ZyWALL 10~100 Series

Internet Security Gateway

Reference Guide

Versions 3.52, 3.60 and 3.61

March 2003

ZyXEL
Unleash Networking Power

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

This device may not cause harmful interference.

This device must accept any interference received, including interference that may cause undesired operations.

This equipment has been tested and found to comply with the limits for a CLASS B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

If this equipment does cause harmful interference to radio/television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and the receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

Notice 1

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Certifications

Refer to the product page at www.zyxel.com.

Information for Canadian Users

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operation, and safety requirements. The Industry Canada does not guarantee that the equipment will operate to a user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly. The customer should be aware that the compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

For their own protection, users should ensure that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution

Users should not attempt to make such connections themselves, but should contact the appropriate electrical inspection authority, or electrician, as appropriate.

Note

This digital apparatus does not exceed the class A limits for radio noise emissions from digital apparatus set out in the radio interference regulations of Industry Canada.

ZyXEL Limited Warranty

ZyXEL warrants to the original end user (purchaser) that this product is free from any defects in materials or workmanship for a period of up to two years from the date of purchase. During the warranty period, and upon proof of purchase, should the product have indications of failure due to faulty workmanship and/or materials, ZyXEL will, at its discretion, repair or replace the defective products or components without charge for either parts or labor, and to whatever extent it shall deem necessary to restore the product or components to proper operating condition. Any replacement will consist of a new or re-manufactured functionally equivalent product of equal value, and will be solely at the discretion of ZyXEL. This warranty shall not apply if the product is modified, misused, tampered with, damaged by an act of God, or subjected to abnormal working conditions.

NOTE

Repair or replacement, as provided under this warranty, is the exclusive remedy of the purchaser. This warranty is in lieu of all other warranties, express or implied, including any implied warranty of merchantability or fitness for a particular use or purpose. ZyXEL shall in no event be held liable for indirect or consequential damages of any kind of character to the purchaser.

To obtain the services of this warranty, contact ZyXEL's Service Center for your Return Material Authorization number (RMA). Products must be returned Postage Prepaid. It is recommended that the unit be insured when shipped. Any returned products without proof of purchase or those with an out-dated warranty will be repaired or replaced (at the discretion of ZyXEL) and the customer will be billed for parts and labor. All repaired or replaced products will be shipped by ZyXEL to the corresponding return address, Postage Paid. This warranty gives you specific legal rights, and you may also have other rights that vary from country to country.

Online Registration

Register online registration at www.zyxel.com for free future product updates and information.

Customer Support

When you contact your customer support representative please have the following information ready: Please have the following information ready when you contact customer support.

- Product model and serial number.
- Information in **Menu 24.2.1 – System Information**.
- Warranty Information.
- Date that you received your device.
- Brief description of the problem and the steps you took to solve it.

METHOD LOCATION	E-MAIL SUPPORT/SALES	TELEPHONE/FAX	WEB SITE/ FTP SITE	REGULAR MAIL
WORLDWIDE	support@zyxel.com.tw sales@zyxel.com.tw	+886-3-578-3942 +886-3-578-2439	www.zyxel.com www.europe.zyxel.com ftp.europe.zyxel.com	ZyXEL Communications Corp., 6 Innovation Road II, Science-Based Industrial Park, Hsinchu 300, Taiwan
NORTH AMERICA	support@zyxel.com sales@zyxel.com	+1-714-632-0882 800-255-4101 +1-714-632-0858	www.zyxel.com ftp.zyxel.com	ZyXEL Communications Inc., 1650 Miraloma Avenue, Placentia, CA 92870, U.S.A.
SCANDINAVIA	support@zyxel.dk sales@zyxel.dk	+45-3955-0700 +45-3955-0707	www.zyxel.dk ftp.zyxel.dk	ZyXEL Communications A/S, Columbusvej 5, 2860 Soeborg, Denmark
GERMANY	support@zyxel.de sales@zyxel.de	+49-2405-6909-0 +49-2405-6909-99	www.zyxel.de	ZyXEL Deutschland GmbH. Adenauerstr. 20/A2 D-52146 Wuerselen, Germany

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Preface

About Your ZyWALL

Congratulations on your purchase of the ZyWALL Security Gateway.

About This User's Manual

This manual is designed to provide background information on some of the ZyWALL's features. It also includes commands for use with the command interpreter.

This manual may refer to the ZyWALL Internet Security Gateway as the ZyWALL.

This manual covers the ZyWALL 10 to 100 models. Supported features and the details of the features, vary from model to model. Not every feature applies to every model; refer to the *Model Comparison Chart* in chapter 1 of the *Web Configurator User's Guide* to see what features are specific to your ZyWALL model.

You may use the System Management Terminal (SMT), web configurator or command interpreter interface to configure your ZyWALL. Not all features can be configured through all interfaces.

Related Documentation

- Support Disk
  Refer to the included CD for support documents.
- Read Me First or Quick Start Guide
  The Read Me First or Quick Start Guide is designed to help you get up and running right away. It contains a detailed easy-to-follow connection diagram, default settings, handy checklists and information on setting up your network and configuring for Internet access.
- SMT User's Guide
  This manual is designed to guide you through the configuration of your ZyWALL using the System Management Terminal.
- Web Configurator User's Guide
  This manual is designed to guide you through the configuration of your ZyWALL using the embedded web configurator.
- Web Configurator Online Help
  Embedded web help for descriptions of individual screens and supplementary information.
- Packing List Card
  The Packing List Card lists all items that should have come in the package.
- Certifications
  Refer to the product page at www.zyxel.com for information on product certifications.
- ZyXEL Glossary and Web Site
  Please refer to www.zyxel.com for an online glossary of networking terms and additional support documentation.

Syntax Conventions

- "Enter" means for you to type one or more characters and press the carriage return. "Select" or "Choose" means for you to use one of the predefined choices.
- The SMT menu titles and labels are in **Bold Times New Roman** font.
- The choices of a menu item are in **Bold Arial** font.
- A single keystroke is in Arial font and enclosed in square brackets, for instance, [ENTER] means the Enter, or carriage return, key; [ESC] means the escape key and [SPACE BAR] means the space bar. [UP] and [DOWN] are the up and down arrow keys.
- Mouse action sequences are denoted using a comma. For example, "click the Apple icon, **Control Panels** and then **Modem**" means first click the Apple icon, then point your mouse pointer to **Control Panels** and then click **Modem**.
- For brevity's sake, we will use "e.g." as a shorthand for "for instance" and "i.e." for "that is" or "in other words" throughout this manual.

Part I:

General Information

This part provides background information about setting up your computer's IP address, triangle route, how functions are related, wireless LAN, 802.1x, PPPoE, PPTP and IP subnetting.

Chapter 1
Setting up Your Computer’s IP Address

All computers must have a 10M or 100M Ethernet adapter card and TCP/IP installed.

Windows 95/98/Me/NT/2000/XP, Macintosh OS 7 and later operating systems and all versions of UNIX/LINUX include the software components you need to install and use TCP/IP on your computer. Windows 3.1 requires the purchase of a third-party TCP/IP application package.

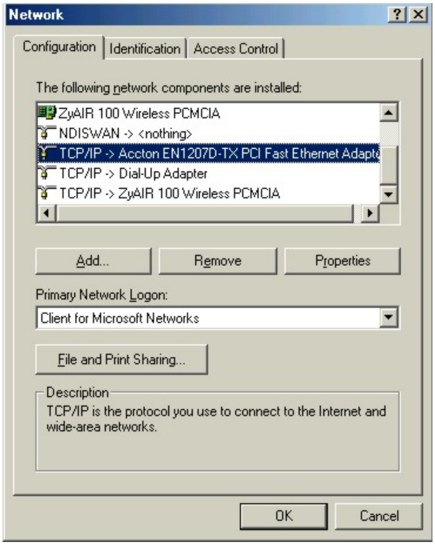
TCP/IP should already be installed on computers using Windows NT/2000/XP, Macintosh OS 7 and later operating systems.

After the appropriate TCP/IP components are installed, configure the TCP/IP settings in order to "communicate" with your network.

If you manually assign IP information instead of using dynamic assignment, make sure that your computers have IP addresses that place them in the same subnet as the ZyWALL's LAN port.

Windows 95/98/Me

Click **Start**, **Settings**, **Control Panel** and double-click the **Network** icon to open the **Network** window.



The following network components are installed:

ZyAIR 100 Wireless PCMCIA
NDISWAN -> <nothing>
TCP/IP -> Accton EN1207D-TX PCI Fast Ethernet Adapte
TCP/IP -> Dial-Up Adapter
TCP/IP -> ZyAIR 100 Wireless PCMCIA

Primary Network Logon: Client for Microsoft Networks

Description
TCP/IP is the protocol you use to connect to the Internet and wide-area networks.

The **Network** window **Configuration** tab displays a list of installed components. You need a network adapter, the TCP/IP protocol and Client for Microsoft Networks.

If you need the adapter:

a. In the **Network** window, click **Add**.

b. Select **Adapter** and then click **Add**.

c. Select the manufacturer and model of your network adapter and then click **OK**.

If you need TCP/IP:

a. In the **Network** window, click **Add**.

b. Select **Protocol** and then click **Add**.

c. Select **Microsoft** from the list of **manufacturers**.

d. Select **TCP/IP** from the list of network protocols and then click **OK**.

If you need Client for Microsoft Networks:

a. Click **Add**.

b. Select **Client** and then click **Add**.

c. Select **Microsoft** from the list of manufacturers.

d. Select **Client for Microsoft Networks** from the list of network clients and then click **OK**.

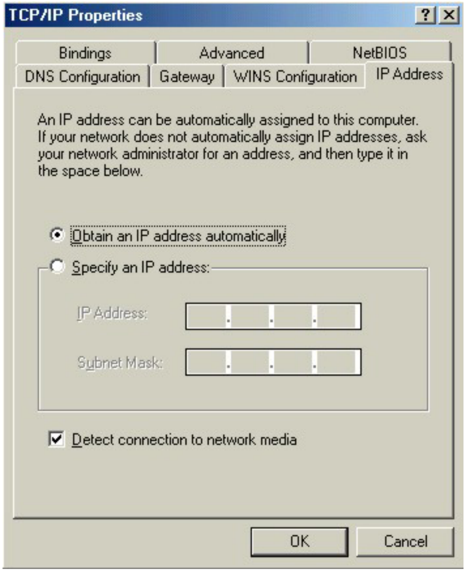
e. Restart your computer so the changes you made take effect.

In the **Network** window **Configuration** tab, select your network adapter's TCP/IP entry and click **Properties**.

1. Click the **IP Address** tab.

   -If your IP address is dynamic, select **Obtain an IP address automatically**.

   -If you have a static IP address, select **Specify an IP address** and type your information into the **IP Address** and **Subnet Mask** fields.



TCP/IP Properties

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:

IP Address: . . .

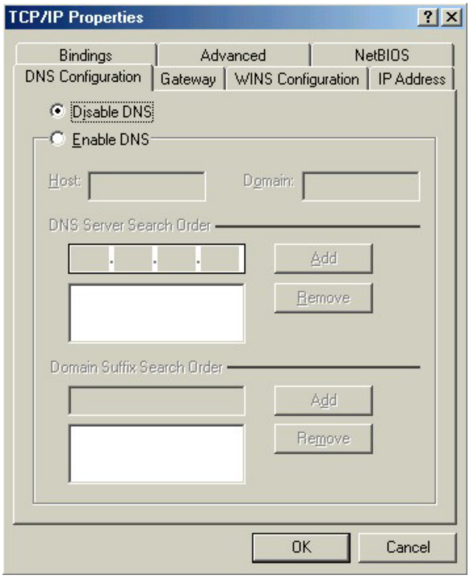
Subnet Mask: . . .

☑ Detect connection to network media

2. Click the **DNS** Configuration tab.

   -If you do not know your DNS information, select **Disable DNS**.

   -If you know your DNS information, select **Enable DNS** and type the information in the fields below (you may not need to fill them all in).



TCP/IP Properties

● Disable DNS

○ Enable DNS

Host:

Domain:

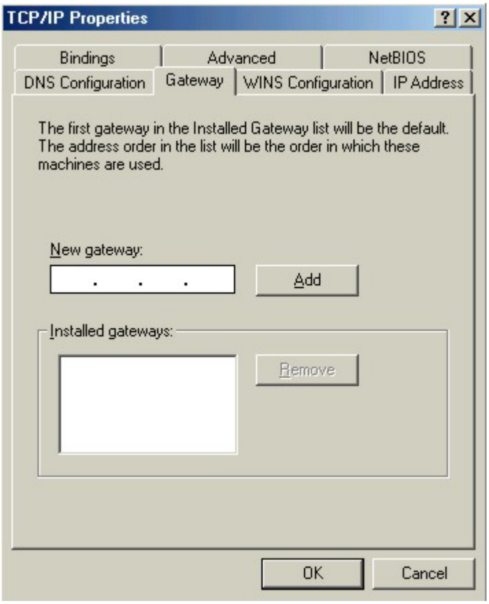
DNS Server Search Order

Domain Suffix Search Order

3. Click the **Gateway** tab.

   -If you do not know your gateway's IP address, remove previously installed gateways.

   -If you have a gateway IP address, type it in the **New gateway field** and click **Add**.



TCP/IP Properties

The first gateway in the Installed Gateway list will be the default. The address order in the list will be the order in which these machines are used.

New gateway: . . .

Installed gateways:

4. Click **OK** to save and close the **TCP/IP Properties** window.

5. Click **OK** to close the **Network** window. Insert the Windows CD if prompted.

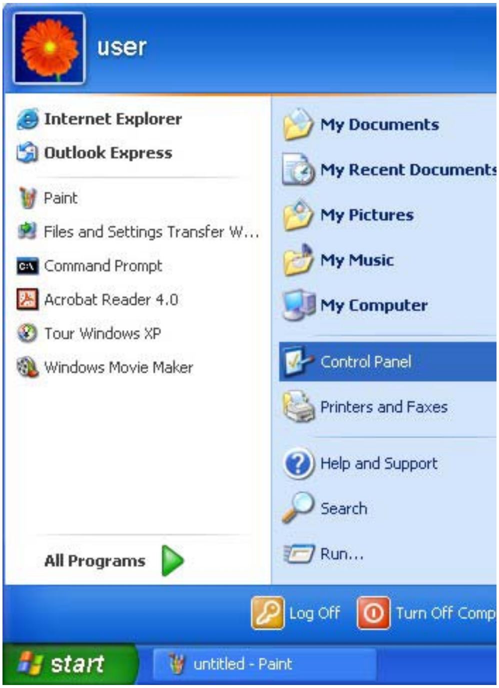
6. Turn on your ZyWALL and restart your computer when prompted.

Verifying Your Computer's IP Address

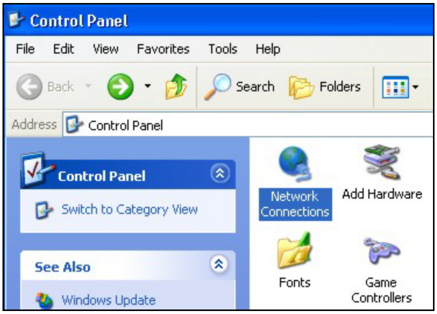
1. Click **Start** and then **Run**.
2. In the **Run** window, type "winipcfg" and then click **OK** to open the **IP Configuration** window.
3. Select your network adapter. You should see your computer's IP address, subnet mask and default gateway.

