VSG-1200 V2

Vantage Service Gateway

User's Guide

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Edition 1

ZyXEL

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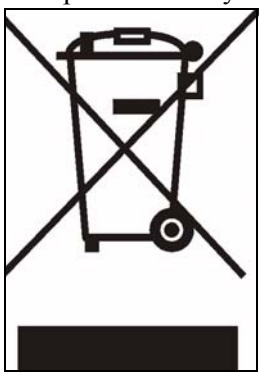

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Table of Contents

Copyright **2**

Certifications **3**

Safety Warnings **5**

ZyXEL Limited Warranty **7**

Customer Support **8**

List of Figures **20**

List of Tables **26**

Preface **30**

Chapter 1
Getting to Know Your VSG **32**

1.1 Introducing the VSG 32
1.2 Features 32
1.3 Applications 35
1.3.1 Internet Access for LAN Networks 35
1.3.2 Internet Access in Public Areas 36
1.3.3 Hotel Application with PMS 36

Chapter 2
Hardware Installation and Connection **38**

2.1 Installation Options 38
2.1.1 Desktop Installation 38
2.1.2 Rack Mount Installation 38
2.2 Hardware Connections 39
2.2.1 Front Panel 39
2.2.1.1 LAN Port 40
2.2.1.2 WAN Port 40
2.2.1.3 Console Port 40
2.2.1.4 PMS Port 40
2.2.1.5 Reset Button 40
2.2.2 Front Panel LEDs 41
2.2.3 Rear Panel 41

2.2.4 Turning on the VSG 41

Chapter 3
The Web Configurator 42

3.1 Introducing the Web Configurator 42
3.2 Accessing the Web Configurator 42
3.3 Navigation Panel 43
3.3.1 The Navigation Panel 44
3.3.2 Screen Specific Links 44
3.4 Screen Overview 44
3.4.1 Saving Configuration Changes 45
3.5 System Login Accounts 45
3.6 Changing System Login Passwords 45
3.7 Resetting the VSG 47
3.8 Restarting the VSG 47
3.9 Logging Out of the Web Configurator 48

Chapter 4
Initial Setup Example 50

4.1 Overview 50
4.2 Configure the VSG for Internet Access 50
4.3 Create a Billing Profile 51
4.4 Setting User Authentication Method 52
4.5 Creating Customer Accounts 53
4.6 Customer Login Test 53

Chapter 5
System 56

5.1 General System Setting 56

Chapter 6
LAN and WAN Setup 60

6.1 Factory Ethernet Defaults 60
6.2 LANs and WANs 60
6.3 IP Address Assignment 60
6.3.1 IP Address and Subnet Mask 60
6.3.2 Private IP Addresses 61
6.3.3 DNS Server Address 61
6.4 LAN Configuration 62
6.5 WAN Configuration 62
6.5.1 WAN MAC Address 62
6.5.2 WAN Port Mode: Dynamic/Fixed IP Address 63
6.5.3 WAN Port Mode: PPPoE 64

6.5.4 WAN Port Mode: PPTP 66

Chapter 7
Server 70

7.1 DHCP Configuration 70
7.1.1 Public and Private Address Assignment 70
7.1.2 Server Configuration 70

Chapter 8
NAT Pool 74

8.1 NAT Overview 74
8.1.1 NAT Definitions 74
8.1.2 What NAT Does 75
8.1.3 How NAT Works 75
8.1.4 VPN and NAT 75
8.2 NAT Examples 76
8.2.1 Example 1: One-to-One 76
8.2.2 Example 2: Many-to-One 77
8.2.3 Example 3: One-to-One and Many-to-One 77
8.3 NAT Pool Setup 78

Chapter 9
Authentication 80

9.1 Authentication Overview 80
9.1.1 User Agreement 80
9.1.2 CAS (Central Authentication Service) 80
9.1.3 Built-in Authentication 81
9.1.4 RADIUS 81
9.1.4.1 RADIUS Accounting 81
9.1.4.2 Vendor Specific Attribute 82
9.2 Authentication Configuration 82
9.2.1 Scenario Options 85

Chapter 10
Billing 88

10.1 Billing Overview 88
10.1.1 Billing Profile 88
10.1.2 Configuring a Billing Profile 89
10.2 PMS (Property Management System) 91
10.2.1 Port-Location Mapping 91
10.2.2 PMS Configuration 91
10.3 Types of Subscriber Accounts 93

Chapter 11
Static Subscriber Accounts 94

11.1 Static Subscriber Account Overview 94
11.2 Global Static Account Settings 94
11.3 Creating a Static Account 95
11.3.1 Generating Static Accounts Automatically 96
11.3.2 Creating Static Subscriber Accounts Manually 97
11.4 Static Account List Backup and Restore 98
11.4.1 Backing Up a Static Account List 98
11.4.2 Restoring a Static Account List 99
11.5 Editing Subscriber Accounts 100
11.5.1 Static Account Information Print Preview 101
11.6 Viewing the Static Account List 102

Chapter 12
Dynamic Subscriber Accounts 104

12.1 Dynamic Subscriber Account Overview 104
12.2 Dynamic Account General Settings 104
12.3 Creating Dynamic Accounts 106
12.3.1 Dynamic Account Generation Using the Web Configurator 106
12.3.2 Dynamic Account Generation Using a Statement Printer 107
12.4 Viewing the Dynamic Account List 108
12.4.1 Backing Up the Dynamic Account List 109

Chapter 13
Port-Location Mapping 112

13.1 Port-Location Mapping Overview 112
13.2 Configuring Port-Location Mappings 112

Chapter 14
Credit Card 116

14.1 Credit Card Overview 116
14.1.1 How Credit Card Billing Works 116
14.1.2 Configuration Steps 116
14.2 Credit Card Billing Service Configuration 117

Chapter 15
Customization 120

15.1 Customization Overview 120
15.2 Login Screen 120
15.2.1 Standard Login Screen 121
15.2.2 Redirect Login Screen 122
15.2.3 Advanced Login Screen 123

15.2.4 Framed Login Screen 124
15.2.5 Login Service Selection 125
15.3 Information Window 127
15.4 Account Printout 129
15.5 User Agreement Screen 133
15.6 Credit Card 135
15.6.1 Standard Login Page 135
15.6.2 Service Selection Page 136
15.6.3 Successful Page 139
15.6.4 Fail Page 141
15.7 Bill Output 142

Chapter 16
Bandwidth Management 144

16.1 Bandwidth Management Overview 144
16.1.1 Bandwidth Allocation 144
16.2 Activating Bandwidth Management 144
16.2.1 Equal Bandwidth Setup 145
16.2.2 Class of Service Bandwidth Setup 146

Chapter 17
Portal Page, Advertisement Link and Walled Garden 148

17.1 Overview 148
17.2 Portal Page 148
17.3 Advertisement Links 149
17.4 Walled Garden 149

Chapter 18
Passthrough 152

18.1 Passthrough Overview 152
18.2 Computer IP and MAC Address Passthrough 152
18.2.1 Destination URL and IP Address Passthrough 154

Chapter 19
Filter 156

19.1 Filter Setup 156

Chapter 20
Privilege User 158

20.1 Privilege User Setup 158
20.1.1 Accessing Session List As a Privilege User 159

Chapter 21
LAN Devices 160

21.1 LAN Devices Overview 160
21.1.1 Port Mapping 160
21.2 Configuring LAN Device Port Mapping 160
21.2.1 LAN Device Management Example 162
21.2.2 Specifying an Inside Server Example 163

Chapter 22
Static Route 164

22.1 Static Route Overview 164
22.2 Static Route Setup 164

Chapter 23
Private LAN 168

23.1 Private LAN Overview 168
23.2 Configuring a Private LAN 168

Chapter 24
Syslog 170

24.1 Syslog Overview 170
24.1.1 Syslog Server Setup 170
24.1.2 Log Settings 171

Chapter 25
Session Trace 176

25.1 Session Trace Overview 176
25.1.1 Configuring Session Trace 176
25.1.2 Session Trace Filename Convention 177

Chapter 26
SNMP 178

26.1 SNMP Overview 178
26.1.1 Network Management System (NMS) 179
26.2 Configuring SNMP 179

Chapter 27
Miscellanea 182

27.1 Overview 182
27.2 TCP/IP-RS-232 Converter Setup 182

Chapter 28
System Status 184

28.1 System Status Overview 184
28.2 System Information 184
28.3 Current User List 186
28.4 DHCP Client 187
28.5 Session List 188
28.6 NAT Pool Table 189
28.7 LAN Device Status 189
28.7.1 Accessing the LAN Device 190
28.8 Billing Log 191
28.8.1 Billing Logs Backup 192
28.9 PMS Transaction 193
28.10 Static Route Table 193

Chapter 29
Configuration 196

29.1 Configuration Overview 196
29.2 Configuration Backup 196
29.2.1 Configuration Backup Using TFTP 198
29.3 Restore Configuration 199
29.3.1 Restore Configuration Using TFTP 199
29.4 Reset to the Factory Defaults 200

Chapter 30
Firmware 202

30.1 Firmware Overview 202
30.2 Manual Firmware Upgrade 202
30.2.1 Manual Firmware Upgrade via a TFTP Server 203
30.3 Scheduled Firmware Upgrade 204

Chapter 31
SSL Certificate 206

31.1 SSL Certificate Overview 206
31.1.1 Certificate 206
31.1.2 Certificate Authorities 206
31.2 Downloading SSL Certificate to the VSG 206
31.3 Activating SSL Security 207
31.4 Installing SSL Certificate on a Computer 208

Chapter 32
Using The SMT 214

32.1 About the SMT 214

32.1.1 Establishing a Console Port Connection 214
32.2 SMT Login Screen 215
32.3 The SMT Main Menu Summary 215
32.4 Navigating the SMT Interface 216
32.4.1 The Navigation Keys 217
32.5 System Configuration 217
32.6 WAN Configuration 218
32.6.1 WAN Type: Static/Dynamic 218
32.6.2 WAN Type: PPPoE 219
32.6.3 WAN Type: PPTP 220
32.7 LAN Configuration 222
32.8 System Status 223
32.9 System Utilities 224
32.9.1 Firmware Upgrade 225
32.9.2 Changing the Administrator Login Password 226
32.10 Restart 227
32.11 SMT Logout 227
32.12 Factory Defaults 227

Chapter 33
Troubleshooting 230

33.1 Using the LEDs to Diagnose Problems 230
33.1.1 The Power LED 230
33.1.2 The LAN Port LEDs 230
33.1.3 The WAN Port LEDs 231
33.2 The Console Port 231
33.3 Web Configurator 232
33.4 Internet Access 232
33.5 The Statement Printer 233

Appendix A
Product Specifications 234

Appendix B
IP Address Assignment Conflicts..... 236

Appendix C
Subscriber Login..... 240

Appendix D
Vendor Specific Attributes 242

Appendix E

Report Printing Using the SP-200 246

Appendix F
Cable Types and Cable Pin Assignments 252

Appendix G
Setting up Your Computer's IP Address 256

Appendix H
IP Addresses and Subnetting 268

Index 276

List of Figures

Figure 1 Application: Internet Access for LAN Networks 35
Figure 2 Application: Internet Access in Public Areas 36
Figure 3 Application: Hotel 36
Figure 4 Rack Mount: Attaching Brackets 39
Figure 5 Rack Mount: Securing to the Rack 39
Figure 6 Front Panel 40
Figure 7 Rear Panel 41
Figure 8 Entering IP Address in Internet Explorer 42
Figure 9 Web Configurator: Login 43
Figure 10 Web Configurator: Main Menu 43
Figure 11 Web Configurator: Navigation Panel 44
Figure 12 Navigation Panel: Screen specific Links 44
Figure 13 Apply: Success 45
Figure 14 Apply: Restart 45
Figure 15 System Tools: System Account 46
Figure 16 System Tools: Restart 48
Figure 17 System Tools: Logout 48
Figure 18 Initial Setup: Network Example 50
Figure 19 System Setting: System 56
Figure 20 System Settings: WAN/LAN: LAN Configuration 62
Figure 21 System Settings: WAN/LAN: WAN MAC Address 63
Figure 22 System Settings: WAN/LAN: Dynamic/Static WAN IP Address 64
Figure 23 System Settings: WAN/LAN: PPPoE 65
Figure 24 System Settings: WAN/LAN: PPTP 67
Figure 25 System Settings: Server 71
Figure 26 NAT Example: One-to-One 76
Figure 27 NAT Example: Many-to-One 77
Figure 28 NAT Example: One-to-One and Many-to-One 77
Figure 29 System Settings: NAT Pool 78
Figure 30 CAS Example 80
Figure 31 Accounting Usage Time 82
Figure 32 System Settings: Authentication 83
Figure 33 System: Authentication: Scenario Guide 86
Figure 34 Subscriber Login: Scenario A 87
Figure 35 Subscriber Login: Scenario B 87
Figure 36 Subscriber Login: Scenario C 87
Figure 37 System Setting: Billing: Billing Profile 88
Figure 38 System Settings: Billing: Billing Profile Setting 89

Figure 39 System Setting: Billing: PMS Configuration 92
Figure 40 Static Account: Links 94
Figure 41 Static Account Settings: Global Settings 94
Figure 42 System Settings: Create Static Subscriber Account 95
Figure 43 Create Static Subscriber Account: Generate Automatically 96
Figure 44 Create Static Subscriber Account: Manual 97
Figure 45 Static Subscriber Account: Backup and Restore 98
Figure 46 Static Subscriber Account: Backup and Restore: File Download 99
Figure 47 Static Subscriber Account: Backup and Restore: Save As 99
Figure 48 Static Subscriber Account: Backup and Restore 100
Figure 49 Static Account Operator 100
Figure 50 Static Account Information Printout Example 102
Figure 51 Static Account List 102
Figure 52 Dynamic Account: Links 104
Figure 53 Accounting: Dynamic Account Setting 105
Figure 54 SP-200 Button Labels 106
Figure 55 Dynamic Account Operator Panel 107
Figure 56 Dynamic Account Information Printout Example 107
Figure 57 Dynamic Account List 108
Figure 58 Dynamic Account List Backup: File Download 109
Figure 59 Dynamic Account List Backup: Save As 110
Figure 60 System Setting: Port-Location Mapping 113
Figure 61 Advanced Setting: Credit Card 117
Figure 62 Customization: Login 121
Figure 63 Customization: Login: Standard 122
Figure 64 Subscriber Login Screen Example: Standard 122
Figure 65 Customization: Login Screen: Redirect 122
Figure 66 Customization: Login Screen: Advanced 123
Figure 67 Subscriber Login Screen Example: Advanced 124
Figure 68 Customization: Login Screen: Frame 124
Figure 69 Subscriber Login Screen Example: Frame 125
Figure 70 Customization: Service Selection Customization 126
Figure 71 Subscriber Login Screen Example: Service Selection Messages 126
Figure 72 Customization: Information Window 127
Figure 73 Subscriber Pop-up Information Window Example 128
Figure 74 Customization: Account Printout 129
Figure 75 Static Account Printout Example 131
Figure 76 Static Account with PMS Billing Printout Example 131
Figure 77 Static Account Printout: Statement Printer Example 132
Figure 78 Static Account with PMS Billing Printout: Statement Printer Example 132
Figure 79 Dynamic Account Printout Example 133
Figure 80 Dynamic Account Printout: Statement Printer Example 133
Figure 81 Customize: User Agreement 134

Figure 82 Customization: Account Printout: Preview 135
Figure 83 Credit Card Customization: Standard Login Screen Message 135
Figure 84 Credit Card Customization: Standard Login Screen Message: Preview 136
Figure 85 Credit Card Customization: Service Selection Page 137
Figure 86 Credit Card Customization: Service Selection Page: Preview 139
Figure 87 Credit Card Customization: Successful Page 140
Figure 88 Credit Card Customization: Successful Page: Preview 141
Figure 89 Credit Card Customization: Fail Page 141
Figure 90 Credit Card Customization: Fail Page: Preview 142
Figure 91 Customization: Output Bill 142
Figure 92 Customization: Output Bill: Example 143
Figure 93 Bandwidth Management: Activate 145
Figure 94 Bandwidth Management: Equal Share 145
Figure 95 Bandwidth Management: Class of Service 146
Figure 96 Portal Page 148
Figure 97 Advertisement 149
Figure 98 Walled Garden 150
Figure 99 Subscriber Login Screen with Walled Garden Links Example 151
Figure 100 Passthrough: Subscriber IP and MAC Address 153
Figure 101 Passthrough: Destination URL and IP 154
Figure 102 Advanced: Filter 156
Figure 103 Privilege User 158
Figure 104 Privilege User: Access Session List Example 159
Figure 105 LAN Devices 161
Figure 106 LAN Device Remote Management Example 1 162
Figure 107 LAN Devices: Example 1 162
Figure 108 LAN Device Remote Management Example 2 163
Figure 109 LAN Devices: Example 2 163
Figure 110 Sample Static Routing Topology 164
Figure 111 Advanced: Static Route 165
Figure 112 Private LAN Network Example 168
Figure 113 Private LAN 169
Figure 114 Logs: Syslog 170
Figure 115 Logs: Log Settings 172
Figure 116 Advanced: Session Trace 176
Figure 117 Session Trace Information Example 177
Figure 118 SNMP Management Model 178
Figure 119 SNMP 179
Figure 120 Network Example Using TCP/IP-RS232 Convertor 182
Figure 121 Advanced Setup: Miscellanea 183
Figure 122 System Status: System 184
Figure 123 System Status: Current User List 186
Figure 124 System Status: DHCP Clients 188

Figure 125 System Status: Session List 188
Figure 126 System Status: NAT Pool Table 189
Figure 127 System Status: LAN Device Status 190
Figure 128 System Status: Billing Log 191
Figure 129 Billing Log Backup: File Download 192
Figure 130 Billing Log Backup: Save As 192
Figure 131 Billing Log Backup: Example File Content 193
Figure 132 System Status: PMS Transaction Log 193
Figure 133 System Status: Static Route Table 193
Figure 134 Configuration: Backup 197
Figure 135 Configuration Backup: File Download 197
Figure 136 Configuration Backup: Save As 198
Figure 137 Configuration: Backup using TFTP 198
Figure 138 Configuration Backup: TFTP: Successful 199
Figure 139 Configuration: Restore 199
Figure 140 Configuration: Restore: TFTP 200
Figure 141 Configuration: Reset 201
Figure 142 Firmware: Links 202
Figure 143 Firmware: Manual Upgrade 202
Figure 144 Web Configurator: Firmware Upgrade Successful 203
Figure 145 Firmware: Manual Upgrade Using TFTP 203
Figure 146 Scheduled Firmware Upgrade: Synchronization File Example 204
Figure 147 Scheduled Firmware Upgrade Example 204
Figure 148 Firmware: Scheduled Upgrade 204
Figure 149 SSL Certificate 207
Figure 150 System Settings: Server Configuration: Enable SSL Security 207
Figure 151 System Settings: Authentication: Activate SSL Login 208
Figure 152 Installing the SSL Security Certificate: First Security Alert 208
Figure 153 Installing the SSL Security Certificate: Second Security Alert 209
Figure 154 Installing the SSL Security Certificate: View Certificate 209
Figure 155 Installing the SSL Security Certificate: Certificate Import Wizard 210
Figure 156 Certificate Import Wizard: Location 210
Figure 157 Certificate Import Wizard: Finish 211
Figure 158 Root Certificate Store 211
Figure 159 Certificate Import Wizard 211
Figure 160 Certificate: Detailed Information 212
Figure 161 Security Alert: Trusted 212
Figure 162 HyperTerminal Communication Parameter Settings Example 215
Figure 163 SMT: Login Screen 215
Figure 164 SMT: Main Menu 216
Figure 165 SMT: System Configuration 217
Figure 166 SMT: WAN Configuration: Static/Dynamic 218
Figure 167 SMT: WAN Configuration: PPPoE 219

