VSG-1200

Vantage Service Gateway

User's Guide

Version 1.08
1/2006

ZyXEL

Copyright

Disclaimer

ZyXEL does not assume any liability arising out of the application or use of any products, or software described herein. Neither does it convey any license under its patent rights nor the patent rights of others. ZyXEL further reserves the right to make changes in any products described herein without notice. This publication is subject to change without notice.

Trademarks

ZyNOS (ZyXEL Network Operating System) is a registered trademark of ZyXEL Communications, Inc. Other trademarks mentioned in this publication are used for identification purposes only and may be properties of their respective owners.

Federal Communications Commission (FCC) Interference Statement

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

Go to www.zyxel.com

1. Select your product from the drop-down list box on the ZyXEL home page to go to that product's page.
2. Select the certification you wish to view from this page

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 or higher value, and will be solely at the discretion of ZyXEL. This warranty shall not apply if the product has been 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 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.

Registration

Register your product online to receive e-mail notices of firmware upgrades and information at www.zyxel.com for global products, or at www.us.zyxel.com for North American products.

Safety Warnings

1. To reduce the risk of fire, use only No. 26 AWG or larger telephone wire.
2. Do not use this product near water, for example, in a wet basement or near a swimming pool.
3. Avoid using this product during an electrical storm. There may be a remote risk of electric shock from lightening.

Customer Support

Please have the following information ready when you contact customer support.

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

METHOD / LOCATION	SUPPORT E-MAIL / SALES E-MAIL	TELEPHONE[A] / FAX	WEB SITE / FTP SITE	REGULAR MAIL
CORPORATE HEADQUARTERS (WORLDWIDE)	support@zyxel.com.tw	+886-3-578-3942	www.zyxel.com www.europe.zyxel.com	ZyXEL Communications Corp. 6 Innovation Road II Science Park Hsinchu 300 Taiwan
	sales@zyxel.com.tw	+886-3-578-2439	ftp.zyxel.com ftp.europe.zyxel.com	
CZECH REPUBLIC	info@cz.zyxel.com	+420-241-091-350	www.zyxel.cz	ZyXEL Communications Czech s.r.o. Modranská 621 143 01 Praha 4 - Modrany Ceská Republika
	info@cz.zyxel.com	+420-241-091-359		
DENMARK	support@zyxel.dk	+45-39-55-07-00	www.zyxel.dk	ZyXEL Communications A/S Columbusvej 2860 Soeborg Denmark
	sales@zyxel.dk	+45-39-55-07-07		
FINLAND	support@zyxel.fi	+358-9-4780-8411	www.zyxel.fi	ZyXEL Communications Oy Malminkaari 10 00700 Helsinki Finland
	sales@zyxel.fi	+358-9-4780 8448		
FRANCE	info@zyxel.fr	+33-4-72-52-97-97	www.zyxel.fr	ZyXEL France 1 rue des Vergers Bat. 1 / C 69760 Limonest France
		+33-4-72-52-19-20		
GERMANY	support@zyxel.de	+49-2405-6909-0	www.zyxel.de	ZyXEL Deutschland GmbH. Adenauerstr. 20/A2 D-52146 Wuerselen Germany
	sales@zyxel.de	+49-2405-6909-99		
HUNGARY	support@zyxel.hu	+36-1-3361649	www.zyxel.hu	ZyXEL Hungary 48, Zoldlomb Str. H-1025, Budapest Hungary
	info@zyxel.hu	+36-1-3259100		
KAZAKHSTAN	http://zyxel.kz/support	+7-3272-590-698	www.zyxel.kz	ZyXEL Kazakhstan 43, Dostyk ave.,Office 414 Dostyk Business Centre 050010, Almaty Republic of Kazakhstan
	sales@zyxel.kz	+7-3272-590-689		
NORTH AMERICA	support@zyxel.com	1-800-255-4101 +1-714-632-0882	www.us.zyxel.com	ZyXEL Communications Inc. 1130 N. Miller St. Anaheim CA 92806-2001 U.S.A.
	sales@zyxel.com	+1-714-632-0858	ftp.us.zyxel.com	
NORWAY	support@zyxel.no	+47-22-80-61-80	www.zyxel.no	ZyXEL Communications A/S Nils Hansens vei 13 0667 Oslo Norway
	sales@zyxel.no	+47-22-80-61-81		

METHOD / LOCATION	SUPPORT E-MAIL / SALES E-MAIL	TELEPHONE[A] / FAX	WEB SITE / FTP SITE	REGULAR MAIL
POLAND	info@pl.zyxel.com	+48-22-5286603 +48-22-5206701	www.pl.zyxel.com	ZyXEL Communications ul.Emilli Plater 53 00-113 Warszawa Poland
RUSSIA	http://zyxel.ru/support sales@zyxel.ru	+7-095-542-89-29 +7-095-542-89-25	www.zyxel.ru	ZyXEL Russia Ostrovityanova 37a Str. Moscow, 117279 Russia
SPAIN	support@zyxel.es sales@zyxel.es	+34-902-195-420 +34-913-005-345	www.zyxel.es	ZyXEL Communications Alejandro Villegas 33 1º, 28043 Madrid Spain
SWEDEN	support@zyxel.se sales@zyxel.se	+46-31-744-7700 +46-31-744-7701	www.zyxel.se	ZyXEL Communications A/S Sjöporten 4, 41764 Göteborg Sweden
UKRAINE	support@ua.zyxel.com sales@ua.zyxel.com	+380-44-247-69-78 +380-44-494-49-32	www.ua.zyxel.com	ZyXEL Ukraine 13, Pimonenko Str. Kiev, 04050 Ukraine
UNITED KINGDOM	support@zyxel.co.uk sales@zyxel.co.uk	+44-1344 303044 08707 555779 (UK only) +44-1344 303034	www.zyxel.co.uk ftp.zyxel.co.uk	ZyXEL Communications UK Ltd.,11 The Courtyard, Eastern Road, Bracknell, Berkshire, RG12 2XB, United Kingdom (UK)

a. "+" is the (prefix) number you enter to make an international telephone call.

Table of Contents

List of Figures

List of Tables

Preface

Congratulations on your purchase of the VSG-1200 Vantage Service Gateway. Your VSG-1200 is easy to install and configure.

About This User's Guide

This manual is designed to guide you through the configuration of your VSG-1200 for its various applications. The web configurator parts of this guide contain background information on features configurable by web configurator. The SMT parts of this guide contain background information solely on features not configurable by web configurator.

Note: Use the web configurator or System Management Terminal (SMT) to configure your VSG-1200. Not all features can be configured through all interfaces.

Related Documentation

- Supporting Disk

  Refer to the included CD for support documents.

- ZyXEL Glossary and Web Site

  Please refer to www.zyxel.com for an online glossary of networking terms and additional support documentation.

User Guide Feedback

Help us help you. E-mail all User Guide-related comments, questions or suggestions for improvement to techwriters@zyxel.com.tw or send regular mail to The Technical Writing Team, ZyXEL Communications Corp., 6 Innovation Road II, Science-Based Industrial Park, Hsinchu, 300, Taiwan. Thank you!

Syntax Conventions

- "Enter" means for you to type one or more characters. "Select" or "Choose" means for you to use one of the predefined choices.
- Command and arrow keys are enclosed in square brackets. [ENTER] means the Enter, or carriage return key; [ESC] means the Escape key and [SPACE BAR] means the Space Bar.
- 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**.
- "e.g.," is a shorthand for "for instance", and "i.e.," means "that is" or "in other words".
- The VSG-1200 Vantage Service Gateway may be referred to as the VSG-1200 or, simply, as the VSG in this User's Guide.

Graphics Icons Key

Vantage Service Gateway 	Computer 	Notebook computer 
Server 	DSLAM 	Firewall 
Telephone 	Switch 	Router 
Statement Printer (SP-200) 	Access Point 	

CHAPTER 1
Getting to Know Your VSG

This chapter introduces the features and applications of the VSG.

1.1 Introducing the VSG

The VSG (Vantage Service Gateway) is a rack-mountable Internet Service Gateway that provides multiple subscribers easy Internet connectivity. The VSG is ideal for office, hotspot and hotel environments.

Hotspots are public areas, such as airports, hotels, coffee shops, where end users (or subscribers) can access the Internet at any time.

1.2 Features

Your VSG provides the following features to accommodate subscribers with a variety of network configurations with little or no technical support.

Automatic Account Billing with Property Management System (PMS)

Many hotels use a PMS to perform in-room billing of services the guests use such as room service, mini-bar, pay-per-view TV or telephone usage. The VSG supports PMS from Micros Fidelios.

CAS (Central Authentication Service)

The Hilton Group Corporation developed the High Speed Internet Access (HSIA) service to provide Internet access service across its entire Hilton Group hotels. In order to use the HSIA, hotel guest(s) must be authenticated through the proprietary CAS. The CAS performs both user authentication and accounting.

Credit Card Billing

Your VSG is integrated with online secure credit card billing service providers[1] to allow you to use a credit card service to authorize, process, and manage credit transactions directly through the Internet.

1. At the time of writing, the VSG allows online credit card billing through Authorize.net and SecurePay.

SSL Secure Login

With Secure Socket Layer (SSL) security activated upon login, data exchanged between the VSG and client computers is encrypted and protected.

PPPoE Support (RFC2516)

PPPoE (Point-to-Point Protocol over Ethernet) emulates a dial-up connection. It allows your ISP to use their existing network configuration with newer broadband technologies such as ADSL. The PPPoE driver on the VSG is transparent to the computers on the LAN, which see only Ethernet and are not aware of PPPoE; thus saving you from having to manage PPPoE clients on individual computers.

PPTP Support

Point-to-Point Tunneling Protocol (PPTP) is a network protocol that enables secure transfer of data from a remote client to a private server, creating a Virtual Private Network (VPN) using a TCP/IP-based network. PPTP supports on-demand, multi-protocol and virtual private networking over public networks, such as the Internet. Subscribers can use PPTP to connect to a broadband modem to achieve access to high-speed data networks via a familiar "dialup networking" user interface.

4-Port Switch

A combination of switch and Internet gateway makes your VSG a cost-effective and viable network solution. You can connect up to four computers to the LAN ports on the VSG without the cost of a hub. To connect more than four Ethernet devices, attach a hub or switch.

Reset Button

Use the reset button to restore the VSG back to its factory defaults.

Plug-and-Play Internet Access

The VSG provides Internet access to attached computer(s) without extra software installation or computer configuration. In addition, with transparent proxy, the VSG resolves any incompatible proxy settings.

Port Forwarding

Use this feature to forward incoming service requests to a server on your local network.

DHCP Support

DHCP (Dynamic Host Configuration Protocol) allows the individual computers (DHCP clients) to obtain TCP/IP configuration at start-up from a centralized DHCP server. The VSG has built-in DHCP server capability. It can assign IP addresses, an IP default gateway and DNS servers to DHCP clients. The VSG can also act as a surrogate DHCP server (DHCP Relay) where it relays IP address assignment from another DHCP server to the DHCP clients.

RADIUS (Remote Authentication Dial-In User Service) Client

The VSG allows you to maintain a central subscriber database on an external RADIUS server. Subscriber accounting and authentication is then done through the external RADIUS server. In addition, the VSG supports Vendor Specific Attributes (VSAs) that allows enforcement of upload/download bandwidth limits or specific advertisement web page per subscriber.

Built-in Authentication and Local Subscriber Database

The VSG allows you to maintain a subscriber database on the VSG without setting up an external RADIUS server. Subscriber accounting and authentication can be done using the local subscriber database.

Accounting

Accounting can be done using an external RADIUS server or the built-in accounting feature.

Local Content and Advertising Links

The VSG can redirect subscribers to a specified web site and display advertising links. This can be a source of extra online advertising revenues and increased business exposure.

Access Control (Walled Garden)

With the walled garden feature, subscribers are able to access predetermined web sites without logging in. The VSG blocks other Internet access until the subscribers log in.

E-mail Forwarding

The VSG is able to forward and retrieve e-mail messages when the subscriber's default e-mail server is down or behind a firewall.

DNS Proxy

With DNS proxy, the VSG provides DNS redirection when a subscriber's configured DNS server is behind a firewall or located in a private Intranet.

NAT (Network Address Translation)

NAT (RFC 1631) is the translation of the IP address of a host in a packet, for example, the source address of an outgoing packet, used within one network to a different IP address known within another network.

The VSG automatically performs NAT on the LAN. You can also set the VSG to perform NAT on the WAN for VPN (IPSec and PPTP) connections.

MAC (Media Access Control) Filter

The MAC filter lets you block specific devices from accessing the Internet through the VSG.

Static Route

Static routes tell the VSG how to forward IP traffic when you configure the TCP/IP parameters manually and disable NAT.

Subscriber Login Page Customization

You can customize the subscriber login page according to your business needs. The advanced settings allow you to include welcome messages, a company logo and basic formatting.

Dual-function Console Port

The VSG provides a console port for local management. You can also set this console port to act as the printer port when connected to an external statement printer.

Web Configurator Management

The VSG comes with an embedded web-based configurator. It offers advanced management features and allows you to manage the VSG remotely using Internet Explorer (version 4.0 or above) or Netscape (version 6.0 or later).

System Maintenance

The firmware of the VSG can be upgraded via the web configurator or the SMT menu. The Embedded FTP server is for firmware upgrades as well as configuration file backups and restoration.

Ease of Installation

Your VSG is designed for quick, intuitive and easy installation. It can be mounted on a desktop or standard 19" rack.

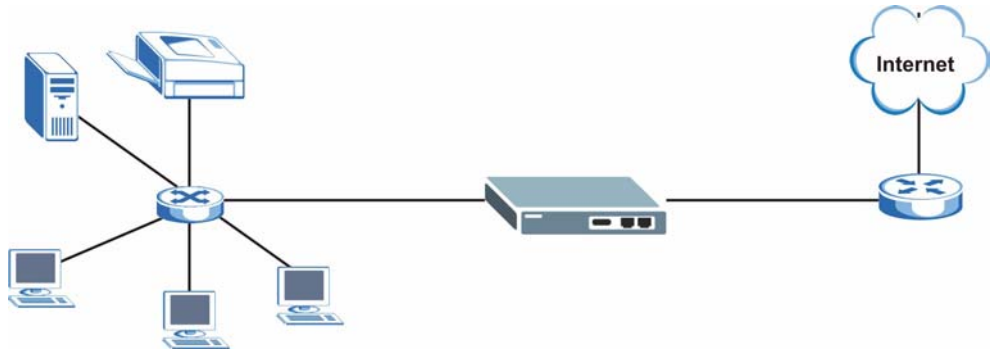
1.3 Applications

The following sections describe network application examples in which the VSG is used.

1.3.1 Internet Access for LAN Networks

With a broadband service account set up, the VSG allows the attached computers to enjoy high speed Internet access.

Figure 1 Application: Internet Access for LAN Networks

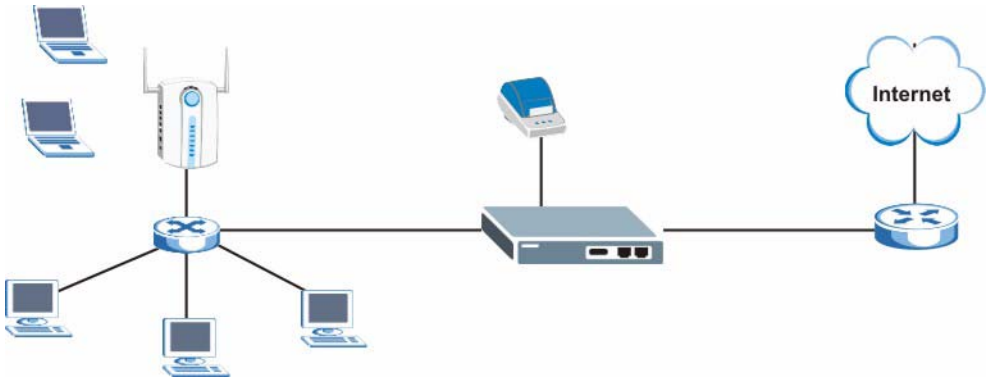


1.3.2 Internet Access in Public Areas

In public areas, such as a hotel, the VSG provides high speed Internet access to subscribers. Account billing and authentication can be done either using an external RADIUS server or the built-in billing function and local subscriber database.

Connect an access point (AP) to bridge the wired and the wireless network allowing wireless stations to access the Internet through the VSG.

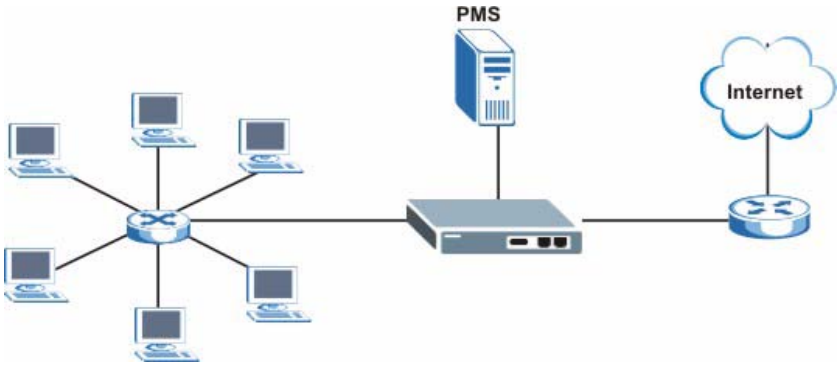
Figure 2 Application: Internet Access in Public Areas



1.3.3 Hotel Application with PMS

The following figure depicts an example where the VSG is used in a hotel to provide Internet service as one of their in-room services. Billing is done through an existing PMS in the hotel.

Figure 3 Application: Hotel



CHAPTER 2
Hardware Installation and Connection

This chapter shows you how to install the VSG and make hardware connections.

2.1 Installation Options

The following sections describe the different installation options.

Note: Do NOT block the ventilation holes and leave adequate space on the rear and sides of the VSG during hardware installation or when stacking.

2.1.1 Desktop Installation

1. Make sure the VSG is clean and dry. Set the VSG on a smooth space strong enough to support the weight of the VSG and the connected cables. Make sure there is a power outlet nearby.
2. Make sure there is enough clearance around the VSG to allow air circulation and the attachment of cables and the power cord.
3. Attach the rubber feet to each corner on the bottom of the VSG. These rubber feet help protect the VSG from shock or vibration and ensure space between devices when stacking.

2.1.2 Rack Mount Installation

The VSG can be mounted on an EIA standard size, 19-inch rack or in a wiring closet with other equipment. Follow the steps below to mount your VSG on a standard EIA rack using the included rack-mounting kit.

1. Align one bracket with the holes on one side of the VSG and secure it with the bracket screws (smaller than the rack-mounting screws. Similarly, attach the other bracket.

Figure 4 Rack Mount: Attaching Brackets

2 After attaching both mounting brackets, position the VSG in the rack by lining up the holes in the brackets with the appropriate holes on the rack. Secure the VSG to the rack with rack-mounting screws.

Figure 5 Rack Mount: Securing to the Rack

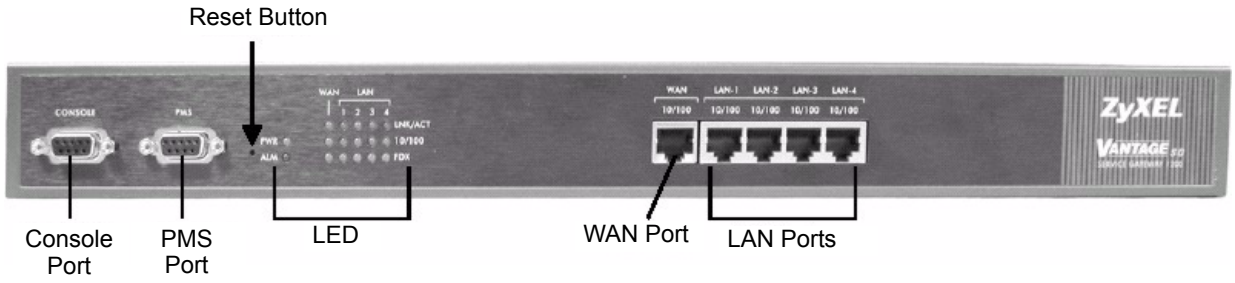
2.2 Hardware Connections

The following sections describe the hardware connections of the VSG.

2.2.1 Front Panel

The console, LAN and WAN ports, the reset button and the LEDs are located on the front panel.

Figure 6 Front Panel



2.2.1.1 Four LAN 10/100M Ports

Ethernet 10Base-T/100Base-T networks use Ethernet cables with RJ-45 connectors. The LAN ports are auto-crossover, so you may use a crossover Ethernet cable or a straight-through Ethernet cable to connect your VSG to a computer or external switch.

If you want to connect more than four Ethernet devices to your VSG, you must use an external switch or hub. Connect a LAN port on the VSG to a port on the switch using an Ethernet cable.

2.2.1.2 The WAN Port

Connect the VSG to a network with broadband Internet service. The WAN port is auto-crossover, so you may use a crossover Ethernet cable or a straight-through Ethernet cable to connect your VSG to a router.

2.2.1.3 The Console Port

You can perform local management of the VSG through the port labeled **CONSOLE**. It requires a direct connection between the VSG and a computer via a console cable. Refer to chapters on SMT configurations for more information.

You can also connect the **CONSOLE** port to a statement printer (the SP-200, sold separately) with a DB25 male to DB9 male adapter. A statement printer allows you to create and print out subscriber accounts automatically. In addition, you can also print the system status and the account and network reports. Set the function of the console port in the web configurator (see Section 3.5 "General System Setting" on page 44).

2.2.1.4 The PMS Port

Use a DB9 console cable to connect the **PMS** port to a PMS system.

2.2.1.5 The Reset Button

Use a pointed object to press this button in once to reset the VSG back to the factory defaults.

Note: All your custom configuration including the system usernames and passwords will be erased.

This will NOT delete the subscriber database or the port-location mappings.

2.2.2 Front Panel LEDs

The following table describes the LEDs on the front panel. When turned on, all LEDs are green unless otherwise specified.

Table 1 Front Panel LEDs

LED	STATUS	DESCRIPTION
PWR	On	The VSG is receiving power.
	Off	The VSG is not receiving power.
ALARM	On (Red)	There is a hardware failure.
	Blink Once (Red)	The system is starting up.
	Off	The system is functioning normally.
LAN or WAN		
LK/ACT	On	The port is connected to an Ethernet device.
	Blinking	The port is receiving or sending data.
	Off	The port is not connected to an Ethernet device.
10/100	On	The port is operating at 100 Mpbs.
	Off	The port is operating at 10 Mpbs.
FDX	On	The port is operating in full-duplex mode.
	Off	The port is operating in half-duplex mode.

2.2.3 Rear Panel

The power socket, the fan and a ventilation hole are located on the rear panel as shown next.

Note: Do NOT block the ventilation hole.

Figure 7 Rear Panel

2.2.4 Turning on the VSG

Connect the female end of the supplied power cord to the power socket on the back of the VSG and the male end to an appropriate power source.

When the power source is turned on, the **PWR** LED on the front panel turns on.

2.2.5 Methods of Restoring Factory Defaults

You can erase the current configuration and restore factory defaults in two ways:

- Use the **RESET** button on the front panel of the VSG (press this button once). Use this method for cases when the username, password and IP addresses of the VSG is not known.
- Use the web configurator to restore defaults (refer to Section 26.8 "Reset the VSG to Factory Defaults" on page 204).

Note: All custom settings will be lost once you reset to the default settings.

CHAPTER 3
The Web Configurator

This chapter introduces how to access the web configurator and perform general system configuration.

3.1 Introducing the Web Configurator

The web configurator is best viewed with Internet Explorer (version 4.0 or above) or Netscape (version 6. or later).

Note: JavaScript support must be enabled.

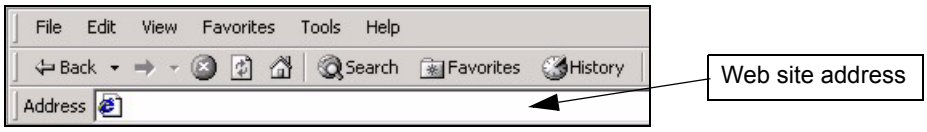
3.2 Accessing the Web Configurator

Follow the steps below to access the web configurator.

Note: The VSG allows only one web configurator session at a time.

1. Make sure your VSG is properly connected (refer to the instructions in Chapter 2, "Hardware Installation and Connection," on page 35).
2. Launch your web browser and type the WAN or LAN IP address of the VSG as the web site address. **192.168.1.1** is the default IP address for the WAN port and **10.59.1.1** is the default IP address for the LAN port.
3. If you are using a different port number (between 8000 and 8099) for the web server, you must also append the port number to the WAN IP address separated with a colon ":", for example, http://192.168.1.1:8080.

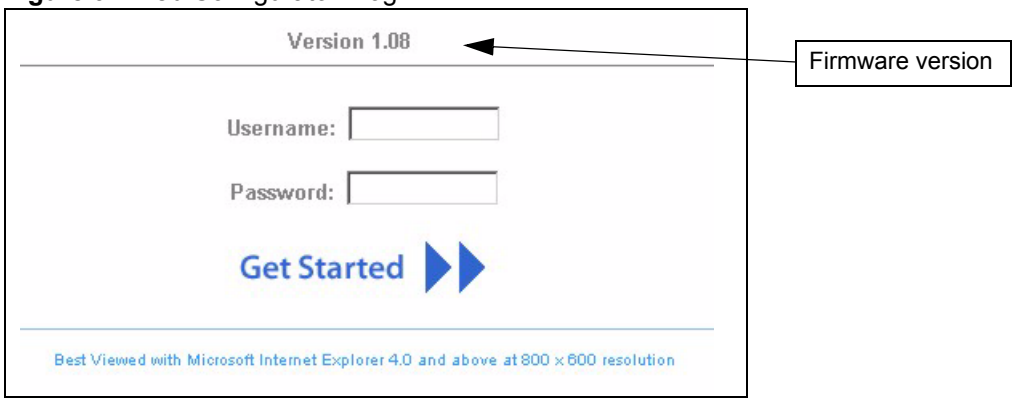
Figure 8 Entering IP Address in Internet Explorer



4. A login screen displays. Type "admin" (default) as the administrator user name and "1234" (default) as the password and click **Get Started**.

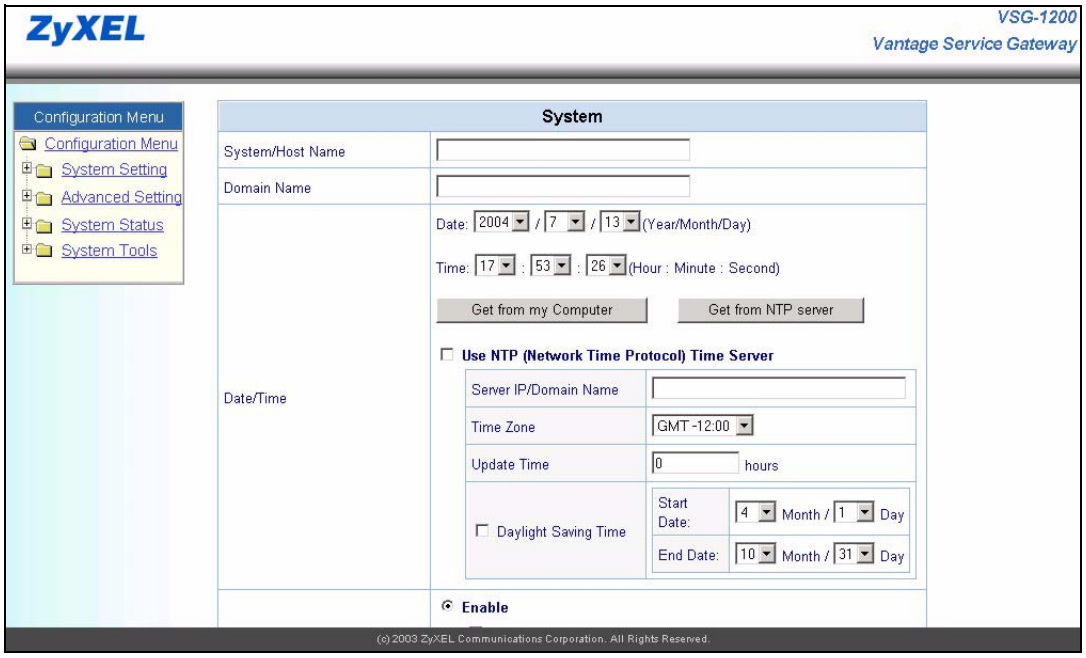
Note: The user name and password are case sensitive.

Figure 9 Web Configurator: Login



5 You should see the main screen as shown.

Figure 10 Web Configurator: Main Menu



Note: Please note that if there is no activity for longer than five minutes after you log in, the VSG will automatically log you out. If this happens, simply log back in again. You can change the timeout period in the web configurator (refer to Section 4.8 "Server Configuration" on page 61).

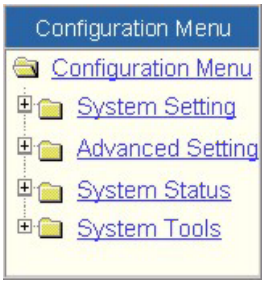
3.3 The Navigation Panels

The VSG web configurator provides two levels of navigation: the **Configuration Menu** panel and a screen-specific link panel.

3.3.1 The Configuration Menu Panel

The **Configuration Menu** panel on the left of all web pages provides a consistent way to access the configuration screens. Click each heading to expand the menu.

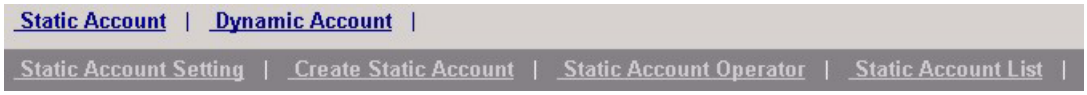
Figure 11 Navigation Panel



3.3.2 Screen Specific Link Panel

In some screens, a link panel displays on the top of the screen that allows you to navigate to advanced configuration screens. An example is shown in the figure below.

Figure 12 Navigation Panels: Screen specific Link Panel



3.4 Screen Overview

The following table lists the various web configurator screens.

Table 2 Web Configurator Screen Overview

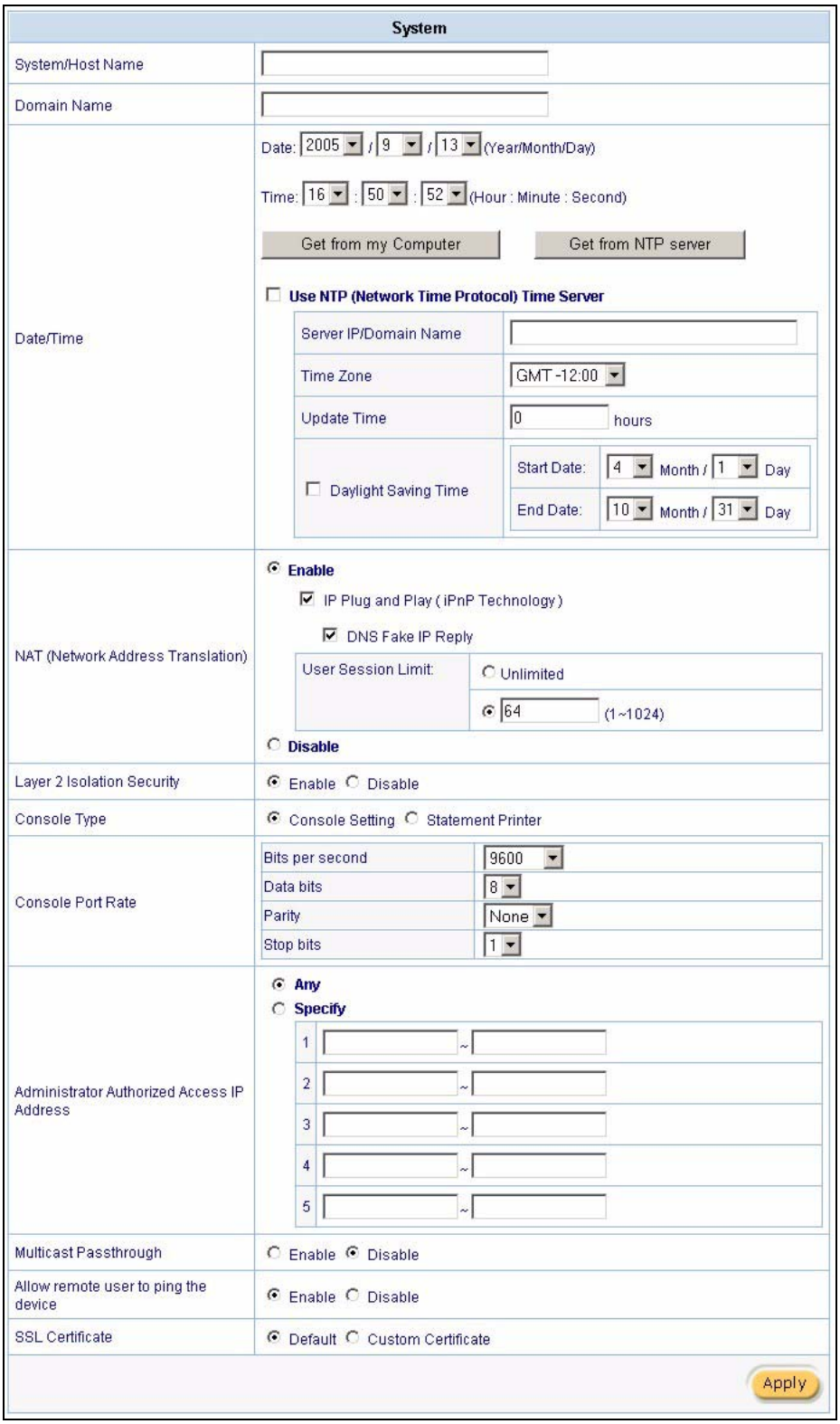
SYSTEM SETTING	ADVANCED SETTINGS	SYSTEM STATUS	SYSTEM TOOLS
			

3.5 General System Setting

The **System** screen displays first when you access the web configurator.

The **Domain Name** entry is what is propagated to the DHCP clients on the LAN. If you leave this blank, the domain name obtained by a DHCP server is used. While you must enter the host name (System Name) on each individual computer, the domain name can be assigned from the VSG via DHCP.

Figure 13 System Setting: System



The following table describes the labels in this screen.

Table 3 System Setting: System

LABEL	DESCRIPTION
System/ Host Name	Enter a descriptive name (up to 32 characters) for identification purposes.
Domain Name	Enter the domain name (if you know it) here. If you leave this field blank, the VSG may obtain a domain name from a DHCP server. The domain name entered by you is given priority over the DHCP server assigned domain name.
Date/Time	To manually set the system date and time, select the appropriate choices from the **Date** and **Time** drop-down list boxes. Click **Get from my Computer** to set the time and date on the VSG to be the same as the computer that you use to configure the VSG. If you select **Use NTP (Network Time Protocol) Time Server** option and set the necessary fields, you can click **Get from NTP Server** to update the time and date on the VSG from the NTP time server.
Use NTP (Network Time Protocol) Time Server	Select this option to have the VSG get the date and time information from a time server.
Server IP/ Domain Name	Enter the IP address or the domain name of the time server. Check with your ISP/ network administrator if you are unsure of this information.
Time Zone	Select your time zone from the drop-down list box. This will set the time difference between your time zone and Greenwich Mean Time (GMT).
Update Time	Enter the number of hours between updates.
Daylight Savings	Select this option if you use daylight savings time. Daylight saving is a period from late spring to early fall when many countries set their clocks ahead of normal local time by one hour to give more daytime light in the evening.
Start Date	Specify the month and day that your daylight-savings time starts on if you select **Daylight Savings**.
End Date	Specify the month and day that your daylight-savings time ends on if you select **Daylight Savings**.
NAT (Network Address Translation)	NAT (RFC 1631) is the translation of the IP address of a host in a packet, for example, the source address of an outgoing packet, used within one network to a different IP address known within another network. Select **Enable** to activate Network Address Translation (NAT). Enable this feature to set your VSG to map multiple local IP addresses to one global IP address. This is the default selection. Select **Disable** to deactivate NAT.
IP Plug and Play (iPnP Technology)	Select this option to allow plug-and-play Internet access which means that subscribers do not have to change their network settings. This feature is activated by default.
DNS Fake IP Reply	Select this option to assign private IP address to a network device (such as the e-mail server). NAT will translate the private IP address to the public IP address on the WAN.
User Session Limit	You can set the VSG to limit the number of sessions each user can use at a time. Select Unlimited to allow each user to use any number of sessions at a time. Select the second option and enter the number of sessions (between 1 and 1024) each user is allowed to use at a time.

Table 3 System Setting: System (continued)

LABEL	DESCRIPTION
Layer 2 Isolation Security	If you activate NAT, select **Enable** in this field to prevent communication between subscribers. This is the default selection. Select **Disable** to deactivate layer 2 security and allow communication between subscribers.
Console Type	Use this field to set the function of the **Console** port on the front panel of the VSG.Select **Console Setting** when you connect the console port directly to a computer for local management. This is the default setting. Select **Statement Printer** when you connect the console port to an SP-200.
Console Port Rate	Select the fields below to configure the Console port. **Note:** If you change the console port settings, make sure you also make the same change to the terminal emulator software.
Bits per second	This field only applies when you select **Console Setting** in the **Console Type** field. Select a console port speed from the drop-down list box. Choices are **1200**, **2400**, **4800**, **9600**, **14400**, **19200, 38400**, **57600** and **115200**. The default selection is **9600**.
Data bits	Select a data bit from the drop-down list box.
Parity	Select the parity from the drop-down list box.
Stop bits	Select the stop bit from the drop-down list box.
Administrator Authorized Access IP Address	Select **Any** to use any computer to access the web configurator on the VSG. Select **Specify** and then enter the IP address(es) or a range of IP addresses of the computer(s) that is allowed to log in to configure the VSG.
Multicast Pass Through	Select **Enable** to allow multicast traffic to pass through the VSG. This may affect your network performance. Select **Disable** to prevent any multicast traffic from passing through the VSG. This is the default setting.
Allow remote user to ping the device	Select **Enable** to respond to Ping requests from the LAN or WAN interface. Select **Disable** to not respond to Ping requests from the LAN or WAN interface.
SSL Certificate	Certificate Secure Socket Layer (SSL) security allows you to create a secure connection between the VSG and the client computer(s). Select **Default** to use the default system-generated SSL certificate. Select **Custom Certificate** to use a certificate obtained from a certificate authority. Refer to Chapter 25, "Secure Socket Layer," on page 189 for more information.
Apply	Click **Apply** to save the changes.

3.6 System Login Accounts

There are four system accounts that you can use to log in to the VSG: administrator, account manager, supervisor and super subscriber.

- The administrator account allows you full access to all system configurations. The default administrator user name is "admin" and password "1234".

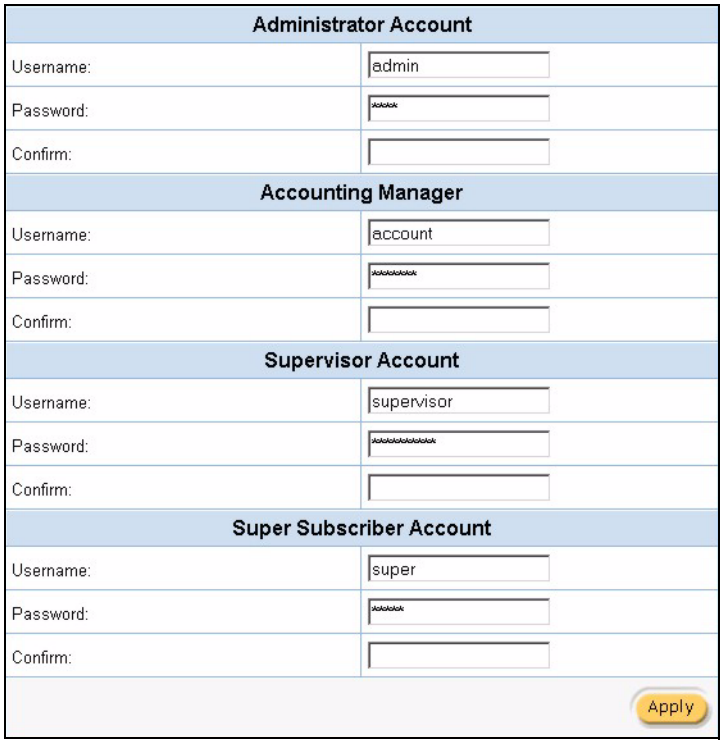
- The account manager account is used for subscriber account management only. No system configuration is allowed. This account is useful for front desk personnel (such as in a hotel) for setting up subscriber accounts without tampering with the system configuration. The default user name and password are "account".
- With the supervisor account, you can view the system status and change the supervisor account password. You can also edit the **Advanced Setting Portal Page**, **Advertisement** and **Walled Garden** screens. The default user name and password are "supervisor".
- The super subscriber account is used for testing the Internet connection between the VSG and the ISP. There is no time limitation or billing imposed on this account. Thus anyone who logs in with this account is able to gain Internet access for free. The default super subscriber user name and password are "super".

3.7 Changing System Login Passwords

Note: It is recommended you change the system passwords.

From the **Main Menu** screen, click **System Tools** and **System Account**.

Figure 14 System Tools: System Account



The following table describes the labels in this screen.

Table 4 System Tools: System Account

LABEL	DESCRIPTION
Administrator Account	This account permits full access to all system configurations.
Username	Enter the user name for the administrative account. The default is **admin**.
Password	Enter a new administrative account password.
Confirm	Enter the new administrator password again for confirmation.
Accounting Manager	This account allows you to set up subscriber accounts. No system configuration is allowed.
Username	Enter the user name for the account manager account. The default is **account**.
Password	Enter a new account manager password.
Confirm	Enter the new account manager password again for confirmation.
Supervisor Account	This account allows you to view system status only.
Username	Enter the user name for the supervisor account. The default is **supervisor**.
Password	Enter a new supervisor password.
Confirm	Enter the new supervisor password again for confirmation.
Super Subscriber Account	You can use this account to test Internet connection between a computer behind the VSG to the ISP. No time limit or billing is imposed on this account.
Username	Enter the user name for the super subscriber account. The default is **super**.
Password	Enter a new super subscriber account password.
Confirm	Enter the new super subscriber account password again for confirmation.
Apply	Click **Apply** to save the changes back to the VSG.

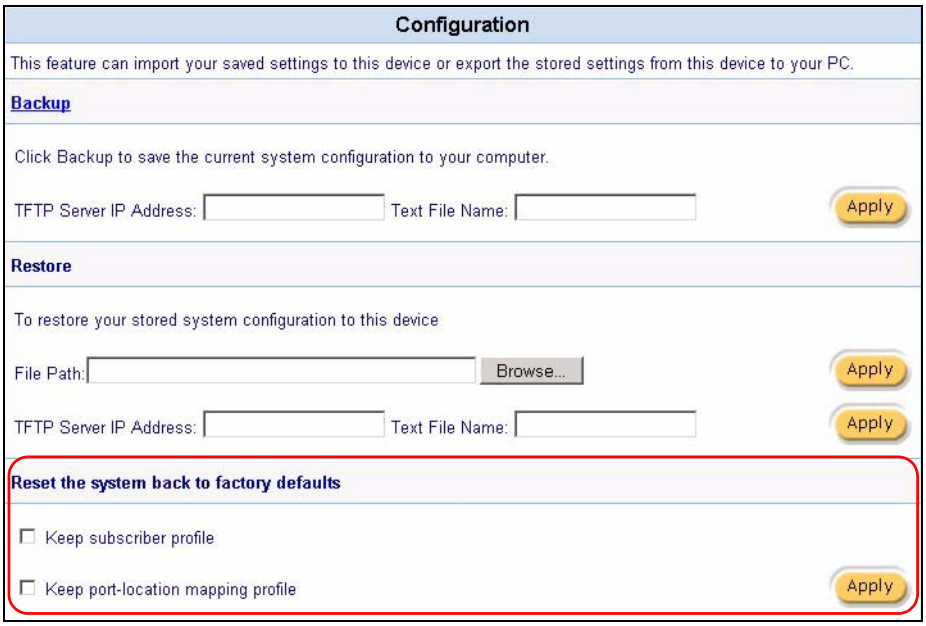
3.8 Resetting the VSG

Note: All your custom configuration will be erased once you reset the VSG. You may choose to keep the subscriber account information and the port-location mapping settings.

Follow the steps below to reset the VSG back to the factory default settings.

1 Click **System Tools**, **Configuration** to display the screen as shown next.

Figure 15 System Tools: Reset



2 Scroll down to the **Reset the system back to factory defaults** section at the bottom of the screen.

3 If you want to keep all subscriber account information, select **Keep subscriber profile** and/or **Keep port-location mapping profile**.

4 Click **Apply**.

5 Wait for the VSG to finish restarting before accessing the VSG again.

3.8 Restarting the VSG

Note: You *must* restart the VSG every time you change the system IP address or upload a firmware or configuration file.

In the **Main Menu** screen, click **System Tools**, **Restart** and click **Apply**.

Figure 16 System Tools: Restart

3.9 Logging Out of the Web Configurator

In the **Main Menu** screen, click **System Tools**, **Logout** and click **Apply** to exit from the web configurator.

Figure 17 System Tools: Logging Out

CHAPTER 4
LAN, WAN and Server Setup

This chapter shows you how to configure LAN and WAN ports and server settings.

4.1 Factory Ethernet Defaults

The Ethernet parameters of the VSG are preset to the following values:

1. WAN IP address of 192.168.1.1 with subnet mask of 255.255.255.0.
2. LAN IP address of 10.59.1.1.
3. DHCP server enabled on the LAN with a 252 client IP address pool starting from 10.59.1.2

These parameters should work for the majority of installations. If you wish to change the factory defaults or to learn more about TCP/IP, please read on.

4.2 LANs and WANs

A LAN (Local Area Network) is a computer network limited to the immediate area, usually the same building or floor of a building. A WAN (Wide Area Network), on the other hand, is an outside connection to another network or the Internet.

4.3 IP Address Assignment

A static IP is a fixed IP that you configure on the VSG. A dynamic IP is not fixed; the DHCP server provides an IP address to the VSG each time it connects to the network. When an Ethernet device is configured to obtain a dynamic IP address from a DHCP server, it is known as a DHCP client.

4.4 DHCP Configuration

DHCP (Dynamic Host Configuration Protocol) allows the individual clients (Ethernet device) to obtain the TCP/IP configuration from a centralized DHCP server. The VSG has built-in DHCP server capability, which means it can assign IP addresses, an IP default gateway and DNS servers to computer systems that support the DHCP client when this feature is activated. The VSG can also act as a surrogate DHCP server where it relays IP address assignment from the actual DHCP server to the clients.

4.4.1 IP Address and Subnet Mask

Like houses on a street that share a common street name, the computers on a LAN share one common network number.

Where you obtain your network number depends on your particular situation. If the ISP or your network administrator assigns you a block of registered IP addresses, follow their instructions in selecting the IP addresses and the subnet mask.

The Internet Assigned Number Authority (IANA) reserved a block of addresses specifically for private use (refer to Section 4.4.2 "Private IP Addresses" on page 54); please do *not* use any other number unless you are told otherwise. Let's say you select 192.168.1.0 as the network number; which covers 254 individual addresses, from 192.168.1.1 to 192.168.1.254 (zero and 255 are reserved). In other words, the first three numbers specify the network number while the last number identifies an individual computer on that network.

The subnet mask specifies the network number portion of an IP address.

4.4.2 Private IP Addresses

Every machine on the Internet must have a unique address. If your networks are isolated from the Internet, for example, only between your two branch offices, you can assign any IP addresses to the hosts without problems.

However, the Internet Assigned Numbers Authority (IANA) has reserved the following three blocks of IP addresses specifically for private networks:

```
10.0.0.0 – 10.255.255.255
172.16.0.0 – 172.31.255.255
192.168.0.0 – 192.168.255.255
```

You can obtain your IP address from the IANA, from an ISP or it can be assigned from a private network. If you belong to a small organization and your Internet access is through an ISP, the ISP can provide you with the Internet addresses for your local networks. On the other hand, if you are part of a much larger organization, you should consult your network administrator for the appropriate IP addresses.

Regardless of your particular situation, do not create an arbitrary IP address; always follow the guidelines above.

Note: For more information on address assignment, please refer to RFC 1597, *Address Allocation for Private Internets* and RFC 1466, *Guidelines for Management of IP Address Space.*

4.5 DNS Server Address

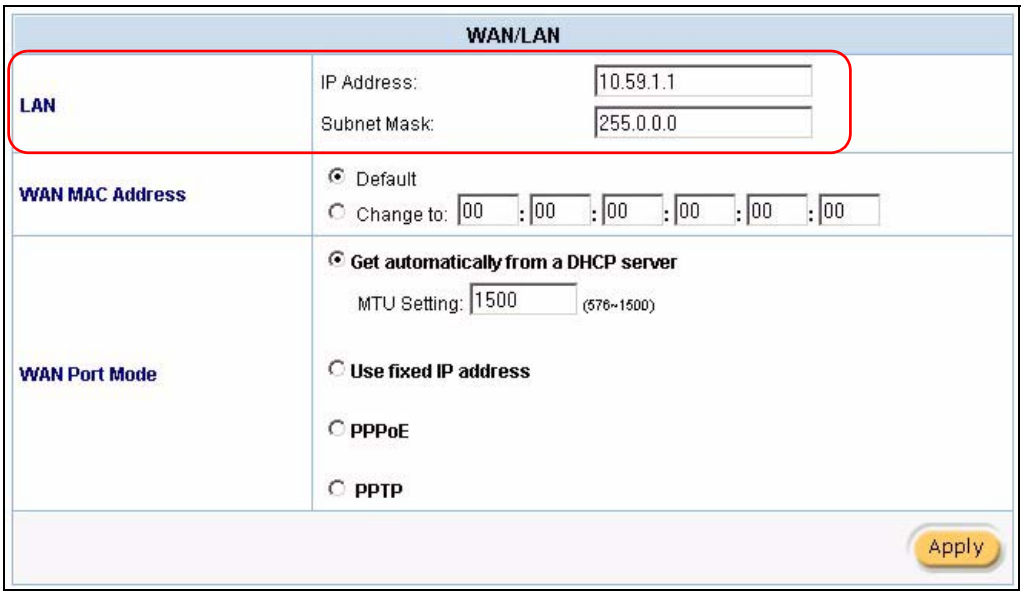
DNS (Domain Name System) is for mapping a domain name to its corresponding IP address and vice versa, for example, the IP address of *www.zyxel.com* is 204.217.0.2. The DNS server is extremely important because without it, you must know the IP address of a machine before you can access it. The DNS server addresses that you enter in the DHCP setup are passed to the client machines along with the assigned IP address and subnet mask.

There are two ways that an ISP disseminates the DNS server addresses. The first is for an ISP to tell a customer the DNS server addresses, usually in the form of an information sheet, when s/he signs up. The second is to obtain the DNS server information automatically when a computer is set as a DHCP client.

4.6 LAN Configuration

To configure the LAN settings on the VSG, click **System Setting** and **WAN/LAN** to display the screen as shown.

Figure 18 System Setting: WAN/LAN: LAN Configuration



The following table describes the LAN-related fields in this screen.

Table 5 System Setting: WAN/LAN: LAN Configuration

FIELD	DESCRIPTION
LAN	
IP Address	Enter the LAN IP address of the VSG in dotted decimal notation. The default is **10.59.1.1**.
Subnet Mask	Enter the LAN subnet mask in dotted decimal notation. The default is **255.0.0.0**.

Note: You must restart the VSG if you change the IP address.

If you set the VSG as a DHCP server on the LAN, the VSG will automatically change the LAN DHCP settings based on the new LAN IP address.

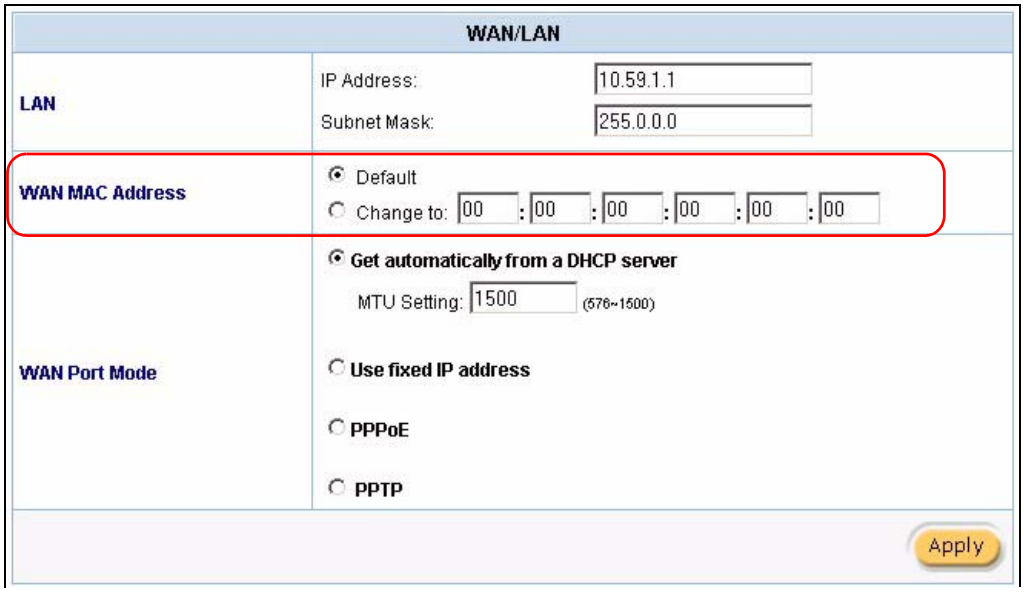
4.7 WAN Configuration

To configure the WAN settings on the VSG, click **System Setting** and **WAN/LAN**. The **WAN/LAN** screen varies depending on the settings in the **WAN Port Mode** field.