Windows 2000/NT/XP

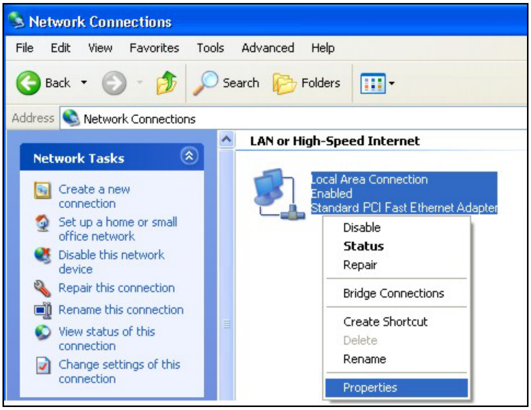
1. For Windows XP, click **start**, **Control Panel**. In Windows 2000/NT, click **Start**, **Settings**, **Control Panel**.



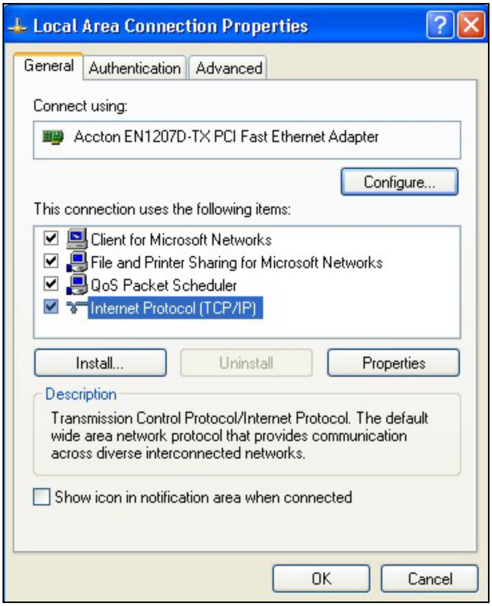
2. For Windows XP, click **Network Connections**. For Windows 2000/NT, click **Network and Dial-up Connections**.



3. Right-click **Local Area Connection** and then click **Properties**.



4. Select **Internet Protocol (TCP/IP)** (under the **General** tab in Win XP) and click **Properties**.



Connect using:

Accton EN1207D-TX PCI Fast Ethernet Adapter

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.

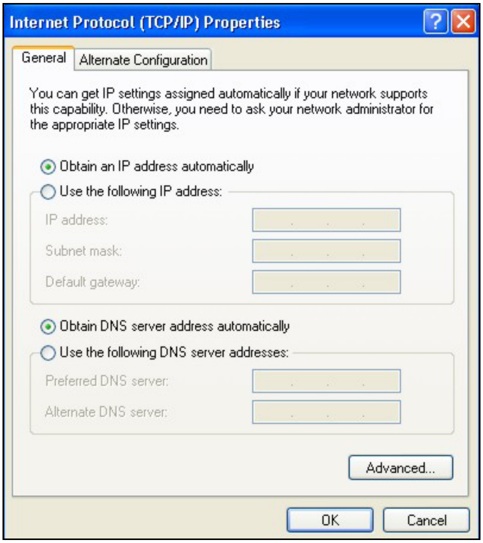
□ Show icon in notification area when connected

5. The **Internet Protocol TCP/IP Properties** window opens (the **General tab** in Windows XP).

   -If you have a dynamic IP address click **Obtain an IP address automatically**.

   -If you have a static IP address click **Use the following IP Address** and fill in the **IP address**, **Subnet mask**, and **Default gateway** fields.

   Click **Advanced**.



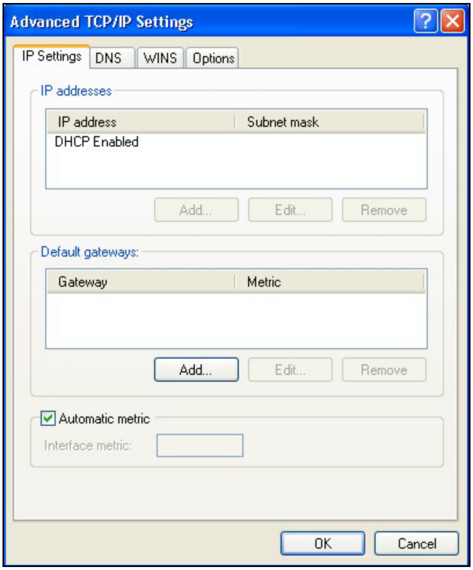
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

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

IP address: . . .
Subnet mask: . . .
Default gateway: . . .

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

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



6. -If you do not know your gateway's IP address, remove any previously installed gateways in the **IP Settin**gs tab and click **OK**.

   Do one or more of the following if you want to configure additional IP addresses:

   -In the **IP Settings** tab, in IP addresses, click **Add**.

   -In **TCP/IP Address**, type an IP address in **IP address** and a subnet mask in **Subnet mask**, and then click **Add**.

   -Repeat the above two steps for each IP address you want to add.

   -Configure additional default gateways in the **IP Settings** tab by clicking **Add** in **Default gateways**.

   -In **TCP/IP Gateway Address**, type the IP address of the default gateway in **Gateway**. To manually configure a default metric (the number of transmission hops), clear the **Automatic metric** check box and type a metric in **Metric**.

   -Click **Add**.

   -Repeat the previous three steps for each default gateway you want to add.

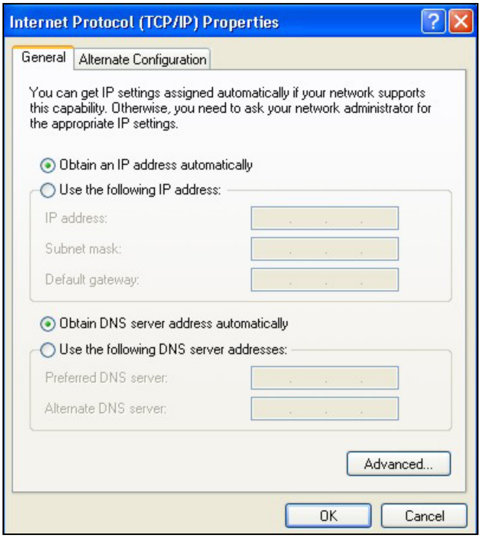
   -Click **OK** when finished.

7. In the **Internet Protocol TCP/IP Properties** window (the **General tab** in Windows XP):

   -Click **Obtain DNS server address automatically** if you do not know your DNS server IP address(es).

   -If you know your DNS server IP address(es), click **Use the following DNS server addresses**, and type them in the **Preferred DNS server** and **Alternate DNS server** fields.

   If you have previously configured DNS servers, click **Advanced** and then the **DNS** tab to order them.



Internet Protocol (TCP/IP) Properties

General | Alternate Configuration

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:

Subnet mask:

Default gateway:

● Obtain DNS server address automatically

○ Use the following DNS server addresses:

Preferred DNS server:

Alternate DNS server:

8. Click **OK** to close the **Internet Protocol (TCP/IP) Properties** window.

9. Click **OK** to close the **Local Area Connection Properties** window.

10. Turn on your ZyWALL and restart your computer (if prompted).

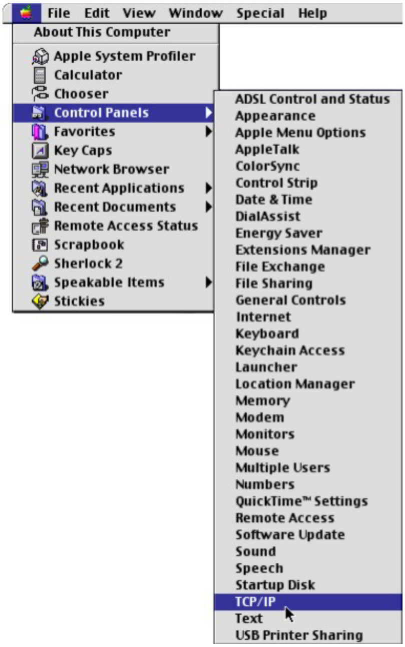
Verifying Your Computer's IP Address

1. Click **Start**, **All Programs**, **Accessories** and then **Command Prompt**.

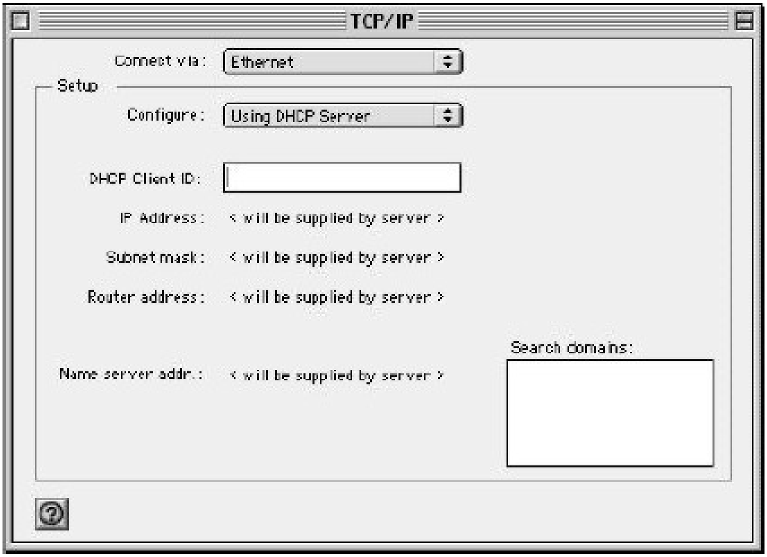
2. In the **Command Prompt** window, type "ipconfig" and then press [ENTER]. You can also open **Network Connections**, right-click a network connection, click **Status** and then click the **Support** tab.

Macintosh OS 8/9

1. Click the **Apple** menu, **Control Panel** and double-click **TCP/IP** to open the **TCP/IP Control Panel**.



2. Select **Ethernet built-in** from the **Connect via** list.



TCP/IP

Connect via: Ethernet

Setup

Configure: Using DHCP Server

DHCP Client ID:

IP Address: < will be supplied by server >

Subnet mask: < will be supplied by server >

Router address: < will be supplied by server >

Search domains:

Name server addr.: < will be supplied by server >

3. For dynamically assigned settings, select **Using DHCP Server** from the **Configure:** list.

4. For statically assigned settings, do the following:

   -From the **Configure** box, select **Manually**.

   -Type your IP address in the **IP Address** box.

   -Type your subnet mask in the **Subnet mask** box.

   -Type the IP address of your ZyWALL in the **Router address** box.

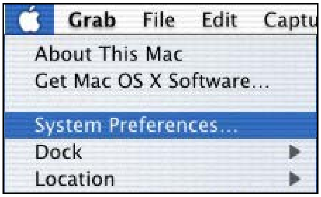
5. Close the **TCP/IP Control Panel**.
6. Click **Save** if prompted, to save changes to your configuration.
7. Turn on your ZyWALL and restart your computer (if prompted).

Verifying Your Computer's IP Address

Check your TCP/IP properties in the **TCP/IP Control Panel** window.

Macintosh OS X

1. Click the **Apple** menu, and click **System Preferences** to open the **System Preferences** window.

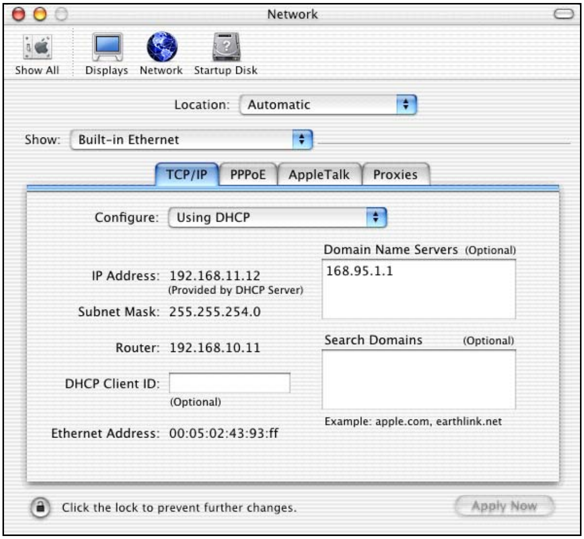


2. Click **Network** in the icon bar.

   - Select **Automatic** from the **Location** list.

   - Select **Built-in Ethernet** from the **Show** list.

   - Click the **TCP/IP** tab.



Location: Automatic

Show: Built-in Ethernet

Configure: Using DHCP

IP Address: 192.168.11.12
(Provided by DHCP Server)

Subnet Mask: 255.255.254.0

Router: 192.168.10.11

DHCP Client ID:
(Optional)

Ethernet Address: 00:05:02:43:93:ff

Domain Name Servers (Optional)
168.95.1.1

Search Domains (Optional)

Example: apple.com, earthlink.net

Click the lock to prevent further changes.

3. For dynamically assigned settings, select **Using DHCP** from the **Configure** list.

4. For statically assigned settings, do the following:

   -From the **Configure** box, select **Manually**.

   -Type your IP address in the **IP Address** box.

   -Type your subnet mask in the **Subnet mask** box.

   -Type the IP address of your ZyWALL in the **Router address** box.

5. Click **Apply Now** and close the window.

6. Turn on your ZyWALL and restart your computer (if prompted).

Verifying Your Computer's IP Address

Check your TCP/IP properties in the **Network** window.

Chapter 2
Triangle Route

The Ideal Setup

When the firewall is on, your ZyWALL acts as a secure gateway between your LAN and the Internet. In an ideal network topology, all incoming and outgoing network traffic passes through the ZyWALL to protect your LAN against attacks.

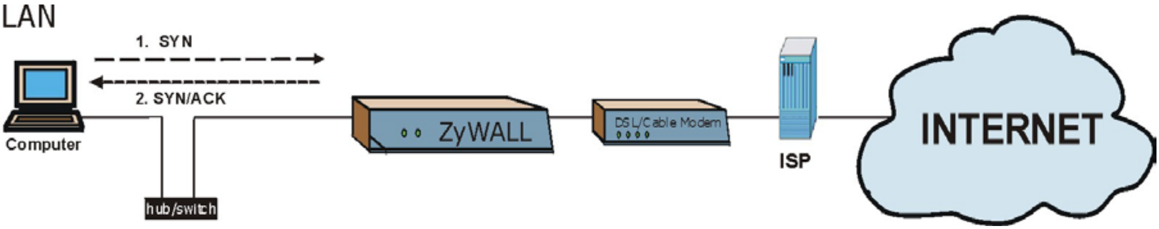


Diagram 2-1 Ideal Setup

The “Triangle Route” Problem

A traffic route is a path for sending or receiving data packets between two Ethernet devices. Some companies have more than one alternate route to one or more ISPs. If the LAN and ISP(s) are in the same subnet, the “triangle route” problem may occur. The steps below describe the “triangle route” problem.

Step 1. A computer on the LAN initiates a connection by sending out a SYN packet to a receiving server on the WAN.

Step 2. The ZyWALL reroutes the SYN packet through Gateway **B** on the LAN to the WAN.

Step 3. The reply from the WAN goes directly to the computer on the LAN without going through the ZyWALL.

As a result, the ZyWALL resets the connection, as the connection has not been acknowledged.

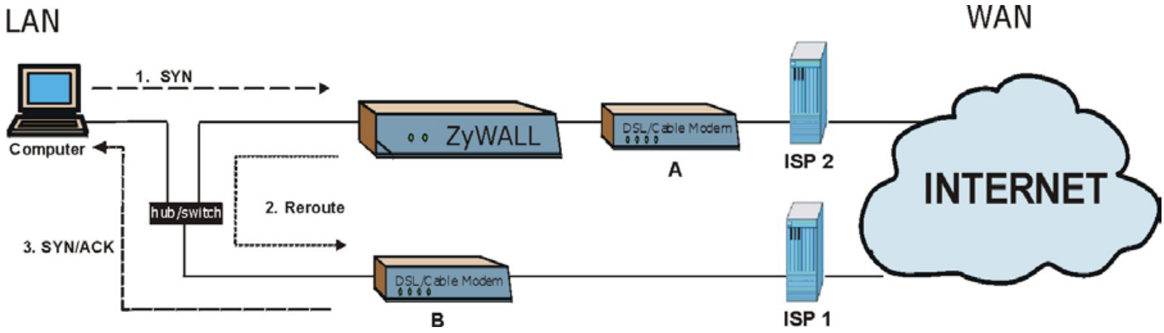


Diagram 2-2 "Triangle Route" Problem

The "Triangle Route" Solutions

This section presents you two solutions to the "triangle route" problem.