Figure 168 SMT: WAN Configuration: PPTP 221
Figure 169 SMT: LAN Configuration 222
Figure 170 SMT: System Status 223
Figure 171 SMT: Utilities Menu 225
Figure 172 SMT: Firmware Upgrade 225
Figure 173 SMT: Firmware Upgrade Process 226
Figure 174 SMT: Change Administrator Password 226
Figure 175 SMT: Restart 227
Figure 176 SMT: System Logout 227
Figure 177 SMT: Reset to Factory Defaults 228
Figure 178 IP Address Conflicts: Scenario 1 236
Figure 179 IP Address Conflicts: Scenario 2 236
Figure 180 IP Address Conflicts: Scenario 3 237
Figure 181 IP Address Conflicts: Scenario 4 238
Figure 182 Subscriber Login Screen: Framed Example 240
Figure 183 Subscriber Login: Information Window Example 240
Figure 184 SP-200: Daily Account 247
Figure 185 SP-200: Monthly Account 248
Figure 186 SP-200: System Status 249
Figure 187 SP-200: Network Statistics 250
Figure 188 WAN Port Cable Pin Assignments 253
Figure 189 LAN Port Cable Pin Assignments 253
Figure 190 DB25 Male to DB9 Male Connector 254
Figure 191 WIndows 95/98/Me: Network: Configuration 257
Figure 192 Windows 95/98/Me: TCP/IP Properties: IP Address 258
Figure 193 Windows 95/98/Me: TCP/IP Properties: DNS Configuration 259
Figure 194 Windows XP: Start Menu 260
Figure 195 Windows XP: Control Panel 260
Figure 196 Windows XP: Control Panel: Network Connections: Properties 261
Figure 197 Windows XP: Local Area Connection Properties 261
Figure 198 Windows XP: Advanced TCP/IP Settings 262
Figure 199 Windows XP: Internet Protocol (TCP/IP) Properties 263
Figure 200 Macintosh OS 8/9: Apple Menu 264
Figure 201 Macintosh OS 8/9: TCP/IP 264
Figure 202 Macintosh OS X: Apple Menu 265
Figure 203 Macintosh OS X: Network 266

List of Tables

Table 1 Front Panel LEDs 41
Table 2 Web Configurator: Screen Overview 44
Table 3 System Tools: System Account 46
Table 4 System Setting: System 57
Table 5 System Settings: WAN/LAN: LAN Configuration 62
Table 6 System Settings: WAN/LAN: WAN MAC Address 63
Table 7 System Settings: WAN/LAN: WAN IP 64
Table 8 System Settings: WAN/LAN: PPPoE 65
Table 9 System Settings: WAN/LAN: PPTP 67
Table 10 System Settings: Server 71
Table 11 NAT Definitions 74
Table 12 WAN NAT Mapping Types for VPN 76
Table 13 NAT Example: One-to-One 76
Table 14 NAT Example: Many-to-One 77
Table 15 NAT Example: One-to-One and Many-to-One 78
Table 16 System Settings: NAT Pool 78
Table 17 System Settings: Authentication 84
Table 18 System: Authentication: Scenario Guide 87
Table 19 System Setting: Billing: Billing Profile 89
Table 20 System Settings: Billing: Billing Profile Setting 90
Table 21 System Setting: Billing: PMS Configuration 92
Table 22 Static Account Settings: Global Settings 95
Table 23 Create Static Subscriber Account: Generate Automatically 96
Table 24 Create Static Subscriber Account: Manual 97
Table 25 Static Account Operator 100
Table 26 Static Account List 103
Table 27 Accounting: Dynamic Account Setting 105
Table 28 Dynamic Account List 108
Table 29 System Setting: Port-Location Mapping 113
Table 30 Advanced Setting: Credit Card 117
Table 31 Customization: Login: Standard 122
Table 32 Customization: Login Screen: Redirect 123
Table 33 Customization: Login Screen: Advanced 123
Table 34 Customization: Login Screen: Frame 125
Table 35 Customization: Service Selection Customization 126
Table 36 Customization: Information Window 128
Table 37 Customization: Account Printout 129
Table 38 Customization: Account Printout 134

Table 39 Credit Card Customization: Service Selection Page 138
Table 40 Credit Card Customization: Successful Page 140
Table 41 Credit Card Customization: Fail Page 141
Table 42 Customization: Output Bill 143
Table 43 Bandwidth Management: Equal Share 146
Table 44 Portal Page 148
Table 45 Advertisement 149
Table 46 Walled Garden 150
Table 47 Passthrough: Subscriber IP and MAC Address 153
Table 48 Passthrough: Destination URL and IP 154
Table 49 Filter 156
Table 50 Privilege User 158
Table 51 LAN Devices 161
Table 52 Advanced: Static Route 165
Table 53 Advanced: Private LAN 169
Table 54 Logs: Syslog 171
Table 55 Logs: Log Settings 172
Table 56 Logs: Log Format 173
Table 57 Advanced: Session Trace 176
Table 58 Session Trace File Fields 177
Table 59 SNMP 180
Table 60 Miscellanea 183
Table 61 System Status: System 185
Table 62 System Status: Current User List 187
Table 63 System Status: DHCP Clients 188
Table 64 System Status: Session List 188
Table 65 System Status: NAT Tool Table 189
Table 66 System Status: LAN Device Status 190
Table 67 System Status: Billing Log 191
Table 68 System Status: Static Route Table 194
Table 69 Firmware: Scheduled Upgrade 205
Table 70 SSL Certificate 207
Table 71 SMT: Main Menu 216
Table 72 SMT: Control Key Descriptions 217
Table 73 SMT: System Configuration 217
Table 74 SMT: WAN Configuration: Static or Dynamic IP Address 219
Table 75 SMT: WAN Configuration: PPPoE 220
Table 76 SMT: WAN Configuration: PPTP 221
Table 77 SMT: LAN Configuration 222
Table 78 SMT: System Status 223
Table 79 Troubleshooting the Power LED 230
Table 80 Troubleshooting the LAN LED 230
Table 81 Troubleshooting the WAN LED 231

Table 82 Troubleshooting Console Port 231
Table 83 Troubleshooting Web Configurator 232
Table 84 Troubleshooting Internet Browser Display 232
Table 85 Troubleshooting Internet Access 232
Table 86 Troubleshooting the Statement Printer 233
Table 87 Product Specifications: General 234
Table 88 Product Specifications: Performance and Management 235
Table 89 Product Specifications: Physical and Environmental 235
Table 90 VSG-1200 V2 Supported VSAs 243
Table 91 VSA-related Error Messages 244
Table 92 SP-200: Report Printing Key Combination 247
Table 93 SP-200: System Status 249
Table 94 SP-200: Network Statistics 251
Table 95 Network Cable Types 252
Table 96 WAN Port Cable Ping Assignments 252
Table 97 LAN Port Cable Pin Assignments 253
Table 98 Console Port Pin Assignment 254
Table 99 DB25 Male to DB9 Male Connector Ping Assignment 254
Table 100 Classes of IP Addresses 269
Table 101 Allowed IP Address Range By Class 269
Table 102 "Natural" Masks 270
Table 103 Alternative Subnet Mask Notation 270
Table 104 Two Subnets Example 271
Table 105 Subnet 1 271
Table 106 Subnet 2 272
Table 107 Subnet 1 272
Table 108 Subnet 2 273
Table 109 Subnet 3 273
Table 110 Subnet 4 273
Table 111 Eight Subnets 274
Table 112 Class C Subnet Planning 274
Table 113 Class B Subnet Planning 275

Preface

Congratulations on your purchase of the VSG-1200 V2 Vantage Service Gateway.

Note: 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.

About This User's Guide

This manual is designed to guide you through the configuration of your VSG-1200 V2 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 V2. 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 Convention

- "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**.
- For brevity's sake, we will use "e.g.," as a shorthand for "for instance", and "i.e.," for "that is" or "in other words" throughout this manual.
- The VSG-1200 V2 Vantage Service Gateway may be referred to as "the VSG-1200 V2" or, simply, as "the VSG" in this User's Guide.

Graphics Icons Key

VSG-1200 V2	Computer	Notebook computer
Server	Statement Printer	Access Point
Switch	Router	Internet

CHAPTER 1
Getting to Know Your VSG

This chapter introduces the features and applications of the VSG.

1.1 Introducing the VSG

The VSG-1200 V2 Vantage Service Gateway is a rack-mountable service gateway that provides multiple subscribers easy Internet connectivity. The VSG is ideal for office, hotspot and hotel network 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.

Property Management System (PMS)

Many hotels use a PMS to perform automatic billing of services the guests use such as room service, mini-bar, pay-per-view TV or telephone calls. 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 various online credit card billing service providers allowing you to use a credit card service to authorize, process, and manage credit card transactions directly through the Internet.

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.

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 the actual real DHCP server to the DHCP clients.

RADIUS (Remote Authentication Dial-In User Service)

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.

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 are 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

Once connected to the network, the VSG can redirect the subscriber 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 full 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.

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 5.5 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.

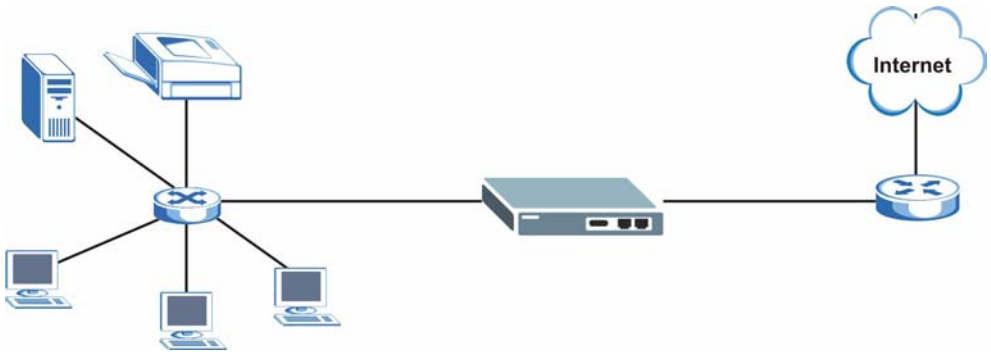
1.3 Applications

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

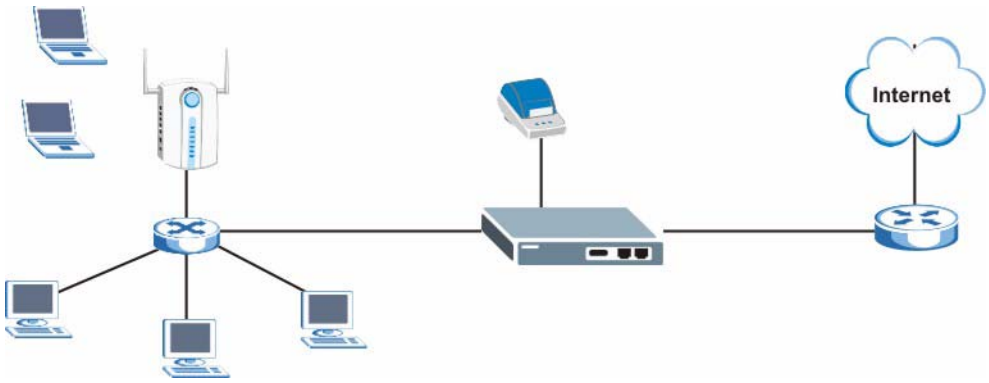


1.3.2 Internet Access in Public Areas

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.

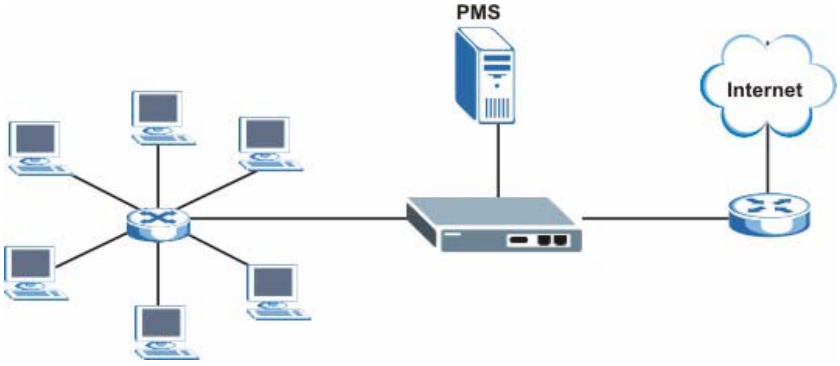
Figure 2 Application: Internet Access in Public Areas



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

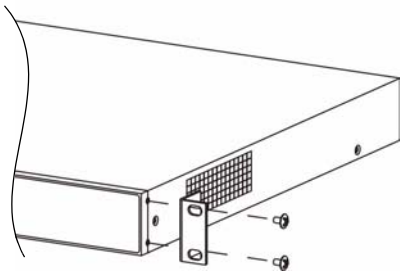
1. Make sure the VSG is clean and dry. Set the VSG on a smooth space strong enough to support the weight of the VSG and the connected cables. Make sure there is a power outlet nearby.
2. Make sure there is enough clearance around the VSG to allow air circulation and the attachment of cables and the power 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.

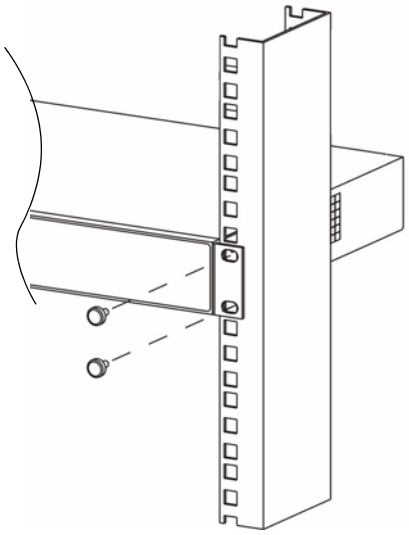
1. Align one bracket with the holes on one side of the VSG and secure it with the bracket screws (smaller than the rack-mounting screws. Similarly, attach the other bracket.

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



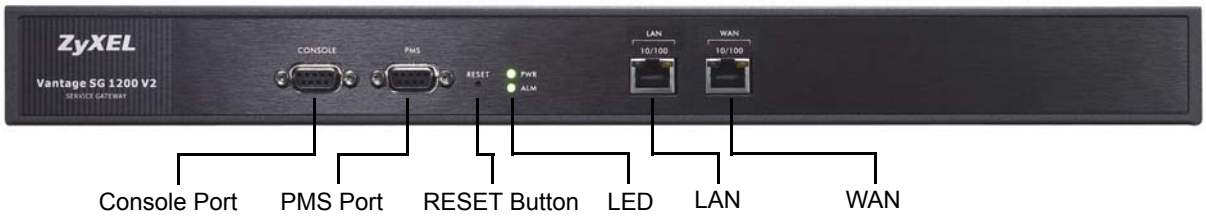
2.2 Hardware Connections

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 LAN Port

The VSG has one 10/100Mbps Ethernet port. The LAN port is auto-crossover, so you may use a crossover or a straight-through Ethernet cable to connect your VSG to a computer/external switch.

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

2.2.1.2 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 Console Port

Local management of the VSG is done 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 (also known as account generator printer, 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 5.1 on page 56).

2.2.1.4 PMS Port

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

2.2.1.5 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.
SYS	On	The system is functioning normally.
	Blinking	The system is not functioning properly.
	Off	The system is not ready or has failed.
LAN or WAN		
10	On	The port is connected at 10 Mbps.
	Blinking	The port is receiving or sending data.
	Off	The port is not connected to an Ethernet device.
100	On	The port is connected at 100 Mbps.
	Blinking	The port is receiving or sending data.
	Off	The port is not connected to an Ethernet device.

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.

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 5.5 or above) or Netscape (version 6. or later).

Note: JavaScript support must be enabled.

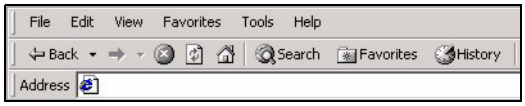
3.2 Accessing the Web Configurator

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 on page 38).
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



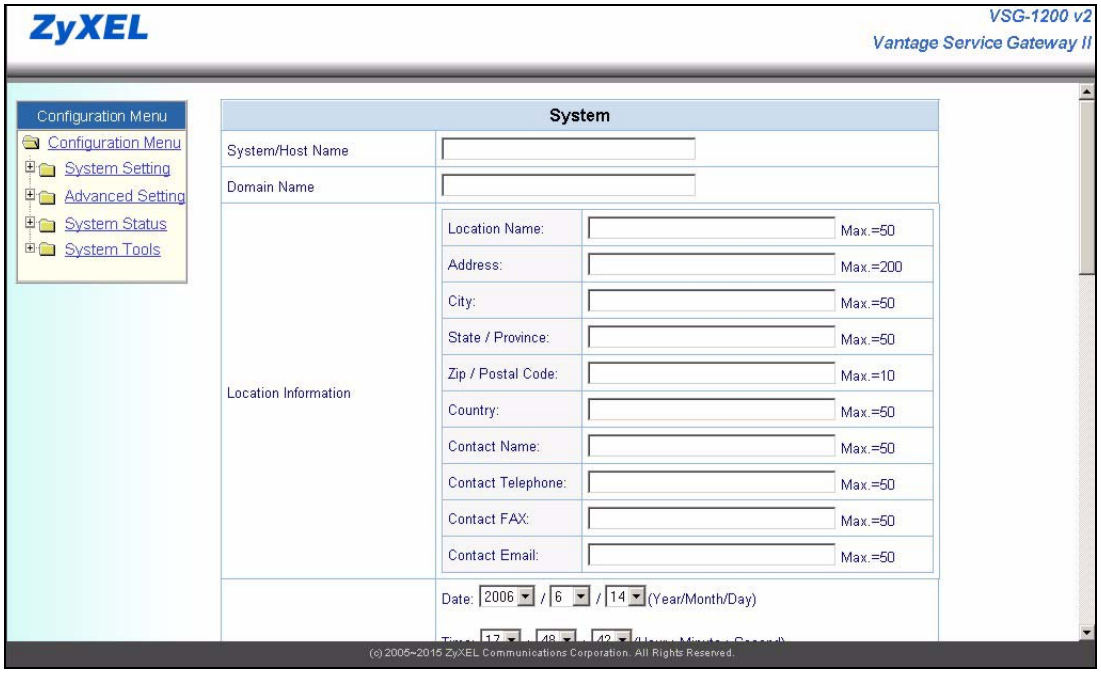
4. A login screen displays. Type "admin" (default) as the administrator user name and "1234" (default) as the password and click **Get Started ..**.

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: 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 Chapter 7 on page 70).

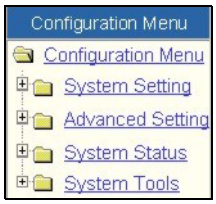
3.3 Navigation Panel

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

3.3.1 The Navigation Panel

The navigation 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 Web Configurator: Navigation Panel



3.3.2 Screen Specific Links

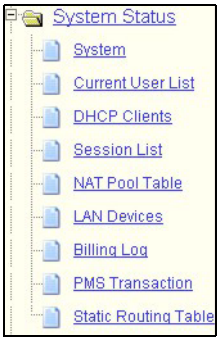
In some screens, a link panel displays on the top of the screen that allows you to navigate to advanced configuration screens. An example is shown in the figure below.

Figure 12 Navigation Panel: Screen specific Links

3.4 Screen Overview

The following table lists the various web configurator screens.

Table 2 Web Configurator: Screen Overview

SYSTEM SETTINGS	ADVANCED SETTINGS	SYSTEM STATUS	SYSTEM TOOLS
			

3.4.1 Saving Configuration Changes

In a configuration screen, you must click **Apply** to save the changes. A **Success** screen displays when the configuration settings are saved to the VSG. Click **back** to return to the previous screen.

Figure 13 Apply: Success

For specific settings (such as the device IP address, subscriber authentication method, etc.), you will be prompted to restart the VSG after you click **Apply** in the configuration screen. A **Restart** screen displays. Click **Apply** again to restart the VSG and make the changes take effect.

Figure 14 Apply: Restart

3.5 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.

