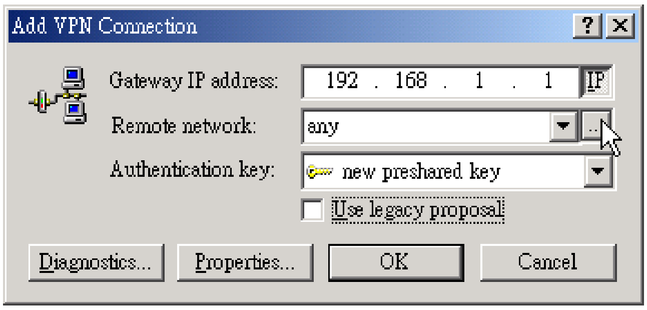
Description
A virtual private network is created when the local host establishes an IPSec-protected connection to a remote private network through a security gateway.

7. **Add VPN Connection** window will pop out. Press **IP** button besides **Gateway Name** box. Enter Prestige's LAN IP address in **Gateway IP address**.



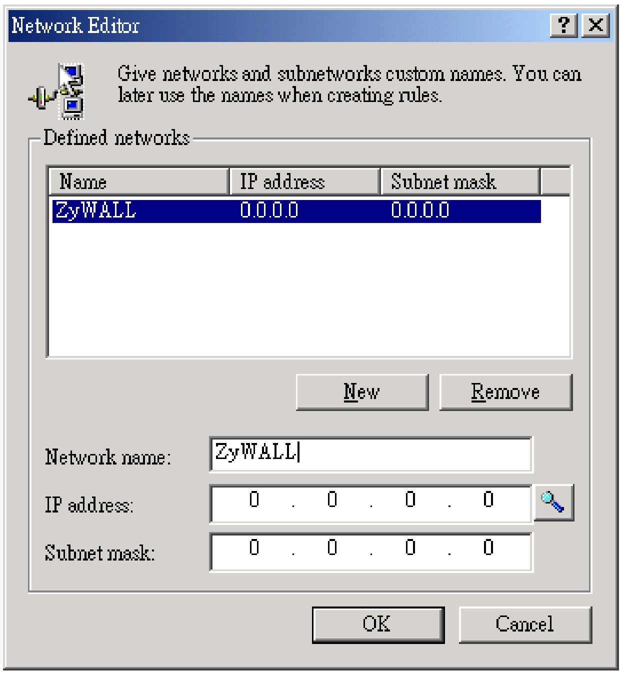
Gateway IP address: 192 . 168 . 1 . 1
Remote network: any
Authentication key: new preshared key
□ Use legacy proposal

8. Press **...** button besides **Remote network**.



Gateway IP address: 192 . 168 . 1 . 1
Remote network: any
Authentication key: new preshared key
□ Use legacy proposal

9. **Network Editor** Window will pop out. Press **New** button, and Enter **ZyWALL** in Network name, and **192.168.1.0** in **IP address** field, and **0.0.0.0** in Subnet Mask field. Then click **OK** to go back to **Add VPN Connection** window.



Network Editor

Give networks and subnetworks custom names. You can later use the names when creating rules.

Defined networks

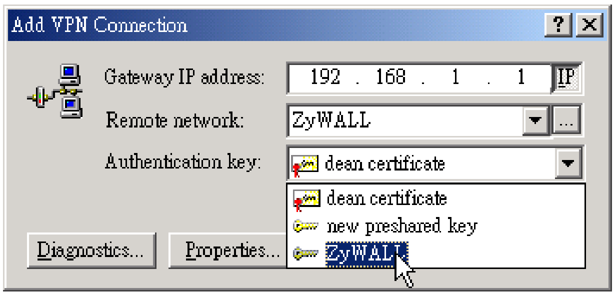
Name	IP address	Subnet mask
ZyWALL	0.0.0.0	0.0.0.0

Network name: ZyWALL

IP address: 0 . 0 . 0 . 0

Subnet mask: 0 . 0 . 0 . 0

10. Choose **ZyWALL** as **Authentication Key**. Then click **OK** to save.



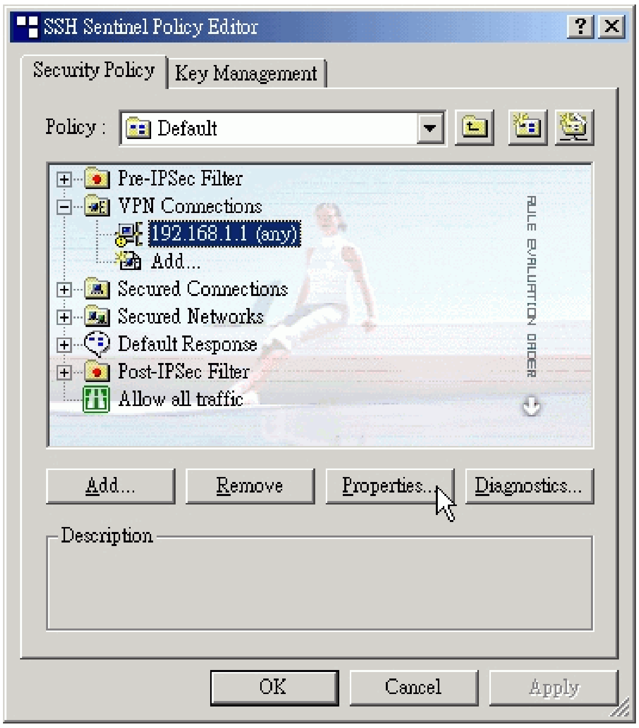
Add VPN Connection

Gateway IP address: 192 . 168 . 1 . 1

Remote network: ZyWALL

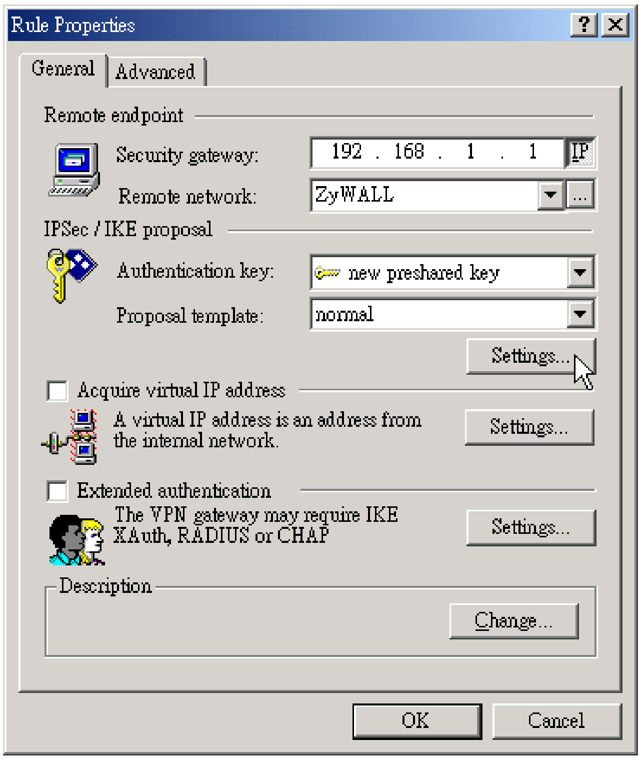
Authentication key: dean certificate

In **SSH Sentinel Policy Editor**, you will get a new VPN connection, **192.168.1.1 (ZyWALL)**, choose this item, and then press **Properties...** button.



Policy : Default

Choose **Settings** button in **Remote endpoint** section. Please uncheck the boxes of "Acquire virtual IP address" and "Extended authentication".



Security gateway: 192 . 168 . 1 . 1 IP

Remote network: ZyWALL

Authentication key: new preshared key

Proposal template: normal

☐ Acquire virtual IP address

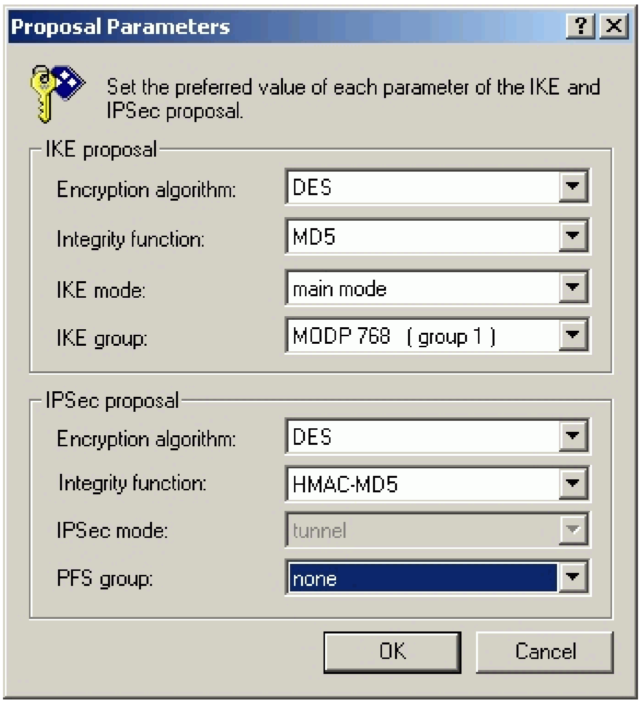
A virtual IP address is an address from the internal network.

☐ Extended authentication

The VPN gateway may require IKE XAuth, RADIUS or CHAP

Tune **IKE proposal** to Encryption algorithm as **DES**, Integrity function as **MD5**, IKE mode as **main mode**, IKE group as **MODP 768 (group 1)**, and **IPSec proposal** to

Encryption algorithm as **DES**, Integrity funciton as **HMAC-MD5**, PFS group as **none**.



Proposal Parameters

Set the preferred value of each parameter of the IKE and IPSec proposal.

IKE proposal

Encryption algorithm: DES

Integrity function: MD5

IKE mode: main mode

IKE group: MODP 768 (group 1)

IPSec proposal

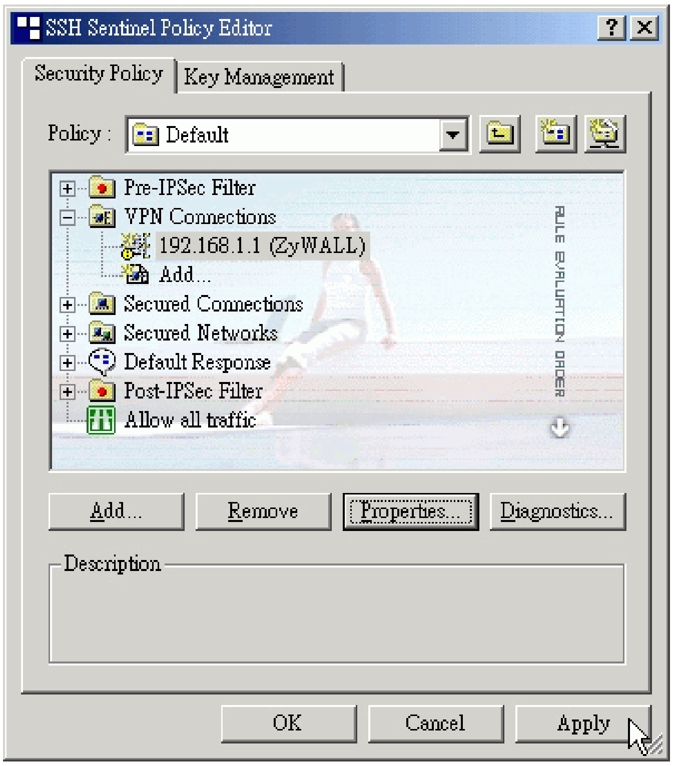
Encryption algorithm: DES

Integrity function: HMAC-MD5

IPSec mode: tunnel

PFS group: none

Press Apply to save all of the settings.



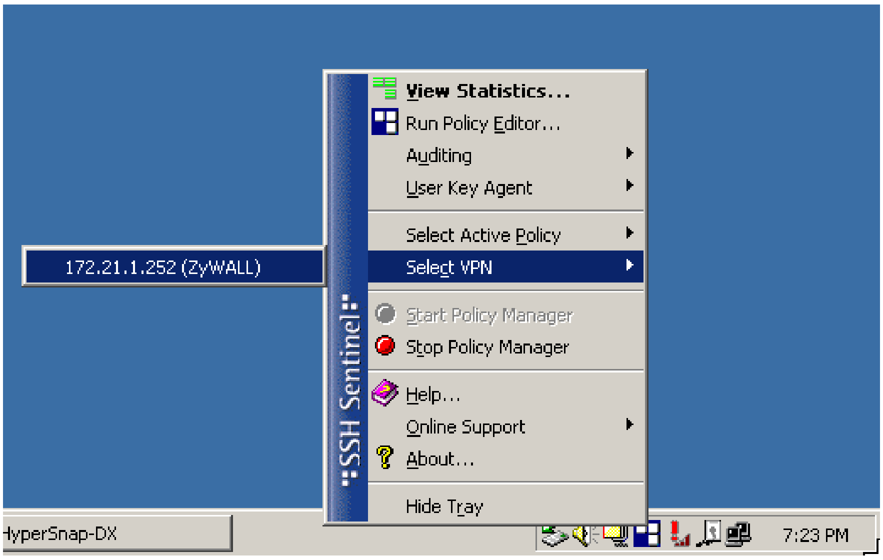
SSH Sentinel Policy Editor

Initiate VPN connection from Sentinel by selecting your VPN connection from **Select VPN** item.

Note:

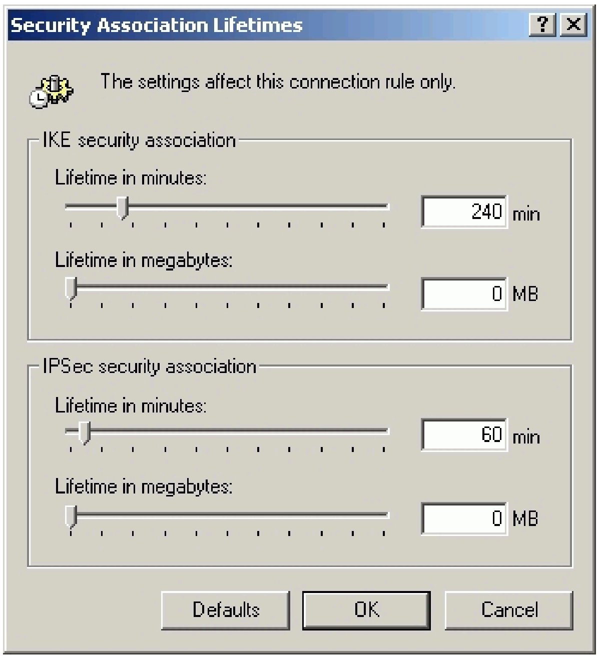
A. When building VPN between Sentinel and Prestige, the tunnel can't be initiated from Prestige side. Please always initiate the tunnel from Sentinel.

B. VPN tunnel on Sentinel can't be initiated by triggered packets (such as ping, ftp, telnet, HTTP...etc.) You can only initiate VPN tunnel by choosing "Select VPN" from SSH/Sentinel tray.



NOTE:

Please check your Prestige's release note, if your current firmware version doesn't support Mega Bytes as SA lifetime. You have to Zero your Mega Bytes setting in SA life time. Switch to **Security Policy**, the configuration page is in **<Your VPN connection>/Properties.../Advanced Tab/Settings...**



Security Association Lifetimes

The settings affect this connection rule only.