4.7.1 Configuring WAN MAC Address

Use the **WAN/LAN** screen to configure the MAC address of the WAN port by either setting the VSG to use the factory default or specify the MAC address of a computer on the LAN.

Figure 19 System Setting: WAN/LAN: WAN MAC Address



The following table describes the related field in this screen.

Table 6 System Setting: WAN/LAN: WAN MAC Address

FIELD	DESCRIPTION
WAN MAC Address	Select **Default** to use the factory assigned MAC address. If your ISP requires MAC address authentication, select **Change to** and enter the MAC address of a computer on the LAN in the fields provided.

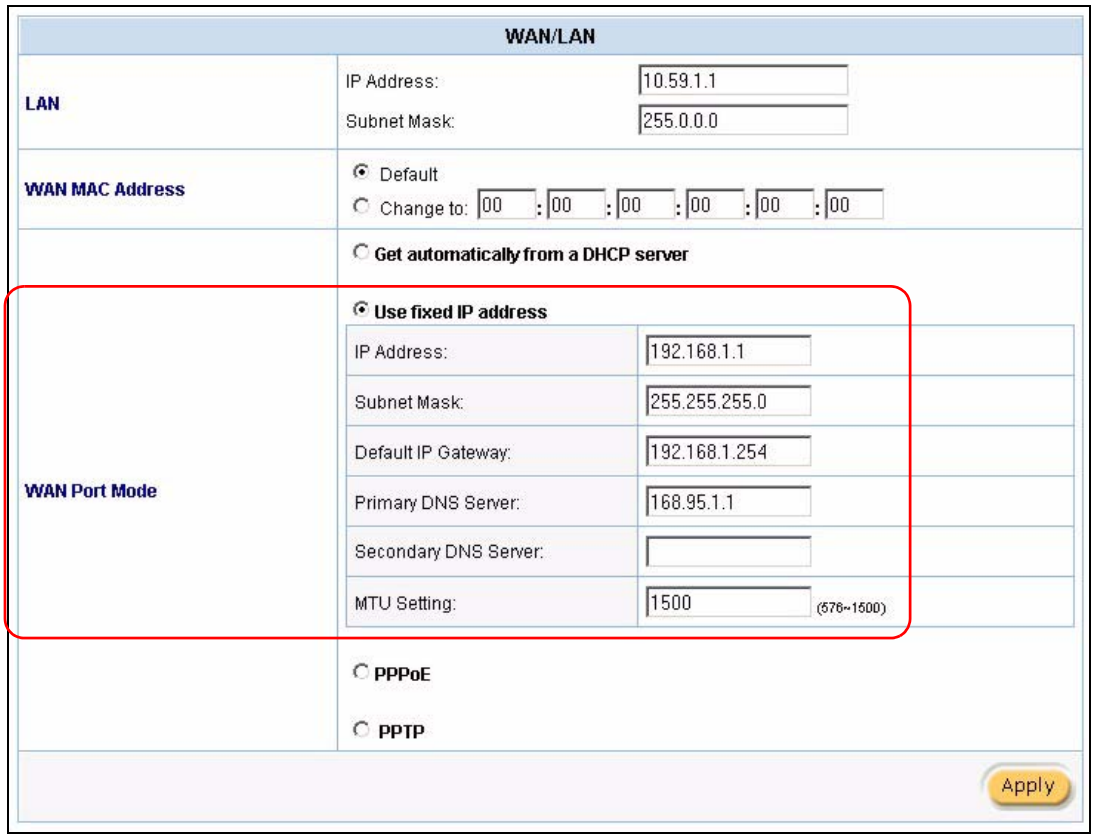
4.7.2 MTU

A maximum transmission unit (MTU) is the largest size packet or frame, specified in octets (eight-bit bytes) that can be sent in a packet- or frame-based network. The Transmission Control Protocol (TCP) uses the MTU to determine the maximum size of each packet in any transmission. Too large an MTU size may mean retransmissions if the packet encounters a router that can't handle that large a packet. Too small an MTU size means relatively more header overhead and more acknowledgements that have to be sent and handled.

4.7.3 WAN IP Address Settings

Use the **WAN/LAN** screen to change the WAN IP address settings.

Figure 20 System Setting: WAN/LAN: WAN IP



The following table describes the related labels in this screen.

Table 7 System Setting: WAN/LAN: WAN IP

FIELD	DESCRIPTION
WAN Port Mode	
Get automatically from a DHCP server	Select this option to set the VSG to act as a DHCP client on the WAN. The VSG obtains TCP/IP information (IP address, DNS server information, etc.) from a DHCP server.
MTU Setting	Enter the MTU (Maximum Transfer Unit) size.

Table 7 System Setting: WAN/LAN: WAN IP (continued)

FIELD	DESCRIPTION
Use fixed IP address	Select this option to set the VSG to use a static (or fixed) IP address. This is the default setting.
IP Address	Enter the static IP address in dotted decimal notation. The default WAN IP address is **192.168.1.1**.
Subnet Mask	Enter the subnet mask in dotted decimal notation.
Default IP Gateway	Enter the IP address of the default gateway device.
Primary/Secondary DNS Server	Enter the IP addresses of the primary and/or secondary DNS servers.
MTU Setting	Enter the MTU (Maximum Transfer Unit) size.

4.7.4 PPPoE

Point-to-Point Protocol over Ethernet (PPPoE) functions as a dial-up connection. PPPoE is an IETF (Internet Engineering Task Force) draft standard specifying how a host personal computer interacts with a broadband modem (for example DSL, cable, wireless, etc.) to achieve access to high-speed data networks. It preserves the existing Microsoft Dial-Up Networking experience and requires no new learning or procedures.

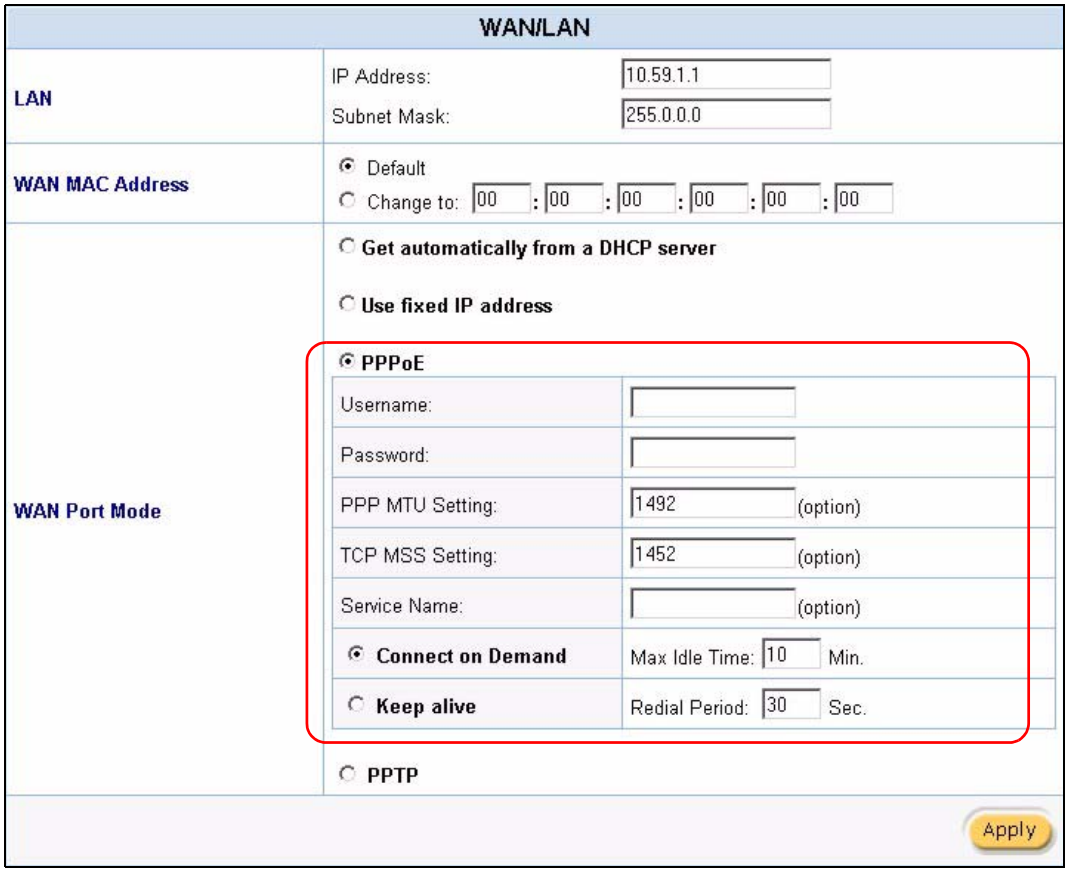
For the service provider, PPPoE offers an access and authentication method that works with existing access control systems (for instance, RADIUS). For the user, PPPoE provides a login and authentication method that the existing Microsoft Dial-Up Networking software can activate, and therefore requires no new learning or procedures for Windows users.

One of the benefits of PPPoE is the ability to let end users access one of multiple network services, a function known as dynamic service selection. This enables the service provider to easily create and offer new IP services for specific users.

Operationally, PPPoE saves significant effort for both the subscriber and the ISP/carrier, as it requires no specific configuration of the broadband modem at the subscriber's site.

By implementing PPPoE directly on the VSG (rather than individual computers), the computers on the LAN do not need PPPoE software installed, since the VSG does that part of the task. Furthermore, with NAT, all of the LAN's computers will have Internet access.

Figure 21 System Setting: WAN/LAN: PPPoE



The following table describes the related fields in this screen.

Table 8 System Setting: WAN/LAN: PPPoE

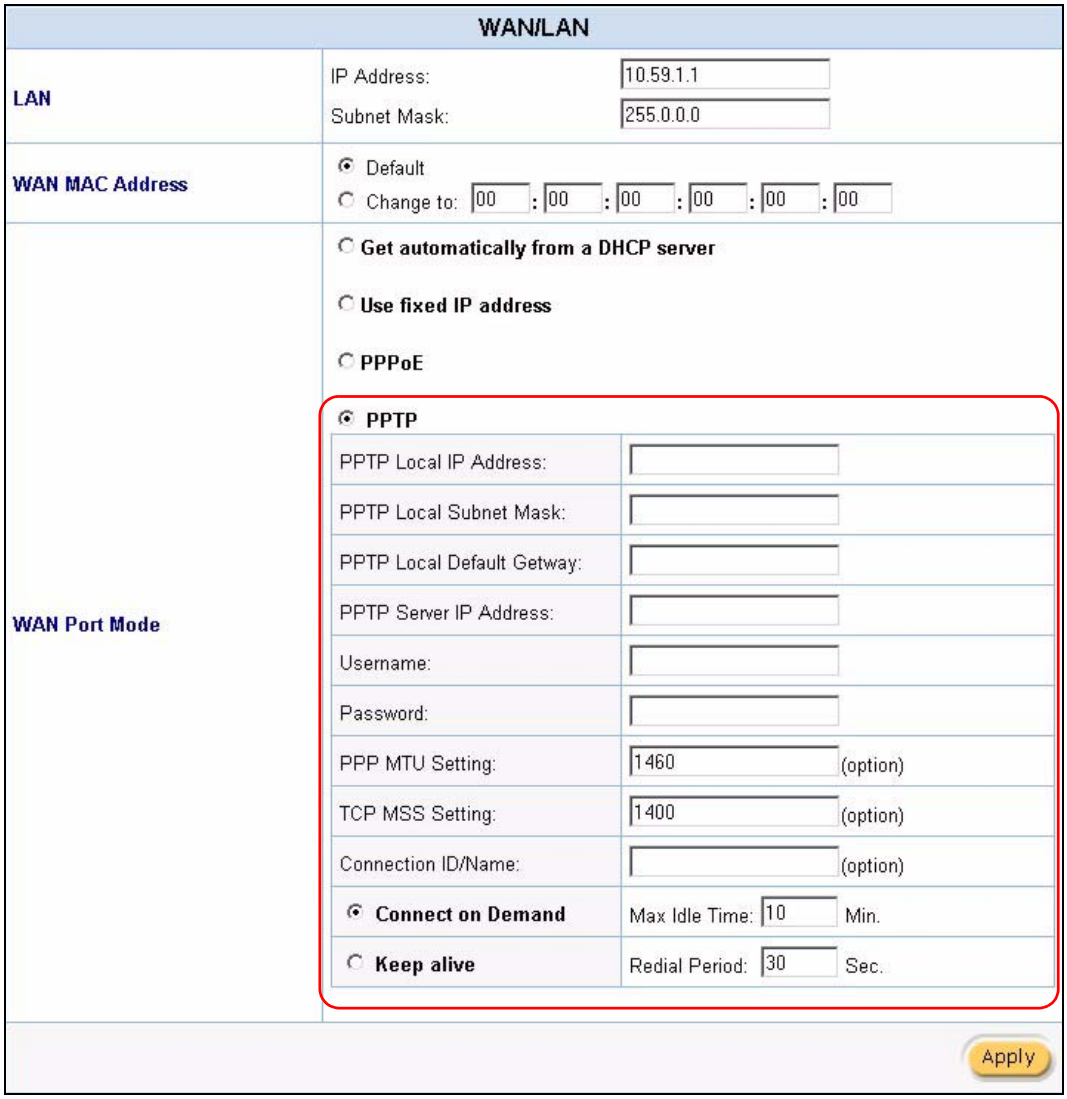
FIELD	DESCRIPTION
WAN Port Mode	PPPoE Select this option to activate **PPPoE** support.
Username	Enter the user name exactly as your ISP assigned. If assigned a name in the form user@domain where domain identifies a service name, then enter both components exactly as given.
Password	Enter the password associated with the user name above.
PPP MTU Setting	Enter the size of a Maximum Transmission Unit (MTU).
TCP MSS Setting	Enter the size of the Maximum Segment Size (MSS).
Service Name	Enter the name of your PPPoE service.
Connect on Demand	Select this option when you don't want the connection up all the time and specify an idle timeout in the **Max Idle Time** field (maximum 65535 minutes). This is the default setting with an idle timeout of **10** minutes.
Keep Alive	Select this option when you want the Internet connection up all the time and specify a redial period in the **Redial Period** field (maximum 65535 seconds). When disconnected, the VSG will attempt to bring up the connection after the redial period.

4.7.5 PPTP

Point-to-Point Tunneling Protocol (PPTP) is a network protocol that enables transfers of data from a remote client to a private server, creating a Virtual Private Network (VPN) using TCP/IP-based networks.

PPTP supports on-demand, multi-protocol, and virtual private networking over public networks, such as the Internet.

Figure 22 System Setting: WAN/LAN: PPTP



The following table describes the related fields in this screen.

Table 9 System Setting: WAN/LAN: PPTP

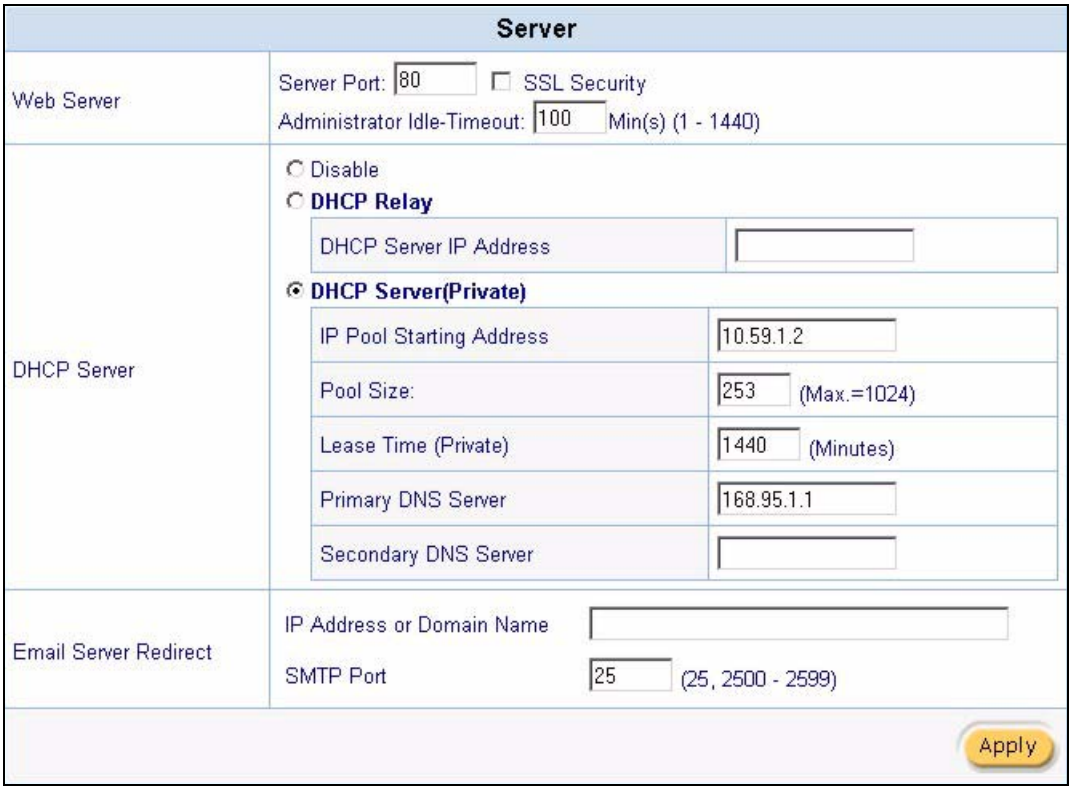
FIELD	DESCRIPTION
WAN Port Mode	
PPTP	Select this option to activate **PPTP** support. Refer to Section 4.7.5 "PPTP" on page 60 for more information.
PPTP Local IP Address	Enter the IP address assigned to you.
PPTP Local Subnet Mask	Enter the subnet mask assigned to you.
PPTP Local Default Gateway	Enter the IP address of the gateway device.
Username	Enter the user name exactly as your ISP assigned. If assigned a name in the form user@domain where domain identifies a service name, then enter both components exactly as given.
Password	Enter the password associated with the user name above.
PPP MTU Setting	Enter the size of a Maximum Transmission Unit (MTU).
TCP MSS Setting	Enter the size of the Maximum Segment Size (MSS).
Connections ID/Name	Enter your identification name of the PPTP server assigned to you by the ISP.
Connect on Demand	Select this option when you don't want the connection up all the time and specify an idle timeout in the **Max Idle Time** field (maximum 65535 minutes). This is the default setting with an idle timeout of **10** minutes.
Keep Alive	Select this option when you want the Internet connection up all the time and specify a redial period in the **Redial Period** field (maximum 65535 seconds). When disconnected, the VSG will attempt to bring up the connection after the redial period.

4.8 Server Configuration

Use the **Server Configuration** screen to set the embedded web server, the LAN DHCP server and specify the e-mail server for e-mail redirection on the VSG.

Click **System Setting** and **Server** to display the screen as shown next.

Figure 23 System Setting: Server



The following table describes the labels in this screen.

Table 10 System Setting: Server

LABEL	DESCRIPTION
Web Server	
Server Port	Specify the port number of the embedded web server on the VSG for accessing the web configurator. The default port number is **80**. Enter a number between 8010 and 8060 to access the web configurator behind a NAT-enabled network. If you enter a number between 8010 and 8060, you need to append the port number to the **WAN** or **LAN** port IP address to access the web configurator. For example, if you enter "8010" as the web server port number, then you must enter "http://www.192.168.1.1:8010" where 192.168.1.1 is the WAN or LAN port IP address.
SSL	Security Secure Socket Layer (SSL) security allows you to create a secure connection between the VSG and the client computer(s). Refer to Chapter 25, "Secure Socket Layer," on page 189 for more information. Select this option to activate SSL security. By default, SSL login security is disabled.
Administrator Idle-Timeout	Specify how many minutes (between 1 and 1440) the web configuration can be left idle before the session times out. After it times out you have to log in with your username and password again. Very long idle timeouts may have security risks. **Note:** This does NOT apply to the SMT management session.

Table 10 System Setting: Server (continued)

LABEL	DESCRIPTION
DHCP Server	Select the DHCP mode on the LAN.
Disable	Select this option to disable DHCP server on the LAN.
DHCP Relay	Select this option to set the VSG to forward client DHCP requests to a DHCP server on the LAN network. Then configure the **DHCP Server IP Address** field.
DHCP Server IP Address	If you select **DHCP Relay**, enter the IP address of the real DHCP server.
DHCP Server	Select this option to set the VSG to assign network information (IP address, DNS information etc.) to Ethernet device(s) connected to the **LAN** port(s). This is the default setting.
DHCP Pool Start IP Address	Enter the first of the continuous addresses in the IP address pool. The default is **10.59.1.2** (based on the default LAN IP address of **10.59.1.1**).
DHCP Pool Size	This field specifies the size or count of the IP address pool. Enter a number not greater than 1024. The default is **253**.
Lease Time	Specify the time (in minutes between 1 and 71582788) a DHCP client is allowed to use an assigned IP address. When the lease time expires, the DHCP client is given a new, unused IP address.
Primary/Secondary DNS IP Address	Enter the IP address of the DNS server(s) in the **Primary DNS IP Address** and/or **Secondary DNS IP Address** fields. **Note:** You *must* specify a DNS server.
E-mail Server Redirect	You can set the VSG to redirect and send subscriber's E-mail via a specified e-mail server. This feature allows subscribers to send E-mail via the local E-mail server when their default e-mail server is not working or prevented by relay restrictions.
IP Address or Domain Name	Specify the IP address or the domain name of the e-mail server to which the VSG forwards e-mail.
SMTP Port	Specify the port number (**25** is the default) for SMTP (Simple Mail Transfer Protocol). Enter a number between 2500 and 2599.
Apply	Click **Apply** to save the settings.

CHAPTER 5
NAT Pool

This chapter shows how to configure Network Address Translation (NAT) on the WAN for VPN packets.

5.1 NAT Introduction

NAT (Network Address Translation - NAT, RFC 1631) is the translation of the IP address of a host in a packet, for example, the source address of an outgoing packet, used within one network to a different IP address known within another network.

5.1.1 NAT Definitions

Inside/outside denotes where a host is located relative to the VSG, for example, the computers of your subscribers are the inside hosts, while the web servers on the Internet are the outside hosts.

Global/local denotes the IP address of a host in a packet as the packet traverses a router, for example, the local address refers to the IP address of a host when the packet is in the local network, while the global address refers to the IP address of the host when the same packet is traveling in the WAN side.

Note that inside/outside refers to the location of a host, while global/local refers to the IP address of a host used in a packet. Thus, an inside local address (ILA) is the IP address of an inside host in a packet when the packet is still in the local network, while an inside global address (IGA) is the IP address of the same inside host when the packet is on the WAN side. The following table summarizes this information.

Table 11 NAT Definitions

ITEM	DESCRIPTION
Inside	This refers to the host on the LAN.
Outside	This refers to the host on the WAN.
Local	This refers to the packet address (source or destination) as the packet travels on the LAN.
Global	This refers to the packet address (source or destination) as the packet travels on the WAN.

NAT never changes the IP address (either local or global) of an outside host.

5.1.2 What NAT Does

In the simplest form, NAT changes the source IP address in a packet received from a subscriber (the inside local address) to another (the inside global address) before forwarding the packet to the WAN side. When the response comes back, NAT translates the destination address (the inside global address) back to the inside local address before forwarding it to the original inside host. Note that the IP address (either local or global) of an outside host is never changed.

The global IP addresses for the inside hosts can be either static or dynamically assigned by the ISP. In addition, you can designate servers, for example, a web server and a telnet server, on your local network and make them accessible to the outside world. If you do not define any servers, NAT offers the additional benefit of firewall protection. With no servers defined, your VSG filters out all incoming inquiries, thus preventing intruders from probing your network. For more information on IP address translation, refer to *RFC 1631*, *The IP Network Address Translator (NAT)*.

5.1.3 How NAT Works

Each packet has two addresses – a source address and a destination address. For outgoing packets, the ILA (Inside Local Address) is the source address on the LAN, and the IGA (Inside Global Address) is the source address on the WAN. For incoming packets, the ILA is the destination address on the LAN, and the IGA is the destination address on the WAN. NAT maps private (local) IP addresses to globally unique ones required for communication with hosts on other networks. It replaces the original IP source address in each packet and then forwards it to the Internet. The VSG keeps track of the original addresses and port numbers so incoming reply packets can have their original values restored.

5.2 VPN and NAT

A VPN (Virtual Private Network) provides secure communications between sites without the expense of leased site-to-site lines. A secure VPN is a combination of tunneling, encryption, authentication, access control and auditing technologies/services used to transport traffic over the Internet or any insecure network that uses the TCP/IP protocol suite for communication.

The VSG allows subscribers to create a VPN tunnel to a remote site.

Note: For IPSec, the VSG does not support AH protocol.

By default, the VSG performs NAT on the LAN; mapping multiple private LAN addresses to a single public address on the WAN. This prevents subscribers from creating multiple VPN connections to a remote VPN device that allows only one VPN connection per source IP address.

In order to allow subscribers to establish multiple VPN connections to a remote VPN device with single-connection-per-source limitation, set the VSG to perform NAT on the WAN. You need to configure the NAT address pool for use with VPN connections on the WAN port. The VSG automatically maps one/more private IP addresses to one/more public IP addresses for VPN packets. The following table describes the NAT mapping types on the WAN for VPN packets.

Table 12 WAN NAT Mapping Types for VPN

TYPE	DESCRIPTION
One-to-One	For VPN connections to the same remote VPN device, the VSG maps each private LAN IP address to one public WAN IP address.
One-to-Many	For VPN connections to different remote VPN devices, the VSG maps multiple private LAN IP address to one public WAN IP address.

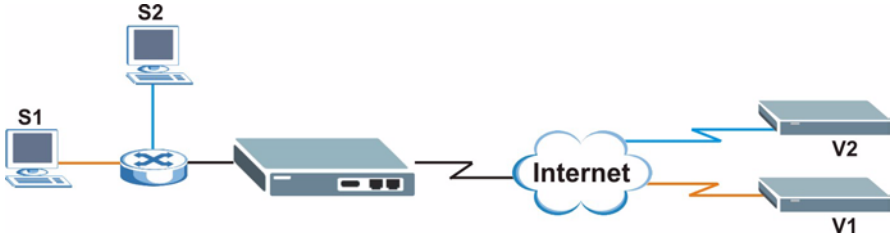
5.3 NAT Examples

The following sections describe some NAT address mapping examples for VPN connections.

5.3.1 Example 1: One-to-One

The figure below shows an example where the two subscribers **S1** and **S2** tries to establish secure VPN connections to the same VPN server **V1** at the same time. For example, the VSG is using a public IP address of 211.21.21.1[2]. In this case, the VSG performs One-to-One IP address translation on the WAN.

Figure 24 NAT Example: One-to-One



The following table shows the address mapping.

Table 13 NAT Example: One-to-One

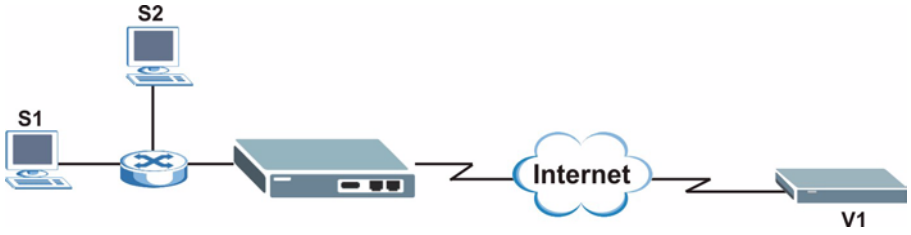
SUBSCRIBER	ORIGINAL SOURCE IP	TRANSLATED SOURCE IP
S1	10.59.1.2	211.21.21.2
S2	10.59.1.3	221.21.21.3

2. All public IP address discussed are for examples only.

5.3.2 Example 2: Many-to-One

The figure below shows an example where the two subscribers **S1** and **S2** try to establish a secure VPN connection to VPN servers **V1** and **V2** respectively at the same time. In this case, the VSG performs Many-to-One IP address translation on the WAN since the destination address is different.

Figure 25 NAT Example: Many-to-One



The following table shows the address mapping.

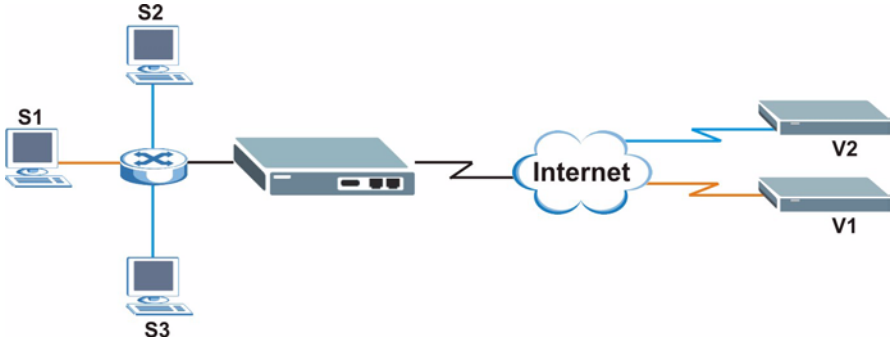
Table 14 NAT Example: Many-to-One

SUBSCRIBER	ORIGINAL SOURCE IP	TRANSLATED SOURCE IP
S1	10.59.1.2	211.21.21.2
S2	10.59.1.3	211.21.21.2

5.3.3 Example 3: One-to-One and Many-to-One

The figure below shows an example where subscriber **S1** tires to connect to VPN server **V1** while subscriber **S2** and **S3** try to connect to the same VPN server **V2** at the same time. In this case, subscribers **S1** and **S2** map to the same WAN IP address since the destination is different while subscriber **S3** maps to a different WAN IP address.

Figure 26 NAT Example: One-to-One and Many-to-One



The following table shows the address mapping.

Table 15 NAT Example: One-to-One and Many-to-One

SUBSCRIBER	ORIGINAL SOURCE IP	TRANSLATED SOURCE IP
S1	10.59.1.2	211.21.21.2
S2	10.59.1.3	211.21.21.2
S3	10.59.1.4	211.21.21.3

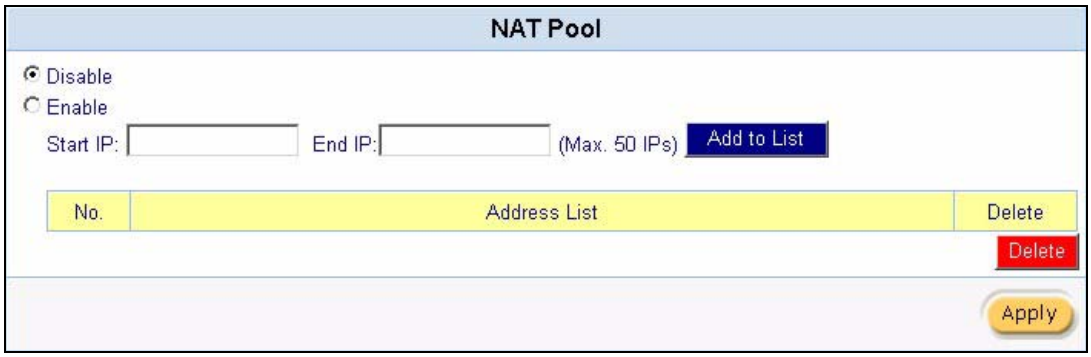
5.4 Configuring NAT Pool

Note: You only need to set the NAT address pool if the remote VPN server(s) allows only one connection per source IP address.

Note: You need to acquire additional public IP address(es) from your ISP to create NAT pool(s).

To set the NAT address pool, click **System Setting** and **NAT Pool** in the navigation panel. A screen displays as shown next.

Figure 27 System Setting: NAT Pool



The following table describes the labels in this screen.

Table 16 System Setting: NAT Pool

LABEL	DESCRIPTION
Disable	Select this option to deactivate this feature. Subscribers are not be able to establish multiple connections simultaneously to the same VPN server (that has the single-connection-per-source limitation).
Enable	Select this option to perform address translation on the WAN to allow subscribers to establish simultaneous connections to the same VPN server (that has the single-connection-per-source limitation). You must then configure the address pool for VPN connections.
Start/End IP	Specify the beginning and ending IP addresses of the address pool in the fields provided and click **Add to List**. The following shows NAT pool examples if the VSG is using a WAN public IP address of 211.21.21.1: Group 1: 211.21.21.2 ~ 211.21.21.6 (five IP addresses) Group 2: 211.21.21.20 ~ 211.21.21.29 (ten IP addresses) Group 3: 211.21.21.60 ~ 211.21.21.69 (ten IP addresses) Group 4: 211.21.21.75 ~ 211.21.21.76 (two IP addresses) **Note:** You can configure up to ten address pools (each pool can contain up to 50 addresses) on the VSG.
No.	This read-only field displays the index number.
Address List	This read-only field displays the address pool.
Delete	Click **Delete** to remove the selected entry(ies).
Apply	Click **Apply** to save the changes.

CHAPTER 6
Authentication

This chapter shows you how to set up subscriber authentication on the VSG.

6.1 Authentication Overview

You can set the VSG to authenticate subscribers in a number of ways:

- User agreement
- CAS (Central Authentication Service)
- Built-in authentication
- Remote RADIUS server

By default, subscriber authentication is disabled. This allows all subscribers to access the Internet without entering account username and password.

6.1.1 User Agreement

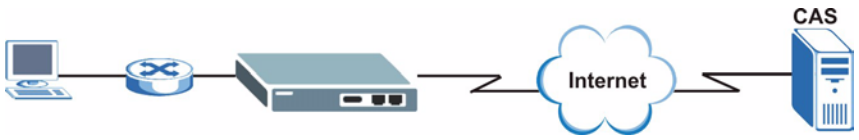
In cases where authentication is not required and anyone can access the Internet through the VSG, you can set the VSG to require users to accept a service usage agreement before they can access the Internet.

6.1.2 CAS (Central Authentication Service)

The Hilton Group Corporation developed the High Speed Internet Access (HSIA) service to provide Internet access service across its entire Hilton Group hotels.

In order to use the HSIA, hotel guest(s) must be authenticated through the proprietary CAS. The CAS performs both user authentication and accounting.

Figure 28 CAS Example



The following summarizes the communication steps before Internet access is allowed.

1. A hotel guest launches a web browser.
2. The VSG redirects the guest's web browser to a login screen at CAS.

3 The guest enters the provided access information.

4 Once authentication is successful, CAS informs VSG to allow Internet access to the guest.

6.1.3 Accounting Methods

The VSG provides two accounting methods: **Accumulation** and **Time to Finish**.

- The **Accumulation** accounting method allows multiple re-logins until the allocated time period or until the subscriber account is expired. The VSG accounts for the time the subscriber logs in for Internet access.
- The **Time to Finish** accounting method is good for one-time logins. Once a subscriber logs in, the VSG stores the MAC address of the subscriber's computer for the duration of the time allocated. Thus the subscriber does not have to enter the user name and password again for re-login within the allocated time. Once activated, the subscriber account is valid until the allocated time is reached even if the subscriber disconnects Internet access for a certain period within the allocated time. For example, if Joe purchases a one-hour time-to-finish account. He starts using the Internet for the first 20 minutes and then disconnects Internet access to go to a 20-minute meeting. Then he only has 20 minutes left on his account.

6.1.4 Built-in Authentication

The built-in authentication method is useful if you do not have a RADIUS server. You can use the built-in subscriber database to manage the subscribers. With the built-in authentication, the VSG provides three sets of preconfigured scenarios that you can choose for easy and simple setup. For billing, use either a PMS or the built-in billing mechanism to set up accounting information.

6.1.5 RADIUS

The VSG supports Remote Authentication Dial-In user Service (RADIUS). By integrating RADIUS with the VSG, you can set up the subscriber database on the RADIUS server. In addition to subscriber information, the subscriber database may hold the Internet usage time period each subscriber is allocated. For example, when a subscriber logs in, the RADIUS server will send the time allocation information (such as session time-out) to the VSG, which uses this information to control the subscriber's connection.

6.1.5.1 RADIUS Accounting

The VSG sends "accounting start" and "accounting stop" messages to the RADIUS server, which uses these messages to accurately track subscriber Internet usage.

6.1.5.2 Vendor Specific Attribute

With RADIUS server authentication, you can define vendor specific attributes (VSAs) in addition to the set of standard RADIUS attributes defined in RFC 2865 and RFC 2866. A VSA is an attribute-value pair that is sent between a RADIUS server and the VSG. It is necessary you define the VSAs on the RADIUS sever if you want the VSG to perform the following:

- Limit Download bandwidth per subscriber
- Limit Upload bandwidth per subscriber
- Limit Total traffic bandwidth allowed per subscriber
- Specify advertising web site per subscriber
- Enable/disable SMTP redirect

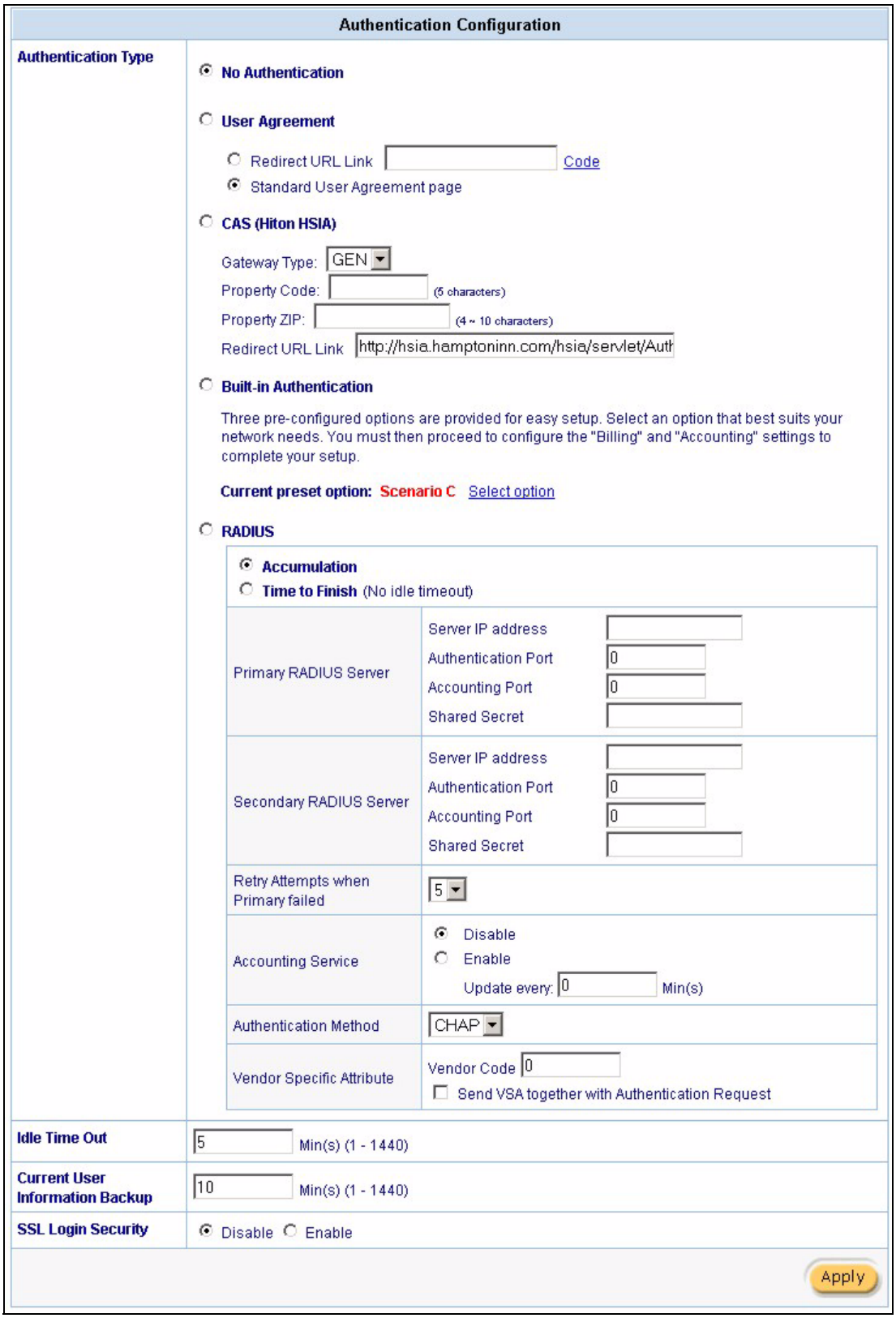
Note: Before you can make use of these functions on the VSG, configure the proprietary VSAs on the RADIUS server. Refer to the documentation that comes with your RADIUS server for more information.

See Appendix D, "Vendor Specific Attributes," on page 239 for more information on the VSAs.

6.2 Authentication Settings

To configure the subscriber authentication method, click **System Setting** and **Authentication** to display the screen as shown next.

Figure 29 System Setting: Authentication



The following table describes the labels in this screen.

Table 17 System Setting: Authentication

LABEL	DESCRIPTION
No Authentication	Select this option to disable subscriber authentication. Subscribers can access the Internet without entering user names and passwords. This is the default setting.
User Agreement	Select **User Agreement** to direct a subscriber to an Internet service usage agreement page before accessing the Internet.
Redirect Page URL Link	Select this radio button to send the subscribers to a different web page for authentication. Specify the URL of the user agreement page in the field provided. Click **Code** to display the HTML source code of a default sample page.
Standard User Agreement page	Select this radio button to use the system's built-in user agreement page.
CAS (Hilton HSIA)	Select this option to use the Hilton Group proprietary CAS (Central Authentication Service) for HSIA. Then specify the fields below.
Gateway Type	Specify the type of this gateway from the drop-down list box. Select **ZYL** for ZyXEL devices. Otherwise, select **GEN**.
Property Code	Enter the provided property location code (up to five characters) for the hotel. This identifies the location of the Internet access request.
Property Zip	Enter the provided property zip code (between four and 10 characters).
Redirect Page URL Link	Specify the web site address of the login screen to which the hotel guests are directed for authentication using CAS. **Note:** The default web site address is already entered for you. You don't need to change this unless otherwise instructed by the Hilton HSIA support team.
Built-in Authentication	Select this option to authenticate the subscribers using the local subscriber database. Then click **Select option** to choose a per-configured setting in the **Current Preset option** field. **Note:** When you select this option, you *must* also configure the **Billing** and **Accounting** screens. **Note:** Time to finish accounting is available with the **Built-in Authentication** option. The **RADIUS** option allows you to use accumulation or time to finish accounting.
Current preset option	This field is available when you select **Built-in Authentication**. This field displays the current pre-configured setting for the built-in authentication. To select a predefined option, click **Select option** to open the **Scenario Guide** screen (refer to Figure 30 on page 77).
RADIUS	Select this option to authenticate subscribers using a remote RADIUS server. Then configure the following fields.
Accumulation	Select this option for multiple re-login until the time allocated is used up. If a subscriber logs out and accesses the Internet again within the time period specified in the **Idle Timeout** field, the subscriber does not have to enter the user name and password again to log in.
Time to Finish	Select this option to allow each subscriber a one-time login. If a subscriber logs out before the allocated time expires, the subscriber does not have to enter the user name and password to access the Internet again.
Primary/Secondary RADIUS Server	Server IP Address Enter the IP address of a RADIUS server in dotted decimal notation.

Table 17 System Setting: Authentication (continued)

LABEL	DESCRIPTION
Authentication Port	Specify the authentication port of the RADIUS server. The common port numbers are 1645 and 1812.
Accounting Port	Specify the accounting port of the RADIUS server. The common port numbers are 1646 and 1813.
Secret Key	Specify a password (up to 31 alphanumeric characters) as the key to be shared between the RADIUS server and the VSG. The key is not sent over the network. **Note:** This key must be the same on the RADIUS server and the VSG.
Retry Attempts when Primary fail	Specify the number of times (1 to 3) the VSG resends an authentication request to the primary and/or secondary RADIUS servers.
Accounting Service	Select **Enable** from the drop-down list box to activate the accounting feature and enter the time (in minutes) between updates in the **Update every** field. Select **Disable** to de-activate the accounting feature.
Authentication Method	Select either the **CHAP** or **PAP** authentication method from the drop-down list box.
Vendor Specific Attribute	In the **Vendor Code** field, specify a number for the vendor ID. This is an IANA (Internet Assigned Numbers Authority) assigned number that identifies the vendor or enterprise. Enter **890** for ZyXEL devices. Select **Send VSA together with Authentication Request** to set the VSG to include the VSA information in the authentication requests.
Idle-Timeout	The VSG automatically disconnects a computer from the network after a period of inactivity. The subscriber may need to enter the username and password again before access to the network is allowed. Specify the idle timeout between 1 and 1440 minutes. The default is **5** minutes.
Current User Information Backup	This feature is applicable for built-in authentication. Select this option to back up account information every time interval specified (between 1 and 1440 minutes). The default time interval is **10** minutes. The account information includes unused dynamic accounts and accounts that are currently in use.
SSL Login Page Security	Select **Enable** to activate SSL security upon accessing the login screen so that user names and passwords are encrypted before being transmitted to the VSG. Select **Disable** to de-activate SSL security for the subscriber login screen. Refer to Chapter 25, "Secure Socket Layer," on page 189 for more information.
Apply	Click **Apply** to save the changes.

6.2.1 Scenario Options

Note: This feature is for built-in authentication method only.

When you select **Built-in Authentication** in the **Authentication** screen, you must select a pre-configured scenario option by clicking the **Select option** link to display a screen as shown next.

Select a scenario option in the **Items Check** field and click **Apply** to save the settings. Then proceed to configure the billing and accounting settings.

Figure 30 System: Authentication: Scenario Guide

Scenario Guide

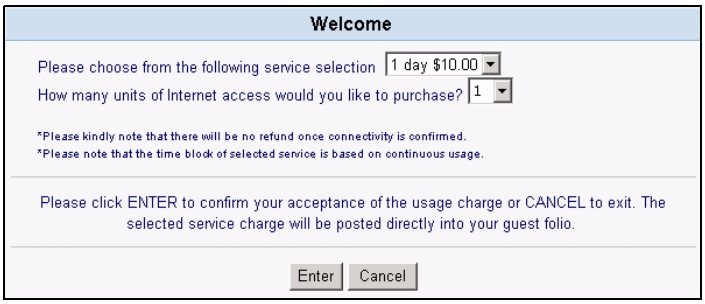
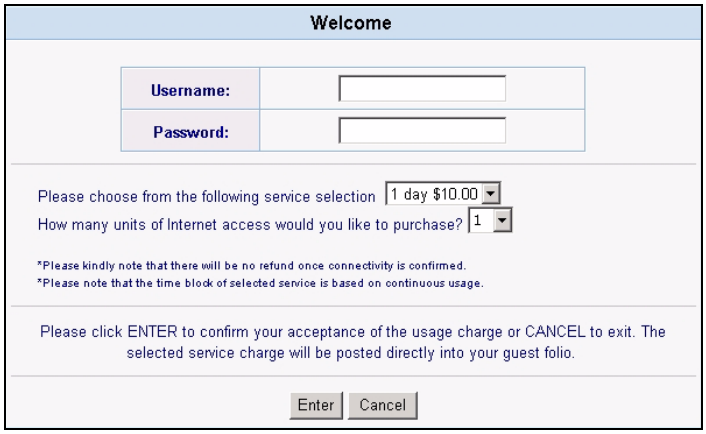
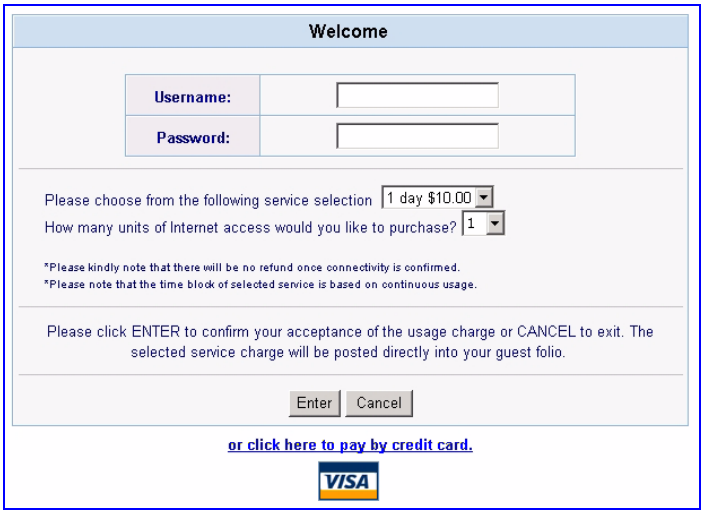
Express way to fit your business model

Items check	Scenario A	Scenario B	Scenario C
PMS billing system	Yes	Yes	No
Infrastructure	Port-Location Mapping	General	General
Need **username/password** when guests go to Internet	No	Yes	Yes
Need to create **static accounts**	Option	Yes	Option
Allow guests to **select service** when first login	Yes	Yes	No
Billing mode	Time to Finish	Time to Finish	Time to Finish Accumulation Idle Timeout 5 Min (s).(1 - 1440) Accumulation account will be deleted after logged in 7 days
Billing**Charge** mode	Based on Room Based on Subscriber	-	-
Default **Billing Profile**	Need to continue configuring "Billing" and choose at lease one active billing profile	Need to continue configuring "Billing" and choose at lease one active billing profile	Allow Credit Card Payment
Remarks	Need to continue configuring "Port-Location Mapping Table"		

Apply

The following table describes each scenario.

Table 18 System: Authentication: Scenario Guide

OPTION	DESCRIPTION	SAMPLE SUBSCRIBER LOGIN SCREEN
Scenario A	Select this option to use PMS billing with port-location mapping. Once you configure the port-location mappings, subscribers are able to access the Internet without entering usernames and passwords. Subscribers can purchase additional time blocks with different billing plans. You can still create static or dynamic accounts. However, subscribers using the dynamic or static accounts are prompted for usernames and passwords.	**Figure 31** Subscriber Login: Scenario A 
Scenario B	Select this option if you want to use PMS billing without port-location mapping. You must then create the subscriber accounts. Subscribers are prompted for their usernames and passwords before Internet access is allowed. Subscribers can purchase additional time blocks with different billing plans.	**Figure 32** Subscriber Login: Scenario B 
Scenario C	Select this option to use the VSG's built-in or credit card billing function. You can select time to finish or accumulation accounting. No PMS device is needed.	**Figure 33** Subscriber Login: Scenario C 

CHAPTER 7
Billing Profiles and PMS Configuration

This chapter shows you how to set up subscriber billing and PMS (Property Management System) configuration.

7.1 About Billing Profiles

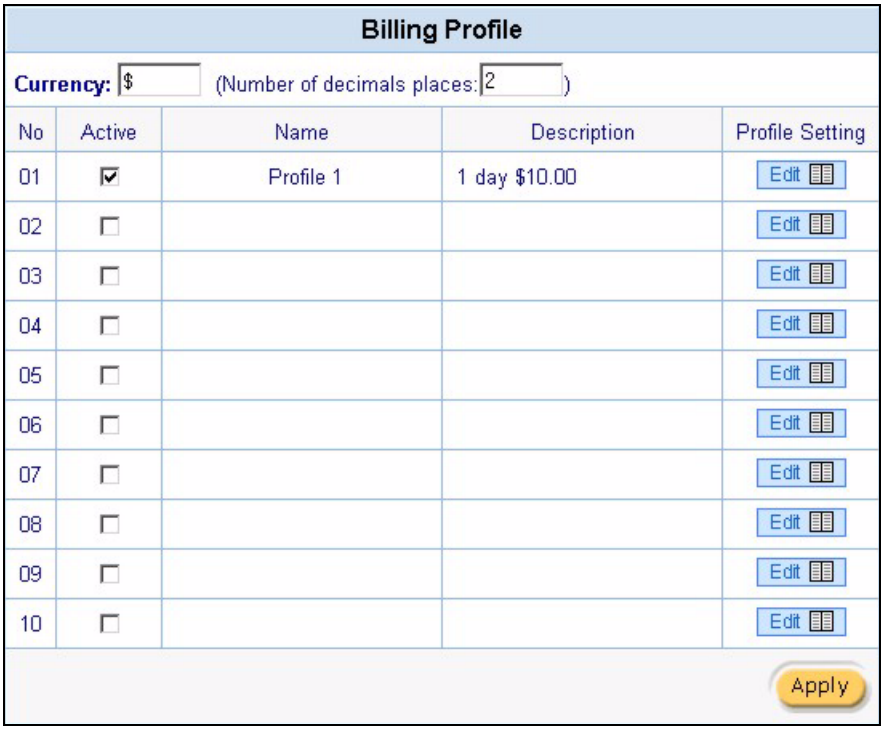
A billing profile contains information such as time unit, unit cost and/or account expiration time. You must associate a subscriber account with a billing profile.

In addition, for PMS billing, subscribers may have a choice of purchasing additional time blocks with different billing profiles you set and activate on the VSG.

7.1.1 Creating a Billing Profile

You can create up to ten billing profiles on the VSG. Click **System Setting**, **Billing** and the **Billing Profile** link to display the screen as shown next.

Figure 34 System Setting: Billing: Billing Profile



The following table describes the labels in this screen.