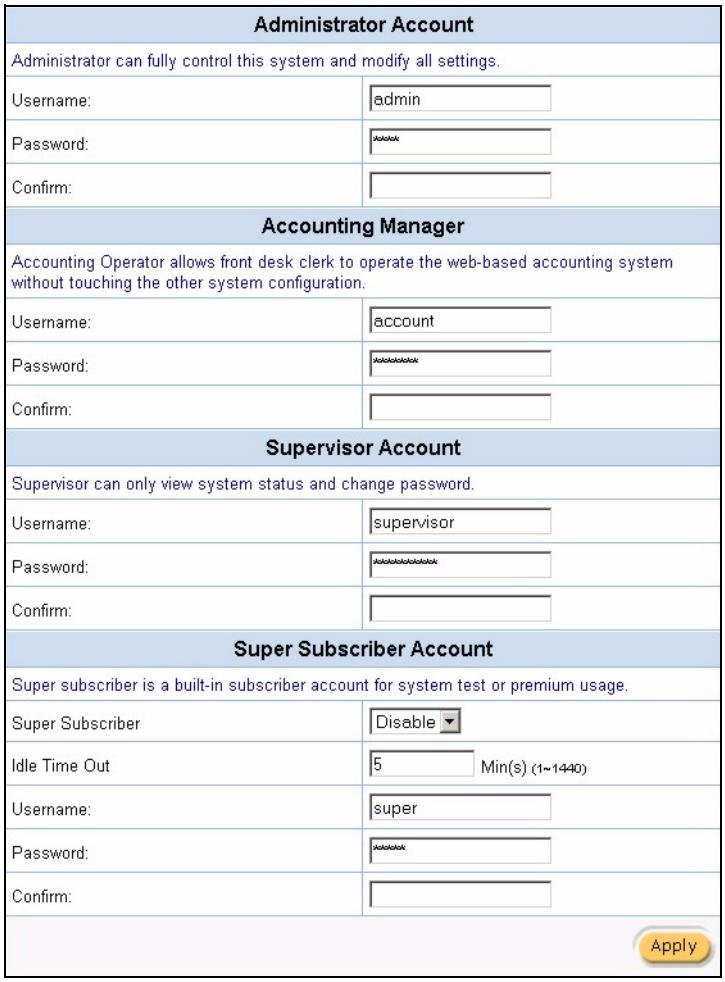
- The administrator account allows you full access to all system configurations. The default administrator user name is "admin" and password "1234".
- The account manager account is used for subscriber account management only. No system configuration is allowed. This account is useful for front desk 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 only view the system status and change the supervisor account password. The default user name 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".

3.6 Changing System Login Passwords

Note: It is recommended that you change the system login passwords.

From the **Main Menu** screen, click **System Tools** and **System Account**. You can enter up to 20 alphanumerical characters for the account user name and password and they are case sensitive.

Figure 15 System Tools: System Account



The following table describes the labels in this screen.

Table 3 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. The default is **1234**.
Confirm	Enter the new administrator password again for confirmation.
Account 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. The default is **account**.

Table 3 System Tools: System Account (continued)

LABEL	DESCRIPTION
Confirm	Enter the new administrator password again for confirmation.
Supervisor Account	This account allows you to view device status only.
Username	Enter the user name for the supervisor account. The default is **supervisor**
Password	Enter a new supervisor password. The default is **supervisor**.
Confirm	Enter the new administrator password again for confirmation.
Super Subscriber Account	Once you have configured the Internet connection settings on the VSG, you can use this account to test the Internet connection through the VSG.
Super Subscriber	Select Enable to activate this account. Select Disable to deactivate this account.
Idle Timeout	By default, the VSG automatically logs out a super subscriber after five minutes of inactivity. Enter a number (1 to 1440) to set the VSG to log out the super subscriber after the specified inactivity timeout (in minutes).
Username	Enter the user name for the account manager account. The default is **super**.
Password	Enter a new account manager password. The default is **super**.
Confirm	Enter the new administrator password again for confirmation.
Apply	Click **Apply** to save the changes back to the VSG.

3.7 Resetting the VSG

You can restore the device to the factory defaults in one of the following ways.

- The **RESET** button on the front panel of the VSG (press this button once). Use this method for cases when the username and password of the VSG is not known (refer to Section 2.2.1.5 on page 40).
- The web configurator (refer to Section 3.7 on page 47).
- The SMT (refer to Section 29.4 on page 200).

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.

All unsaved changes will be lost once you restart the VSG.

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: Logout

CHAPTER 4
Initial Setup Example

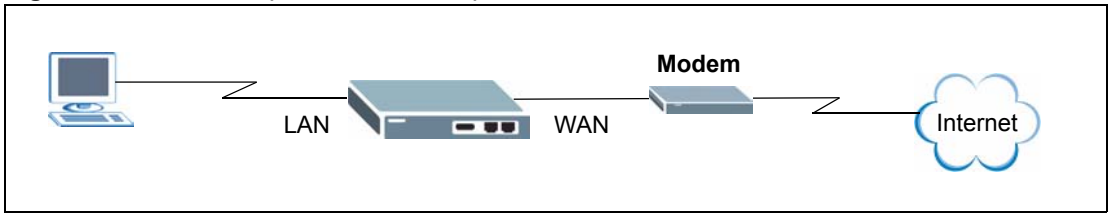
This chapter shows you how to configure the VSG for Internet access and user login.

4.1 Overview

As an Internet cafe owner, you want to set up the VSG in the store and provide Internet service to customers. You have already signed up for Internet access from your local ISP and a DSL modem is installed for Internet connection.

In-store Internet access is provided with a fee. You want to charge $5 per hour for Internet access and allow customers to purchase up to 15 hours at a time. You create 10 customer accounts and store them on the VSG which checks the account information before Internet access is allowed.

Figure 18 Initial Setup: Network Example



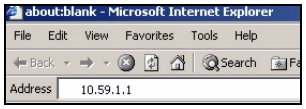
The following outlines the configuration steps.

1. You should have already made the hardware connections and turned on the VSG. Refer to Chapter 2 on page 38 for more information.
2. Configure the VSG for Internet access using the information provided by your ISP.
3. Create a billing profile that charges $5 per hour of Internet access.
4. Set the VSG to prompt for and checl customer account information.
5. Create customer accounts on the VSG.
6. Log in as a customer for connection test.

4.2 Configure the VSG for Internet Access

In this section, you set the VSG to receive a dynamic WAN IP address from the ISP since the ISP does not provide you with a public IP address or Internet access account information.

1 Connect your computer to the **LAN** port on the VSG. Launch your web browser and enter **10.59.1.1** (the default LAN management IP address on the VSG).



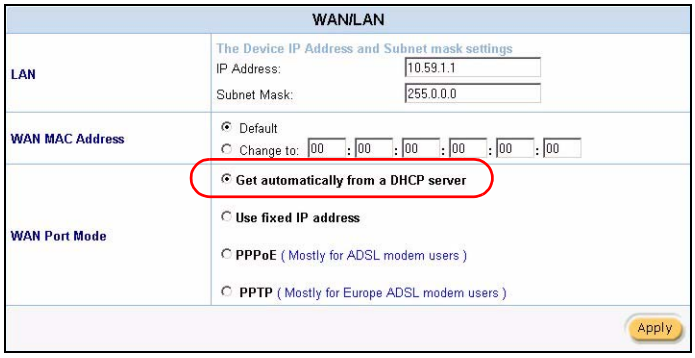
2 A login screen displays. Type "admin" (default) as the administrator user name and "1234" (default) as the password and click **Get Started ..**.

3 In the web configurator, click **System Setting > WAN/LAN**.

4 Select **Get automatically from a DHCP server** in the **WAN Port Mode** field.

5 Click **Apply** to save the changes.

6 Click **Apply** again to restart the VSG.



7 Log into the web configurator again and check that the VSG has obtained a WAN IP address in the **System Status** screen.

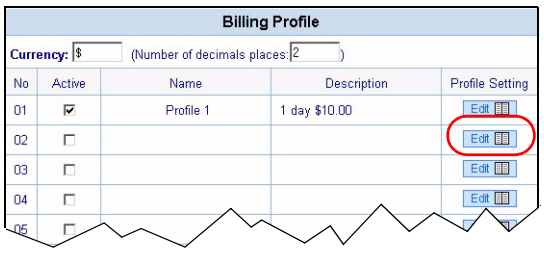
4.3 Create a Billing Profile

Next you create a billing profile that charges $5 per hour for Internet access and allows customers to purchase up to 15 hours of Internet access time.

1 Click **System Setting > Billing** to display the **Billing Profile** screen.

2 Change the **Currency** and **Number of decimal places** fields if required.

3 To configure a new billing profile, click **Edit** in a new entry.



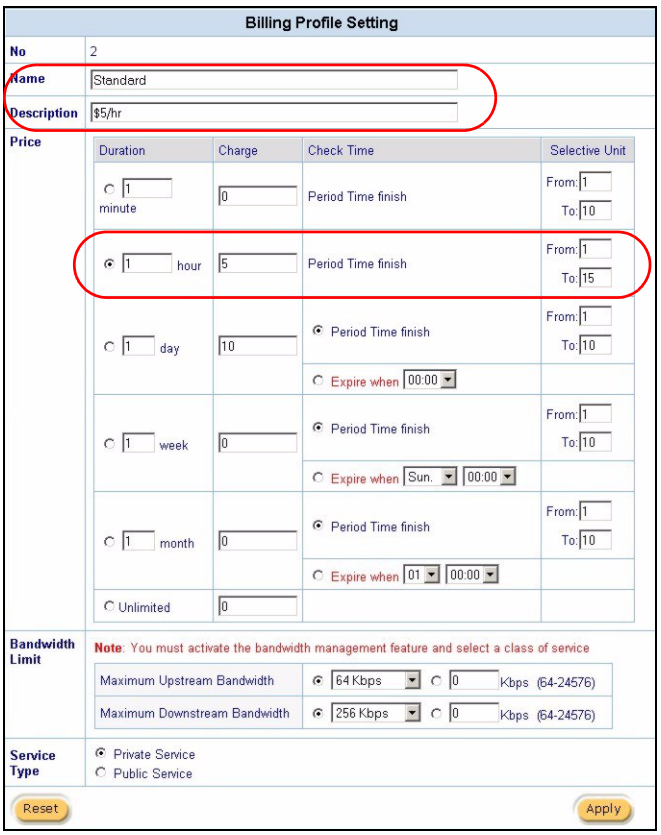
4 The **Billing Profile Setting** screen displays. In the **Name** field, enter "Standard" for identification.

5 Enter "$5/hr" in the **Description** field.

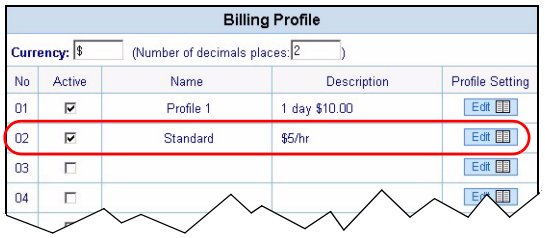
6 Select **hour** and enter 5 in the **Charge** field.

7 Enter 15 in the **To** field under **Selective Unit**. Leave all other fields to the defaults.

8 Click **Apply** and **Close** to save the settings.



9 In the **Billing Profile** screen, you should see the name of the profile you have just created. Select **Active** to enable it and click **Apply** to save the settings.



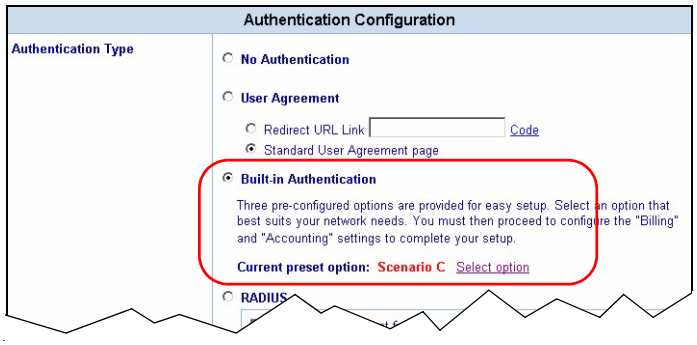
4.4 Setting User Authentication Method

You want to configure the VSG to check user account information against the account information stored on its database.

1 In the web configurator, click **System Setting > Authentication**.

2 Select **Built-in Authentication** and use the default scenario settings.

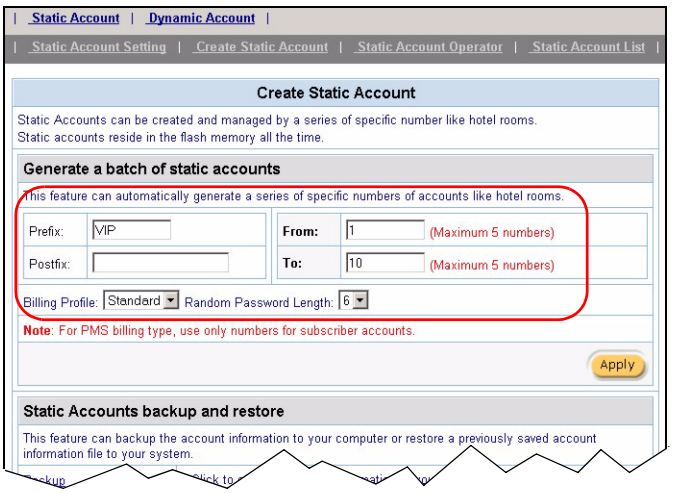
3 Click **Apply** to save the settings.



4 Click **Apply** again to restart the VSG.

4.5 Creating Customer Accounts

For initial setup, you want to configure 10 customer accounts (VIP1, VIP2, VIP3, .., VIP 10) using the Standard billing profile on the VSG.



1 Click **System Setting > Accounting** and click the **Create Static Account**.

2 In the **Prefix** field, enter "VIP" which will appear in the account names.

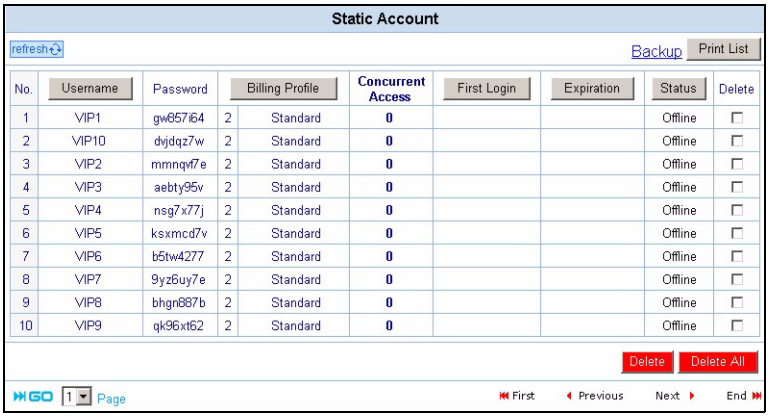
3 To create 10 accounts, enter 1 the **From** field and enter 10 in the **To** field.

4 In the **Billing Profile** field, select **Standard** to apply the profile you just created.

5 Select **6** in the **Random Password Length** field to have the VSG generate a 6-character password for each account.

6 Click **Apply** to generate the accounts. Click **back**.

7 To view the list of accounts created, click the **Static Account List** link. You should see the new accounts and the generated passwords.



4.6 Customer Login Test

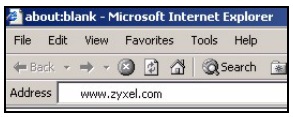
In this section, you log into the VSG as a customer and test the Internet connection.

1 From the **Static Account List** screen, write down a customer account user name and password.

2 Log out from the web configurator.

3 Make sure your computer is set to use a dynamic IP address and is connected to the **LAN** port on the VSG.

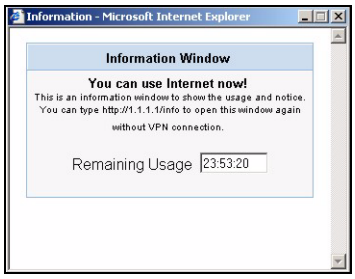
4 Open a web browser and enter any web site address (for example, www.zyxel.com).



5 A **Welcome** screen displays prompting you to enter the account information.

6 Enter the customer account user name and password you wrote down in step 1. Click **Enter**.

7 An **Information Window** screen displays. This indicates that you have successfully logged into the VSG and Internet access is allowed.



CHAPTER 5
System

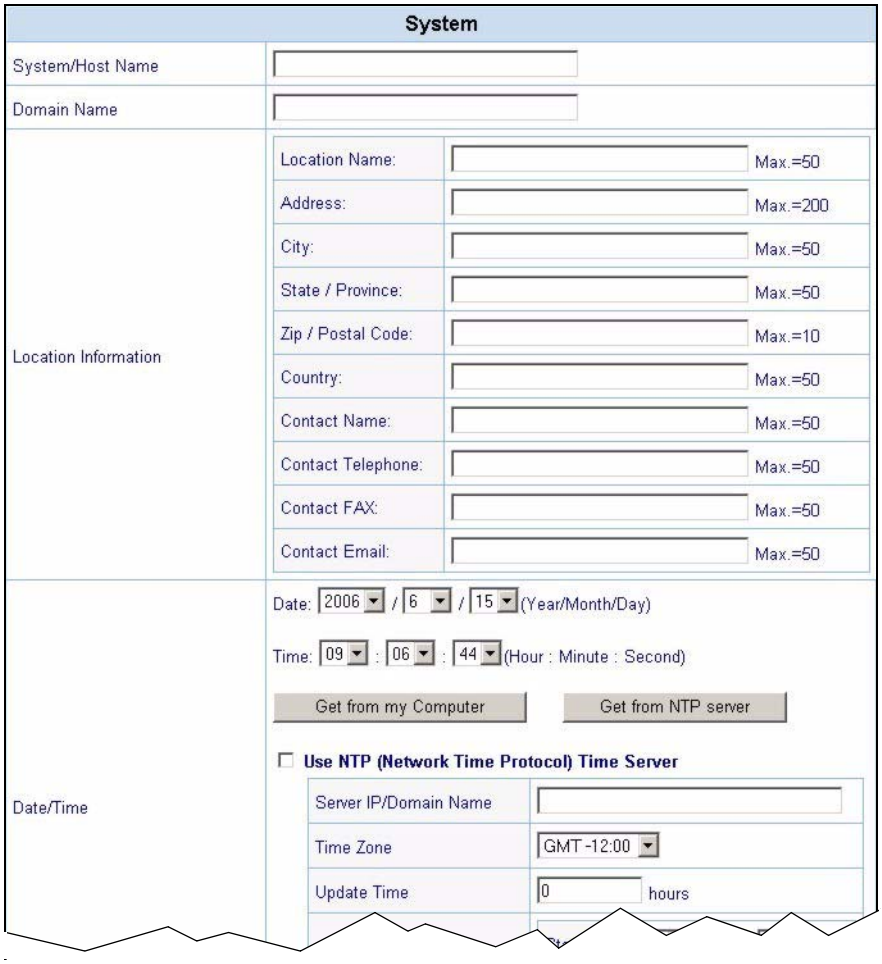
This chapter describes the System screen where you can configure general device settings and set up the system time and date.

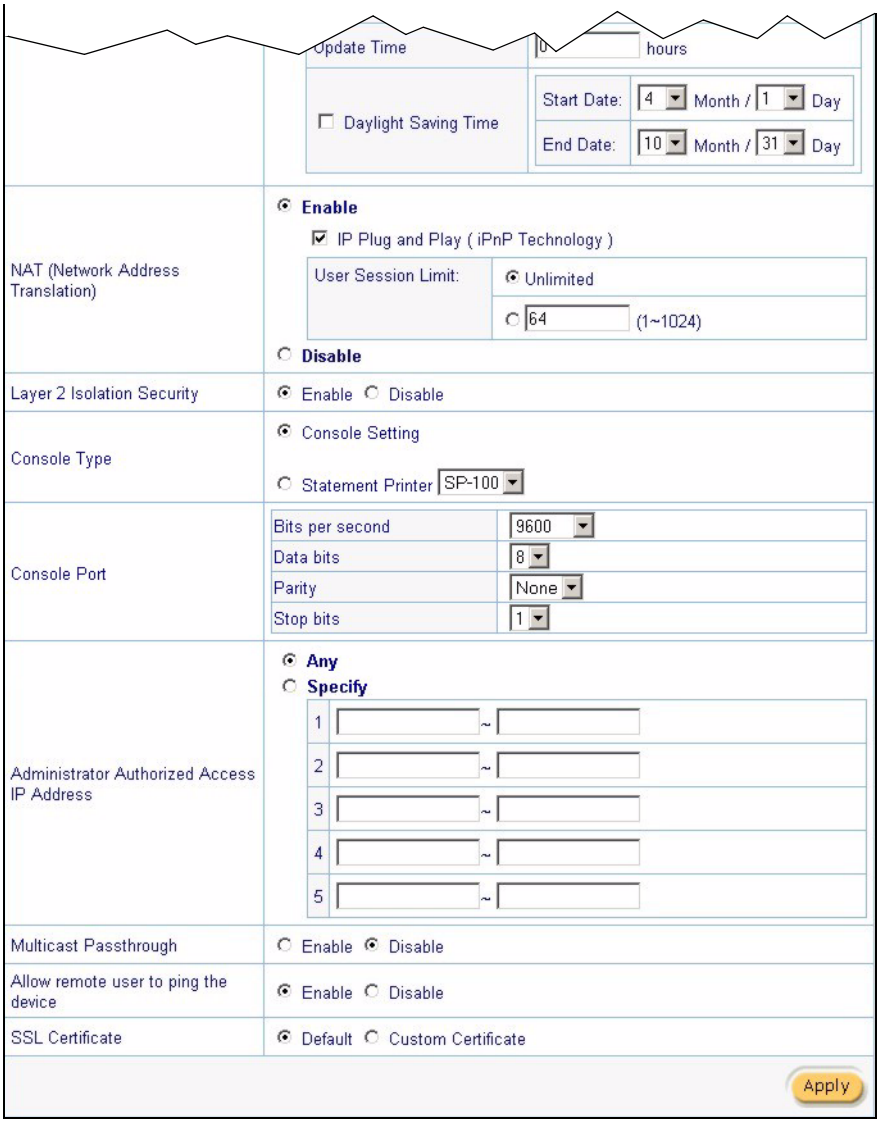
5.1 General System Setting

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 19 System Setting: System





The following table describes the labels in this screen.