IKE security association

Lifetime in minutes: 240 min

Lifetime in megabytes: 0 MB

IPSec security association

Lifetime in minutes: 60 min

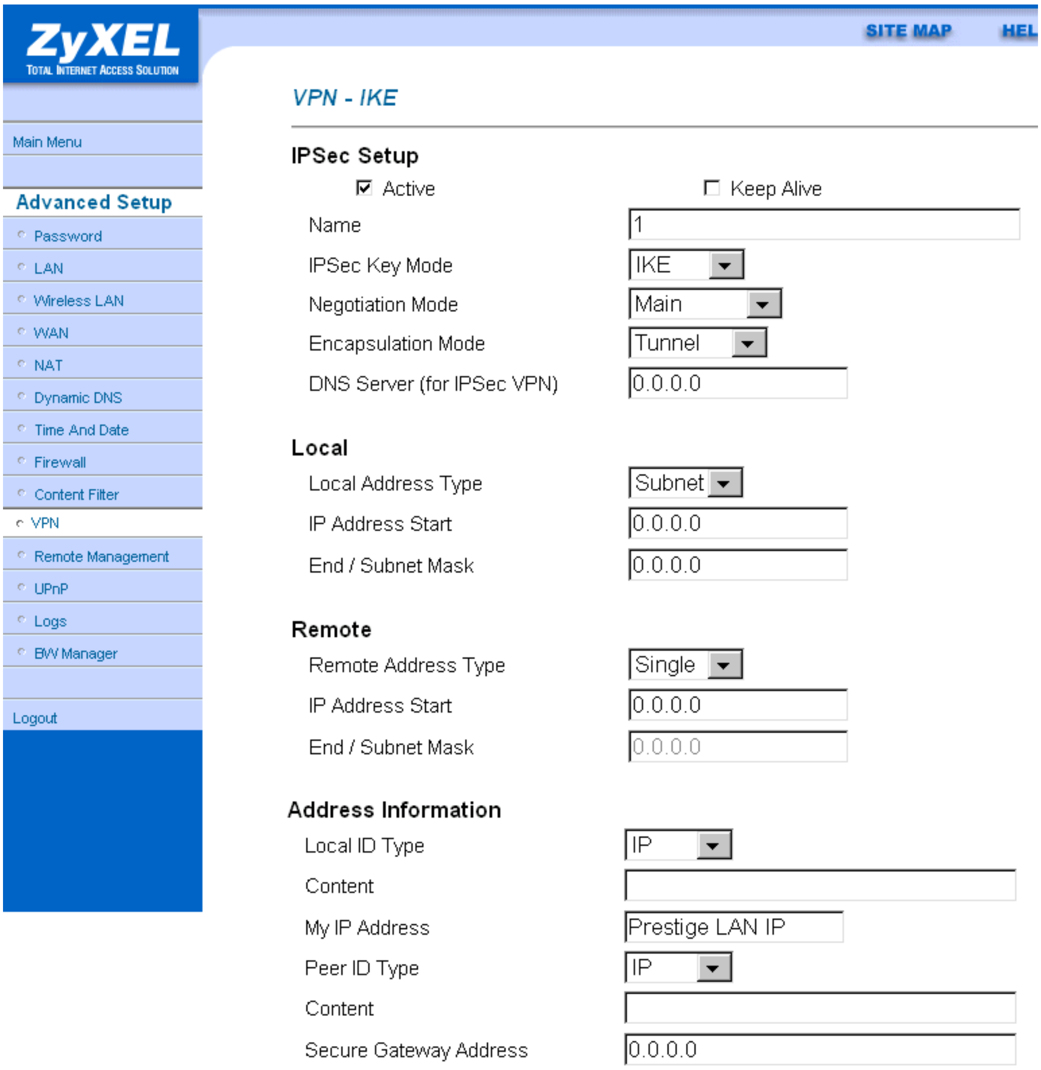
Lifetime in megabytes: 0 MB

2. Setup Prestige VPN

Using a web browser, login Prestige by giving the LAN IP address of Prestige in URL field. Default LAN IP is **192.168.1.1**, default password to login web configurator is **1234**.
Go to **Advanced -> VPN**
Select **Negotiation Mode** to **Main**, as we configured in Sentinel.
Local IP, **Address Type** is **Subnet**, **Address Start** is **0.0.0.0 End/Subnet Mask** is **0.0.0.0**
Remote IP, leave the field as **defalut**.
My IP Addr is the **LAN IP of Prestige.**
Secure Gateway IP Addr is **0.0.0.0**.
Select **Encapsulation Mode** to **Tunnel**.
Check the **ESP** check box. (AH can not be used in SUA/NAT case)
Select **Encryption Algorithm** to **DES** and **Authentication Algorithm** to **MD5**, as we configured in Sentinel.
Enter the key string **12345678** in the **Preshared Key** text box, and click **Apply**.
Press **Advanced** button to set IKE phase 1 and phase 2 parameters.
Telnet or console connect to Prestige SMT menu 24.8, and then issue this command, "**ipsec route lan on**". Please note that, if you simply issue this command in Menu 24.8, this will be lose efficacy after rebooting,
to make it function all the time, please save this command into Prestige by the following CI command in Menu 24.8,

a. please type "sys edit autoexec.net"
b. press "i", then type "**ipsec route lan on**"
c. press "x", to save the configuration.

See the VPN rule screen shot



VPN - IKE

IPSec Setup

☑ Active ☐ Keep Alive

Name	1
IPSec Key Mode	IKE
Negotiation Mode	Main
Encapsulation Mode	Tunnel
DNS Server (for IPSec VPN)	0.0.0.0

Local

Local Address Type	Subnet
IP Address Start	0.0.0.0
End / Subnet Mask	0.0.0.0

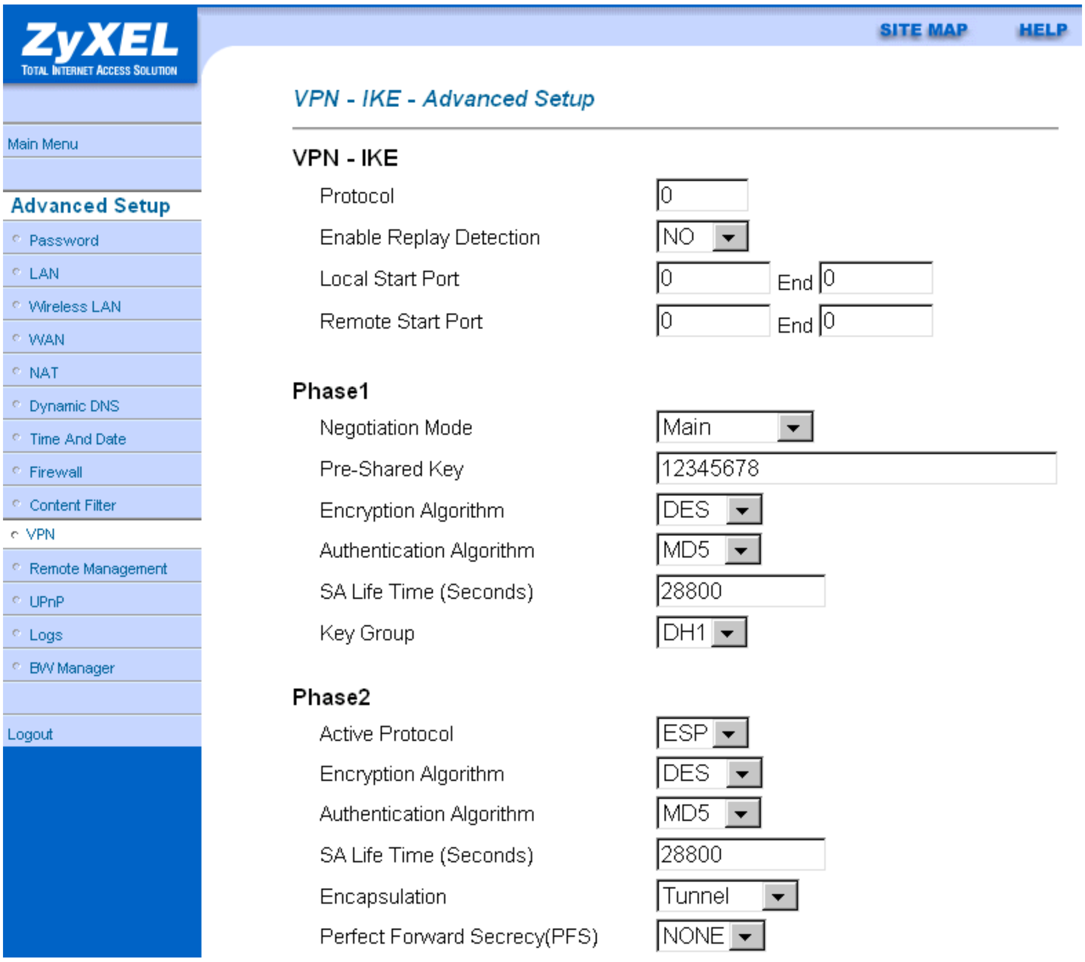
Remote

Remote Address Type	Single
IP Address Start	0.0.0.0
End / Subnet Mask	0.0.0.0

Address Information

Local ID Type	IP
Content	
My IP Address	Prestige LAN IP
Peer ID Type	IP
Content	
Secure Gateway Address	0.0.0.0

Set IKE Phase 1 and Phase 2 parameters.



VPN - IKE - Advanced Setup

VPN - IKE

Protocol	0
Enable Replay Detection	NO
Local Start Port	0 End 0
Remote Start Port	0 End 0

Phase1

Negotiation Mode	Main
Pre-Shared Key	12345678
Encryption Algorithm	DES
Authentication Algorithm	MD5
SA Life Time (Seconds)	28800
Key Group	DH1

Phase2

Active Protocol	ESP
Encryption Algorithm	DES
Authentication Algorithm	MD5
SA Life Time (Seconds)	28800
Encapsulation	Tunnel
Perfect Forward Secrecy(PFS)	NONE

7. Configure 802.1x and WPA

What is the WPA Functionality?
Configuration for Access Point
Configuration for your PC

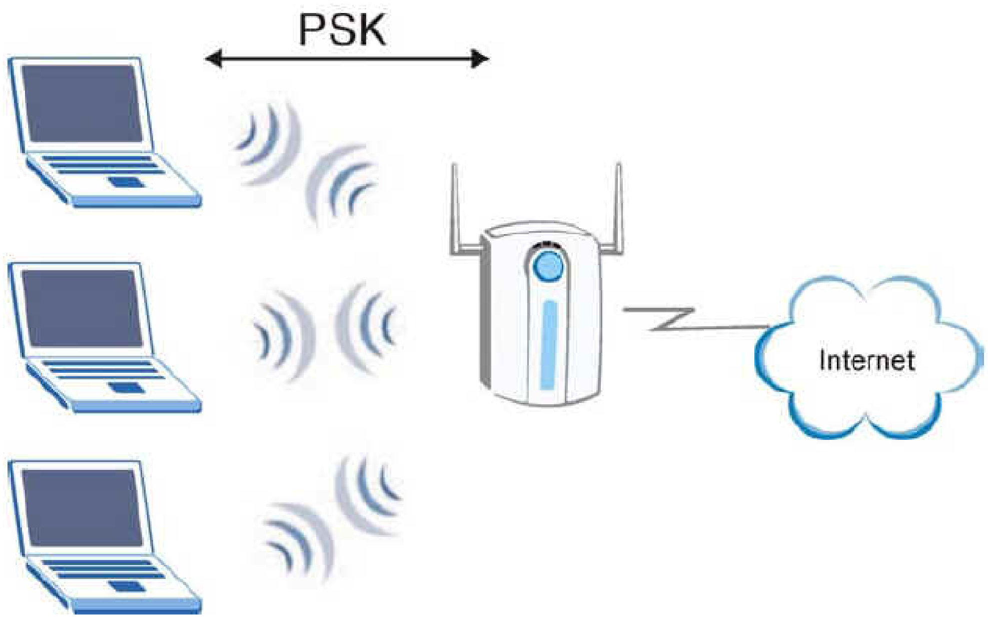
What is WPA Functionality?

Wi-Fi Protected Access (WPA) is a subset of the IEEE 802.11i security specification draft. Key differences between WAP and WEP are user authentication and improved data encryption WAP applies IEEE 802.1x Extensible Authentication Protocol (EAP) to authenticate wireless clients using an external RADIUS database. You can not use the 662's local user database for WPA authentication purpose since the local user database uses MD5 EAP which can not to generate keys.

WPA improves data encryption by using Temporal Key Integrity Protocol (TKIP), Message Integrity Check and IEEE 802.1x. Temporal Key Integrity Protocol uses 128-bits keys that are dynamically generated and distributed by the authentication server. It includes a per-packet key mixing function, a Message Integrity Check (MIC) named Michael, an extend initialization vector (IV) with sequencing rules and a re-keying mechanism.

If you do not have an external RADIUS, server, you should use WPA-PSK (WPA Pre-Share Key) that only requires a single (identical) password entered into each access point, wireless gateway and wireless client. As long as the password match, a client will be granted access to a WLAN.

Here comes **WPA-PSK Application example** for your reference.



Configuration for Access point

The IEEE 802.1x standard outlines enhanced security methods for both the authentication of wireless stations and encryption key management. Authentication cabn be done using local user database internal to the P662 (authenticate up to 32 users) or an external RADIUS server for an unlimited number of users.

1. To change your P662's authentication settings, click the wireless **Wireless** link under Advanced.

2. Select **802.1x/WPA** tab.

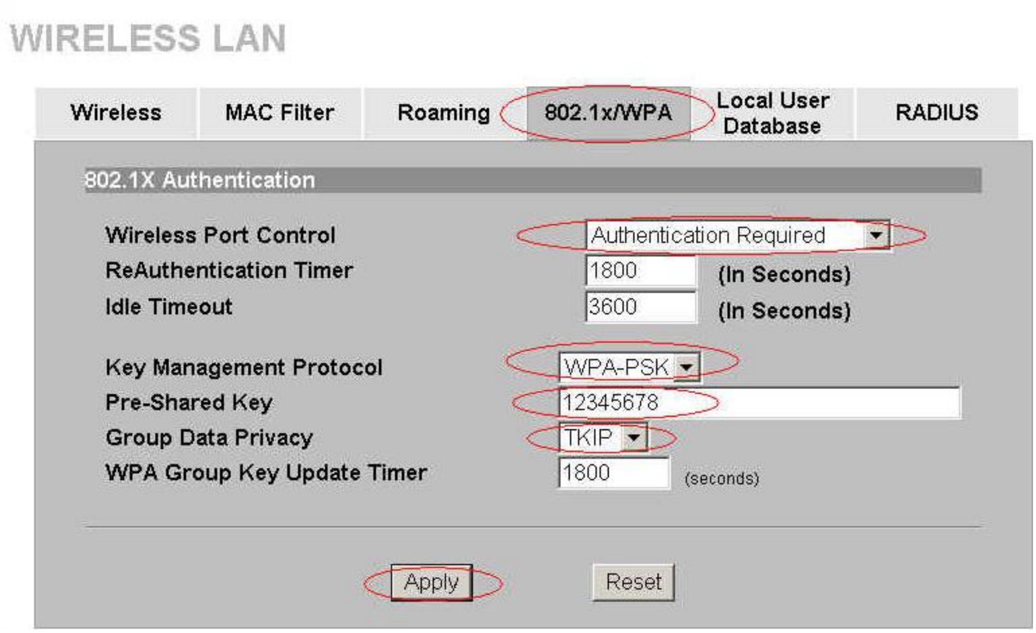
3. choose **Authentication Required** from the **Wireless Port Control.**