IP Aliasing

IP alias allows you to partition your network into logical sections over the same Ethernet interface. Your ZyWALL supports up to three logical LAN interfaces with the ZyWALL being the gateway for each logical network. By putting your LAN and Gateway **B** in different subnets, all returning network traffic must pass through the ZyWALL to your LAN. The following steps describe such a scenario.

Step 1. A computer on the LAN initiates a connection by sending a SYN packet to a receiving server on the WAN.

Step 2. The ZyWALL reroutes the packet to Gateway **B** which is in Subnet 2.

Step 3. The reply from WAN goes through the ZyWALL to the computer on the LAN in Subnet 1.

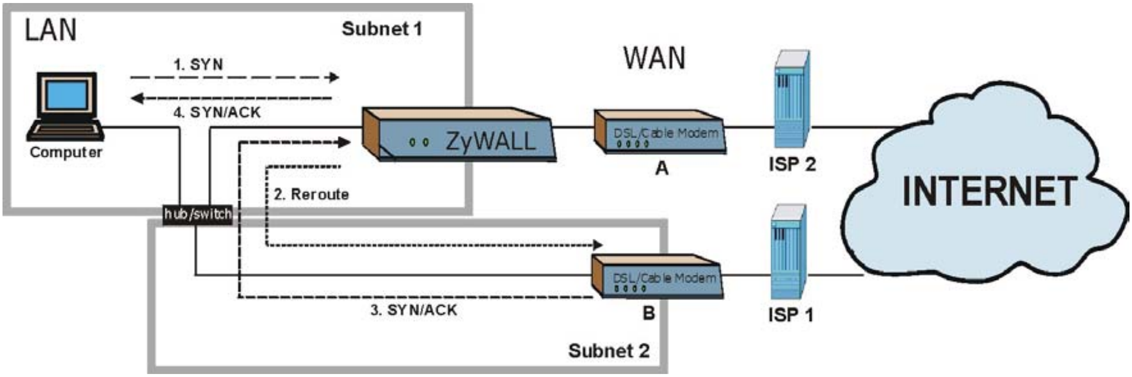


Diagram 2-3 IP Alias

Gateways on the WAN Side

A second solution to the "triangle route" problem is to put all of your network gateways on the WAN side as the following figure shows. This ensures that all incoming network traffic passes through your ZyWALL to your LAN. Therefore your LAN is protected.

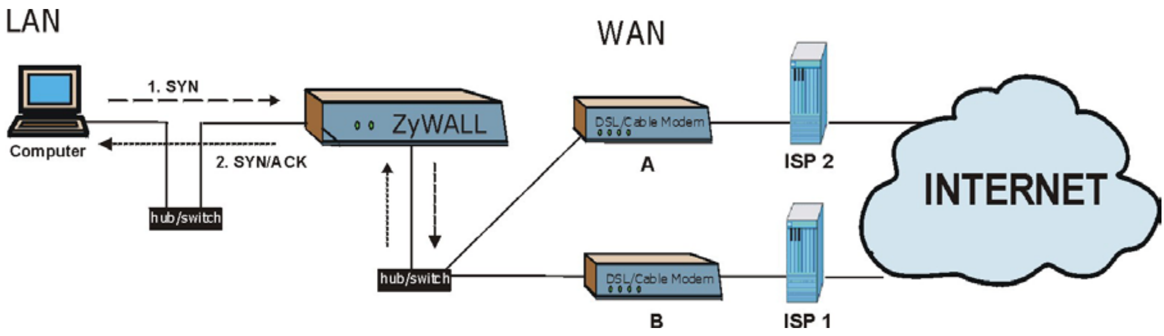


Diagram 2-4 Gateways on the WAN Side

Chapter 3
The Big Picture

The following figure gives an overview of how filtering, the firewall, VPN and NAT are related.

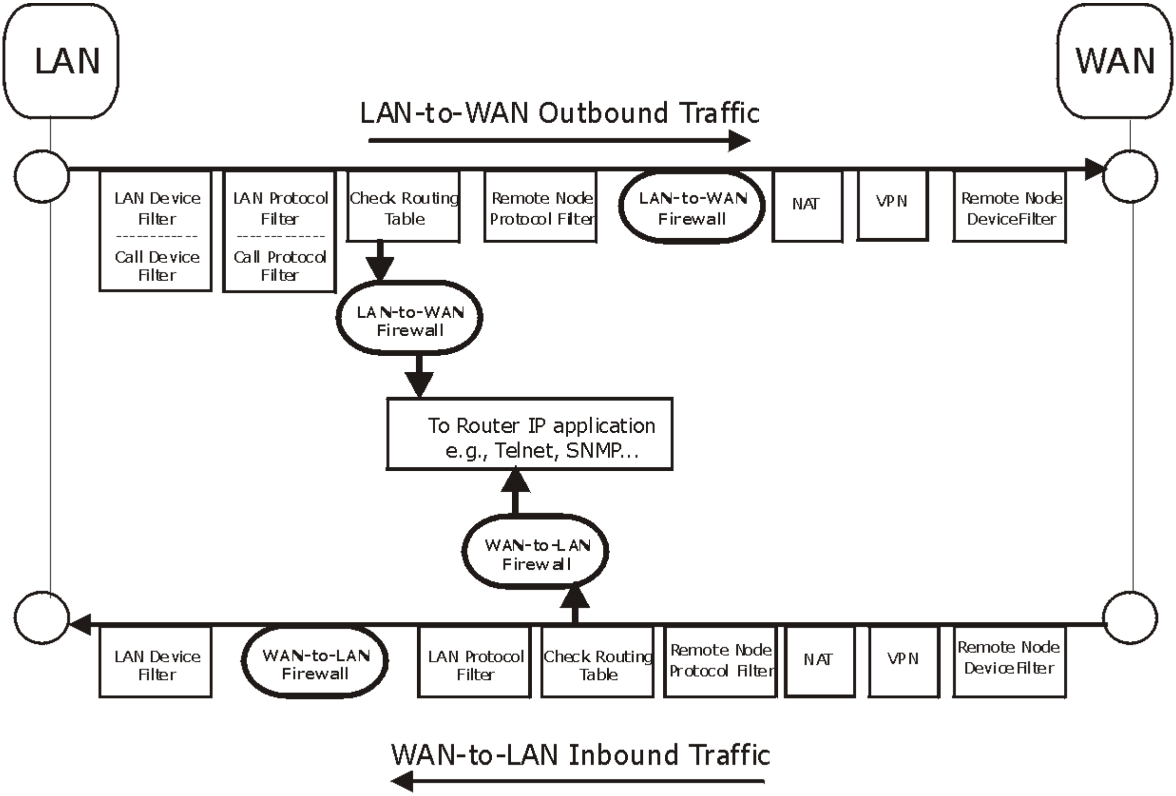


Diagram 3-1 Big Picture— Filtering, Firewall, VPN and NAT

Chapter 4
Wireless LAN and IEEE 802.11

A wireless LAN (WLAN) provides a flexible data communications system that you can use to access various services (navigating the Internet, email, printer services, etc.) without the use of a cabled connection. In effect a wireless LAN environment provides you the freedom to stay connected to the network while roaming around in the coverage area. WLAN is not available on all models.

Benefits of a Wireless LAN

Wireless LAN offers the following benefits:

1. It provides you with access to network services in areas otherwise hard or expensive to wire, such as historical buildings, buildings with asbestos materials and classrooms.
2. It provides healthcare workers like doctors and nurses access to a complete patient’s profile on a handheld or notebook computer upon entering a patient’s room.
3. It allows flexible workgroups a lower total cost of ownership for workspaces that are frequently reconfigured.
4. It allows conference room users access to the network as they move from meeting to meeting, getting up-to-date access to information and the ability to communicate decisions while “on the go”.
5. It provides campus-wide networking mobility, allowing enterprises the roaming capability to set up easy-to-use wireless networks that cover the entire campus transparently.

IEEE 802.11

The 1997 completion of the IEEE 802.11 standard for wireless LANs (WLANs) was a first important step in the evolutionary development of wireless networking technologies. The standard was developed to maximize interoperability between differing brands of wireless LANs as well as to introduce a variety of performance improvements and benefits. On September 16, 1999, the 802.11b provided much higher data rates of up to 11Mbps, while maintaining the 802.11 protocol.

The IEEE 802.11 specifies three different transmission methods for the PHY, the layer responsible for transferring data between nodes. Two of the methods use spread spectrum RF signals, Direct Sequence Spread Spectrum (DSSS) and Frequency-Hopping Spread Spectrum (FHSS), in the 2.4 to 2.4825 GHz unlicensed ISM (Industrial, Scientific and Medical) band. The third method is infrared technology, using very high frequencies, just below visible light in the electromagnetic spectrum to carry data.

Ad-hoc Wireless LAN Configuration

The simplest WLAN configuration is an independent (Ad-hoc) WLAN that connects a set of computers with wireless nodes or stations (STA), which is called a Basic Service Set (BSS). In the most basic form, a wireless LAN connects a set of computers with wireless adapters. Any time two or more wireless adapters are within range of each other, they can set up an independent network, which is commonly referred to as an Ad-hoc network or Independent Basic Service Set (IBSS). See the following diagram of an example of an Ad-hoc wireless LAN.

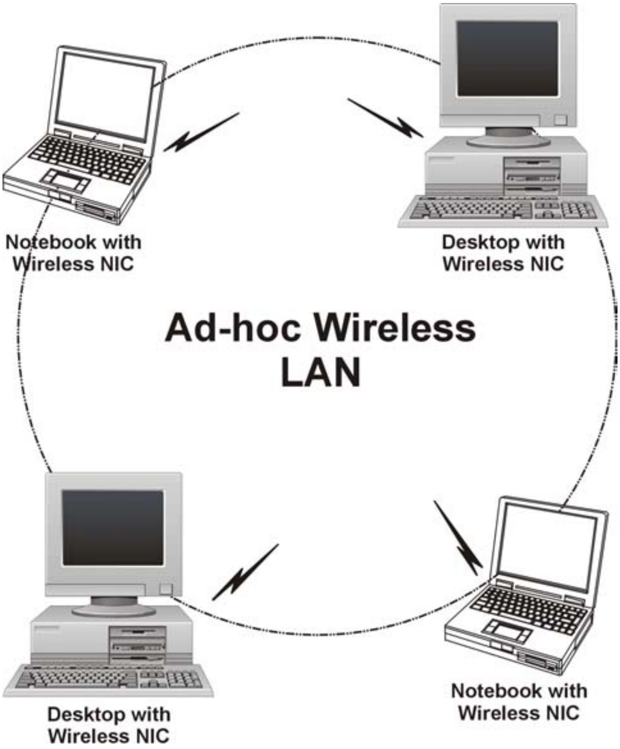

Notebook with Wireless NIC
Desktop with Wireless NIC
Ad-hoc Wireless LAN
Desktop with Wireless NIC
Notebook with Wireless NIC

Diagram 4-1 Peer-to-Peer Communication in an Ad-hoc Network

Infrastructure Wireless LAN Configuration

For Infrastructure WLANs, multiple Access Points (APs) link the WLAN to the wired network and allow users to efficiently share network resources. The Access Points not only provide communication with the wired network but also mediate wireless network traffic in the immediate neighborhood. Multiple Access Points can provide wireless coverage for an entire building or campus. All communications between stations or between a station and a wired network client go through the Access Point.

The Extended Service Set (ESS) shown in the next figure consists of a series of overlapping BSSs (each containing an Access Point) connected together by means of a Distribution System (DS). Although the DS could be any type of network, it is almost invariably an Ethernet LAN. Mobile nodes can roam between Access Points and seamless campus-wide coverage is possible.

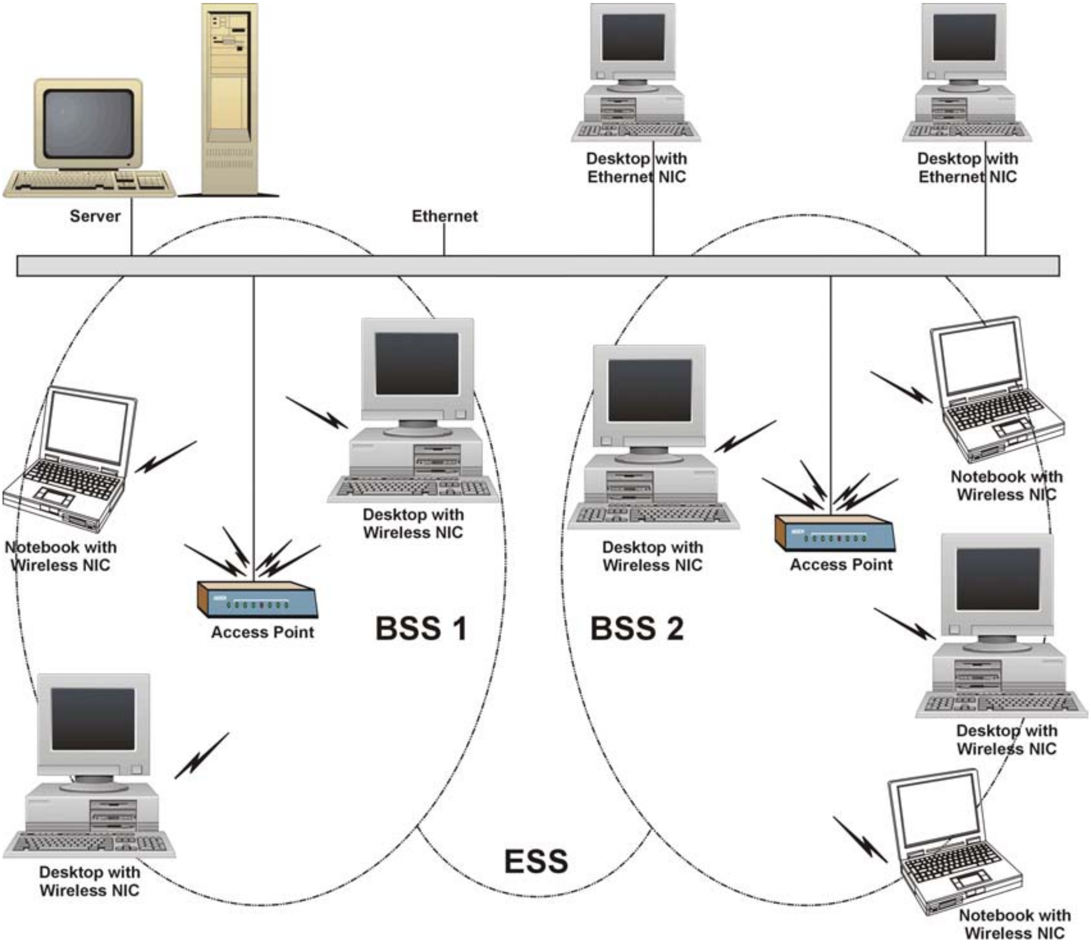

Server
Ethernet
Desktop with Ethernet NIC
Desktop with Ethernet NIC
Desktop with Wireless NIC
Notebook with Wireless NIC
Access Point
BSS 1
Desktop with Wireless NIC
Desktop with Wireless NIC
Access Point
BSS 2
Notebook with Wireless NIC
Desktop with Wireless NIC
ESS
Notebook with Wireless NIC

Diagram 4-2 ESS Provides Campus-Wide Coverage

Chapter 5
Wireless LAN With IEEE 802.1x

As wireless networks become popular for both portable computing and corporate networks, security is now a priority.