Table 4 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.
Location Information	Specify where the VSG is located and the person or administrator you can contact in case you have problem using the VSG.
Location Name	Enter a descriptive name of the location for identification purposes.
Address	Enter the street address of the location where the VSG is installed.

Table 4 System Setting: System (continued)

LABEL	DESCRIPTION
City	Enter the name of the city where the VSG is installed.
State/Province	Enter the name of the state or province where the VSG is installed.
Zip/Postal Code	Enter the ZIP or postal code of the location where is the VSG is installed.
Country	Enter the name of the country where the VSG is installed.
Contact Name	Enter the name of the person to contact in case there is any problem with the VSG.
Contact Telephone	Enter the telephone number of the person to contact in case there is any problem with the VSG.
Contact Fax	Enter the fax number of the person to contact in case there is any problem with the VSG.
Contact Email	Enter the e-mail address of the person to contact in case there is any problem with the VSG.
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.

Table 4 System Setting: System (continued)

LABEL	DESCRIPTION
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.
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** and select the printer model when you connect the console port a statement print.
Console Port	The fields in this section of the screen are applicable when you select 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** (default), **14400**, **19200, 38400**, **57600** and **115200**.
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 Passthrough	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 31 on page 206 for more information.
Apply	Click **Apply** to save the changes.

CHAPTER 6
LAN and WAN Setup

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

6.1 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.

6.2 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.

6.3 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.

6.3.1 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 6.3.2 on page 61); 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.

6.3.2 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.

6.3.3 DNS Server Address

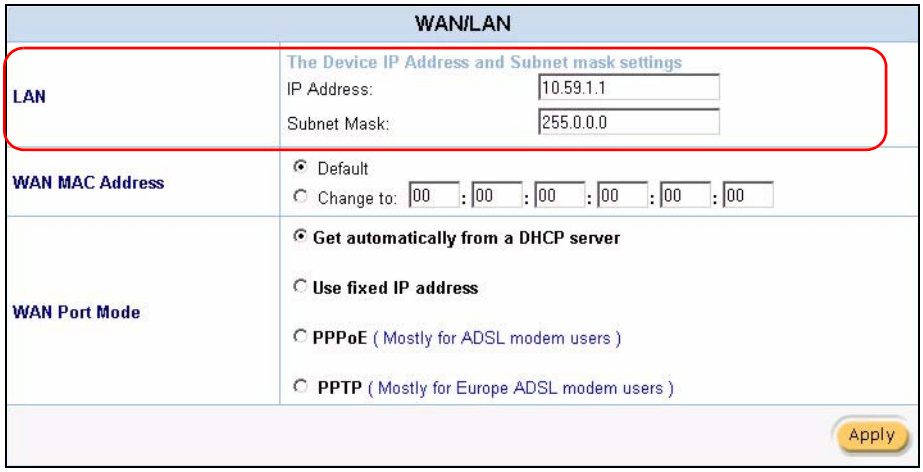
DNS (Domain Name System) is for mapping a domain name to its corresponding IP address and vice versa, for example, the IP address of *www.zyxel.com* is 204.217.0.2. The DNS server is extremely important because without it, you must know the IP address of a machine before you can access it. The DNS server 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.

6.4 LAN Configuration

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

Figure 20 System Settings: WAN/LAN: LAN Configuration



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

Table 5 System Settings: 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.

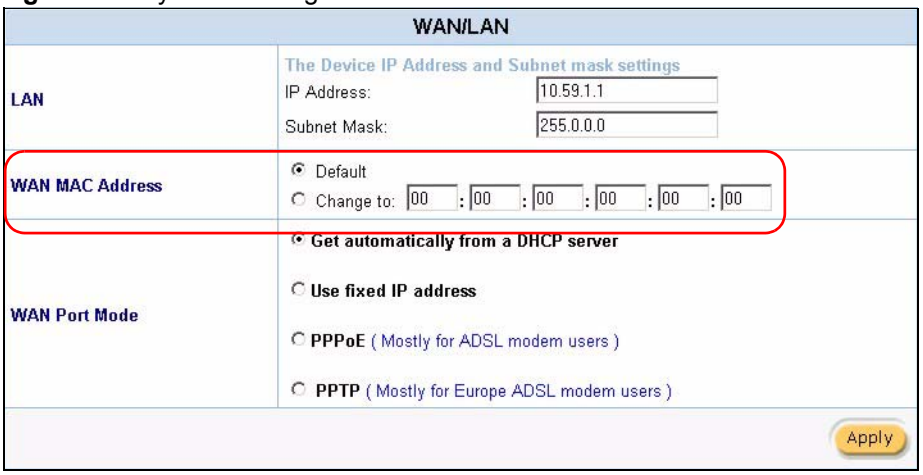
6.5 WAN Configuration

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

6.5.1 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 21 System Settings: WAN/LAN: WAN MAC Address



The following table describes the related field in this screen.

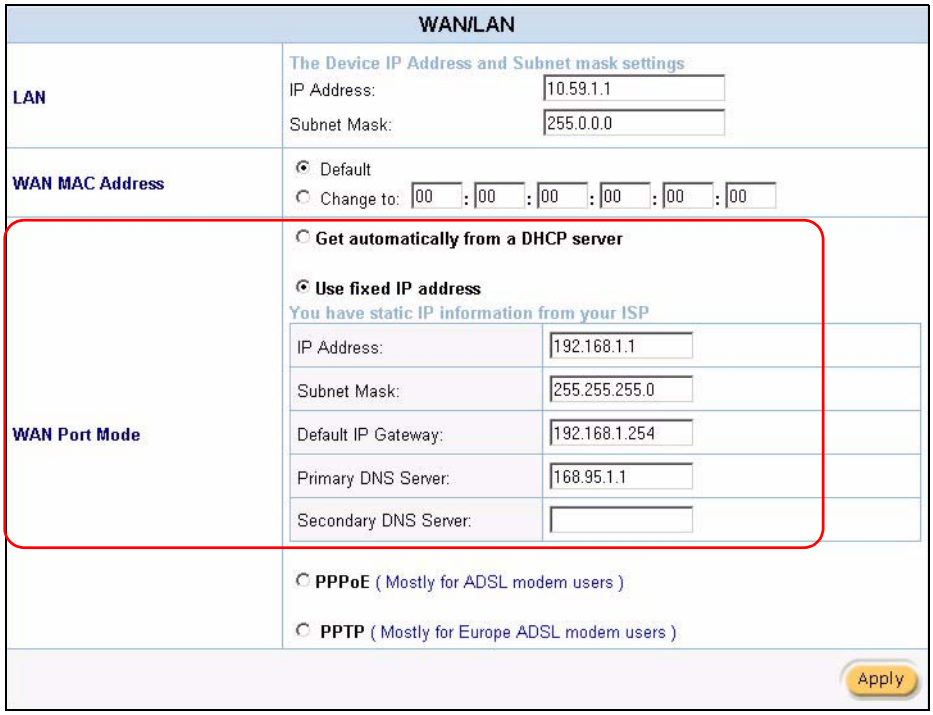
Table 6 System Settings: WAN/LAN: WAN MAC Address

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.

6.5.2 WAN Port Mode: Dynamic/Fixed IP Address

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

Figure 22 System Settings: WAN/LAN: Dynamic/Static WAN IP Address



The following table describes the related labels in this screen.

Table 7 System Settings: 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.
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.

6.5.3 WAN Port Mode: 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.

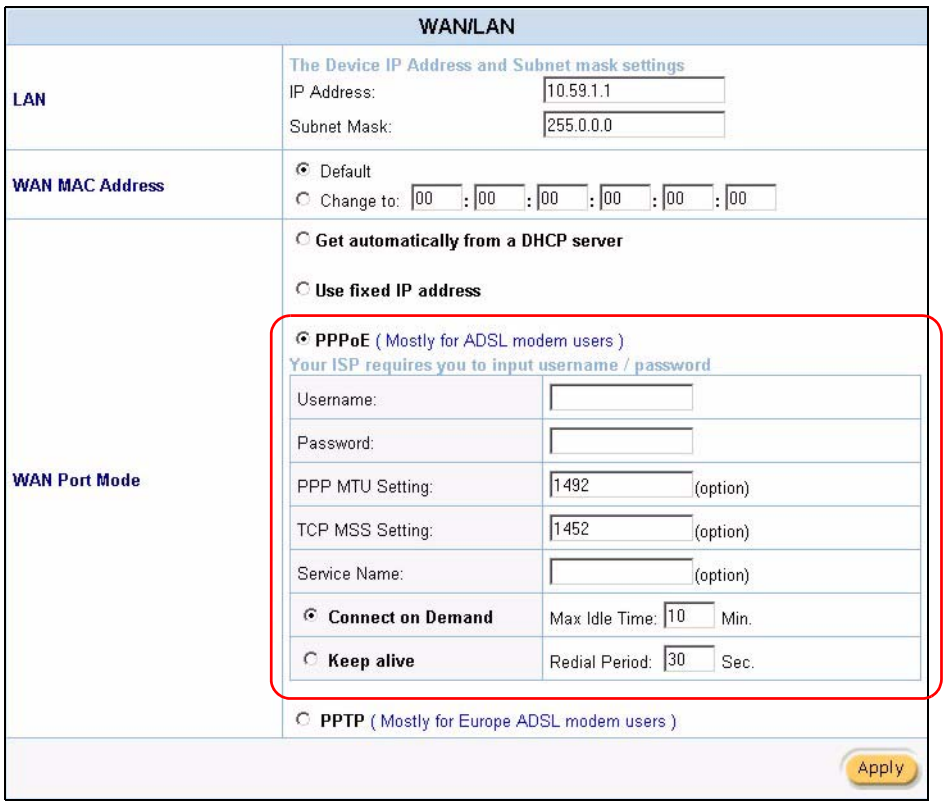
For the service provider, PPPoE offers an access and authentication method that works with existing access control systems (for instance, RADIUS). For the user, PPPoE provides a login and authentication method that the existing Microsoft Dial-Up Networking software can activate, and therefore requires 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 23 System Settings: WAN/LAN: PPPoE



The following table describes the related fields in this screen.

Table 8 System Settings: WAN/LAN: PPPoE

FIELD	DESCRIPTION
WAN Port Mode	
PPPoE	Select this option to activate **PPPoE** support.

Table 8 System Settings: WAN/LAN: PPPoE (continued)

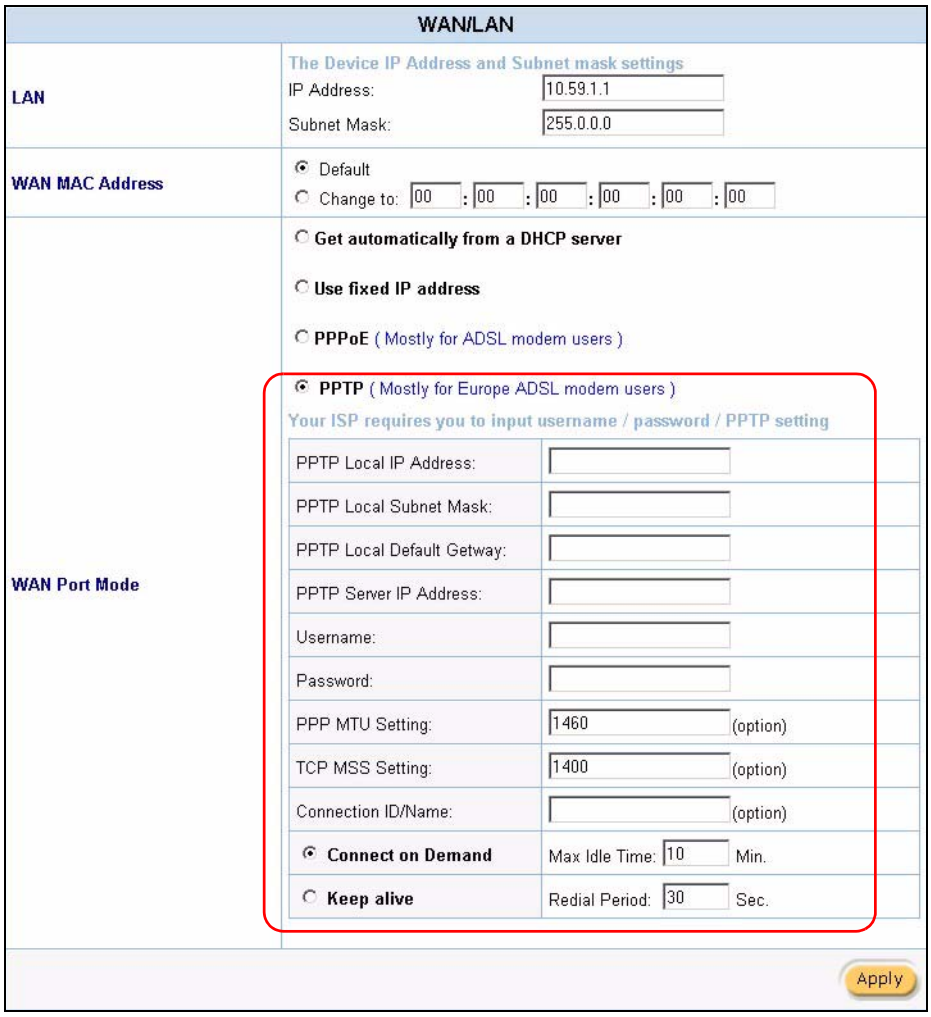
FIELD	DESCRIPTION
Username	Enter the user name exactly as assigned by your ISP. If the name is assigned in the form user@domain where domain identifies a service name, then enter both components exactly as given.
Password	Enter the password associated with the user name above.
PPP MTU Setting	Enter the 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.

6.5.4 WAN Port Mode: 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 24 System Settings: WAN/LAN: PPTP



The following table describes the related fields in this screen.

Table 9 System Settings: WAN/LAN: PPTP

FIELD	DESCRIPTION
WAN Port Mode	
PPTP	Select this option to activate **PPTP** support. Refer to Section 6.5.4 on page 66 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).

Table 9 System Settings: WAN/LAN: PPTP (continued)

FIELD	DESCRIPTION
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.

CHAPTER 7
Server

This chapter shows you how to configure the internal web server and set up DHCP settings and email server redirect on the VSG..

7.1 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.

7.1.1 Public and Private Address Assignment

When you configure the VSG as a DHCP server, you can set the VSG to assign private or public IP addresses to subscriber computer(s) connected to the LAN port.

In most cases, the VSG assigns private IP address to subscriber computer(s) connected on the LAN. When the subscribers access the Internet, NAT is applied. This allows multiple computers to share one Internet connection.

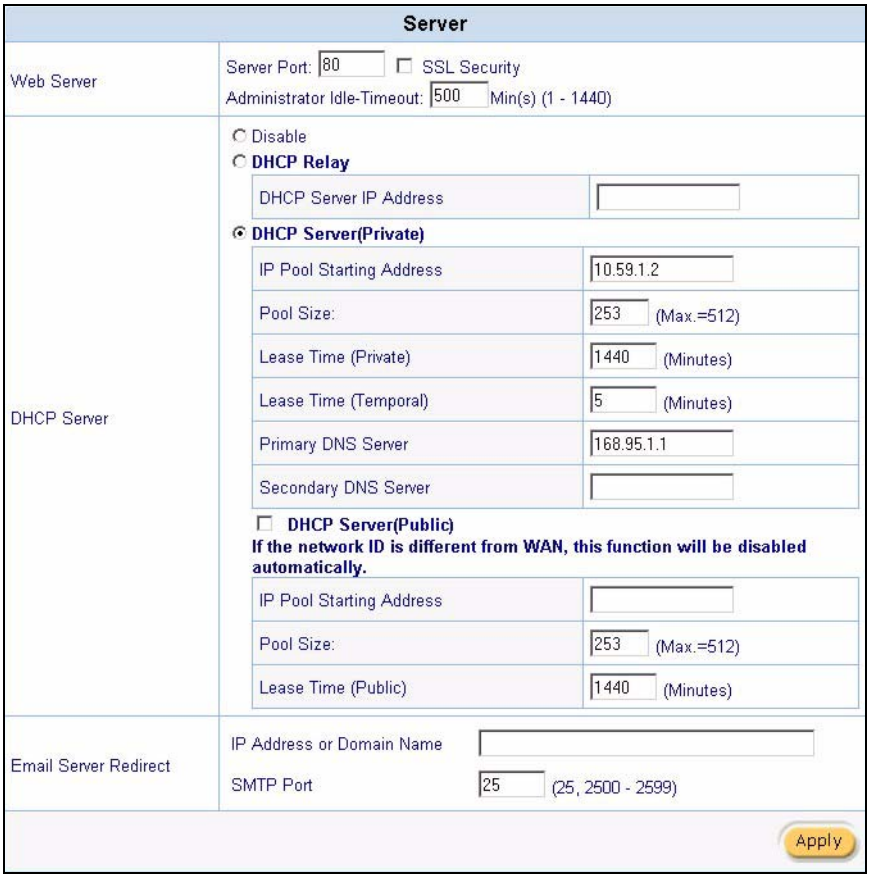
With public IP address assignment through DHCP, the VSG assigns public IP addresses to subscribers connected on the LAN. In this case, the VSG works as a bridge and NAT is NOT applied on the traffic. However, you need to obtain multiple public IP addresses (one for the VSG and one for each computer) from your ISP before you can use this feature.

7.1.2 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 Settings** and **Server** to display the screen as shown next.

Figure 25 System Settings: Server



The following table describes the labels in this screen.

Table 10 System Settings: 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	Security Secure Socket Layer (SSL) security allows you to create a secure connection between the VSG and the client computer(s). Refer to Chapter 31 on page 206 for more information. Select this option to activate SSL security. By default, SSL login security is disabled.

Table 10 System Settings: Server (continued)

LABEL	DESCRIPTION
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.
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 network configuration 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 (Private)	Select this option to set the VSG to assign network information (such as IP address, DNS information etc.) to Ethernet device(s) connected to the **LAN** port. This is the default setting.
IP Pool Start Address	Enter the first of the continuous addresses in the IP address pool. The default is **10.59.1.2** (based on the default management LAN IP address of **10.59.1.1**).
Pool Size	This field specifies the size or count of the IP address pool. Enter a number not greater than 512.
Lease Time (Private)	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.
DHCP Server (Public)	Select this option if you want to assign public IP address(es) to the computer(s) connected on the LAN port. The VSG does not apply NAT on traffic using public IP address assigned on the LAN. **Note:** You must obtain more than one public IP address from your ISP. You need to configure a billing profile with the public service type (see Section 10.1.1 on page 88).
IP Pool Start Address	Enter the first of the continuous addresses in the public client IP address pool. Make sure the IP pool addresses are in the same range as the WAN IP address of the VSG. If they are in different IP ranges, this feature is disabled. If you are given a range of public IP addresses, do not include the VSG's WAN IP address in the address pool.
Pool Size	This field specifies the size or count of the IP address pool. Enter a number not greater than 512.
Lease Time (Public)	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.
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.

Table 10 System Settings: Server (continued)

LABEL	DESCRIPTION
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 8
NAT Pool

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

8.1 NAT Overview

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.

8.1.1 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.

8.1.2 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).

8.1.3 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.

8.1.4 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 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.