4. Select the **WAP-PSK** in the **Key Management Protocol** field.

5. Type the Pre Shared Key in the **Pre-Shared Key** field.

6. select **TKIP** in the **Group Data Privavy.**

7. Click **Apply** to finish.



WIRELESS LAN

802.1X Authentication

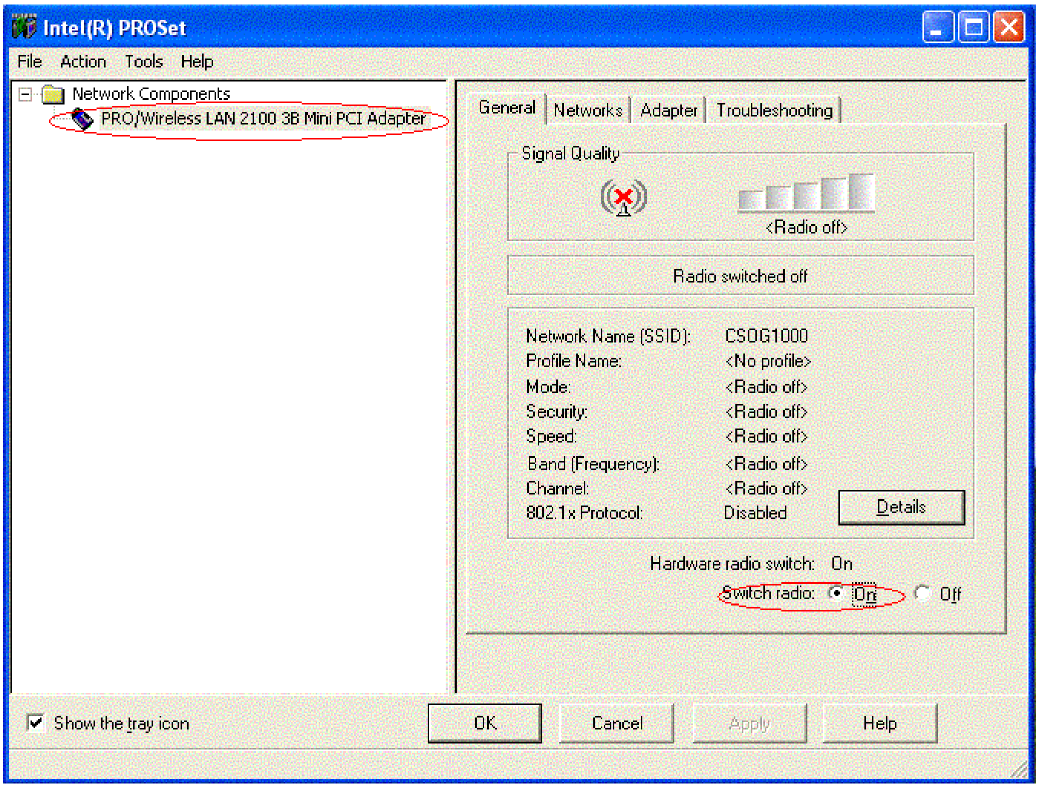
Wireless Port Control	Authentication Required	
ReAuthentication Timer	1800	(In Seconds)
Idle Timeout	3600	(In Seconds)
Key Management Protocol	WPA-PSK	
Pre-Shared Key	12345678	
Group Data Privacy	TKIP	
WPA Group Key Update Timer	1800	(seconds)

Configuration for your PC

1. Double click on your wireless utility icon(here is the Centrion on Windows XP) in your windows task bar the utility will pop up on your windows screen.

2. Select the **wireless card** that you want to configure.

3. Select **on** from the Switch Radio.



<Radio off>

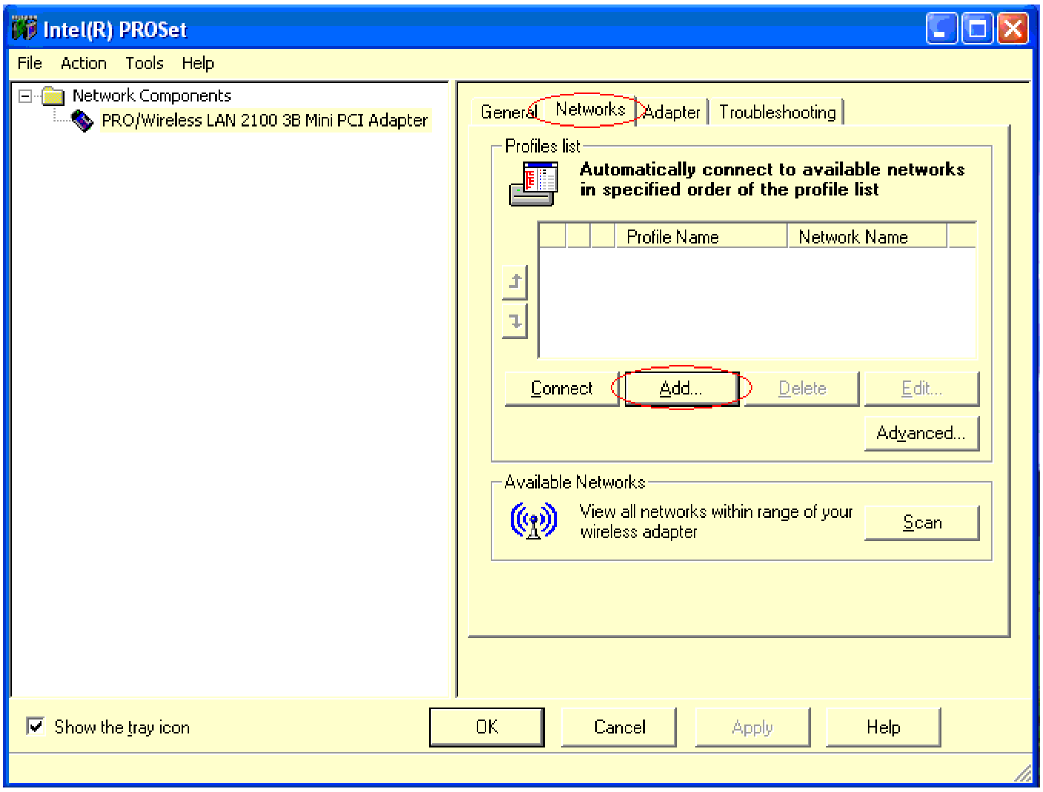
Radio switched off

Network Name (SSID): CSOG1000
Profile Name: <No profile>
Mode: <Radio off>
Security: <Radio off>
Speed: <Radio off>
Band (Frequency): <Radio off>
Channel: <Radio off>
802.1x Protocol: Disabled

Hardware radio switch: On
Switch radio: ● On ○ Off

4. choose **Network** option.

5. **Add** a new wireless profile.

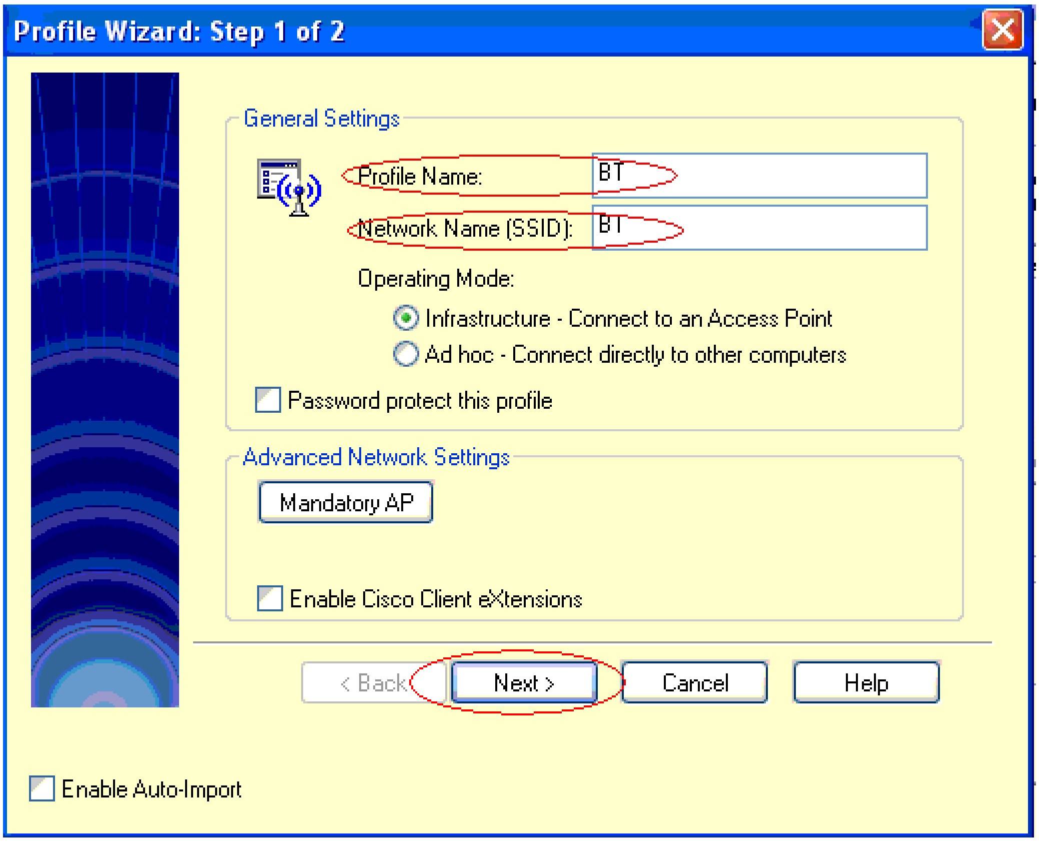


Automatically connect to available networks in specified order of the profile list

View all networks within range of your wireless adapter

6. Type the **Profile Name** and **Network Name (SSID)** in the field.

7. Click **Next** button.



Profile Wizard: Step 1 of 2

General Settings

Profile Name: BT

Network Name (SSID): BT

Operating Mode:

● Infrastructure - Connect to an Access Point

○ Ad hoc - Connect directly to other computers

□ Password protect this profile

Advanced Network Settings

□ Enable Cisco Client eXtensions

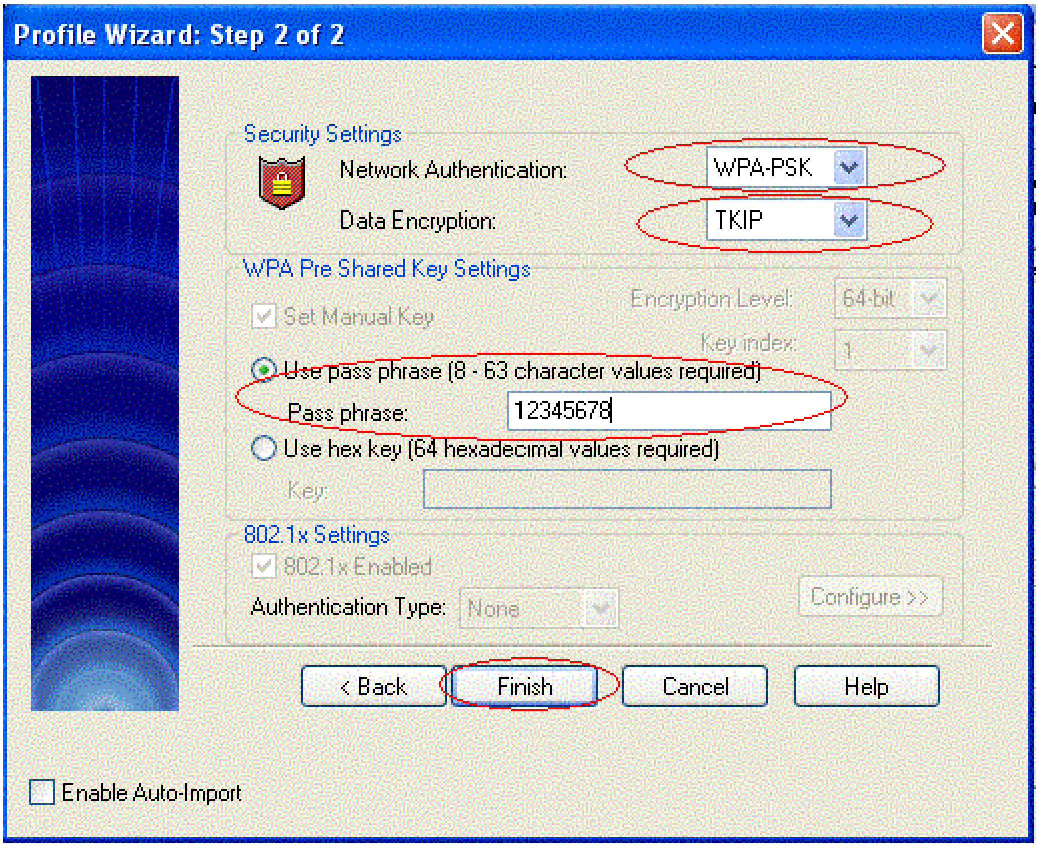
□ Enable Auto-Import

8. Select **WPA-PSK** from the **Network Authentication** field.

9. Select **TKIP** from the **Data Encryption** field.

10. Type the **Pre Share Key** (8-63 character) in the **Pass phrase** field.

11. Click **Finish** to exit the **Profile Wizard** screen.



Profile Wizard: Step 2 of 2

Security Settings

Network Authentication: WPA-PSK

Data Encryption: TKIP

WPA Pre Shared Key Settings

☑ Set Manual Key

Encryption Level: 64-bit

Key index: 1

● Use pass phrase (8 - 63 character values required)

Pass phrase: 12345678

○ Use hex key (64 hexadecimal values required)

Key:

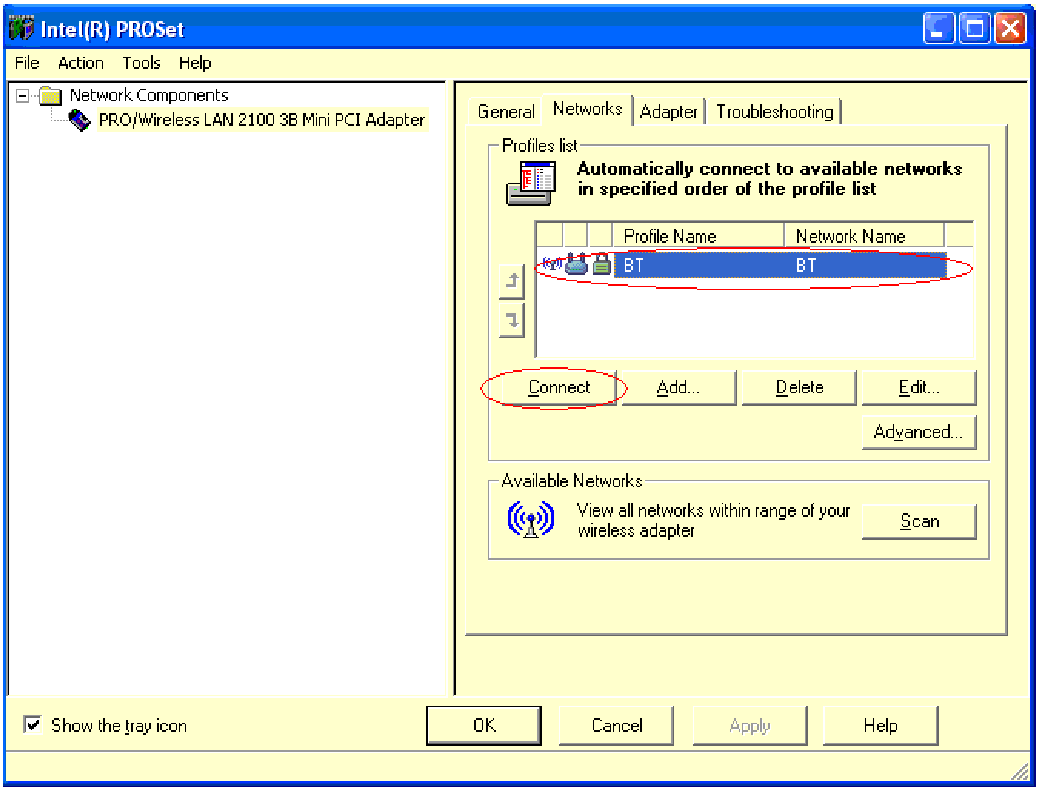
802.1x Settings

☑ 802.1x Enabled

Authentication Type: None

□ Enable Auto-Import

12. After you finished the profile settings, choose the profile you configured. Then, click **Connect** button to associate with the Access Point.