Security Flaws with IEEE 802.11

Wireless networks based on the original IEEE 802.11 have a poor reputation for safety. The IEEE 802.11b wireless access standard, first published in 1999, was based on the MAC address. As the MAC address is sent across the wireless link in clear text, it is easy to spoof and fake. Even the WEP (Wire Equivalent Privacy) data encryption is unreliable as it can be easily decrypted with current computer speed

Deployment Issues with IEEE 802.11

User account management has become a network administrator's nightmare in a corporate environment, as the IEEE 802.11b standard does not provide any central user account management. User access control is done through manual modification of the MAC address table on the access point. Although WEP data encryption offers a form of data security, you have to reset the WEP key on the clients each time you change your WEP key on the access point.

IEEE 802.1x

In June 2001, the IEEE 802.1x standard was designed to extend the features of IEEE 802.11 to support extended authentication as well as providing additional accounting and control features. It is supported by Windows XP and a number of network devices.

Advantages of the IEEE 802.1x

- User based identification that allows for roaming.

- Support for RADIUS (Remote Authentication Dial In User Service, RFC 2138, 2139) for centralized user profile and accounting management on a network RADIUS server.
- Support for EAP (Extensible Authentication Protocol, RFC 2486) that allows additional authentication methods to be deployed with no changes to the access point or the wireless clients.

RADIUS Server Authentication Sequence

The following figure depicts a typical wireless network with a remote RADIUS server for user authentication using EAPOL (EAP Over LAN).

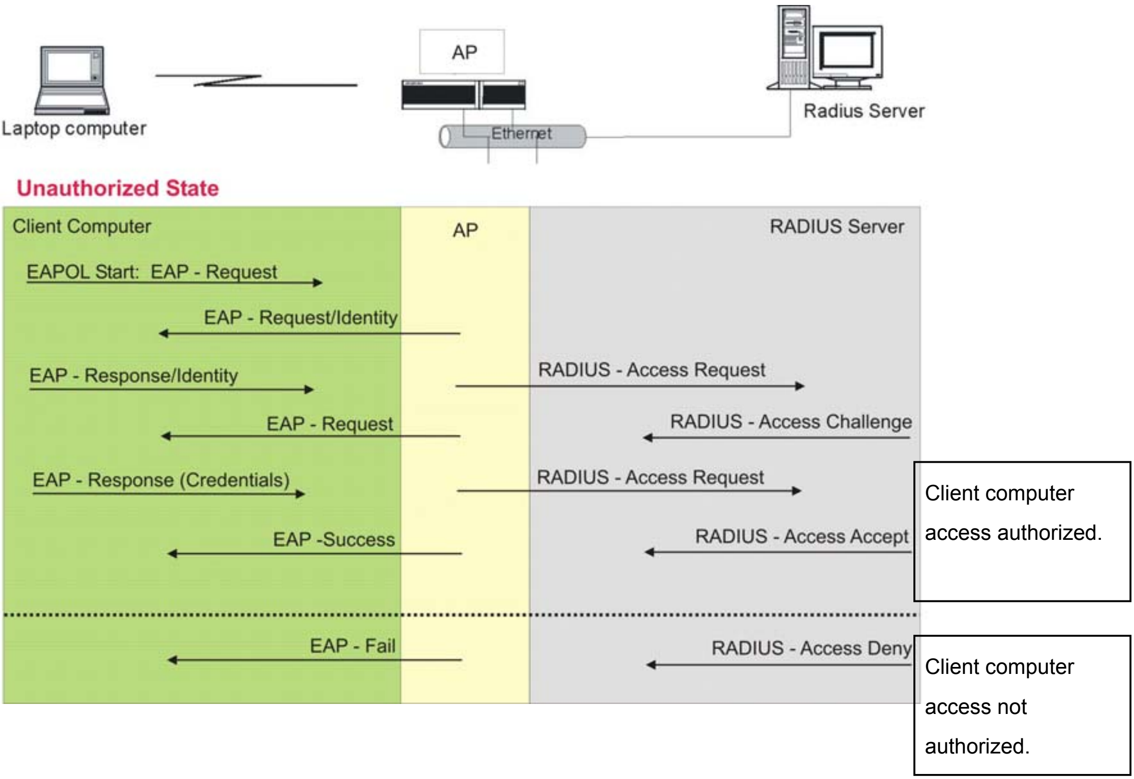


Diagram 5-1 Sequences for EAP MD5–Challenge Authentication

Chapter 6
PPPoE

PPPoE in Action

An ADSL modem bridges a PPP session over Ethernet (PPP over Ethernet, RFC 2516) from your PC to an ATM PVC (Permanent Virtual Circuit), which connects to a DSL Access Concentrator where the PPP session terminates (see the next figure). One PVC can support any number of PPP sessions from your LAN. PPPoE provides access control and billing functionality in a manner similar to dial-up services using PPP.

Benefits of PPPoE

PPPoE offers the following benefits:

1. It provides you with a familiar dial-up networking (DUN) user interface.
2. It lessens the burden on the carriers of provisioning virtual circuits all the way to the ISP on multiple switches for thousands of users. For GSTN (PSTN & ISDN), the switching fabric is already in place.
3. It allows the ISP to use the existing dial-up model to authenticate and (optionally) to provide differentiated services.

Traditional Dial-up Scenario

The following diagram depicts a typical hardware configuration where the PCs use traditional dial-up networking.

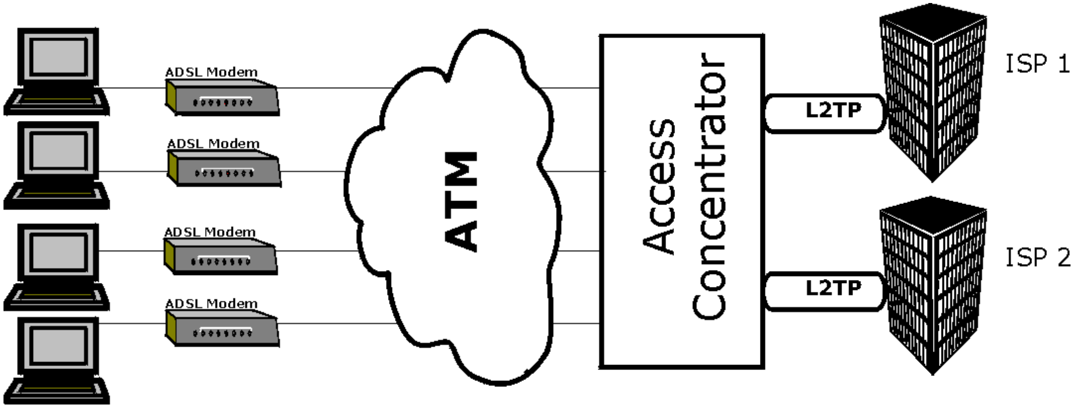


Diagram 6-1 Single-PC per Modem Hardware Configuration

How PPPoE Works

The PPPoE driver makes the Ethernet appear as a serial link to the PC and the PC runs PPP over it, while the modem bridges the Ethernet frames to the Access Concentrator (AC). Between the AC and an ISP, the AC is acting as a L2TP (Layer 2 Tunneling Protocol) LAC (L2TP Access Concentrator) and tunnels the PPP frames to the ISP. The L2TP tunnel is capable of carrying multiple PPP sessions.

With PPPoE, the VC (Virtual Circuit) is equivalent to the dial-up connection and is between the modem and the AC, as opposed to all the way to the ISP. However, the PPP negotiation is between the PC and the ISP.

ZyWALL as a PPPoE Client

When using the ZyWALL as a PPPoE client, the PCs on the LAN see only Ethernet and are not aware of PPPoE. This alleviates the administrator from having to manage the PPPoE clients on the individual PCs.

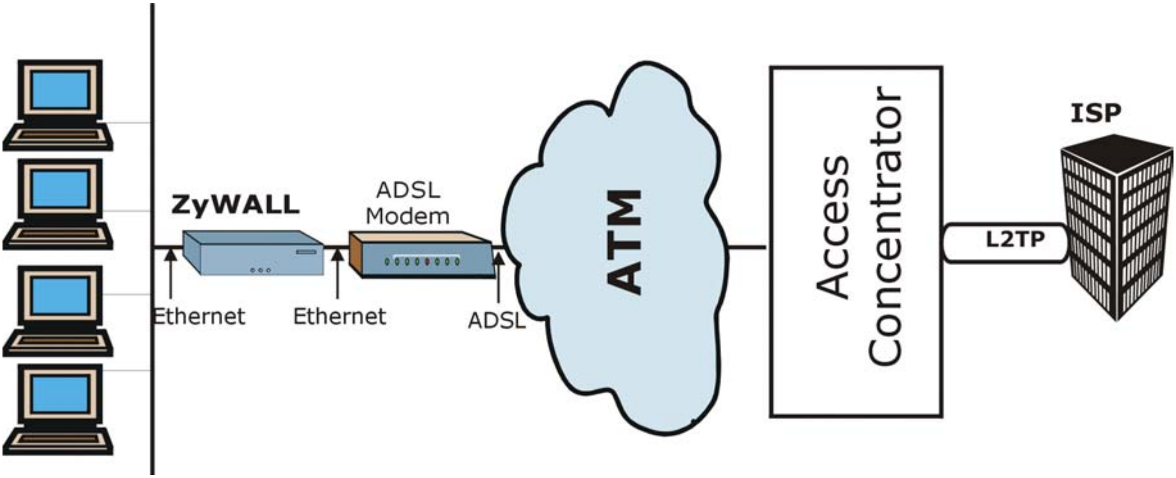


Diagram 6-2 ZyWALL as a PPPoE Client

Chapter 7
PPTP

What is PPTP?

PPTP (Point-to-Point Tunneling Protocol) is a Microsoft proprietary protocol (RFC 2637 for PPTP is informational only) to tunnel PPP frames.

How can we transport PPP frames from a PC to a broadband modem over Ethernet?

A solution is to build PPTP into the ANT (ADSL Network Termination) where PPTP is used only over the short haul between the PC and the modem over Ethernet. For the rest of the connection, the PPP frames are transported with PPP over AAL5 (RFC 2364). The PPP connection, however, is still between the PC and the ISP. The various connections in this setup are depicted in the following diagram. The drawback of this solution is that it requires one separate ATM VC per destination.

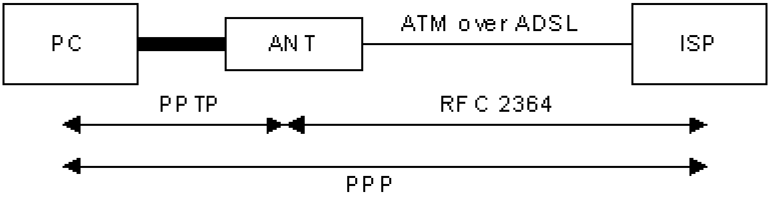


Diagram 7-1 Transport PPP frames over Ethernet

PPTP and the ZyWALL

When the ZyWALL is deployed in such a setup, it appears as a PC to the ANT.

In Windows VPN or PPTP Pass-Through feature, the PPTP tunneling is created from Windows 95, 98 and NT clients to an NT server in a remote location. The pass-through feature allows users on the network to access a different remote server using the ZyWALL's Internet connection. In NAT mode, the ZyWALL is able to pass the PPTP packets to the internal PPTP server (i.e. NT server) behind the NAT. Users need to forward PPTP packets to port 1723 by configuring the server in **Menu 15.2 - Server Set Setup**. In the case above as the remote PPTP Client initializes the PPTP connection, the user must configure the PPTP clients. The ZyWALL initializes the PPTP connection hence; there is no need to configure the remote PPTP clients.

PPTP Protocol Overview

PPTP is very similar to L2TP, since L2TP is based on both PPTP and L2F (Cisco's Layer 2 Forwarding). Conceptually, there are three parties in PPTP, namely the PNS (PPTP Network Server), the PAC (PPTP Access Concentrator) and the PPTP user. The PNS is the box that hosts both the PPP and the PPTP stacks and forms one end of the PPTP tunnel. The PAC is the box that dials/answers the phone calls and relays the PPP frames to the PNS. The PPTP user is not necessarily a PPP client (can be a PPP server too). Both the PNS and the PAC must have IP connectivity; however, the PAC must in addition have dial-up capability. The phone call is between the user and the PAC and the PAC tunnels the PPP frames to the PNS. The PPTP user is unaware of the tunnel between the PAC and the PNS.

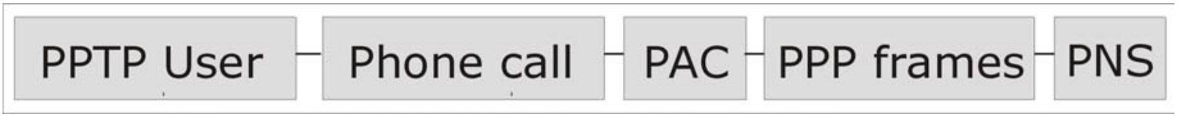

PPTP User – Phone call – PAC – PPP frames – PNS

Diagram 7-2 PPTP Protocol Overview

Microsoft includes PPTP as a part of the Windows OS. In Microsoft's implementation, the PC, and hence the ZyWALL, is the PNS that requests the PAC (the ANT) to place an outgoing call over AAL5 to an RFC 2364 server.

Control & PPP connections

Each PPTP session has distinct control connection and PPP data connection.

Call Connection

The control connection runs over TCP. Similar to L2TP, a tunnel control connection is first established before call control messages can be exchanged. Please note that a tunnel control connection supports multiple call sessions.

The following diagram depicts the message exchange of a successful call setup between a PC and an ANT.

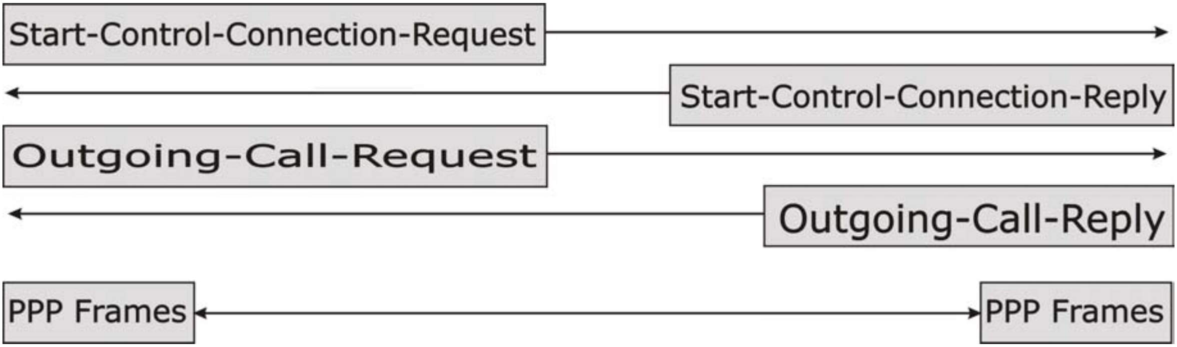

Start-Control-Connection-Request
Start-Control-Connection-Reply
Outgoing-Call-Request
Outgoing-Call-Reply
PPP Frames
PPP Frames

Diagram 7-3 Example Message Exchange between PC and an ANT

PPP Data Connection

The PPP frames are tunneled between the PNS and PAC over GRE (General Routing Encapsulation, RFC 1701, 1702). The individual calls within a tunnel are distinguished using the Call ID field in the GRE header.

Chapter 8
IP Subnetting

IP Addressing

Routers "route" based on the network number. The router that delivers the data packet to the correct destination host uses the host ID.

IP Classes

An IP address is made up of four octets (eight bits), written in dotted decimal notation, for example, 192.168.1.1. IP addresses are categorized into different classes. The class of an address depends on the value of its first octet.