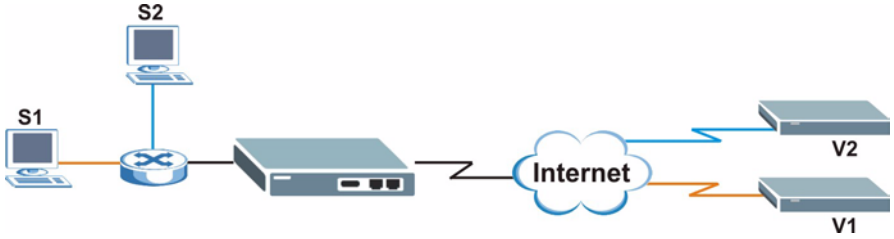
8.2 NAT Examples

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

8.2.1 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[1]. In this case, the VSG performs One-to-One IP address translation on the WAN.

Figure 26 NAT Example: One-to-One



The following table shows the address mapping.

Table 13 NAT Example: One-to-One

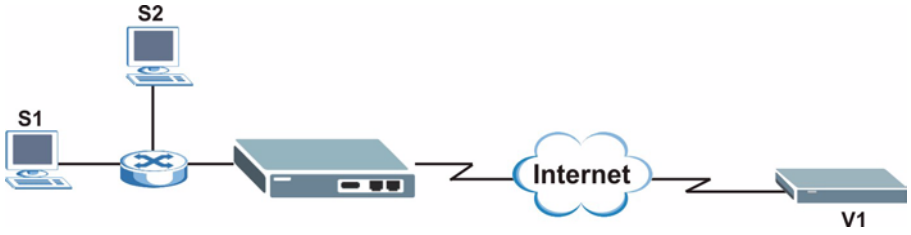
SUBSCRIBER	ORIGINAL SOURCE IP	TRANSLATED SOURCE IP
S1	10.59.1.2	211.21.21.2
S2	10.59.1.3	221.21.21.3

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

8.2.2 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 27 NAT Example: Many-to-One



The following table shows the address mapping.

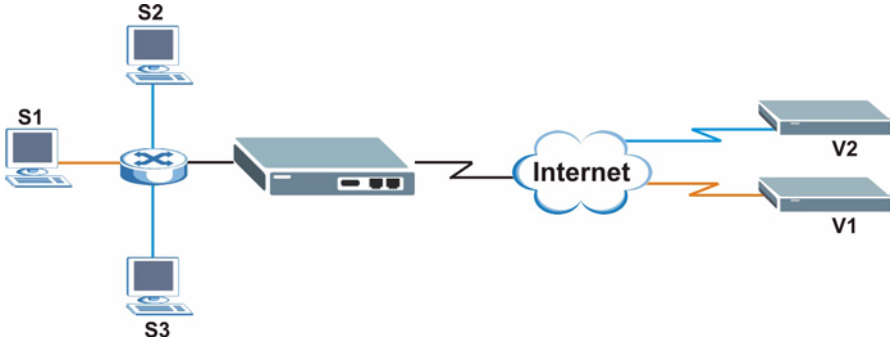
Table 14 NAT Example: Many-to-One

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

8.2.3 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 28 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

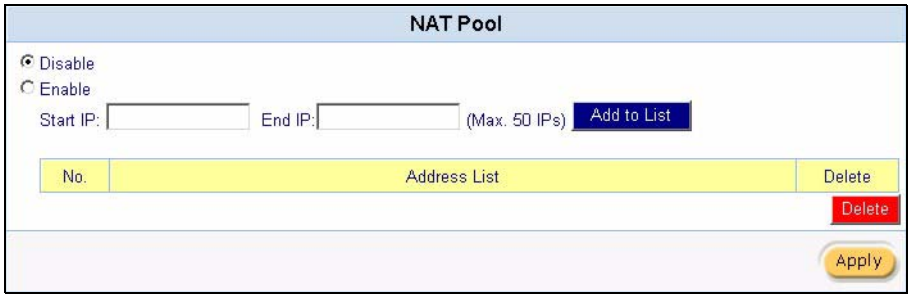
8.3 NAT Pool Setup

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

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 Settings** and **NAT Pool** in the navigation panel. A screen displays as shown next.

Figure 29 System Settings: NAT Pool



The following table describes the labels in this screen.

Table 16 System Settings: 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.

Table 16 System Settings: NAT Pool (continued)

LABEL	DESCRIPTION
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 three 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 9 Authentication

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

9.1 Authentication Overview

You can set the VSG to authenticate subscriber 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.

9.1.1 User Agreement

In cases where authentication is not required and anyone can access the Internet through the VSG, you can set the VSG to redirect client users to an Internet service usage agreement page. Users *must* accept the service usage agreement before they can access the Internet.

9.1.2 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 (in the local hotel network or the remote network). The CAS performs both user authentication and accounting.

Figure 30 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.

9.1.3 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.

9.1.4 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.

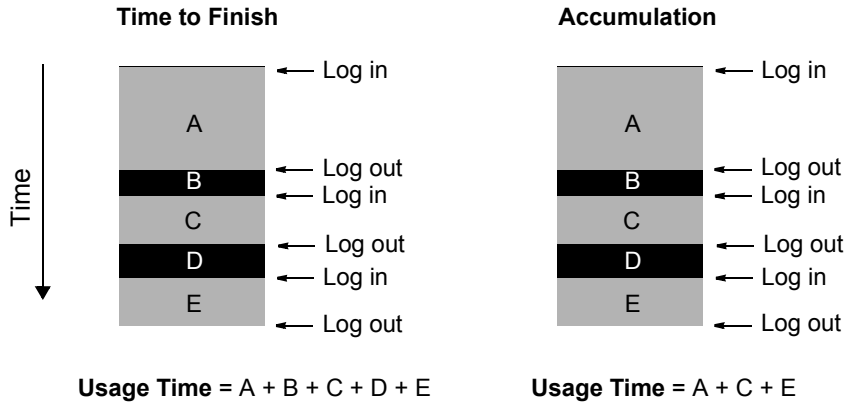
9.1.4.1 RADIUS Accounting

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

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 15-minute meeting. Then he only has 25 minutes left on his account.

Figure 31 Accounting Usage Time



9.1.4.2 Vendor Specific Attribute

With RADIUS 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

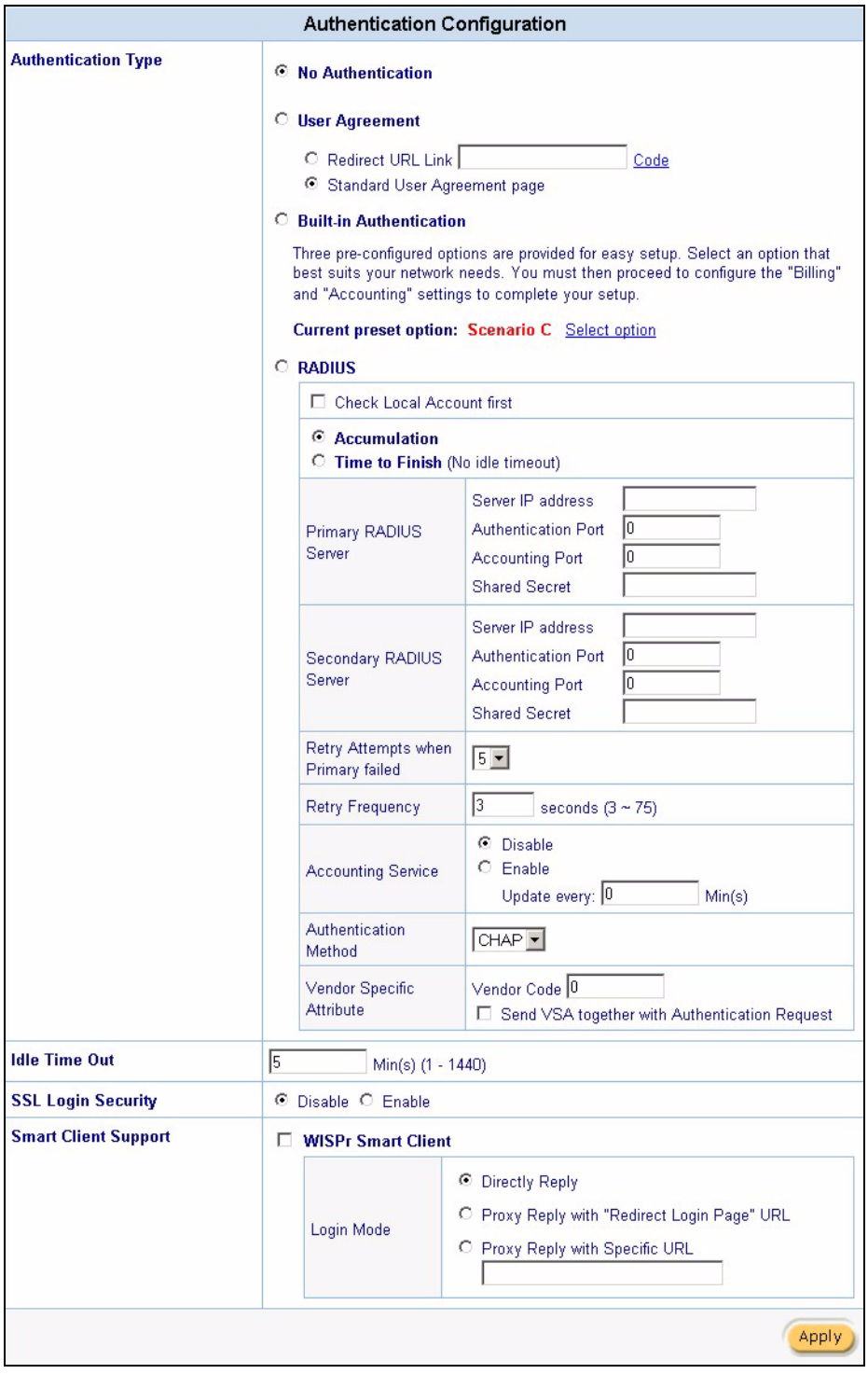
Note: Before you can make use of these functions on the VSG, configure the proprietary VSAs on the RADIUS server. Refer to the documentation that comes with your RADIUS server for more information.

See Appendix D on page 242 for more information on the VSAs.

9.2 Authentication Configuration

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

Figure 32 System Settings: Authentication



The following table describes the labels in this screen.

Table 17 System Settings: 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	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 option to use the pre-configured user agreement page on the VSG.
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.
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 33 on page 86).
RADIUS	Select this option to authenticate subscribers using a remote RADIUS server. Then configure the following fields.
Check Local Account First	Select this option to have the VSG authenticate a subscriber using the local user database first. If the account information is not found, then the VSG authenticates subscribers using the RADIUS server(s) specified. Clear this check box to have the VSG authenticate subscribers using the RADIUS server(s) only.
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.
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.

Table 17 System Settings: Authentication (continued)

LABEL	DESCRIPTION
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.
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 31 on page 206 for more information.
Smart Client Support	WISPr (WiFi Internet Service Provider Roaming) allows roaming subscribers to access different service provider networks for seamless network connection.
WISPr Smart Client	Select this option to allow the VSG to accept incoming roaming subscribers. Clear this check box to disable this feature. Your access network is not available for roaming subscribers.
Login Mode	Specify a login method for roaming subscribers. Select **Replay Directly** to display the VSG's default login screen. Select **Proxy Reply with "Redirect Login Page" URL** to redirect roaming subscribers to the same login screen as specified in the **Login Page** screen (see Section 15.2 on page 120 for more information). Select **Proxy Reply with "Redirect Login Page" URL** and enter the URL of the login page for roaming subscribers only.
Apply	Click **Apply** to save the changes.

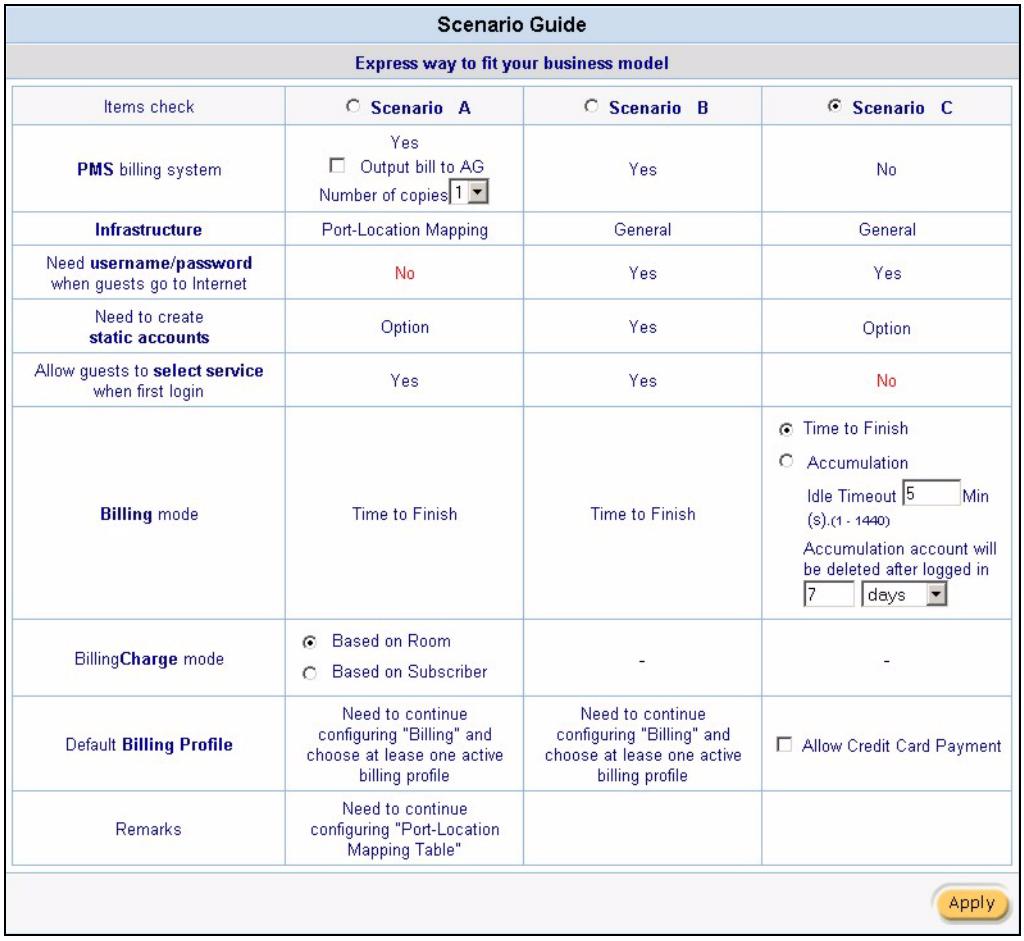
9.2.1 Scenario Options

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 33 System: Authentication: Scenario Guide



Scenario Guide

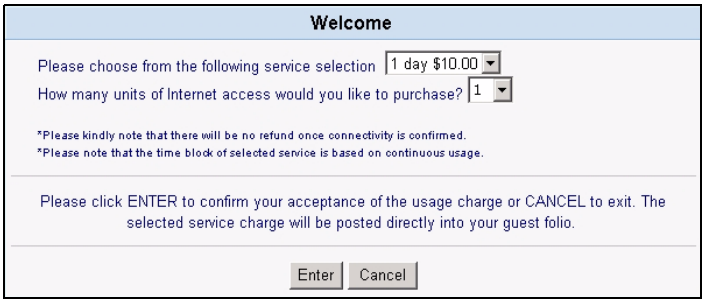
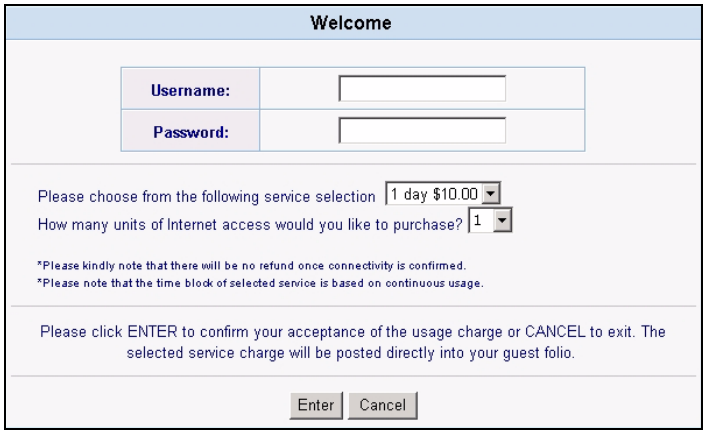
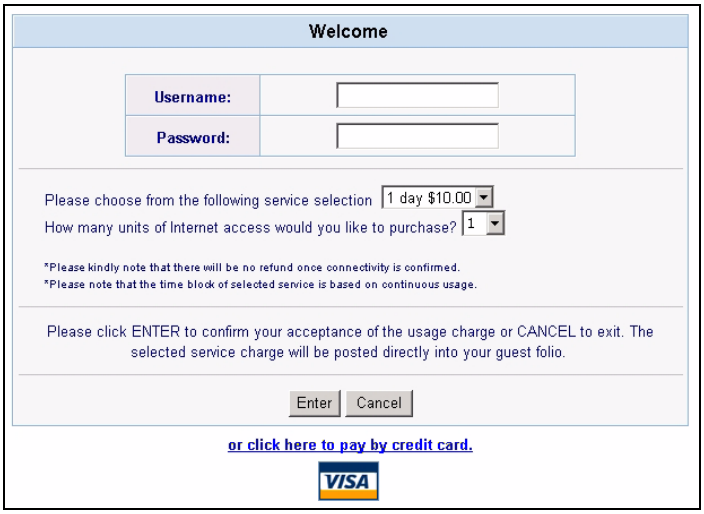
Express way to fit your business model

Items check	Scenario A	Scenario B	Scenario C
PMS billing system	Yes Output bill to AG Number of copies 1	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 34** 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 35** Subscriber Login: Scenario B 
Scenario C	Select this option to use the VSG's built-in or credit card billing function. No PMS device is needed.	**Figure 36** Subscriber Login: Scenario C 

CHAPTER 10
Billing

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

10.1 Billing Overview

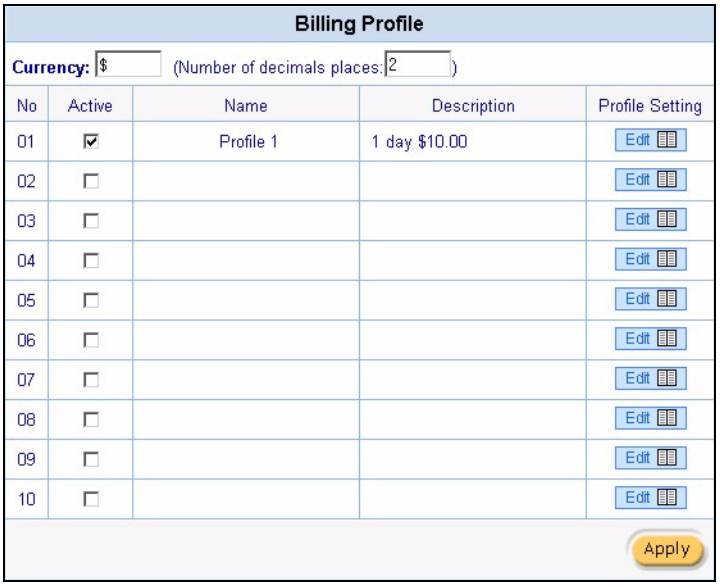
A billing profile contains information such as time unit, unit cost and/or account expiration time. You must associate a subscriber account with a billing profile.

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.

10.1.1 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 37 System Setting: Billing: Billing Profile



The following table describes the labels in this screen.