Intel(R) PROSet

Profiles list

Automatically connect to available networks in specified order of the profile list

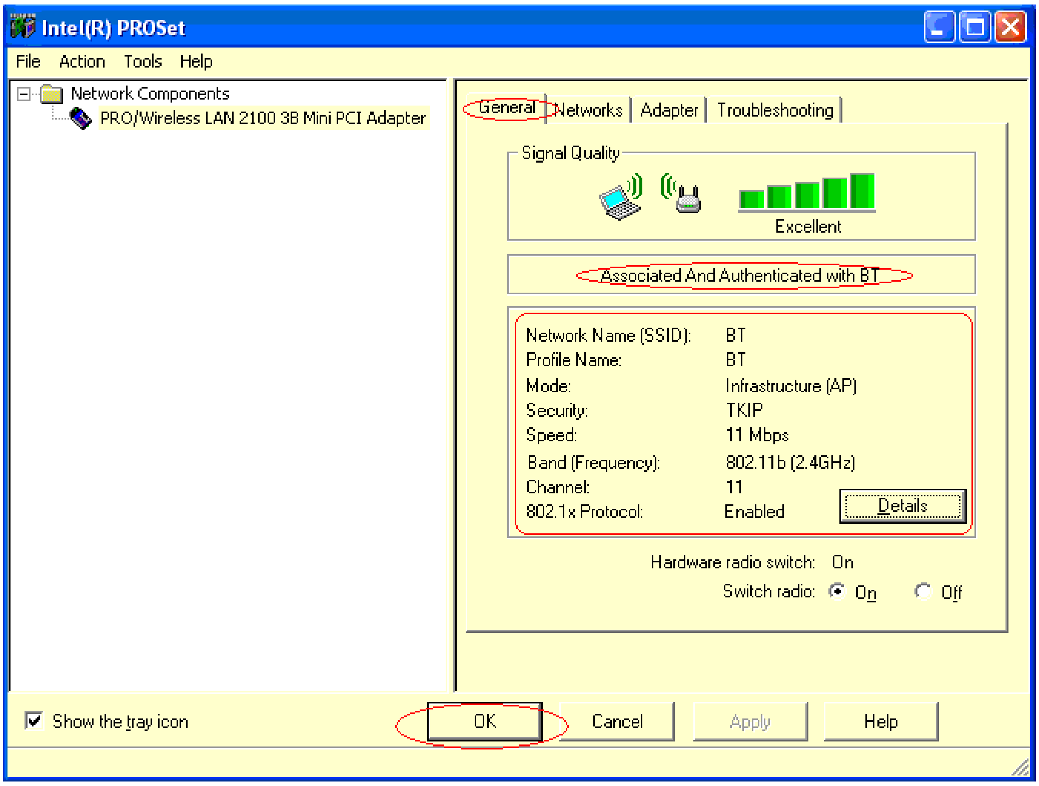
Profile Name	Network Name
BT	BT

Available Networks

View all networks within range of your wireless adapter

☑ Show the tray icon

13. Click the General option, we will see the following information, that means the PC associated and authenticated with AP successfully.



Associated And Authenticated with BT

Network Name (SSID):	BT
Profile Name:	BT
Mode:	Infrastructure (AP)
Security:	TKIP
Speed:	11 Mbps
Band (Frequency):	802.11b (2.4GHz)
Channel:	11
802.1x Protocol:	Enabled

Hardware radio switch: On

Switch radio: ● On ○ Off

☑ Show the tray icon

Support Tool

1. LAN/WAN Packet Trace

The Prestige packet trace records and analyzes packets running on LAN and WAN interfaces. It is designed for users with technical backgrounds who are interested in the details of the packet flow on LAN or WAN end of Prestige. It is also very helpful for diagnostics if you have compatibility problems with your ISP or if you want to know the details of a packet for configuring a filter rule.

The format of the display is as following:

Packet:

```
0    11880.160 ENET0-R[0062] TCP 192.168.1.2:1108->192.31.7.130:80
```

[index] [timer/second][channel-receive/transmit][length]   [protocol] [sourceIP/port] [destIP/port]

There are two ways to dump the trace:

- **Online Trace**--display the trace real time on screen
- **Offline Trace**--capture the trace first and display later

The details for capturing the trace in SMT menu 24.8 are as follows.

Online Trace

- Trace LAN packet
- Trace WAN packet

1. Trace LAN packet

- Disable to capture the WAN packet by entering: **sys trcp channel mpoa00 none**
- Enable to capture the LAN packet by entering: **sys trcp channel enet0 bothway**
- Enable the trace log by entering: **sys trcp sw on** & **sys trcl sw on**
- Display the brief trace online by entering: **sys trcd brief**
- Display the detailed trace online by entering: **sys trcd parse**

Example:

```
P-660> sys trcp channel mpoa00 none
P-660> sys trcp channel enet0 bothway
```

```
P-660> sys trcp sw on
P-660> sys trcl sw on
P-660> sys trcd brief
   0    11880.160 ENET0-R[0062] TCP 192.168.1.2:1108->192.31.7.130:80
   1    11883.100 ENET0-R[0062] TCP 192.168.1.2:1108->192.31.7.130:80
   2    11883.330 ENET0-T[0058] TCP 192.31.7.130:80->192.168.1.2:1108
   3    11883.340 ENET0-R[0060] TCP 192.168.1.2:1108->192.31.7.130:80
   4    11883.340 ENET0-R[0339] TCP 192.168.1.2:1108->192.31.7.130:80
   5    11883.610 ENET0-T[0054] TCP 192.31.7.130:80->192.168.1.2:1108
   6    11883.620 ENET0-T[0102] TCP 192.31.7.130:80->192.168.1.2:1108
   7    11883.630 ENET0-T[0054] TCP 192.31.7.130:80->192.168.1.2:1108
   8    11883.630 ENET0-R[0060] TCP 192.168.1.2:1108->192.31.7.130:80
   9    11883.650 ENET0-R[0060] TCP 192.168.1.2:1108->192.31.7.130:80
  10    11883.650 ENET0-R[0062] TCP 192.168.1.2:1109->192.31.7.130:80
P-660> sys trcd parse
---<0000>----------------------------------------------------------------
LAN Frame: ENET0-RECV    Size:   62/   62    Time: 12089.790 sec
Frame Type: TCP 192.168.1.2:1116->192.31.7.130:80

  Ethernet Header:
    Destination MAC Addr      = 00A0C5921311
    Source MAC Addr           = 0080C84CEA63
    Network Type              = 0x0800 (TCP/IP)

  IP Header:
    IP Version                = 4
    Header Length             = 20
    Type of Service           = 0x00 (0)
    Total Length              = 0x0030 (48)
    Idetification             = 0x330B (13067)
    Flags                     = 0x02
    Fragment Offset           = 0x00
    Time to Live              = 0x80 (128)
    Protocol                  = 0x06 (TCP)
    Header Checksum           = 0x3E71 (15985)
    Source IP                 = 0xC0A80102 (192.168.1.2)
    Destination IP            = 0xC01F0782 (192.31.7.130)

  TCP Header:
    Source Port               = 0x045C (1116)
    Destination Port          = 0x0050 (80)
    Sequence Number           = 0x00BD15A7 (12391847)
    Ack Number                = 0x00000000 (0)
    Header Length             = 28
    Flags                 = 0x02 (....S.)
    Window Size             = 0x2000 (8192)
    Checksum               = 0xBEC3 (48835)
    Urgent Ptr             = 0x0000 (0)
    Options               =
      0000: 02 04 05 B4 01 01 04 02

  RAW DATA:
  0000: 00 A0 C5 92 13 11 00 80-C8 4C EA 63 08 00 45 00   .........L.c..E.
  0010: 00 30 33 0B 40 00 80 06-3E 71 C0 A8 01 02 C0 1F   .03.@...>q......
  0020: 07 82 04 5C 00 50 00 BD-15 A7 00 00 00 00 70 02   ...\.P........p.
  0030: 20 00 BE C3 00 00 02 04-05 B4 01 01 04 02         .............
---<0001>------------------------------------------------------------------
LAN Frame: ENET0-XMIT    Size:   58/   58    Time: 12090.020 sec
Frame Type: TCP 192.31.7.130:80->192.168.1.2:1116

  Ethernet Header:
    Destination MAC Addr      = 0080C84CEA63
    Source MAC Addr          = 00A0C5921311
    Network Type            = 0x0800 (TCP/IP)

  IP Header:
    IP Version             = 4
    Header Length           = 20
    Type of Service          = 0x00 (0)
    Total Length            = 0x002C (44)
    Idetification           = 0x57F3 (22515)
    Flags                 = 0x02
    Fragment Offset          = 0x00
    Time to Live            = 0xED (237)
    Protocol              = 0x06 (TCP)
    Header Checksum          = 0xAC8C (44172)
    Source IP              = 0xC01F0782 (192.31.7.130)
    Destination IP          = 0xC0A80102 (192.168.1.2)

  TCP Header:
    Source Port             = 0x0050 (80)
    Destination Port         = 0x045C (1116)
    Sequence Number          = 0x4AD1B57F (1255257471)
    Ack Number              = 0x00BD15A8 (12391848)
    Header Length           = 24
    Flags                 = 0x12 (.A..S.)
    Window Size             = 0xFAF0 (66040)
    Checksum               = 0xF877 (63607)
    Urgent Ptr              = 0x0000 (0)
    Options                 =
       0000: 02 04 05 B4

  RAW DATA:
  0000: 00 80 C8 4C EA 63 00 A0-C5 92 13 11 08 00 45 00   ...L.c........E.
  0010: 00 2C 57 F3 40 00 ED 06-AC 8C C0 1F 07 82 C0 A8   .,W.@..........
  0020: 01 02 00 50 04 5C 4A D1-B5 7F 00 BD 15 A8 60 12   ...P.\J.......`.
  0030: FA F0 F8 77 00 00 02 04-05 B4                     ...w......
---<0002>-------------------------------------------------------------
LAN Frame: ENET0-RECV    Size:   60/   60    Time: 12090.210 sec
Frame Type: TCP 192.168.1.2:1116->192.31.7.130:80

  Ethernet Header:
    Destination MAC Addr      = 00A0C5921311
    Source MAC Addr           = 0080C84CEA63
    Network Type              = 0x0800 (TCP/IP)

  IP Header:
    IP Version              = 4
    Header Length           = 20
    Type of Service         = 0x00 (0)
    Total Length            = 0x0028 (40)
    Idetification           = 0x350B (13579)
    Flags                   = 0x02
    Fragment Offset         = 0x00
    Time to Live            = 0x80 (128)
    Protocol                = 0x06 (TCP)
    Header Checksum         = 0x3C79 (15481)
    Source IP               = 0xC0A80102 (192.168.1.2)
    Destination IP          = 0xC01F0782 (192.31.7.130)

  TCP Header:
    Source Port             = 0x045C (1116)
    Destination Port        = 0x0050 (80)
    Sequence Number         = 0x00BD15A8 (12391848)
    Ack Number              = 0x4AD1B580 (1255257472)
    Header Length           = 20
    Flags                   = 0x10 (.A....)
    Window Size             = 0x2238 (8760)
    Checksum                = 0xE8ED (59629)
    Urgent Ptr              = 0x0000 (0)

  TCP Data: (Length=6, Captured=6)
```

```
   0000: 20 20 20 20 20 20

 RAW DATA:
 0000: 00 A0 C5 92 13 11 00 80-C8 4C EA 63 08 00 45 00   .........L.c..E.
 0010: 00 28 35 0B 40 00 80 06-3C 79 C0 A8 01 02 C0 1F   .(5.@...<y......
 0020: 07 82 04 5C 00 50 00 BD-15 A8 4A D1 B5 80 50 10   ...\.P....J...P.
 0030: 22 38 E8 ED 00 00 20 20-20 20 20 20               "8....
```

2. Trace WAN packet

- Disable the capture of the LAN packet by entering: **sys trcp channel enet0 none**
- Enable to capture the WAN packet by entering: **sys trcp channel mpoa00 bothway**
- Enable the trace log by entering: **sys trcp sw on** & **sys trcl sw on**
- Display the brief trace online by entering: **sys trcd brief**
- Display the detailed trace online by entering: **sys trcd parse**

Example:

```
P-660> sys trcp channel enet0 none
P-660> sys trcp channel mpoa00 bothway
P-660> sys trcp sw on
P-660> sys trcl sw on
P-660> sys trcd brief
0     12367.680 MPOA00-R[0070] UDP 202.132.155.95:520->202.132.155.255:520
1     12370.980 MPOA00-T[0062] TCP 202.132.155.97:10261->192.31.7.130:80
P-660> sys trcd parse
---<0000>----------------------------------------------------------------
LAN Frame: MPOA00-RECV    Size:1181/   96    Time: 12387.260 sec
Frame Type: TCP 192.31.7.130:80->202.132.155.97:10270

  Ethernet Header:
    Destination MAC Addr      = 00A0C5921312
    Source MAC Addr           = 00A0C5012345
    Network Type              = 0x0800 (TCP/IP)

  IP Header:
    IP Version                = 4
    Header Length             = 20
    Type of Service           = 0x00 (0)
    Total Length              = 0x048B (1163)
    Idetification             = 0xB139 (45369)
    Flags                     = 0x02
    Fragment Offset           = 0x00
    Time to Live              = 0xEE (238)
    Protocol              = 0x06 (TCP)
    Header Checksum          = 0xA9AB (43435)
    Source IP             = 0xC01F0782 (192.31.7.130)
    Destination IP          = 0xCA849B61 (202.132.155.97)

  TCP Header:
    Source Port            = 0x0050 (80)
    Destination Port         = 0x281E (10270)
    Sequence Number          = 0xD3E95985 (3555285381)
    Ack Number              = 0x00C18F63 (12685155)
    Header Length           = 20
    Flags                = 0x19 (.AP..F)
    Window Size             = 0xFAF0 (66040)
    Checksum               = 0x3735 (14133)
    Urgent Ptr             = 0x0000 (0)

  TCP Data: (Length=1127, Captured=42)
  0000: DF 33 AF 62 58 37 52 3D-79 99 A5 3C 2B 59 E2 78   .3.bX7R=y..<+Y.x
  0010: A7 98 8F 3F A9 09 E4 0F-26 14 9C 58 3E 95 3E E7   ...?....&..X>.>.
  0020: FC 2A 4C 2F FB BE 2F FE-EF D0                     .*L/../...

  RAW DATA:
  0000: 00 A0 C5 92 13 12 00 A0-C5 01 23 45 08 00 45 00   ..........#E..E.
  0010: 04 8B B1 39 40 00 EE 06-A9 AB C0 1F 07 82 CA 84   ...9@..........
  0020: 9B 61 00 50 28 1E D3 E9-59 85 00 C1 8F 63 50 19   .a.P(...Y....cP.
  0030: FA F0 37 35 00 00 DF 33-AF 62 58 37 52 3D 79 99   ..75...3.bX7R=y.
  0040: A5 3C 2B 59 E2 78 A7 98-8F 3F A9 09 E4 0F 26 14   .<+Y.x...?....&.
  0050: 9C 58 3E 95 3E E7 FC 2A-4C 2F FB BE 2F FE EF D0   .X>.>..*L/../...
```