- Class "A" addresses have a 0 in the left most bit. In a class "A" address the first octet is the network number and the remaining three octets make up the host ID.
- Class "B" addresses have a 1 in the left most bit and a 0 in the next left most bit. In a class "B" address the first two octets make up the network number and the two remaining octets make up the host ID.
- Class "C" addresses begin (starting from the left) with 1 1 0. In a class "C" address the first three octets make up the network number and the last octet is the host ID.
- Class "D" addresses begin with 1 1 1 0. Class "D" addresses are used for multicasting. (There is also a class "E" address. It is reserved for future use.)

Chart 8-1 Classes of IP Addresses

IP ADDRESS:		OCTET 1	OCTET 2	OCTET 3	OCTET 4
Class A	0	Network number	Host ID	Host ID	Host ID
Class B	10	Network number	Network number	Host ID	Host ID
Class C	110	Network number	Network number	Network number	Host ID

Host IDs of all zeros or all ones are not allowed.

Therefore:

- A class "C" network (8 host bits) can have 2^8 –2 or 254 hosts.

- A class “B” address (16 host bits) can have 2^{16} –2 or 65534 hosts.

A class “A” address (24 host bits) can have 2^{24} –2 hosts (approximately 16 million hosts).

Since the first octet of a class “A” IP address must contain a “0”, the first octet of a class “A” address can have a value of 0 to 127.

Similarly the first octet of a class “B” must begin with “10”, therefore the first octet of a class “B” address has a valid range of 128 to 191. The first octet of a class “C” address begins with “110”, and therefore has a range of 192 to 223.

Chart 8-2 Allowed IP Address Range By Class

CLASS	ALLOWED RANGE OF FIRST OCTET (BINARY)	ALLOWED RANGE OF FIRST OCTET (DECIMAL)
Class A	**0**0000000 to **0**1111111	0 to 127
Class B	**10**000000 to **10**111111	128 to 191
Class C	**110**00000 to **110**11111	192 to 223
Class D	**1110**0000 to **1110**1111	224 to 239

Subnet Masks

A subnet mask is used to determine which bits are part of the network number, and which bits are part of the host ID (using a logical AND operation). A subnet mask has 32 bits; each bit of the mask corresponds to a bit of the IP address. If a bit in the subnet mask is a “1” then the corresponding bit in the IP address is part of the network number. If a bit in the subnet mask is “0” then the corresponding bit in the IP address is part of the host ID.

Subnet masks are expressed in dotted decimal notation just as IP addresses are. The “natural” masks for class A, B and C IP addresses are as follows.

Chart 8-3 “Natural” Masks

CLASS	NATURAL MASK
A	255.0.0.0
B	255.255.0.0
C	255.255.255.0

Subnetting

With subnetting, the class arrangement of an IP address is ignored. For example, a class C address no longer has to have 24 bits of network number and 8 bits of host ID. With subnetting, some of the host ID bits are converted into network number bits. By convention, subnet masks always consist of a continuous sequence of ones beginning from the left most bit of the mask, followed by a continuous sequence of zeros, for a total number of 32 bits.

Since the mask is always a continuous number of ones beginning from the left, followed by a continuous number of zeros for the remainder of the 32 bit mask, you can simply specify the number of ones instead of writing the value of each octet. This is usually specified by writing a “/” followed by the number of bits in the mask after the address.

For example, 192.1.1.0 /25 is equivalent to saying 192.1.1.0 with mask 255.255.255.128.

The following table shows all possible subnet masks for a class “C” address using both notations.

Chart 8-4 Alternative Subnet Mask Notation

SUBNET MASK IP ADDRESS	SUBNET MASK “1” BITS	LAST OCTET BIT VALUE
255.255.255.0	/24	0000 0000
255.255.255.128	/25	1000 0000
255.255.255.192	/26	1100 0000
255.255.255.224	/27	1110 0000
255.255.255.240	/28	1111 0000
255.255.255.248	/29	1111 1000
255.255.255.252	/30	1111 1100

The first mask shown is the class “C” natural mask. Normally if no mask is specified it is understood that the natural mask is being used.

Example: Two Subnets

As an example, you have a class “C” address 192.168.1.0 with subnet mask of 255.255.255.0.

	NETWORK NUMBER	HOST ID
IP Address	192.168.1.	0
IP Address (Binary)	11000000.10101000.00000001.	00000000
Subnet Mask	255.255.255.	0
Subnet Mask (Binary)	11111111.11111111.11111111.	00000000

The first three octets of the address make up the network number (class "C"). You want to have two separate networks.

Divide the network 192.168.1.0 into two separate subnets by converting one of the host ID bits of the IP address to a network number bit. The "borrowed" host ID bit can be either "0" or "1" thus giving two subnets; 192.168.1.0 with mask 255.255.255.128 and 192.168.1.128 with mask 255.255.255.128.

In the following charts, shaded/bolded last octet bit values indicate host ID bits "borrowed" to form network ID bits. The number of "borrowed" host ID bits determines the number of subnets you can have. The remaining number of host ID bits (after "borrowing") determines the number of hosts you can have on each subnet.

Chart 8-5 Subnet 1

	NETWORK NUMBER	LAST OCTET BIT VALUE
IP Address	192.168.1.	0
IP Address (Binary)	11000000.10101000.00000001.	**0**0000000
Subnet Mask	255.255.255.	128
Subnet Mask (Binary)	11111111.11111111.11111111.	**1**0000000
Subnet Address: 192.168.1.0	Lowest Host ID: 192.168.1.1	
Broadcast Address: 192.168.1.127	Highest Host ID: 192.168.1.126	

Chart 8-6 Subnet 2

	NETWORK NUMBER	LAST OCTET BIT VALUE
IP Address	192.168.1.	128
IP Address (Binary)	11000000.10101000.00000001.	**1**0000000
Subnet Mask	255.255.255.	128
Subnet Mask (Binary)	11111111.11111111.11111111.	**1**0000000
Subnet Address: 192.168.1.128	Lowest Host ID: 192.168.1.129	
Broadcast Address: 192.168.1.255	Highest Host ID: 192.168.1.254	

The remaining 7 bits determine the number of hosts each subnet can have. Host IDs of all zeros represent the subnet itself and host IDs of all ones are the broadcast address for that subnet, so the actual number of hosts available on each subnet in the example above is $2^7 - 2$ or 126 hosts for each subnet.

192.168.1.0 with mask 255.255.255.128 is the subnet itself, and 192.168.1.127 with mask 255.255.255.128 is the directed broadcast address for the first subnet. Therefore, the lowest IP address that can be assigned to an actual host for the first subnet is 192.168.1.1 and the highest is 192.168.1.126. Similarly the host ID range for the second subnet is 192.168.1.129 to 192.168.1.254.

Example: Four Subnets

The above example illustrated using a 25-bit subnet mask to divide a class "C" address space into two subnets. Similarly to divide a class "C" address into four subnets, you need to "borrow" two host ID bits to give four possible combinations of 00, 01, 10 and 11. The subnet mask is 26 bits (11111111.11111111.11111111.**11**000000) or 255.255.255.192. Each subnet contains 6 host ID bits, giving 2^6-2 or 62 hosts for each subnet (all 0's is the subnet itself, all 1's is the broadcast address on the subnet).

Chart 8-7 Subnet 1

	NETWORK NUMBER	LAST OCTET BIT VALUE
IP Address	192.168.1.	0
IP Address (Binary)	11000000.10101000.00000001.	**00**000000
Subnet Mask (Binary)	11111111.11111111.11111111.	**11**000000
Subnet Address: 192.168.1.0	Lowest Host ID: 192.168.1.1	
Broadcast Address: 192.168.1.63	Highest Host ID: 192.168.1.62	

Chart 8-8 Subnet 2

	NETWORK NUMBER	LAST OCTET BIT VALUE
IP Address	192.168.1.	64
IP Address (Binary)	11000000.10101000.00000001.	**01**000000
Subnet Mask (Binary)	11111111.11111111.11111111.	**11**000000
Subnet Address: 192.168.1.64	Lowest Host ID: 192.168.1.65	
Broadcast Address: 192.168.1.127	Highest Host ID: 192.168.1.126	

Chart 8-9 Subnet 3

	NETWORK NUMBER	LAST OCTET BIT VALUE
IP Address	192.168.1.	128
IP Address (Binary)	11000000.10101000.00000001.	**10**000000
Subnet Mask (Binary)	11111111.11111111.11111111.	**11**000000

Subnet Address: 192.168.1.128	Lowest Host ID: 192.168.1.129
Broadcast Address: 192.168.1.191	Highest Host ID: 192.168.1.190

Chart 8-10 Subnet 4

	NETWORK NUMBER	LAST OCTET BIT VALUE
IP Address	192.168.1.	192
IP Address (Binary)	11000000.10101000.00000001.	**11**000000
Subnet Mask (Binary)	11111111.11111111.11111111.	**11**000000
Subnet Address: 192.168.1.192		Lowest Host ID: 192.168.1.193
Broadcast Address: 192.168.1.255		Highest Host ID: 192.168.1.254

Example Eight Subnets

Similarly use a 27-bit mask to create 8 subnets (001, 010, 011, 100, 101, 110).

The following table shows class C IP address last octet values for each subnet.

Chart 8-11 Eight Subnets

SUBNET	SUBNET ADDRESS	FIRST ADDRESS	LAST ADDRESS	BROADCAST ADDRESS
1	0	1	30	31
2	32	33	62	63
3	64	65	94	95
4	96	97	126	127
5	128	129	158	159
6	160	161	190	191
7	192	193	222	223
8	224	223	254	255

The following table is a summary for class “C” subnet planning.

Chart 8-12 Class C Subnet Planning

NO. “BORROWED” HOST BITS	SUBNET MASK	NO. SUBNETS	NO. HOSTS PER SUBNET
1	255.255.255.128 (/25)	2	126
2	255.255.255.192 (/26)	4	62
3	255.255.255.224 (/27)	8	30
4	255.255.255.240 (/28)	16	14
5	255.255.255.248 (/29)	32	6
6	255.255.255.252 (/30)	64	2
7	255.255.255.254 (/31)	128	1

Subnetting With Class A and Class B Networks.

For class “A” and class “B” addresses the subnet mask also determines which bits are part of the network number and which are part of the host ID.

A class “B” address has two host ID octets available for subnetting and a class “A” address has three host ID octets (see *Chart 8-1*) available for subnetting.

The following table is a summary for class “B” subnet planning.

Chart 8-13 Class B Subnet Planning

NO. “BORROWED” HOST BITS	SUBNET MASK	NO. SUBNETS	NO. HOSTS PER SUBNET
1	255.255.128.0 (/17)	2	32766
2	255.255.192.0 (/18)	4	16382
3	255.255.224.0 (/19)	8	8190
4	255.255.240.0 (/20)	16	4094
5	255.255.248.0 (/21)	32	2046
6	255.255.252.0 (/22)	64	1022
7	255.255.254.0 (/23)	128	510
8	255.255.255.0 (/24)	256	254

Chart 8-13 Class B Subnet Planning

NO. "BORROWED" HOST BITS	SUBNET MASK	NO. SUBNETS	NO. HOSTS PER SUBNET
9	255.255.255.128 (/25)	512	126
10	255.255.255.192 (/26)	1024	62
11	255.255.255.224 (/27)	2048	30
12	255.255.255.240 (/28)	4096	14
13	255.255.255.248 (/29)	8192	6
14	255.255.255.252 (/30)	16384	2
15	255.255.255.254 (/31)	32768	1

Part II:

Command and Log Information

This part provides information on the command interpreter interface, firewall and NetBIOS commands and logs and password protection.

Chapter 9
Command Interpreter

The following describes how to use the command interpreter. Enter 24 in the main menu to bring up the system maintenance menu. Enter 8 to go to **Menu 24.8 - Command Interpreter Mode**. See the included disk or zyxel.com for more detailed information on these commands.

Use of undocumented commands or misconfiguration can damage the unit and possibly render it unusable.

Command Syntax

The command keywords are in `courier new` font.

Enter the command keywords exactly as shown, do not abbreviate.

The required fields in a command are enclosed in angle brackets <>.

The optional fields in a command are enclosed in square brackets `[]`.

The `|`symbol means “or”.

For example,

```
sys filter netbios config <type> <on|off>
```

means that you must specify the type of netbios filter and whether to turn it on or off.

Command Usage

A list of valid commands can be found by typing `help` or `?` at the command prompt. Always type the full command. Type `exit` to return to the SMT main menu when finished.

Chapter 10
Firewall Commands

The following describes the firewall commands. See the *Command Interpreter* appendix for information on the command structure.

Chart 10-1 Firewall Commands

FUNCTION	COMMAND	DESCRIPTION
Firewall		
Set-Up		
	`config edit firewall active <yes | no>`	This command turns the firewall on or off.
	`config retrieve firewall`	This command returns the previously saved firewall settings.
	`config save firewall`	This command saves the current firewall settings.
Display		
	`config display firewall`	This command shows the of all the firewall settings including e-mail, attack, and the sets/ rules.
	`config display firewall set <set #>`	This command shows the current configuration of a set; including timeout values, name, default-permit, and etc. If you don't put use a number (#) after "set", information about all of the sets/rules appears.
	`config display firewall set <set #> rule <rule #>`	This command shows the current entries of a rule in a firewall rule set.

Chart 10-1 Firewall Commands

FUNCTION	COMMAND	DESCRIPTION
	`config display firewall attack`	This command shows all of the attack response settings.
	`config display firewall e-mail`	This command shows all of the e-mail settings.
	`config display firewall ?`	This command shows all of the available firewall sub commands.
Edit		
E-mail	`config edit firewall e-mail mail-server <ip address of mail server>`	This command sets the IP address to which the e-mail messages are sent.
	`config edit firewall e-mail return-addr <e-mail address>`	This command sets the source e-mail address of the firewall e-mails.
	`config edit firewall e-mail email-to <e-mail address>`	This command sets the e-mail address to which the firewall e-mails are sent.
	`config edit firewall e-mail policy <full | hourly | daily | weekly>`	This command sets how frequently the firewall log is sent via e-mail.
	`config edit firewall e-mail day <sunday | monday | tuesday | wednesday | thursday | friday | saturday>`	This command sets the day on which the current firewall log is sent through e-mail if the ZyWALL is set to send it on a weekly basis.

Chart 10-1 Firewall Commands

FUNCTION	COMMAND	DESCRIPTION
	`config edit firewall e-mail hour <0-23>`	This command sets the hour when the firewall log is sent through e- mail if the ZyWALL is set to send it on an hourly, daily or weekly basis.
	`config edit firewall e-mail minute <0-59>`	This command sets the minute of the hour for the firewall log to be sent via e- mail if the ZyWALL is set to send it on a hourly, daily or weekly basis.
Attack	`config edit firewall attack send-alert <yes | no>`	This command enables or disables the immediate sending of DOS attack notification e-mail messages.
	`config edit firewall attack block <yes | no>`	Set this command to `yes` to block new traffic after the tcp-max-incomplete threshold is exceeded. Set it to `no` to delete the oldest half-open session when traffic exceeds the tcp-max-incomplete threshold.
	`config edit firewall attack block-minute <0-255>`	This command sets the number of minutes for new sessions to be blocked when the tcp-max-incomplete threshold is reached. This command is only valid when `block` is set to `yes`.
	`config edit firewall attack minute-high <0-255>`	This command sets the threshold rate of new half-open sessions per minute where the ZyWALL starts deleting old half-opened sessions until it gets them down to the minute-low threshold.