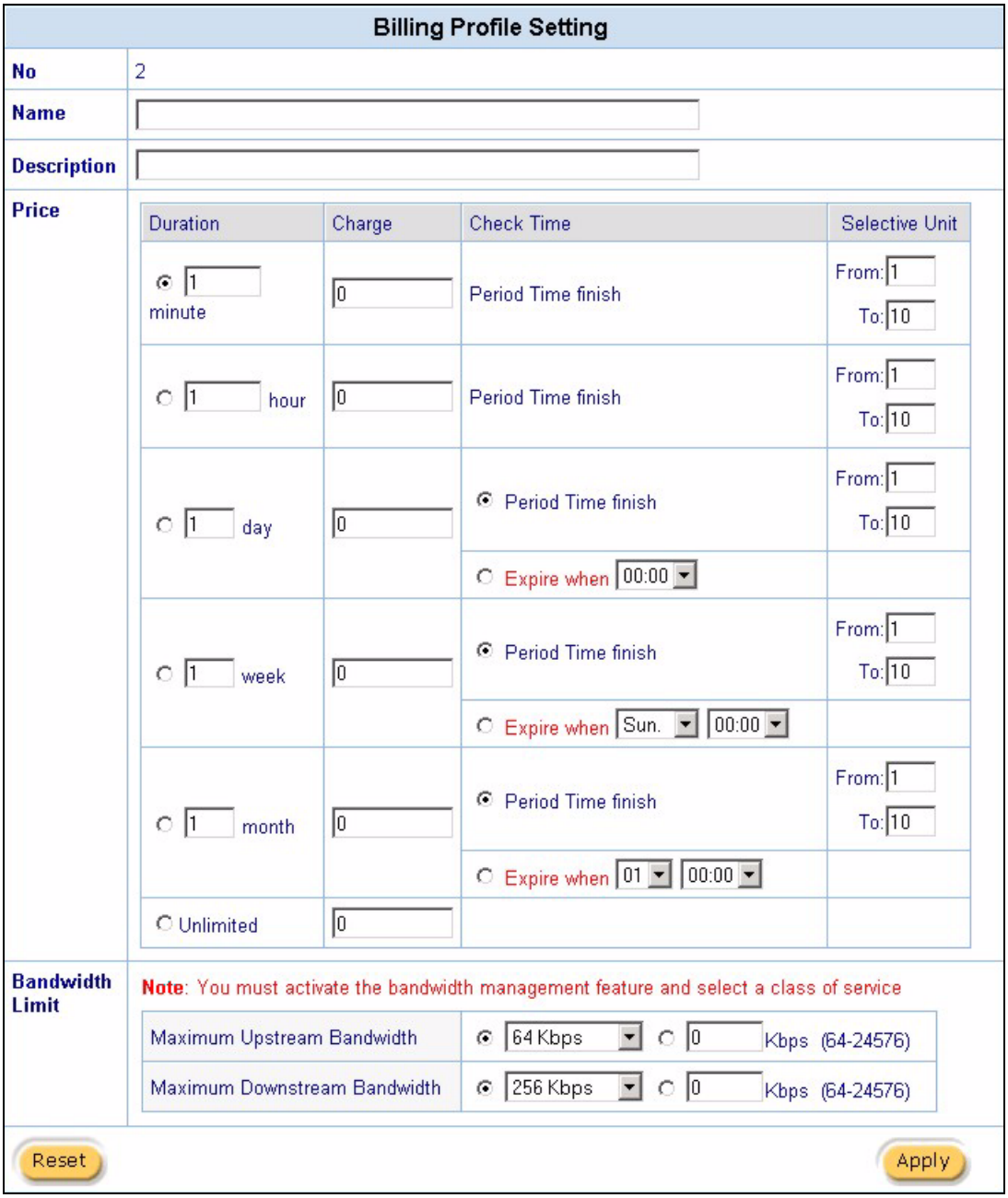
Table 19 System Setting: Billing: Billing Profile

LABEL	DESCRIPTION
Currency	Specify the type of currency and/or dollar sign for billing.
Number of decimal places	Specify the number of decimal places for the currency. The default is **2**.
No	This field displays the index number of a billing profile.
Active	Select this check box to enable the billing profile.
Name	This field displays the name of a billing profile.
Description	This field displays a description of a billing profile.
Profile Setting	Click **Edit** to edit the selected billing profile. Refer to Section 7.1.2 "Editing a Billing Profile" on page 80 for more information.
Apply	Click **Apply** to save the changes.

7.1.2 Editing a Billing Profile

To edit a billing profile, click the **Edit** button in the **Billing Profile** screen to display the configuration screen for the selected billing profile.

Figure 35 System Setting: Billing: Billing Profile Setting



The following table descries the labels in this screen.

Table 20 System Setting: Billing: Billing Profile Setting

LABEL	DESCRIPTION
No	This read-only field displays the index number of the billing profile.
Name	Enter a descriptive name for the billing profile for identification purposes.
Description	Enter a description for this billing profile
Price	

Table 20 System Setting: Billing: Billing Profile Setting (continued)

LABEL	DESCRIPTION
Duration	Select a time period (**minute**, **hour**, **day**, **week**, **month** or **Unlimited**) and enter the time unit in the field provided (not available for **Unlimited**).
Charge	Specify the unit cost in this field.
Check Time	Select **Period Time Finish** for time-to-finish billing method. Refer to Section 6.1.5 "RADIUS" on page 72 for more information. Select **Expired when** and specify the time from the drop-down list box(es) for the accumulate billing method. The subscriber accounts will be invalid once the allocated time period is used up. This option is only available when you select the **Day**, **Week** or **Month** option in the **Period Time** field.
Selective Unit	Specify the range of time units (between 1 and 99) a subscriber is allowed to purchase at any one time. The range is presented as a drop-down list box in the information pop-up window.
Bandwidth Limit	**Note:** You must activate bandwidth management to use this feature. Refer to Chapter 16, "Bandwidth Management," on page 141. Set the fields below to configure the bandwidth limit for this billing profile.
Uplink Bandwidth Limitation	To use a pre-defined option, select the first option and choose a bandwidth from the drop-down list box. To manually set the bandwidth, select the second option and specify the bandwidth in the field provided.
Downlink Bandwidth Limitation	To use a pre-defined option, select the first option and choose a bandwidth from the drop-down list box. To manually set the bandwidth, select the second option and specify the bandwidth in the field provided.
Reset	Click **Reset** to restart configuring this screen again.
Apply	Click **Apply** to save the changes.

7.2 PMS (Property Management System)

Many hotels use a PMS device to perform in-room billing for services (such as room service, mini-bar, pay-per-view TV or telephone) that the guests use.

With PMS, the VSG allows subscribers to purchase additional time units online. In addition, subscribers can select from a number of different billing plans.

To use PMS for billing, first connect the VSG to a PMS device using the **PMS** port (refer to Chapter 2, "Hardware Installation and Connection," on page 35), then configure the PMS settings on the VSG.

7.2.1 Port-Location Mapping Charge Modes

When you activate port-location mapping and PMS on the VSG, two charge modes are available: per room and per subscriber.

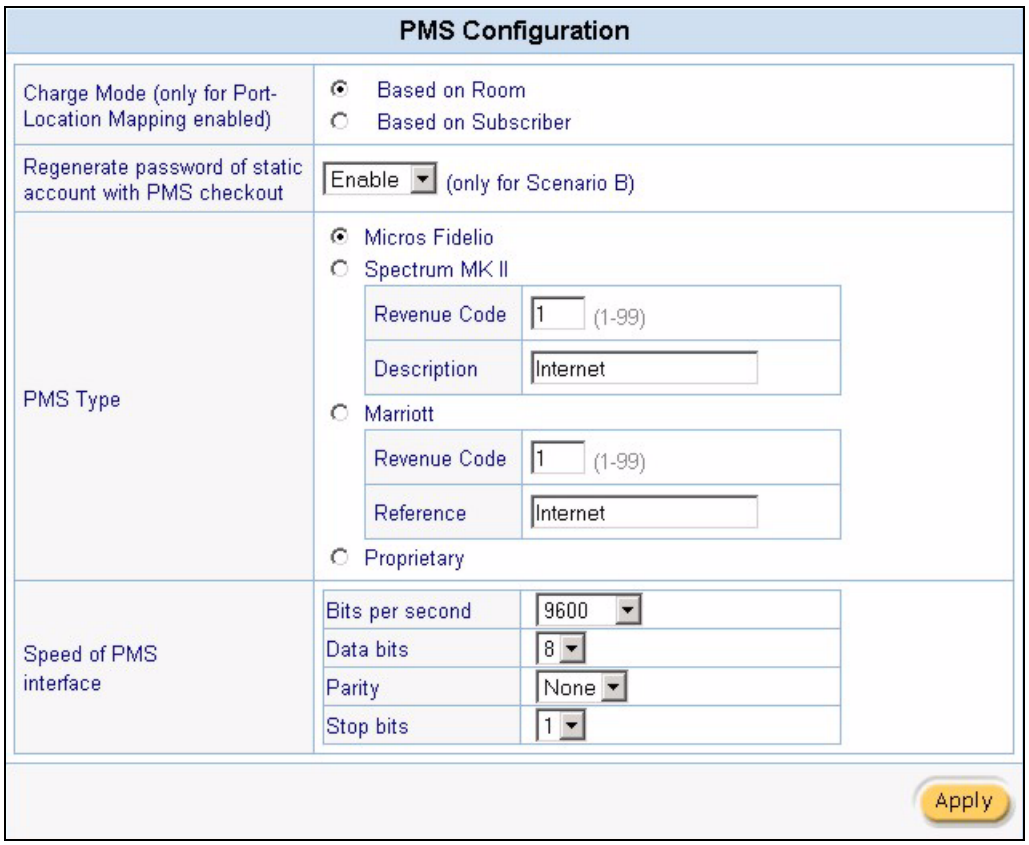
Select **Based on Room** when location is important. If a subscriber disconnects from one location and reconnects in another location, the VSG prompts for the user name and password again.

Select **Based on Subscriber** to allow a subscriber to freely move between different locations without prompting for user name and password.

7.2.2 PMS Configuration

Click **System Setting**, **Billing** and click the **PMS Configuration** link to display the screen as shown next.

Figure 36 System Setting: Billing: PMS Configuration



The following table describes the labels in this screen.

Table 21 System Setting: Billing: PMS Configuration

LABEL	DESCRIPTION
Charge Mode (only for Port-Location Mapping enabled)	When you set up Port-Location Mapping, your VSG offers two billing modes: **Based on Room** and **Based on Subscriber**. Select **Based on Room** when location is important. If a subscriber disconnects from one location and reconnects in another location, the VSG prompts for the user name and password again. Select **Based on Subscriber** to allow a subscriber to freely move between different locations without prompting for user name and password. **Note:** You must activate the port-location mapping feature. Refer to Chapter 10, "Port-Location Mapping," on page 103.
Regenerate password of static account with PMS checkout.	This feature is applicable when you select **Scenario B** with **Built-in Authentication** in the **Authentication** screen (see Figure 29 on page 74). Select **Enable** to automatically generate a new password for the static account when a subscriber checks out. Select **Disable** to keep the password for the static account unchanged after a subscriber checks out.
PMS Type	Select a PMS system and specify the fields below (if available). Currently the VSG supports **Micros Fidelio**, **Spectrum MK II**, **Marriott** and **Proprietary**.
Revenue Code	Enter a revenue code (between 01 and 99).
Description	Enter the description for the revenue. Refer to the user's guide that comes with your PMS device.
Speed of PMS Interface	Set the fields below to configure the PMS port settings on the VSG. **Note:** Make sure the port settings are the same on the VSG and the connected PMS device.
Bits per second	Select the speed of the PMS port connection. The default is **9600**.
Data bits	Specify the data bits.
Parity	Specify the parity.
Stop bits	Specify the data stop bits.
Apply	Click **Apply** to save the changes.

7.3 Types of Subscriber Accounts

After you have set up the subscriber authentication methods and billing profile(s), you need to create subscriber accounts. There are two types of subscriber accounts: static and dynamic.

- For static accounts, refer to Chapter 8, "Static Subscriber Accounts," on page 85.
- For dynamic accounts, refer to Chapter 9, "Dynamic Subscriber Accounts," on page 95.

CHAPTER 8
Static Subscriber Accounts

This chapter shows you how to set up and manage static subscriber accounts.

8.1 About Static Subscriber Accounts

Static accounts are useful in locations such as hotels where you can match an account user name to a fixed location for easy management. Once a static subscriber account is created, it stays permanently in the VSG unless deleted manually. You can generate static accounts automatically or manually.

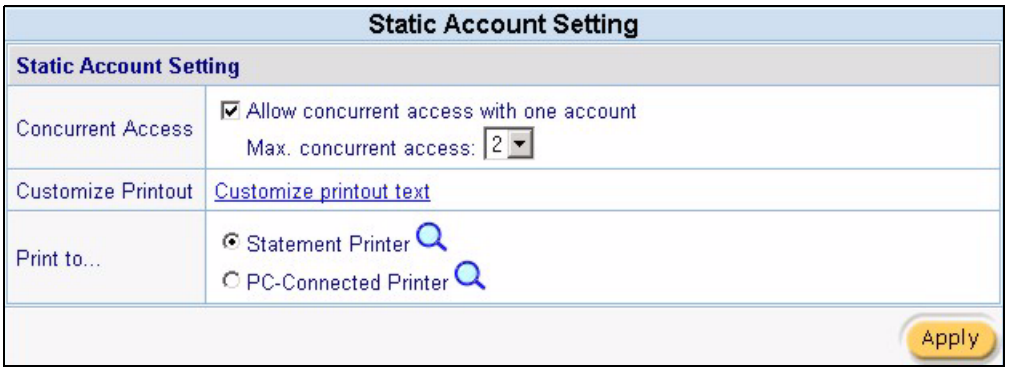
The following figure shows the links for accessing the static account configuration screens when you click **System Setting**, **Accounting** and **Static Accounts.**

Figure 37 Static Account: Links

8.2 Global Static Account Settings

To configure global static account settings, click the **Static Account Setting** link to display the screen as shown.

Figure 38 Static Account Settings: Global Settings



The following table describes the labels in this screen.

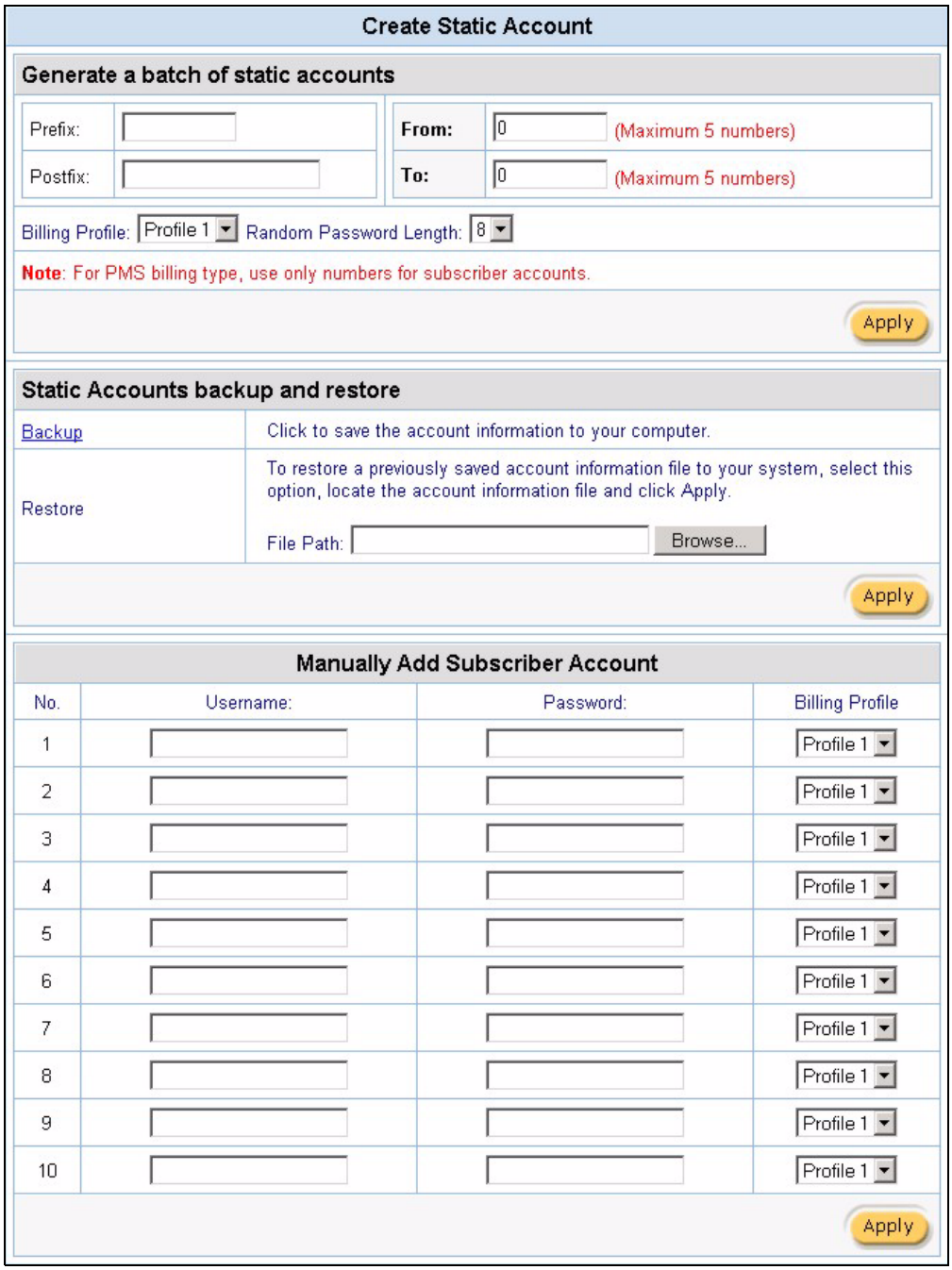
Table 22 Static Account Settings: Global Settings

LABEL	DESCRIPTION
Concurrent Access	Select **Allow concurrent access with one account** to allow more than one users to access the Internet using the same account at the same time. Then specify the number of concurrent users from the **Max. concurrent access** drop-down list box. The default number of concurrent access is **2** users per account.
Customize Printout	Click **Customize printout text** to set the account printout page. Refer to Chapter 14, "Account Printout," on page 129.
Print To	Select **Statement Printer** if you want to print the account information using a statement printer connected to the **CONSOLE** port on the VSG. Select **PC-Connected Printer** if you want to print the account information using a printer connected to a network computer. Click on the  icon to display a print preview.
Apply	Click **Apply** to save the settings.

8.3 Creating a Static Account

Click **System Setting**, **Accounts**, **Static Accounting** and **Create Static Account** to display the screen as shown next.

Figure 39 System Setting: Create Static Subscriber Account

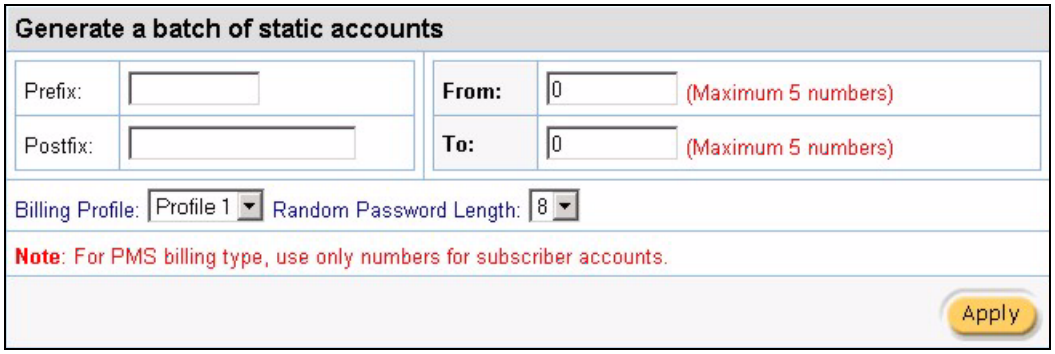


There are two ways to create static subscriber accounts as described in the following sections.

8.3.1 Generating Static Accounts Automatically

To generate a list of static subscriber accounts automatically, set the fields in **Generate a batch of static accounts** in the **Create Static Subscriber Account** screen.

Figure 40 Create Static Subscriber Account: Generate Automatically



The following table describes the related labels in this screen.

Table 23 Create Static Subscriber Account: Generate Automatically

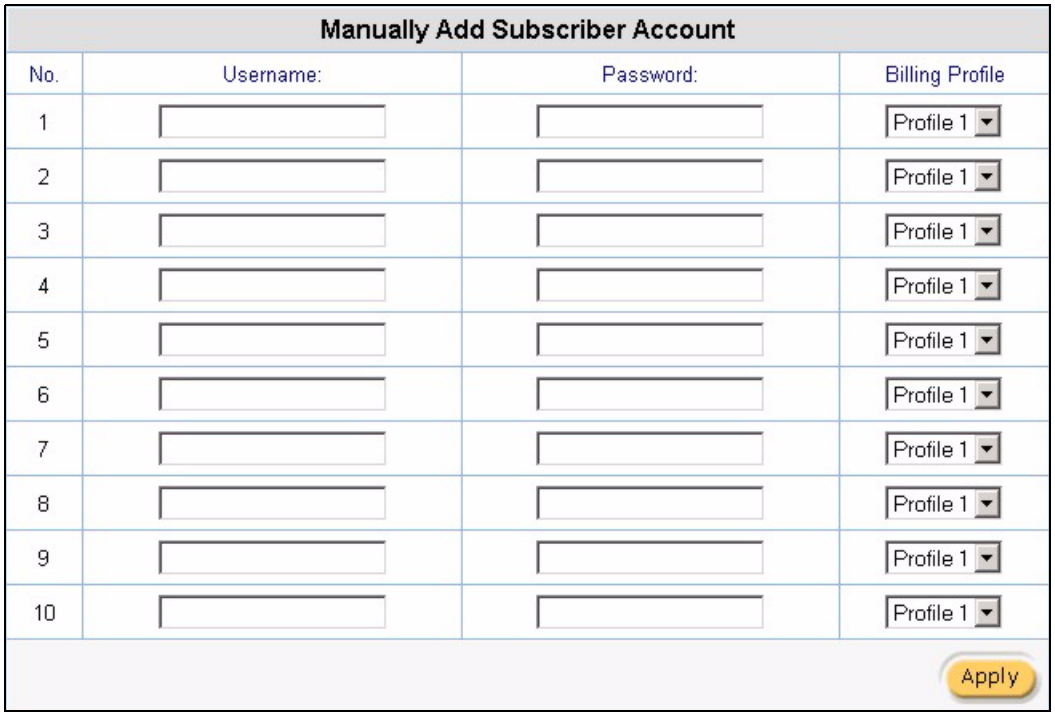
LABEL	DESCRIPTION
Generate a batch of static accounts	
Prefix	Specify the starting characters affixed to the beginning of all account user names.
Postfix	Specify the characters to append o the end of all account user names.
From	Enter the first number of the range of static accounts.
To	Enter the ending number of the range of static accounts.
Billing Profile	Select a predefined billing profile from the drop-down list box. **Note:** This drop-down list box displays active profiles only. Refer to Section 7.1.1 "Creating a Billing Profile" on page 79 for more information.
Random Password Length	The VSG automatically generates a password for each automatically created static account. Specify the length of the password from the drop-down list box.
Apply	Click **Apply** to start generating the static accounts based on the above criterion.

After you have generated the list of static accounts in this screen click **Static Account List** to display the list of static accounts. Refer to Section 8.6 "Viewing the Static Account List" on page 94.

8.3.2 Creating Static Subscriber Accounts Manually

To create static accounts manually, display the **Create Static Subscriber Account** screen and scroll down to the **Manually Add Static Subscriber Accounts** section as shown next. You can manually create up to 10 static accounts at a time.

Figure 41 Create Static Subscriber Account: Manual



The following table describes the related labels in this screen.

Table 24 Create Static Subscriber Account: Manual

LABEL	DESCRIPTION
No	This read-only field displays the index number of an entry.
Username	Enter the user name for a static subscriber account.
Password	Enter the password associated with the user name above. You may also set the VSG to generate a password automatically (refer to Section 8.5 "Editing Subscriber Accounts" on page 92).
Billing Profile	From the drop-down list box, select a billing profile for the static account. **Note:** This drop-down list box displays active profiles only. Refer to Section 7.1.1 "Creating a Billing Profile" on page 79 for more information.
Apply	Click **Apply** to create the static account(s) and save the changes.

8.4 Static Account List Backup and Restore

You can back up and restore static account information in the **Create Static Account** screen.

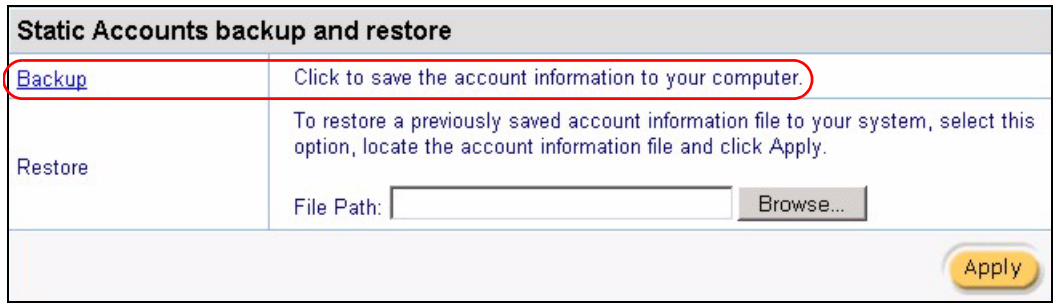
8.4.1 Backing Up a Static Account List

Follow the steps below to back up static subscriber account information to your computer.

1 In the **Create Static Subscriber Account** screen and scroll down to the **Static Accounts backup and restore** section.

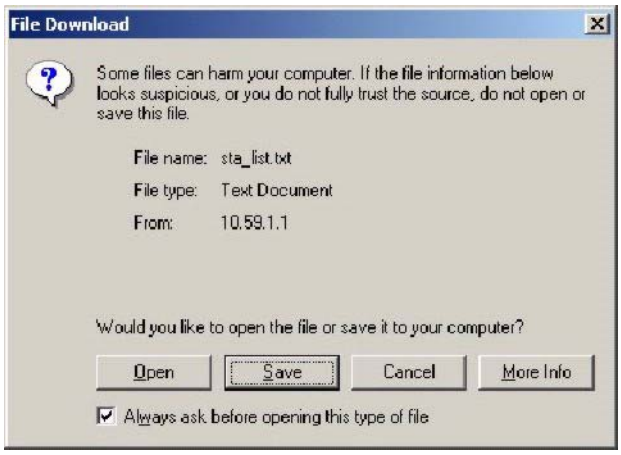
2 Click **Backup**.

Figure 42 Static Subscriber Account: Backup and Restore



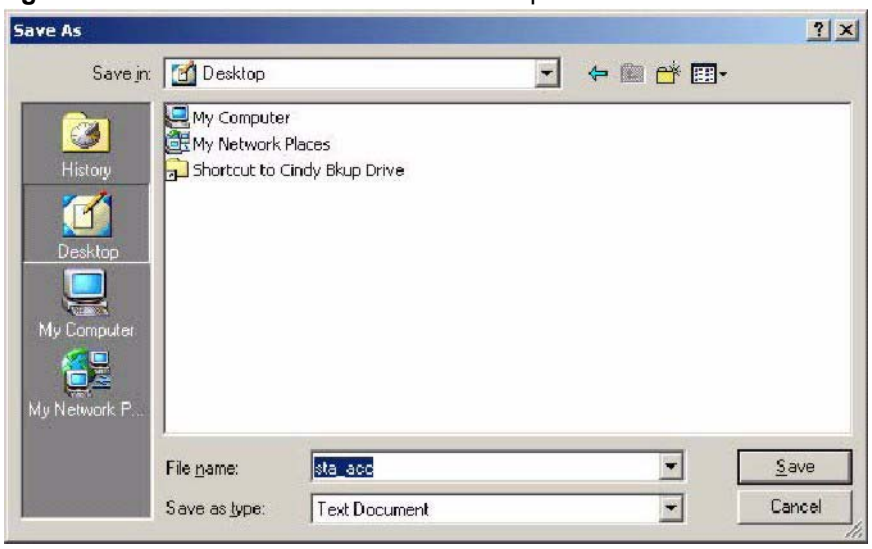
3 A **File Download** window displays. Click **Save**.

Figure 43 Static Subscriber Account: Backup and Restore: File Download



4 A **Save As** window displays. Specify the filename and/or location and click **Save** to save the backup file.

Figure 44 Static Subscriber Account: Backup and Restore: Save As



You can view the backed up file using any text-editing program.

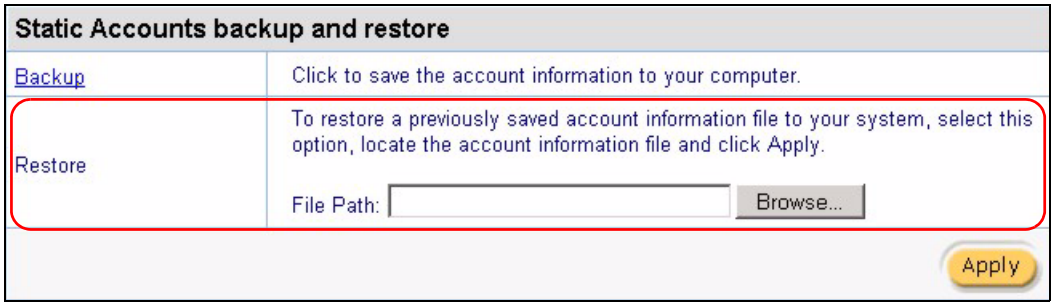
8.4.2 Restoring a Static Account List

You may restore the static account list if you accidentally reset the VSG back to the factory defaults and erased the subscriber account information.

Follow the steps below to restore a previously backed up subscriber account list.

1 In the **Create Static Subscriber Account** screen and scroll down to the **Static Accounts backup and restore** section.

Figure 45 Static Subscriber Account: Backup and Restore



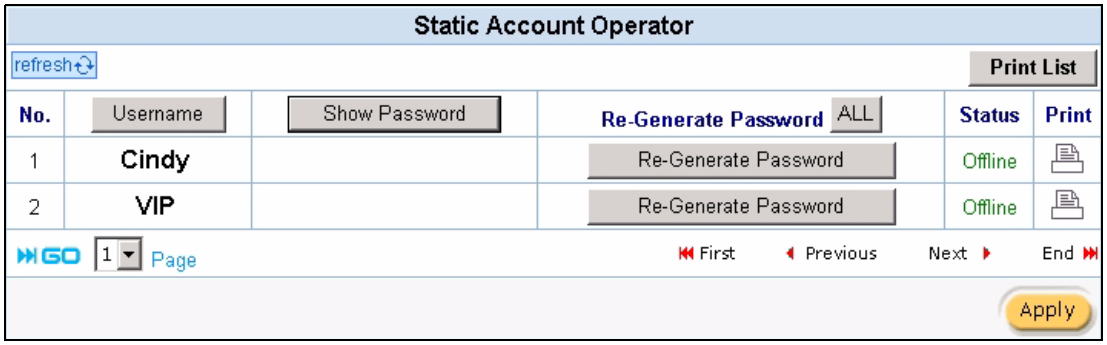
2 Specify the location and/or file name of the account information file in the **File Path** field or click **Browse** to locate it.

3 Click **Apply** to start the file transfer process. The VSG automatically restarts after the file transfer is complete.

8.5 Editing Subscriber Accounts

To edit a subscriber account, click **System Setting**, **Accounting** and the **Static Account Operator** link to display the screen as shown next.

Figure 46 Static Account Operator



The following table describes the labels in this screen.

Table 25 Static Account Operator

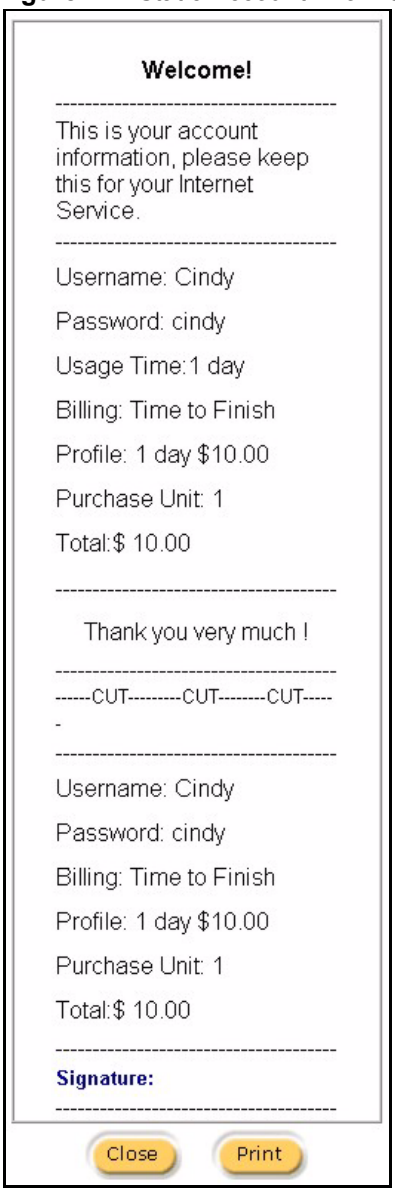
LABEL	DESCRIPTION
Refresh	Click this button to update the screen.
Print List	Click this button to print a list of all subscriber accounts.
No	This read-only field displays the index number of an entry.
Username	This read-only field displays the account user name. Click the heading to sort the entries in ascending or descending order.
Hide Password/ Show Password	Click **Hide Password** to not display the passwords for the accounts on the screen. Click **Show Password** to display the passwords for the accounts on the screen.
Re-Generate Password	You may set the VSG to generate a new password for each account. Click **All** to set the VSG to generate new passwords for all accounts. Click **Re-Generate Password** to set the VSG to generate a new password for the corresponding account.
Status	This field indicates whether the account is currently in use (**Online**) or not (**Offline**).
Print	Click the icon to print the account information of the selected account.
GO .. Page	Select a page number from the drop-down list box to display the selected page.
First	Click **First** to go to the first page.
Previous	Click **Previous** to return to the previous page.
Next	Click **Next** to go to the next page.
End	Click **End** to go to the last page.
Apply	Click **Apply** to save the changes.

8.5.1 Static Account Information Print Preview

To display a printout preview of static account information, click the **Print** icon to display a printout preview window showing the account information. An example is shown in the following figure.

Refer to Section 14.1.1 "Customizing the Account Printout" on page 129 to configure the printout page.

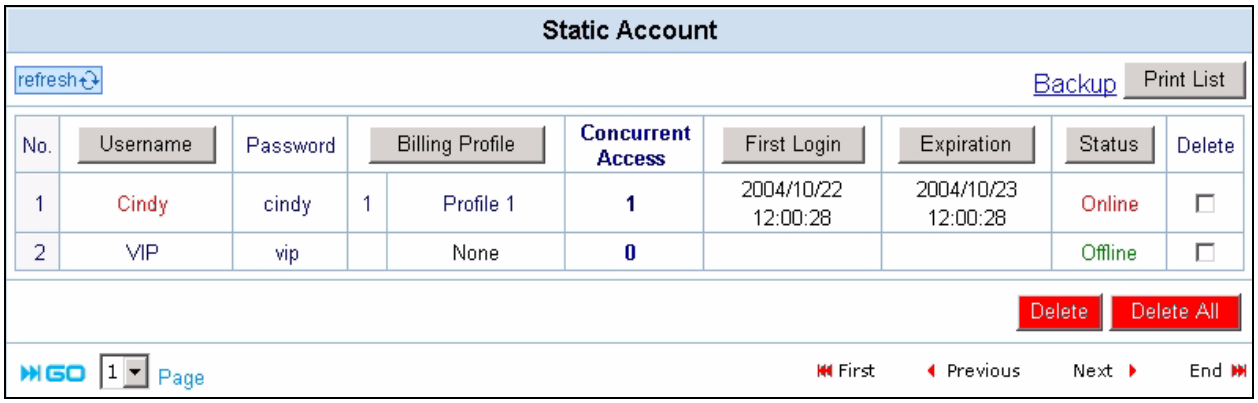
Figure 47 Static Account Information Printout Example



8.6 Viewing the Static Account List

To display the static account list, click **Static Account List**.

Figure 48 Static Account List



The following table describes the labels in this screen.

Table 26 Static Account List

LABEL	DESCRIPTION
Refresh	Click **Refresh** to update this screen.
Backup	Click **Backup** to backup the account information to a computer.
Print List	Click **Print List** to print ALL account information on a printer connected to the computer you use to access the web configurator. **Note:** This does NOT display a print preview window.
No	This field displays the index number.
Username	This field displays the account user name. Click the heading to sort the entries in ascending or descending order based on this column.
Password	This field displays the account password.
Billing Profile	This field displays the name of the profile associated to the account.
Concurrent Access	This field displays the number of users are currently using this account for Internet access.
First Login	This field displays the time a subscriber logs in using the account.
Expiration	This field displays the time the account becomes invalid.
Status	This field indicates whether the account is currently is use (**Online**) or not (**Offline**).
Delete	Click **Delete All** to remove all accounts. Click **Delete** to remove the selected account(s).
GO .. Page	Select a page number from the drop-down list box to display the selected page.
First	Click **First** to go to the first page.
Previous	Click **Previous** to return to the previous page.
Next	Click **Next** to go to the next page.
End	Click **End** to go to the last page.

CHAPTER 9
Dynamic Subscriber Accounts

This chapter shows you how to set up and manage dynamic subscriber accounts.

9.1 About Dynamic Subscriber Accounts

Unlike a static account, a dynamic account is not permanent. Once the time allocated to a dynamic account is used up or a dynamic account remains un-used after the expiration time, the account is deleted from the account list automatically.

Dynamic accounts are automatically generated either by pressing a button on an external statement printer connected to the **CONSOLE** port or using the web configurator (the **Dynamic Account Operator Panel** screen).

Note: You cannot manually add a dynamic account.

The following figure displays the links for accessing the dynamic account configuration screens when you click **System Setting**, **Accounting** and **Dynamic Account**.

Figure 49 Dynamic Account: Links

9.2 Dynamic Account General Settings

There are two ways you can create dynamic accounts on the VSG:

- using a statement printer connected to the VSG.
- using the web configurator.

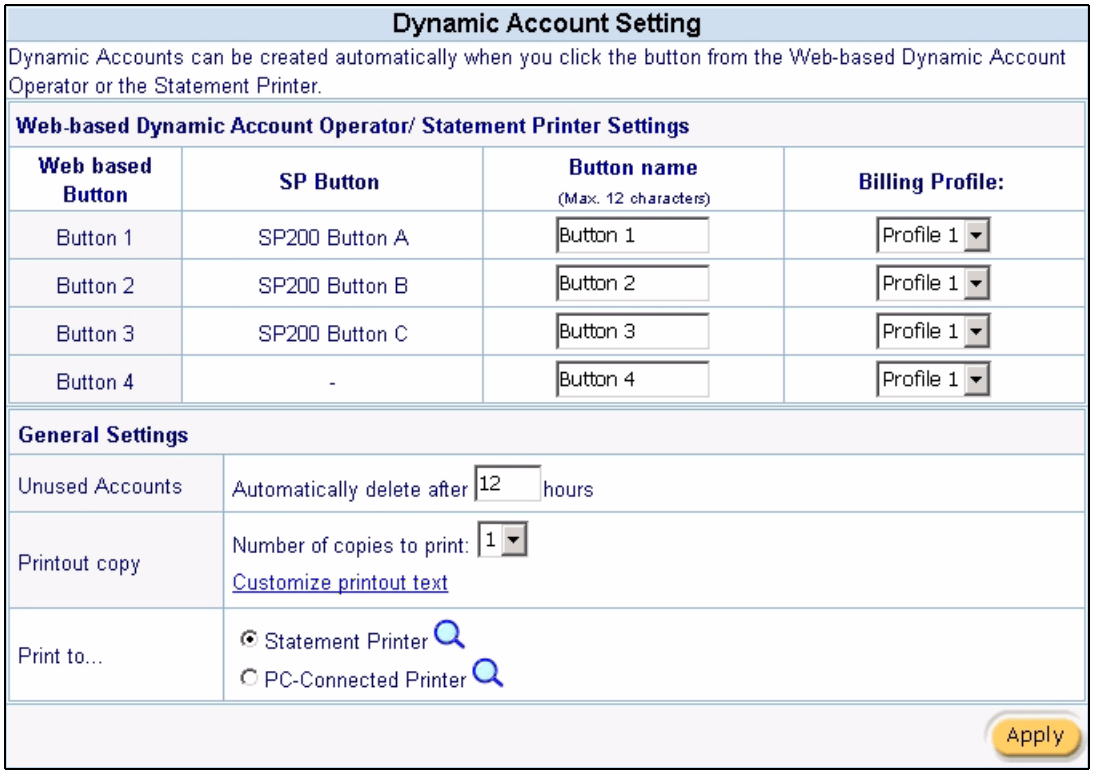
Before you create dynamic accounts, you must specify the billing profile(s), the number of printout copies and the number of hours before the VSG automatically deletes an inactive account. Refer to the related sections for more information.

For creating dynamic accounts using a statement printer, make sure you connect the statement printer (sold separately) to the **CONSOLE** port on the VSG. Then, in the **Dynamic Account Setting** screen, select the profile setting for each button on the statement printer (refer to the user's guide that comes with the statement printer).

For web-based dynamic account generation, you can specify up to four billing profiles (one for each of the four buttons you click to generate the accounts automatically on the web-based screen).

Click **System Setting**, **Accounting**, **Dynamic Account**, and then **Dynamic Account Setting** link to display the screen as shown next.

Figure 50 Accounting: Dynamic Account Setting



The following table describes the labels in this screen.

Table 27 Accounting: Dynamic Account Setting

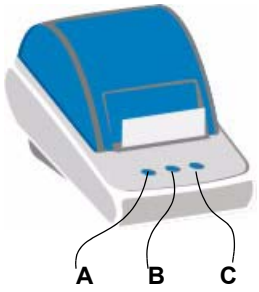
LABEL	DESCRIPTION
Web-based Dynamic Account Operator/ Statement Printer Settings	
Web-based Button	This read-only field displays the button index number (Button 1 .. 4). The button numbers correspond to the buttons displayed in the **Dynamic Account Operator Panel** screen. Refer to Section 9.3.1 "Dynamic Account Generation Using the Web Configurator" on page 97 for more information.
SP Button	This read-only field displays the button label on the SP-200. Refer to Figure 51 on page 97. Refer to Section 9.3.2 "Dynamic Account Generation Using a Statement Printer" on page 98 for more information on generating dynamic accounts using a statement printer.
Button name	Specify the name of the web-based button (up to 12 characters) in the field provided. The buttons are displayed in the **Dynamic Account Operator Panel** screen (see Figure 52 on page 98).

Table 27 Accounting: Dynamic Account Setting (continued)

LABEL	DESCRIPTION
Billing Profile	Select a billing profile to associate to the web-based and SP buttons from the drop-down list box. Only the activated billing profiles are displayed. Refer to Section 7.1.1 "Creating a Billing Profile" on page 79 for more information on creating billing profiles.
General Settings	
Unused Accounts	Specify the number of hours to wait before the VSG deletes an inactive dynamic account.
Printout copy	Select the number of copies (1 to 3) to print from the drop-down list box. Click **Customize printout text** to configure the printout page.
Print to …	Select **Statement Printer** if you want to print the account information using a statement printer connected to the **CONSOLE** port on the VSG. Select **PC-Connected Printer** if you want to print the account information using a printer connected to a network computer. Click the icon to display a print preview. Refer to Chapter 14, "Account Printout," on page 129 for more information.
Apply	Click **Apply** to save the changes.

The following figure shows the button labels on the SP-200.

Figure 51 SP-200 Button Labels



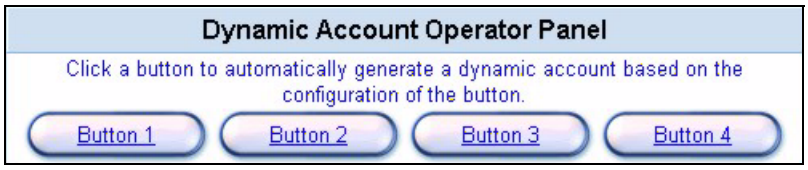
9.3 Creating Dynamic Accounts

You can only create dynamic accounts automatically. You can create dynamic accounts using either the web configurator screen or the statement printer.

9.3.1 Dynamic Account Generation Using the Web Configurator

Display the **Dynamic Account Operator Panel** screen as shown next.

Figure 52 Dynamic Account Operator Panel



Click a button to generate a dynamic account based on the settings you configure for the button in the **Dynamic Account Setting** screen. A window displays showing a printout preview of the dynamic account generated.

The following figure shows an example. Refer to Chapter 14, "Account Printout," on page 129 on account printout to configure the printout page.

Figure 53 Dynamic Account Information Printout Example

9.3.2 Dynamic Account Generation Using a Statement Printer

Follow the steps below to create dynamic accounts and print the account information using a statement printer.

Note: You have to purchase a statement printer separately.

1 Connect the statement printer to the port labeled **CONSOLE**. Refer to Section 2.2 "Hardware Connections" on page 36 for more information.

2 Configure the **Console Type** field in the **System** screen. Refer to Section 3.5 "General System Setting" on page 44.

3 Turn on the statement printer and make sure there is printing paper.

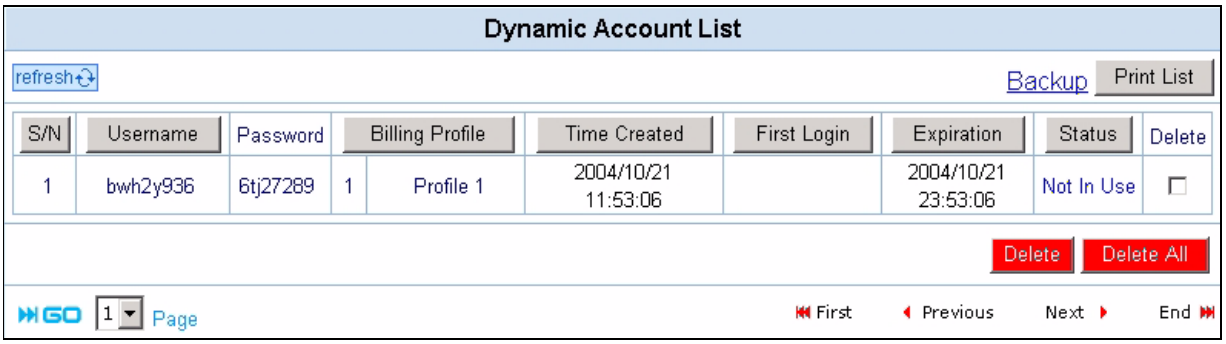
4 Press the button on the statement printer. A dynamic account is generated and the account information should be printed. Refer to Figure 84 on page 134 for a printout example.

Note: The settings of the buttons on the statement printer correspond to the three SP-200 buttons you set in the **Dynamic Account Operator Panel** screen. Refer to Section 9.2 "Dynamic Account General Settings" on page 95.

9.4 Viewing the Dynamic Account List

To display the dynamic account list, click **Dynamic Account List**. Click a heading to sort the entries in ascending or descending order based on the column if applicable.

Figure 54 Dynamic Account List



The following table describes the labels in this screen.

Table 28 Dynamic Account List

LABEL	DESCRIPTION
Refresh	Click **Refresh** to update this screen.
Backup	Click **Backup** to backup the account information to a computer. Refer to Section 9.4.1 "Backing Up the Dynamic Account List" on page 100.
Print List	Click **Print List** to print all account information to the local printer connected to the computer that you use to configure the VSG. **Note:** This does NOT display a printout preview window.
S/N	This field displays the serial number (or the Index number) of a dynamic account.
Username	This field displays the account user name. Click the heading to sort the entries in ascending or descending order based on this column.
Password	This field displays the account password.

Table 28 Dynamic Account List (continued)

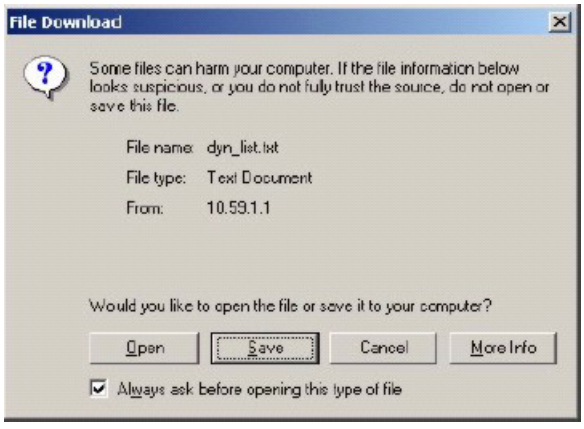
LABEL	DESCRIPTION
Billing Profile	This field displays the index number and the name of a billing profile the account is using.
Time Created	This field displays the time the account is created.
First Login	This field displays the time a subscriber logs in using the account.
Expiration	When an account is currently in use, this field displays the time before which a subscriber can still use the account to access the Internet. When an account is never used, this field displays the time the account becomes invalid.
Status	This field displays **In Use** when the account is currently in use. Otherwise it displays **Not In Use**.
Delete	Click **Delete All** to remove all accounts. Click **Delete** to remove the selected account.
GO .. Page	Select a page number from the drop-down list box to display the selected page.
First	Click **First** to go to the first page.
Previous	Click **Previous** to return to the previous page.
Next	Click **Next** to go to the next page.
End	Click **End** to go to the last page.

9.4.1 Backing Up the Dynamic Account List

Follow the steps below to backup the dynamic account list to your computer.

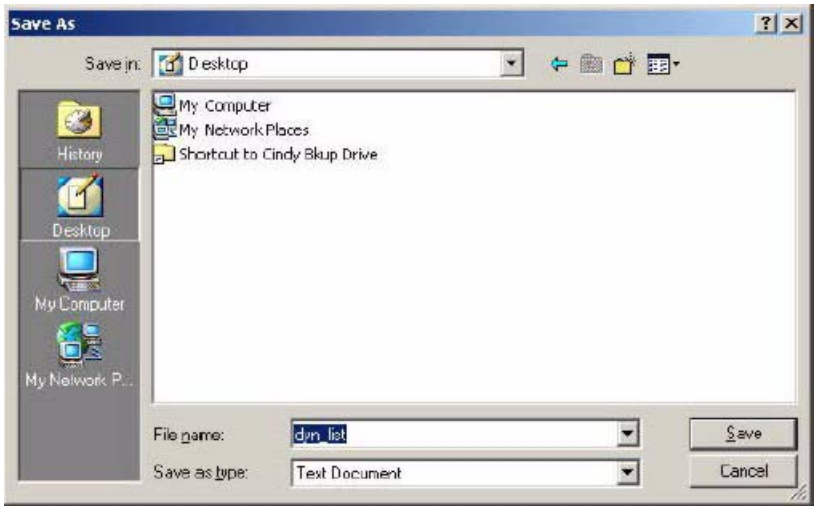
1. Display the **Dynamic Account Setting** screen (refer to Figure 50 on page 96).
2. Click **Dynamic Account List** (refer to Figure 54 on page 99).
3. Click the **Backup** link.
4. A **File Download** window displays. Click **Save**.

Figure 55 Dynamic Account List Backup: File Download



5. A **Save As** window displays. Specify the filename and/or location and click **Save**.

Figure 56 Dynamic Account List Backup: Save As



You can view the backed up file using any text-editing program.

CHAPTER 10
Port-Location Mapping

This chapter describes the port-location mapping feature.

10.1 About Port-Location Mapping

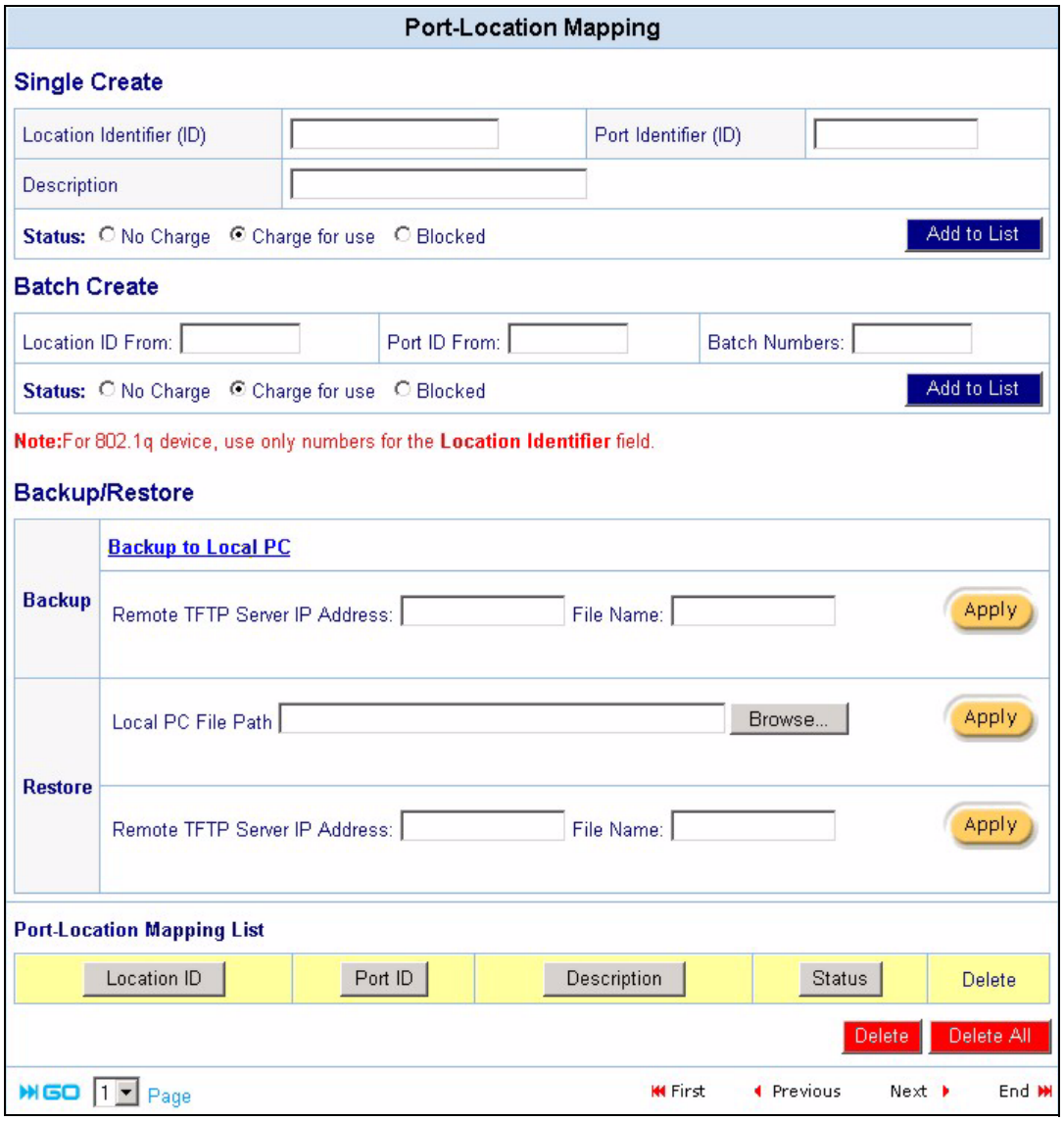
With port-location mapping, you can map a port on the VSG or a VLAN-enabled switch to a room number in a building (such as a hotel). This is done using IEEE802.1q VLAN tags. The port-location mapping feature is used together with the PMS billing function so charges can be done automatically.