Offline Trace

- Disable the capture of the WAN packet by entering: **sys trcp channel mpoa00 none**
- Enable the capture of the LAN packet by entering: **sys trcp channel enet0 bothway**
- Enable the trace log by entering: **sys trcp sw on** & **sys trcl sw on**
- Wait for packet passing through the Prestige over LAN
- Disable the trace log by entering: **sys trcp sw off** & **sys trcl sw off**
- Display the trace briefly by entering: **sys trcp brief**
- Display specific packets by using: **sys trcp parse <from_index> <to_index>**

2. Firmware/Configurations Uploading and Downloading using TFTP

- Using TFTP client software
- Using TFTP command on Windows NT
- Using TFTP command on UNIX

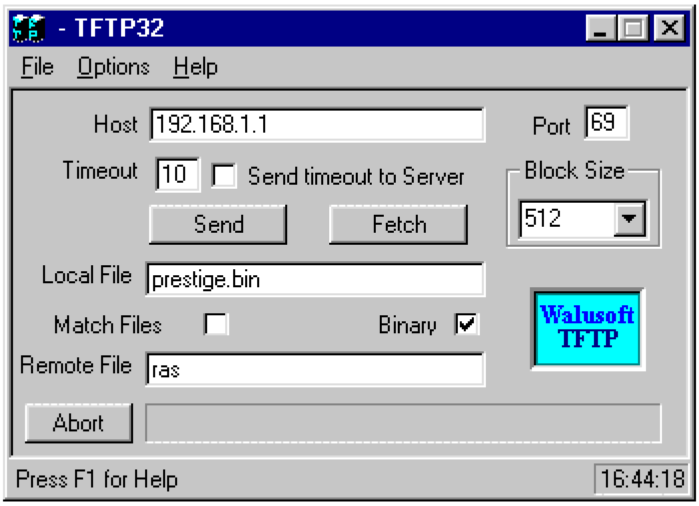
Using TFTP client software

- Upload/download ZyNOS via LAN
- Upload/download SMT configurations via LAN

Using TFTP to upload/download ZyNOS via LAN

- TELNET to your Prestige first before running the TFTP software
- Type the CI command **'sys stdio 0'** to disable console idle timeout in Menu 24.8 and stay in Menu 24.8
- Run the TFTP client software
- Enter the IP address of the Prestige
- To upload the firmware, please save the remote file as **'ras'** to Prestige. After the transfer is complete, the Prestige will program the upgraded firmware into FLASH ROM and reboot itself.

An example:



Host 192.168.1.1 Port 69

Timeout 10 □ Send timeout to Server

Block Size 512

Local File prestige.bin

Match Files □ Binary ☑

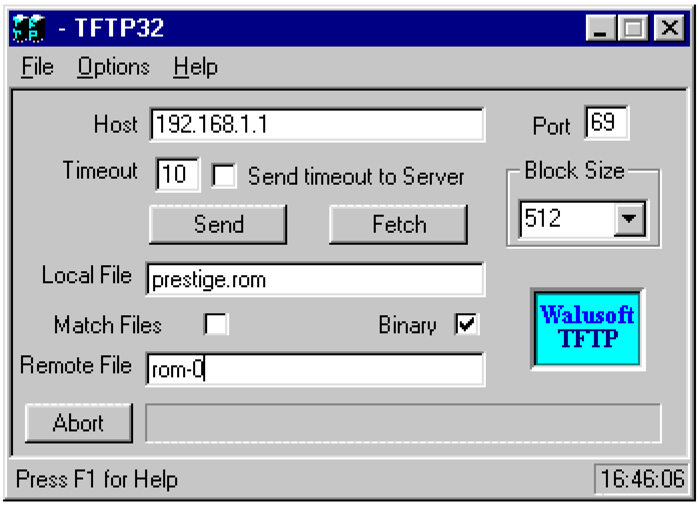
Remote File ras

The 192.168.1.1 is the IP address of the Prestige. The local file is the source file of the ZyNOS firmware that is available in your hard disk. The remote file is the file name that will be saved in Prestige. Check the port number 69 and 512-Octet blocks for TFTP. Check **'Binary'** mode for file transfering.

Using TFTP to upload/download SMT configurations via LAN

- TELNET to your Prestige first before running the TFTP software
- Type the CI command **'sys stdio 0'** to disable console idle timeout in Menu 24.8 and stay in Menu 24.8
- Run the TFTP client software
- To download the SMT configuration, please get the remote file **'rom-0'** from the Prestige.
- To upload the SMT configuration, please save the remote file as **'rom-0'** in the Prestige.

An example:



Host 192.168.1.1

Port 69

Timeout 10 ☐ Send timeout to Server

Block Size 512

Local File prestige.rom

Match Files ☐ Binary ☑

Remote File rom-0

- The 192.168.1.1 is the IP address of the Prestige.
- The local file is the source file of your configuration file that is available in your hard disk.
- The remote file is the file name that will be saved in Prestige.
- Check the port number 69 and 512-Octet blocks for TFTP.
- Check 'Binary' mode for file transfering.

Using TFTP command on Windows NT

Before you begin:

1. TELNET to your Prestige first before using TFTP command
2. Type the CI command **'sys stdio 0'** to disable console idle timeout in Menu 24.8 and stay in Menu 24.8

- **Download ZyNOS via LAN**

```
c:\tftp -i [PrestigeIP] get ras [localfile]
```

- **Upload SMT configurations via LAN**

```
c:\tftp -i [PrestigeIP] put [localfile] rom-0
```

- **Download SMT configurations via LAN**

```
c:\tftp -i [PrestigeIP] get rom-0 [localfile]
```

Using TFTP command on UNIX

Before you begin:

1. TELNET to your Prestige first before using TFTP command
2. Type the CI command **'sys stdio 0'** to disable console idle timeout in Menu 24.8 and stay in Menu 24.8

Example:

```
[cppwu@faelinux cppwu]$ telnet 192.168.1.1
Trying 192.168.1.1...
Connected to 192.168.1.1.
Escape character is '^]'.
Password: ****
             Copyright (c) 1994 – 2005 ZyXEL Communications Corp.
                    Prestige 660 Main Menu
     Getting Started                Advanced Management
     1. General Setup                21. Filter Set Configuration
     3. Ethernet Setup               22. SNMP Configuration
     4. Internet Access Setup        23. System Password
                                     24. System Maintenance
    Advanced Applications
     11. Remote Node Setup
     12. Static Routing Setup
     15. SUA Server Setup               99. Exit



                 Enter Menu Selection Number: 24
```

```
            Menu 24 - System Maintenance

               1.  System Status
               2.  System Information and Console Port Speed
               3.  Log and Trace
               4.  Diagnostic
               5.  Backup Configuration
               6.  Restore Configuration
               7.  Firmware Update
               8.  Command Interpreter Mode

            Enter Menu Selection Number: 8

Copyright (c) 1994-2005    ZyXEL Communications Corp.
ras> sys stdio 0
(Open a new window)
[cppwu@faelinux cppwu]$ tftp -I 192.168.1.1 get rom-0 [local-rom] <- change to binary mode

<- download configurations

[cppwu@faelinux cppwu]$ tftp -I 192.168.1.1 put [local-rom] rom-0 <- upload configurations

[cppwu@faelinux cppwu]$ tftp -I 192.168.1.1 get ras [local-ras ] <- download firmware

[cppwu@faelinux cppwu]$ tftp -I 192.168.1.1 put [local-ras] ras <- upload firmware
```

3. Using FTP to Upload the Firmware and Configuration Files

In addition to upload the firmware and configuration file via the console port and TFTP client, you can also upload the firmware and configuration files to the Prestige using FTP.

To use this feature, your workstation must have a FTP client software. There are two examples as shown below.

- Using FTP command in terminal
- Using FTP client software

Using FTP command in terminal

Step 1	Use FTP client from your workstation to connect to the Prestige by entering

	the IP address of the Prestige.
Step2	Press **'Enter'** key to ignore the username, because the Prestige does not check the username.
Step 3	Enter the SMT password as the FTP login password, the default is **'1234**'.
Step 4	Enter command **'bin'** to set the transfer type to binary.
Step 5	Use **'put'** command to transfer the file to the Prestige.

Note: The remote file name for the firmware is **'ras'** and for the configuration file is **'rom-0'** (rom-zero, not capital o).

Example:

```
C:\temp>ftp 192.168.1.1
Connected to 192.168.1.1
220 FTP version 1.0 ready at Thu Jan 1 00:02:09 1970
User (192.168.1.1:(none)):   <Enter>
331 Enter PASS command
Password:****
230 Logged in
ftp> bin
200 Type I OK
ftp> put prestige.bin ras
200 Port command okay
150 Opening data connection for STOR ras
226 File received OK
ftp: 924512 bytes sent in 4.83Seconds 191.41Kbytes/sec.
ftp>
```

Here, the **'prestige.bin'** is the local file and **'ras'** is the remote file that will be saved in the Prestige.

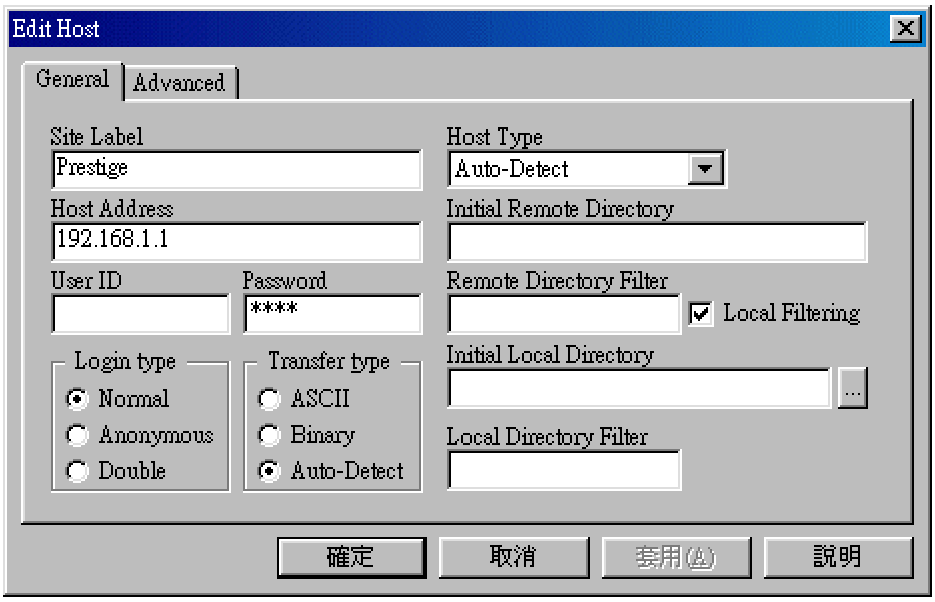
The Prestige reboots automatically after the uploading is finished.

Using FTP client software

Step 1	Rename the local firmware and configuration files to **'ras'** and **'rom-0'**, because we can not specify the remote file name in the FTP client software.
Step 2	Use FTP client from your workstation to connect to the Prestige by entering the IP address of the Prestige.
Step 3	Enter the SMT password as the FTP login password. The default is **'1234'**.
Step 4	Press **'OK'** key to ignore the username, because the Prestige does not check the username.

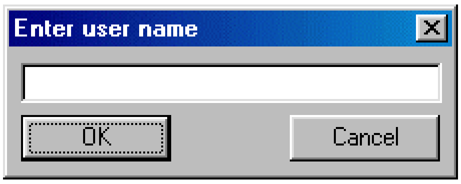
Example:

1. Connect to the Prestige by entering the Prestige's IP and SMT password in the FTP software. Set the transfer type to '**Auto-Detect**' or '**Binary**'.



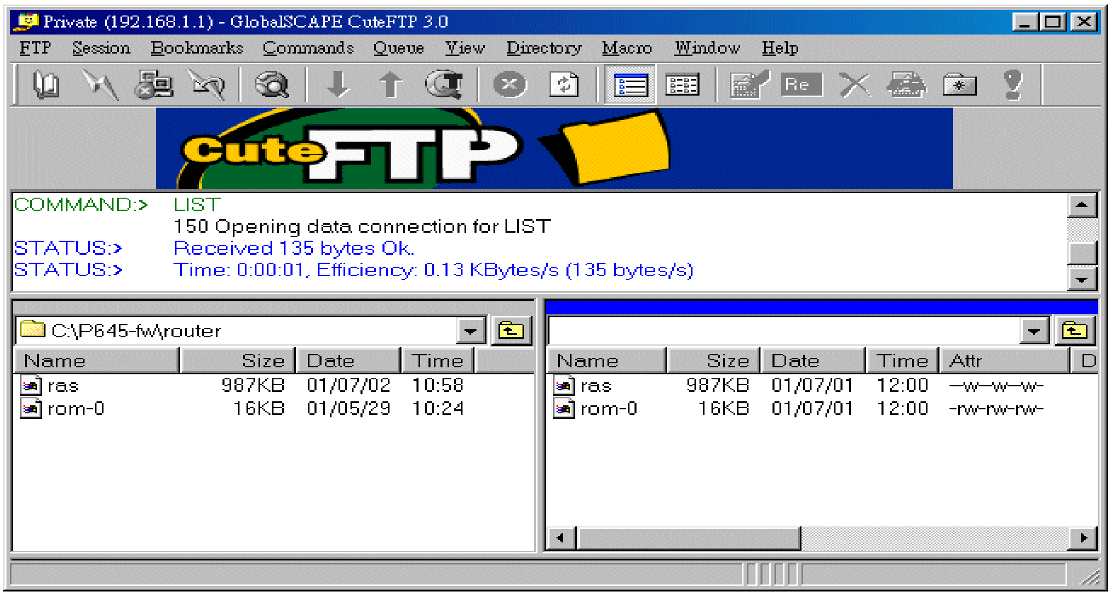
Site Label: Prestige
Host Type: Auto-Detect
Host Address: 192.168.1.1
Initial Remote Directory:
User ID:
Password: ****
Remote Directory Filter:
☑ Local Filtering
Login type: ● Normal ○ Anonymous ○ Double
Transfer type: ○ ASCII ○ Binary ● Auto-Detect
Initial Local Directory:
Local Directory Filter:

2. Press '**OK**' to ignore the 'Username' prompt.



3. To upload the firmware file, we transfer the local '**ras**' file to overwrite the remote '**ras**' file.

To upload the configuration file, we transfer the local '**rom-0**' to overwrite the remote **'rom-0'** file.


Private (192.168.1.1) - GlobalSCAPE CuteFTP 3.0
FTP Session Bookmarks Commands Queue View Directory Macro Window Help
CuteFTP

```
COMMAND:>   LIST
            150 Opening data connection for LIST
STATUS:>    Received 135 bytes Ok.
STATUS:>    Time: 0:00:01, Efficiency: 0.13 KBytes/s (135 bytes/s)
```

C:\P645-fw\router

Name	Size	Date	Time
ras	987KB	01/07/02	10:58
rom-0	16KB	01/05/29	10:24

Name	Size	Date	Time	Attr
ras	987KB	01/07/01	12:00	-w--w--w-
rom-0	16KB	01/07/01	12:00	-rw-rw-rw-

4. The Prestige reboots automatically after the uploading is finished. Please do not power off the router at this moment.