Chart 10-1 Firewall Commands

FUNCTION	COMMAND	DESCRIPTION
	`config edit firewall attack minute-low <0-255>`	This command sets the threshold of half-open sessions where the ZyWALL stops deleting half-opened sessions.
	`config edit firewall attack max-incomplete-high <0-255>`	This command sets the threshold of half-open sessions where the ZyWALL starts deleting old half-opened sessions until it gets them down to the max incomplete low.
	`config edit firewall attack max-incomplete-low <0-255>`	This command sets the threshold where the ZyWALL stops deleting half-opened sessions.
	`config edit firewall attack tcp-max-incomplete <0-255>`	This command sets the threshold of half-open TCP sessions with the same destination where the ZyWALL starts dropping half-open sessions to that destination.
Sets	`config edit firewall set <set #> name <desired name>`	This command sets a name to identify a specified set.
	`Config edit firewall set <set #> default-permit <forward | block>`	This command sets whether a packet is dropped or allowed through, when it does not meet a rule within the set.
	`Config edit firewall set <set #> icmp-timeout <seconds>`	This command sets the time period to allow an ICMP session to wait for the ICMP response.
	`Config edit firewall set <set #> udp-idle-timeout <seconds>`	This command sets how long a UDP connection is allowed to remain inactive before the ZyWALL considers the connection closed.

Chart 10-1 Firewall Commands

FUNCTION	COMMAND	DESCRIPTION
	`Config edit firewall set <set #> connection-timeout <seconds>`	This command sets how long ZyWALL waits for a TCP session to be established before dropping the session.
	`Config edit firewall set <set #> fin-wait-timeout <seconds>`	This command sets how long the ZyWALL leaves a TCP session open after the firewall detects a FIN-exchange (indicating the end of the TCP session).
	`Config edit firewall set <set #> tcp-idle-timeout <seconds>`	This command sets how long ZyWALL lets an inactive TCP connection remain open before considering it closed.
	`Config edit firewall set <set #> log <yes | no>`	This command sets whether or not the ZyWALL creates logs for packets that match the firewall's default rule set.
Rules	`Config edit firewall set <set #> rule <rule #> permit <forward | block>`	This command sets whether packets that match this rule are dropped or allowed through.
	`Config edit firewall set <set #> rule <rule #> active <yes | no>`	This command sets whether a rule is enabled or not.
	`Config edit firewall set <set #> rule <rule #> protocol <integer protocol value >`	This command sets the protocol specification number made in this rule for ICMP.
	`Config edit firewall set <set #> rule <rule #> log <none | match | not-match | both>`	This command sets the ZyWALL to log traffic that matches the rule, doesn't match, both or neither.

Chart 10-1 Firewall Commands

FUNCTION	COMMAND	DESCRIPTION
	`Config edit firewall set <set #> rule <rule #> alert <yes | no>`	This command sets whether or not the ZyWALL sends an alert e-mail when a DOS attack or a violation of a particular rule occurs.
	`config edit firewall set <set #> rule <rule #> srcaddr-single <ip address>`	This command sets the rule to have the ZyWALL check for traffic with this individual source address.
	`config edit firewall set <set #> rule <rule #> srcaddr-subnet <ip address> <subnet mask>`	This command sets a rule to have the ZyWALL check for traffic from a particular subnet (defined by IP address and subnet mask).
	`config edit firewall set <set #> rule <rule #> srcaddr-range <start ip address> <end ip address>`	This command sets a rule to have the ZyWALL check for traffic from this range of addresses.
	`config edit firewall set <set #> rule <rule #> destaddr-single <ip address>`	This command sets the rule to have the ZyWALL check for traffic with this individual destination address.
	`config edit firewall set <set #> rule <rule #> destaddr-subnet <ip address> <subnet mask>`	This command sets a rule to have the ZyWALL check for traffic with a particular subnet destination (defined by IP address and subnet mask).
	`config edit firewall set <set #> rule <rule #> destaddr-range <start ip address> <end ip address>`	This command sets a rule to have the ZyWALL check for traffic going to this range of addresses.

Chart 10-1 Firewall Commands

FUNCTION	COMMAND	DESCRIPTION
	`config edit firewall set <set #> rule <rule #> TCP destport-single  <port #>`	This command sets a rule to have the ZyWALL check for TCP traffic with this destination address. You may repeat this command to enter various, non-consecutive port numbers.
	`config edit firewall set <set #> rule <rule #> TCP destport-range <start port #> <end port #>`	This command sets a rule to have the ZyWALL check for TCP traffic with a destination port in this range.
	`config edit firewall set <set #> rule <rule #> UDP destport-single  <port #>`	This command sets a rule to have the ZyWALL check for UDP traffic with this destination address. You may repeat this command to enter various, non-consecutive port numbers.
	`config edit firewall set <set #> rule <rule #> UDP destport-range <start port #> <end port #>`	This command sets a rule to have the ZyWALL check for UDP traffic with a destination port in this range.
Delete		
	`config delete firewall e-mail`	This command removes all of the settings for e-mail alert.
	`config delete firewall attack`	This command resets all of the attack response settings to their defaults.
	`config delete firewall set <set #>`	This command removes the specified set from the firewall configuration.

Chart 10-1 Firewall Commands

FUNCTION	COMMAND	DESCRIPTION

	`config delete firewall set <set #> rule`
	`<rule #>`
		This command removes the specified rule in a firewall configuration set.

Chapter 11
NetBIOS Filter Commands

The following describes the NetBIOS packet filter commands. See the *Command Interpreter* appendix for information on the command structure.

Introduction

NetBIOS (Network Basic Input/Output System) are TCP or UDP broadcast packets that enable a computer to connect to and communicate with a LAN.

For some dial-up services such as PPPoE or PPTP, NetBIOS packets cause unwanted calls.

You can configure NetBIOS filters to do the following (filters for DMZ are not available on all models):

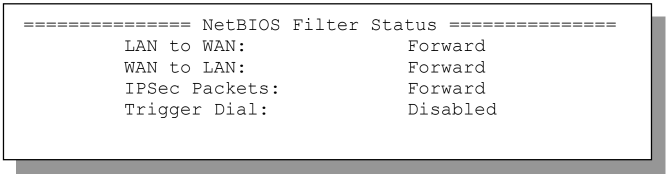
- Allow or disallow the sending of NetBIOS packets from the LAN to the WAN.
- Allow or disallow the sending of NetBIOS packets from the WAN to the LAN.
- Allow or disallow the sending of NetBIOS packets from the LAN to the DMZ.
- Allow or disallow the sending of NetBIOS packets from the WAN to the DMZ.
- Allow or disallow the sending of NetBIOS packets from the DMZ to the LAN.
- Allow or disallow the sending of NetBIOS packets from the DMZ to the WAN.
- Allow or disallow the sending of NetBIOS packets through VPN connections.
- Allow or disallow NetBIOS packets to initiate calls.

Display NetBIOS Filter Settings

Syntax:

```
sys filter netbios disp
```

This command gives a read-only list of the current NetBIOS filter modes for a ZyWALL that does not have DMZ.

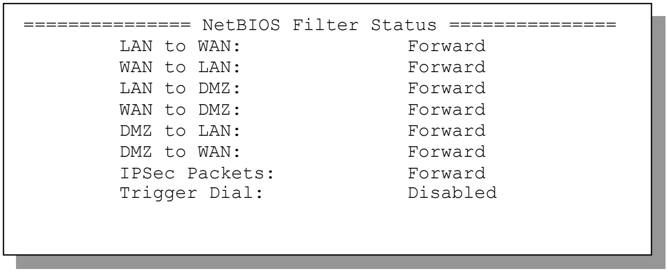


```
=============== NetBIOS Filter Status ===============
         LAN to WAN:              Forward
         WAN to LAN:              Forward
         IPSec Packets:           Forward
         Trigger Dial:            Disabled
```

Diagram 11-1 NetBIOS Display Filter Settings Command Without DMZ Example

Syntax: `sys filter netbios disp`

This command gives a read-only list of the current NetBIOS filter modes for a ZyWALL that has DMZ.



```
=============== NetBIOS Filter Status ===============
        LAN to WAN:               Forward
        WAN to LAN:               Forward
        LAN to DMZ:               Forward
        WAN to DMZ:               Forward
        DMZ to LAN:               Forward
        DMZ to WAN:               Forward
        IPSec Packets:            Forward
        Trigger Dial:             Disabled
```

Diagram 11-2 NetBIOS Display Filter Settings Command With DMZ Example

The filter types and their default settings are as follows.

Chart 11-1 NetBIOS Filter Default Settings

NAME	DESCRIPTION	EXAMPLE
LAN to WAN	This field displays whether NetBIOS packets are blocked or forwarded from the LAN to the WAN.	Forward
WAN to LAN	This field displays whether NetBIOS packets are blocked or forwarded from the WAN to the LAN.	Forward
LAN to DMZ	This field displays whether NetBIOS packets are blocked or forwarded from the LAN to the DMZ.	Forward

Chart 11-1 NetBIOS Filter Default Settings

NAME	DESCRIPTION	EXAMPLE
WAN to DMZ	This field displays whether NetBIOS packets are blocked or forwarded from the WAN to the DMZ.	Forward
DMZ to LAN	This field displays whether NetBIOS packets are blocked or forwarded from the DMZ to the LAN.	Forward
DMZ to WAN	This field displays whether NetBIOS packets are blocked or forwarded from the DMZ to the WAN.	Forward
IPSec Packets	This field displays whether NetBIOS packets sent through a VPN connection are blocked or forwarded.	Forward
Trigger dial	This field displays whether NetBIOS packets are allowed to initiate calls. Disabled means that NetBIOS packets are blocked from initiating calls.	Disabled

NetBIOS Filter Configuration

Syntax: `sys filter netbios config <type> <on|off>`

where

`<type> =` Identify which NetBIOS filter (numbered 0-3) to configure.

0 = LAN to WAN

1 = WAN to LAN

2 =LAN to DMZ

3 = WAN to DMZ

4 = DMZ to LAN

5 = DMZ to WAN

6 = IPSec packet pass through

7 = Trigger Dial

`<on|off>` = For types `0` and `1`, use `on` to enable the filter and block NetBIOS packets. Use `off` to disable the filter and forward NetBIOS packets.

For type `6`, use `on` to block NetBIOS packets from being sent through a VPN connection. Use `off` to allow NetBIOS packets to be sent through a VPN connection.

For type `7`, use `on` to allow NetBIOS packets to initiate dial backup calls. Use `off` to block NetBIOS packets from initiating dial backup calls.

Example commands

Command:

```
sys filter netbios config 0 on
```

This command blocks LAN to WAN NetBIOS packets

Command:

```
sys filter netbios config 1 off
```

This command forwards WAN to LAN NetBIOS packets

Command:

```
sys filter netbios config 6 on
```

This command blocks IPSec NetBIOS packets

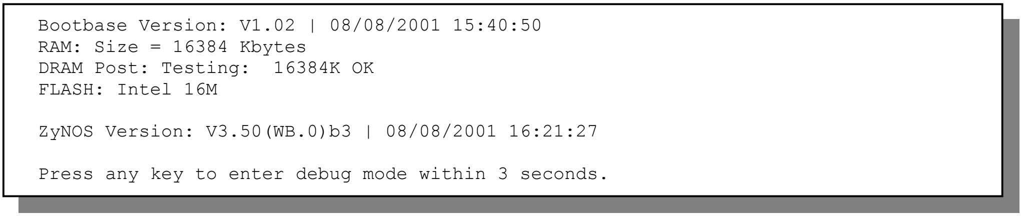
Command:

```
sys filter netbios config 7 off
```

This command stops NetBIOS commands from initiating calls.

Chapter 12
Boot Commands

The BootModule AT commands execute from within the router's bootup software, when debug mode is selected before the main router firmware (ZyNOS) is started. When you start up your ZyWALL, you are given a choice to go into debug mode by pressing a key at the prompt shown in the following screen. In debug mode you have access to a series of boot module commands, for example `ATUR` (for uploading firmware) and `ATLC` (for uploading the configuration file). These are already discussed in the *Firmware and Configuration File Maintenance* chapter.



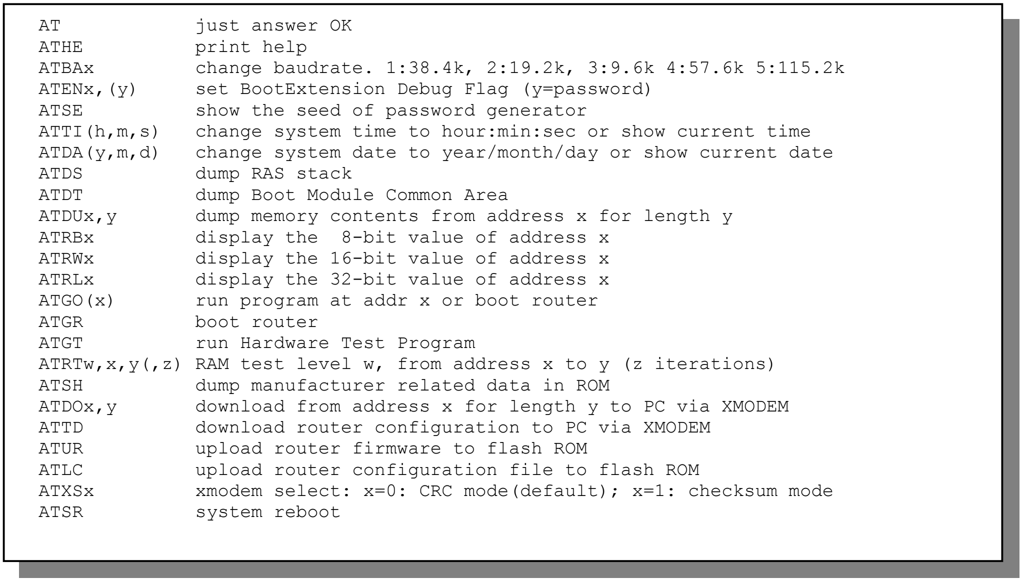
```
Bootbase Version: V1.02 | 08/08/2001 15:40:50
RAM: Size = 16384 Kbytes
DRAM Post: Testing:  16384K OK
FLASH: Intel 16M

ZyNOS Version: V3.50(WB.0)b3 | 08/08/2001 16:21:27

Press any key to enter debug mode within 3 seconds.
```

Diagram 12-1 Option to Enter Debug Mode

Enter `ATHE` to view all available ZyWALL boot module commands as shown in the next screen. `ATBAx` allows you to change the console port speed. The x denotes the number preceding the colon to give the console port speed following the colon in the list of numbers that follows; for example `ATBA3` will give a console port speed of 9.6 Kbps. `ATSE` displays the seed that is used to generate a password to turn on the debug flag in the firmware. The `ATSH` command shows product related information such as boot module version, vendor name, product model, RAS code revision, etc. `ATGO` allows you to continue booting the system. Most other commands aid in advanced troubleshooting and should only be used by qualified engineers.



```
AT             just answer OK
ATHE           print help
ATBAx          change baudrate. 1:38.4k, 2:19.2k, 3:9.6k 4:57.6k 5:115.2k
ATENx,(y)      set BootExtension Debug Flag (y=password)
ATSE           show the seed of password generator
ATTI(h,m,s)    change system time to hour:min:sec or show current time
ATDA(y,m,d)    change system date to year/month/day or show current date
ATDS           dump RAS stack
ATDT           dump Boot Module Common Area
ATDUx,y        dump memory contents from address x for length y
ATRBx          display the  8-bit value of address x
ATRWx          display the 16-bit value of address x
ATRLx          display the 32-bit value of address x
ATGO(x)        run program at addr x or boot router
ATGR           boot router
ATGT           run Hardware Test Program
ATRTw,x,y(,z)  RAM test level w, from address x to y (z iterations)
ATSH           dump manufacturer related data in ROM
ATDOx,y        download from address x for length y to PC via XMODEM
ATTD           download router configuration to PC via XMODEM
ATUR           upload router firmware to flash ROM
ATLC           upload router configuration file to flash ROM
ATXSx          xmodem select: x=0: CRC mode(default); x=1: checksum mode
ATSR           system reboot
```

Diagram 12-2 Boot Module Commands

Chapter 13
Log Descriptions

Chart 13-1 System Error Logs

LOG MESSAGE	DESCRIPTION
`%s exceeds the max. number of session per host!`	This attempt to create a NAT session exceeds the maximum number of NAT session table entries allowed to be created per host.