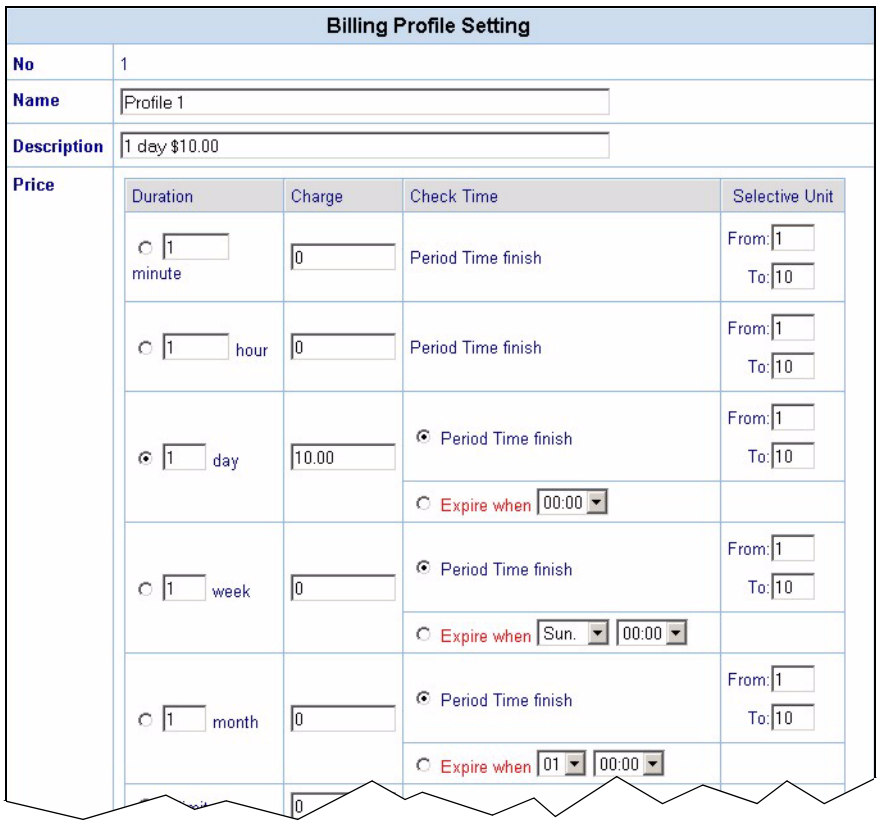
Table 19 System Setting: Billing: Billing Profile

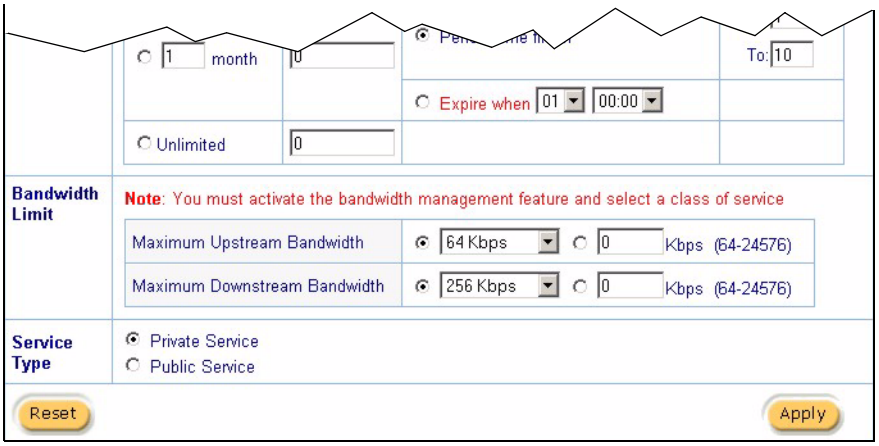
LABEL	DESCRIPTION
Currency	Specify the type of currency and/or dollar sign for billing.
Number of decimal places	Specify the number of decimal places for the currency. The default is **2**.
No	This field displays the index number of a billing profile.
Active	Select this check box to enable the billing 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 10.1.2 on page 89 for more information.
Apply	Click **Apply** to save the changes.

10.1.2 Configuring 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 38 System Settings: Billing: Billing Profile Setting





The following table descries the labels in this screen.

Table 20 System Settings: 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	
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 9.1.4 on page 81 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 on page 144. 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.

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

LABEL	DESCRIPTION
Service Type	Select **Private Service** to set the VSG to assign private IP addresses to the subscribers connected on the LAN. Select **Public Service** to set the VSG to assign public IP addresses to the subscribers connected on the LAN. You must have more than one public IP address from your ISP. Configure private and public DHCP IP address assignment in the **Server** screen. Refer to Section 7.1.1 on page 70 for more information.
Reset	Click **Reset** to restart configuring this screen again.
Apply	Click **Apply** to save the changes.

10.2 PMS (Property Management System)

Many hotels use a PMS device to perform in-room billing for services (such as room services, 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 on page 38), then configure the PMS settings on the VSG.

10.2.1 Port-Location Mapping

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

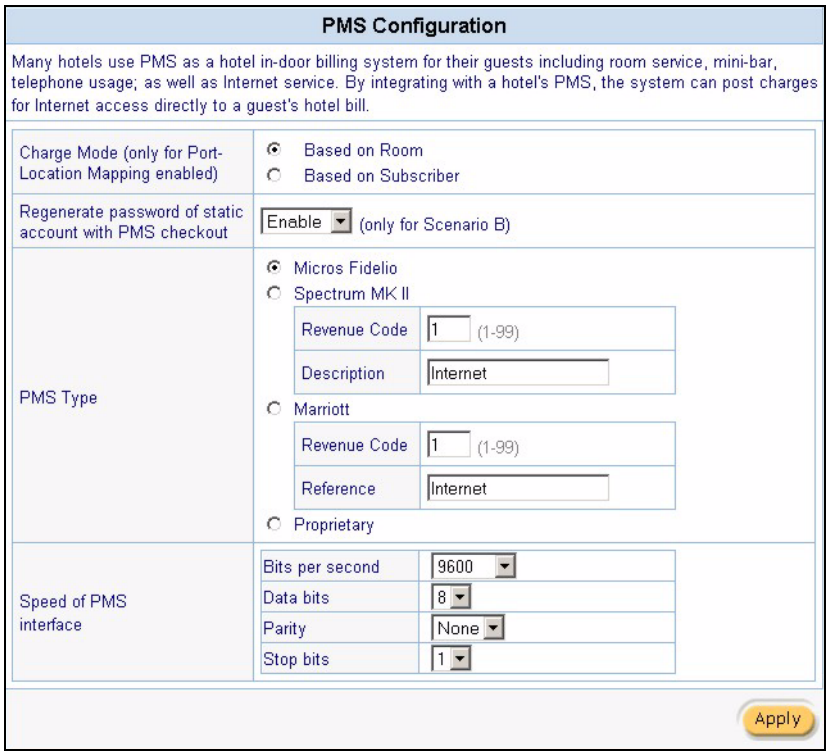
Select **Based on Room** when location is important. If a subscriber disconnects from one location and reconnects in another location, the VSG prompts for the user name and password again.

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

10.2.2 PMS Configuration

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

Figure 39 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 13 on page 112.
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 32 on page 83). 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**.
Micros Fidelio	
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.

Table 21 System Setting: Billing: PMS Configuration (continued)

LABEL	DESCRIPTION
Spectrum MK II	
Revenue Code	Enter a revenue code (between 01 and 99).
Description	Enter a description to identify the service. For example, Internet.
Marriott	
Revenue Code	Enter a revenue code (between 01 and 99).
Reference	Enter a description to identify the service. For example, Internet.
Proprietary	Select this option if you are using a proprietary PMS system.
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.

10.3 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 11 on page 94.
- For dynamic accounts, refer to Chapter 12 on page 104.

CHAPTER 11
Static Subscriber Accounts

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

11.1 Static Subscriber Account Overview

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.

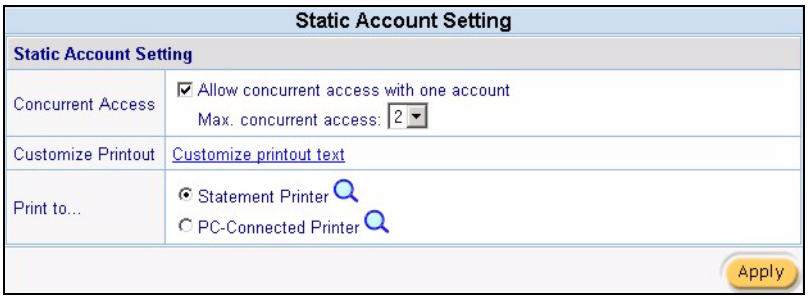
The following figure shows the links for accessing the static account configuration screens when you click **System Settings**, **Accounting** and **Static Accounts.**

Figure 40 Static Account: Links

11.2 Global Static Account Settings

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

Figure 41 Static Account Settings: Global Settings



The following table describes the labels in this screen.

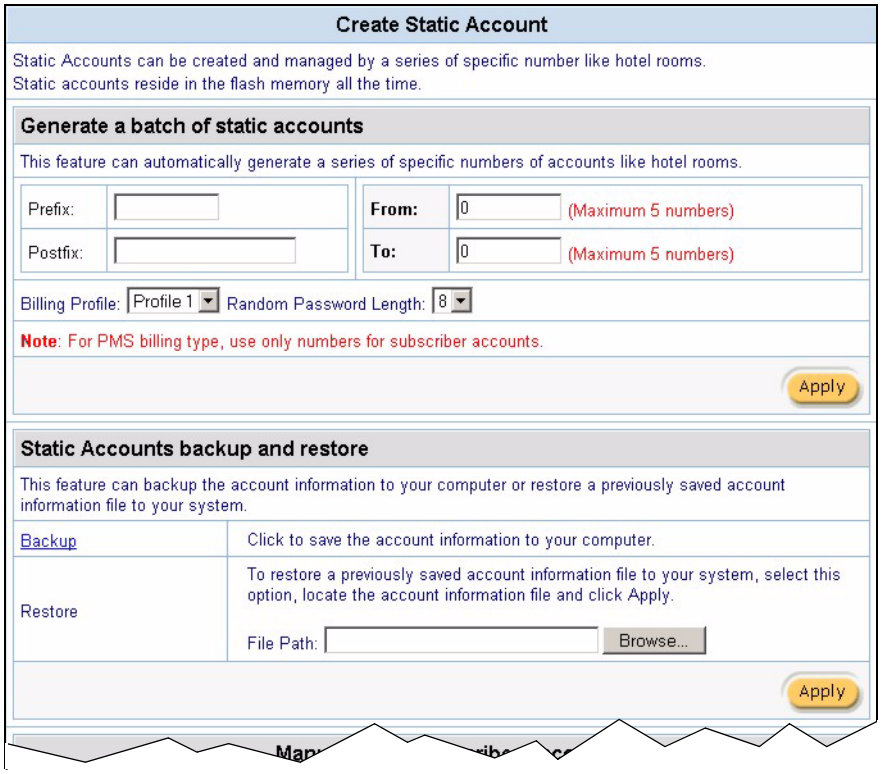
Table 22 Static Account Settings: Global Settings

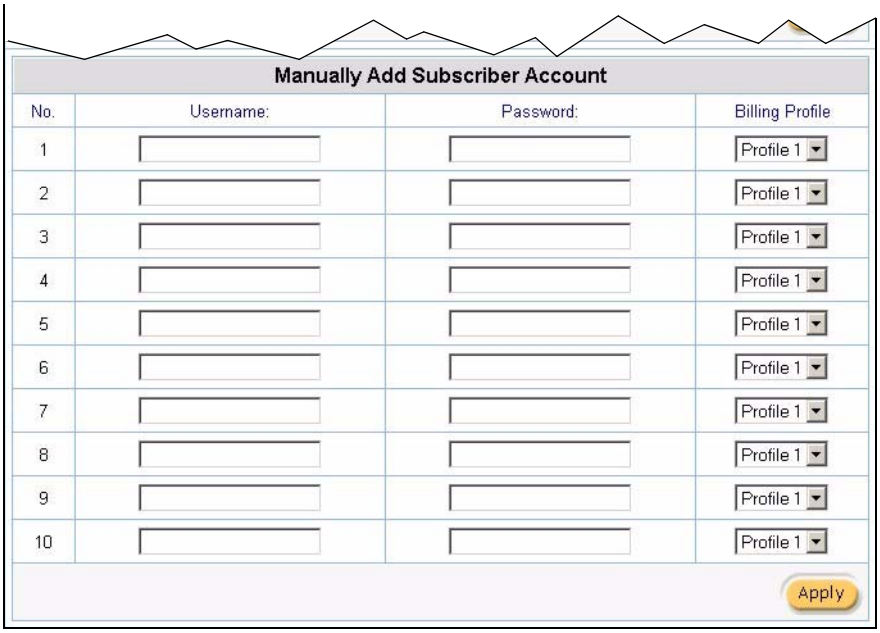
LABEL	DESCRIPTION
Concurrent Access	Select **Allow concurrent access with one account** to allow more than one users to access the Internet using the same account at the same time. Then specify the number of concurrent users from the **Max. concurrent access** drop-down list box. The default number of concurrent access is **2** users per account.
Customize Printout	Click **Customize printout text** to set the account printout page. Refer to "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.

11.3 Creating a Static Account

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

Figure 42 System Settings: Create Static Subscriber Account



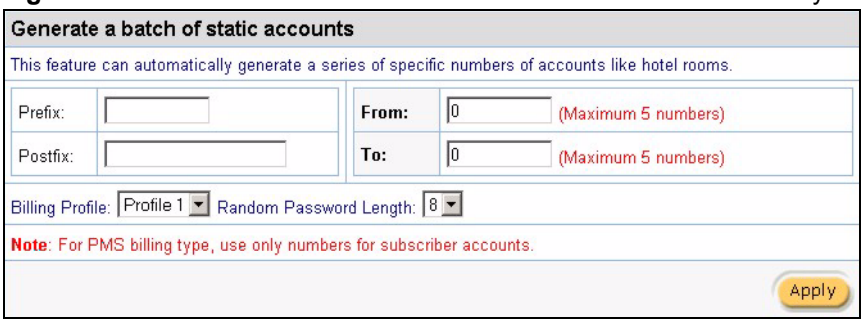


There are two ways to create static subscriber accounts as described in the following sections.

11.3.1 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 43 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.

Table 23 Create Static Subscriber Account: Generate Automatically (continued)

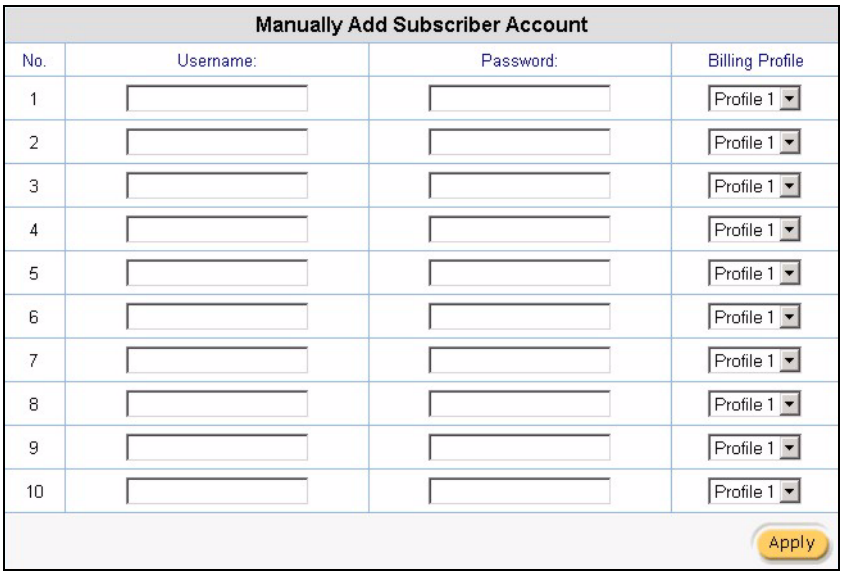
LABEL	DESCRIPTION
To	Enter the ending number of the range of static accounts.
Billing Profile	Select a predefined billing profile from the drop-down list box. **Note:** This drop-down list box displays active profiles only. Refer to Section 10.1.1 on page 88 for more information.
Random Password Length	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 11.6 on page 102.

11.3.2 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 44 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.

Table 24 Create Static Subscriber Account: Manual (continued)

LABEL	DESCRIPTION
Password	Enter the password associated with the user name above. You may also set the VSG to generate a password automatically (refer to Section 11.5 on page 100).
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 10.1.1 on page 88 for more information.
Apply	Click **Apply** to create the static account(s) and save the changes.

11.4 Static Account List Backup and Restore

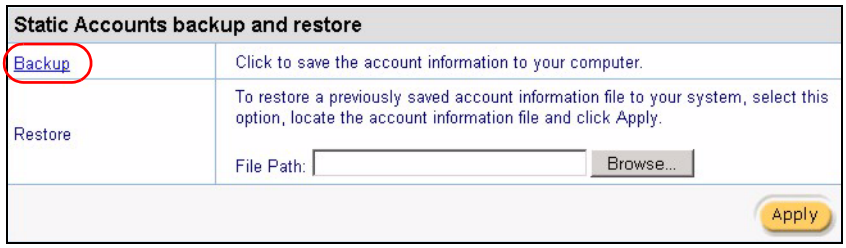
You can back up and restore static account information in the **Create Static Account** screen.

11.4.1 Backing Up a Static Account List

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

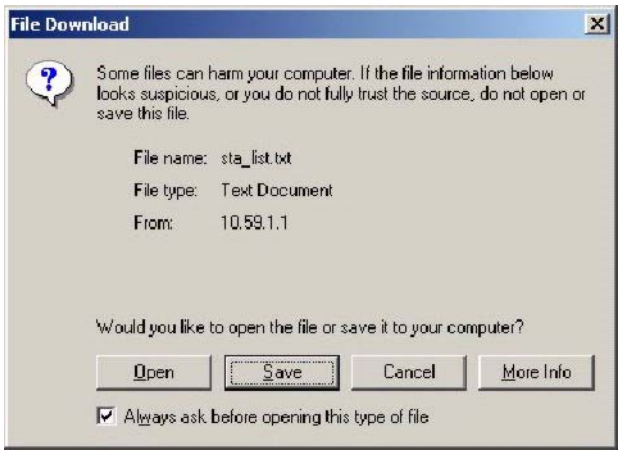
1. In the **Create Static Subscriber Account** screen and scroll down to the **Static Accounts backup and restore** section.
2. Click **Backup**.

Figure 45 Static Subscriber Account: Backup and Restore



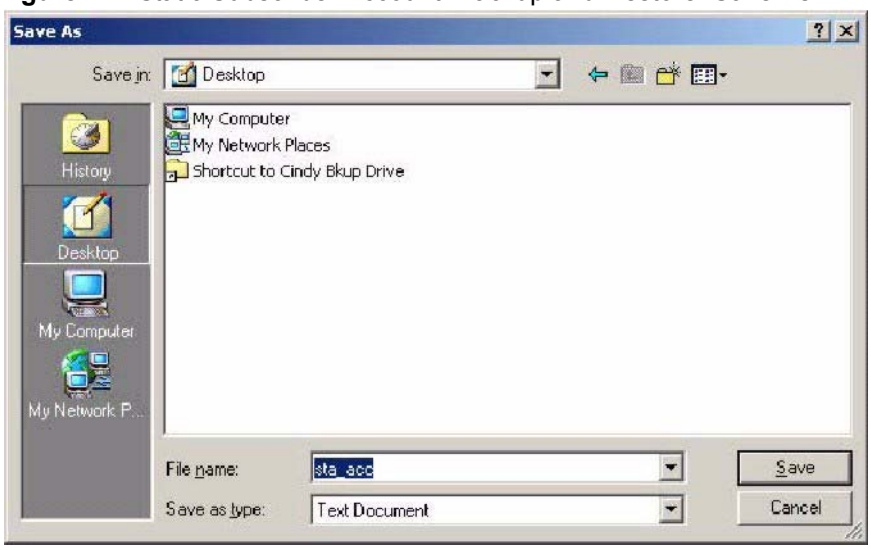
3. A **File Download** window displays. Click **Save**.

Figure 46 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 47 Static Subscriber Account: Backup and Restore: Save As



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

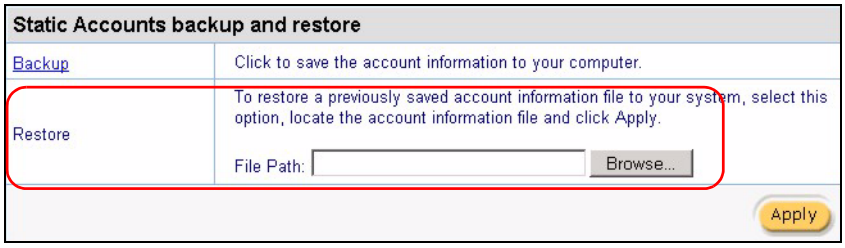
11.4.2 Restoring a Static Account List

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 48 Static Subscriber Account: Backup and Restore



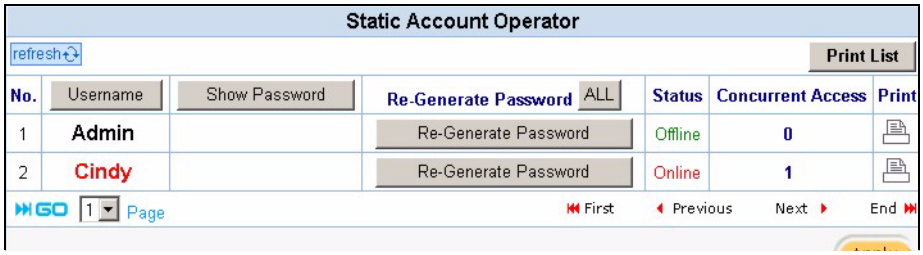
2 Specify the location and/or file name of the account information file in the **File Path** field or click **Browse** to locate it.