10.2 Configuring Port-Location Mapping

Note: Make sure you select **Built-in Authentication** and **Scenario A** in the **Authentication** screen (see Figure 29 on page 74) and configure the **PMS Configuration** screen (see Figure 36 on page 83).

Click **System Setting** in the navigation panel and the **Port-Location Mapping** link to display the screen as shown.

Figure 57 System Setting: Port-Location Mapping



The following table describes the labels in this screen.

Table 29 System Setting: Port-Location Mapping

LABEL	DESCRIPTION
Single Create	Set the related fields to create a port-location mapping one at a time.
Location Identifier (ID)	Enter an identity (up to 20 characters) for a mapping. This field must match the VLAN ID of a port.
Port Identifier (ID)	Enter the an ID number (between 1 and 999999) of a port for this mapping. This is the location ID number you set in the PMS.
Description	Enter a description (up to 32 characters) for this mapping for identification purposes.

Table 29 System Setting: Port-Location Mapping (continued)

LABEL	DESCRIPTION
Status	Select **No Charge** if you don't want to bill a subscriber accessing the Internet at this port location. Select **Charge for use** to bill a subscriber accessing the Internet at this port location. Select **Blocked** to stop any subscriber from accessing the Internet at this port location.
Add to List	Click **Add to List** to insert a new mapping rule.
Batch Create	Set the related fields to create a specified number of port-location mappings.
Location ID From	Enter an identity (up to 20 characters) of the first location for a mapping. This field must match the VLAN ID of a port.
Port ID From	Enter the an ID number (between 1 and 999999) of the starting port for this mapping. This is the location ID number you set in the PMS.
Batch Numbers	Specify the number of port-location mappings you want to create at a time.
Status	Select **No Charge** if you don't want to bill a subscriber accessing the Internet at this port location. Select **Charge for use** to bill a subscriber accessing the Internet at this port location. Select **Blocked** to stop any subscriber from accessing the Internet at this port location.
Add to List	Click **Add to List** to insert a new mapping rule.
Backup/ Restore	You can back up or restore the port-location mappings.
Backup	Click **Backup to Local PC** to save the current port-location mappings to a computer. To back up the current port-location mapping to a TFTP server, specify the IP address of the TFTP server and the file name in the fields provided and click **Apply**.
Restore	Make sure you have previously backed up the port-location mapping. **Note:** All current port-location mappings will be lost. To restore from a local computer, specify the name and location of the backup file or click **Browse ..** to locate it and click **Apply**. To restore from a TFTP server, specify the IP address of the TFTP server and the file name in the fields provided and click **Apply**.
Port-Location Mapping List	This table displays a summary of each mapping rule. If applicable, click on a heading to sort the entry.
Location ID	This field displays the ID of a mapping rule.
Port ID	This field displays the port ID.
Description	This field displays a description.
Status	This field displays the status (**No Charge**, **Charge for use** or **Blocked**) of a mapping.
Delete	Click **Delete All** to remove all accounts. Click **Delete** to remove the selected account.
GO .. Page	Select a page number from the drop-down list box to display the selected page.
First	Click **First** to go to the first page.
Previous	Click **Previous** to return to the previous page.

Table 29 System Setting: Port-Location Mapping (continued)

LABEL	DESCRIPTION
Next	Click **Next** to go to the next page.
End	Click **End** to go to the last page.

CHAPTER 11
Credit Card Billing and Customization

This chapter shows you how to configure secure online credit card service on the VSG and customize the subscriber credit card information screen.

11.1 Credit Card Billing Overview

Your VSG is integrated with the Authroize.net and SecurePay online secure credit card billing service providers, allowing you to process credit card transactions via the Internet.

Note: You must register with the Authorize.Net credit card service (www.authorizenet.com or www.authorize.net) or the SecurePay credit card service (www.securepay.com.au) before you can configure the VSG to handle credit card transactions.

11.1.1 How Credit Card Billing Works

The following summarizes the process of how a customer pays for a subscriber account using a credit card.

1. A customer accesses the subscriber login screen and selects credit card payment.
2. The customer selects a service type and enters contact and billing information.
3. Customer billing information is processed real-time via the secure online credit card billing service.
4. After the transaction is successful, the VSG provides the username and password information so the customer can log in for Internet access.

11.1.2 Configuration Steps

Do the following to allow credit card service.

1. Obtain an account with Authorize.net or SecurePay.
2. In the **Authentication** screen, select **Built-in Authentication** and allow credit card payment with Scenario C (refer to Section 6.2 "Authentication Settings" on page 73 for more information).
3. Enter your account information in the **Credit Card** screen.

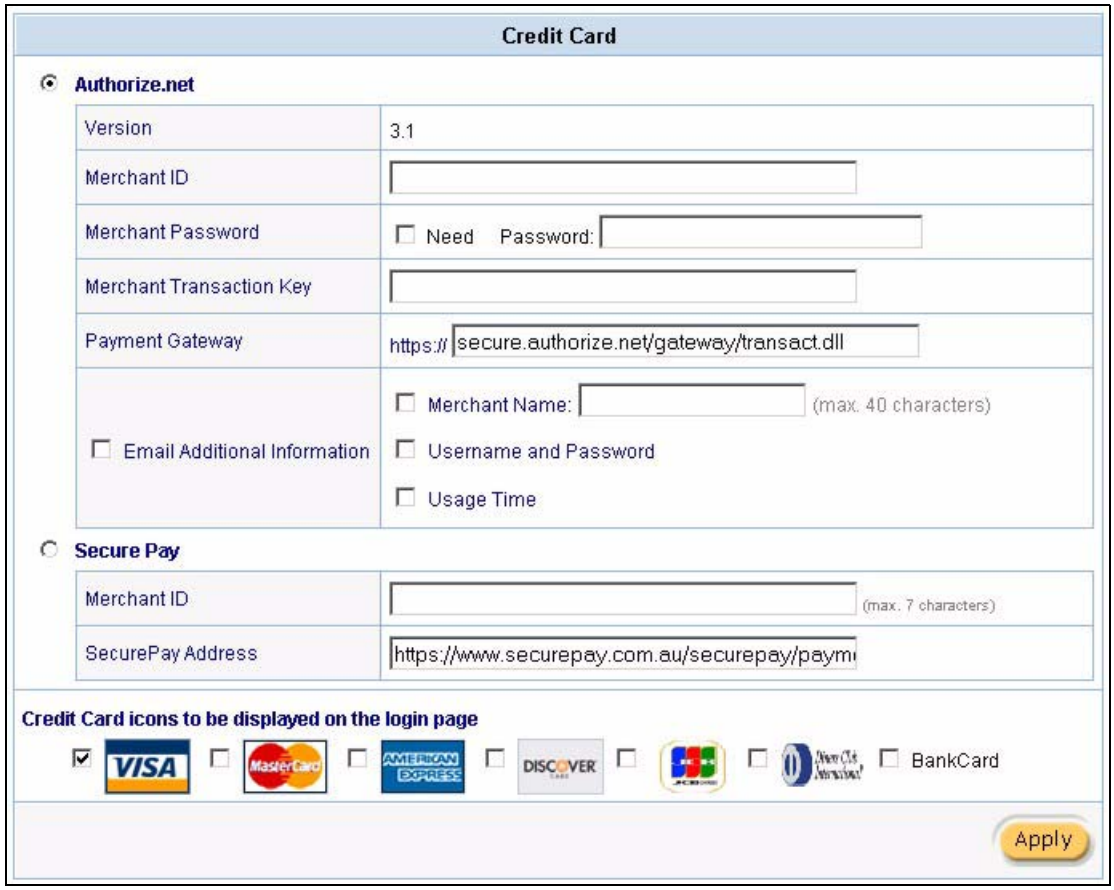
4 Configure the subscriber credit card information screen (see Chapter 12, "Subscriber Login Screen," on page 117 for more information).

11.2 Setting up Credit Card Billing Service

After you have obtained an Authorize.net or SecurePay account, set up the online credit card billing information in the **Credit Card** screen.

Click **Advanced Setting**, **Credit Card** to displays the screen as shown below. Enter your account information in this screen.

Figure 58 Advanced Setting: Credit Card



The following table describes the labels in this screen.

Table 30 Advanced Setting: Credit Card

LABEL	DESCRIPTION
Authorize.net	Select this option to use the Authorize.Net online credit card service for billing subscribers.
Version	This is the (read-only) software version of the Authorize.Net payment gateway.
Merchant ID	Enter the IDentification number that you received from Authorize.Net.

Table 30 Advanced Setting: Credit Card (continued)

LABEL	DESCRIPTION
Merchant Password	Select **Need** if a password is required for the Authroize.net account. Then enter the password exactly as you received it from Authorize.Net in the **Password** field.
Merchant Transaction Key	Enter the transaction key exactly as you received it from Authorize.Net. The transaction key is similar to a password. The Authorize.Net gateway uses the transaction key to authenticate transactions.
Payment Gateway	Enter the address of the Authorize.Net gateway. The default value is "https://cardpresent.authorize.net/gateway/transact.dll". **Note:** You don't need to change this address unless instructed by an Authorize.net administrator.
Email Additional Information	Select this check box to have the VSG e-mail the subscriber the information that you specify in the following fields.
Merchant Name	Select this check box to have the VSG include the company name in the e-mail that it sends to the subscriber. Enter the company name (up to 40 characters) in the field provided.
Username and Password	Select this check box to have the VSG e-mail the subscriber the subscriber user name and password.
Usage Time	Select this check box to have the VSG e-mail the subscriber the amount of usage time purchased.
Secure Pay	Select this option to use the Secure Pay online credit card service for billing subscribers.
Merchant ID	Enter the merchant ID exactly as you received it from SecurePay.
SecurePay Address	Enter the address of the SecurePay server. The default value is "https://www.securepay.com.au/securepay/payments/process2.asp". **Note:** You don't need to change this address unless instructed by a Secure Pay administrator.
Credit card icons to be displayed on the login page	Select the check box(es) of the credit card icon(s) that you want the VSG to display on the subscriber login screen (refer to Figure 33 on page 78 for an example).
Apply	Click **Apply** to save the changes.

11.3 Customizing Subscriber Credit Card Information Screen

After you have entered your account information in the **Credit Card** screen, you may customize the credit card information screen the subscribers use.

Click **Advanced**, **Customization** and click the **Credit Card** link to display the **Credit Card Customization** screen. Configure the fields in this screen and click **Apply** to save the changes.

11.3.1 Subscriber Standard Login Page Message

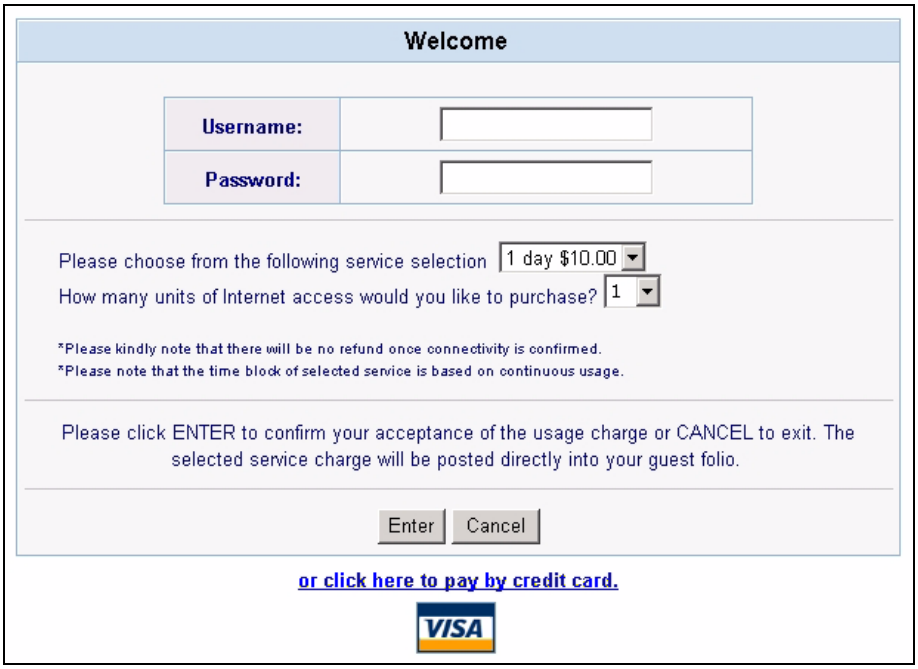
If you use the standard subscriber login screen, you can specify a message to re-direct credit-card-paying subscribers to the credit card information screen.

In the **Credit Card Customization** screen, enter the message in the **Credit Card Message** field and click **Apply** to save the changes.

Figure 59 Credit Card Customization: Standard Login Screen Message

Click **Preview of Standard Login Page** to display a preview screen.

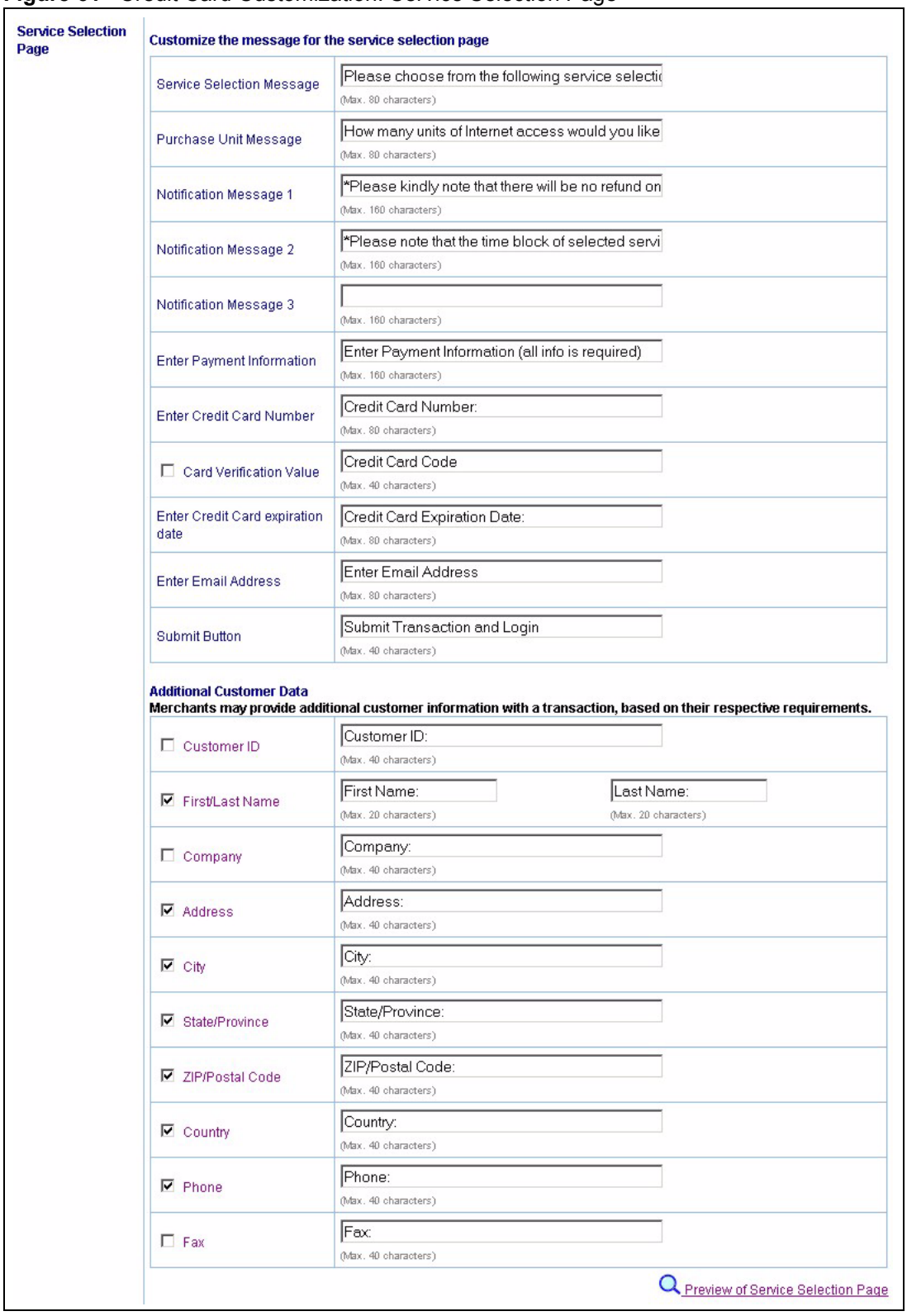
Figure 60 Credit Card Customization: Standard Login Screen Message: Preview



11.3.2 Service Selection Page

Specify the service selection and credit card messages to display on the subscriber login screen in the **Credit Card Customization** screen.

Figure 61 Credit Card Customization: Service Selection Page



The following table describes the labels in this screen.

Table 31 Credit Card Customization: Service Selection Page

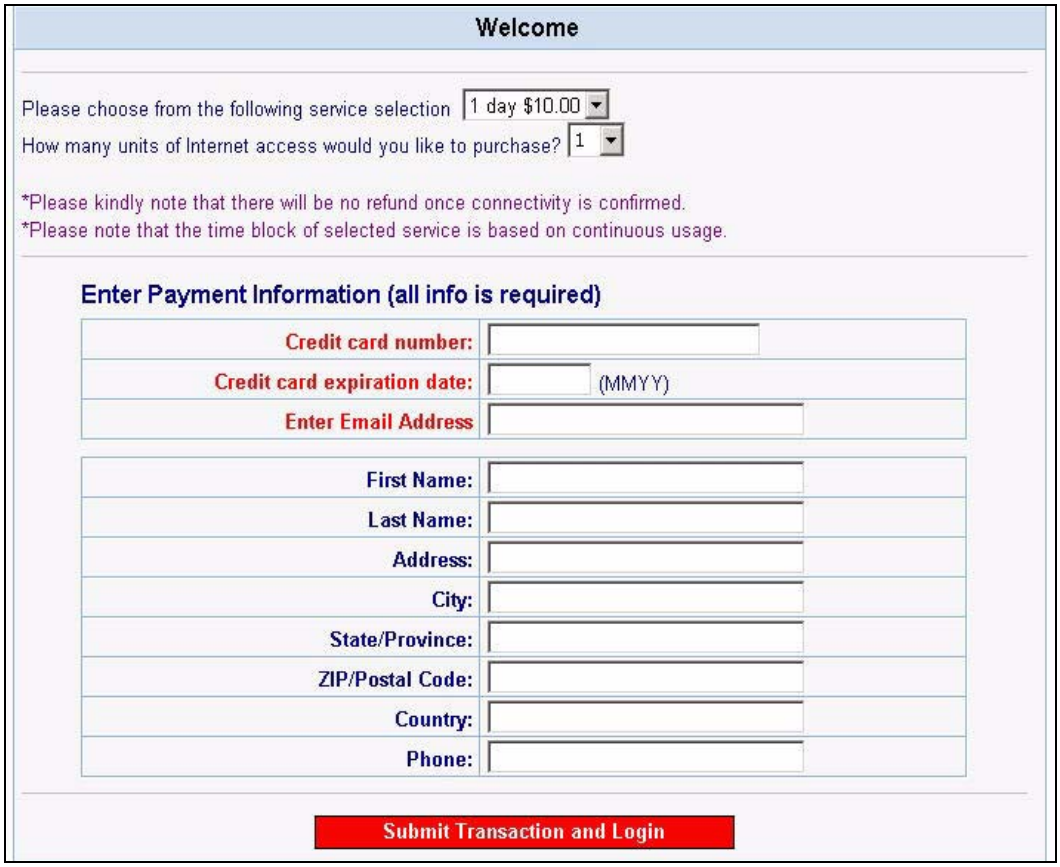
LABEL	DESCRIPTION
Service Selection Page	
Customize the message for the service selection page.	Specify the service selection messages in the fields provided.
Service Selection Messages	Enter a message to instruct the subscribers to select a billing profile.
Purchase Unit Message	Enter a message to instruct the subscribers to select the number of time units to purchase.
Notification Message 1 .. 3	Enter additional message(s) regarding the replenish feature. For example, you may enter a refund policy.
Enter Payment Information	Enter the heading label name to prompt for the payment information.
Enter Credit Card Number	Enter the label name of a field in which subscribers enter the credit card number.
Card Verification Value	Select this check box to display this field if you need the subscriber to enter the credit card's 3 or 4 digit Card Verification Value/Code (CVV or CVC). Specify the label name of a field in which subscribers enter the credit card's CVV.
Enter Credit Card expiration date	Enter the label name of a field in which subscribers enter the expiration date of the credit card.
Enter Email Address	Enter the field label for the subscriber's e-mail address. The VSG sends the subscriber account information to this e-mail address if you enable the feature in the Credit Card screen (refer to Section 11.2 "Setting up Credit Card Billing Service" on page 108 for more information).
Submit Button	Enter the label of the button on which subscribers clicks to send the information in the screen.
Additional Customer Data	If you want to obtain more information from the subscribers, select the checkbox(es) and specify the corresponding field label(s).
Customer ID	Select this check box to display this field and enter the field label for customer ID information.
First/Last Name	Select this check box to display these two fields and specify the field labels for the subscriber to enter the first and last names.
Company	Select this check box to display this field and specify the label name of a field in which subscribers enter a company name.
Address	Select this check box to display this field and specify the label name of a field in which subscribers enter their addresses.
City	Select this check box to display this field and specify the label name of a the field in which subscribers enter the city.
State/Province	Select this check box to display this field and specify the label name of the field in which subscribers enter the state or province name.
Zip/Postal Code	Select this check box to display this field and specify the label name of the field in which subscribers enter the ZIP or postal code.
Country	Select this check box to display this field and specify the label name of the field in which subscribers enter the country.

Table 31 Credit Card Customization: Service Selection Page (continued)

LABEL	DESCRIPTION
Phone	Select this check box to display this field and specify the label name of a field in whish subscribers enter the phone numbers.
Fax	Select this check box to display this field and specify the label name of the field in which subscribers enter the fax numbers.
Preview of the Service Selection Page	Click **Preview of the Service Selection Page** for a preview screen (see Figure 62 on page 113 for an example).

The following figure shows an example of the subscriber credit card information screen. Field labels display in red are the required fields.

Figure 62 Credit Card Customization: Service Selection Page: Preview

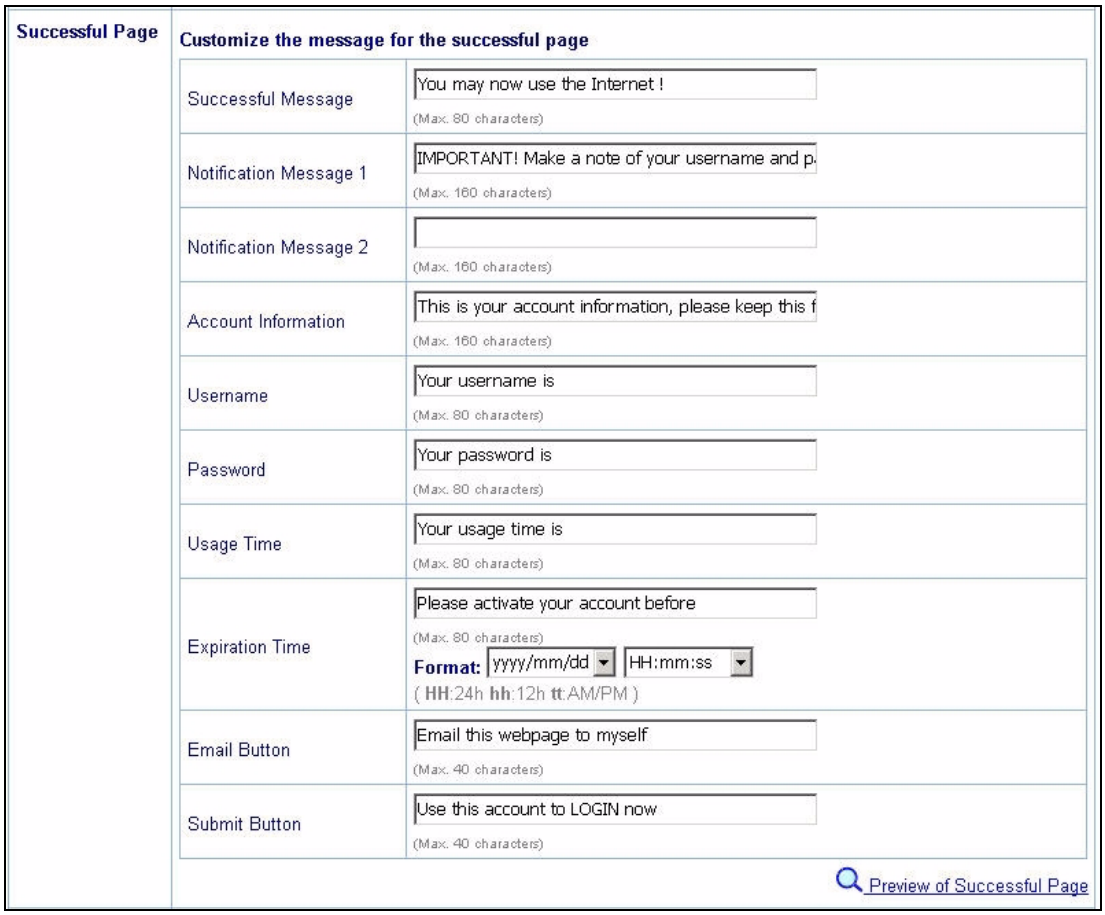


11.3.3 Successful Screen

You can customize the notification screen to display on the subscriber's computer when the credit card is validated and the transaction is successful.

Scroll down the **Credit Card Customization** screen and configure the **Successful Page** fields and click **Apply** to save the changes.

Figure 63 Credit Card Customization: Successful Page



The following table describes the labels in this screen.

Table 32 Credit Card Customization: Successful Page

LABEL	DESCRIPTION
Successful Message	Enter a message to notify the subscribers that the credit card validation is successful.
Notification Message 1 .. 2	Enter additional message(s). For example, you may enter a refund policy.
Account Information	Enter the caption for the account information.
Username	Enter the label name for the username field.
Password	Enter the label name for the password field.
Usage Time	Enter the label name for the usage time field.
Expiration Date	Enter the label name for the expiration date field.
Email Button	Enter the label name for the e-mail button the subscribers click to have the VSG e-mail this information in this screen to the subscribers.
Submit Button	Enter the label name for the button the subscribers click to confirm and log in for I
Preview of Successful Page	Click **Preview of Successful Page** for a preview screen (see Figure 64 on page 115 for an example).

The following figure shows an example.

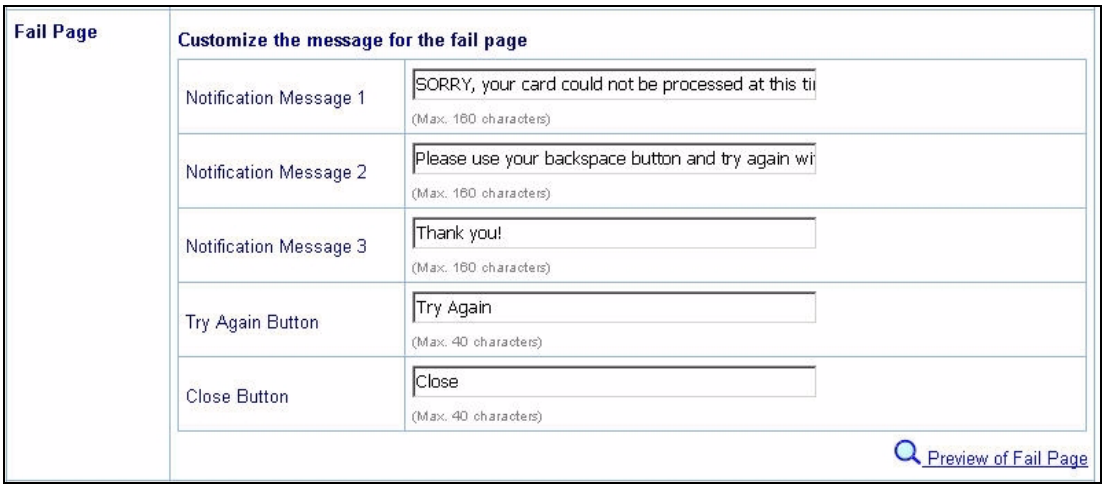
Figure 64 Credit Card Customization: Successful Page: Preview

11.3.4 Fail Page

You can customize the notification screen to display on the subscriber's computer when the credit card is not validated or the transaction is not successful.

Scroll down the **Credit Card Customization** screen and configure the **Fail Page** fields and click **Apply** to save the changes.

Figure 65 Credit Card Customization: Fail Page



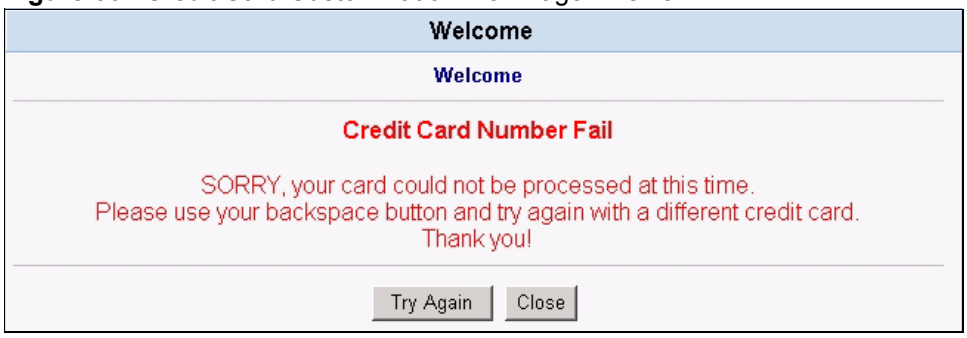
The following table describes the labels in this screen.

Table 33 Credit Card Customization: Fail Page

LABEL	DESCRIPTION
Notification Message 1 .. 3	Enter additional message(s). For example, why the transaction failed.
Try Again Button	Enter the label name for the button subscribers click to display the screen in which the subscribers can enter the credit card information again.
Close Button	Enter the label name for the button subscribers click to close this screen.
Preview of Fail Page	Click **Preview of Fail Page** for a preview screen (see Figure 66 on page 116 for an example).

The following figure shows an example.

Figure 66 Credit Card Customization: Fail Page: Preview



CHAPTER 12
Subscriber Login Screen

This chapter shows you how to customize the subscriber login screen when subscriber control is activated.

12.1 About the Subscriber Login Screen

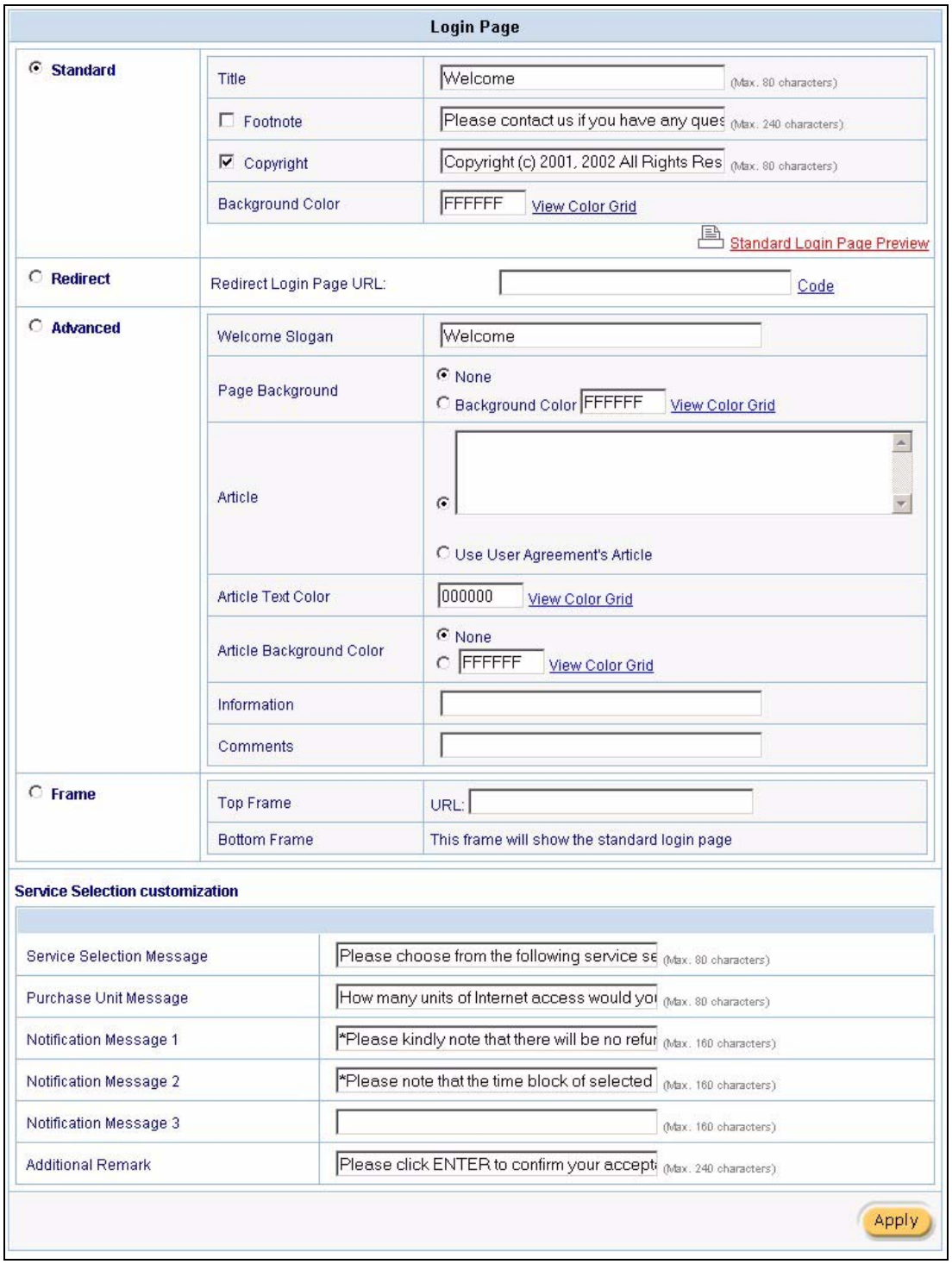
When subscriber authentication is activated in the **Authentication Configuration** screen, the subscriber login screen is the first screen that all subscribers see when trying to access the Internet. You can configure walled garden web addresses for web sites which all subscribers are allowed to access without logging in (refer to Section 17.4 "Walled Garden" on page 147).

The VSG provides different formats in which you can customize the login screen: **Standard**, **Redirect**, **Advanced** and **Frame**.

12.2 Customizing Subscriber Login Screen

To customize the subscriber login screen, click **Advanced Setting**, **Customization** and then **Login Page** to display the screen as shown next.

Figure 67 Customization: Login



12.2.1 Standard Subscriber Login Screen

The standard subscriber login screen is the VSG's pre-configured, default simple login screen. You can modify the screen color and title and add copyright information and a footnote.

In the **Login Screen Configuration** screen, select **Standard**.

Figure 68 Customization: Login: Standard

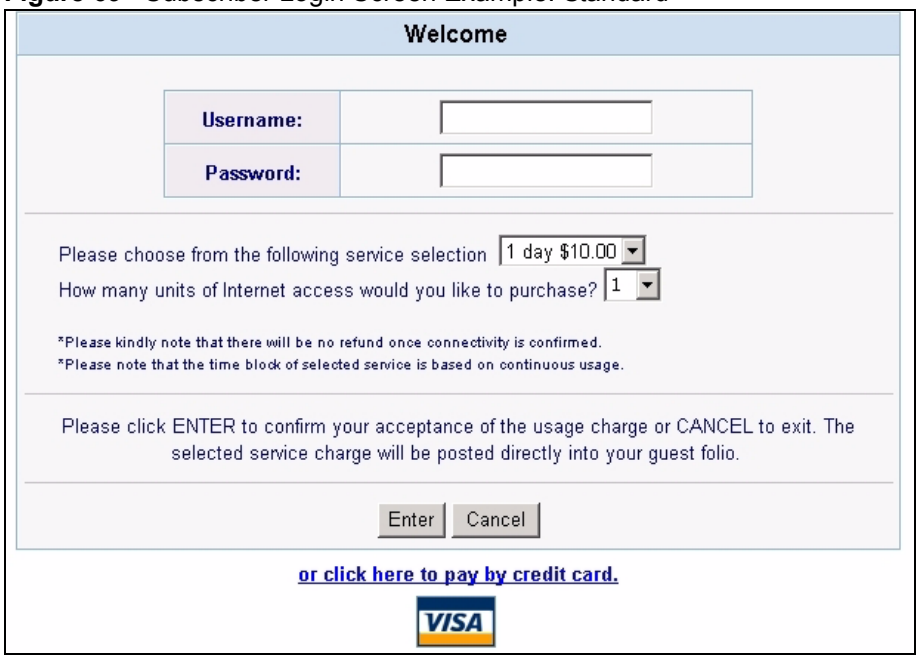
The following table describes the related labels in this screen.

Table 34 Customization: Login: Standard

LABEL	DESCRIPTION
Standard	Select this option to use the standard subscriber login screen.
Title	Enter the login page title (up to 80 characters) in the field provided.
Footnote	Select this check box and enter up to 240 characters in the field provided to add the footnote to the login screen.
Copyright	Select this check box and enter the copyright information (up to 80 characters) in the field provided to add copyright information to the login screen.
Background Color	Specify the color of the registration text. For example, enter '000000' for black. Click **View Color Grid** to display a list of web-friendly colors and corresponding hexadecimal values. The default is black ("000000").
Standard Login Page Preview	Save the settings and click this link to preview the standard login screen in a new browser window.

The following figure shows an example.

Figure 69 Subscriber Login Screen Example: Standard



Note: For credit card settings, refer to Chapter 11, "Credit Card Billing and Customization," on page 107.

12.2.2 Redirect Subscriber Login Screen

You can set the VSG to redirect the subscribers a to another login screen.

In the **Login Screen Configuration** screen, select **Redirect**.

Figure 70 Customization: Login Screen: Redirect

The following table describes the related fields.

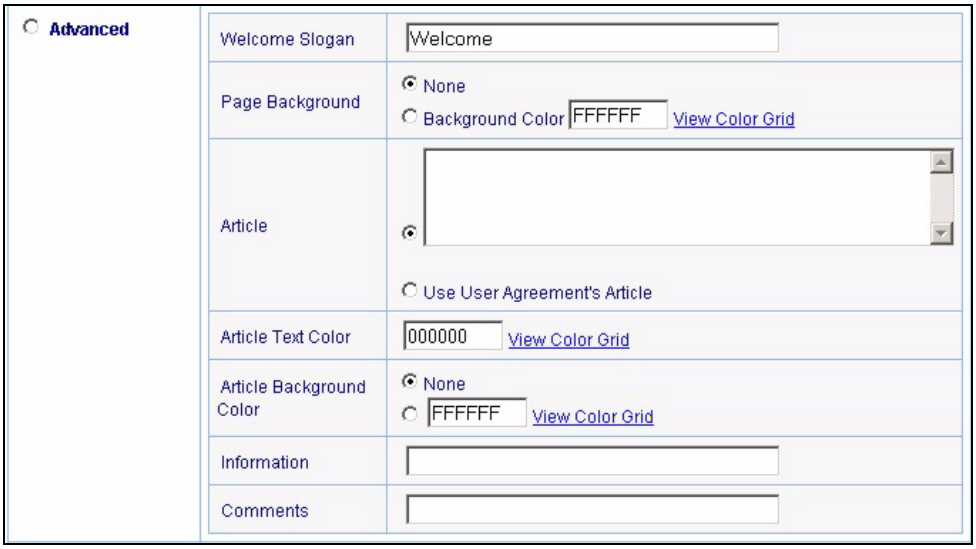
Table 35 Customization: Login Screen: Redirect

FIELD	DESCRIPTION
Redirect	Select this option to redirect the subscriber to another login screen.
Redirect Login Page URL	Specify the web site address to which the VSG directs the subscribers for logins.
Code	Click **Code** to display the source code of the web page you specify above.

12.2.3 Advanced Subscriber Login Screen

Use the **Advanced** login screen option to customize a login screen where you can create a welcome slogan and add advertising information.

Figure 71 Customization: Login Screen: Advanced



The following table describes the related fields.

Table 36 Customization: Login Screen: Advanced

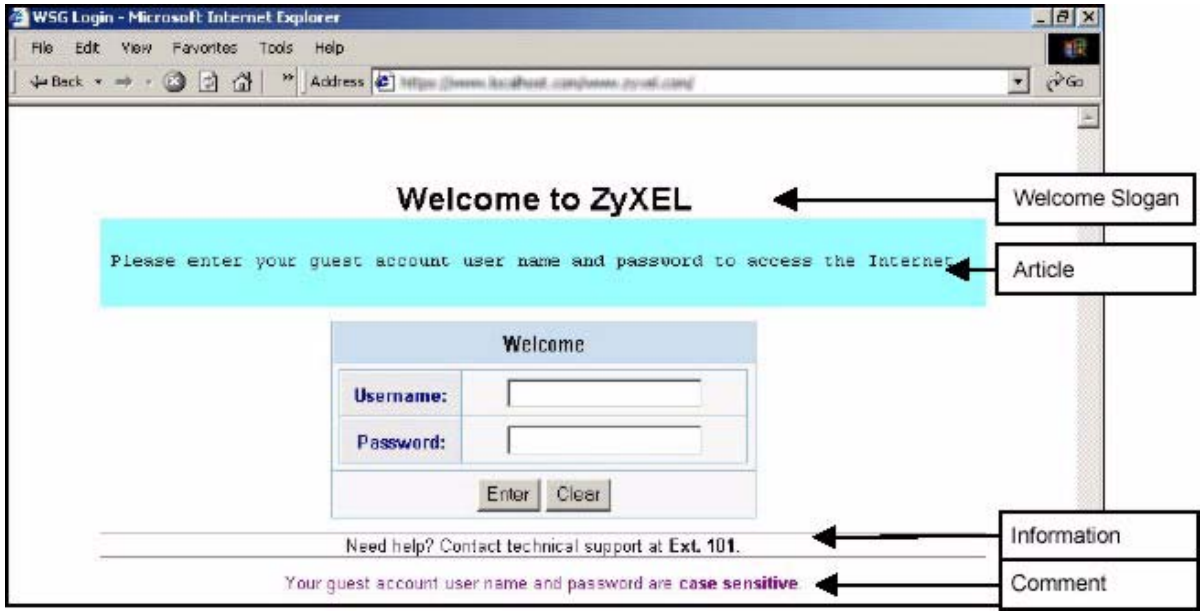
FIELD	DESCRIPTION
Advanced	Select this option to set the VSG to display the advanced subscriber login screen.
Welcome Slogan	Enter a welcome message (up to 80 characters long) in the text box provided.
Page Background	Select **None** to set the background color of the login screen to white ("FFFFFF" the default). Select **Background Color** to set the color of the login screen background to the color specified, for example, enter '000000' for black. Click **View Color Grid** to display a list of web-friendly colors and corresponding hexadecimal values.
Article	Select this option to use a custom message on the login screen. Enter a block of text (up to 1024 characters long) in the text box. This is useful for advertisements or announcements.
Use User Agreement's Article	Select this option to use the article from the user agreement page in the login screen.
Article Text Color	Set the color of the article text. For example, use '000000' for black. Click **View Color Grid** to display a list of web-friendly colors and corresponding hexadecimal values.
Article Background Color	Select **None** to set the background color of the article text block to white ("FFFFFF" the default). Select **Background Color** to set the background color of the article text block to the color specified, for example, enter '000000' for black. Click **View Color Grid** to display a list of web-friendly colors and corresponding hexadecimal values.

Table 36 Customization: Login Screen: Advanced (continued)

FIELD	DESCRIPTION
Information	Enter information such address and telephone or fax numbers in the text box provided. Up to 80 characters allowed.
Comments	Enter any comments (up to 80 characters long) in the text box provided.

The following figure shows an example.

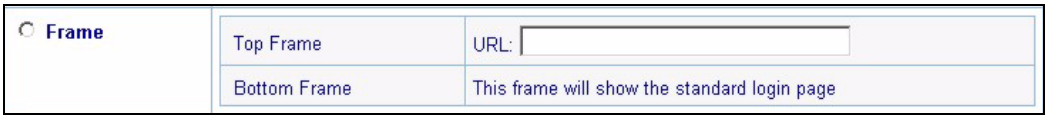
Figure 72 Subscriber Login Screen Example: Advanced



12.2.4 Frame Subscriber Login Screen

The **Frame** login screen splits the login screen into two frames: top and bottom. You can specify a web site to be displayed in the top frame with the user name and password prompt displayed in the bottom frame. The frame login screen is useful for you to link to a web site (such as the company web site) as your welcome screen. In addition, you can externally design a web page with images and/or advanced multimedia features.

Figure 73 Customization: Login Screen: Frame



The following table describes the related fields.

Table 37 Customization: Login Screen: Frame

FIELD	DESCRIPTION
Frame	Select this option to configure and set the VSG to display the subscriber login screen in two frames.
Top Frame	Enter a web site address in the **URL** field, for example, http://www.zyxel.com.
Bottom Frame	The bottom frame of the subscriber login screen displays the default login prompt. You cannot configure this part of the screen.

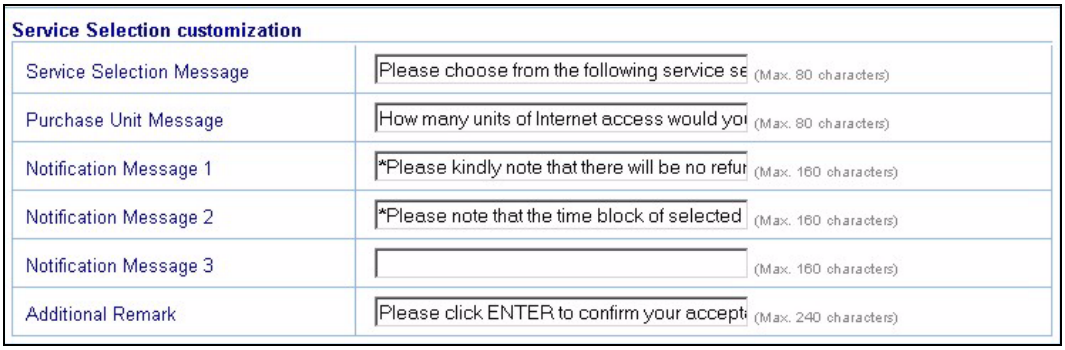
The following figure shows a framed subscriber login screen example.

Figure 74 Subscriber Login Screen Example: Frame

12.2.5 Service Selection Messages

The service selection messages are available in the subscriber login screen *only* when you configure the VSG to use PMS billing.

Figure 75 Customization: Service Selection Customization



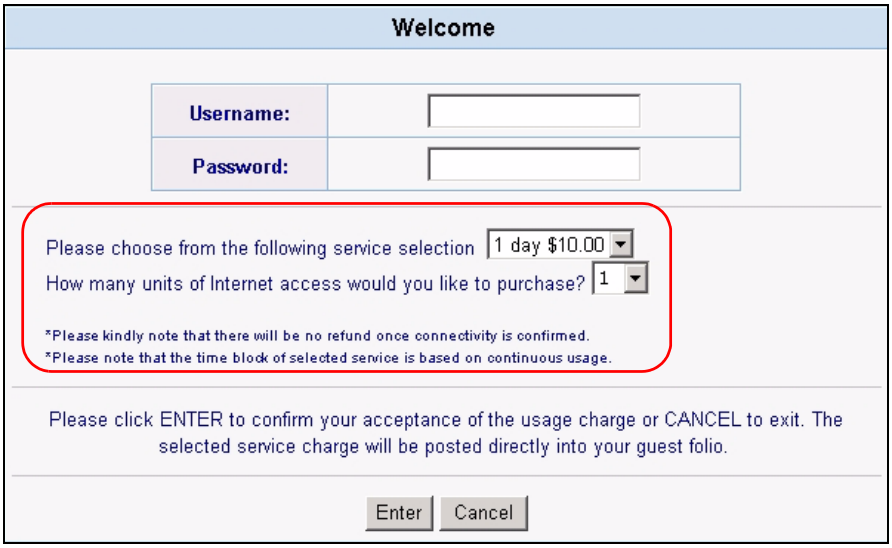
The following table describes the related labels.

Table 38 Customization: Service Selection Customization

LABEL	DESCRIPTION
Service Selection Customization	
Service Selection Messages	Enter a message to instruct the subscribers to select a billing profile.
Purchase Unit Message	Enter a message to instruct the subscribers to select the number of time units to purchase.
Notification Message 1 .. 3	Enter additional message(s) regarding the replenish feature. For example, you may enter a refund policy.
Additional Remark	Enter any additional information. For example, enter contact information for help.

The following figure shows an example of a standard subscriber login screen with the service selection messages.

Figure 76 Subscriber Login Screen Example: Service Selection Messages



CHAPTER 13
Subscriber Information Window

This chapter shows you how to customize the subscriber information window.

13.1 About the Information Window

You can set the VSG to display an information window after a subscriber has successfully logged in. This information window shows the amount of time a subscriber has used or the time the subscriber still has to access the Internet.

The subscriber information window varies depending on the billing and accounting configuration you set on the VSG.

The information window displays the amount of time used for Internet access when you select **Built-in Authentication** in the **Authentication Configuration** screen or when you select **RADIUS Server** and the RADIUS server is configured not to send session timeout messages.

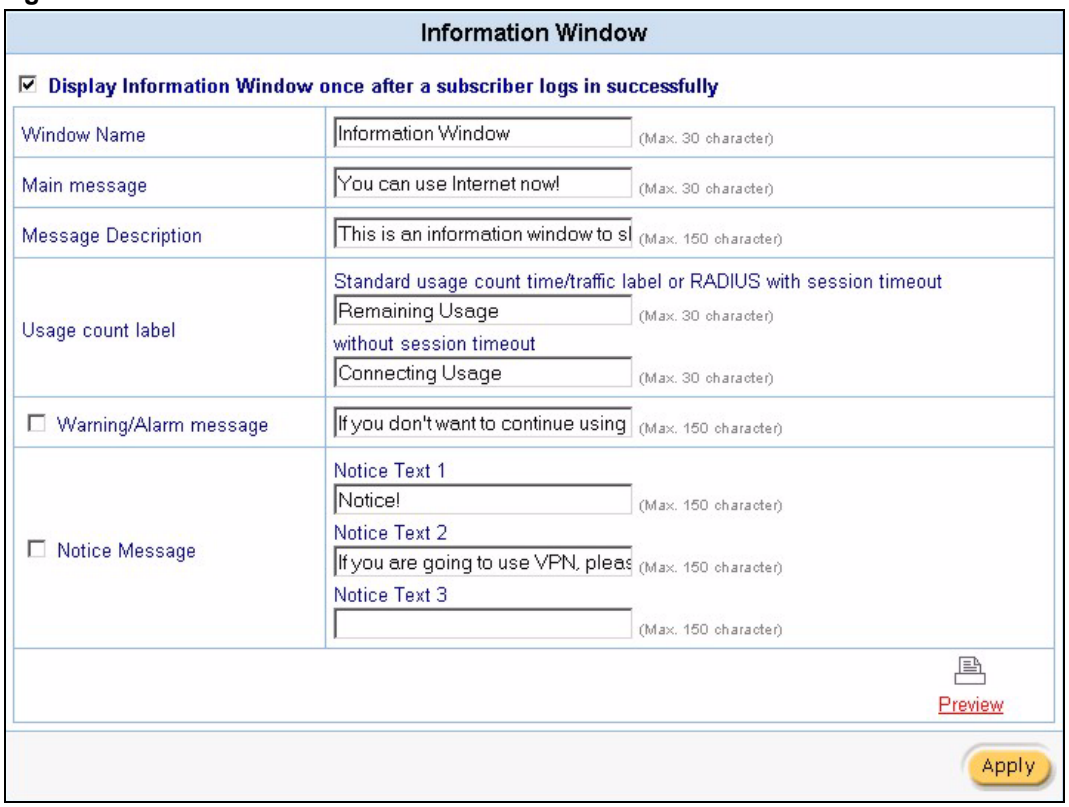
The information window displays the amount of time a subscriber still has to use for Internet access when you select **RADIUS Server** in the **Authentication Configuration** screen and the RADIUS server is configured to send session timeout messages.