Chart 13-2 System Maintenance Logs

LOG MESSAGE	DESCRIPTION
`Time calibration is successful`	The router has adjusted its time based on information from the time server.
`Time calibration failed`	The router failed to get information from the time server.
`DHCP client gets %s`	A DHCP client got a new IP address from the DHCP server.
`DHCP client IP expired`	A DHCP client's IP address has expired.
`DHCP server assigns %s`	The DHCP server assigned an IP address to a client.
`SMT Login Successfully`	Someone has logged on to the router's SMT interface.
`SMT Login Fail`	Someone has failed to log on to the router's SMT interface.
`WEB Login Successfully`	Someone has logged on to the router's web configurator interface.
`WEB Login Fail`	Someone has failed to log on to the router's web configurator interface.
`TELNET Login Successfully`	Someone has logged on to the router via telnet.

Chart 13-2 System Maintenance Logs

`TELNET Login Fail`	Someone has failed to log on to the router via telnet.
`FTP Login Successfully`	Someone has logged on to the router via ftp.
`FTP Login Fail`	Someone has failed to log on to the router via ftp.
`NAT Session Table is Full!`	The maximum number of NAT session table entries has been exceeded and the table is full.

Chart 13-3 UPnP Logs

LOG MESSAGE	DESCRIPTION
`UPnP pass through Firewall`	UPnP packets can pass through the firewall.

Chart 13-4 Content Filtering Logs

CATEGORY	LOG MESSAGE	DESCRIPTION
URLFOR	`IP/Domain Name`	The ZyWALL allows access to this IP address or domain name and forwarded traffic addressed to the IP address or domain name.
URLBLK	`IP/Domain Name`	The ZyWALL blocked access to this IP address or domain name due to a forbidden keyword. All web traffic is disabled except for trusted domains, untrusted domains, or the cybernot list.
JAVBLK	`IP/Domain Name`	The ZyWALL blocked access to this IP address or domain name because of a forbidden service such as: ActiveX, a Java applet, a cookie, or a proxy.

Chart 13-5 Attack Logs

LOG MESSAGE	DESCRIPTION
`attack TCP`	The firewall detected a TCP attack.
`attack UDP`	The firewall detected an UDP attack.

Chart 13-5 Attack Logs

LOG MESSAGE	DESCRIPTION
`attack IGMP`	The firewall detected an IGMP attack.
`attack ESP`	The firewall detected an ESP attack.
`attack GRE`	The firewall detected a GRE attack.
`attack OSPF`	The firewall detected an OSPF attack.
`attack ICMP (type:%d, code:%d)`	The firewall detected an ICMP attack; see the section on ICMP messages for type and code details.
`land TCP`	The firewall detected a TCP land attack.
`land UDP`	The firewall detected an UDP land attack.
`land IGMP`	The firewall detected an IGMP land attack.
`land ESP`	The firewall detected an ESP land attack.
`land GRE`	The firewall detected a GRE land attack.
`land OSPF`	The firewall detected an OSPF land attack.
`land ICMP (type:%d, code:%d)`	The firewall detected an ICMP land attack; see the section on ICMP messages for type and code details.
`ip spoofing - WAN TCP`	The firewall detected a TCP IP spoofing attack on the WAN port.
`ip spoofing - WAN UDP`	The firewall detected an UDP IP spoofing attack on the WAN port.
`ip spoofing - WAN IGMP`	The firewall detected an IGMP IP spoofing attack on the WAN port.
`ip spoofing - WAN ESP`	The firewall detected an ESP IP spoofing attack on the WAN port.
`ip spoofing - WAN GRE`	The firewall detected a GRE IP spoofing attack on the WAN port.
`ip spoofing - WAN OSPF`	The firewall detected an OSPF IP spoofing attack on the WAN port.
`ip spoofing - WAN ICMP (type:%d, code:%d)`	The firewall detected an ICMP IP spoofing attack on the WAN port. See the section on ICMP messages for type and code details.
`icmp echo ICMP (type:%d, code:%d)`	The firewall detected an ICMP echo attack. See the section on ICMP messages for type and code details.

Chart 13-5 Attack Logs

LOG MESSAGE	DESCRIPTION
`syn flood TCP`	The firewall detected a TCP syn flood attack.
`ports scan TCP`	The firewall detected a TCP port scan attack.
`teardrop TCP`	The firewall detected a TCP teardrop attack.
`teardrop UDP`	The firewall detected an UDP teardrop attack.
`teardrop ICMP (type:%d, code:%d)`	The firewall detected an ICMP teardrop attack; see the section on ICMP messages for type and code details.
`illegal command TCP`	The firewall detected a TCP illegal command attack.
`NetBIOS TCP`	The firewall detected a TCP NetBIOS attack.
`ip spoofing - no routing entry TCP`	The firewall detected a TCP IP spoofing attack while the ZyWALL did not have a default route.
`ip spoofing - no routing entry UDP`	The firewall detected an UDP IP spoofing attack while the ZyWALL did not have a default route.
`ip spoofing - no routing entry IGMP`	The firewall detected an IGMP IP spoofing attack while the ZyWALL did not have a default route.
`ip spoofing - no routing entry ESP`	The firewall detected an ESP IP spoofing attack while the ZyWALL did not have a default route.
`ip spoofing - no routing entry GRE`	The firewall detected a GRE IP spoofing attack while the ZyWALL did not have a default route.
`ip spoofing - no routing entry OSPF`	The firewall detected an OSPF IP spoofing attack while the ZyWALL did not have a default route.
`ip spoofing - no routing entry ICMP (type:%d, code:%d)`	The firewall detected an ICMP IP spoofing attack while the ZyWALL did not have a default route; see the section on ICMP messages for type and code details.
`vulnerability ICMP (type:%d, code:%d)`	The firewall detected an ICMP vulnerability attack; see the section on ICMP messages for type and code details.
`traceroute ICMP (type:%d, code:%d)`	The firewall detected an ICMP traceroute attack; see the section on ICMP messages for type and code details.

Chart 13-6 Access Logs

LOG MESSAGE	DESCRIPTION
`Firewall default policy: TCP (set:%d)`	TCP access matched the default policy of the listed ACL set and the ZyWALL blocked or forwarded it according to the ACL set's configuration.
`Firewall default policy: UDP (set:%d)`	UDP access matched the default policy of the listed ACL set and the ZyWALL blocked or forwarded it according to the ACL set's configuration.
`Firewall default policy: ICMP (set:%d, type:%d, code:%d)`	ICMP access matched the default policy of the listed ACL set and the ZyWALL blocked or forwarded it according to the ACL set's configuration. See the section on ICMP messages for type and code details.
`Firewall default policy: IGMP (set:%d)`	IGMP access matched the default policy of the listed ACL set and the ZyWALL blocked or forwarded it according to the ACL set's configuration.
`Firewall default policy: ESP (set:%d)`	ESP access matched the default policy of the listed ACL set and the ZyWALL blocked or forwarded it according to the ACL set's configuration.
`Firewall default policy: GRE (set:%d)`	GRE access matched the default policy of the listed ACL set and the ZyWALL blocked or forwarded it according to the ACL set's configuration.
`Firewall default policy: OSPF (set:%d)`	OSPF access matched the default policy of the listed ACL set and the ZyWALL blocked or forwarded it according to the ACL set's configuration.
`Firewall default policy: (set:%d)`	Access matched the default policy of the listed ACL set and the ZyWALL blocked or forwarded it according to the ACL set's configuration.
`Firewall rule match: TCP (set:%d, rule:%d)`	TCP access matched the listed firewall rule and the ZyWALL blocked or forwarded it according to the rule's configuration.
`Firewall rule match: UDP (set:%d, rule:%d)`	UDP access matched the listed firewall rule and the ZyWALL blocked or forwarded it according to the rule's configuration.
`Firewall rule match: ICMP (set:%d, rule:%d, type:%d, code:%d)`	ICMP access matched the listed firewall rule and the ZyWALL blocked or forwarded it according to the rule's configuration. See the section on ICMP messages for type and code details.

Chart 13-6 Access Logs

LOG MESSAGE	DESCRIPTION
`Firewall rule match: IGMP (set:%d, rule:%d)`	IGMP access matched the listed firewall rule and the ZyWALL blocked or forwarded it according to the rule's configuration.
`Firewall rule match: ESP (set:%d, rule:%d)`	ESP access matched the listed firewall rule and the ZyWALL blocked or forwarded it according to the rule's configuration.
`Firewall rule match: GRE (set:%d, rule:%d)`	GRE access matched the listed firewall rule and the ZyWALL blocked or forwarded it according to the rule's configuration.
`Firewall rule match: OSPF (set:%d, rule:%d)`	OSPF access matched the listed a firewall rule and the ZyWALL blocked or forwarded it according to the rule's configuration.
`Firewall rule match: (set:%d, rule:%d)`	Access matched the listed firewall rule and the ZyWALL blocked or forwarded it according to the rule's configuration.
`Firewall rule NOT match: TCP  (set:%d, rule:%d)`	TCP access did not match the listed firewall rule and the ZyWALL logged it.
`Firewall rule NOT match: UDP (set:%d, rule:%d)`	UDP access did not match the listed firewall rule and the ZyWALL logged it.
`Firewall rule NOT match: ICMP (set:%d, rule:%d, type:%d, code:%d)`	ICMP access did not match the listed firewall rule and the ZyWALL logged it.
`Firewall rule NOT match: IGMP (set:%d, rule:%d)`	IGMP access did not match the listed firewall rule and the ZyWALL logged it.
`Firewall rule NOT match: ESP (set:%d, rule:%d)`	ESP access did not match the listed firewall rule and the ZyWALL logged it.
`Firewall rule NOT match: GRE (set:%d, rule:%d)`	GRE ac access did not match the listed firewall rule and the ZyWALL logged it.

Chart 13-6 Access Logs

LOG MESSAGE	DESCRIPTION
`Firewall rule NOT match: OSPF (set:%d, rule:%d)`	OSPF access did not match the listed firewall rule and the ZyWALL logged it.
`Firewall rule NOT match: (set:%d, rule:%d)`	Access did not match the listed firewall rule and the ZyWALL logged it.
`Filter default policy DROP!`	TCP access matched a default filter policy and the ZyWALL dropped the packet to block access.
`Filter default policy DROP!`	UDP access matched a default filter policy and the ZyWALL dropped the packet to block access.
`Filter default policy DROP!`	ICMP access matched a default filter policy and the ZyWALL dropped the packet to block access.
`Filter default policy DROP!`	Access matched a default filter policy and the ZyWALL dropped the packet to block access.
`Filter default policy DROP!`	Access matched a default filter policy (denied LAN IP) and the ZyWALL dropped the packet to block access.
`Filter default policy FORWARD!`	TCP access matched a default filter policy. Access was allowed and the router forwarded the packet.
`Filter default policy FORWARD!`	UDP access matched a default filter policy. Access was allowed and the router forwarded the packet.
`Filter default policy FORWARD!`	ICMP access matched a default filter policy. Access was allowed and the router forwarded the packet.
`Filter default policy FORWARD!`	Access matched a default filter policy. Access was allowed and the router forwarded the packet.
`Filter default policy FORWARD!`	Access matched a default filter policy (denied LAN IP). Access was allowed and the router forwarded the packet.
`Filter match DROP <set %d/rule %d>`	TCP access matched the listed filter rule and the ZyWALL dropped the packet to block access.
`Filter match DROP <set %d/rule %d>`	UDP access matched the listed filter rule and the ZyWALL dropped the packet to block access.

Chart 13-6 Access Logs

LOG MESSAGE	DESCRIPTION
`Filter match DROP <set %d/rule %d>`	ICMP access matched the listed filter rule and the ZyWALL dropped the packet to block access.
`Filter match DROP <set %d/rule %d>`	Access matched the listed filter rule and the ZyWALL dropped the packet to block access.
`Filter match DROP <set %d/rule %d>`	Access matched the listed filter rule (denied LAN IP) and the ZyWALL dropped the packet to block access.
`Filter match FORWARD <set %d/rule %d>`	TCP access matched the listed filter rule. Access was allowed and the router forwarded the packet.
`Filter match FORWARD <set %d/rule %d>`	UDP access matched the listed filter rule. Access was allowed and the router forwarded the packet.
`Filter match FORWARD <set %d/rule %d>`	ICMP access matched the listed filter rule. Access was allowed and the router forwarded the packet.
`Filter match FORWARD <set %d/rule %d>`	Access matched the listed filter rule. Access was allowed and the router forwarded the packet.
`Filter match FORWARD <set %d/rule %d>`	Access matched the listed filter rule (denied LAN IP). Access was allowed and the router forwarded the packet.
`(set:%d)`	With firewall messages, this is the number of the ACL policy set and denotes the packet's direction (see *Chart 13-7*). With filter messages, this is the number of the filter set.
`(rule:%d)`	With firewall messages, the firewall rule number denotes the number of a firewall rule within an ACL policy set. With filter messages, this is the number of an individual filter rule.
`Router sent blocked web site message`	A message was sent to notify a user that the router blocked access to a requested web site
`Triangle route packet forwarded`	The firewall allowed a triangle route session to pass through.
`Firewall sent TCP packet in response to DoS attack`	The firewall detected a DoS attack and sent a TCP packet(s) in response.

Chart 13-6 Access Logs

LOG MESSAGE	DESCRIPTION
`Firewall sent TCP reset packets`	The firewall sent out TCP reset packets.
`Packet without a NAT table entry blocked`	The router blocked a packet that did not have a corresponding NAT table entry.
`Out of order TCP handshake packet blocked`	The router blocked a TCP handshake packet that came out of the proper order
`Drop unsupported/out-of-order ICMP`	The ZyWALL generates this log after it drops an ICMP packet due to one of the following two reasons: 1. The ZyWALL does not support the ICMP packet's protocol. 2. The ICMP packet is an echo reply for which there was no corresponding echo request.
`Router sent ICMP response packet (type:%d, code:%d)`	The router sent an ICMP response packet. This packet automatically bypasses the firewall. See the section on ICMP messages for type and code details.

Chart 13-7 ACL Setting Notes

ACL SET NUMBER	DIRECTION	DESCRIPTION
1	LAN to WAN	ACL set 1 for packets traveling from the LAN to the WAN.
2	WAN to LAN	ACL set 2 for packets traveling from the WAN to the LAN.
3	DMZ to LAN	ACL set 3 for packets traveling from the DMZ to the LAN.
4	DMZ to WAN	ACL set 4 for packets traveling from the DMZ to the WAN.
5	WAN to DMZ	ACL set 5 for packets traveling from the WAN to the DMZ.
6	LAN to DMZ	ACL set 6 for packets traveling from the LAN to the DMZ.
7	LAN to LAN/ZyWALL	ACL set 7 for packets traveling from the LAN to the LAN or the ZyWALL.
8	WAN to WAN/ZyWALL	ACL set 8 for packets traveling from the WAN to the WAN or the ZyWALL.

Chart 13-7 ACL Setting Notes

ACL SET NUMBER	DIRECTION	DESCRIPTION
9	DMZ to DMZ/ZyWALL	ACL set 9 for packets traveling from the DMZ to the DM or the ZyWALL.