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

11.5 Editing Subscriber Accounts

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

Figure 49 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**).

Table 25 Static Account Operator (continued)

LABEL	DESCRIPTION
Concurrent Access	This field displays how many computers are logged in using this account.
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.

11.5.1 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.

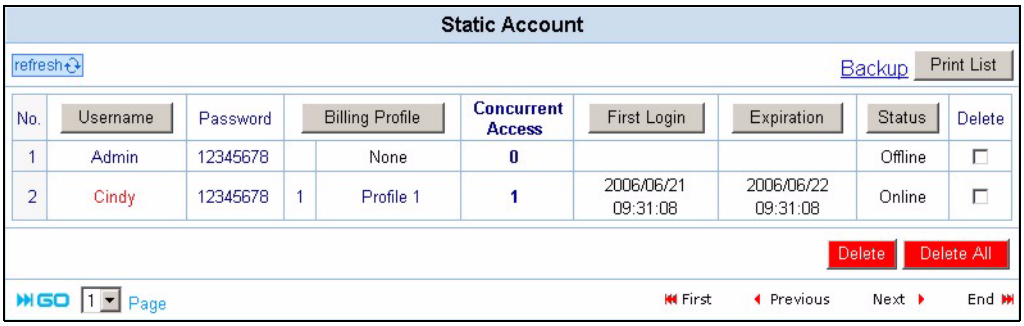
Refer to Section 15.4 on page 129 to configure the printout page.

Figure 50 Static Account Information Printout Example

11.6 Viewing the Static Account List

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

Figure 51 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 12
Dynamic Subscriber Accounts

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

12.1 Dynamic Subscriber Account Overview

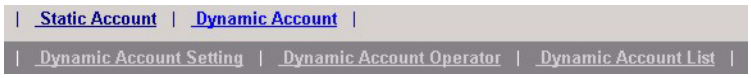
Unlike a static account, a dynamic account is not permanent. Once the time allocated to a dynamic account is used up or a dynamic account remains un-used after the expiration time, the account is deleted from the account list automatically.

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 Settings**, **Accounting** and **Dynamic Account**.

Figure 52 Dynamic Account: Links



12.2 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.

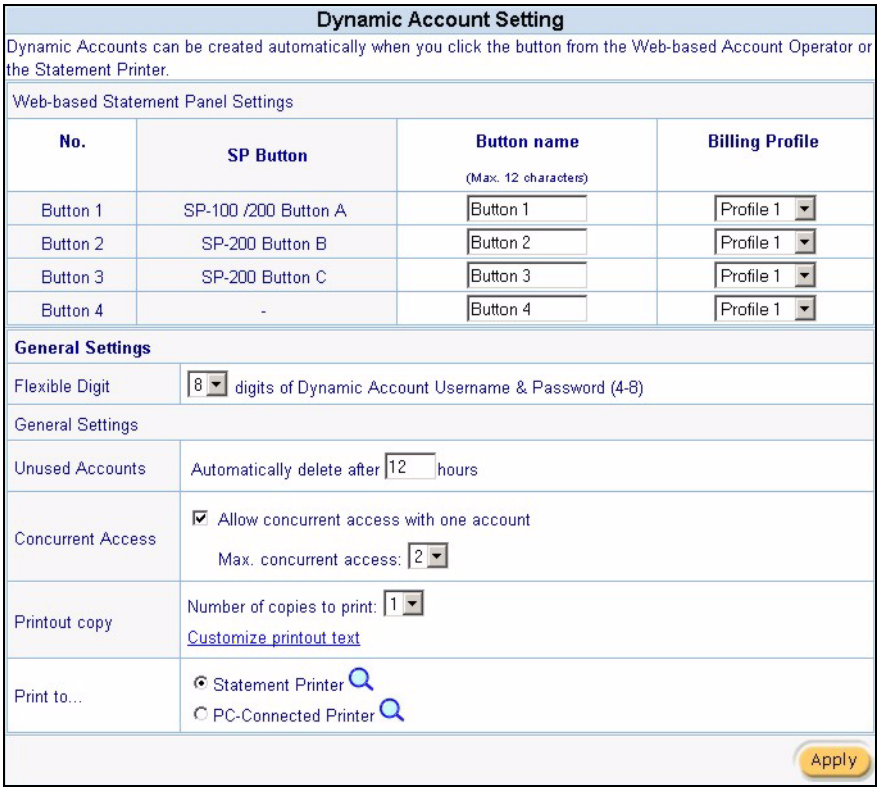
Before you create dynamic accounts, you must specify the billing profile(s), the number of printout copies and the number of hours before the VSG automatically deletes an inactive account. Refer to the related sections for more information.

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 Settings**, **Accounting**, and click the **Dynamic Account Setting** link to display the screen as shown next.

Figure 53 Accounting: Dynamic Account Setting



The following table describes the labels in this screen.

Table 27 Accounting: Dynamic Account Setting

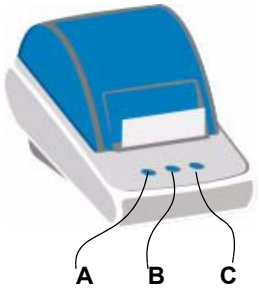
LABEL	DESCRIPTION
Web-based Statement Panel Settings	
No.	This read-only field displays the button index number (Button 1 .. 4). The button numbers correspond to the buttons displayed in the **Dynamic Account Operator Panel** screen. Refer to Section 12.3.1 on page 106 for more information.
SP Button	This read-only field displays the button label on the statement printer. Refer to Figure 54 on page 106. Refer to Section 12.3.2 on page 107 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 55 on page 107).

Table 27 Accounting: Dynamic Account Setting (continued)

LABEL	DESCRIPTION
Billing Profile	Select a billing profile to associate to the web-based SP buttons from the drop-down list box. Only the activated billing profiles are displayed. Refer to Section 10.1.1 on page 88 for more information on creating billing profiles.
General Settings	
Flexible Digit	Specify how many characters/digits the VSG uses for the generated account username and password.
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 Section 15.4 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 54 SP-200 Button Labels



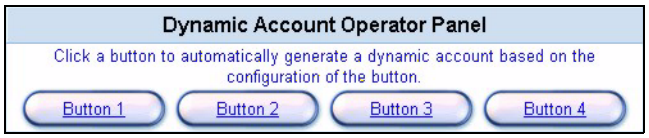
12.3 Creating Dynamic Accounts

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

12.3.1 Dynamic Account Generation Using the Web Configurator

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

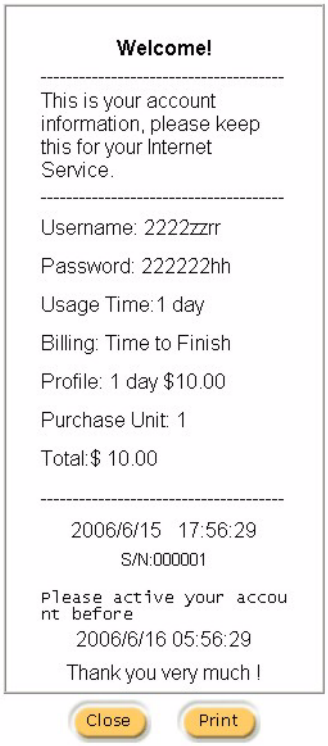
Figure 55 Dynamic Account Operator Panel



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 Section 15.4 on page 129 on account printout to configure the printout page.

Figure 56 Dynamic Account Information Printout Example



12.3.2 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 on page 39 for more information.
2. Configure the **Console Type** field in the **System** screen. Refer to Section 5.1 on page 56.
3. Turn on the statement printer and make sure there is printing paper.

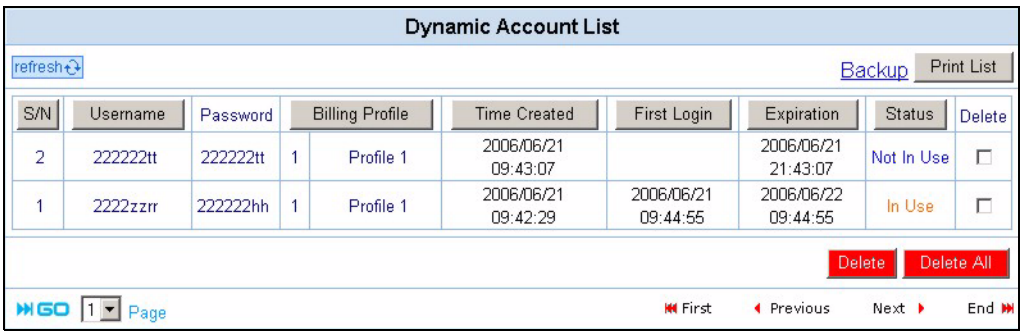
4 Press the button on the statement printer. A dynamic account is generated and the account information should be printed. Refer to Figure 79 on page 133 for a printout example.

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 12.2 on page 104.

12.4 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 57 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 12.4.1 on page 109.
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.
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.

Table 28 Dynamic Account List (continued)

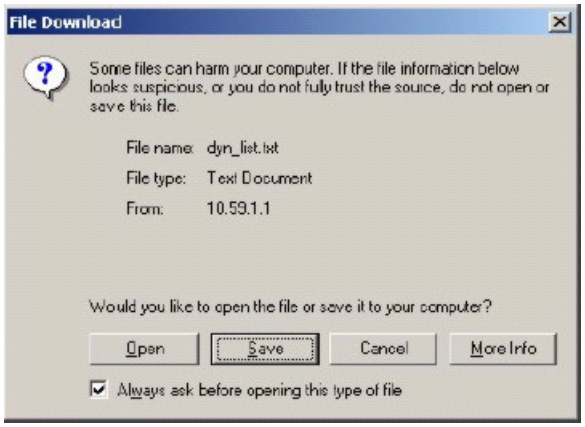
LABEL	DESCRIPTION
Status	This field displays **In Use** when the account is currently in use. Otherwise it displays **Not In Use**.
Delete	Click **Delete All** to remove all accounts. Click **Delete** to remove the selected account.
Go .. page	Select a page number from the drop-down list box to display 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.

12.4.1 Backing Up the Dynamic Account List

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

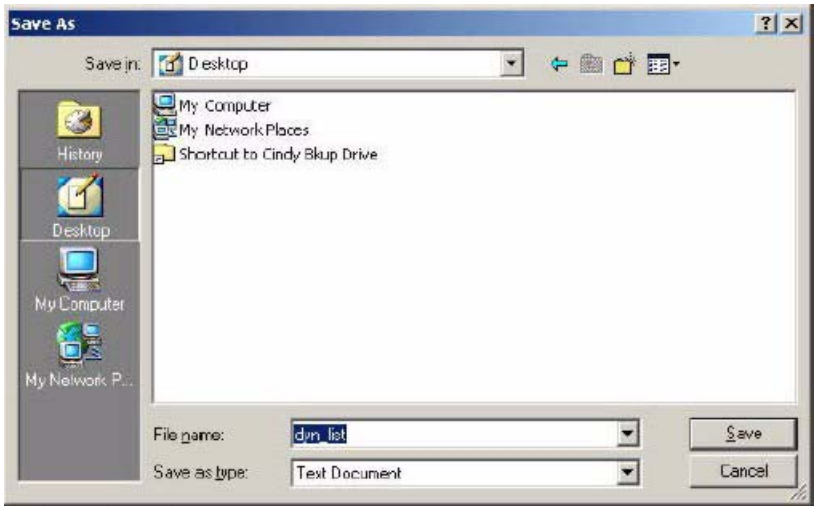
1. Display the **Dynamic Account Setting** screen (refer to Figure 53 on page 105).
2. Click **Dynamic Account List** (refer to Figure 57 on page 108).
3. Click the **Backup** link.
4. A **File Download** window displays. Click **Save**.

Figure 58 Dynamic Account List Backup: File Download



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

Figure 59 Dynamic Account List Backup: Save As



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

CHAPTER 13
Port-Location Mapping

This chapter describes the port-location mapping feature.

13.1 Port-Location Mapping Overview

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.

13.2 Configuring Port-Location Mappings

Note: Make sure you select **Built-in Authentication** and **Scenario A** in the **Authentication** screen (see Figure 32 on page 83) and configure the **PMS Configuration** screen (see Figure 39 on page 92).

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

Figure 60 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.
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.

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

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

CHAPTER 14
Credit Card

This chapter shows you how to configure secure online credit card service on the VSG.

14.1 Credit Card Overview

Your VSG is integrated with various online secure credit card billing services that allow you to process credit card transactions via the Internet.

Note: You must register with a credit card billing service provider before you can configure the VSG to handle credit card transactions.

14.1.1 How Credit Card Billing Works

The following summarizes the process of a customer paying for a subscriber account with a credit card.

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

14.1.2 Configuration Steps

Do the following to provide online credit card billing service.

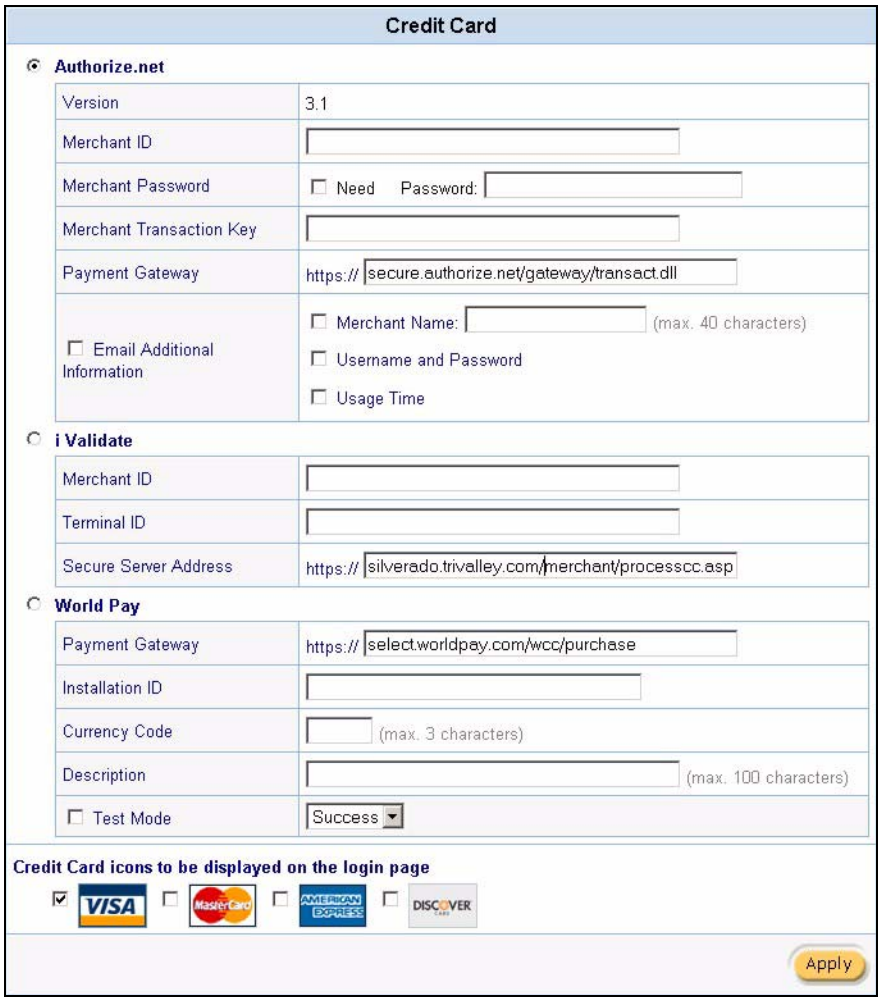
1. Obtain a payment account from Authorize.net, iValidate or WorldPay.
2. In the **Authentication** screen, select **Built-in Authentication**.
3. Click **Select option** to display the **Scenario Guide** screen. Select **Scenario C** and select the **Allow Credit Card Payment** option.
4. Enter your payment account information in the **Credit Card** screen.
5. Configure the subscriber credit card information screen (see Section 15.6 on page 135 for more information).

14.2 Credit Card Billing Service Configuration

After you have registered a payment account with an online credit card billing service provider, set the payment account information in the **Credit Card** screen. If you are not using one of the credit card billing services supported on the VSG, then you cannot use credit card for billing.

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

Figure 61 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 if you have a payment account from Authorize.net.
Version	This is the (read-only) software version of the Authorize.Net payment gateway.
Merchant ID	Enter the ID 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	Then 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 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.
i Validate	Select this option if you have a payment account from iValidate.
Merchant ID	Enter the merchant ID number that you received from iValidate.
Terminal ID	Enter the terminal ID number that you received from iValidate.
Secure Server Address	Enter the address of the iValidate gateway. The default value is "https://silverado.trivalley.com/merchant/processcc.aspl". **Note:** You don't need to change this address unless instructed by iValidate administrator.
World Pay	Select this option if you have a payment account from WorldPay.
Payment Gateway	Enter the address of the WorldPay gateway. The default value is "https://select.worldpay.com/wcc/purchase". **Note:** You don't need to change this address unless instructed by WorldPay administrator.
Installation ID	Enter the payment account ID. Enter the unique reference number assigned by WorldPay. This is the number the VSG send to WorldPay in the payment process. You may get two WorldPay IDs, one for testing and one for payment processing.
Currency Code	Enter the code for the currency charged. For example, "USD".
Description	Enter a descriptive note about the purchase. For example, "Internet Access".
Test Mode	WorldPay provides you with a test account that allows you to test the credit card processing on your site. The test account works the same as the real account except that no funds are actually transferred. For more information, refer to the document on the WorldPay web site. Select **Test Mode** to use the account for testing purposes. Select **Success** to always simulate a successful credit card transaction. Select **Fail** to always simulate a failed credit card transaction.

Table 30 Advanced Setting: Credit Card (continued)

LABEL	DESCRIPTION
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 36 on page 87 for an example).
Apply	Click **Apply** to save the changes.

CHAPTER 15
Customization

This chapter shows you how to customize the subscriber login information, user agreement and credit card screens and account or bill printouts.

15.1 Customization Overview

Use the Customization screens to configure the subscriber login screen, the account information screen, credit card option screen, account printouts and bill printouts.