13.1.1 Customizing the Information Window

Click **Advanced Setting**, **Customization** and the **Information Window** link to display a screen as shown next.

To display the information window on the subscriber's computer after a successful login, select the **Display Information Window once after the subscriber logs in successfully** check box.

Figure 77 Customization: Information Window



The following table describes the labels in this screen that you set to customize the information window.

Table 39 Customization: Information Window

LABEL	DESCRIPTION
Window Name	Enter a descriptive name (up to 30 characters) as the title of the window.
Main message	Enter a short message (up to 30 characters).
Message Description	Enter a short description about the information window.
Usage count label	Enter the label for the field displaying the remaining time in the first text box provided. This field displays when the VSG is set to use proprietary or RADIUS server (without session timeout messages) authentication. Enter the label for the field displaying the amount of time used in the second text box provided. This field displays when the VSG is set to use RADIUS (without session timeout messages) authentication.
Warning/Alarm Messages	Select this check box to display the warning message that you enter in the text box provided.
Notice Message	Select this check box to display any additional message(s) that you enter in the test box(es) provided. You can specify up to three additional messages (such as discount information) in the information window.
Preview	Click to display a preview of the information window.
Apply	Click **Apply** to save the changes.

The following figure shows an information window example.

Figure 78 Subscriber Pop-up Information Window Example

CHAPTER 14
Account Printout

This chapter describes how you can customize and display a preview of the information of an account.

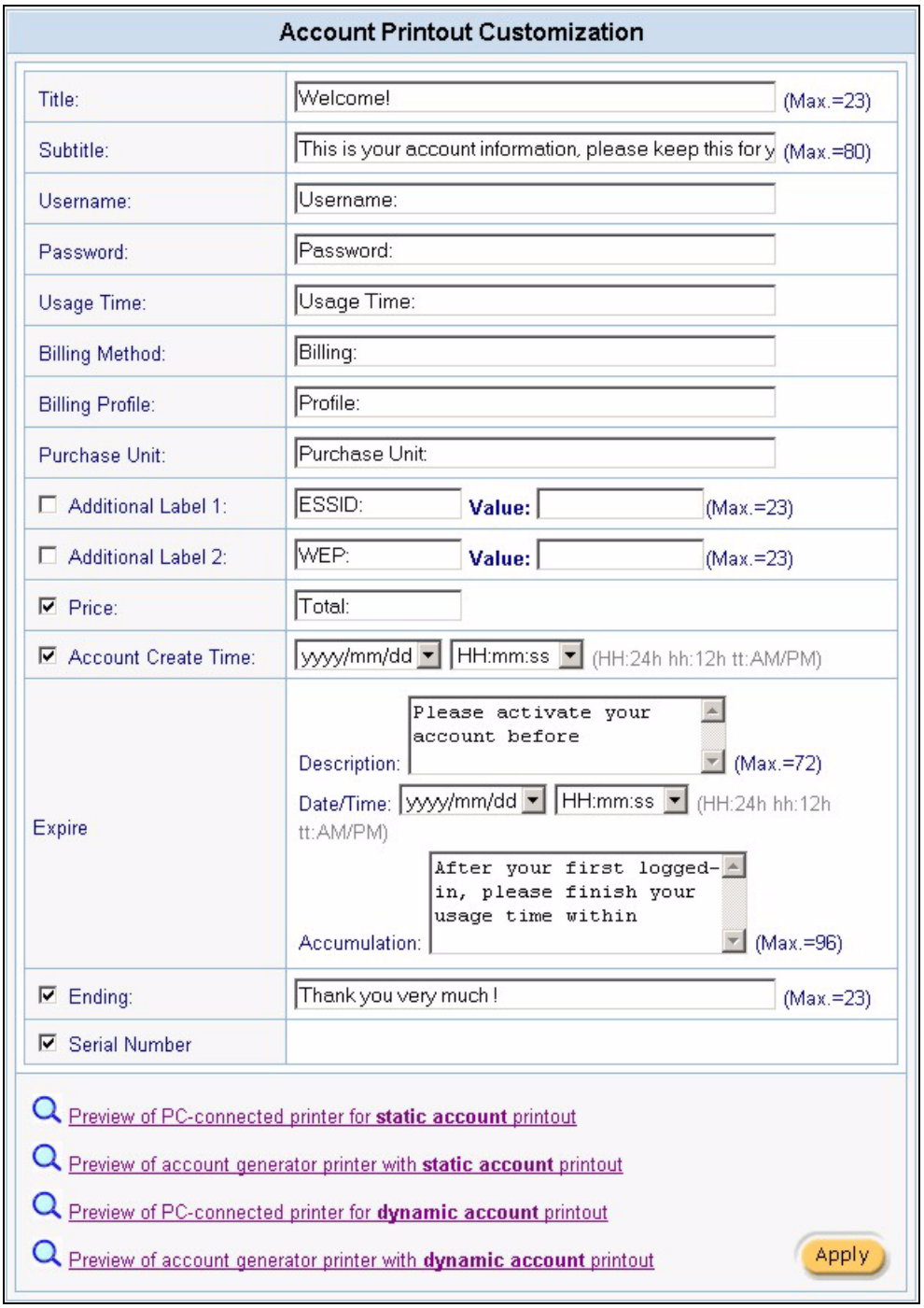
14.1 About the Account Printout

After you have created the subscriber accounts, you can print out the account information. The printout page is different for static and dynamic subscriber accounts.

14.1.1 Customizing the Account Printout

To customize the account printout, click **Advanced Setting**, **Customization** and click the **Account Printout** link to display the screen as shown.

Figure 79 Customization: Account Printout



The following table describes the labels in this screen.

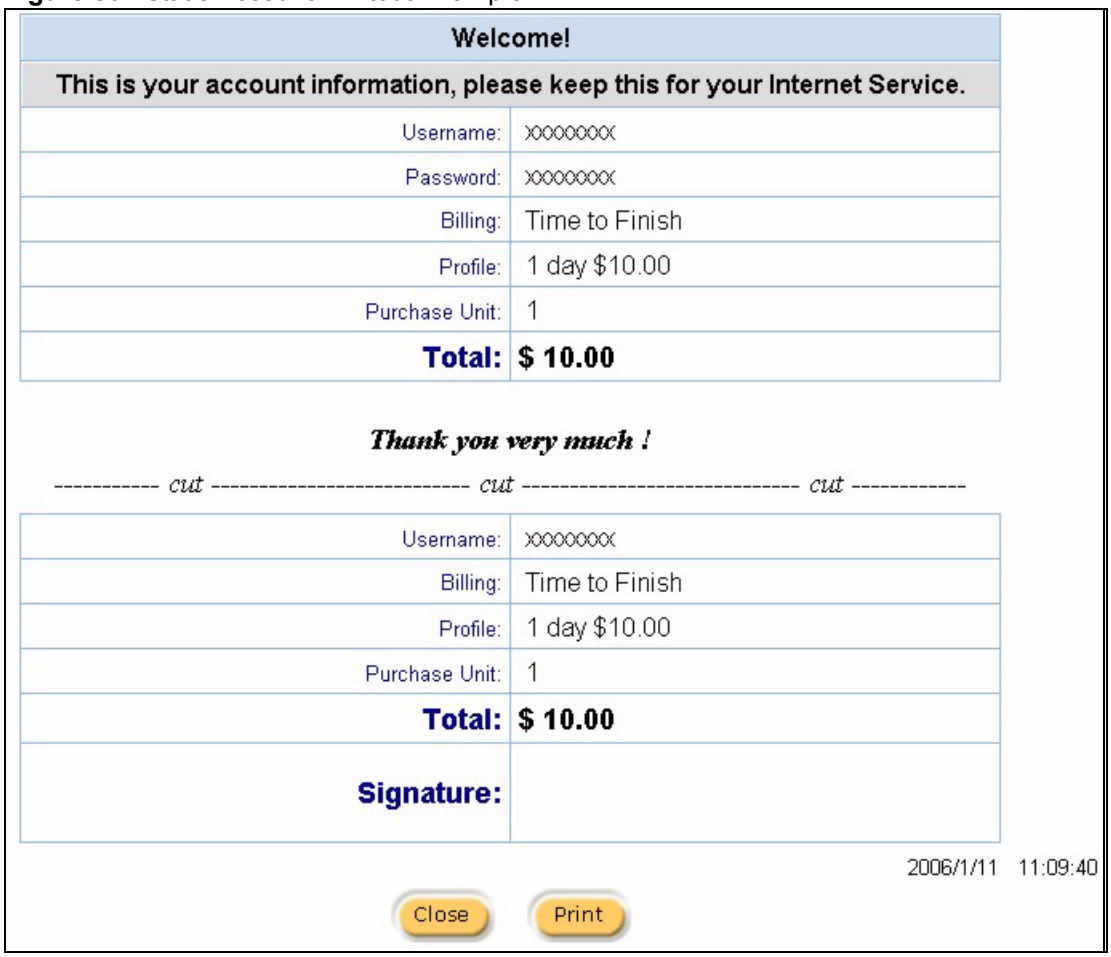
Table 40 Customization: Account Printout

LABEL	DESCRIPTION
Title	Enter a title (up to 24 characters) for the printout.
Subtitle	Enter a subtitle (up to 80 characters) for the printout.
Username	Enter the label name for the field displaying the account username.
Password	Enter the label name for the field displaying the account password.
Usage Time	Enter the label name for the field displaying the amount of time an account is allowed for Internet access.
Billing Method	Enter the label name for the field displaying the method for billing.
Billing Profile	Enter the label name for the field displaying the name for the billing profile used.
Purchase Unit	Enter the label name for the field displaying the number of time units purchased.
Additional Label 1.. 2	Select this check box to display the specified label name(s) for the field(s) displaying any additional information. For example, you can specify additional information such as ESS ID and/or WEB key for wireless stations when you connect an access point to the VSG.
Price	Select this check box to display the specified label name for the field displaying the total price.
Account Create Time	Select this check box to display the time an account is created. Select date and time formats from the drop-down list boxes.
Description	Enter text to explain that the user needs to activate the Internet access account before the expiration date and time.
Date/Time	Select the formats to use when displaying the expiration dates and times.
Accumulation	This description applies with accumulation billing. Enter text to explain that the user needs to finish using the purchased Internet access time before the expiration date and time.
Ending	Select this check box to display a message to display at the end of the printout. Enter the message in the text box provided.
Serial Number	Select this check box to display a serial number on the printout.
Preview of PC-Connected printer for **Static Account** printout.	Click this link to display a preview of a static account printout as it would print on a printer connected to a computer.
Preview of account generator printer with **Static Account** printout.	Click this link to display a preview of a static account printout as it would print on an external account generator printer (or the Statement Printer).
Preview of PC-Connected printer for **Dynamic Account** printout.	Click this link to display a preview of a dynamic account printout as it would print on a printer connected to a computer.
Preview of account generator printer with **Dynamic Account** printout.	Click this link to display a preview of a dynamic account printout as it would print on an external account generator printer (or the Statement Printer).
Apply	Click **Apply** to save the changes.

Note: The account information printout for a static account varies depending on whether PMS billing is used or not.

The following figures show the account printout examples.

Figure 80 Static Account Printout Example



Welcome!	
This is your account information, please keep this for your Internet Service.	
Username:	xxxxxxxx
Password:	xxxxxxxx
Billing:	Time to Finish
Profile:	1 day $10.00
Purchase Unit:	1
Total:	**$ 10.00**

Thank you very much !

---------- cut ---------- cut ---------- cut ----------

Username:	xxxxxxxx
Billing:	Time to Finish
Profile:	1 day $10.00
Purchase Unit:	1
Total:	**$ 10.00**
Signature:	

2006/1/11 11:09:40

Close Print

Figure 81 Static Account with PMS Billing Printout Example

Welcome!	
This is your account information, please keep this for your Internet Service.	
Username:	xxxxxxxx
Password:	xxxxxxxx

Thank you very much !

Close Print

Figure 82 Static Account Printout: Statement Printer Example

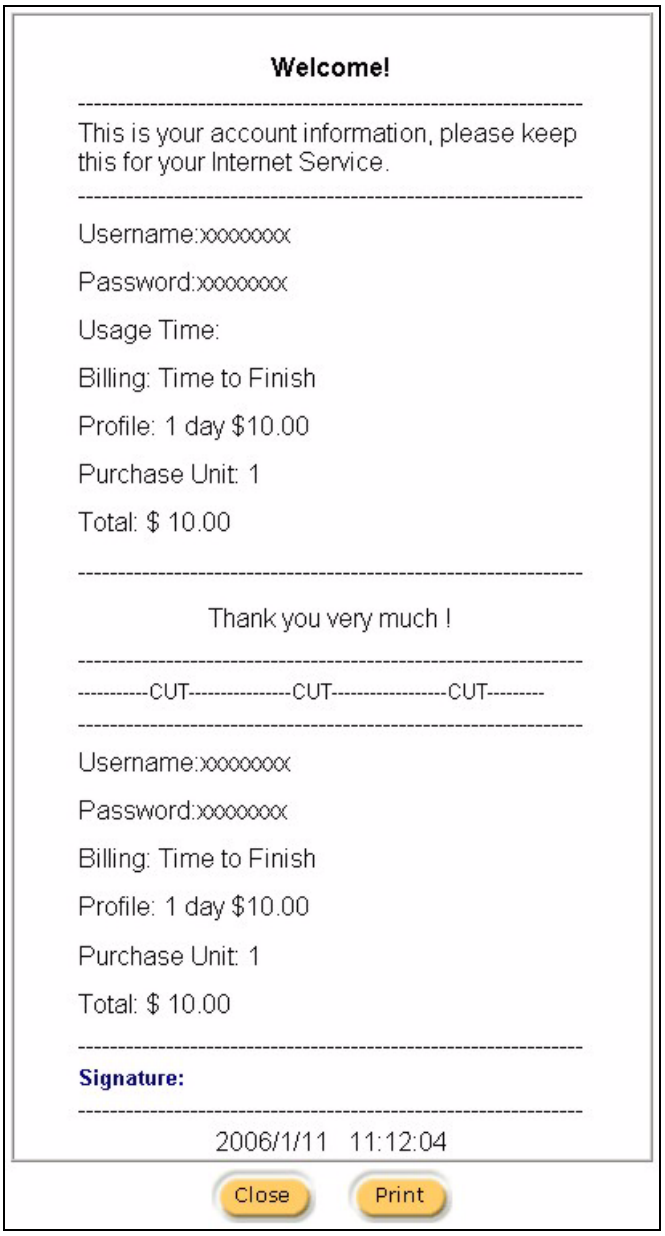


Figure 83 Static Account with PMS Billing Printout: Statement Printer Example

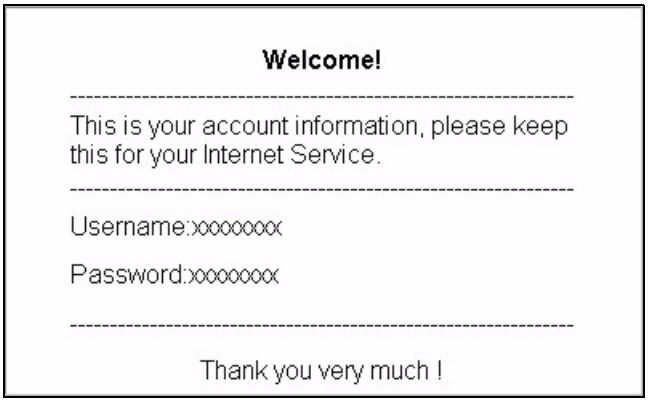
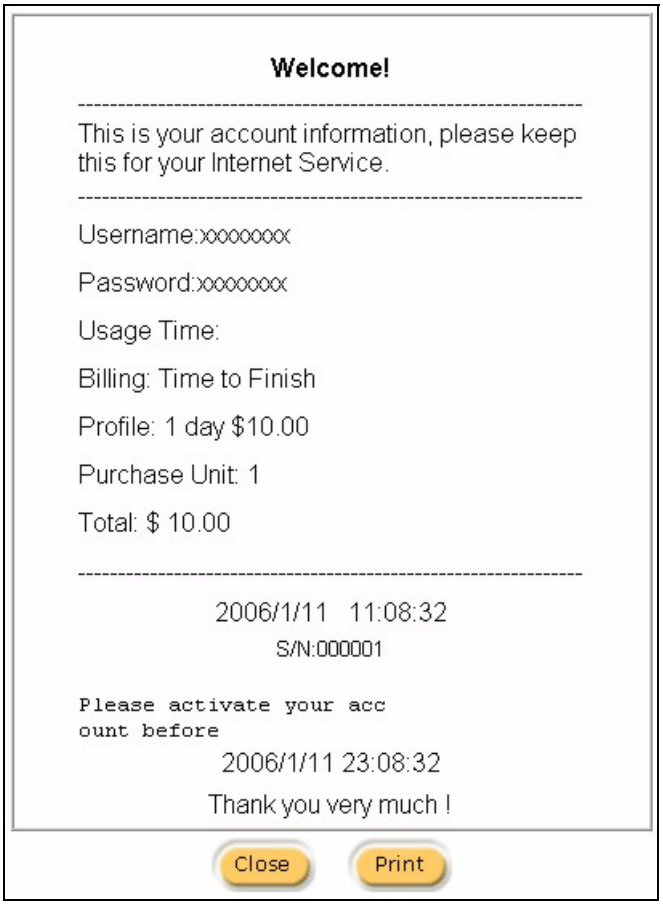


Figure 84 Dynamic Account Printout Example

Figure 85 Dynamic Account Printout: Statement Printer Example



CHAPTER 15
User Agreement Page

This chapter describes how you can customize and display a preview of the subscriber user agreement page.

15.1 About the User Agreement Page

In cases where authentication is not required and anyone can access the Internet through the VSG, you can set the VSG to require users to accept a service usage agreement before they can access the Internet. The VSG has a built-in user agreement page that you can customize.

15.2 Customizing the User Agreement Page

To customize the user agreement page, click **Advanced Setting**, **Customization** and click the **User Agreement Page** link to display the screen as shown.

Figure 86 Customization: User Agreement Page

The following table describes the labels in this screen.

Table 41 Customization: User Agreement Page

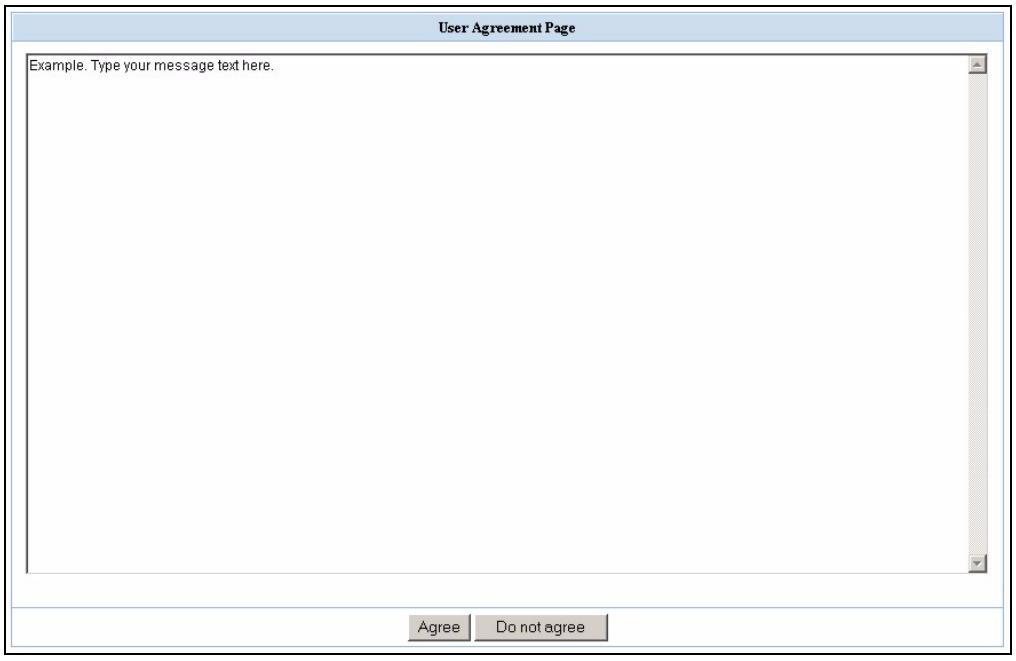
LABEL	DESCRIPTION
Title	Enter a title (up to 100 characters) for the user agreement page.
Title Text Color	Set the color of the title text. For example, use '000000' for black. Click **View Color Grid** to display a list of web-friendly colors and corresponding hexadecimal values.
Article	Enter a block of text (up to 12000 characters long) in the text box. This is the restrictions or conditions that you want the user to agree to before allowing Internet access.
Article Text Color	Set the color of the article text. For example, use '000000' for black. Click **View Color Grid** to display a list of web-friendly colors and corresponding hexadecimal values.

Table 41 Customization: User Agreement Page (continued)

LABEL	DESCRIPTION
Article Background Color	Set the background color for the article. For example, use 'FFFFFF' for white. Click **View Color Grid** to display a list of web-friendly colors and corresponding hexadecimal values.
Page Background Color	Set the background color for the page. For example, use 'FFFFFF' for white. Click **View Color Grid** to display a list of web-friendly colors and corresponding hexadecimal values.
Agree Button	Enter the label name for the button the subscribers click to accept the service usage agreement before they can access the Internet.
Disagree Button	Enter the label name for the button the subscribers click to decline the service usage agreement. They will not be able to access the Internet.
Standard User Agreement Page Preview	Click this link to preview the standard user agreement screen in a new browser window.
Apply	Click **Apply** to save the changes.

The following figure shows a user agreement page example.

Figure 87 User Agreement Page Example



CHAPTER 16
Bandwidth Management

This chapter describes the bandwidth feature and shows you how to configure bandwidth control.

16.1 Bandwidth Management Overview

Bandwidth management allows you to control the amount of outbound and inbound traffic on the LAN. This helps reduce delays and dropped packets due to busy network traffic. On the VSG, outbound traffic refers to network traffic coming from a LAN port to the WAN port whereas inbound traffic refers to network traffic coming from the WAN port to a LAN port.

16.1.1 Bandwidth Allocation

The VSG provides two types of bandwidth control based on a subscriber's computer MAC address: equal share or class-based.

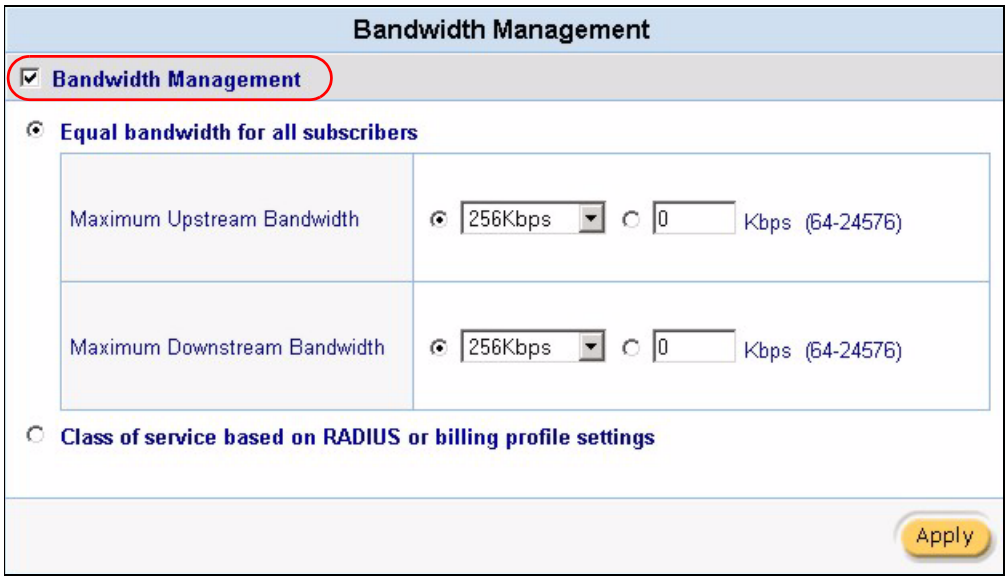
With equal share bandwidth allocation, the VSG allocates an equal amount of outgoing and incoming bandwidth for each subscriber on the LAN.

With class-based bandwidth allocation, you can set up bandwidth classes in the billing profiles on the VSG or on a RADIUS server.

13.1.2 Activating Bandwidth Management

To activate bandwidth management, click **Advanced Setting**, **Bandwidth** and select the **Bandwidth Management** check box.

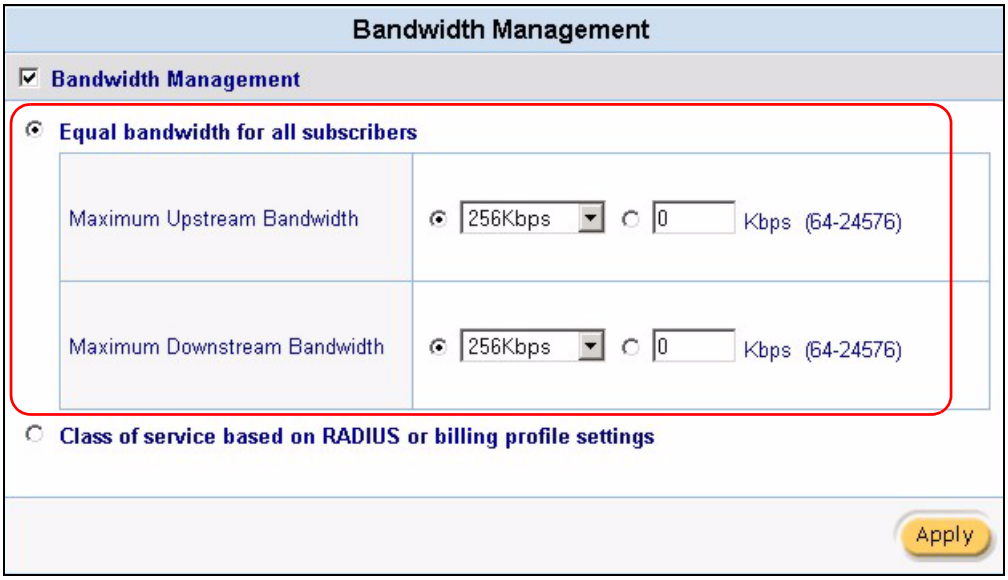
Figure 88 Bandwidth Management: Activate



16.1.2 Configuring Equal Share Bandwidth Management

To configure the VSG to impose the same bandwidth limits on all subscribers, select **Equal bandwidth for all subscribers** in the **Bandwidth Management** screen and set the related fields.

Figure 89 Bandwidth Management: Equal Share



The following table describes the related labels in this screen.

Table 42 Bandwidth Management: Equal Share

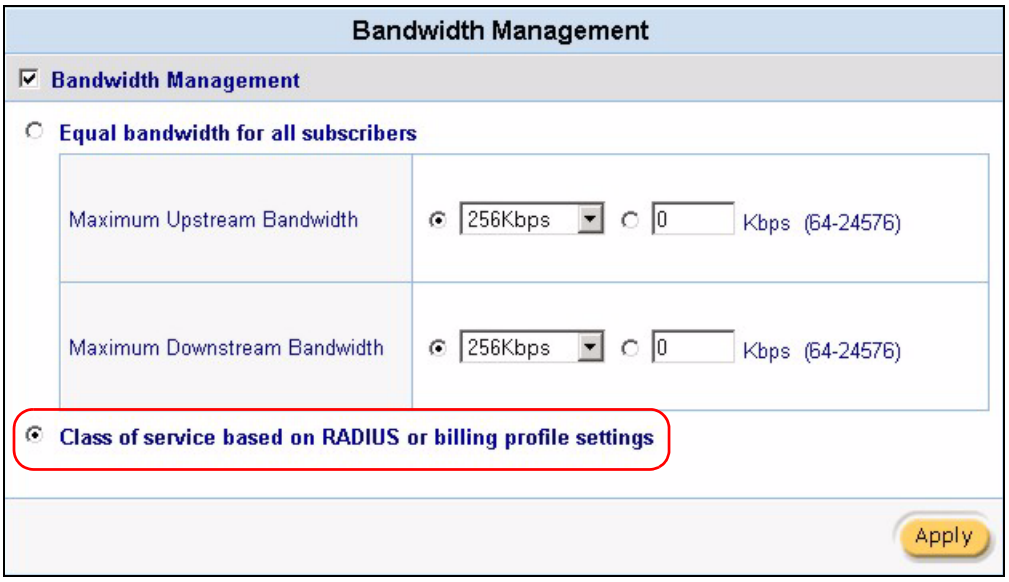
LABEL	DESCRIPTION
Maximum Upstream Bandwidth	To use a pre-defined option, select the first option and choose a bandwidth from the drop-down list box. To manually set the bandwidth, select the second option and specify the bandwidth in the field provided.
Maximum Downstream Bandwidth	To use a pre-defined option, select the first option and choose a bandwidth from the drop-down list box. To manually set the bandwidth, select the second option and specify the bandwidth in the field provided.

16.1.3 Configuring Class of Service Bandwidth Management

To set the VSG to impose different bandwidth limits based on the configurations in a RADIUS server or a billing profile, select **Class of service based on RADIUS or Billing profile settings** in the **Bandwidth Management** screen.

You must then set the bandwidth management on a RADIUS server or in a billing profile. Refer to Chapter 7, "Billing Profiles and PMS Configuration," on page 79 to set the bandwidth limits in a billing profile.

Figure 90 Bandwidth Management: Class of Service



CHAPTER 17
Portal Page, Advertisement Link and Walled Garden

This chapter shows you how to set a portal web site, advertisement links and create walled garden web sites.

17.1 Introduction

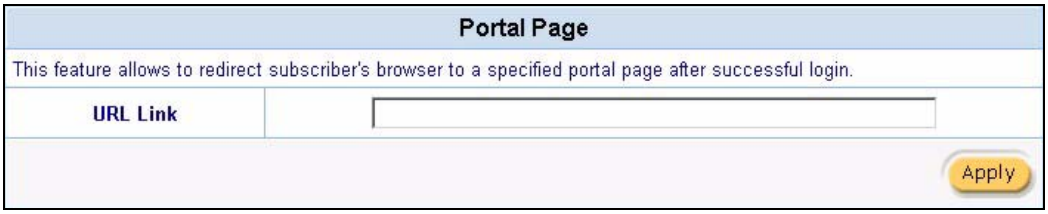
When you enable subscriber authentication in the **Authentication Configuration** screen, you can set the VSG to redirect a subscriber to a portal web site, display advertisement links or activate the walled garden feature for generating on-line advertising revenue.

17.2 Portal Page

A portal page is the first web site to which a subscriber is redirected after logging in successfully. If you do not specify a portal web site, the subscriber will be directed to the intended web site specified.

Click **Advanced** and **Portal Page** to display the screen as shown next.

Figure 91 Portal Page



The following table describes the labels in this screen.

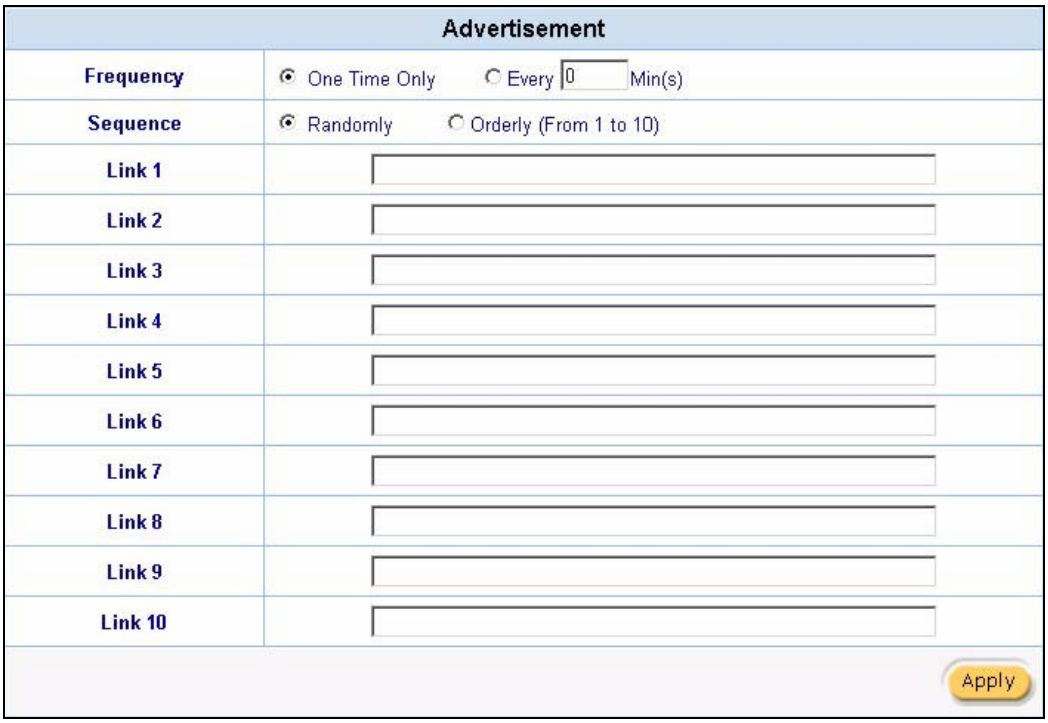
Table 43 Portal Page

LABEL	DESCRIPTION
URL Link	Enter the web site address of a portal page.
Apply	Click **Apply** to save the settings.

17.3 Advertisement Links

You can set the VSG to display an advertisement web page first on the subscriber's computer once connected to the Internet. Click **Advanced** and **Advertisement** to display the screen as shown next.

Figure 92 Advertisement



The following table describes the labels in this screen.

Table 44 Advertisement

LABEL	DESCRIPTION
Frequency	Select **One Time Only** to display an advertisement web site in a pop-up browser window once after a subscriber logs in successfully. Select **Every … Min(s)** to display an advertisement web site in a pop-up browser window once every time period specified (between 1 and 60 minutes) after a subscriber logs in successfully.
Sequence	Select **Randomly** to display the advertisement web pages in random order. Select **In Order** to display the advertisement web pages in the order as configured.
Link 1 .. 10	Enter the web site addresses in the fields provided.
Apply	Click **Apply** to save the changes.

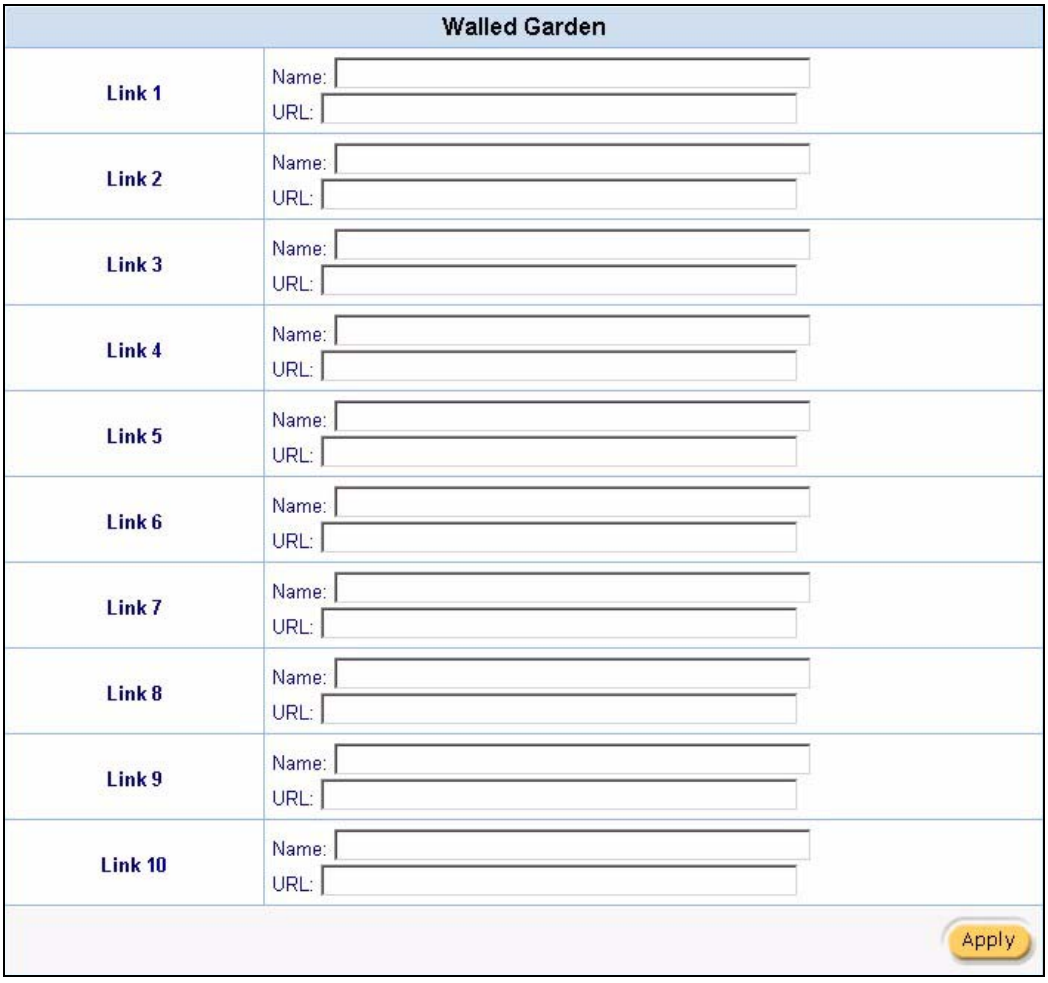
17.4 Walled Garden

A subscriber must log in before the VSG allows the subscriber access to the Internet. However, with walled garden, you can define the web site address(es) which all users can access without logging in.

Note: A walled garden web site may not display properly or even be accessible if the domain name contains multiple IP addresses.

Click **Advanced** and then **Walled Garden** to display the screen as shown.

Figure 93 Walled Garden



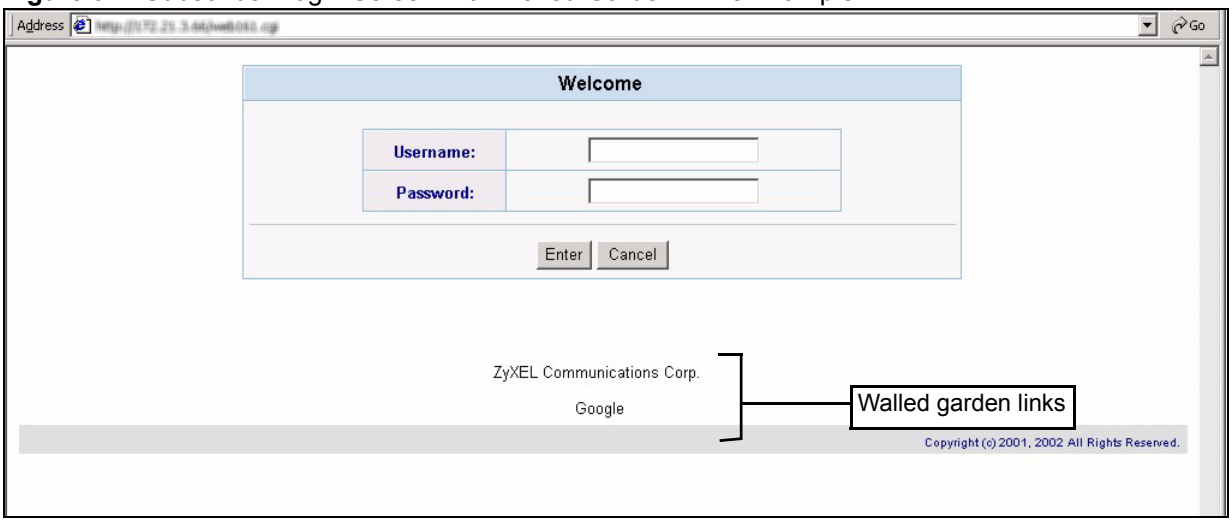
The following table describes the labels to configure the walled garden feature.

Table 45 Walled Garden

LABEL	DESCRIPTION
Link 1 … 10	In the **Name** field, enter a descriptive name (up to 80 characters) for the walled garden link to be displayed in the web browser. In the **URL** field, enter the web site address (up to 200 characters) of the web site.
Apply	Click **Apply** to save the changes.

The following figure shows a subscriber login screen example with walled garden links.

Figure 94 Subscriber Login Screen with Walled Garden Links Example



CHAPTER 18
Passthrough

This chapter shows you how to set up computer and web site passthrough.

18.1 About the Passthrough

There are two types of pass through you can set up on the VSG: by device or by web site address You can set the VSG to allow specific computers (based on the IP or MAC address) to access the Internet without prompting for a user name and password.

To allow global access to web sites, specify the web site address (by IP address or URL) that any user can access without logging in. This is similar to the walled garden feature, but without displaying the web site link(s) in the subscriber login screen. You have to inform the users about which web sites they can access for free.

18.2 Configuring Passthrough

To configure passthrough on the VSG, click **Advanced** and then **Passthrough**.

18.2.1 Subscriber Computer Passthrough

You can specify the IP or MAC address(es) of a computer that can access the Internet without entering a user name and password. This feature is useful, for example, if you want to set up computers to provide free Internet access in the VIP room or for sponsors in events.

Figure 95 Passthrough: Subscriber IP and MAC Address

Subscriber IP & MAC Address Passthrough

No.	IP Address	No.	IP Address	No.	IP Address
1		13		25	
2		14		26	
3		15		27	
4		16		28	
5		17		29	
6		18		30	
7		19		31	
8		20		32	
9		21		33	
10		22		34	
11		23		35	
12		24		36	

No.	MAC Address	No.	MAC Address	No.	MAC Address
1		11		21	
2		12		22	
3		13		23	
4		14		24	
5		15		25	
6		16		26	
7		17		27	
8		18		28	
9		19		29	
10		20		30	

The following table describes the fields in this screen.

Table 46 Passthrough: Subscriber IP and MAC Address

FIELD	DESCRIPTION
Subscriber IP & MAC Address Passthrough	
No.	This read-only field displays the index number of an entry.
IP Address	Enter the IP address of a computer (in dotted decimal notation) whose packets are allowed to pass through the VSG. For example, 10.59.1.10.
MAC Address	Enter the MAC address of a computer (in 6 hexadecimal pairs separated by a hyphen "-", for example, 00-50-BA-8D-22-96) whose packets are allowed to pass through the VSG.

18.2.2 Destination URL and IP Address Passthrough

You can specify the IP address or the URL of the web site(s) that any user can access without entering a user name or password.

Figure 96 Passthrough: Destination URL and IP

Destination IP Address Passthrough

No.	IP Address	No.	IP Address	No.	IP Address
1		13		25	
2		14		26	
3		15		27	
4		16		28	
5		17		29	
6		18		30	
7		19		31	
8		20		32	
9		21		33	
10		22		34	
11		23		35	
12		24		36	

Destination URL Passthrough

No.	URL Link Page
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

The following table describes the fields in this screen.

Table 47 Passthrough: Destination URL and IP

FIELD	DESCRIPTION
Destination IP Address Passthrough	
No.	This read-only field displays the index number of an entry.
IP Address	Enter the IP address of a web site in dotted decimal notation, for example, 192.168.1.10
Pass Through Destination URL	
No.	This read-only field displays the index number of an entry.
URL Link Page	Enter the web site address, for example, http://www.zyxel.com.

CHAPTER 19
LAN Devices

This chapter describes how you can remotely access devices on the LAN through the VSG.

19.1 LAN Devices and NAT Overview

NAT (Network Address Translation - NAT, RFC 1631) is the translation of the IP address of a host in a packet. Form example, the source address of an outgoing packet, used within one network is changed to a different IP address known within another network.

Traditionally, when you have a device (for example, a switch) on a LAN using NAT, you cannot access the device from the WAN since the LAN device is assigned a private IP address.

Your VSG is a NAT-enabled device that makes your whole inside network appear as a single computer to the outside world.

19.1.1 Port Mapping

To make LAN devices behind the VSG visible to the outside world, you configure a mapping between a virtual port on the VSG and a server port on a LAN device. A virtual port is a port on the VSG that appears as a physical port to the attached devices. A server port defines a server to which all specified requests are forwarded.

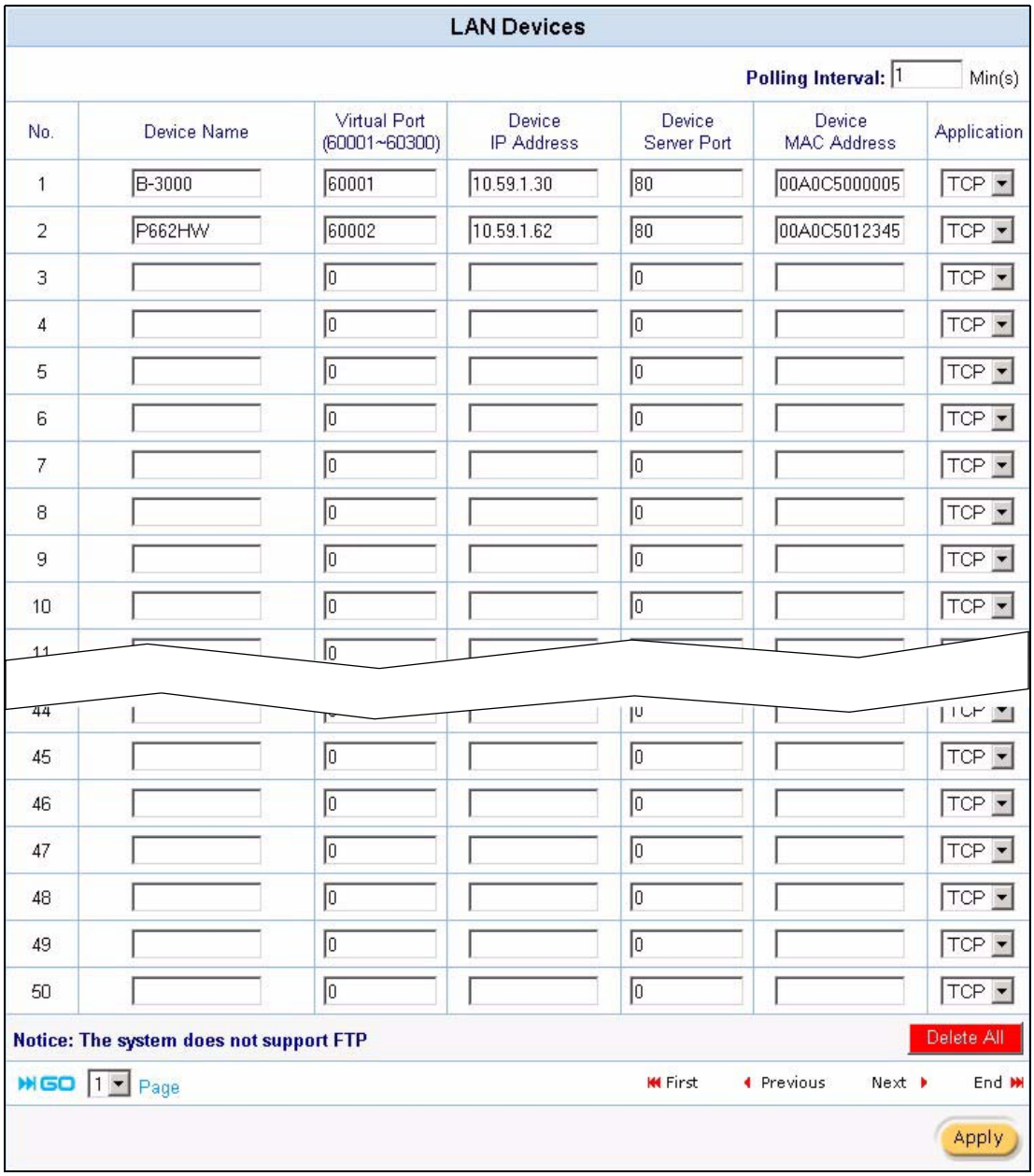
In addition, centralized LAN device management is possible through the VSG using port mapping. You can access the management interface on the LAN device remotely provided that the LAN device has allowed remote management.

19.2 Configuring LAN Device Port Mapping

Click **Advanced** and **LAN Devices** to display the **LAN Device Management** screen as shown.

Note: You can configure port mapping for up to 300 LAN devices on the VSG.

Figure 97 LAN Devices



The following table describes the labels in this screen.

Table 48 LAN Devices

LABEL	DESCRIPTION
Polling Interval	Specify the time interval (in minutes) between the VSG's probes for device availability.
No.	This read-only field displays the index number of an entry.
Device Name	Enter the name of the LAN device for identification purposes.
Virtual Port	Enter a unique port number between 60001 and 60300 to map to the port number in the **Server Port** field.

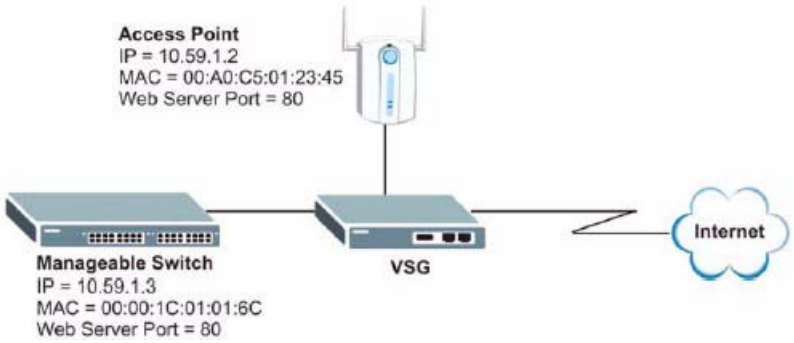
Table 48 LAN Devices (continued)

LABEL	DESCRIPTION
Device IP Address	Enter the IP address of a LAN device in dotted decimal notation. For example, 10.59.1.111.
Device Server Port	Enter the port number of a management service (for example, 80 for HTTP) on the LAN device.
MAC Address	Enter the MAC address of the LAN device in hexadecimal notation in 6 hexadecimal pairs, for example, 0050BA8D2296. **Note:** Make sure you enter the correct MAC address.
Application	Select an application type from the drop-down list box. Choose from **TCP** or **UDP**. Only requests for the selected application type are forwarded to the specified server port on the LAN device.
Delete	Click **Delete All** to remove all accounts. Click **Delete** to remove the selected account.
GO .. Page	Select a page number from the drop-down list box to display the selected page.
First	Click **First** to go to the first page.
Previous	Click **Previous** to return to the previous page.
Next	Click **Next** to go to the next page.
End	Click **End** to go to the last page.
Apply	Click **Apply** to save the changes.

19.2.1 LAN Device Management Example

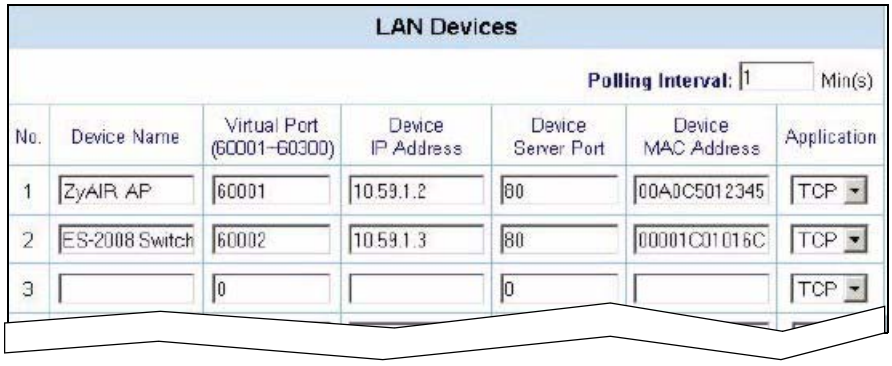
In this example, there is a manageable switch and a wireless access point behind the VSG and you want to be able to remotely access the web-based management interfaces on the manageable switch and access point over the Internet.

Figure 98 LAN Device Remote Management Example 1



You map virtual port 60001 on the VSG to the web server port on the access point and 60002 to the web server port on the manageable switch.

Figure 99 LAN Devices: Example 1



To access the web-based management interface, enter the WAN IP address of your VSG and the virtual port number of the LAN device separated by a colon. In this example, to access the access point (AP), enter "http:// 192.168.1.1:60001" where 192.168.1.1 is the WAN IP address of the VSG. The login screen of the LAN device management interface should display.

You can also access the LAN devices through the VSG web configurator, refer to Section 24.7.1 "Accessing the LAN Device" on page 184 for more information.

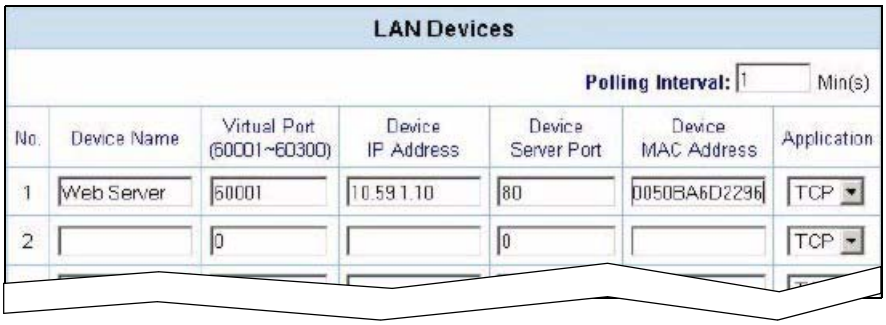
19.2.2 Specifying an Inside Server Example

Let's say you have a web server behind the VSG as shown in the next figure.