CI Command Reference

Command Syntax and General User Interface

CI has the following command syntax:

command <*iface* | *device* > **subcommand** [*param*]
command subcommand [*param*]
command ? | help
command subcommand ? | help

General user interface:

1.	**?**	Shows the following commands and all major (sub)commands
2.	**exit**	Returns to SMT

1. System Related Commands

[ch-name]: enet0, mpoa00

Command				Description
sys				
	adjtime			retrive date and time from Internet
	cbuf			
		display	[a|f|u]	display cbuf a: all f: free u: used
		cnt		cbuf static
			display	display cbuf static
			clear	clear cbuf static
	baud		<1..5>	change console speed
	callhist			
		display		display call history
		remove	<index>	remove entry from call history
	clear			clear the counters in GUI status menu
	countrycode		[countrycode]	set country code
	date		[year month date]	set/display date
	domainname			display domain name
	edit		<filename>	edit a text file

	enhanced			return OK if commands are supported for PWC purposes
	errctl		[level]	set the error control level 0:crash no save,not in debug mode (default) 1:crash no save,in debug mode 2:crash save,not in debug mode 3:crash save,in debug mode
	event			
		display		display tag flags information
		trace		display system event information
			display	display trace event
			clear <num>	clear trace event
	extraphnum			maintain extra phone numbers for outcalls
		add	<set 1-3> <1st phone num> [2nd phone num]	add extra phone numbers
		display		display extra phone numbers
		node	<num>	set all extend phone number to remote node <num>
		remove	<set 1-3>	remove extra phone numbers
		reset		reset flag and mask
	feature			display feature bit
	fid			
		display		display function id list
	firmware			display ISDN firmware type
	hostname		[hostname]	display system hostname
	iface			
		disp	[#]	display iface list
	isr		[all|used|free]	display interrupt service routine
	interrupt			display interrupt

				status
	logs			
		category		
			access [0:none/1:log]	record the access control logs
			attack [0:none/1:log/2:alert/3:both]	record and alert the firewall attack logs
			display	display the category setting
			error [0:none/1:log/2:alert/3:both]	record and alert the system error logs
			ipsec [0:none/1:log]	record the access control logs
			mten [0:none/1:log]	record the system maintenance logs
			upnp [0:none/1:log]	record upnp logs
			urlblocked [0:none/1:log/2:alert/3:both]	record and alert the web blocked logs
			urlforward [0:none/1:log]	record web forward logs
		clear		clear log
		display		display all logs
		errlog		
			clear	display log error
			disp	clear log error
			online	turn on/off error log online display
		load		load the log setting buffer
		mail		
			alertAddr [mail address]	send alerts to this mail address
			display	display mail setting
			logAddr [mail address]	send logs to this mail address
			schedule display	display mail schedule
			schedule hour [0-23]	hour time to send the logs
			schedule minute [0-59]	minute time to send the logs
			schedule policy [0:full/1:hourly/2:daily/3:weekly/4:none]	mail schedule policy

			schedule week [0:sun/1:mon/2:tue/3:wed/4:thu/5:fri/6:sat]	weekly time to send the logs
			server [domainName/IP]	mail server to send the logs
			subject [mail subject]	mail subject
		save		save the log setting buffer
		syslog		
			active [0:no/1:yes]	active to enable unix syslog
			display	display syslog setting
			facility [Local ID(1-7)]	log the messages to different files
			server [domainName/IP]	syslog server to send the logs
	mbuf			
		cnt		
			disp	display system mbuf count
			clear	clear system mbuf count
		link	link	list system mbuf link
		pool	<id> [type]	list system mbuf pool
		status		display system mbuf status
		disp	<address>	display mbuf status
		debug	[on|off]	
	memory		<address> <length>	display memory content
	memwrite		<address> <len> [data list ...]	write some data to memory at <address>
	memwl		<address>	write long word to memory at <address>
	memrl		<address>	read long word at <address>
	memutil			
		usage		display memory allocate and heap status
		mqueue	<address> <len>	display memory queues
		mcell	mid [f|u]	display memory cells by given ID

		msecs	[a|f|u]	display memory sections
		mtstart	<n-mcell>	start memory test
		mtstop		stop memory test
		mtalloc	<size> [n-mcell]	allocate memory for testing
		mtfree	<start-idx> [end-idx]	free the test memory
	model			display server model name
	proc			
		display		display all process information
		stack	[tag]	display process's stack by a give TAG
		pstatus		display process's status by a give TAG
	queue			
		display	[a|f|u] [start#] [end#]	display queue by given status and range numbers
		ndisp	[qid]	display a queue by a given number
	quit			quit CI command mode
	reboot		[code]	reboot system code = 0 cold boot, = 1 immediately boot = 2 bootModule debug mode
	reslog			
		disp		display resources trace
		clear		clear resources trace
	stdio		[second]	change terminal timeout value
	time		[hour [min [sec]]]	display/set system time
	timer			
		disp		display timer cell
		trace	[on|off]	set/display timer information online
		start	[tmValue]	start a timer
		stop	<ID>	stop a timer
	trcdisp			monitor packets

	trclog			
		switch	[on|off]	set system trace log
		online	[on|off]	set on/off trace log online
		level	[level]	set trace level of trace log #:1-10
		type	<bitmap>	set trace type of trace log
		disp		display trace log
		clear		clear trace
		call		display call event
		encapmask	[mask]	set/display tracelog encapsulation mask
	trcpacket			
		create	<entry> <size>	create packet trace buffer
		destroy		packet trace related commands
		channel	<name> [none|incoming|outgoing|bothway]	<channel name>=enet0,sdsl00, fr0 set packet trace direction for a given channel
		string		enable smt trace log
		switch	[on|off]	turn on/off the packet trace
		disp		display packet trace
		udp		send packet trace to other system
			switch [on|off]	set tracepacket upd switch
			addr <addr>	send trace packet to remote udp address
			port <port>	set tracepacket udp port
		parse	[[start_idx], end_idx]	parse packet content
		brief		display packet content briefly
	version			display RAS code and driver version
	view		<filename>	view a text file
	wdog			

		switch	[on|off]	set on/off wdog
		cnt	[value]	display watchdog counts value: 0-34463
	romreset			restore default romfile
	server			
		access	<telnet|ftp|web|icmp|snmp|dns> <value>	set server access type
		load		load server information
		disp		display server information
		port	<telnet|ftp|web|snmp> <port>	set server port
		save		save server information
		secureip	<telnet|ftp|web|icmp|snmp|dns> <ip>	set server secure ip addr
	spt			
		dump		dump spt raw data
			root	dump spt root data
			rn	dump spt remote node data
			user	dump spt user data
			slot	dump spt slot data
		save		save spt data
		size		display spt record size
		clear		clear spt data
	cmgr			
		trace		
			disp <ch-name>	show the connection trace of this channel
			clear <ch-name>	clear the connection trace of this channel
		cnt	<ch-name>	show channel connection related counter
	socket			display system socket information
	filter			
		clear		clear filter statistic counter
		disp		display filter statistic counters
		sw	[on|off]	set filter status switch
		set	<set>	display filter rule

		netbios		
			disp	display netbios filter status
			config <0:LAN to WAN, 1:WAN to LAN, 2:LAN to DMZ, 3:IPSec passthrough, 4:Trigger Dial> <on|off>	config netbios filter
	ddns			
		debug	<level>	enable/disable ddns service
		display	<iface name>	display ddns information
		restart	<iface name>	restart ddns
		logout	<iface name>	logout ddns
	cpu			
		display		display CPU utilization

2. Exit Related Commands

Command				Description
exit				exit smt menu

3. Ethernet Related Commands

<ch-name> : enet0, mpoa00

Command				Description
ether				
	config			display LAN configuration information
	driver			
		cnt		
			disp <name>	display ether driver counters
			clear <name>	clear ether driver counters
		iface	<ch_name> <num>	send driver iface
		ioctl	<ch_name>	Useless in this stage.
		mac	<ch_name> <mac_addr>	Set LAN Mac address
		reg	<ch_name>	display LAN hardware related registers
		rxmod	<ch_name> <mode>	set LAN receive mode.

				mode: 1: turn off receiving 2: receive only packets of this interface 3: mode 2+ broadcast 5: mode 2 + multicast 6: all packets
		status	<ch_name>	see LAN status
		init	<ch_name>	initialize LAN
	version			see ethernet device type
	pkttest			
		disp		
			packet <level>	set ether test packet display level
			event <ch> [on|off]	turn on/off ether test event display
		sap	[ch_name]	send sap packet
		arp	<ch_name> <ip-addr>	send arp packet to ip-addr
		mem	<addr> <data> [type]	write memory data in address
	test		<ch_id> <test_id> [arg3] [arg4]	do LAN test
	pncconfig		<ch_name>	do pnc config
	mac		<src_ch> <dest_ch> <ipaddr>	fake mac address

4. IP Related Commands

<hostid> format : xxx.xxx.xxx.xxx (ip Address)
<ether addr> format : xx:xx:xx:xx:xx:xx
<iface> : enif0, wanif0
<gw> : gateway ip address

Command				Description
ip				
	address		[addr]	display host ip address
	loopbackaddr		<IP1> [IP2]	Set loopback address.
	alias		<iface>	alias iface
	aliasdis		<0|1>	disable alias
	arp			
		status	<iface>	display ip arp status
		add	<hostid> ether <ether addr>	add arp information
		resolve	<hostid>	resolve ip-addr
		drop	<hostid> [hardware]	drop arp

		flush		flush arp table
		publish		add proxy arp
	dhcp		<iface>	
		client		
			release	release DHCP client IP
			renew	renew DHCP client IP
		mode	<server|relay|none|client>	set dhcp mode
		relay	server <serverIP>	set dicp relay server ip-addr
		reset		reset dhcp table
		server		
			probecount <num>	set dhcp probe count
			dnsserver <IP1> [IP2] [IP3]	set dns server ip-addr
			winsserver <winsIP1> [<winsIP2>]	set wins server ip-addr
			gateway <gatewayIP>	set gateway
			hostname <hostname>	set hostname
			initialize	fills in DHCP parameters and initializes (for PWC purposes)
			leasetime <period>	set dhcp leasetime
			netmask <netmask>	set dhcp netmask
			pool <startIP> <numIP>	set dhcp ip pool
			renewaltime <period>	set dhcp renew time
			rebindtime <period>	set dhcp rebind time
			reset	reset dhcp table
			server <serverIP>	set dhcp server ip for relay
			dnsorder [router|isp]	set dhcp dns order
		status	[option]	show dhcp status
		static		
			delete <num>|all	delete static dhcp mac table
			display	display static dhcp mac table
			update <num> <mac> <ip>	update static dhcp mac table
	dns			
		query		
			address <ipaddr> [timeout]	resolve ip-addr to name
			debug <num>	enable dns debug value
			name <hostname> [timeout]	resolve name to ip-addr
			status	display dns query status

			table	display dns query table
		server	<primary> [secondary] [third]	set dns server
		stats		
			clear	clear dns statistics
			disp	display dns statistics
		table		display dns table
	httpd			
		debug	[on|off]	set http debug flag
	icmp			
		echo	[on|off]	set icmp echo response flag
		data	<option>	select general data type
		status		display icmp statistic counter
		trace	[on|off]	turn on/off trace for debugging
		discovery	<iface> [on|off]	set icmp router discovery flag
	ifconfig		[iface] [ipaddr] [broadcast <addr> |mtu <value>|dynamic]	configure network interface
	ifdrop		<iface>	chaek if iface is available.
	ping		<hostid>	ping remote host
	pong		<hostid> [<size> <time-interval>]	pong remote host
	extping		<target address>	
			[-t]	Continue to send ECHO_REQ until Ctrl-C input
			[-c]	Validate the reply data
			[-d] [Data]	Data pattern. The maximum length of data is 255 characters.
			[-f]	Set DF flag.
			[-l] [Data size]	Datagram size in bytes (with 28 bytes Header).
			[-v] [TOS value]	Specify the value of TOS flag.
			[-n] [Repeat value]	The number of times to send ECHO_REQ packet.
			[-w] [Timeout value]	Specify the value of Timeout in seconds.
			[-o] [IP address/IFace]	To specify one IP address

				or interface to be the Source IP address.
			[-p] [Min MTU] [Max MTU] [Interval size]	Sweep range of sizes.
	route			
		status	[if]	display routing table
		add	<dest_addr|default>[/<bits>] <gateway> [<metric>]	add route
		addiface	<dest_addr|default>[/<bits>] <gateway> [<metric>]	add an entry to the routing table to iface
		addprivate	<dest_addr|default>[/<bits>] <gateway> [<metric>]	add private route
		drop	<host addr> [/<bits>]	drop a route
		flush		flush route table
		lookup	<addr>	find a route to the destination
		errcnt		
			disp	display routing statistic counters
			clear	clear routing statistic counters
	status			display ip statistic counters
	adjTcp		<iface> [<mss>]	adjust the TCP mss of iface
	udp			
		status		display udp status
	rip			
		accept	<gateway>	drop an entry from the RIP refuse list
		activate		enable rip
		merge	[on|off]	set RIP merge flag
		refuse	<gateway>	add an entry to the rip refuse list
		request	<addr> [port]	send rip request to some address and port
		reverse	[on|off]	RIP Poisoned Reverse
		status		display rip statistic counters
		trace		enable debug rip trace
		mode		
			<iface> in [mode]	set rip in mode
			<iface> out [mode]	set rip out mode

		dialin_user	[show|in|out|both|none]	show dialin user rip direction
	tcp			
		ceiling	[value]	TCP maximum round trip time
		floor	[value]	TCP minimum rtt
		irtt	[value]	TCP default init rtt
		kick	<tcb>	kick tcb
		limit	[value]	set tcp output window limit
		max-incomplete	[number]	Set the maximum number of TCP incomplete connection.
		mss	[value]	TCP input MSS
		reset	<tcb>	reset tcb
		rtt	<tcb> <value>	set round trip time for tcb
		status	[tcb] [<interval>]	display TCP statistic counters
		syndata	[on|off]	TCP syndata piggyback
		trace	[on|off]	turn on/off trace for debugging
		window	[tcb]	TCP input window size
	samenet		<iface1> [<iface2>]	display the ifaces that in the same net
	uninet		<iface>	set the iface to uninet
	tftp			
		support		pritn if tfpt is support
		stats		display tftp status
	xparent			
		join	<iface1> [<iface2>]	join iface2 to iface1 group
		break	<iface>	break iface to leave ipxparent group
	antiprobe		<0|1> 1:yes 0:no	set ip anti-probe flag
	igmp			
		debug	[level]	set igmp debug level
		forwardall	[on|off]	turn on/off igmp forward to all interfaces flag
		querier	[on|off]	turn on/off igmp stop query flag
		iface		
			<iface> grouptm <timeout>	set igmp group timeout
			<iface> interval <interval>	set igmp query interval
			<iface> join <group>	join a group on iface