Chart 13-8 ICMP Notes

TYPE	CODE	DESCRIPTION
0		Echo Reply
	0	Echo reply message
3		Destination Unreachable
	0	Net unreachable
	1	Host unreachable
	2	Protocol unreachable
	3	Port unreachable
	4	A packet that needed fragmentation was dropped because it was set to Don't Fragment (DF)
	5	Source route failed
4		Source Quench
	0	A gateway may discard internet datagrams if it does not have the buffer space needed to queue the datagrams for output to the next network on the route to the destination network.
5		Redirect
	0	Redirect datagrams for the Network
	1	Redirect datagrams for the Host
	2	Redirect datagrams for the Type of Service and Network
	3	Redirect datagrams for the Type of Service and Host
8		Echo

Chart 13-8 ICMP Notes

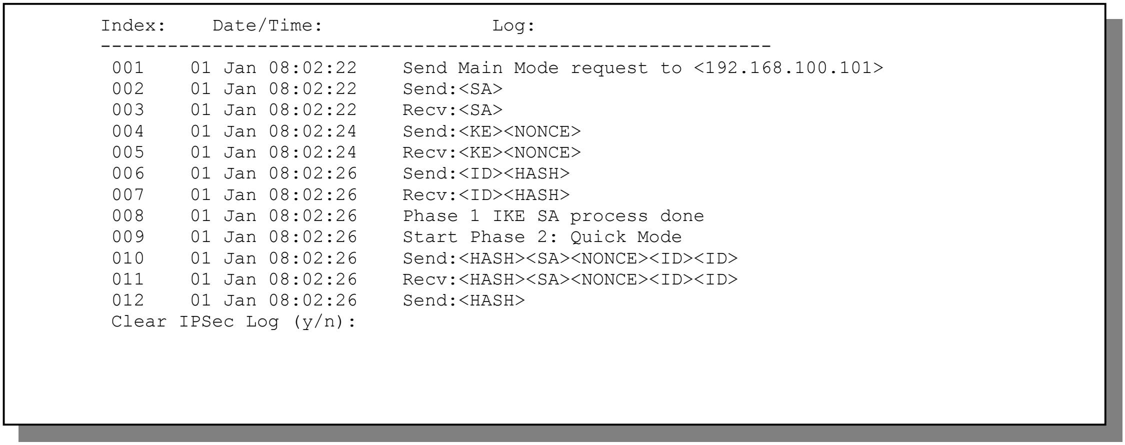
TYPE	CODE	DESCRIPTION
	0	Echo message
11		Time Exceeded
	0	Time to live exceeded in transit
	1	Fragment reassembly time exceeded
12		Parameter Problem
	0	Pointer indicates the error
13		Timestamp
	0	Timestamp request message
14		Timestamp Reply
	0	Timestamp reply message
15		Information Request
	0	Information request message
16		Information Reply
	0	Information reply message

Chart 13-9 Sys log

LOG MESSAGE	DESCRIPTION
Mon dd hr:mm:ss hostname src="<srcIP:srcPort>" dst="<dstIP:dstPort>" msg="<msg>" note="<note>"	This message is sent by the "RAS" when this syslog is generated. The messages and notes are defined in this appendix's other charts.

VPN/IPSec logs

To view the IPSec and IKE connection log, type 3 in menu 27 and press [ENTER] to display the IPSec log as shown next. The following figure shows a typical log from the initiator of a VPN connection.

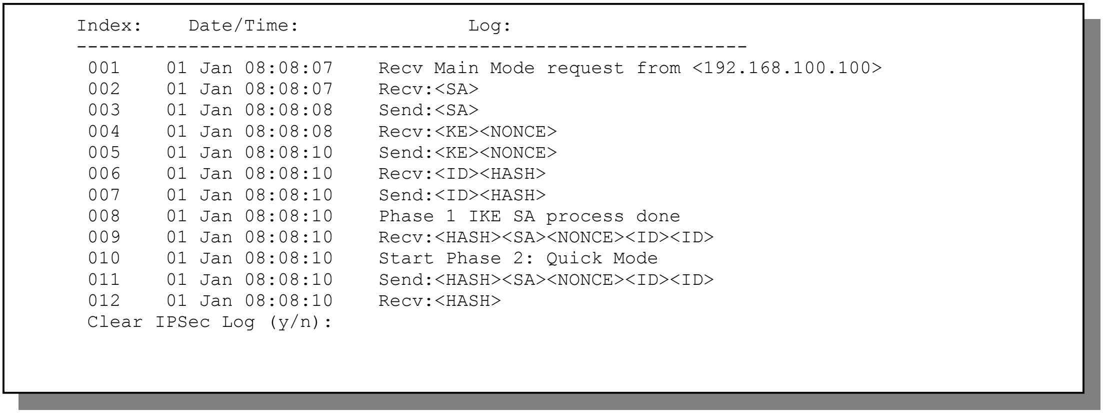


```
Index:    Date/Time:               Log:
------------------------------------------------------------
 001    01 Jan 08:02:22    Send Main Mode request to <192.168.100.101>
 002    01 Jan 08:02:22    Send:<SA>
 003    01 Jan 08:02:22    Recv:<SA>
 004    01 Jan 08:02:24    Send:<KE><NONCE>
 005    01 Jan 08:02:24    Recv:<KE><NONCE>
 006    01 Jan 08:02:26    Send:<ID><HASH>
 007    01 Jan 08:02:26    Recv:<ID><HASH>
 008    01 Jan 08:02:26    Phase 1 IKE SA process done
 009    01 Jan 08:02:26    Start Phase 2: Quick Mode
 010    01 Jan 08:02:26    Send:<HASH><SA><NONCE><ID><ID>
 011    01 Jan 08:02:26    Recv:<HASH><SA><NONCE><ID><ID>
 012    01 Jan 08:02:26    Send:<HASH>
 Clear IPSec Log (y/n):
```

Diagram 13-1 Example VPN Initiator IPSec Log

VPN Responder IPSec Log

The following figure shows a typical log from the VPN connection peer.



```
Index:    Date/Time:               Log:
------------------------------------------------------------
 001    01 Jan 08:08:07    Recv Main Mode request from <192.168.100.100>
 002    01 Jan 08:08:07    Recv:<SA>
 003    01 Jan 08:08:08    Send:<SA>
 004    01 Jan 08:08:08    Recv:<KE><NONCE>
 005    01 Jan 08:08:10    Send:<KE><NONCE>
 006    01 Jan 08:08:10    Recv:<ID><HASH>
 007    01 Jan 08:08:10    Send:<ID><HASH>
 008    01 Jan 08:08:10    Phase 1 IKE SA process done
 009    01 Jan 08:08:10    Recv:<HASH><SA><NONCE><ID><ID>
 010    01 Jan 08:08:10    Start Phase 2: Quick Mode
 011    01 Jan 08:08:10    Send:<HASH><SA><NONCE><ID><ID>
 012    01 Jan 08:08:10    Recv:<HASH>
 Clear IPSec Log (y/n):
```

Diagram 13-2 Example VPN Responder IPSec Log

This menu is useful for troubleshooting. A log index number, the date and time the log was created and a log message are displayed.

Double exclamation marks (!!) denote an error or warning message.

The following table shows sample log messages during IKE key exchange.

Chart 13-10 Sample IKE Key Exchange Logs

LOG MESSAGE	DESCRIPTION
`Send <Symbol> Mode request to <IP>` `Send <Symbol> Mode request to <IP>`	The ZyWALL has started negotiation with the peer.
`Recv <Symbol> Mode request from <IP>` `Recv <Symbol> Mode request from <IP>`	The ZyWALL has received an IKE negotiation request from the peer.
`Recv:<Symbol>`	IKE uses the ISAKMP protocol (refer to RFC2408 – ISAKMP) to transmit data. Each ISAKMP packet contains payloads of different types that show in the log - see Chart 13-12.
`Phase 1 IKE SA process done`	Phase 1 negotiation is finished.
`Start Phase 2: Quick Mode`	Phase 2 negotiation is beginning using Quick Mode.
`!! IKE Negotiation is in process`	The ZyWALL has begun negotiation with the peer for the connection already, but the IKE key exchange has not finished yet.
`!! Duplicate requests with the same cookie`	The ZyWALL has received multiple requests from the same peer but it is still processing the first IKE packet from that peer.
`!! No proposal chosen`	The parameters configured for Phase 1 or Phase 2 negotiations don't match. Please check all protocols and settings for these phases. For example, one party may be using 3DES encryption, but the other party is using DES encryption, so the connection will fail.

`!! Verifying Local ID failed`
`!! Verifying Remote ID failed`
	During IKE Phase 2 negotiation, both parties exchange policy details, including local and remote IP address ranges. If these ranges differ, then the connection fails.

`!! Local / remote IPs of incoming request conflict with rule <#d>`	If the security gateway is "0.0.0.0", the ZyWALL will use the peer's "Local Addr" as its "Remote Addr". If this IP (range) conflicts with a previously configured rule then the connection is not allowed.
`!! Invalid IP <IP start>/<IP end>`	The peer's "Local IP Addr" range is invalid.

Chart 13-10 Sample IKE Key Exchange Logs

LOG MESSAGE	DESCRIPTION
`!! Remote IP <IP start> / <IP end> conflicts`	If the security gateway is "0.0.0.0", the ZyWALL will use the peer's "Local Addr" as its "Remote Addr". If a peer's "Local Addr" range conflicts with other connections, then the ZyWALL will not accept VPN connection requests from this peer.
`!! Active connection allowed exceeded`	The ZyWALL limits the number of simultaneous Phase 2 SA negotiations. The IKE key exchange process fails if this limit is exceeded.
`!! IKE Packet Retransmit`	The ZyWALL did not receive a response from the peer and so retransmits the last packet sent.
`!! Failed to send IKE Packet`	The ZyWALL cannot send IKE packets due to a network error.
`!! Too many errors! Deleting SA`	The ZyWALL deletes an SA when too many errors occur.
`!! Phase 1 ID type mismatch`	The ID type of an incoming packet does not match the local's peer ID type.
`!! Phase 1 ID content mismatch`	The ID content of an incoming packet does not match the local's peer ID content.
`!! No known phase 1 ID type found`	The ID type of an incoming packet does not match any known ID type.
`Peer ID: IP address type <IP address>`	The IP address type or IP address of an incoming packet does not match the peer IP address type or IP address configured on the local router. The log displays the IP address type and IP address of the incoming packet.
`vs. My Remote <IP address>`	The IP address type or IP address of an incoming packet does not match the peer IP address type or IP address configured on the local router. The log displays this router's configured remote IP address type or IP address that the incoming packet did not match.

Chart 13-10 Sample IKE Key Exchange Logs

LOG MESSAGE	DESCRIPTION
`vs. My Local <IP address>`	The IP address type or IP address of an incoming packet does not match the peer IP address type or IP address configured on the local router. The log displays this router's configured local IP address type or IP address that the incoming packet did not match.
`    -> <symbol>`	The router sent a payload type of IKE packet.
`Error ID Info`	The parameters configured for Phase 1 ID content do not match or the parameters configured for the Phase 2 ID (IP address of single, range or subnet) do not match. Please check all protocols and settings for these phases.

The following table shows sample log messages during packet transmission.

Chart 13-11 Sample IPSec Logs During Packet Transmission

LOG MESSAGE	DESCRIPTION
`!! WAN IP changed to <IP>`	If the ZyWALL's WAN IP changes, all configured "My IP Addr" are changed to b "0.0.0.0". If this field is configured as 0.0.0.0, then the ZyWALL will use the current ZyWALL WAN IP address (static or dynamic) to set up the VPN tunnel.
`!! Cannot find IPSec SA`	The ZyWALL cannot find a phase 2 SA that corresponds with the SPI of an inbound packet (from the peer); the packet is dropped.
`!! Cannot find outbound SA for rule <%d>`	The packet matches the rule index number (#d), but Phase 1 or Phase 2 negotiation for outbound (from the VPN initiator) traffic is not finished yet.
`!! Discard REPLAY packet`	If the ZyWALL receives a packet with the wrong sequence number it will discard it.
`!! Inbound packet authentication failed`	The authentication configuration settings are incorrect. Please check them.
`!! Inbound packet decryption failed`	The decryption configuration settings are incorrect. Please check them.
`Rule <#d> idle time out, disconnect`	If an SA has no packets transmitted for a period of time (configurable via CI command), the ZyWALL drops the connection.

The following table shows RFC-2408 ISAKMP payload types that the log displays. Please refer to the RFC for detailed information on each type.

Chart 13-12 RFC-2408 ISAKMP Payload Types

LOG DISPLAY	PAYLOAD TYPE
SA	Security Association
PROP	Proposal
TRANS	Transform
KE	Key Exchange
ID	Identification
CER	Certificate
CER_REQ	Certificate Request
HASH	Hash
SIG	Signature
NONCE	Nonce
NOTFY	Notification
DEL	Delete
VID	Vendor ID

Log Commands

Go to the command interpreter interface (the *Command Interpreter Appendix* explains how to access and use the commands).

Configuring What You Want the ZyWALL to Log

Use the `sys logs load` command to load the log setting buffer that allows you to configure which logs the ZyWALL is to record.

Use `sys logs category` followed by a log category and a parameter to decide what to record

Chart 13-13 Log Categories and Available Settings

LOG CATEGORIES	AVAILABLE PARAMETERS
`access`	`0, 1, 2, 3`
`attack`	`0, 1, 2, 3`
`error`	`0, 1, 2, 3`
`ike`	`0, 1, 2, 3`
`ipsec`	`0, 1, 2, 3`
`javablocked`	`0, 1, 2, 3`
`mten`	`0, 1`
`upnp`	`0, 1`
`urlblocked`	`0, 1, 2, 3`
`urlforward`	`0, 1`
Use `0` to not record logs for that category, `1` to record only logs for that category, `2` to record only alerts for that category, and `3` to record both logs and alerts for that category.	

Use the `sys logs save` command to store the settings in the ZyWALL (you must do this in order to record logs).

Displaying Logs

Use the `sys logs display` command to show all of the logs in the ZyWALL's log.

Use the `sys logs category display` command to show the log settings for all of the log categories.

Use the `sys logs display [log category]` command to show the logs in an individual ZyWALL log category.

Use the `sys logs clear` command to erase all of the ZyWALL's logs.

Log Command Example

This example shows how to set the ZyWALL to record the access logs and alerts and then view the results.

```
ras> sys logs load

ras> sys logs category access 3

ras> sys logs save

ras> sys logs display access


#  .time                  source                     destination
notes

    message

  0|11/11/2002 15:10:12 |172.22.3.80:137       |172.22.255.255:137
|ACCESS BLOCK

    Firewall default policy: UDP(set:8)

  1|11/11/2002 15:10:12 |172.21.4.17:138       |172.21.255.255:138
|ACCESS BLOCK

    Firewall default policy: UDP(set:8)

  2|11/11/2002 15:10:11 |172.17.2.1            |224.0.1.60
|ACCESS BLOCK

    Firewall default policy: IGMP(set:8)

  3|11/11/2002 15:10:11 |172.22.3.80:137       |172.22.255.255:137
|ACCESS BLOCK

    Firewall default policy: UDP(set:8)

  4|11/11/2002 15:10:10 |192.168.10.1:520      |192.168.10.255:520
|ACCESS BLOCK

    Firewall default policy: UDP(set:8)

  5|11/11/2002 15:10:10 |172.21.4.67:137       |172.21.255.255:137
|ACCESS BLOCK
```

Chapter 14
Brute-Force Password Guessing Protection

The following describes the commands for enabling, disabling and configuring the brute-force password guessing protection mechanism for the password. See the *Command Interpreter* appendix for information on the command structure.

Chart 14-1 Brute-Force Password Guessing Protection Commands

COMI IAND	DESCRIPTION
`sys pwderrtm`	This command displays the brute-force guessing password protection settings.
`sys pwderrtm 0`	This command turns off the password's protection from brute-force guessing. The brute-force password guessing protection is turned off by default.
`sys pwderrtm N`	This command sets the password protection to block all access attempts for N (a number from 1 to 60) minutes after the third time an incorrect password is entered.
Example	
`sys pwderrtm 5`	This command sets the password protection to block all access attempts for five minutes after the third time an incorrect password is entered.

Part III:

Index

This part provides an Index of key terms.

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