Figure 100 LAN Device Remote Management Example 2

In the **LAN Device Management** screen, you map virtual port 60001 to the server port (80) on the web server.

Figure 101 LAN Devices: Example 2



To access an inside server on the LAN, enter the WAN IP address of your VSG and the virtual port number of the inside server separated by a colon. In this example, to access the web server, enter "http:// 192.168.1.1:9602" where 192.168.1.1 is the WAN IP address of the VSG.

You can also access the server by entering the domain name provided that you specified a DNS server on the VSG. Enter the domain name and the virtual port number separated by a colon, for example, http://www.domainName:60001.

You can also access the LAN devices through the VSG web configurator, refer to Section 24.7.1 "Accessing the LAN Device" on page 184 for more information.

CHAPTER 20
Static Route

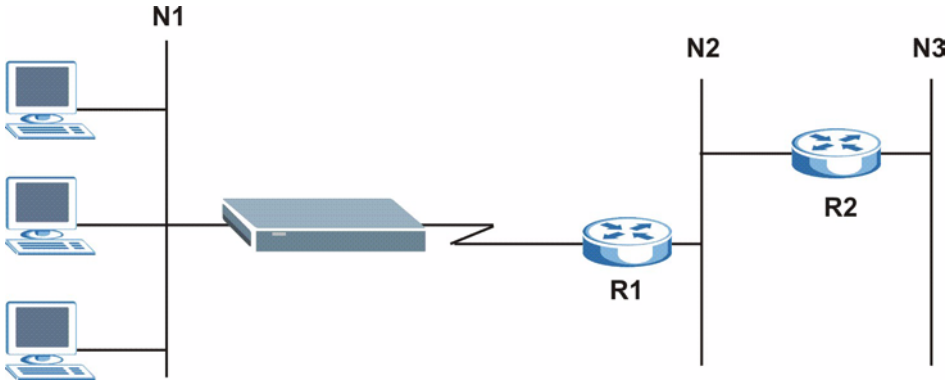
This chapter shows you how to configure static routes to specified destinations.

20.1 Static Route Overview

Static routes tell the VSG routing information that it cannot learn automatically through other means. This can arise in cases where RIP is disabled on the LAN or a remote network is beyond the one that is directly connected to a remote node.

Each remote node specifies only the network to which the gateway is directly connected and the VSG has no knowledge of the networks beyond. For instance, the VSG knows about network N2 in the following figure through remote node Router 1. However, the VSG is unable to route a packet to network N3 because it does not know that there is a route through remote node Router 1 (via Router 2). The static routes allow you to tell the VSG about the networks beyond the remote nodes.

Figure 102 Sample Static Routing Topology

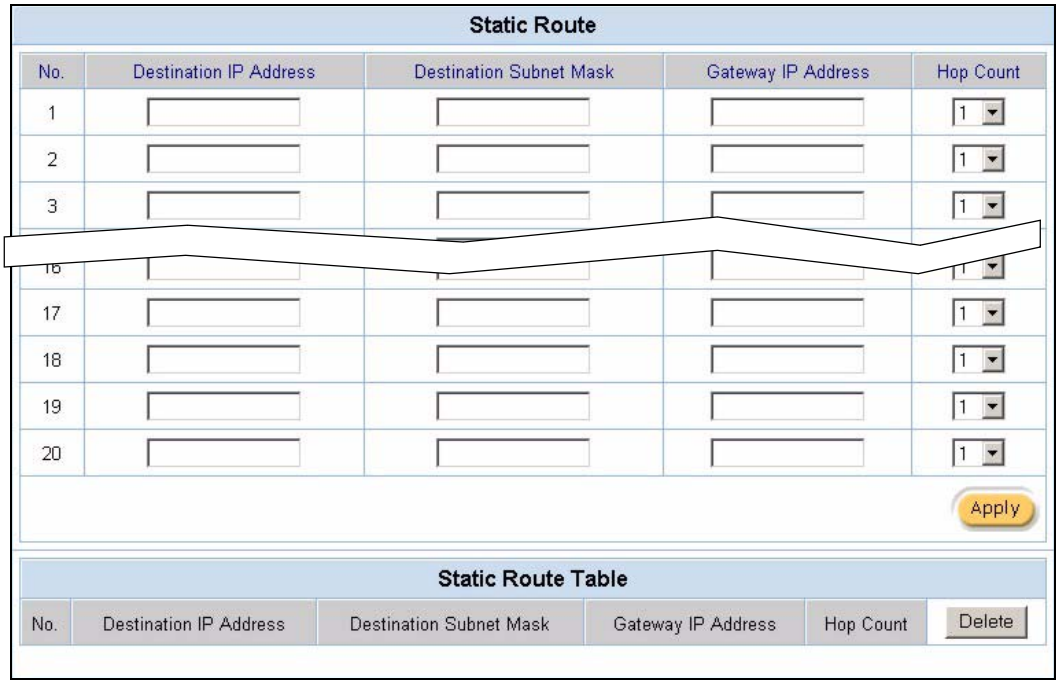


20.2 The Static Route Screen

Configure and view static route settings in the **Static Route** screen.

Click **Advanced** and **Static Route** to display the configuration screen.

Figure 103 Advanced: Static Route



The following table describes the labels in this screen.

Table 49 Advanced: Static Route

LABEL	DESCRIPTION
Static Route	Set the fields below to configure static route settings. You can configure up to 20 static routes at a time.
No.	This is the index number of the static route that you chose in menu 12.1.
Destination IP Address	This parameter specifies the IP network address of the final destination. Routing is always based on network number. If you need to specify a route to a single host, use a subnet mask of 255.255.255.255 in the subnet mask field to force the network number to be identical to the host ID.
Destination Subnet Mask	Type the subnet mask for this destination.
Gateway IP Address	Type the IP address of the gateway. The gateway is a router or switch on the same network segment as the device's LAN or WAN port. The gateway helps forward packets to their destinations.
Hop Count	Hop count represents the cost of transmission for routing purposes. IP routing uses hop count as the measurement of cost, with a minimum of 1 for directly connected networks. Select a number that approximates the cost for this link. The number need not be precise, but it must be between 1 and 15. In practice, 2 or 3 is usually a good number.
Apply	Click **Apply** to save the changes. New static route entries display in the table below.
Static Route Table	This table displays the static routes configured.
No.	This field displays the index number.
Destination IP Address	This field displays the IP address of the final destination.

Table 49 Advanced: Static Route (continued)

LABEL	DESCRIPTION
Destination Subnet Mask	This field displays the subnet mask of the final destination.
Gateway IP Address	This field displays the IP address of the gateway device.
Hop Count	This field displays the "cost" of this static route.
Delete	Click **Delete** to remove the selected static route(s).

CHAPTER 21
Syslog and Session Trace

This chapter shows you how to configure syslog logging and set the VSG to send subscriber session information.

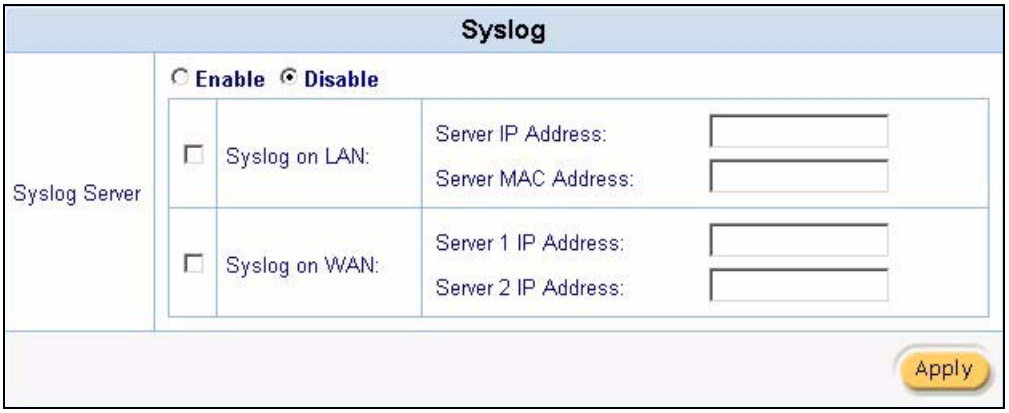
21.1 Syslog

Syslog logging allows the VSG to send logs to an external syslog server that is used to store and analyze logs.

21.1.1 Syslog Server Setup

Use the **Syslog** screen to configure to where the VSG is to send logs. To configure the syslog settings, click **Advanced**, **Logs** to display the screen as shown next.

Figure 104 Logs: Syslog



The following table describes the labels in this screen.

Table 50 Logs: Syslog

LABEL	DESCRIPTION
Syslog Server	Select **Enable** to activate the syslog function. Select **Disable** to de-activate the syslog function.
Syslog on LAN	Select this check box to specify a syslog server on the LAN.
Server IP Address	Enter the IP address (in dotted decimal notation) of the syslog server on the LAN.
Server MAC Address	Enter the MAC address of the syslog server on the LAN.
Syslog on WAN	Select this check box to specify a syslog server on the WAN.

Table 50 Logs: Syslog (continued)

LABEL	DESCRIPTION
Server 1 IP Address	Enter the IP address of the first syslog server on the WAN in dotted decimal notation.
Server 2 IP Address	Enter the IP address of the second syslog server on the WAN in dotted decimal notation.
Apply	Click **Apply** to save the settings.

21.1.2 Configure Log Settings

To specify which logs the VSG is to send and the schedule for when the VSG is to send the logs, click **Advanced**, **Logs** and click the **Log Settings** link.

Figure 105 Logs: Log Settings

Log Settings

System

Syslog	Syslog Name	Description	Interval Time	Type
☐	System Information	A log including the system information will be sent according to specified interval time	60 minutes	166
☐	System Boot Notice	Once system reboots, the log will be sent	When system reboot	165
☐	System Account Activity Information	A log would be sent if system account (Administrator, Supervisor or Account Operator) login to or logout from the device	When system account login or logout.	166

Accounting

Syslog	Syslog Name	Description	Interval Time	Type
☐	Account Created	A log will be sent once after an account is created	When an account is created	166
☐	Subscriber Trace	A log including subscribers login/logout time will be sent once after subscriber logout	When subscriber logout	165
☐	Logged-in Users	A login users information will be sent according to specified interval time	60 minutes	166
☐	User Agreement	A log would be sent when "user agreement" enabled	When subscriber login	166

Billing

Syslog	Syslog Name	Description	Interval Time	Type
☐	Billing Log	A log would be sent according to specified interval time	When log created	166

LAN Devices Management

Syslog	Syslog Name	Description	Interval Time	Type
☐	LAN Devices Information	A log including current LAN Devices Status will be sent according to specified interval time	60 minutes	166 164
☐	LAN Devices Alarm	A log will be sent if one of the LAN Devices detected result is "Fail"	When device fail	161

Alert

Syslog	Syslog Name	Description	Interval Time	Type
☐	Administration access Fail	A log would be sent when someone failed to access the administration web server	When someone failed to access the system web server	161
☐	NAT Pool exhausted(IP/Port)	A log would be sent when IP or Port mapping exhausted	When NAT Pool exhausted	161

Apply

The following table describes the labels in this screen.

Table 51 Logs: Log Settings

LABEL	DESCRIPTION
Syslog Name	This field displays the name (or type) of the log. Select the check box(es) to send the syslog.
Description	This field displays a short description about the syslog.
Interval Time	This field displays how often the VSG sends the logs. If available, enter the number of minutes the VSG waits between sending the syslog.
Type	This field displays the type number of a log. This number is read-only.
Apply	Click **Apply** to save the settings.

The following table describes the log formats.

Table 52 Logs: Log Format

SYSLOG NAME	FORMAT	CREATED
System Information	**Id** <MAC Address> **System Uptime** <0 days 00h:04m:00s> **WAN** <FrameTxOK| FrameRxOK| FrameTxError| FrameRxError> **LAN** <FrameTxOK| FrameRxOK| FrameTxError| FrameRxError>	Each time interval specified (between 1 and 10080 minutes).
System Boot Notice	**Id** <MAC Address> **System Up**	Each time when the device reboots.
System Account Activity Information	**Id** <MAC Address> **System Account Activity Information** <Username, User IP, Status> Where: Username = Administrator | Supervisor | Accounting Operator User IP = IP Address Status = Login | Logout | Idle Time Out	Each time when the system account logs in or logs out.
Account Created	**Id** <Mac Address> **Account Create** <username, Account usage time, Billing profile information> Where: Username = **Single account** <username> or **Batch account** <prefix, from, to, postfix>] Billing profile information = index, name	When an account is created.
Subscriber Trace	**Id** <MAC Address> **Subscriber Trace** <username, user IP, user MAC, interface, login time, logout time, RxData count, TxData count>	When a subscriber logs out.
Logged-in Users	**Id** <MAC Address> **Logged-in Users** <Number of Logged-in users, Start Number, End Number) (Username, user IP, user MAC, interface, login time, RxData count, TxData count> [additional information]	Each time interval specified.

Table 52 Logs: Log Format (continued)

SYSLOG NAME	FORMAT	CREATED
Billing Log	**Id** <Mac Address> **Billing Log** <Username, Billing profile information, Log time, Usage time, Bill, Charge From> Where: Charge From = PMS | Dynamic Billing profile name = Name Log time = MM/DD/YYYY HH:MM:SS Usage time = "x minutes" | "Expire when 00:00" Billing profile information = index, name	When a log is created
LAN Devices Information	**Id** <MAC Address> **LAN Devices Information** <Number of devices, Start Number, End number> **Device name** <status> [additional information]	Each time interval specified (between 1 and 10080 minutes).
LAN Devices Alarm	**Id** <MAC Address> **LAN Device Alarm** <Device name, FAIL>	When the VSG cannot connect to an attached LAN device.
Administrator access Fail	**Id** <MAC Address> **Administration Access Fail** <Fail message, User IP, Username> Where: Fail message = Bad Username/Password | Unauthorized IP | Exceeded Maximum Login Note: If **Fail message** = **Unauthorized IP** and no user name can be obtained, then **Username** = **None**. If **Fail message** = **Exceeded Maximum Login**, then **Username =** Administrator | Supervisor | Accounting Operator	Each time a system login attempt fails.
NAT Pool Exhausted (IP/ Port)	**Id** <MAC Address>) **NAT Pool Exhausted** <Type> where: Type = NAT pool IP address | NAT Port number	When no IP address or port is available for additional NAT mapping.

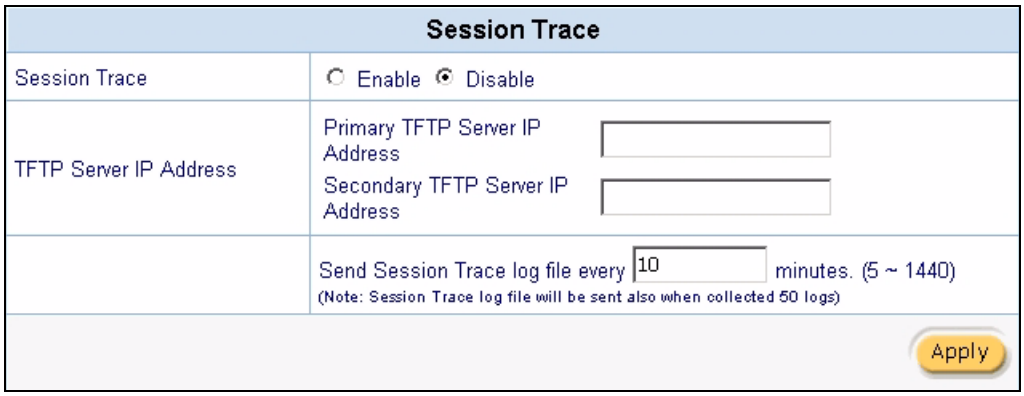
21.2 Session Trace

You can set the VSG to send session information of subscribers accessing the Internet. The VSG records the session information and stores it temporary. Once the session trace information reaches a maximum of 50 records or the specified time period is reached, the VSG sends the session information to the specified TFTP server.

21.2.1 Configuring Session Trace

To configure the VSG to send subscriber session information, click **Advanced**, **Session Trace** to display the screen as shown.

Figure 106 Advanced: Session Trace



The following table describes the labels in this screen.

Table 53 Advanced: Session Trace

LABEL	DESCRIPTION
Session Trace	Select **Enable** to set the VSG to record and send subscriber session information. Select **Disable** to de-activate this feature.
TFTP Server IP Address	Specify the primary and/or secondary TFTP IP address in the **Primary TFTP Server IP Address** and/or **Secondary TFTP IP Address** fields. Enter the IP address(es) in dotted decimal notation. For example, 192.168.1.10. Enter the time interval (in minutes between 5 and 1440) the VSG waits before sending the session information to the TFTP server(s). **Note:** If there are 50 session trace records, the VSG sends the session information to the TFTP server even if the time interval is not up.
Apply	Click **Apply** to save the settings.

21.2.1.1 Session Trace Filename Convention

The subscriber session information is stored a plain text file with a "txt" filename extension. The general structure of the filename is <hostname>DDMMYYHHMMSS.txt. For example, "MIS221004131543.txt" is the file name of a session information file created at 13:15:43 PM on October 22, 2004 on a VSG with a hostname of "MIS".

You can view the subscriber session trace information using any text editor. The following figure shows an example of the session information file the VSG sends to a TFTP server.

Figure 107 Session Trace Information Example

```
Host Name  User Name   Date    VLANId SourceIP  SourceMac  SourcePort  DestIP   DestPort
MIS        Cindy    22Oct04130403   192.168.1.10  0085A0010104 3974   192.168.1.1     80
MIS        Cindy    22Oct04130404   192.168.1.10  0085A0010104 3977   172.20.0.63     53
MIS        Cindy    22Oct04130440   192.168.1.10  0085A0010104 3991   172.20.0.27     80
```

The following table describes the fields in a session information file.

Table 54 Session Trace File Fields

FIELD	DESCRIPTION
Host Name	This is the host (or system) name of the VSG.
User Name	This is the subscriber account username. This field is empty if you disable authentication in the Authentication screen (see Chapter 6, "Authentication," on page 71 for more information).
Date	This is the date and time the VSG creates a session trace record.
VLANId	This is the VID of the VLAN to which a subscriber belongs. This field is empty if no VLAN tag is present (see Chapter 10, "Port-Location Mapping," on page 103 for more information).
SourceIP	This is the IP address of the subscriber.
SourceMac	This is the MAC address of the subscriber's computer.
SourcePort	This is the source port number of the subscriber.
DestIP	This is the destination IP address the subscriber accesses.
DestPort	This is the destination port number for this session.

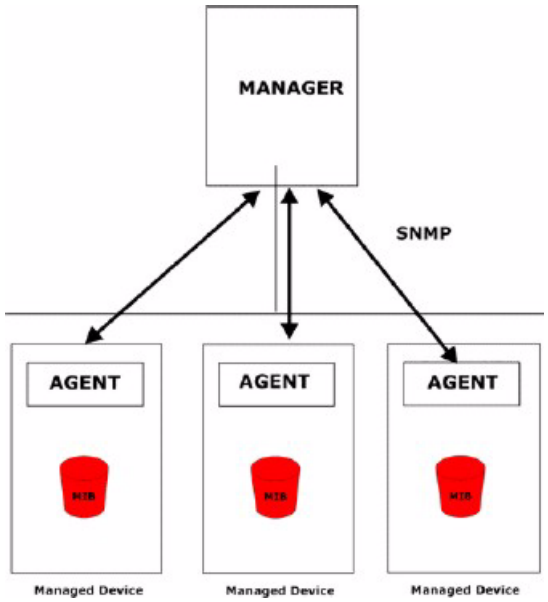
CHAPTER 22
SNMP

This chapter shows you how to set up SNMP.

22.1 SNMP Overview

Simple Network Management Protocol (SNMP) is a protocol used for exchanging management information between network devices. SNMP is a member of the TCP/IP protocol suite. Your VSG supports SNMP version one and version 2. The next figure illustrates an SNMP management operation.

Figure 108 SNMP Management Model



An SNMP managed network consists of two main components: agents and a manager.

An agent is a management software module that resides in a managed device. An agent translates the local management information from the managed device into a form compatible with SNMP. The manager is the console through which network administrators perform network management functions. It executes applications that control and monitor managed devices.

The managed devices contain object variables/managed objects that define each piece of information to be collected about a device. Examples of variables include such as number of packets received, node port status etc. A Management Information Base (MIB) is a collection of managed objects. SNMP allows a manager and agents to communicate for the purpose of accessing these objects.

SNMP itself is a simple request/response protocol based on the manager/agent model. The manager issues a request and the agent returns responses using the following protocol operations:

- Get - Allows the manager to retrieve an object variable from the agent.
- GetNext - Allows the manager to retrieve the next object variable from a table or list within an agent. In SNMPv1, when a manager wants to retrieve all elements of a table from an agent, it initiates a Get operation, followed by a series of GetNext operations.
- Set - Allows the manager to set values for object variables within an agent.
- Trap - Used by the agent to inform the manager of some events.

22.1.1 Network Management System (NMS)

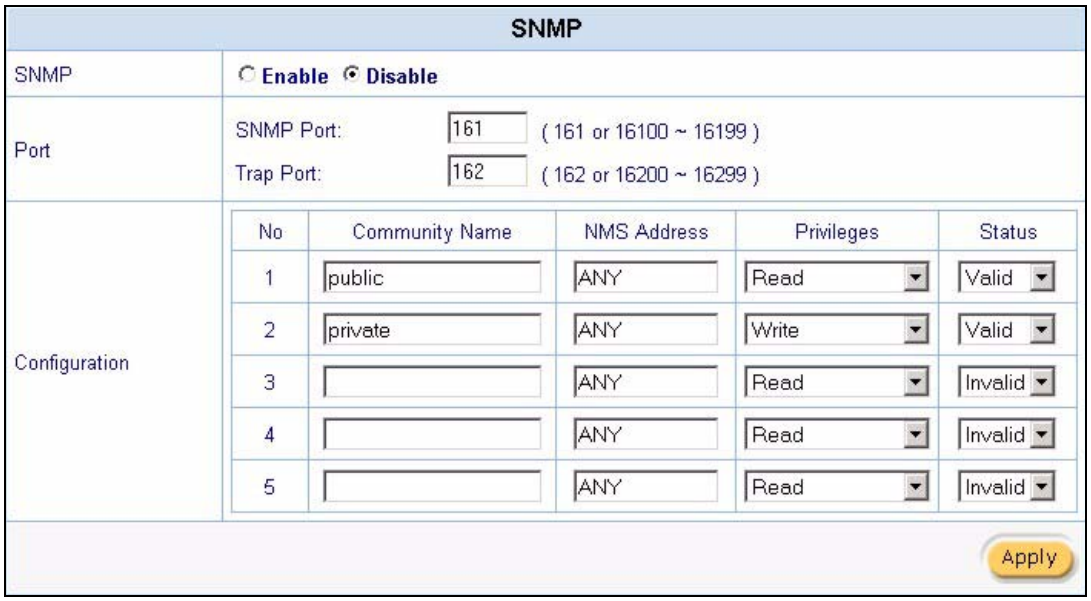
An NMS (Network Management System) is a management station that receives traps (the system alerts generated).

If no NMS is defined, then no traps are generated.

22.2 Configuring SNMP

Click **Advanced Setting** and **SNMP** to display the screen as shown next.

Figure 109 SNMP



The following table describes the labels in this screen.

Table 55 SNMP

LABEL	DESCRIPTION
SNMP	Select **Enable** to activate SNMP support. Select **Disable** to de-activate the SNMP support.
Port	
SNMP Port	Enter a port number on the VSG for SNMP management. The default is **161**. Otherwise enter a port number between 16100 and 16199.
Trap Port	Enter a port number on the VSG for sending SNMP traps. The default is **162**. Otherwise enter a port number between 16200 and 16299.
Configuration	
No	This read-only field displays the index number of the entry.
Community Name	Enter the community string (or the password) of the management station.
NMS Address	Enter the IP address of the management station.
Privileges	Select a privilege level from the drop-down list box. Options are **Read**, **Write**, **Trap Recipient** and **All**.
Status	Select **Valid** to activate the selected SNMP configuration entry. Select **Invalid** to disable the selected SNMP configuration entry.
Apply	Click **Apply** to save the changes.

CHAPTER 23
MAC Filter

This chapter describes how you can configure the MAC filter feature.

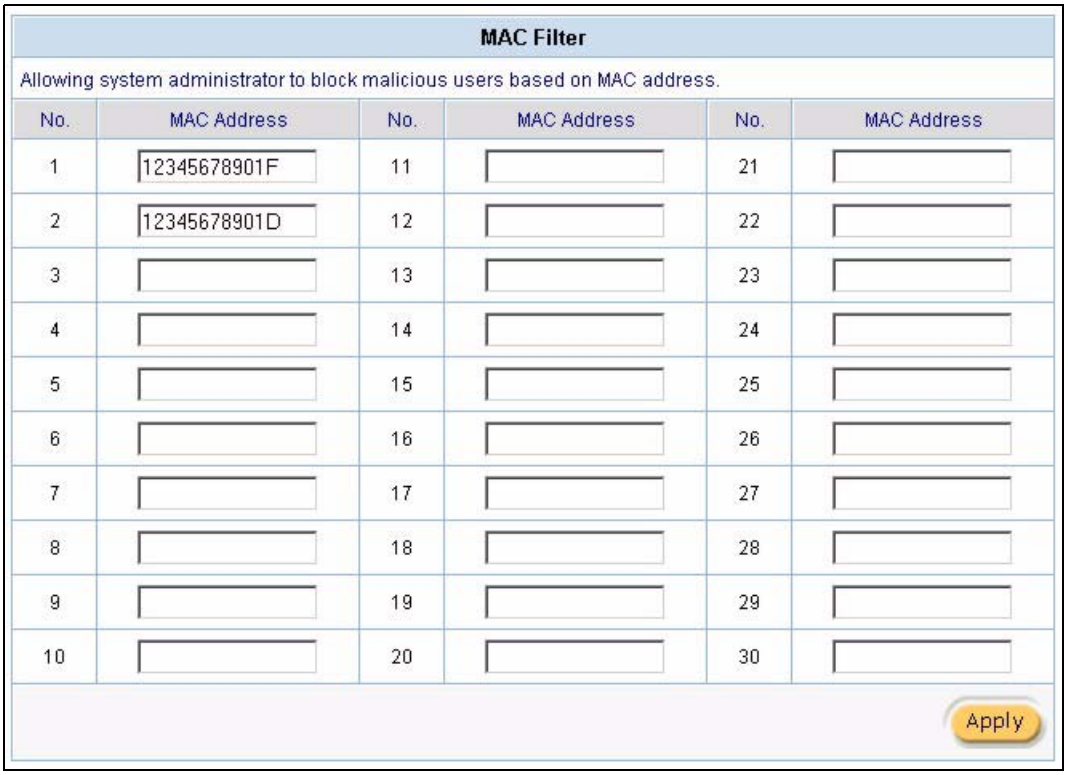
23.1 About the MAC Filter

The **MAC Filter** screen allows you to configure the VSG to block devices from accessing the Internet through the VSG. Every Ethernet device has a unique MAC (Media Access Control) address. The MAC address is assigned at the factory and consists of six pairs of hexadecimal characters, for example, 00A0C5000002. You need to know the MAC addresses of the devices to configure this screen.

23.2 Configuring the MAC Filter

To configure the MAC filter, click **Advanced Setting**, **MAC Filter** to display the screen as shown.

Figure 110 MAC Filter



The following table describes the labels in this screen.

Table 56 MAC Filter

LABEL	DESCRIPTION
MAC Address	Enter the MAC addresses (in XXXXXXXXXXXX format) of the devices that are denied access to the VSG in these address fields.
Apply	Click **Apply** to save the changes.

CHAPTER 24
System Status

This chapter describes the screens under **System Status**.

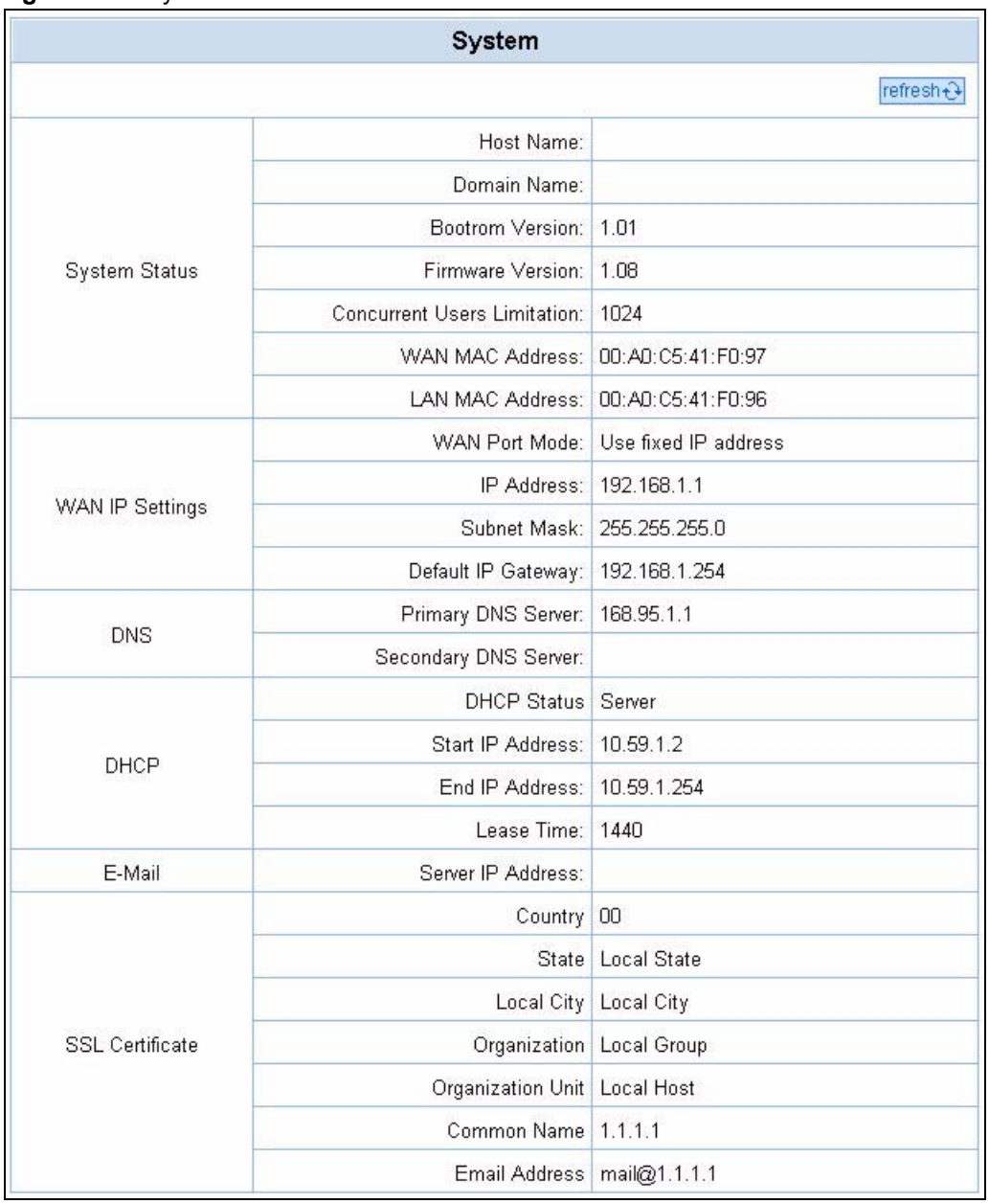
24.1 About System Status

The screens in **System Status** show the current state of the VSG.

24.2 View System Information

Click **System Status** and **System** to display the screen as shown next. The **System** screen automatically updates every 5 seconds.

Figure 111 System Status



System		
	refresh	
System Status	Host Name:	
	Domain Name:	
	Bootrom Version:	1.01
	Firmware Version:	1.08
	Concurrent Users Limitation:	1024
	WAN MAC Address:	00:A0:C5:41:F0:97
	LAN MAC Address:	00:A0:C5:41:F0:96
WAN IP Settings	WAN Port Mode:	Use fixed IP address
	IP Address:	192.168.1.1
	Subnet Mask:	255.255.255.0
	Default IP Gateway:	192.168.1.254
DNS	Primary DNS Server:	168.95.1.1
	Secondary DNS Server:	
DHCP	DHCP Status	Server
	Start IP Address:	10.59.1.2
	End IP Address:	10.59.1.254
	Lease Time:	1440
E-Mail	Server IP Address:	
SSL Certificate	Country	00
	State	Local State
	Local City	Local City
	Organization	Local Group
	Organization Unit	Local Host
	Common Name	1.1.1.1
	Email Address	mail@1.1.1.1

The following table describes the fields in this screen.

Table 57 System Status

FIELD	DESCRIPTION
System Status	
Host Name	This field displays the description name of the VSG for identification purposes.
Domain Name	This field displays the domain name of the VSG.
Bootrom Version	This field displays the version of the bootrom.
Firmware Version	This field displays the version of the firmware on the VSG.

Table 57 System Status (continued)

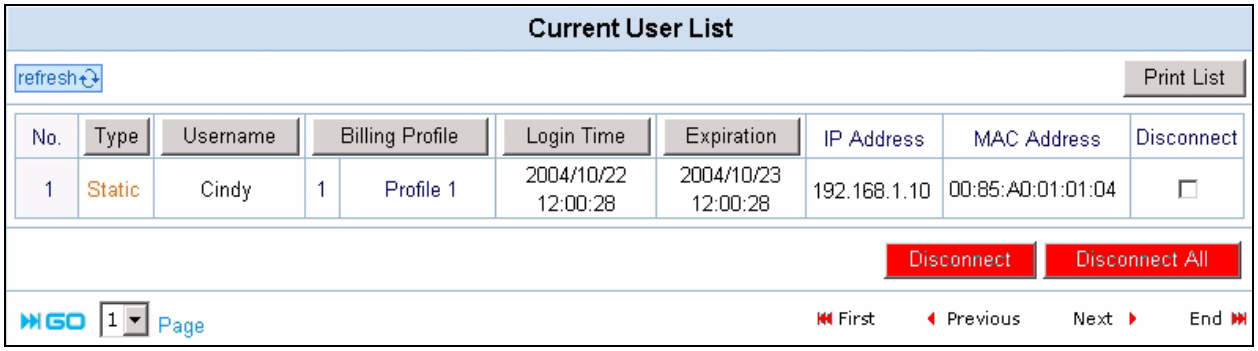
FIELD	DESCRIPTION
Concurrent User Limitation	This field displays the maximum number of users that can log in simultaneously for Internet access.
WAN MAC Address	This field displays the MAC address of the VSG on the WAN.
LAN MAC Address	This field displays the MAC address of the VSG on the LAN.
WAN IP Settings	
WAN Port Mode	This field displays the DHCP mode of the WAN port.
IP Address	This field displays the IP address of the WAN port on the VSG.
Subnet Mask	This field displays the subnet mask of the WAN port on the VSG.
Default IP Gateway	This field displays the IP address of the default gateway of the WAN port on the VSG.
DNS	
Primary DNS Server	This field displays the IP address of the primary DNS server.
Secondary DNS Server	This field displays the IP address of the secondary DNS server.
DHCP	
DHCP Status	This field displays the DHCP mode (**Server**, **Relay** or **Disable**) on the LAN.
Server IP Address	This field is visible when the **DHCP Status** is **Server** or **Relay**. This field displays the IP address of the DHCP server on the network.
Start IP Address	This field is visible when the **DHCP Status** is **Server** or **Relay**. This field displays the first of the continuous addresses in the IP address pool.
End IP Address	This field is visible when the **DHCP Status** is **Server**. This field displays the end of the continuous addresses in the IP address pool.
Lease Time	This field is visible when the **DHCP Status** is **Server**. This field displays the time (in minutes) a DHCP client is allowed to use an assigned IP address.
E-mail	
Server IP Address	The field displays the IP address or the domain name of the e-mail server.
SSL Certificate	
Country	This field displays the two-letter abbreviation of your country.
State	This field displays the name of the state or province where your organization is located.
Local City	This field displays the name of the city your organization is located.
Organization	This field displays the name of your organization.
Origination Unit	This field displays additional information about your organization.
Common Name	This field displays the fully qualified domain name of your web server.
Email Address	This field displays your e-mail address.

24.3 Current User List

The **Current User List** screen displays a list of subscribers currently logged on to the VSG for Internet access.

Click **System Status** and **Current User List** to display the screen as shown. Click a column heading to sort the entries if applicable. The Username, Billing Profile, Login Time, expiration and Disconnect fields and buttons

Figure 112 Current User List



The following table describes the labels in this screen.

Table 58 Current User List

LABEL	DESCRIPTION
Refresh	Click **Refresh** to update this screen.
Print List	Click **Print List** to print the current user list to a printer. No preview option is available.
No	This field displays the index number.
Type	This field displays the type of subscriber accounts.
Username	This displays when you are using authentication. This field displays the username of a subscriber account.
Billing Profile	This field displays the number of concurrent access allowed and the name of the billing profile that the subscriber uses.
Login Time	This displays when you are using authentication. This field displays the time the subscriber logs in.
Expiration	This displays when you are using authentication. This field displays the time this account expires. This field displays **N/A** when total bandwidth limitation is enforced on this account. Refer to Section 6.1.5.2 "Vendor Specific Attribute" on page 73 and Appendix D, "Vendor Specific Attributes," on page 239 for more information.
IP Address	This field displays the IP address of the subscriber's computer.
MAC Address	This field displays the MAC address of the computer that is logged in using this account.
Disconnect	This displays when you are using authentication. Select this check box and click **Disconnect** to log out the selected subscriber. Click **Disconnect All** to log out all subscribers.
GO .. Page	Select a page number from the drop-down list box to display the selected page.

Table 58 Current User List (continued)

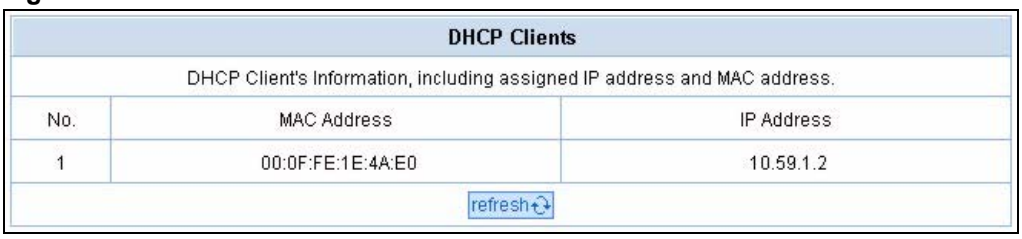
LABEL	DESCRIPTION
First	Click **First** to go to the first page.
Previous	Click **Previous** to return to the previous page.
Next	Click **Next** to go to the next page.
End	Click **End** to go to the last page.

24.4 DHCP Clients

The DHCP client table shows current DHCP client information of all network clients using the DHCP server on the VSG.

Click **System Status** and **DHCP** to display the screen as shown. The **DHCP Clients** screen automatically updates every 120 seconds.

Figure 113 DHCP Clients



The following table describes the labels in this screen.

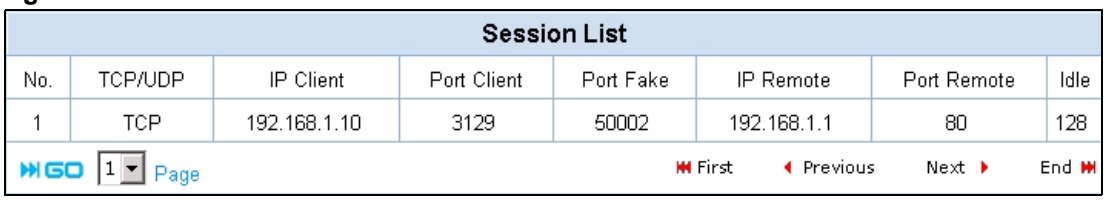
Table 59 DHCP Clients

LABEL	DESCRIPTION
No.	This field displays the index number of an entry.
MAC Address	This field displays the MAC address of the client computer. The MAC (Media Access Control) or Ethernet address on a LAN (Local Area Network) is unique to your computer (six pairs of hexadecimal characters). A network interface card such as an Ethernet adapter has a hard-wired address that is assigned at the factory. This address follows an industry standard that ensures no other adapter has a similar address.
IP Address	This field displays the IP address assigned to the client computer.
refresh	Click this button to manually renew the screen's information display.

24.5 Session List

To display a list of session information, click **System Status** and **Session List**. The **Session List** screen displays up to 2048 entries. When all rows are used, the entries wrap around and the old entries are erased. This screen automatically updates every 5 seconds.

Figure 114 Session List



The following table describes the labels in this screen.

Table 60 Session List

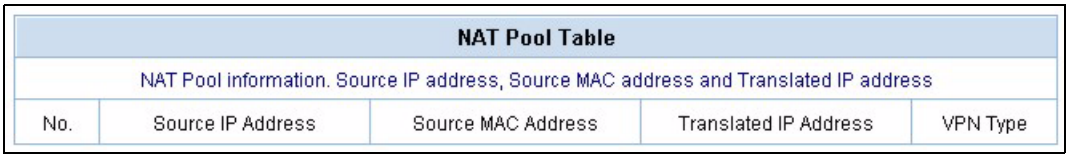
LABEL	DESCRIPTION
No	This field displays the index number of an entry.
TCP/UDP	This field displays the type of traffic (**TCP** or **UDP**).
IP Client	This field displays the IP address of the client computer.
Port Client	This field displays the port number through which the client computer transmits the traffic.
Port Fake	This field displays the virtual port number for a session.
Port Remote	This field displays the port number of a remote device the client computer accesses.
Idle	This field displays the number of seconds of inactivity for a session.
GO .. Page	Select a page number from the drop-down list box to display the selected page.
First	Click **First** to go to the first page.
Previous	Click **Previous** to return to the previous page.
Next	Click **Next** to go to the next page.
End	Click **End** to go to the last page.

24.6 NAT Pool Table

The VSG provides a NAT address pool feature for use with VPN. It allows subscribers to connect to remote VPN servers that allow only one connection per source IP address.

Click **System Status** and **NAT Pool Table** to open the screen shown next. This screen displays the LAN and WAN IP addresses that are currently being used as well the VPN types.

Figure 115 NAT Pool Table



The following table describes the labels in this screen.

Table 61 NAT Pool Table

LABEL	DESCRIPTION
No	This field displays the index number of an entry.
Source IP Address	This field displays the IP address of the subscriber device on the LAN that is using the VPN.
Source MAC Address	This field displays the MAC address of the subscriber device on the LAN that is using the VPN.
Translated IP Address	This field displays the WAN IP address of the VSG to which the LAN IP address of the subscriber using the VPN was translated.
VPN Type	This field displays the type of VPN connection that is being used (IPSec or PPTP).

24.7 LAN Device Status

The **LAN Devices Status** screen displays the status of LAN devices configured in the **LAN Devices** screen (refer to Chapter 19, "LAN Devices," on page 153).

Click **System Status** and **LAN Devices Status** to display the screen as shown next. This screen automatically updates every minute.

Figure 116 System Status: LAN Device Status

LAN Devices Status

No.	Device Name	Status	Virtual Port (60001~60300)	Device IP Address	Device Server Port	Device MAC Address	Application
1	B-3000	OK	60001	10.59.1.30	80	00:A0:C5:00:00:05	TCP
2	P662HW	OK	60002	10.59.1.62	80	00:A0:C5:01:23:45	TCP

The following table describes the labels in this screen.

Table 62 System Status: LAN Device Status

LABEL	DESCRIPTION
No	This field displays the index number.
Device Name	This field displays the name of the LAN device. Click the device name to access web-based management interface of the LAN device if the **Status** field is **OK**. For more information on accessing a LAN device, refer to Section 24.7.1 "Accessing the LAN Device" on page 184.
Status	This field displays the current status of the LAN device. It displays **OK** when the LAN device is turned on and working properly. Otherwise it displays **Fail**.
Virtual Port	This field displays the virtual port number.
Device IP Address	This field displays the IP address of the LAN device.
Device Server Port	This field displays the server port number of the LAN device.

Table 62 System Status: LAN Device Status (continued)

LABEL	DESCRIPTION
Device MAC Address	This field displays the MAC address of the LAN device.
Application	This field displays the type of application packet that is forwarded to the LAN device.

24.7.1 Accessing the LAN Device

Before you can access a LAN device behind the VSG, the following requirements must be met.

- The LAN device has a web-based management interface and it is enabled.
- You have set up the virtual port mapping to the LAN device server port in the **LAN Device Management** screen.
- The LAN device status is **OK** in the **LAN Device Status** screen.

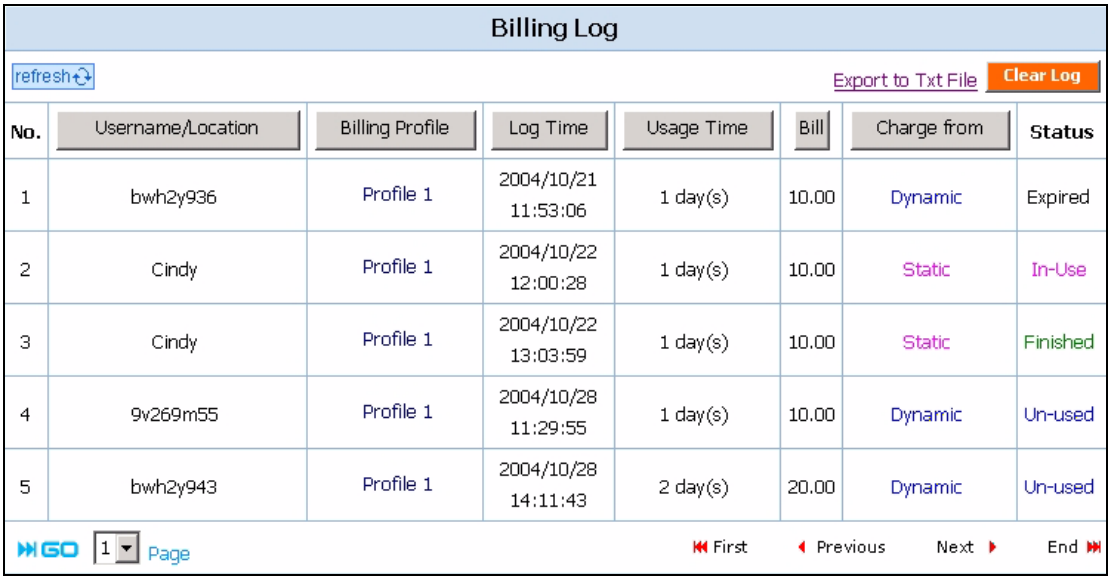
There are two methods to access the LAN device: directly or through the web configurator.

- To access the LAN device through the web configurator, open the **LAN Device Status** screen and click the device name. A new Internet browser should display showing the login screen of the LAN device management interface.
- To directly access the LAN device, enter the WAN IP address of your VSG and the virtual port number of the LAN device separated by a colon. For example, enter "http://192.168.1.1:60001" where 192.168.1.1 is the WAN IP address of the VSG. The login screen of the LAN device management interface should display.

24.8 Billing Logs

Click **System Status** and **Billing Log** in the navigation panel to display the screen as shown. Refer to Section 24.8.1 "Billing Logs Backup" on page 185 for information on backing up the billing logs to a computer.

Figure 117 System Status: Billing Log



The following table describes the labels in this screen.

Table 63 System Status: Billing Log

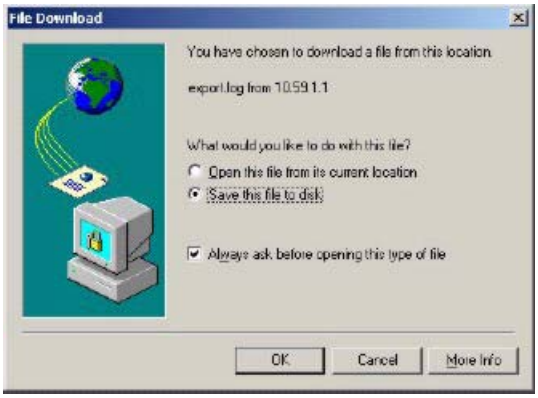
LABEL	DESCRIPTION
Refresh	Click **Refresh** to update the screen.
Export to Txt File	Click **Export to File** to back the billing logs. Refer to Section 24.8.1 "Billing Logs Backup" on page 185 for instructions.
Clear Log	Click **Clear Log** to clear all log entries.
No	This field displays the index number of the entry.
Username/ Location	This field displays the user name or the room number (for **Dynamic**, **PMS** or **Static** accounts only).
Billing Profile	This field displays the name of the billing profile an account is using.
Log Time	This field displays the time the subscriber logged in using the account.
Usage Time	This field displays the time period allocated for an account.
Bill	This field displays the amount of money charged for the time unit(s) purchased.
Charge from	This field displays the type of the account billing (**Accounting**, **Dynamic** or **PMS**).
GO .. Page	Select a page number from the drop-down list box to display the selected page.
First	Click **First** to go to the first page.
Previous	Click **Previous** to return to the previous page.
Next	Click **Next** to go to the next page.
End	Click **End** to go to the last page.

24.8.1 Billing Logs Backup

Follow the steps below to back up billing logs to a computer.

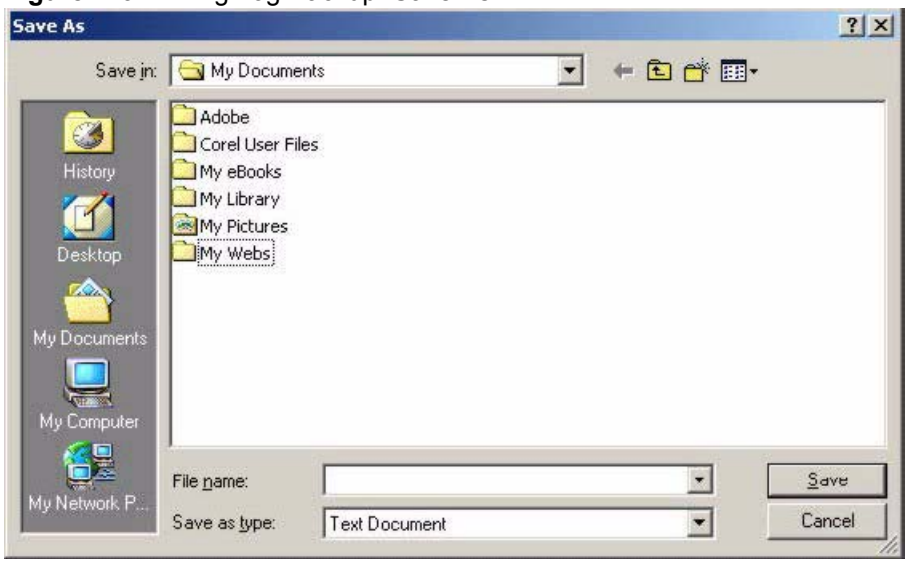
1 In the **Billing Log** screen, click the **Export to Txt File** link. A **File Download** screen displays.

Figure 118 Billing Log Backup: File Download



2 Select **Save this file to disk** and click **OK**. A **Save As** window displays.

Figure 119 Billing Log Backup: Save As



3 Specify the file name and/or location and click **Save** to start the backup process.

To view the billing logs, open the log file using any text editor. The following figure shows an example.

Figure 120 Billing Log Backup: Example File Content

```
[Billing Log Profile]
NO. Username/Location BillingProfile Log Time Usage Time Bill Charge from Status
1    Cindy  Profile 1 2004/10/22 12:00:28 1 day(s) 10.00 Static In-Use
2    Cindy  Profile 1 2004/10/22 13:03:59 1 day(s) 10.00 Static In-Use
3   bwh2y936  Profile 1 2004/10/21 11:53:06 1 day(s) 10.00 Dynamic Expired
```

24.9 PMS Transaction

This screen is applicable when account billing is done using a PMS.

To display transaction messages between the VSG and PMS, click **System Status** and **PMS Transaction**.

Figure 121 System Status: PMS Transaction Log

24.10 Static Route Table

You can view the list of static routes configured in the **Static Route Table** screen.

Click **System Status** and **Static Routing Table** to display the screen.

Figure 122 System Status: Static Route Table

Static Route Table				
No.	Destination IP Address	Destination Subnet Mask	Gateway IP Address	Hop Count
1	1.1.1.1	255.255.255.0	1.1.12.1	1

The following table describes the labels in this screen.

Table 64 System Status: Static Route Table

LABEL	DESCRIPTION
Static Route Table	This table displays the static routes configured.
No.	This field displays the index number.
Destination IP Address	This field displays the IP address of the final destination.
Destination Subnet Mask	This field displays the subnet mask of the final destination.
Gateway IP Address	This field displays the IP address of the gateway device.
Hop Count	This field displays the "cost" of this static route.

CHAPTER 25
Secure Socket Layer

This chapter shows you how to setup and enable Secure Socket Layer (SSL) security on the VSG.

25.1 About SSL

SSL (Secure Socket Layer) security is a standard Internet protocol for secure communications that uses a combination of certificate-based authentication and public-key encryption. SSL protects data transfer between the web configurator on the VSG and the web browser on a connected computer.

With SSL security activated, data (such as user name and password) transferred between the VSG and the computer is protected when you access the VSG using a web browser that supports SSL.

25.1.1 Certificate

A digital certificate (also referred to as a certificate) contains the key owner's name and public key, the name of the issuing certification authority, the certification authority's digital signature and a certificate validity time limit and other optional information fields.

25.1.2 Certificate Authorities

A Certification Authority (CA) issues digital certificates and guarantees the identity of the certificate owner. When someone requests a certificate from a CA, the CA requires proof of identity. There are both commercial certificate authorities like CyberTrust and VeriSign, as well as government certificate authorities.