			<iface> leave <group>	leave a group on iface
			<iface> query	send query on iface
			<iface> rsptime [time]	set igmp response time
			<iface> start	turn on of igmp on iface
			<iface> stop	turn off of igmp on iface
			<iface> ttl <threshold>	set ttl threshold
			<iface> v1compat [on|off]	turn on/off v1compat on iface
		robustness	<num>	set igmp robustness variable
		status		dump igmp status
	pr			
		clear		clear ip pr table counter information
		disp		dump ip pr table counter information
		switch		turn on/off ip pr table counter flag
	nat			
		timeout		
			gre [timeout]	set nat gre timeout value
			iamt [timeout]	set nat iamt timeout value
			generic [timeout]	set nat generic timeout value
			reset [timeout]	set nat reset timeout value
			tcp [timeout]	set nat tcp timeout value
			tcpother [timeout]	set nat tcp other timeout value
		update		create nat system information from spSysParam
		iamt		display nat iamt information
		iface	<iface>	show nat status of an interface
		lookup	<rule set>	display nat lookup rule
		new-lookup	<rule set>	display new nat lookup rule
		loopback	[on|off]	turn on/off nat loopback flag
		reset	<iface>	reset nat table of an iface
		server		
			disp	display nat server table

			load <set id>	load nat server information from ROM
			save	save nat server information to ROM
			clear <set id>	clear nat server information
			edit active <yes|no>	set nat server edit active flag
			edit svrport <start port> [end port]	set nat server server port
			edit intport <start port> [end port]	set nat server forward port
			edit remotehost <start ip> [end ip]	set nat server remote host ip
			edit leasetime [time]	set nat server lease time
			edit rulename [name]	set nat server rule name
			edit forwardip [ip]	set nat server server ip
			edit protocol [protocol id]	set nat server protocol
		service		
			irc [on|off]	turn on/off irc flag
		resetport		reset all nat server table entries
		incikeport	[on|off]	turn on/off increase ike port flag

5. WAN Related Commands

Command				Description
wan	adsl	bert		ADSL ber
		chandata		ADSL channel data, line rate
		close		Close ADSL line
		coding		ADSL standard current
		ctrleint		ADSL CTRLE response command
		defbitmap		ADSL defect bitmap status
		dyinggasp		Send ADSL dyinggasp
		fwav		Test the ADSL F/W available ping
		fwdl		Download modem code, but must reset first
		linedata		
			near	Show ADSL near end noise margin

			far	Show ADSL far end noise margin
		open		Open ADSL line
		opencmd		Open ADSL line with specific standard
		opmode		Show the operational mode
		perfdata		Show performance information,CRC,FEC, error seconds..
		rdata	[start] [length]	Read DSP CTRLE registers 512 bytes
		reset		Reset ADSL modem, and must reload the modem code again
		selftest		
			long	ADSL long loop test
			short	ADSL short loop test
		status		ADSL status (ex: up, down or wait for init)
		version		ADSL version information
		vendorid		ADSL vendor information
		utopia		Show ADSL utopia information
		cellcnt		Show ADSL cell counter
		display		
			shutdown	Show the counter of rate adaptive mechanism happening
			rateup	Show real status that rate adaptive mechanism happened
		rateadap	[on|off]	Turn on/off rate adaptive mechanism
		dumpcondition	[on|off]	Turn on/off online debug information of rate adaptive mechanism
		sampletime	[mins]	Tune the sample time of rate adaptive mechanism
		noisegt	[dB]	if noise margin is 3db greater than before, and rate is worse than before, then system will do ?1 shutdown RA3? default is 3db
		noisemargin	[dB]	if noise margin is greater than

				this value, and rate is worse?than before, then system will do ?1 shutdown RA3? default is 8db
		persisttime	[time]	when the adaptive condition is matched system will continue to monitor the time period ?ersisttime?before doing ?1 shutdown RA3? default is 30 seconds
		timeinterval	[mins]	when ?1 shutdown RA3?is done twice, and still can? reach the max rate which system recorded, it will delay a time period that the period base time is?imeinterval?before starting again. The time-based default is 2 hrs
		defectcheck	[on|off]	Turn on/off detect table checking, default is on
		txgain	[value]	Set the CTRLE register (0xc3), the value is from 0xfa to 0x06
		targetnoise	[value]	Set the CTRLE register (0xc4), the value is from 0xfa to 0x06
		maxtonelimit	[value]	Set the CTRLE register (0xc5), the value is from 0xfa to 0x06
		rxgain	[value]	Set the CTRLE register (0xc6), the value is from 0xfa to 0x06
		txoutputpwr	[value]	Set the CTRLE register (0xc7), the value is from 0xfa to 0x06
		rxoutputpwr	[value]	Set the CTRLE register (0xc8), the value is from 0xfa to 0x06
		maxoutputpwr	[value]	Set the CTRLE register (0xc9), the value is from 0xfa to 0x06
		errorsecond		
			sendes	Send current error second information immediately

		dygasprecover		
		dygasprecover	level [value]	By default is 100, after receiving 100 dying gasp system will reboot
		dygasprecover	active [on|off|	Turn on/off this mechanism
		rsploss	[1|0]	Turn on means to response signal loss of CTRLE immediately, default is off
	atm	test	[fix|rand|period|oam|loopback]	Generate ATM traffic
	hwsar	disp		Display hwsar packets incoming/outgoing information
		clear		Clear hwsar packets information

6. PPP Related Command

Command				Description
ppp				
	bod			
		remote	<iface>	show remote bod information
		reset		reset bod
		setremote	<iface>	set remote bod
		status	<wan_iface>	show wan port bod status
		clear	<wan_iface>	clear wan port bod data
		on		set bod flag on
		off		set bod flag off
		node	<node> <dir>	config the statistic method for remote node bod traffic data
		debug	[on|off]	show bod debug flag
		cnt		
			disp	show bod state
			clear	clear bod state
	ccp		[on|off]	set/display dial-in ccp switch
	lcp			
		acfc	[on|off]	set address/control field compression flag
		pfc	[on|off]	set protocol field compression flag

		mpin	[on|off]	set incoming call MP flag
		callback	[on|off]	set callback flag
		bacp	[on|off]	set bandwidth allocation control flag
		echo		
			retry <retry_count>	set/display retry count to send echo-request
			time <interval>	set/display time interval to send echo-request
	ipcp			
		close		close connection on ppp interface
		list	<iface>	show ipcp state
		open		open fsm link
		timeout	[value]	set timeout interval when waiting for response from remote peer
		try		
			configure [value]	set/display fsm try config
			failure [value]	set/display fsm try failure
			terminate [value]	set/display fsm try terminate
		compress [	on|off]	set compress flag
		slots	[slot_num]	set number of slots
		idcompress [on|	off]	set/display slot id compress
		address	[on|off]	set/display ip one address option
	mp			
		default		show link default flag
			rotate	set link default to rotate
			split	set link default to split
		split	[0|1]	set/display link split
		rotate	[0|1]	set/display link rotate
		sequence		set/display mp start sequence
	configure			
		ipcp		
			compress [on|off]	enable/disable

				compress
			slots [slot_num]	select number of slots
			idcompress [on|off]	enable/disable slot id compress
			address [on|off]	set/display ip one address option
		atcp		apple talk feature not supported anymore
		ccp		
			ascend [on|off]	set/display ascend stac flag
			history <count>	set/display stac history count
			check [argv]	set/display stac check mode
			reset <mode>	set/display stac reset mode
			pfc [on|off]	set/display pfc flag
			debug [on|off]	set/display ccp debug flag
	iface			
			<iface> ipcp	show the ipcp status of the given iface
			<iface> ipxcp	show the ipxcp status of the given iface
			<iface> atcp	
			<iface> ccp [reset|skip|flush] show	the ccp status of the given iface
			<iface> mp	show the mp status of the given iface
	show		<channel>	show the ppp channel status
	fsm			
		trace		
			break [num] [count] [flag]	set the fsm log break value
			clear	clear the fsm log data
			disp	display the fsm log data
			filter [mask] [protocol]	set the fsm log filter value
		Tdata		
			filter [protocol1]	set the fsm filter data

			[protocol2] ?	
			disp	display the fsm data
			clear	clear the fsm data
		Struc		dump fsm data structure
	delay		[inteval]	set the delay timer for sending first PPP packet after call answered

7. Bridge Related Command

Command				Description
bridge				
	mode		<1/0> (enable/disable)	turn on/off (1/0) LAN promiscious mode
	blt			related to bridge local table
		Disp	<channel>	display blt data
		reset	<channel>	reset blt data
		traffic		display local LAN traffic table
		monitor	[on|off]	turn on/off traffice monotor. Default is off.
		Time	<sec>	set blt re-init interval
	brt			related to bridge route table
		Disp	[id]	display brt data
		reset	[id]	reset brt data
	cnt			related to bridge routing statistic table
		Disp		display bridge route counter
		clear		clear bridge route counter
	stat			related to bridge packet statistic table
		Disp		display bridge route packet counter
		Clear		clear bridge route packet counter
	disp			display bridge source table

8. WLAN Related Commands

Command				Description
Wlan				
	active	[on|off]	[0|1]	Turn on/off wireless lan
	association			Show association list
	load			Load WLAN configuration into buffer.
	Display			Display WLAN configuration data.
	chid			Configure channel ID?
	essid			Configure ESSID
	hiddenssid		[on/off]	Enable/Disable hidden SSID
	threshold			
		rts	<RTS threshold value>	Set threshold rts value
		Fragment	<Fragment threshold value>	Set threshold fragmentation value
	wep			
		type	<none|64|128|256>	Set WEP key to 64, 128 or 256 bits.
		Key	Set <set> <value>	Set WEP key value per set
		Key	Default <set>	Set WEP default key set
	macfilter			
		Enable		Enable macfilter
		Disable		Disable macfilter
		Action	<allow|deny>	When action match, allow or deny this mac
		Set	<Set#> <MAC Address>	Set mac address by set
	Clear			Clear all WLAN configuration data.
	Save			Save WLAN configuration working buffer to Rom file.
	Power		[1:19dbm, 2:18dbm, 3:16dbm, 4:15dbm, 5:14dbm]	Change TX power level.
	reset			Reset WLAN
	1130cmd			Internal usage.
		restart_stat		Show WLAN restart statistics
		chg_dot11mode		Set WLAN state to mix mode, B only or G only
		show_rxDesc		Show number of Rx host descriptors

		acxstat		Show acx run time statistics

9. Radius Related Command

Command				Description
radius				
	auth			show current radius authentication server configuration
	acco			show current radius accounting server configuration

10. 8021x Related Command

Command				Description
8021x				
	debug	level	[debug level]	set ieee802.1x debug message level
		trace		show all supplications in the supplication table
		user	[username]	show the specified user status in the supplicant table

11. Configuration Related Command

Command					Description
config					The parameters of config are listed below.
edit	firewall	active <yes|no>			Activate or deactivate the saved firewall settings
retrieve	firewall				Retrieve current saved firewall settings
save	firewall				Save the current firewall settings
display	firewall				Displays all the firewall settings
		set <set#>			Display current entries of a set configuration; including timeout values, name, default-permit, and number of rules in

					the set.
		set <set#>	rule <rule#>		Display current entries of a rule in a set.
		attack			Display all the attack alert settings in PNC
		e-mail			Display all the e-mail settings in PNC
		?			Display all the available sub commands
		e-mail	mail-server <mail server IP>		Edit the mail server IP to send the alert
			return-addr <e-mail address>		Edit the mail address for returning an email alert
			e-mail-to <e-mail address>		Edit the mail address to send the alert
			policy <full | hourly |daily | weekly>		Edit email schedule when log is full or per hour, day, week.
			day <sunday | monday | tuesday | wednesday | thursday | friday | saturday>		Edit the day to send the log when the email policy is set to Weekly
			hour <0~23>		Edit the hour to send the log when the email policy is set to daily or weekly
			minute <0~59>		Edit the minute to send to log when the email policy is set to daily or weekly
			Subject <mail		Edit the email

			subject>		subject
		attack	send-alert <yes|no>		Activate or deactivate the firewall DoS attacks notification emails
			block <yes|no>		Yes: Block the traffic when exceeds the tcp-max-incomplete threshold
					No: Delete the oldest half-open session when exceeds the tcp-max-incomplete threshold
			block-minute <0~255>		Only valid when sets 'Block' to yes. The unit is minute
			minute-high <0~255>		The threshold to start to delete the old half-opened sessions to minute-low
			minute-low <0~255>		The threshold to stop deleting the old half-opened session
			max-incomplete-high <0~255>		The threshold to start to delete the old half-opened sessions to max-incomplete-low
			max-incomplete-low <0~255>		The threshold to stop deleting the half-opened session
			tcp-max-incomplete <0~255>		The threshold to start executing the block field
		set	name <desired		Edit the name for a

		<set#>	name>		set
			default-permit <forward|block>		Edit whether a packet is dropped or allowed when it does not match the default set
			icmp-timeout <seconds>		Edit the timeout for an idle ICMP session before it is terminated
			udp-idle-timeout <seconds>		Edit the timeout for an idle UDP session before it is terminated
			connection-timeout <seconds>		Edit the wait time for the SYN TCP sessions before it is terminated
			fin-wait-timeout <seconds>		Edit the wait time for FIN in concluding a TCP session before it is terminated
			tcp-idle-timeout <seconds>		Edit the timeout for an idle TCP session before it is terminated
			pnc <yes|no>		PNC is allowed when 'yes' is set even there is a rule to block PNC
			log <yes|no>		Switch on/off sending the log for matching the default permit
			rule <rule#>	permit <forward|block>	Edit whether a packet is dropped or allowed when it matches this rule
				active <yes|no>	Edit whether a rule is enabled or not
				protocol <0~255>	Edit the protocol number for a rule.

					1=ICMP, 6=TCP, 17=UDP...
				log <none|match|not-match|both>	Sending a log for a rule when the packet none|matches|not match|both the rule
				alert <yes|no>	Activate or deactivate the notification when a DoS attack occurs or there is a violation of any alert settings. In case of such instances, the function will send an email to the SMTP destination address and log an alert.
				srcaddr-single <ip address>	Select and edit a source address of a packet which complies to this rule
				srcaddr-subnet <ip address> <subnet mask>	Select and edit a source address and subnet mask if a packet which complies to this rule.
				srcaddr-range <start ip address> <end ip address>	Select and edit a source address range of a packet which complies to this rule.
				destaddr-single <ip address>	Select and edit a destination address of a packet which complies to this rule
				destaddr-subnet <ip	Select and edit a

				address> <subnet mask>	destination address and subnet mask if a packet which complies to this rule.
				destaddr-range <start ip address> <end ip address>	Select and edit a destination address range of a packet which complies to this rule.
				tcp destport-single <port#>	Select and edit the destination port of a packet which comply to this rule. For non-consecutive port numbers, the user may repeat this command line to enter the multiple port numbers.
				tcp destport-range <start port#> <end port#>	Select and edit a destination port range of a packet which comply to this rule.
				udp destport-single <port#>	Select and edit the destination port of a packet which comply to this rule. For non-consecutive port numbers, users may repeat this command line to enter the multiple port numbers.
				udp destport-range <start port#> <end port#>	Select and edit a destination port range of a packet which comply to

					this rule.
				desport-custom <desired custom port name>	Type in the desired custom port name
delete	firewall	e-mail			Remove all email alert settings
		attack			Reset all alert settings to defaults
		set <set#>			Remove a specified set from the firewall configuration
		set <set#>	rule <rule#>		Remove a specified rule in a set from the firewall configuration
insert	firewall	e-mail			Insert email alert settings
		attack			Insert attack alert settings
		set <set#>			Insert a specified rule set to the firewall configuration
		set <set#>	rule <rule#>		Insert a specified rule in a set to the firewall configuration
cli					Display the choices of command list.