25.2 Downloading SSL Certificate to the VSG

After you apply for and receive a certificate from a certificate authority, import the certificate and the private key to the VSG.

Click **System Tools** and **SSL Certificate** in the navigation panel to display the screen as shown next.

Figure 123 SSL Certificate Download

The following table describes the labels in this screen.

Table 65 SSL Certificate Download

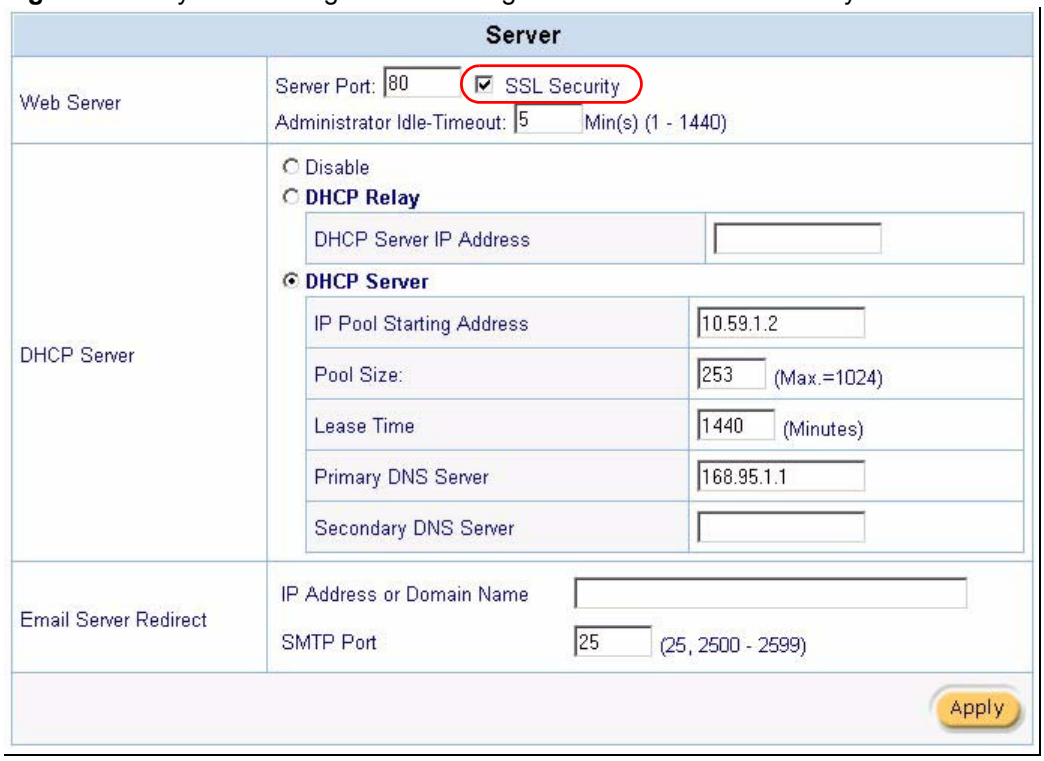
LABEL	DESCRIPTION
Password	Enter the secret password you used when applying for the certificate. **Note:** This password must be the same as the one you entered at the CA's site when creating a certificate.
Certificate File	Specify the certificate sent to you by a CA.
Private Key File	Specify the file that holds the private key.
Apply	Click **Apply** to start the file transfer process.

25.3 Activating SSL Security

Follow the steps below to activate the SSL security in the VSG.

1 Click **System Setting**, **Servers** in the navigation panel and select the **SSL Security** check box in the **Web Server** field.

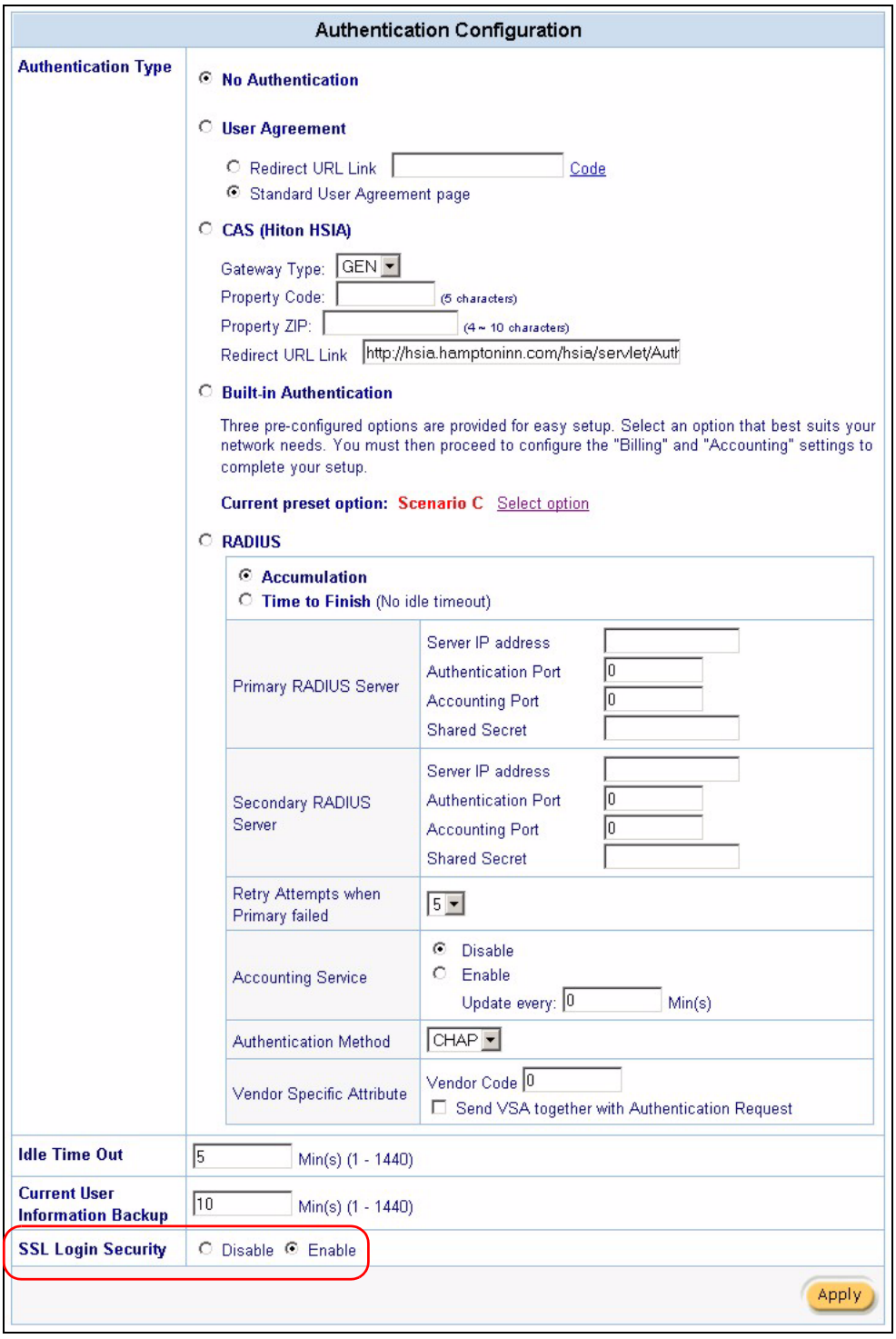
Figure 124 System Setting: Server Configuration: Enable SSL Security



2 Click **Apply** to save the changes and restart the VSG when prompted.

3 Click **Authentication** in the **Configuration Menu** panel and select **Enable** in the **SSL Login Security** field

Figure 125 System Setting: Authentication: Activate SSL Login



4 Click **Apply** to save the changes and restart the VSG when prompted.

25.4 Installing SSL Certificate on a Computer

After you enable and activate the SSL login security on the VSG, you can access the VSG through a secure connection.

Follow the steps below to view and install the default SSL security certificate on a computer.

1 Access the VSG. A **Security Alert** window displays. Click **OK** to continue and close the window.

Figure 126 Installing the SSL Security Certificate: First Security Alert

2 A second **Security Alert** window displays.

Figure 127 Installing the SSL Security Certificate: Second Security Alert

3 Click **View Certificate** to display the **Certificate** window as shown. Notice the warning about the untrusted certificate.

Figure 128 Installing the SSL Security Certificate: View Certificate

4 Click **Install Certificate** to install the certificate to your computer. A **Certificate Import Wizard** window displays. Click **Next**.

Figure 129 Installing the SSL Security Certificate: Certificate Import Wizard

5 Accept the default or specify the location to store the certificate. Click **Next**.

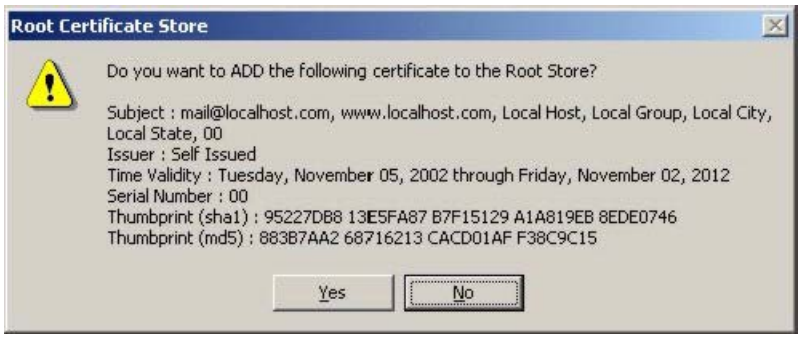
Figure 130 Certificate Import Wizard: Location

6 Click **Finish** to import the certificate.

Figure 131 Certificate Import Wizard: Finish

7 A **Root Certificate Store** window displays as shown. Click **Yes** to store the certificate to the computer.

Figure 132 Root Certificate Store



8 When the certificate is saved successfully, a **Certificate Import Wizard** window displays. Click **OK**.

Figure 133 Certificate Import Wizard

9 A **Certificate** window displays the detailed information. Notice that the certificate is now trusted.

Figure 134 Certificate: Detailed Information

10 Click **OK** in the **Certificate** window to return to the **Security Alert** window as shown. Notice that the first item in the list changed to inform you that the certificate is from a trusted host. Click **Yes** to proceed to the login screen in secure mode.

Figure 135 Security Alert: Trusted

Note: Once you are logged in with SSL security, the URL starts with "https:// " instead of "http://".

CHAPTER 26
The SMT

This chapter introduces the SMT (System Management Terminal), describes how to access the SMT and provides an overview of its menus.

26.1 Introduction to the SMT

The System Management Terminal (SMT) is a menu – driven interface that you use to configure the VSG. Access the SMT using the console port.

Note: You can connect the CONSOLE port on the VSG directly to a computer serial port or to a statement printer (also known as an account generator printer).
Note: Make sure the CONSOLE port is set to the correct mode. Refer to Chapter 3, "The Web Configurator," on page 41 on system settings using the web configurator.

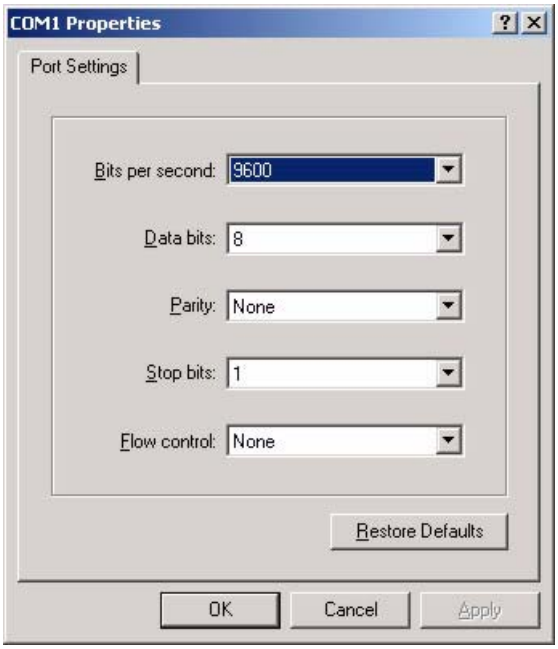
Use the SMT to set general system settings and upgrade firmware. For advanced configuration, use the embedded web configurator (refer to the corresponding chapters on configuration using the web configuration).

26.1.1 Establishing a Console Port Connection

After the VSG is directly connected to a computer using the console port, turn on the computer and run a terminal emulation program (for example, Hyper Terminal in Windows) and configure its communication parameters as follows:

- 9600 bits per second.
- Parity none
- 8 data bits
- 1 stop bit
- flow-control none.

Figure 136 HyperTerminal Communication Parameter Settings Example



26.2 SMT Login Screen

Press [ENTER] to display the login screen. For your first login, enter the default administrator user name "admin" and default password "1234" and then press [ENTER].

Note: The user name and password are case sensitive.

Figure 137 SMT: Login Screen

```
                              VSG-1200

      (c) 2003 ZyXEL Communications Corporation. All Rights Reserved.

                             Version 1.08


                Username:

                Password:
```

Note: The VSG automatically logs you out after five minutes of inactivity. Simply log back into the VSG if this happens.

26.3 The SMT Main Menu Summary

The SMT main menu is shown next.

Figure 138 SMT: Main Menu

```
                                Main Menu


                          1)System Configuration
                          2)Wan Configuration
                          3)Lan Configuration
                          4)System Status
                          5)Utilities
                          6)Restart
                          7)Logout
                          8)Factory Defaults



                          Enter selection:

Enter a numeric between 1 and 8.
```

The following table describes the menu choices in this screen.

Table 66 SMT: Main Menu

NUMBER	MENU TITLE	FUNCTION
1	System Configuration	Use this menu to set up general system setup.
2	WAN Configuration	Use this menu to configure the WAN port.
3	LAN Configuration	Use this menu to configure the LAN port.
4	System Status	Use this menu to view the current configuration of the VSG.
5	Utilities	Use this menu to perform firmware upgrades and change the login password.
6	Restart	Use this menu to restart your VSG.
7	Logout	Use this menu to log out of the SMT.
8	Factory Defaults	Use this menu to reset the VSG back to the factory default settings.

26.4 Navigating the SMT Interface

Familiarize yourself with the SMT operations before you attempt to modify the configuration.

26.4.1 The Navigation Keys

The following table describes the keystrokes that you use in the SMT screens.

Table 67 SMT: Control Key Descriptions

KEY	DESCRIPTION
[ENTER]	To go to the selected menu.
[ESC]	Press [ESC] and enter **Y** to discard any changes and return to the previous screen.
[TAB]	To move to the next configuration field.
[SPACE]	To toggle between field choices.

26.5 General System Setup

The **System Configuration** menu contains administrative and system-related information.

From the **Main Menu** screen, type 1 and press [ENTER] to display the **System Configuration** menu as shown below.

Figure 139 SMT: System Configuration

```
                          System Configuration
System Name               :
Doamin Name               :
Console Port Speed        :9600
Web Server Port           :80
E-Mail Server Redirect    :
```

The following table describes the fields in this menu.

Table 68 SMT: System Configuration

FIELD	DESCRIPTION
System Name	Enter a descriptive name (up to 32 characters) for identification purposes.
Domain Name	Enter the domain name (if you know it) here. If you leave this field blank, the VSG may obtain a domain name from a DHCP server. The domain name you entered is given priority over the DHCP server assigned domain name.
Console Port Speed	Enter 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, or 115200 to set the console port speed. The default setting is 9600. **Note:** If you change the console port speed, make sure you also make the same change to the terminal emulator software.

Table 68 SMT: System Configuration (continued)

FIELD	DESCRIPTION
Web Server Port	Specify the port number of the embedded web server on the VSG to access the web configurator. The default port number is 80. Enter a number between 8010 and 8060 to access the web configurator behind a NAT-enabled network. If you enter a number between 8010 and 8060, you need to append the port number to the WAN or LAN port IP address to access the web configurator. For example, if you enter "8010" as the web server port number, then you must enter "http://www.192.168.1.1:8010" where 192.168.1.1 is the WAN or LAN port IP address.
E-mail Server Redirect	Enter the IP address or domain name of the e-mail server to which the VSG forwards e-mail. This field should be configured if the e-mail server is behind a firewall or on a NAT-enabled network.
At the "S)ave and return R)eturn without saving M)odify:" prompt, type S and press [ENTER] to save the changes and return to the previous screen, type R and press [ENTER] to discard all changes and return to the previous screen or type M and press [ENTER] to continue configuring the fields. Restart the device when prompted Press [ESC] and enter Y to stop any actions in the current screen and return to the previous screen. All changes will be discarded.	

26.6 Changing the System Password

Note: It is recommended you change the default system password.

Follow the steps below to change the system password.

1. In the main menu, type 5 and press [ENTER] to display the **Utilities** menu.
2. In the **Utilities** menu, type 2 and press [ENTER]. The **Change Administrator Password** menu displays.

Figure 140 SMT: Change Administrator Password

```
                    Change Administrator Password


                Enter the old password  :

                Enter the new password  :

                Confirm the new password:
```

3. Type your current system password in the **Enter the old password** field, and press [ENTER].

4 Type your new system password in the **Enter the new password** field, and press [ENTER].

5 Re-type your new system password in the **Confirm the new password** field for confirmation and press [ENTER].

6 Save the settings.

Note: Note that as you type a password, the screen displays an asterisk "*" for each character you type.

26.7 Restarting the VSG

Follow the steps below to restart the VSG.

1 In the main menu, type 6 and press [ENTER]. A screen displays prompting you to confirm.

Figure 141 SMT: Restart

```
Restart System (Y/N)?
```

2 Type **Y** and press [ENTER] to restart the VSG. Otherwise, type **N** and press [ENTER] to cancel the action and return to the main menu.

26.8 Reset the VSG to Factory Defaults

If you forgot your administrator login user name and password, you have to use the **RESET** button to reset the VSG back to the factory defaults. Refer to Chapter 2, "Hardware Installation and Connection," on page 35.

Resetting the VSG restores all system configuration back to the factory defaults. However, you may retain the subscriber account information.

Note: All system settings will be lost once you reset to the default settings.
Note: Press [ESC] to return to the Main Menu screen.

Follow the steps below to reset the VSG back to the factory defaults.

1 In the main menu, type 8 and press [ENTER]. A screen displays prompting you to confirm.

2 Type **Y** and press [ENTER] to reset the VSG.

3 Type **Y** and press [ENTER] to retain the subscriber account information in the local subscriber database.Type **N** and press [ENTER] to delete all subscriber account information.

4 Press [ENTER] to reset the VSG. The VSG automatically restarts.

Figure 142 SMT: Reset to Factory Defaults

```
Change to factory defaults and the system will be restarted!
                        Are you sure(Y/N)?
```

CHAPTER 27
LAN and WAN Setup Using the SMT

This chapter shows you how to configure the LAN and WAN settings on the VSG.

27.1 LAN and WAN Overview

Refer to Chapter 4, "LAN, WAN and Server Setup," on page 53 for more information.

27.2 WAN Configuration

From the main menu, type 1 and press [ENTER] to display the **System Configuration** menu. The **WAN Configuration** menu varies depending on the selection in the **WAN Type** field.

27.2.1 Using a Static/Dynamic WAN IP Address

You can set the VSG to use a static (fixed) or dynamic IP address.

Figure 143 SMT: WAN Configuration: Static or Dynamic IP Address

```
                          WAN Configuration
WAN Type? (D/S/P/T)       :S
    IP Address            :192.168.1.1
    Subnet Mask           :255.255.255.0
    Gateway               :192.168.1.254
    Primary DNS Server    :168.95.1.1
    Secondary DNS Server  :
```

The follow table describes the fields in this menu.

Table 69 SMT: WAN Configuration: Static or Dynamic IP Address

FIELD	DESCRIPTION
WAN Type? (D/S/P/T)	Enter **D** (Dynamic) to set the VSG to dynamically obtain an IP address and other network information (IP address, DNS information etc.) from a DHCP server on the WAN network. This is the default setting. Enter **S** (Static) to set the VSG to use a static (or fixed) IP address. Then set the following fields.
IP Address	This field is available when you select **S** in the **WAN Mode** field. Enter the static IP address assigned to you by your ISP or network administrator.
Subnet Mask	This field is available when you select **D** in the **WAN Mode** field. Enter the subnet mask depending on your network needs. The default is **255.255.255.0**. Refer to Appendix H, "IP Subnetting," on page 265 if you are implementing subnetting.
Default Gateway	Enter the IP address of the default gateway.
Primary/ Secondary DNS IP Address	Enter the IP address of the DNS server(s) in the **Primary DNS IP Address** and/or **Secondary DNS IP Address** fields. The default primary DNS server IP address is **168.95.1.1**. You *must* specify a DNS server if you set the VSG to use a static WAN IP address.
At the "S)ave and return R)eturn without saving M)odify:" prompt, type S and press [ENTER] to save the changes and return to the previous screen, type R and press [ENTER] to discard all changes and return to the previous screen or type M and press [ENTER] to continue configuring the fields. Restart the device when prompted Press [ESC] and enter Y to stop any actions in the current screen and return to the previous screen. All changes will be discarded.	

27.2.2 PPPoE Support

To activate PPPoE support on the VSG, enter **P** in the **WAN Type** field to display the **WAN Configuration** screen as shown next. Refer to the related web configurator section for background information.

Figure 144 SMT: WAN Configuration: PPPoE

```
                          WAN Configuration
WAN Type? (D/S/P/T)       :P
    Username              :
    Password              :
  Connect Setting? (C/K)  :C
    Max idle Time(Min)    :10
  Optional Setting
    Service name          :
    PPP MTU Setting       :1492
    TCP MSS setting       :1452
```

The following table describes the PPPoE related fields in this menu.

Table 70 SMT: WAN Configuration: PPPoE

FIELD	DESCRIPTION
WAN Type? (D/S/P/T)	Enter **P** to enable PPPoE support.
Username	Enter the login user name assigned to you by your ISP.
Password	Enter the password associated with the user name above.
Connect Setting? (C/K)	Enter **C** (Connect on demand) when you don't want the connection up all the time and specify an idle time-out in the **Max. Idle Timeout Setting** field. This is the default selection. Enter **K** (Keep alive) when you want your connection up all the time and specify the redial time in the **Redial Period** field to set how long the VSG waits before trying to bring up the connection automatically if it is disconnected.
Redial Period (Sec)	The field is only visible when you select **K** in the **Connect Setting** field. Type the time in seconds that elapses before the VSG automatically attempts to reconnect to the PPPoE server. The default is **30** seconds.
Max Idle Time (Min)	This field is only visible when you select **C** in the **Connect Setting** field. Type the time in minutes that elapses before the VSG automatically disconnects from the PPPoE server. The default is **10** minutes.
Optional Setting	
Service Name	Enter the name of your Internet service provider.
PPP MTU Setting	Enter the size of a Maximum Transmission Unit (MTU).
TCP MSS Setting	Enter the size of the Maximum Segment Size (MSS).
At the "S)ave and return R)eturn without saving M)odify:" prompt, type S and press [ENTER] to save the changes and return to the previous screen, type R and press [ENTER] to discard all changes and return to the previous screen or type M and press [ENTER] to continue configuring the fields. Restart the device when prompted Press [ESC] and enter Y to stop any actions in the current screen and return to the previous screen. All changes will be discarded.	

27.2.3 PPTP Support

To activate PPTP support on the VSG, enter **T** in the **WAN Type** field to display the **WAN Configuration** screen as shown next. Refer to the related web configurator section for background information.

Figure 145 SMT: WAN Configuration: PPTP

```
                              WAN Configuration
WAN Type? (D/S/P/T)          :T
    Local IP Address         :
    Local Subnet Mask        :
    Gateway IP Address       :
    Server IP Address        :
    Username                 :
    Password                 :
  Connect Setting? (C/K)     :C
    Max idle Time(Min)       :10
  Optional Setting
    Connection ID/Name       :
    PPP MTU Setting          :1460
    TCP MSS setting          :1400
```

The following table describes the PPTP-related fields in this menu.

Table 71 SMT: WAN Configuration: PPTP

FIELD	DESCRIPTION
WAN Type? (D/S/P/T)	Enter **T** to enable PPTP support.
Local IP Address	Enter the (static) IP address assigned to you by your ISP for the WAN interface.
Local Subnet Mask	Enter the subnet mask assigned to you by your ISP (if given) for the WAN interface.
Gateway IP Address	Type the IP address of the gateway device (if given).
Server IP Address	Enter the IP address of the PPTP server.
Username	Enter the login user name assigned to you by your ISP.
Password	Enter the password associated with the user name above.
Connect Setting? (C/K)	Enter **C** (Connect on demand) when you don't want the connection up all the time and specify an idle time-out in the **Max. Idle Timeout Setting** field. This is the default selection. Enter **K** (Keep alive) when you want your connection up all the time and specify the redial time in the **Redial Period** field to set how long the VSG waits before trying to bring up the connection automatically if it is disconnected.
Redial Period (Sec)	The field is only visible when you select **K** in the **Connect Setting** field. Type the time in seconds that elapses before the VSG automatically attempts to reconnect to the PPTP server. The default is **30** seconds.
Max Idle Time Setting	This field is only visible when you select **C** in the **Connect Setting** field. Type the time in minutes that elapses before the VSG automatically disconnects from the PPTP server. The default is **10** minutes.
Optional Setting	
Connection ID/ Name	If your ISP has provided a connection ID name, enter it in this field exactly as provided.
PPP MTU Setting	Enter the size of a Maximum Transmission Unit (MTU).

Table 71 SMT: WAN Configuration: PPTP (continued)

FIELD	DESCRIPTION
TCP MSS Setting	Enter the size of the Maximum Segment Size (MSS).
At the "S)ave and return R)eturn without saving M)odify:" prompt, type S and press [ENTER] to save the changes and return to the previous screen, type R and press [ENTER] to discard all changes and return to the previous screen or type M and press [ENTER] to continue configuring the fields. Restart the device when prompted Press [ESC] and enter Y to stop any actions in the current screen and return to the previous screen. All changes will be discarded.	

27.3 LAN Configuration

From the **Main Menu** screen, enter 3 to display the **LAN Configuration** menu as shown next.

Figure 146 SMT: LAN Configuration

```
                          LAN Configuration
DHCP Configuration
DHCP Service? (D/R/S)     :S
Start IP Address(Private) :10.59.1.2
DHCP Pool Size  (Private) :20
Lease Time      (Private) :1440
Primary DNS IP Address    :168.95.1.1
Secondary DNS IP Address  :
```

The following table describes the fields in this menu.

Table 72 SMT: LAN Configuration

FIELD	DESCRIPTION
DHCP Service? (D/R/S)	Enter **D** (Disable) to deactivate DHCP services on the LAN. Ethernet devices connected to the LAN interface *must* use static IP addresses. Enter **R** (Relay) to set the VSG to forward network configuration requests to a DHCP server on the LAN network. Then configure the **Server IP Address** and **Agent IP Address** fields. Enter **S** (Server) to set the VSG to assign network information (IP address, DNS information etc.) to Ethernet device(s) connected to the **LAN** port. This is the default setting.
Start IP Address	This field is visible when you enter **S** in the **DHCP Service** field. Enter the first of the continuous addresses in the IP address pool. The default is **10.59.1.2**.
DHCP Pool Size	This field is visible when you enter **S** in the **DHCP Service** field. This field specifies the size or count of the IP address pool. Enter a number not greater than 1024. The default is **253**.
Lease Time	This field is visible when you enter **S** in the **DHCP Service** field. Specify the time (in minutes between 1 and 71582788) a DHCP client is allowed to use an assigned IP address. When the lease time expires, the DHCP client is given a new, unused IP address. The default is 1440 minutes.

Table 72 SMT: LAN Configuration (continued)

FIELD	DESCRIPTION
Relay Server IP Address	This field is only visible when you enter **R** in the **DHCP Service** field. If the VSG is set to function as a DHCP relay, enter the IP address of the DHCP server.
Primary/ Secondary DNS IP Address	These fields are visible when you enter **S** in the **DHCP Service** field. Enter the IP address of the DNS server(s) in the **Primary DNS IP Address** and/or **Secondary DNS IP Address** fields. You *must* specify a DNS server.
At the "S)ave and return R)eturn without saving M)odify:" prompt, type S and press [ENTER] to save the changes and return to the previous screen, type R and press [ENTER] to discard all changes and return to the previous screen or type M and press [ENTER] to continue configuring the fields. Restart the device when prompted Press [ESC] and enter Y to stop any actions in the current screen and return to the previous screen. All changes will be discarded.	

27.4 View Current Configuration

From the main menu, enter 4 and press [ENTER] to display the **System Status** menu as shown next.

Figure 147 SMT: System Status

```
                              System Status
  System Name               :
  Doamin Name               :
  Console Port Speed        :9600
  Web Server Port           :80
  E-Mail Server Redirect    :
WAN Configuration
  WAN Type? (D/S/P/T)       :Static IP
      IP Address            :192.168.1.1
      Subnet Mask           :255.255.255.0
      Gateway               :192.168.1.254
      Primary DNS Server    :168.95.1.1
      Secondary DNS Server  :
DHCP Configuration
  DHCP Service? (D/R/S)     :Server
  Start IP Address          :10.59.1.2
  DHCP Pool Size            :253
  Lease Time                :1440
  Primary DNS IP Address    :168.95.1.1
  Secondary DNS IP Address  :


Press any key to return.
```

The following table describes the fields in this screen.

Table 73 SMT: System Status

FIELD	DESCRIPTION
System Name	This field displays the name of the VSG for identification purposes.
Domain Name	This field displays the domain name.
Console Port Speed	This field displays the console port speed (**1200**, **2400**, **4800**, **9600**, **14400**, **19200**, **38400**, **57600**, or **115200**).
Web Server Port	This field displays the port number for the embedded web server. If the port number is not **80**, then you need to append the port number to the **WAN** port IP address to access the VSG web configurator. For example, if 8010 is the web server port number, then you must enter "http://www.192.168.1.1:8010" in the address bar on the web browser where 192.168.1.1 is the WAN or LAN port IP address.
E-mail Server IP Address	This field displays the IP address of the e-mail server to which the VSG forwards the e-mail when the subscriber's e-mail server(s) is behind a NAT-enabled network or firewall.
WAN Configuration	
WAN Type? (D/S/P/T)	This field displays the WAN IP address assignment method (**Static IP Setting** or **DHCP Client**).
IP Address	This field displays the WAN IP address of the VSG.
Subnet Mask	This field displays the subnet mask on the WAN port.
Gateway	This field displays the IP address of the default gateway.
Primary DNS Server	This field displays the IP address of the primary DNS server.
Secondary DNS Server	This field displays the IP address of the secondary DNS server.
DHCP Configuration	
DHCP Service? (D/R/S)	This field displays the DHCP mode (**Server**, **Relay** or **Disable**) on the LAN port.
Start IP Address	This field is visible when the **DHCP Service** field is **Server**. This field displays the first of the contiguous addresses in the IP address pool.
DHCP Pool Size	This field is visible when the **DHCP Service** field is **Server**. This field displays the size of the DHCP client pool.
Lease Time	This field is visible when the **DHCP Service** field is **Server**. This field displays for how many minutes a DHCP client is allowed to use an assigned IP address.
Agent Server IP Address	This field is visible when the **DHCP Service** field displays **Relay**. This field displays the IP address of the DHCP relay agent.
Primary/ Secondary DNS IP Address	These fields are visible when the **DHCP Service** field is **Server**. These two fields display the IP address(es) of the DNS server(s).
Press any key at the "Press any to return" prompt to go back to the previous screen.	

CHAPTER 28
Configuration and Firmware Maintenance

This chapter shows you how to maintain the firmware and configuration file.

Warning: Do not interrupt the file upload process as this may PERMANENTLY damage the device.

28.1 Filename Convention

The configuration file contains the factory default settings in the menus such as password, DHCP Setup, TCP/IP Setup, etc. Once you have customized the settings of the VSG, they can be saved back to your computer under a filename of your choosing.

The firmware or the configuration files do not have any filename conventions. There is not a specific file extension or filename conventions that you need to follow. Therefore, you can specify any name or file extension for the firmware and the configuration files.

However, it is recommended to use the ".bin" file extension for the firmware file and ".rom" for the configuration file for management purposes.

28.2 Firmware Upgrade

The following sections show you how to upgrade the firmware using the SMT and the web configurator.

28.2.1 Firmware Upgrade Using the Web Configurator

There are two ways to upgrade the firmware in the VSG: manually or scheduled.

To manually upgrade the firmware, you have to down the latest firmware from www.zyxel.com. With scheduled firmware upgrade, the VSG automatically checks for, downloads and upgrades the latest firmware every time interval specified.

The following figure shows the top links when you click **System Tools** and **Firmware**.

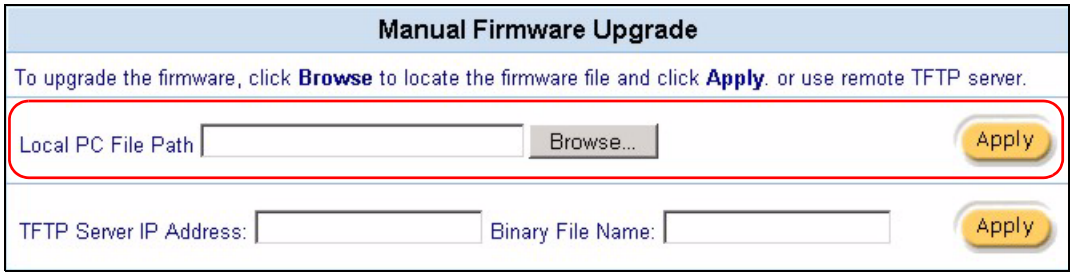
Figure 148 Firmware Upgrade: Links

28.2.1.1 Manual Firmware Upgrade

Follow the steps below to upgrade the firmware manually.

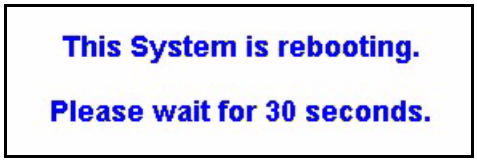
1. Download the latest firmware from www.zyxel.com to your computer. Unzip the file if it is zipped.
2. Access the web configurator. Refer to the section on accessing the web configurator for instructions.
3. Click **System Tools**, **Firmware** and the **Manual Firmware Upgrade** link to display the screen as shown.

Figure 149 Firmware Upgrade: Manual



4. Specify the firmware file name in the **Local PC File Path** field (or click **Browse** to locate it).
5. Click **Apply** to start the file transfer process.
6. When the file transfer is completed successfully, the following message displays and the VSG automatically restarts to complete the firmware upgrade process.

Figure 150 Web Configurator: Firmware Upgrade Successful



7. After the VSG finishes restarting, access the web configurator again. Check the firmware version number in the **System Status** screen.

28.2.1.2 Manual Firmware Upgrade via a TFTP Server

Follow the steps below to upload the firmware using the web configurator.

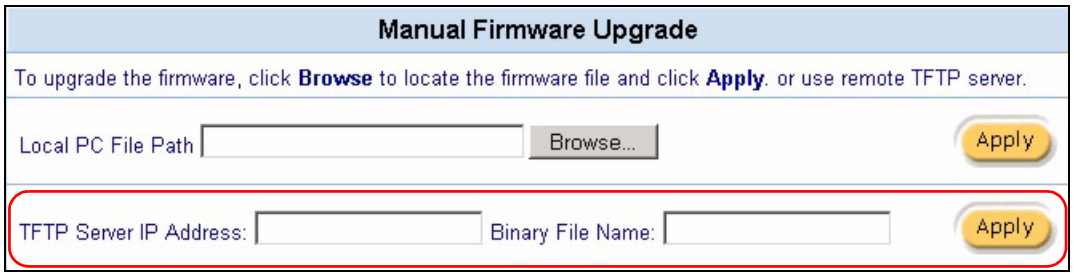
1. Download the latest firmware from www.zyxel.com and store it in a TFTP server. Unzip the file if it is zipped.

2 Run a TFTP server program and specify the location of the firmware file and the communication mode. Refer to the documentation that comes with your TFTP server program for instructions.

3 Access the web configurator. Refer to the section on accessing the web configurator for instructions.

4 Click **System Tools**, **Firmware** and the **Manual Firmware Upgrade** link to display the screen as shown.

Figure 151 Firmware Upgrade: Manual Using a TFTP Server



5 Specify the IP address of the TFTP server in the **TFTP Server IP Address** field.

6 Specify the name of the firmware file in the **Binary File Name** field.

7 Click **Apply** to start the file transfer process.

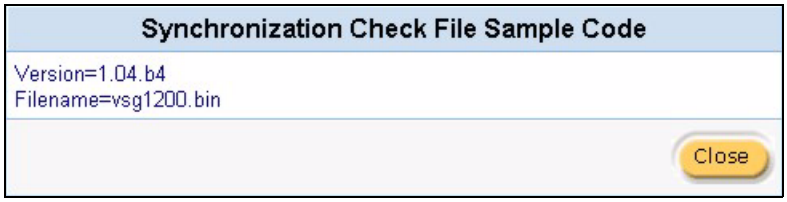
8 When the file transfer is completed successfully, the following message displays and the VSG automatically restarts to complete the firmware upgrade process.

9 After the VSG finishes restarting, access the web configurator again. Check the firmware version number in the **System Status** screen.

28.2.1.3 Scheduled Firmware Upgrade

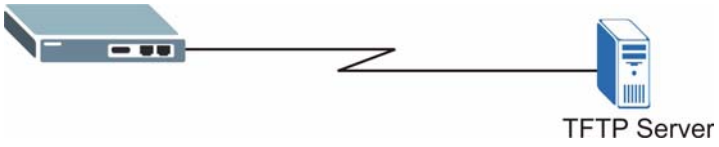
You can set the VSG to automatically check and download a new firmware from a TFTP server. This allows you to automate the firmware upgrade process if you have more than one VSG on your network. A synchronization file contains information on firmware version and filename. A sample synchronization file is shown next.

Figure 152 Synchronization File Example



You have to manually download the latest firmware from www.zyxel.com to the TFTP server and update the synchronization file.

Figure 153 Scheduled Firmware Upgrade Example



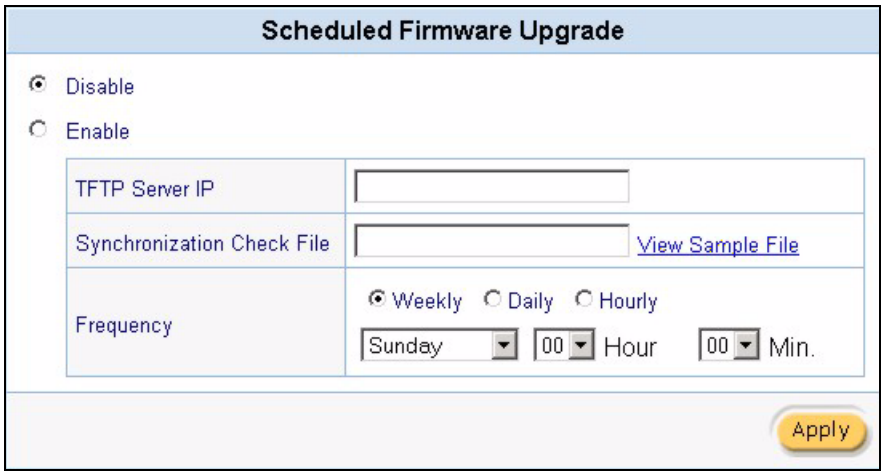
The following describes the automatic firmware upgrade process.

1. The VSG checks the synchronization file on the TFTP server for the firmware version number.
2. If the synchronization file has the latest firmware version number, VSG retrieves the latest firmware file as specified in the synchronization file.
3. VSG upgrades the firmware and restarts.

Note: During the firmware upgrade process, the VSG disconnects all subscriber Internet access. Subscribers need to log in again.

Click **System Tools**, **Firmware** and click the **Scheduled Firmware Upgrade** link to display the screen as shown next.

Figure 154 Firmware Upgrade: Scheduled



The following table describes the labels in this screen.

Table 74 Firmware Upgrade: Scheduled

LABEL	DESCRIPTION
Disable	Select **Disable** to de-activate scheduled firmware upgrade.
Enable	Select **Enable** to activate scheduled firmware upgrade. Then set the following fields.
TFTP Server IP	Enter the IP address of the TFTP server where the firmware resides.

Table 74 Firmware Upgrade: Scheduled (continued)

LABEL	DESCRIPTION
Synchronization Check File	A Synchronization Check file is a file containing the latest firmware filename and version number on the TFTP server. Click **View Sample File** to display an example. Enter the name of the check file.
Frequency	Set how often (**Weekly**, **Daily** or **Hourly**) you want to have the VSG check for new firmware and upgrade to new firmware if available (default **Weekly**). Then select the day (applies only when you select **Weekly**), the hour (applies when you select **Daily** or **Hourly**) and the minute that you want the VSG to do the check and upload.
Apply	Click **Apply** to save the changes.

28.2.2 Firmware Upgrade Using SMT

Note: You *must* run a TFTP server on a computer where a firmware file is stored to perform file upload.

Follow the steps below to configure the TFTP settings in the SMT. You *must* still have a WAN/LAN connection between the VSG and the TFTP server computer at the same time.

1. Connect the computer directly to the VSG through the console port. Refer to the section on establishing a console port connection for more information.
2. In the SMT main menu, type 5 and press [ENTER] to display the **Utilities Menu** screen.

Figure 155 SMT: Utilities Main Menu

```
                      Utilities Menu


                       1)Firmware Upgrade
                       2)Change Password
                       3)Return to Main Menu



                          Enter selection:

Enter a numeric between 1 and 3.
```

3. Type 1 and press [ENTER] to display the Firmware Upgrade screen.
4. Enter the IP address of the computer running the TFTP server in the TFTP Server IP Address field.
5. Specify the name of the firmware file in the Download Filename field.

Figure 156 SMT: Firmware Upgrade

```
                          Firmware Upgrade


                TFTP Server IP Address :172.21.4.72
                Download Filename      :VSG1200V108.bin




          E)xecute Download    R)eturn to Main Menu   M)odify
          Enter Selection:

Enter the command key and press enter.
```

6 Type **E** at the "Enter Selection:" prompt to get the firmware file from the TFTP server.

Figure 157 SMT: Firmware Upgrade Process

```
                          Firmware Upgrade


                TFTP Server IP Address :172.21.4.72
                Download Filename      :VSG1200V108.bin




          |---------+---------+---------+---------+---------|
          ***************************
```

7 When the file transfer is complete, the VSG automatically reboots. Wait until the VSG finishes rebooting before accessing the VSG again.

28.3 Configuration File Maintenance

You can only use the web configurator to perform configuration file backup and restore.

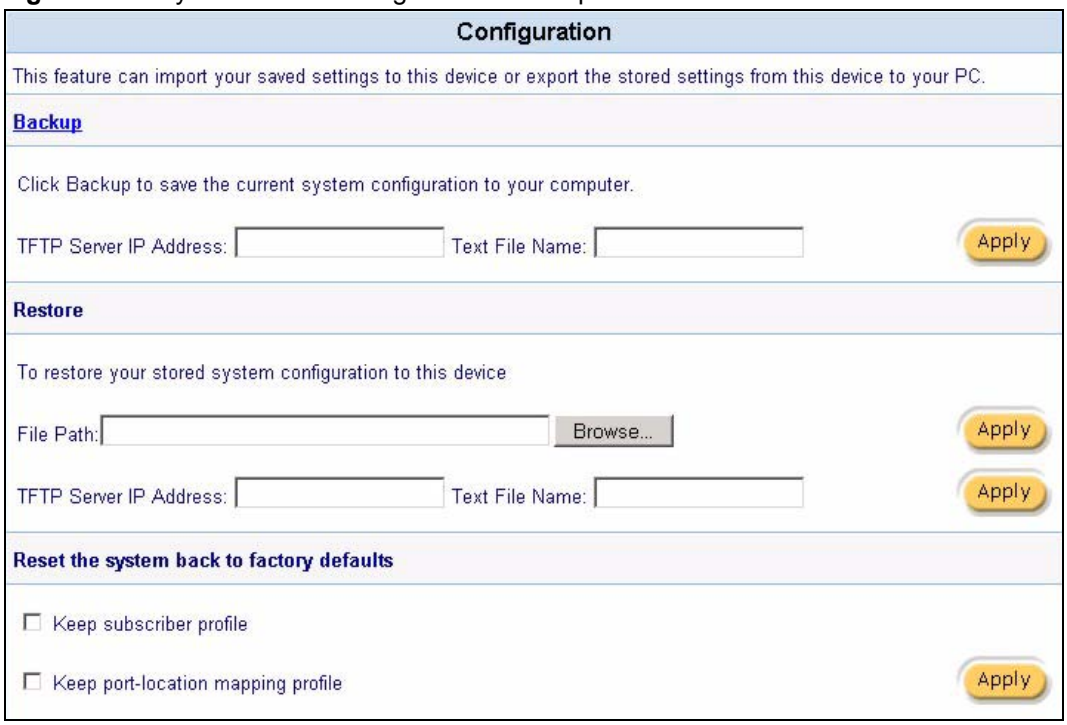
Warning: DO NOT INTERRUPT THE FILE TRANSFER PROCESS AS THIS MAY PERMANENTLY DAMAGE YOUR DEVICE.

28.3.1 Backup Configuration Using HTTP

Backup is highly recommended once your VSG is functioning properly.

1 Click **System Tools** and **Configuration**. A screen displays as shown next.

Figure 158 System Tools: Configuration: Backup

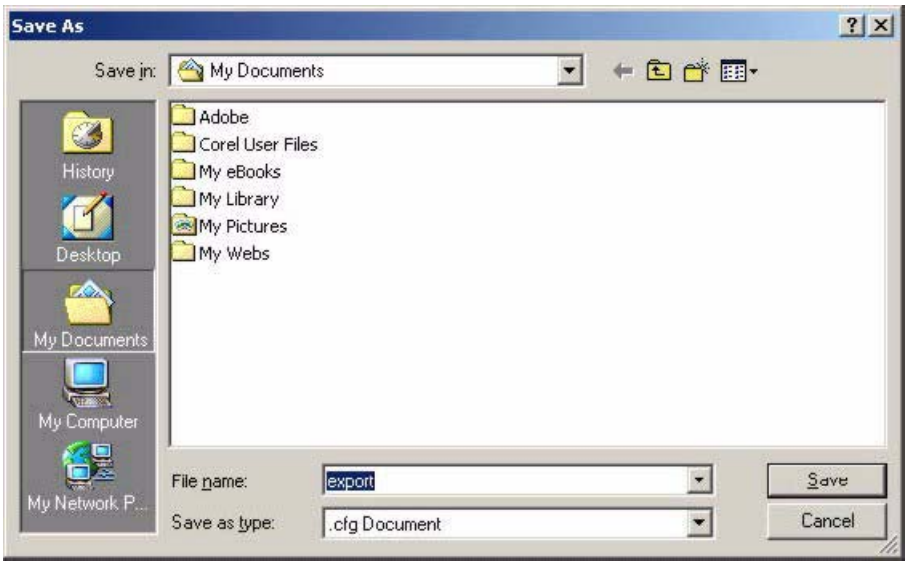


2 Click **Backup**. A **File Download** window displays as shown next.

Figure 159 Configuration Backup: File Download

3 Select **Save this file to disk** and click **OK**. A **Save As** window displays.

Figure 160 Configuration Backup: Save As



4 Specify the file name and/or location and click **Save** to start the backup process.

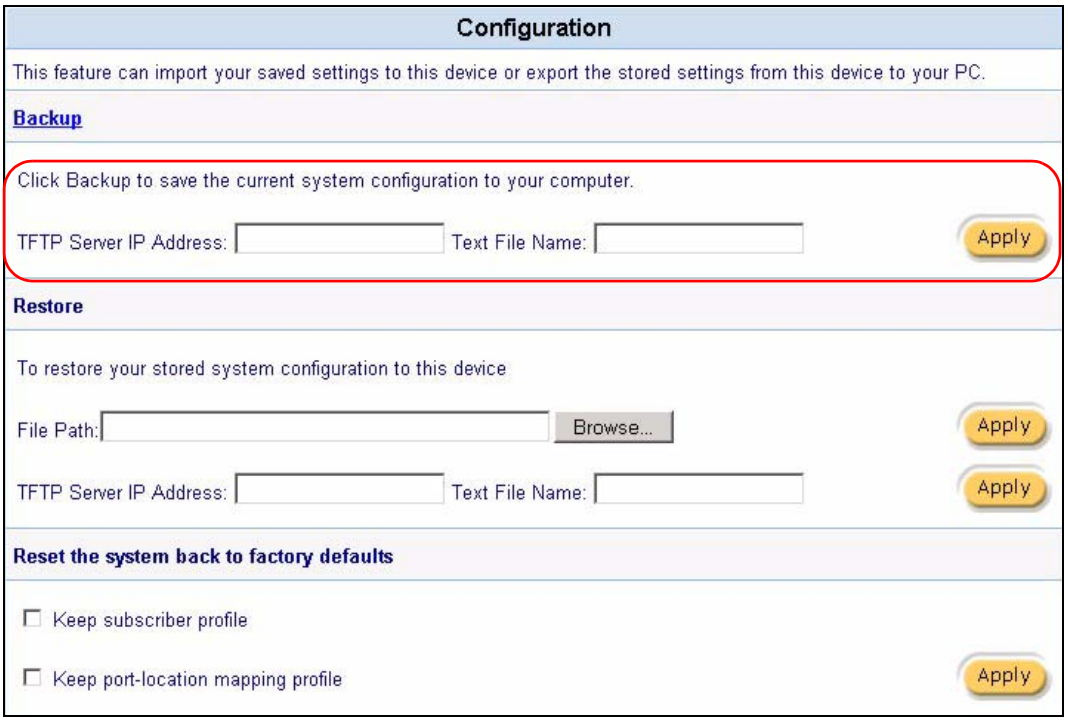
28.3.2 Backup Configuration Using TFTP

1 Click **System Tools** and **Configuration**. A screen displays as shown next.

2 In the **Backup** section, enter the IP address of the TFTP server in dotted decimal notation in the **TFTP Server IP Address** field.

3 Specify a file name for the configuration backup in the **Text File Name** field.

Figure 161 System Tools: Configuration: Backup using TFTP



4 Click **Apply**. When the file transfer process is complete, a screen displays as follows.

Figure 162 Configuration Backup: TFTP: Successful

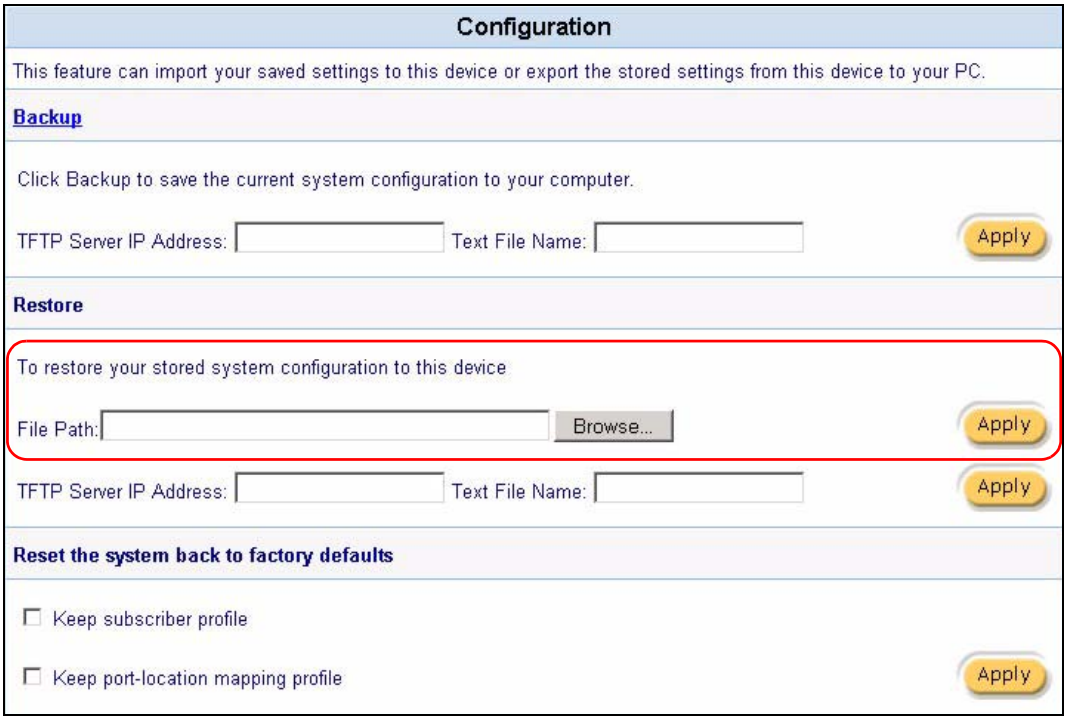
28.3.3 Restore Configuration Using HTTP

This section shows you how to restore a previously saved configuration.

Note: This function erases the current configuration before restoring a previous back up configuration; please do not attempt to restore unless you have a backup configuration file stored on disk.

1 Click **System Tools** and **Configuration**. A screen displays as shown next.

Figure 163 System Tools: Configuration: Restore



2 In the **Restore** section, specify the location and filename of a configuration file in the **File Path** field or click **Browse**.

3 Click **Apply** to start the configuration restore process. The VSG automatically restarts after the restoration process is complete.

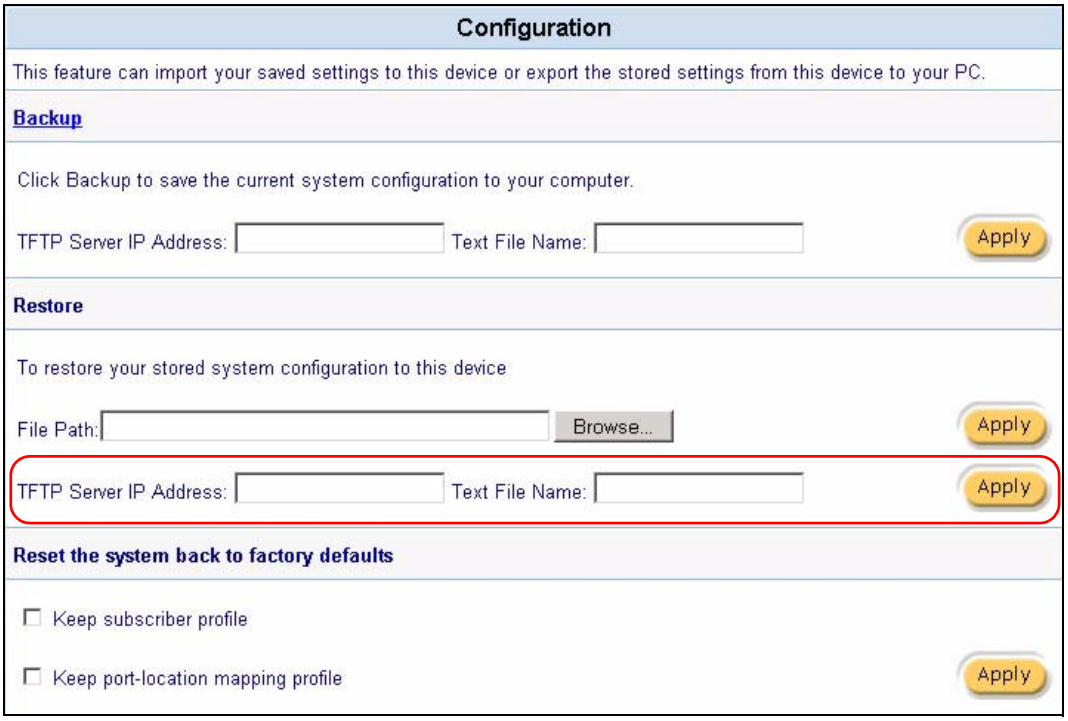
28.3.4 Restore Configuration Using TFTP

This section shows you how to restore a previously saved configuration.

Note: This function erases the current configuration before restoring a previous back up configuration; please do not attempt to restore unless you have a backup configuration file stored on disk.

1 Click **System Tools** and **Configuration**. A screen displays as shown next.

Figure 164 System Tools: Configuration: Restore: TFTP



2 In the **Restore** section, Enter the IP address of the TFTP server in dotted decimal notation in the **TFTP Server IP Address** field.

3 Specify a file name for the configuration backup in the **Text File Name** field.

4 Click **Apply** to start the configuration restore process. The VSG automatically restarts after the restoration process is complete.

CHAPTER 29
Troubleshooting

This chapter covers potential problems and possible remedies. After each problem description, some instructions are provided to help you to diagnose and to solve the problem.

29.1 Using the LEDs to Diagnose Problems

The LEDs are useful aides for finding possible problem causes.

29.1.1 The Power LED

The **PWR** LED on the front panel does not light up.

Table 75 Troubleshooting the Power LED

STEPS	CORRECTIVE ACTION
1	Check the connections from the VSG to the power source. Make sure you are using the supplied power cord and proper power supply. Refer to the appendix on product specifications.
2	Make sure the power source is turned on and that the VSG is receiving sufficient power.
3	If these steps fail to correct the problem, contact your local distributor for assistance.

29.1.2 The LAN Port LEDs

None of the LEDs for the LAN port(s) light up when connected to an Ethernet device.

Table 76 Troubleshooting the LAN LED

STEPS	CORRECTIVE ACTION
1	Make sure the Ethernet cable is properly connected to the LAN port.
2	Verify that the attached device(s) is turned on and properly connected to the VSG.
3	Verify that Ethernet cable length does not exceed 100 meters.
4	Make sure the network adapters are working on the attached devices.

29.1.3 The WAN Port LEDs

None of the LEDs for the WAN port light up when connected to an Ethernet device.

Table 77 Troubleshooting the WAN LED

STEP	CORRECTIVE ACTION
1	Verify that the attached device(s) is turned on and properly connected to the VSG.
2	Verify that Ethernet cable length does not exceed 100 meters.
3	Make sure the network adapters are working on the attached devices.

29.2 The Console Port

I cannot access the VSG through the console port.

Table 78 Troubleshooting Console Port

STEP	CORRECTIVE ACTION
1	Check to see if the VSG is connected to your computer using a console cable.
2	Check to see if the communications program is configured correctly. Set the communication parameters as stated here. • Emulation: auto detect • Baud Rate: 9600 bps • No Parity, 8 data bits, 1 stop bit • Flow Control: None
3	Make sure you entered the correct username and password. The default administrator username is "admin" and the default password is "1234". The username and password are case sensitive. If you have forgotten the administrator user name and/or password, you must reset the VSG back to the factory defaults using the reset button. Use a pointed object to press the reset button on the front panel to reset the VSG. All your custom configuration will be lost.

29.3 Web Configurator

I cannot access the web configurator.

Table 79 Troubleshooting Web Configurator

STEP	CORRECTIVE ACTION
1	Make sure you are using the correct WAN or LAN IP address.
2	Make sure you entered the correct username and password. The default administrator username is "admin" and the default password is "1234". The username and password are case-sensitive. If you change the server port number, you need to append the port number to the **WAN** or **LAN** port IP address to access the web configurator. For example, if you enter "8010" as the web server port number, then you must enter "http://www.192.168.1.1:8010" where 192.168.1.1 is the WAN or LAN port IP address. If you have forgotten the administrator user name and/or password, you must reset the VSG back to the factory defaults using the reset button. Use a pointed object to press the reset button on the front panel to reset the VSG. All your custom configuration will be lost.
3	Ping the VSG from your computer on the WAN or LAN.

The web configurator does not display properly.

Table 80 Troubleshooting Internet Browser Display

STEP	CORRECTIVE ACTION
1	Make sure you are using Internet Explorer (version 4.0 and later) or Netscape (version 6.0 or later) with JavaScript support enabled.
2	Delete the temporary web files and log in again. In Internet Explorer, click **Tools**, **Internet Options** and then click the **Delete Files ...** button. When a **Delete Files** window displays, select **Delete** all offline content and click **OK**. (Steps may vary depending on the version of your Internet browser.)

29.4 Internet Access

A subscriber cannot connect to the Internet through the VSG.

Table 81 Troubleshooting Internet Access

STEPS	CORRECTIVE ACTION
1	Check your Internet settings on your modem and/or router.
2	Make sure the subscriber enters the correct user name and password to log in to the VSG. The user name and password are case sensitive.
3	Make sure the account is still valid.
4	Make sure there is no conflict in IP address assignment. Refer to the appendix.

29.5 The Statement Printer

(This section is applicable when you purchase an external statement printer, also known as an account generator printer).

I cannot print account information using a statement printer.

Table 82 Troubleshooting the Statement Printer

STEP	CORRECTIVE ACTION
1	Make sure the statement printer is connected to a power source and is turned on.
2	Check that the statement printer is connected to the port labeled **Console**.
3	Make sure there is enough printing paper in the statement printer.
4	Check that you select **Account Generator Device** in the **Console Type** field in the **System** screen.
5	4 Make sure you configure and associate a billing profile for the first button in the **Dynamic Account Operator Panel** screen. The first button corresponds to the button on the statement printer.

Appendix A
Product Specifications

Table 83 Product Specifications: General

Standard	IEEE 802.3 10BASE-T Ethernet IEEE 802.3u 100BASE-TX Fast Ethernet
Interface	One 10/100 Ethernet WAN port (auto-crossover) Four 10/100 Ethernet LAN ports (auto-crossover) One RS232 serial port for console setting or an external statement printer One PMS RS232 serial port One reset button
Networking	Plug-and-play subscriber Internet access Supports 1024 simultaneous users NAT (RFC1631) LAN DHCP server (with client pool size of 1024) and DHCP relay HTTP proxy SMTP/DNS redirection WAN connection (static IP/DHCP client /PPPoE/PPTP) NAT for VPN (IPSec/PPTP)
Authentication, Authorization, and Accounting (AAA)	Web-based authentication RADIUS AAA Secondary RADIUS server Proprietary CAS (Central Authentication Service) Global roaming support Built-in Authentication and accounting Vendor Specific Attributes Static/Dynamic Accounting
Security	Port-based VLAN Layer 2 isolation VPN pass through (PPTP/ L2TP) SSL secure user login process SSL secure web-based administration Authorized remote management
Billing	Flexible, time-based billing Port-Location Mapping Credit card (via Authorize.net)
PMS Billing	Supports Micros Fidelio, Spectrum MK II, Marriott and Proprietary. PMS transaction logs Supports IEEE802.1q tag-based VLAN infrastructure
Local Services	Walled garden Advertisement URL link Login page re-direction Customized subscriber login page MAC/IP/URL passthrough

Table 84 Product Specifications: Performance and Management

Maximum Throughput	15.2Mbps
Concurrent Users	1,024
Management	Web-based management TFTP/HTTP firmware upgrade Schedules firmware upgrade Backup/Restore configuration Real-time status list Remote authorized management Configuration file import/export LAN device management Syslog Session trace SNMP v1/v2 (MIB II with traps)

Table 85 Product Specifications: Physical and Environmental

LED	Power ALARM WAN/LAN: 10/100, LK/ACT, FDX
Dimension	440(W) x 116(L) x 44(H) mm
Temperature	0ºC to 50ºC
Humidity	10% to 95% (non-condensing)
Power	Internal universal switching power supply 100-220 V AC, 50/60 Hz Maximum power consumption: 10W
Certifications	FCC part 15 Class A CE

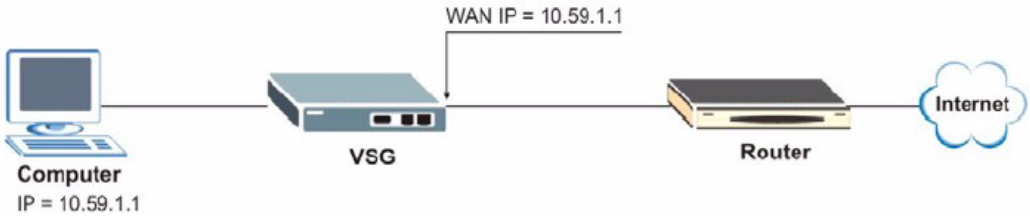
Appendix B
IP Address Assignment Conflicts

This appendix describes situations where IP address conflicts may occur. Subscribers with duplicate IP addresses will not be able to access the Internet.

Scenario 1: The VSG is using the same LAN and WAN IP addresses

The following figure shows an example where the VSG is using a WAN IP address that is the same as the IP address of a computer on the LAN.

Figure 165 IP Address Conflicts: Scenario 1



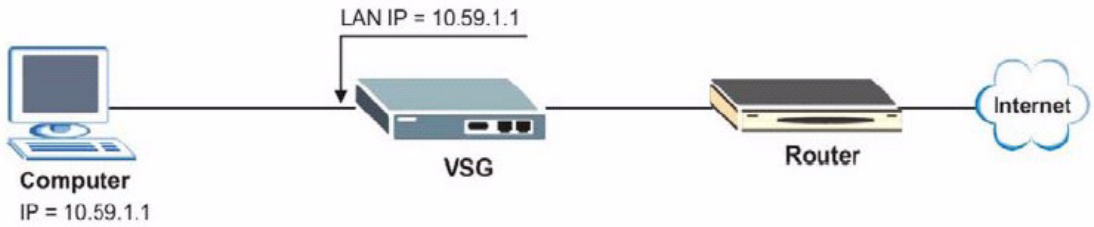
You must set the VSG to use different LAN and WAN IP addresses on different subnets if you enable DHCP server on the VSG. For example, you set the WAN IP address to 192.59.1.1 and the LAN IP address to 10.59.1.1.

Otherwise, It is recommended the VSG use a public WAN IP address.

Scenario 2: The VSG LAN IP address conflicts with the DHCP client IP address

In the following figure, the VSG is acting as a DHCP server. The VSG assigns an IP address, which is the same as its LAN port IP address, to a DHCP client attached to the LAN.

Figure 166 IP Address Conflicts: Scenario 2

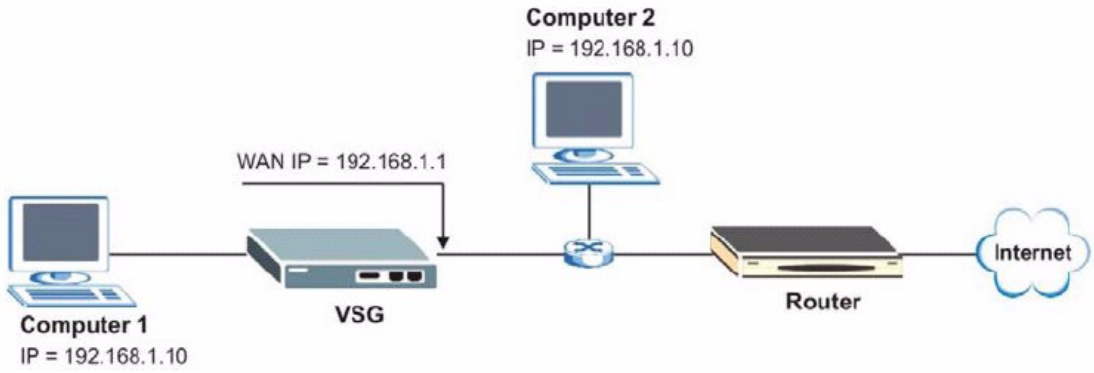


To solve this problem, make sure the VSG LAN IP address is not in the DHCP IP address pool.

Scenario 3: The Subscriber IP address is the same as the IP address of a network device

The following figure depicts an example where the subscriber IP address is the same as the IP address of a network device not attached to the VSG.

Figure 167 IP Address Conflicts: Scenario 3



You must set the VSG to use different LAN and WAN IP addresses on different subnets if you enable DHCP server on the VSG. For example, you set the WAN IP address to 192.59.1.1 and the LAN IP address to 10.59.1.1.

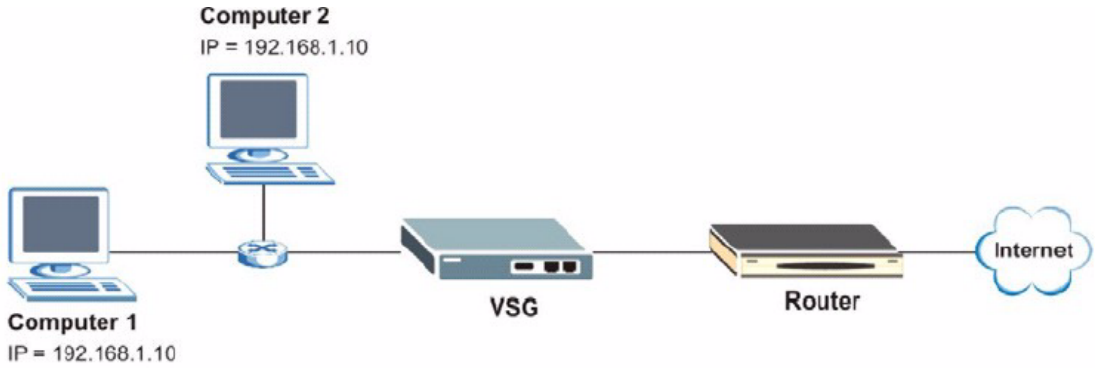
Otherwise, It is recommended the VSG use a public WAN IP address.

Scenario 4: Two or more subscribers have the same IP address.

By converting all private IP addresses to the WAN IP address, the VSG allows subscribers with different network configurations to access the Internet. However, there are situations where two or more subscribers are using the same private IP address. This may happen when a subscriber is configured to use a static (or fixed) IP address that is the same as the IP address the VSG DHCP server assigns to another subscriber acting as a DHCP client.

In this case, the subscribers are not able to access the Internet.

Figure 168 IP Address Conflicts: Scenario 4



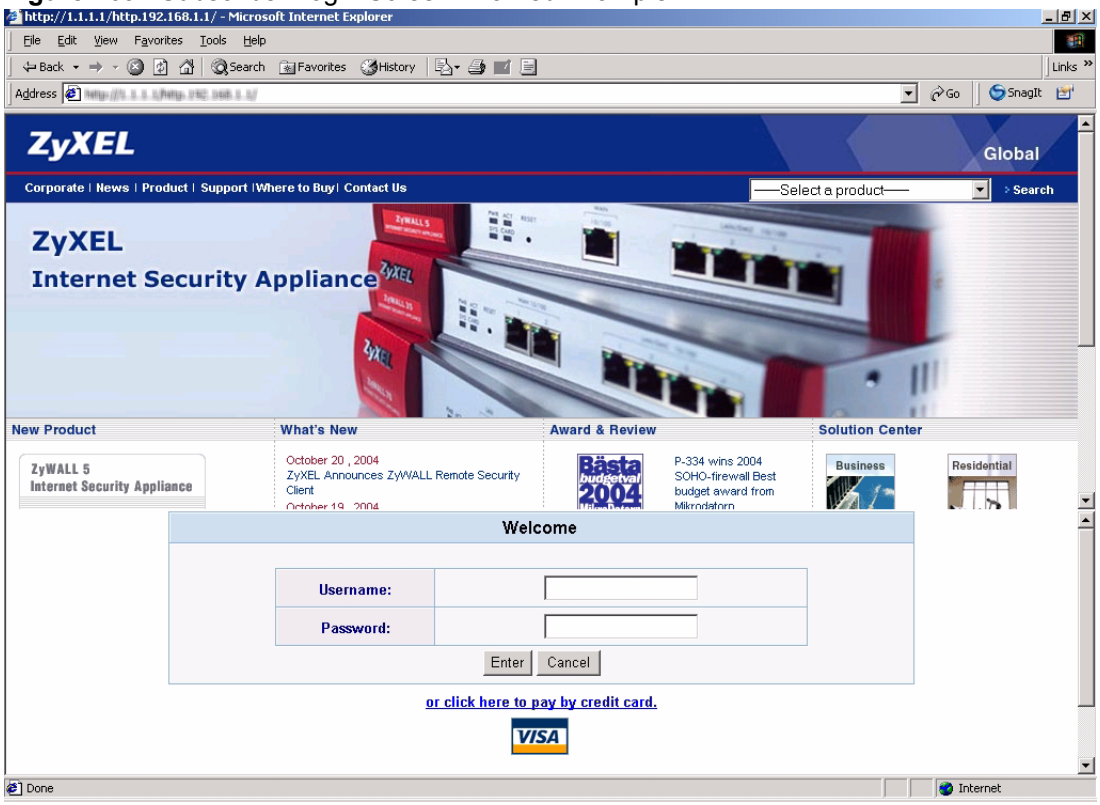
This problem can be solved by adding a VLAN-enabled switch or setting the computers to obtain IP addresses dynamically.

Appendix C Subscriber Login

To log in as a subscriber, enter a web site address such as www.zyxel.com in a web browser.

Depending on the settings, a subscriber login screen displays prompting for a user name and password.

Figure 169 Subscriber Login Screen: Framed Example



Enter a user name and password and click **Enter**. Depending on the settings in the VSG, either the specified web page or an advertisement web page displays. After a successful login, an information window may display.

Figure 170 Subscriber Login: Information Window Example

Appendix D
Vendor Specific Attributes

This appendix describes the format of the vendor specific attributes supported.

Overview

With RADIUS server authentication, you can define vendor specific attributes (VSAs) in addition to the set of standard RADIUS attributes defined in RFC 2865 and RFC 2866. A VSA is an attribute-value pair that is sent between a RADIUS server and the VSG. It is necessary you define the VSAs on the RADIUS sever if you want the VSG to perform any of the additional functions listed below:

- Limit Download bandwidth per subscriber
- Limit Upload bandwidth per subscriber
- Limit Total traffic bandwidth allowed per subscriber
- Specify advertising web site per subscriber
- Enable/disable SMTP redirect

Note: Before you can make use of these functions, configure the proprietary VSAs on the RADIUS server. Refer to the documentation that comes with your RADIUS server for more information.

VSG-1200 Supported VSAs

The following table describes the VSGs specific to the VSG-1200.

Table 86 VSG-1200 Supported VSAs

NO.	NAME	DESCRIPTION	TYPE	VALUE
1	Traffic-Limit	This attribute defines total bandwidth (in Mbytes) allowed for a subscriber. Internet access is based on the total upload/ download bandwidth regardless of the account expiration time. This attribute is supported when you set the VSG to use an external RADIUS server for user authentication in accumulation mode.	Integer	maximum 4095
2	SMTP Redirect	This attribute indicates whether the VSG is to re-direct E-mails. Values: **0** = do not redirect e-mails. **1** = allow e-mail redirection. **Note:** To allow e-mail redirection, you *must* configure the SMTP settings on the VSG. Refer to Section 4.8 "Server Configuration" on page 61 for more information.	Integer	0, 1
3	BW-Up	This attribute defines the upload bandwidth allowed for a subscriber. Internet access is based on the upload bandwidth regardless of the account expiration time. This means that a subscriber is allowed to access the Internet until the total upload bandwidth allocated is reached. This attribute is supported when you enable bandwidth management on the VSG with the class of service based on the RADIUS settings. Refer to Chapter 16, "Bandwidth Management," on page 141 for more information. **Note:** You *must* also specify the **BW-Down** attribute.	Integer	64 -24567
4	BW-Down	This attribute defines the download bandwidth allowed for a subscriber. Internet access is based on the download bandwidth regardless of the account expiration time. This means that a subscriber is allowed to access the Internet until the total download bandwidth allocated is reached. This attribute is supported when you enable bandwidth management on the VSG with the class of service based on the RADIUS settings. Refer to Chapter 16, "Bandwidth Management," on page 141 for more information. **Note:** You *must* also specify the **BW-Up** attribute.	Integer	64 - 24567
5	Portable Page URL	This attribute allows you to specify a different advertising web site for each subscriber after a successful login.	String	maximum 200

Error Messages

The following table describes the VSA-related error messages.

Table 87 VSA-related Error Messages

ERROR MESSAGE	DESCRIPTION
`VSA Error!-Traffic limit-Time to finish is selected`	The VSG is set to use the "Time to Finish" mode while the VSA response from the external RADIUS server include the **Traffic-limit** attribute.
`VSA Error!-Traffic limit-Over value`	The value for Traffic-limit attribute is more than the maximum allowed (4095).
`VSA Error!-SMTP Redirect-no SMTP server setup`	No e-mail server configuration is set on the VSG while the VSA response from the external RADIUS server indicates SMTP redirection is activated (with an attribute value of **1**).
`VSA Error!-BW-up/down-Bandwidth Management =disable`	Bandwidth management is not activated on the VSG while the VSA response from the external RADIUS server contains upload and download bandwidth limits.
`VSA Error!-BW-up/down-Equal bandwidth for all subscriber selected`	Bandwidth management is activated on the VSG with equal bandwidth applied to all subscribers.
`VSA Error!-BW-up/down-Class of service is selected but no BW-up/down`	Bandwidth management is activated on the VSG with class of service selected while no upload/download bandwidth information is obtained from the external RADIUS server.
`VSA Error!-BW-up/down-No BW-down`	The external RADIUS server does not send the **BW-down** attribute value to the VSG.
`VSA Error!-BW-up/down-No BW-up`	The external RADIUS server does not send the **BW-up** attribute value to the VSG.
`VSA Error!-BW-up/down-BW-up out of range`	The value for **BW-up** attribute is invalid.
`VSA Error!-BW-up/down-BW-down out of range`	The value for **BW-down** attribute is invalid.

Appendix E
Report Printing Using the SP-200

This appendix shows you how to print reports using the SP-200.

Overview

The SP-200 allows you to print status reports about the subscriber accounts and general VSG system information . Simply press a key combination on the SP-200 to print a report instantly without accessing the web configurator.

The following lists the reports that you can print using the SP-200.

- Daily account summary
- Monthly account summary
- System status
- Network statistics

Initial Setup

Do the following before you start report printing using an SP-200.

1. Purchase an SP-200 from your local dealer if you don't have one.
2. Set the function of the console port on the VSG for statement printer connection (see Section 3.5 "General System Setting" on page 44).
3. Connect the SP-200 to the **CONSOLE** port on the VSG (see Section 2.2 "Hardware Connections" on page 36).
4. Turn on the power to the SP-200.

Refer to the user's guide that comes with your SP-200 for more information.

Key Combination

The following table lists the key combination to print each report. Refer to Figure 51 on page 97 for button labels on the SP-200.

Note: You must press the key combination on the SP-200 within five seconds to print.

Table 88 SP-200: Report Printing Key Combination

REPORT TYPE	KEY COMBINATION
Daily Account Summary	A B C A A
Monthly Account Summary	A B C B B
System Status	A B C C C
Network Statistics	A B C A B

The following sections describe each report printout in detail.

Daily Account Summary

This report shows the username and price for the subscriber account(s) that is created for the current day.

Key combination: A B C A A

The following figure shows an example.

Figure 171 SP-200: Daily Account

```
        Daily Account
----------------------------
         2004/10/28
----------------------------
Username            Price
9v269m55            10.00
bwh2y943            20.00

----------------------------
TOTAL ACCOUTNS: 2
TOTAL PRICE: $ 30.00
----------------------------

     2004/10/28 14:12:11

          ---End---
```

Monthly Account Summary

This report shows the username and price for the subscriber account(s) that is created for the current month.

Key combination: A B C B B

The following figure shows an example.

Figure 172 SP-200: Monthly Account

```
       Monthly Account
----------------------------
           2004/10
----------------------------
Username            Price
bwh2y936            10.00
Cindy               10.00
9v269m55            10.00
bwh2y943            20.00

----------------------------
TOTAL ACCOUTNS: 4
TOTAL PRICE: $ 50.00
----------------------------

     2004/10/28 14:11:26

          ---End---
```

System Status

This report shows the current system information such as the host name and WAN IP address.

Key combination: A B C C C

The following figure shows an example.

Figure 173 SP-200: System Status

```
        System Status
----------------------------
ITEM DESCRIPTION
----------------------------
WAST ESTABLISHED
SYST 02D:02H:42M:46S
----------------------------
HOST VSG-1200
FRMW 1.05
BTRM 1.01
LOCA
WAMA 00-90-0E-00-4A-29
LAMA 00-90-0E-00-4A-28
WATP DHCP
WAIP 172.21.2.67
WASM 255.255.0.0
WAGW 172.21.0.254
PDNS 172.20.0.63
SDNS 172.20.0.27
DHCP DHCP SERVER
DHSP 10.59.1.2
DHEP 10.59.1.254
DHLT 1440
EMAIL /PORT25
----------------------------

     2004/10/28 11:24:42

          ---End---
```

The following table describes the labels in this report.

Table 89 SP-200: System Status

LABEL	DESCRIPTION
WAST	This field displays the WAN connection status.
SYST	This field displays the time since the system was last restarted.
HOST	This field displays the description name of the VSG for identification purposes.
FRMW	This field displays the version of the firmware on the VSG.
BTRM	This field displays the version of the bootrom.
WAMA	This field displays the MAC address of the VSG on the WAN.
LAMA	This field displays the MAC address of the VSG on the LAN.
WATP	This field displays the mode of the WAN port.
WAIP	This field displays the IP address of the WAN port on the VSG.
WASM	This field displays the subnet mask of the WAN port on the VSG.
WAGW	This field displays the IP address of the default gateway of the WAN port on the VSG.
PDNS	This field displays the IP address of the primary DNS server.
SDNS	This field displays the IP address of the secondary DNS server.

Table 89 SP-200: System Status (continued)

LABEL	DESCRIPTION
DHCP	This field displays the DHCP mode (**DHCP Server**, **Relay** or **DHCP Disable**) on the LAN.
DHSP	If the **DHCP** field is **DHCP Server**, this field displays the first of the continuous addresses in the IP address pool. If the **DHCP** field is **DHCP Relay**, this field displays the DHCP server IP address.
DHEP	This field is visible when the **DHCP** is **DHCP Server**. This field displays the end of the continuous addresses in the IP address pool.
DHLT	This field is visible when the **DHCP** is **DHCP Server**. This field displays the time (in minutes) a DHCP client is allowed to use an assigned IP address.
EMAIL	The field displays e-mail server port number.

Network Statistics

This report shows the network statistics on the VSG.

Key combination: A B C A B

The following figure shows an example.

Figure 174 SP-200: Network Statistics

```
          Network
----------------------------
ITEM DESCRIPTION
----------------------------
WAST ESTABLISHED
SYST 02D:02H:42M:46S
----------------------------
WATD 37
WARD 4816
WATE 0
WARE 0
LATD 1768
LARD 4616
LATE 0
LARE 0
----------------------------

     2004/10/28 15:24:42

          ---End---
```

The following table describes the labels in this report.

Table 90 SP-200: Network Statistics

LABEL	DESCRIPTION
WAST	This field displays the WAN connection status.
SYST	This field displays the time since the system was last restarted.
WATD	This field displays the number of packets transmitted on the WAN.
WARD	This field displays the number of packets received on the WAN.
WATE	This field displays the number of error packets transmitted on the WAN.
WARE	This field displays the number of error packets received on the WAN.
LATD	This field displays the number of packets transmitted on the LAN.
LARD	This field displays the number of packets received on the LAN.
LATE	This field displays the number of error packets transmitted on the LAN.
LARE	This field displays the number of error packets received on the LAN.

Appendix F
Cable Types and Cable Pin Assignments

RJ-45 Ethernet Port

The following table describes the types of network cable used for the different connection speeds.

Note: Make sure the Ethernet cable length between connections does not exceed 100 meters (328 feet).

Table 91 Network Cable Types

SPEED	NETWORK CABLE TYPE
10 Base-TX 100	2-pair UTP/STP Category 3, 4 or 5
100 Base-TX 100	2-pair UTP/STP Category 5

The WAN Port

The following table describes the Ethernet cable pin assignments for the WAN port.

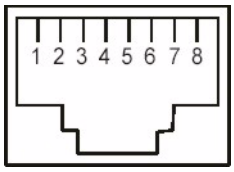


Table 92 WAN Port Cable Ping Assignments

PIN NO	RJ-45 SIGNAL ASSIGNMENT	DESIGNATION
1	Output Transmit Data +	TD+
2	Input Transmit Data +	RD+
3	Input Transmit Data +	RD+
4	Unused	N/U
5	Unused	N/U
6	Input Transmit Data -	RD-
7	Unused	N/U
8	Unused	N/U

Make sure that the Ethernet cable connection between the VSG and the hub or router conforms to the pin assignments as shown in the following diagram.

Figure 175 WAN Port Cable Pin Assignments

ETHERNET DEVICE (SWITCH/HUB/ROUTER ETC.)			VANTAGE SERVICE GATEWAY	
1	RD+	———	1	TD+
2	RD-	———	2	TD-
3	TD+	———	3	RD+
6	TD-	———	6	RD-

The LAN Port

The following table describes the Ethernet cable pin assignments for the LAN port.

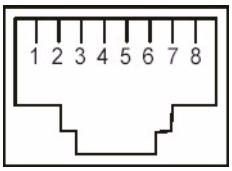


Table 93 LAN Port Cable Pin Assignments

PIN NO	RJ-45 SIGNAL ASSIGNMENT	DESIGNATION
1	Input Transmit Data +	RD+
2	Input Transmit Data -	RD-
3	Output Transmit Data +	TD+
4	Unused	N/U
5	Unused	N/U
6	Output Transmit Data -	TD-
7	Unused	N/U
8	Unused	N/U

Make sure that the Ethernet cable connection between the VSG and a computer or switch uplink port conforms to the pin assignments as shown in the figure.

Figure 176 LAN Port Cable Pin Assignments

ETHERNET DEVICE (COMPUTER/ UPLINK PORT)			VANTAGE SERVICE GATEWAY	
1	TD+	———	1	RD+
2	TD-	———	2	RD-
3	RD+	———	3	TD+
6	RD-	———	6	TD-

Serial Console Port

The following table describes the console cable pin assignments for the serial console port.

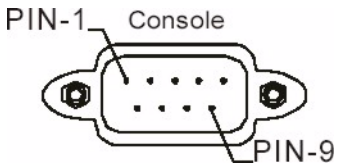


Table 94 Console Port Pin Assignment

PIN NO	MNEMONIC	FUNCTION
1	DCD	Received Line Signal Detector to the VSG.
2	TXT	Transmitted Data from the VSG.
3	RXT	Received Data to the VSG.
4	DTR	Data Terminal Ready from the VSG.
5	GND	Signal Ground (Common)
6	DSR	Data Set Ready to the VSG.
7	RTS	Request to Send from the VSG.
8	CTS	Clear to Send to the VSG.
9	RI	Ring Indicator to the VSG.

DB25 Male to DB9 Male Connector

Figure 177 DB25 Male to DB9 Male Connector

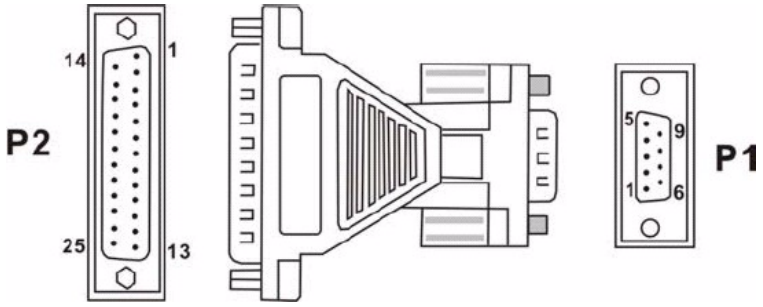


Table 95 DB25 Male to DB9 Male Connector Ping Assignment

P1	P2
1	8
2	2
3	3
4	20
5	7
6	6
7	4
8	5
9	22

Appendix G
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.

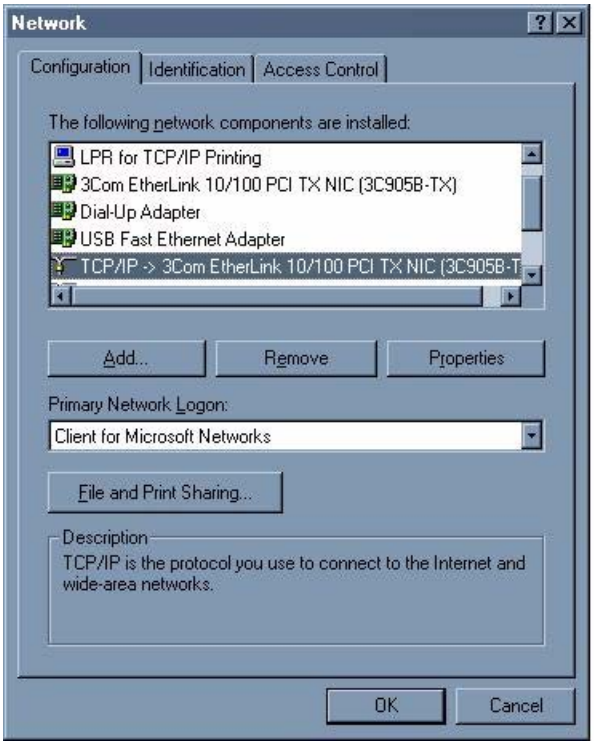
After the appropriate TCP/IP components are installed, configure the TCP/IP settings in order to "communicate" with your network.

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 VSG-1200's LAN port.

Windows 95/98/Me

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

Figure 178 WIndows 95/98/Me: Network: Configuration



Installing Components

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:

1. In the **Network** window, click **Add**.
2. Select **Adapter** and then click **Add**.
3. Select the manufacturer and model of your network adapter and then click **OK**.

If you need TCP/IP:

1. In the **Network** window, click **Add**.
2. Select **Protocol** and then click **Add**.
3. Select **Microsoft** from the list of **manufacturers**.
4. Select **TCP/IP** from the list of network protocols and then click **OK**.

If you need Client for Microsoft Networks:

1. Click **Add**.
2. Select **Client** and then click **Add**.

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

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

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

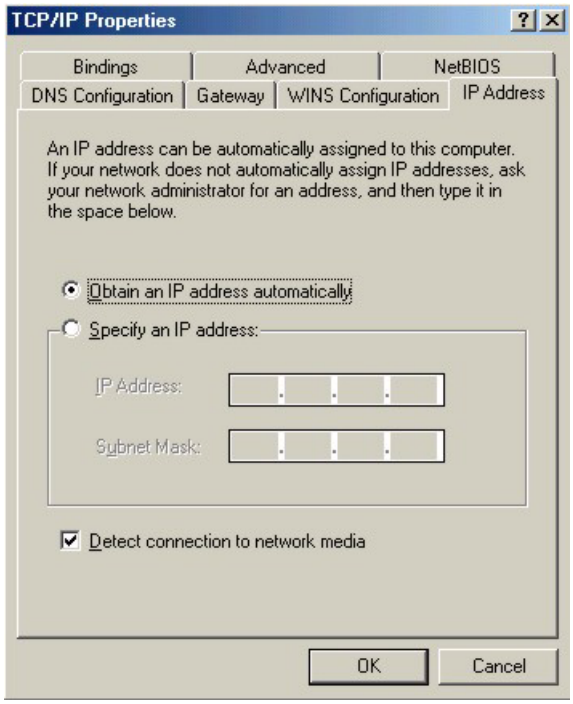
Configuring

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

2 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.

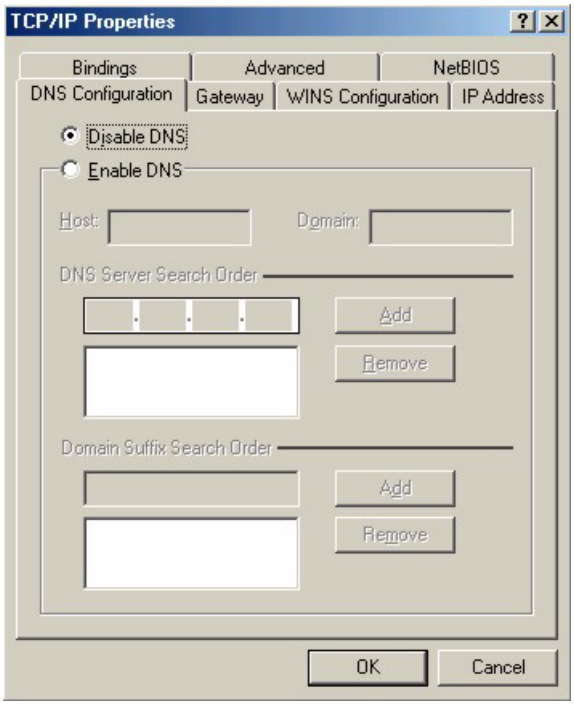
Figure 179 Windows 95/98/Me: TCP/IP Properties: IP Address



3 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).

Figure 180 Windows 95/98/Me: TCP/IP Properties: DNS Configuration



4 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**.

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

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

7 Turn on your VSG-1200 and restart your computer when prompted.

Verifying Settings

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**.

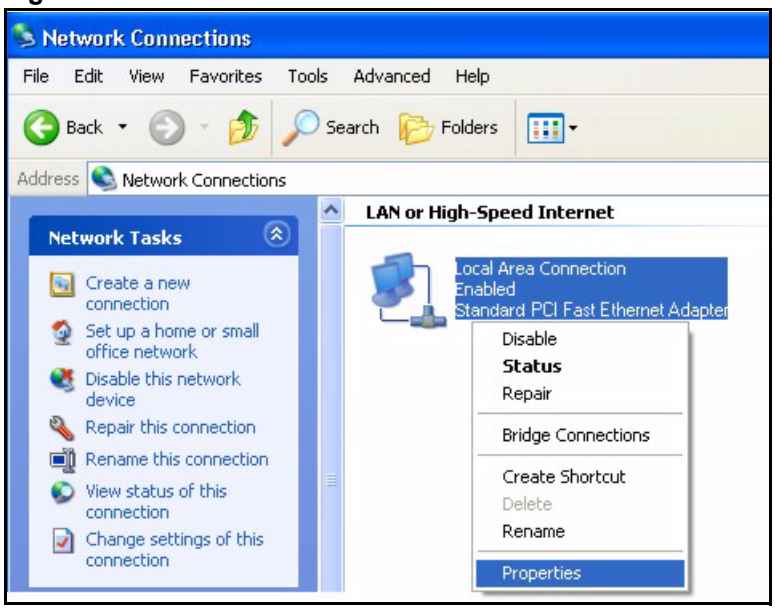
Figure 181 Windows XP: Start Menu

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

Figure 182 Windows XP: Control Panel

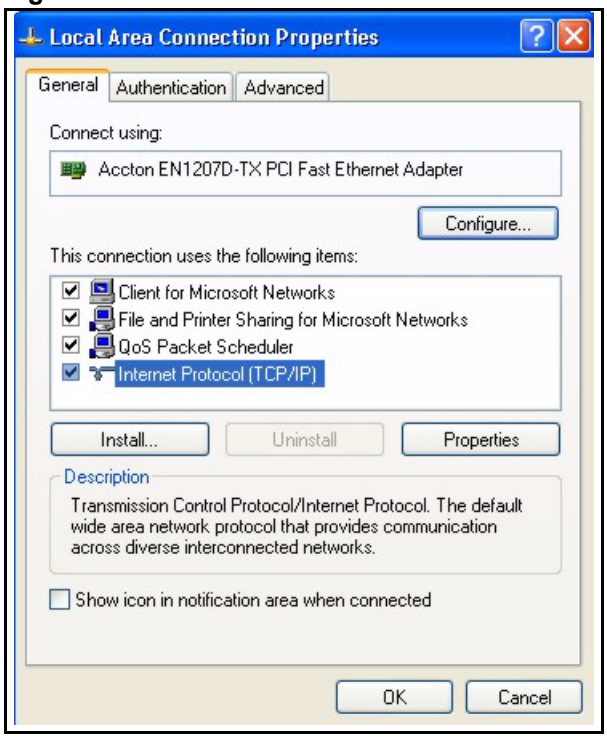
3 Right-click **Local Area Connection** and then click **Properties**.

Figure 183 Windows XP: Control Panel: Network Connections: Properties



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

Figure 184 Windows XP: Local Area Connection Properties

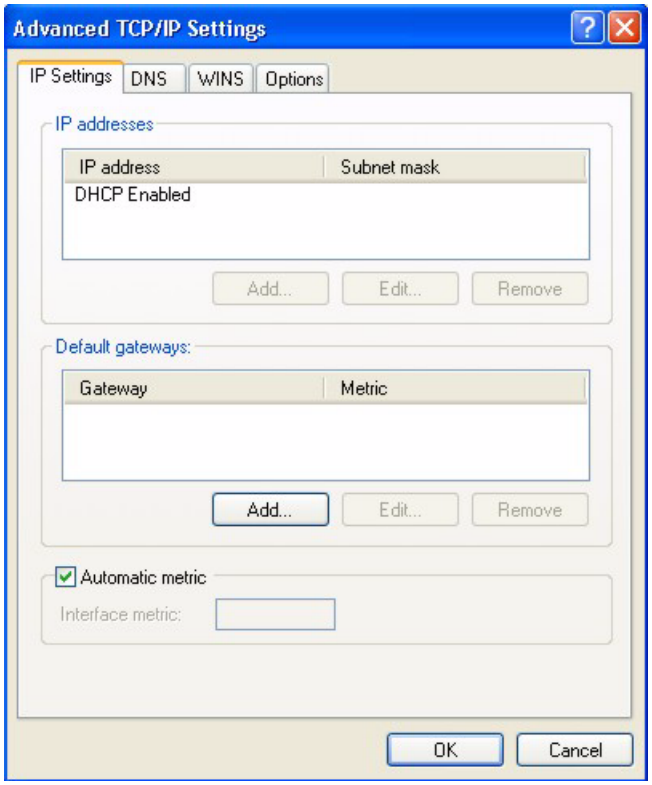


5 The **Internet Protocol TCP/IP Properties** window opens (the **General tab** in Windows XP).

- 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**.

Figure 185 Windows XP: Advanced TCP/IP Settings



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

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

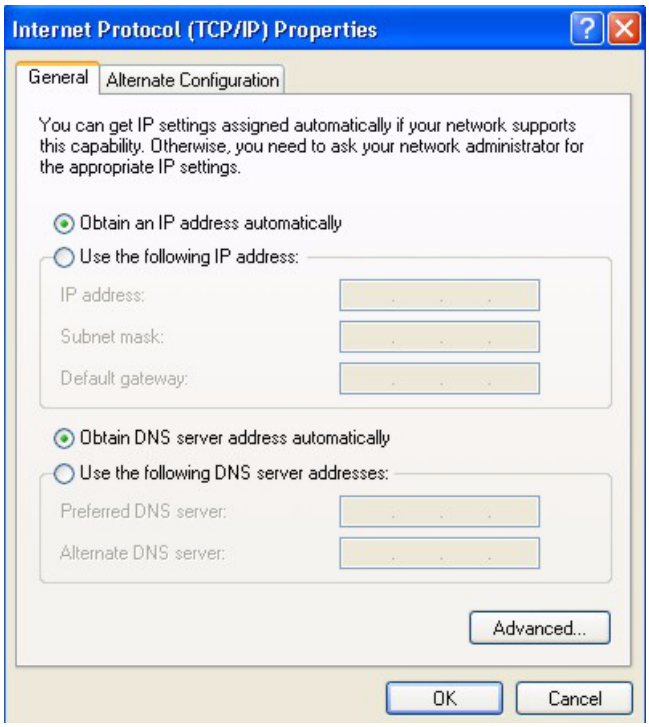
- In the **IP Settings** tab, in IP addresses, click **Add**.
- In **TCP/IP Address**, type an IP address in **IP address** and a subnet mask in **Subnet mask**, and then click **Add**.
- Repeat the above two steps for each IP address you want to add.
- Configure additional default gateways in the **IP 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.

Figure 186 Windows XP: Internet Protocol (TCP/IP) Properties



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 VSG-1200 and restart your computer (if prompted).

Verifying Settings

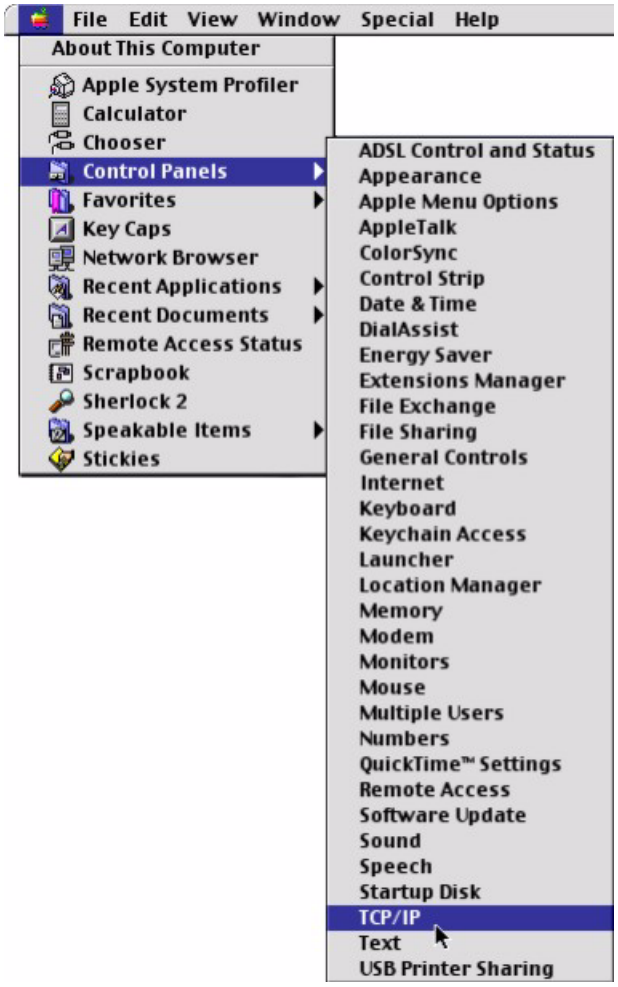
1 Click **Start**, **All Programs**, **Accessories** and then **Command Prompt**.

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

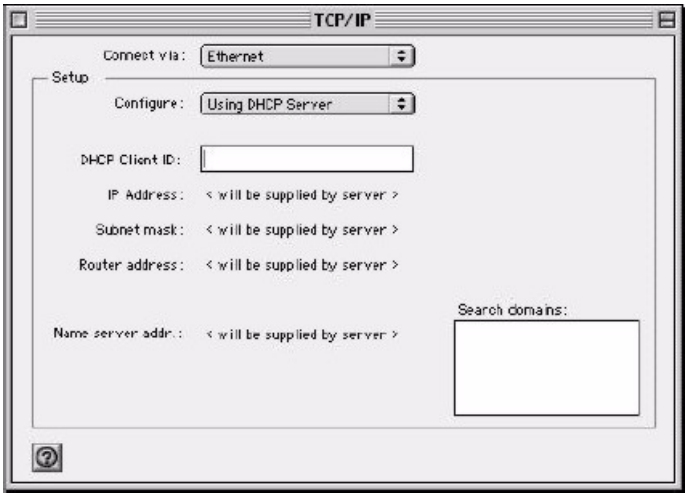
1 Click the **Apple** menu, **Control Panel** and double-click **TCP/IP** to open the **TCP/IP Control Panel**.

Figure 187 Macintosh OS 8/9: Apple Menu



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

Figure 188 Macintosh OS 8/9: TCP/IP



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 VSG-1200 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 VSG-1200 and restart your computer (if prompted).

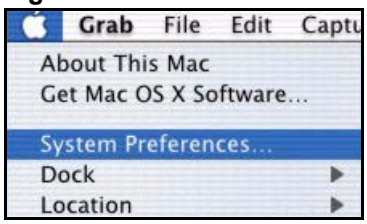
Verifying Settings

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.

Figure 189 Macintosh OS X: Apple Menu

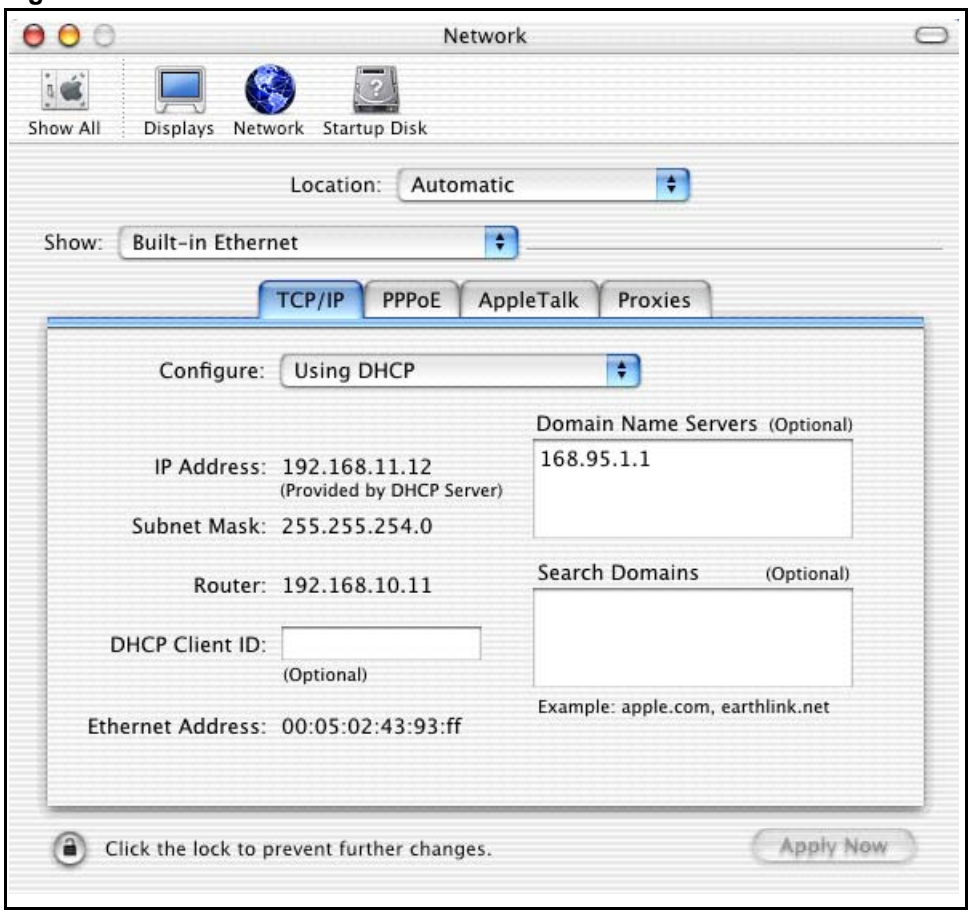


2 Click **Network** in the icon bar.

- Select **Automatic** from the **Location** list.
- Select **Built-in Ethernet** from the **Show** list.
- Click the **TCP/IP** tab.

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

Figure 190 Macintosh OS X: Network



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 VSG-1200 in the **Router address** box.

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

6 Turn on your VSG-1200 and restart your computer (if prompted).

Verifying Settings

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

Appendix H
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.)

Table 96 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

Note: 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.

Table 97 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 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.

Table 98 "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.

Table 99 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.

Table 100 Two Subnets Example

	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.

Note: 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.

Table 101 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	

Table 102 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).

Table 103 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	

Table 104 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	

Table 105 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	

Table 106 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.

Table 107 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	225	254	255

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

Table 108 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 Table 96) available for subnetting.

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

Table 109 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
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

Index

Symbols

Numerics

A

B

C

D

E

F

G

H

I

K

L

M

N

O

P

R

S

T

U

V

W

Z