12. Firewall Related Command

Command				Description
sys				
	firewall			
		acl		
			disp	Display specific ACL set # rule #, or all ACLs.
		active	<yes|no>	Active firewall or deactivate firewall
		cnt		
			disp	Display firewall log type and count.

			clear	Clear firewall log count.
		pktdump		Dump the 64 bytes of dropped packet by firewall
		update		Update firewall
		dynamicrule		
		tcprst		
			rst	Set TCP reset sending on/off.
			rst113	Set TCP reset sending for port 113 on/off.
			display	Display TCP reset sending setting.
		icmp		
		dos		
			smtp	Set SMTP DoS defender on/off
			display	Display SMTP DoS defender setting.
			ignore	Set if firewall ignore DoS in lan/wan/dmz/wlan
		ignore		
			triangle	Set if firewall ignore triangle route in lan/wan/dmz/wlan

13. SMT Related command

No	Command	Description	Comment
	sys bridge [on|off]	Set system bridge on/off	Menu 1
	sys routeip [on|off]	Set system IP routing on/off	Menu 1
	sys hostname [hostname]	Set system name	Menu 1
	sys display	Display hostname, routing/bridge mode information in menu 1	Display Menu 1
	sys default	Load All Default Settings Except LAN and DHCP.	
	sys save	Save all the parameters which will include menu1, menu 3.2 LAN, menu 4 or menu 11 WAN, menu 12 static route, menu 15 NAT server set, menu 21 filter sets, menu 22 SNMP, menu 24.11 remote management and 3.5 Wireless LAN	
	wan backup mechanism [dsl | icmp]	Set wan backup mechanism to DSL link or ICMP	Menu 2
	wan backup addr [index] [IP addr]	Set wan ip address <index>	Menu 2
	wan backup tolerance [number]	Set keepalive fail tolerance	Menu 2
	wan backup recovery [interval(sec)]	Set recovery interval	Menu 2
	wan backup timeout [number]	Set ICMP timeout	Menu 2

	wan backup save	Save wan backup related parameters	Menu 2
	wan backup display	Display wan backup configurations	Menu 2
	wan tredir active [on|off]	Set traffic redirect on/off	Menu 2.1
	wan tredir ip [IP addr]	Set traffic redirect gateway IP address	Menu 2.1
	wan tredir metric [number]	Set traffic redirect metric	Menu 2.1
	wan tredir save	Save traffic redirect related parameters ** Have to apply ?an backup save?command thereafter	Menu 2.1
	wan tredir display	Display traffic redirect configurations	Menu 2.1
	lan index [1|2|3] 1: Select main LAN Interface 2: Select IP Alias 1 3: Select IP Alias 2	Select a LAN interface to edit	Menu 3.2
	lan active [on|off]	Turn on or off on IP Alias Interface	Menu 3.2.1
	lan ipaddr [address] [subnet mask]	Set LAN IP address and subnet mask Example: > lan ipaddr 192.168.1.1 255.255.255.0	Menu 3.2
	lan rip [none|in|out|both] [rip1|rip2b|rip2m]	Set LAN IP RIP mode and RIP version, if you choose none in the first parameter, the second parameter is also necessary	Menu 3.2
	lan multicast [none|igmpv1|igmpv2]	Set LAN IP multicast mode	Menu 3.2
	lan filter [incoming|outgoing] [tcpip|generic] [set#1] [set#2] [set#3] [set#4]	Set LAN filter to be incoming/outgoing or protocol /device and the filter set could be 1-12, 0 means empty Example: Lan filter incoming tcpip 1 0 0 0	Menu 3.1
	lan dhcp mode [server|relay|none]	Set DHCP mode to be?erver? ?elay? ?one?o:p>	Menu 3.2
	lan dhcp server dnsserver [pri dns] [sec dns]	Set primary and secondary LAN DNS server	Menu 3.2
	lan dhcp server pool [start-address] [num]	Set DHCP start address and pool size	Menu 3.2
	lan dhcp server gateway [IP address]	Set DHCP gateway	Menu 3.2
	lan dhcp server netmask [subnet mask]	Set DHCP subnet mask	Menu 3.2

	lan dhcp server leasetime [second]	Set DHCP lease time	Menu 3.2
	lan dhcp server renewaltime [second]	Set DHCP renew time	Menu 3.2
	lan dhcp server rebindtime [second]	Set DHCP rebind time	Menu 3.2
	lan dhcp relay server [IP address]	Set IP address of DHCP relay server	Menu 3.2
	lan display	Display LAN or IP alias parameters	Display Menu 3
	lan clear	Clear the Working Buffer	
	lan save	Save LAN related parameters	
	wan node index [1-8]	Set the node pointer to specific wan profile. If you want to set WAN profile, please use this command first, system will use the index number for pointing to specific PVC (remote node), and for consequent commands reference, if index = 1 means it? ISP node	Menu 11.1
	wan node clear	Clear the parameters of the temporary WAN profile	Menu 11.1
	wan node ispname [ISP name]	Enable the name of wan node	Menu 11.1
	wan node enable	Enable the wan profile	Menu 11.1
	wan node disable	Disable the wan profile	Menu 11.1
	wan node encap [1483|pppoa|pppoe|enet]	Set the wan protocol	Menu 11.1
	wan node mux [vc|llc]	Set the wan multiplex	Menu 11.1
	wan node ppp authen [chap|pap|both]	Set PPP authentication type	Menu 11.1
	wan node ppp username [name]	Set PPP username	Menu 11.1
	wan node ppp password [password]	Set PPP password	Menu 11.1
	wan node service [name]	Set PPPoE service name	Menu 11.1
	wan node bridge [on|off]	Set the wan bridge mode	Menu 11.1
	wan node routeip [on|off]	Set the wan IP routing mode	Menu 11.1
	wan node callsch [set1#][set2#][set3#][set4#]	Set call schedule set, set number 0 means empty	Menu 11.1
	wan node nailedup [on|off]	Set nailed up connection on/off	Menu 11.1
	wan node vpi [num]	Set the wan vpi. Range : 0~255	Menu 11.6
	wan node vci [num]	Set the wan vci. Range : 32~65535	Menu 11.6
	wan node qos[ubr|cbr]	Set the wan QOS type to be UBR or CBR	Menu 11.6
	wan node pcr [num]	Set the wan PCR value	Menu 11.6
	wan node scr [num]	Set the wan SCR value	Menu 11.6
	wan node mbs [num]	Set the wan MBS value	Menu 11.6

	wan node wanip [static|dynamic] [address]	Set the wan IP address	Menu 11.3
	wan node remoteip [address] [subnet mask]	Set the remote gateway IP address and subnet mask	Menu 11.3
	wan node nat [off | sua | full] [address mapping #]	Set type wan NAT mode to be off or SUA or Full feature	Menu 11.3
	wan node rip [none|in|out|both] [rip1|rip2b|rip2m]	Set the wan RIP mode and RIP version	Menu 11.3
	wan node multicast [none|igmpv1|igmpv2]	Set the wan IP multicast mode	Menu 11.3
	wan node filter [incoming|outgoing] [tcpip|generic] [set #1] [set #2] [set #3] [set #4]	Set WAN filter, incoming or outgoing can be specified, and filter set can be 1-12, value 0 means empty	Menu 11.5
	wan node save	Save the related parameters of WAN node	
	wan node display	Display WAN profile configuration in buffer	Display Menu 11
	ip route addrom index [Rule #]	Select a Static Route index 1-16 to edit	Menu 12.1
	ip route addrom name [Name]	Set Rule Name	Menu 12.1
	ip route addrom active [on|off]	Set Active or Inactive Flag	Menu 12.1
	ip route addrom set [dest address/ mask bits] [gateway] [metric]	Set IP static route Example: > ip ro addrom set 192.168.1.33/24 192.168.1.1 2	Menu 12.1
	ip route addrom private [yes|no]	Set Private Flag	Menu 12.1
	ip route addrom disp	Display both working buffer and Editing Entry	Menu 12.1
	ip route addrom freememory	Discard all changes	Menu 12.1
	ip route addrom save	Save edited settings	Menu 12.1
	ip route addrom clear [Index #]	Clear Static Route Index	Menu 12.1
	ip nat addrmap map [map#] [set name]	Select NAT address mapping set and set mapping set name, but set name is optional Example: > ip nat addrmap map 1 myset	Menu 15.1
	ip nat addrmap rule [rule#] [insert |	Set NAT address mapping rule. If	Menu 15.1

	edit] [type] [local start IP] [local end IP] [global start IP] [global end IP] [server set #]	the ?ype?is not ?nside-server? then the ?ype?field will still need a dummy value like ?? Type is 0 - 4 = one-to-one, many-to-one, many-to-many-overload, many-to-many-non overload, inside-server Example: > ip nat addrmap rule 1 edit 3 192.168.1.10 192.168.1.20 192.168.10.56 192.168.1.56 0	
	ip nat addrmap clear [map#] [rule#]	Clear the selected rule of the set	Menu 15.1
	ip nat addrmap freememory	Discard Changes	Menu 15.1
	ip nat addrmap disp	Display nat set information	Menu 15.1
	ip nat addrmap save	Save settings	Menu 15.1
	ip nat server load [set#]	Load the server sets of NAT into buffer	Menu 15.2
	ip nat server disp [1]	?isp 1?means to display the NAT server set in buffer, if parameter ?? is omitted, then it will display all the server sets	Menu 15.2
	ip nat server save	Save the NAT server set buffer into flash	Menu 15.2
	ip nat server clear [set#]	Clear the server set [set#], must use ?ave?command to let it save into flash	Menu 15.2
	ip nat server edit [rule#] active	Activate the rule [rule#], rule number is 1 to 24, the number 25-36 is for UPNP application	Menu 15.2
	ip nat server edit [rule#] svrport <start port> <end port>	Configure the port range from <start port > to <end port>	Menu 15.2
	ip nat server edit [rule#] remotehost <start IP> <end IP>	Configure the IP address range of remote host (Leave it to be default value if you don? need this command)	Menu 15.2
	ip nat server edit [rule#] leasetime <seconds>	Configure the lease time (Leave it to be default value if you don? want this command)	Menu 15.2
	ip nat server edit [rule#] rulename <string>	Configure the name of the rule (Leave it to be default value if you don? want this command)	Menu 15.2
	ip nat server edit [rule#] forwardip <IP address>	Configure the LAN IP address to be forwarded	Menu 15.2
	ip nat server edit [rule#] protocol	Configure the protocol to be used TCP ,	Menu 15.2

	<TCP|UDP|ALL>	UDP or ALL (it must be capital)	
	sys filter set index [set#] [rule#]	Set the index of filter set rule, you may apply this command first before you begin to configure the filter rules	Menu 21 filter sets
	sys filter set name [set name]	Set the name of filter set	Menu 21 filter sets
	sys filter set type [tcpip | generic]	Set the type of filter rule	Menu 21 filter sets
	sys filter set enable	Enable the rule	Menu 21 filter sets
	sys filter set disable	Disable the rule	Menu 21 filter sets
	sys filter set protocol [protocol #]	Set the protocol ID of the rule	Menu 21 filter sets
	sys filter set sourceroute [yes|no]	Set the sourceroute yes/no	Menu 21 filter sets
	sys filter set destip [address] [subnet mask]	Set the destination IP address and subnet mask of the rule	Menu 21 filter sets
	sys filter set destport [port#] [compare type = none|equal|notequal|less|greater]	Set the destination port and compare type (compare type could be 0(none)|1(equal)|2(not equal)|3(less)|4(greater))	Menu 21 filter sets
	sys filter set srcip [address] [subnet mask]	Set the source IP address and subnet mask	Menu 21 filter sets
	sys filter set srcport [port#] [compare type = none|equal|not equal|less|greater]	Set the source port and compare type (compare type could be 0(none)|1(equal)|2(not equal)|3(less)|4(greater))	Menu 21 filter sets
	sys filter set tcpEstab [yes|no]	Set TCP establish option	
	sys filter set more [yes|no]	Set the more option to yes/no	Menu 21 filter sets
	sys filter set log [type 0-3= none | match| notmatch | both]	Set the log type (it could be 0-3 =none, match, not match, both)	Menu 21 filter sets
	sys filter set actmatch[type 0-2 = checknext | forward | drop]	Set the action for match	Menu 21 filter sets
	sys filter set actnomatch [type 0-2 = checknext | forward | drop]	Set the action for not match	Menu 21 filter sets
	sys filter set offset [#]	Set offset for the generic rule	Menu 21, it? for generic filter
	sys filter set length [#]	Set the length for generic rule	Menu 21, it? for generic filter
	sys filter set mask [#]	Set the mask for generic rule	Menu 21, it? for generic filter

	sys filter set value [(depend on length in hex)]	Set the value for generic rule	Menu 21, it? for generic filter
	sys filter set clear	Clear the current filter set	Menu 21
	sys filter set save	Save the filter set parameters	
	sys filter set display [set#][rule#]	Display Filter set information. W/o parameter, it will display buffer information.	
	sys filter set freememory	Discard Changes	
	sys snmp disp	Display SNMP parameters	Menu 22
	sys snmp get [community]	Set the community string of get	Menu 22 SNMP
	sys snmp set [community]	Set the community string of set	Menu 22 SNMP
	sys snmp trusthost [IP address]	Set the IP address of trusted host	Menu 22 SNMP
	sys snmp trap community [community]	Set the community string of trap	Menu 22 SNMP
	sys snmp trap destination [IP address]	Set the destination address of trap	Menu 22 SNMP
	sys snmp discard	Discard changes	
	sys snmp clear	Clear Working Buffer	
	sys snmp save	Set the SNMP parameters	Menu 22 SNMP
	sys password [new password]	Set system password [save immediately]	Menu 23 system password
	sys baud [1-5]	Index 12,3 will be 38400,19200, 9600, 57600, 115200 bps [save immediately]	Menu 24.2.2 console speed
	sys server load	Load setting before editing	
	sys server access [ftp|telnet|web] [access type]	Set the server access type to be 0: ALL, 1: None, 2:LAN only, 3:WAN only	Menu 24.11 remote management
	sys server port [ftp|telnet|web] [port]	Set the server port number	Menu 24.11 remote management
	sys server secureip[ftp|telnet|web] [address]	Set the server security IP address	Menu 24.11 remote management
	sys server disp [1]	Display server settings, [1] means display buffer	
	sys server save	Save the embedded server (remote management) parameters	
	wlan load	Load system parameters into working buffer	Menu 3.5 for Wireless LAN

	wlan disp	Display the working buffer	Menu 3.5 for Wireless LAN
	wlan essid [name]	Set the wireless ESSID	Menu 3.5 for wireless LAN
	wlan hideessid [on|off]	Set to hide ESSID or not	Menu 3.5 for wireless LAN
	wlan chid [#=1~11]	Set channel ID 1-11	Menu 3.5 for wireless LAN
	wlan threshold rts [value]	Set the RTS threshold value	Menu 3.5 for wireless LAN
	wlan threshold fragment [value]	Set fragment threshold	Menu 3.5 for wireless LAN
	wlan wep type [none|64|128]	Set the wep type to be none, 64bit or 128bits	Menu 3.5 for wireless LAN
	wlan wep key set [key set#1-4] [key value]	Set wep key value	Menu 3.5 for wireless LAN
	wlan wep key default [key set # 1-4]	Set default key set value	Menu 3.5 for wireless LAN
	wlan macfilter enable	Enable mac filter	Menu 3.5.1 for wireless LAN
	wlan macfilter disable	Disable mac filter	Menu 3.5.1 for wireless LAN
	wlan macfilter action [allow|deny]	Set the action type of filter	Menu 3.5.1 for wireless LAN
	wlan macfilter set [set# 1-12] [mac address]	Set the mac address of filter	Menu 3.5.1 for wireless LAN
	wlan clear	Clear Working Buffer	
	wlan save	Save wireless MAC filter parameters	