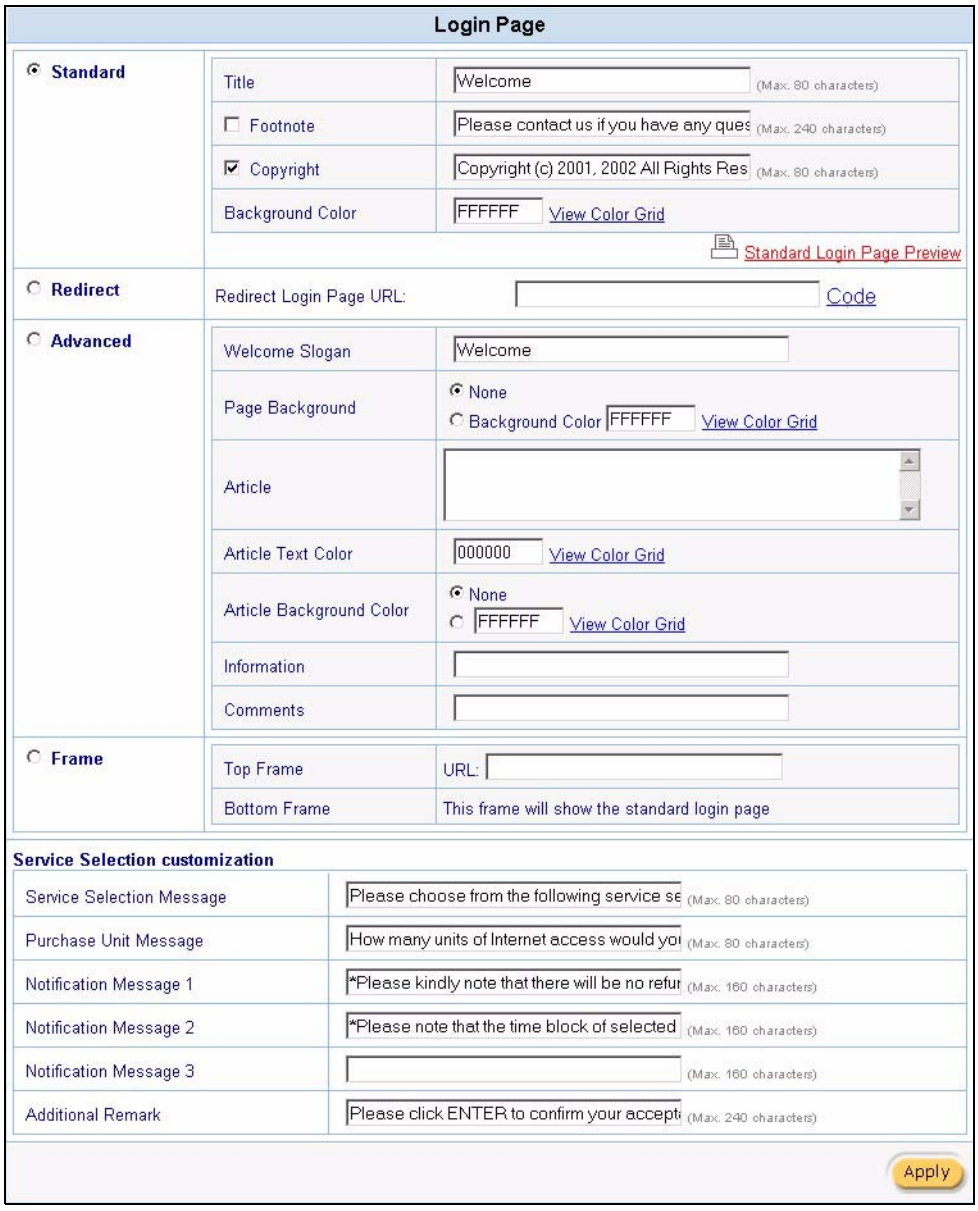
15.2 Login Screen

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 on page 149).

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

To customize the subscriber login screen, click **Advanced Settings** and **Customization** to display the screen as shown next.

Figure 62 Customization: Login



15.2.1 Standard 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 63 Customization: Login: Standard

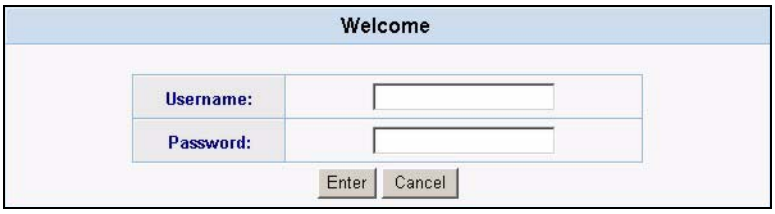
The following table describes the related labels in this screen.

Table 31 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 64 Subscriber Login Screen Example: Standard



Note: For credit card settings, refer to Chapter 14 on page 116.

15.2.2 Redirect 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 65 Customization: Login Screen: Redirect

The following table describes the related fields.

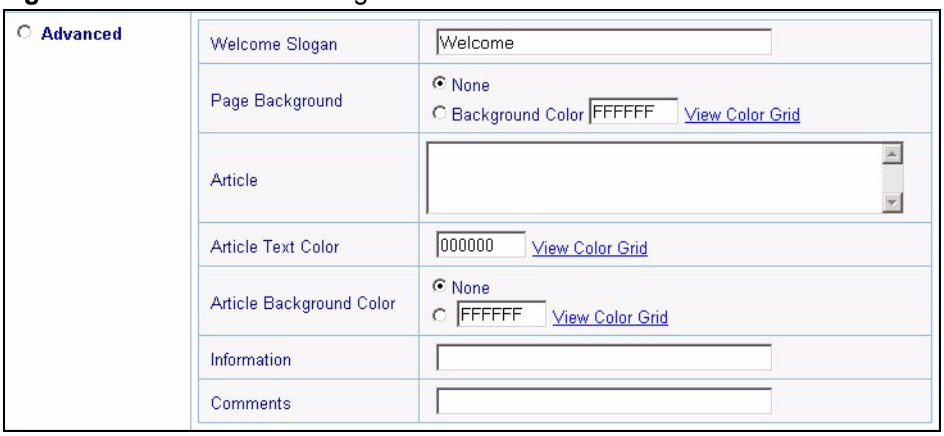
Table 32 Customization: Login Screen: Redirect

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.

15.2.3 Advanced 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 66 Customization: Login Screen: Advanced



The following table describes the related fields.

Table 33 Customization: Login Screen: Advanced

LABEL	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	Enter a block of text (up to 1024 characters long) in the text box. This is useful for advertisements or announcements.
Article Text Color	Select **None** to set the article text color of the login screen to white (the default). Select and set the color of the article text block 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.

Table 33 Customization: Login Screen: Advanced (continued)

LABEL	DESCRIPTION
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.
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.

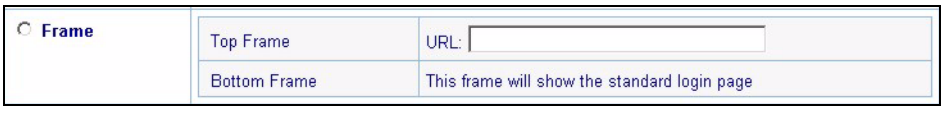
The following figure shows an example.

Figure 67 Subscriber Login Screen Example: Advanced

15.2.4 Framed 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 68 Customization: Login Screen: Frame



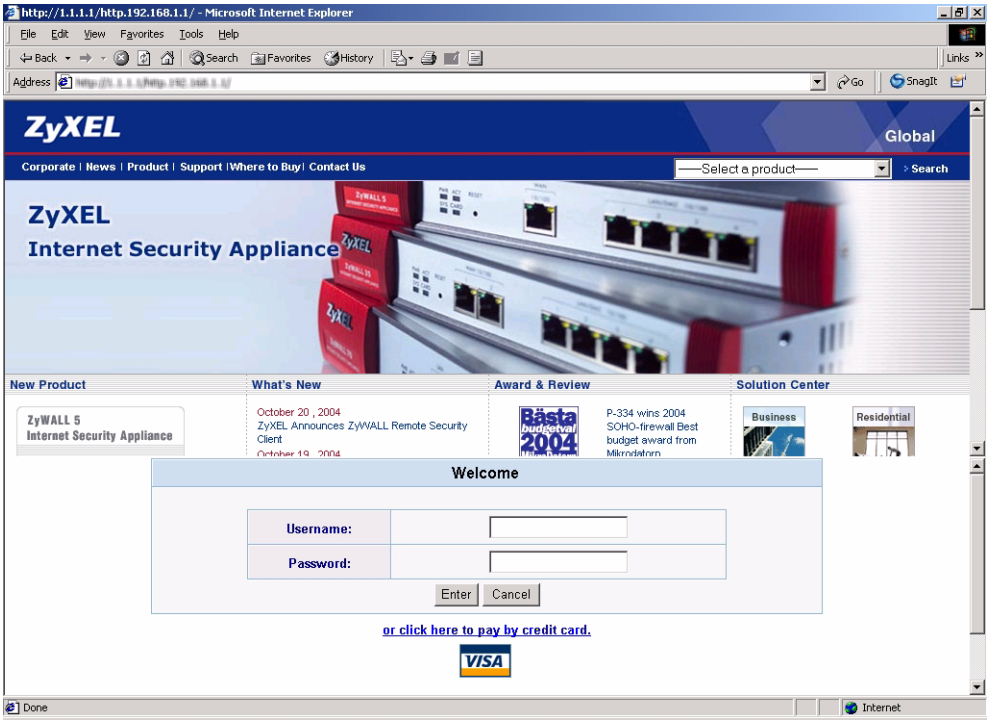
The following table describes the related fields.

Table 34 Customization: Login Screen: Frame

LABEL	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.

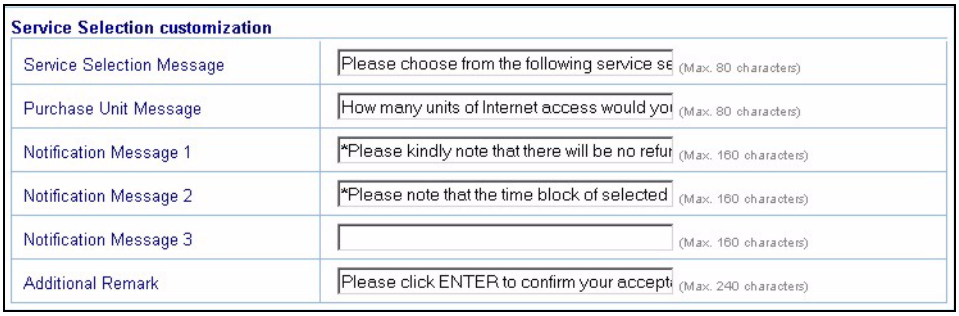
Figure 69 Subscriber Login Screen Example: Frame



15.2.5 Login Service Selection

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

Figure 70 Customization: Service Selection Customization



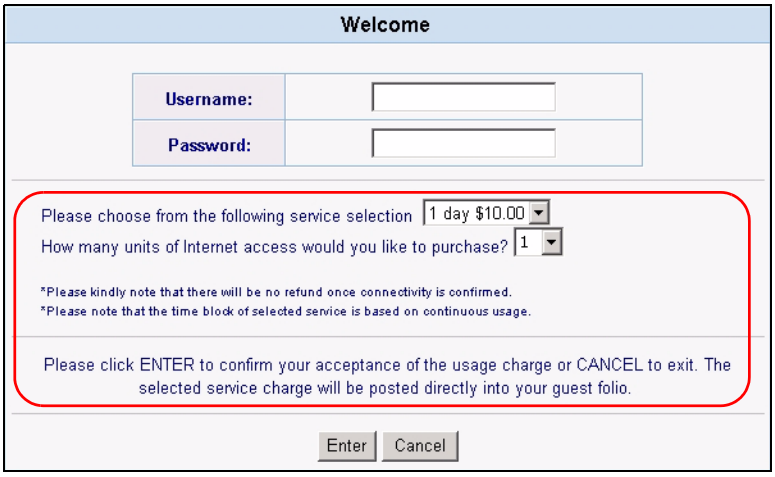
The following table describes the related labels.

Table 35 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 71 Subscriber Login Screen Example: Service Selection Messages



15.3 Information Window

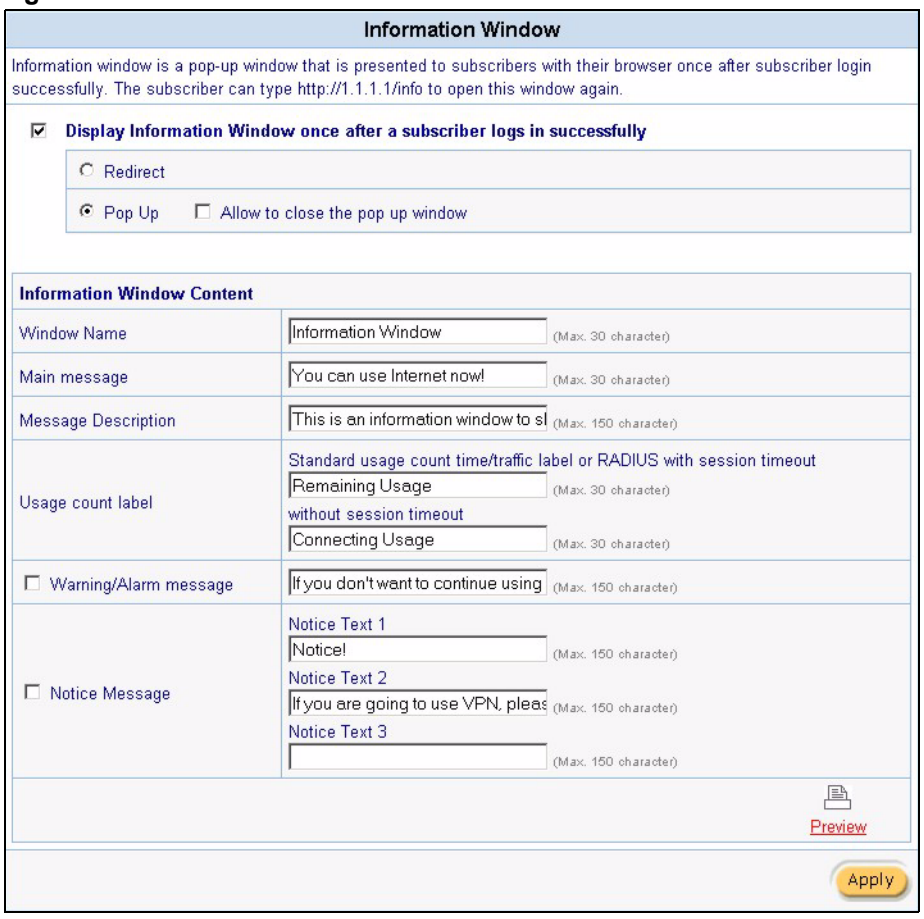
You can set the VSG to display an information window after a subscriber has successfully logged in. This information window shows the amount of time a subscriber has used or the time the subscriber still has to access the Internet. The subscriber information window varies depending on the billing and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

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

Figure 72 Customization: Information Window



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

Table 36 Customization: Information Window

LABEL	DESCRIPTION
Window Name	Enter a descriptive name (up to 30 characters) as the title of the window.
Display Information Window once after a subscriber logs in successfully	Select this option to display the information window on the subscriber's computer after a successful login. Clear this check box to disable this feature.
Redirect	Select **Redirect** to display the information in the same web browser screen.
Pop Up	Select **Pop Up** to display the information in a separate pop-up web browser screen. Select **Allow to close the pop up window** if you want to allow subscribers to close the information pop-up screen. Clear this check box to display the information pop-up screen all the time.
Information Window Content	
Window Name	Enter a descriptive name for the window title.
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.

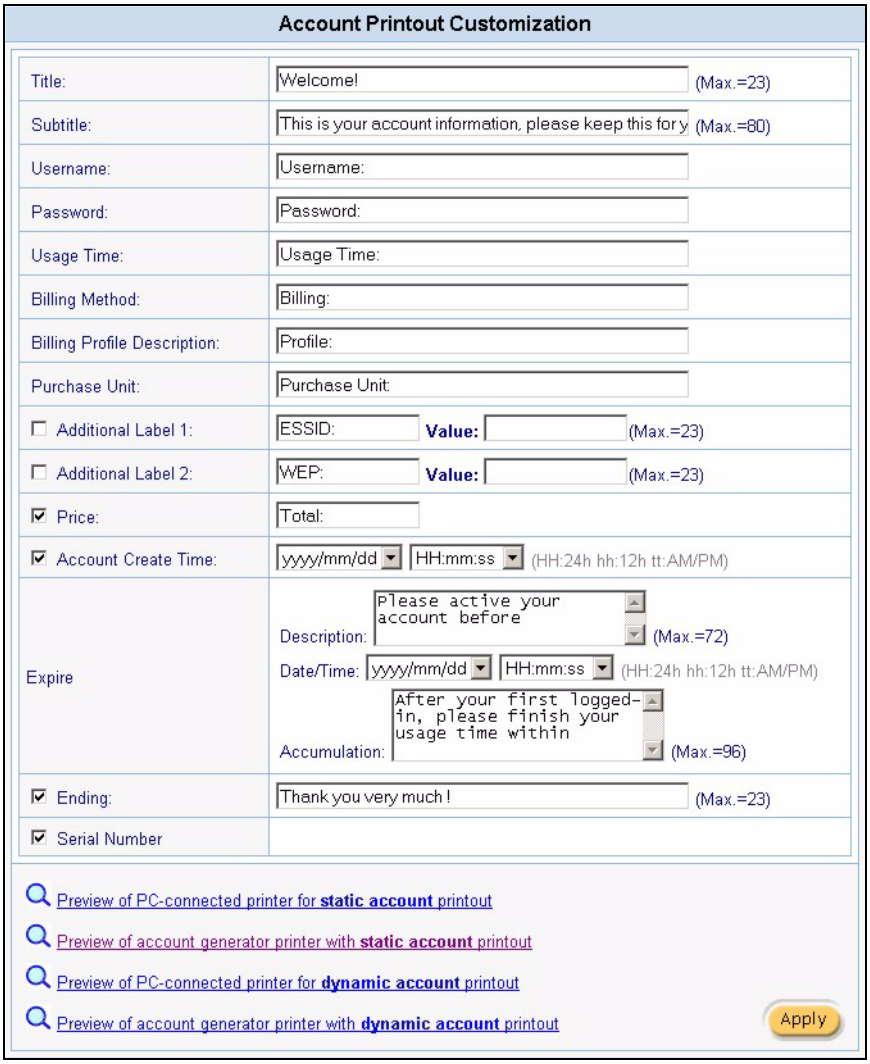
Figure 73 Subscriber Pop-up Information Window Example

15.4 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.

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

Figure 74 Customization: Account Printout



The following table describes the labels in this screen.

Table 37 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.

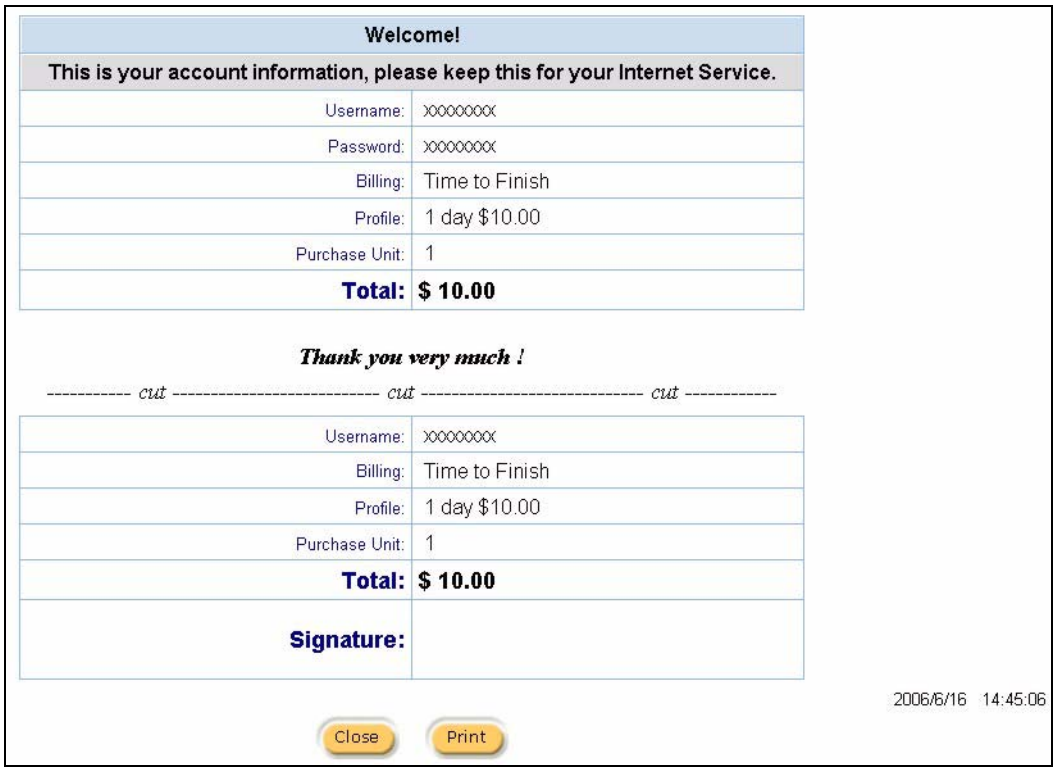
Table 37 Customization: Account Printout (continued)

LABEL	DESCRIPTION
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 Description	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 a time format from the drop-down list boxes.
Expire	
Description	Enter a short description that tells the subscribers when they should activate their accounts before the displayed time.
Date/Time	Select a date and time format for the expiry date.
Accumulation	Enter a short description that tells the subscribers when they should use their purchased Internet access service before the displayed 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 a 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 a 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 75 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:	

2006/6/16 14:45:06

Close Print

Figure 76 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 77 Static Account Printout: Statement Printer Example

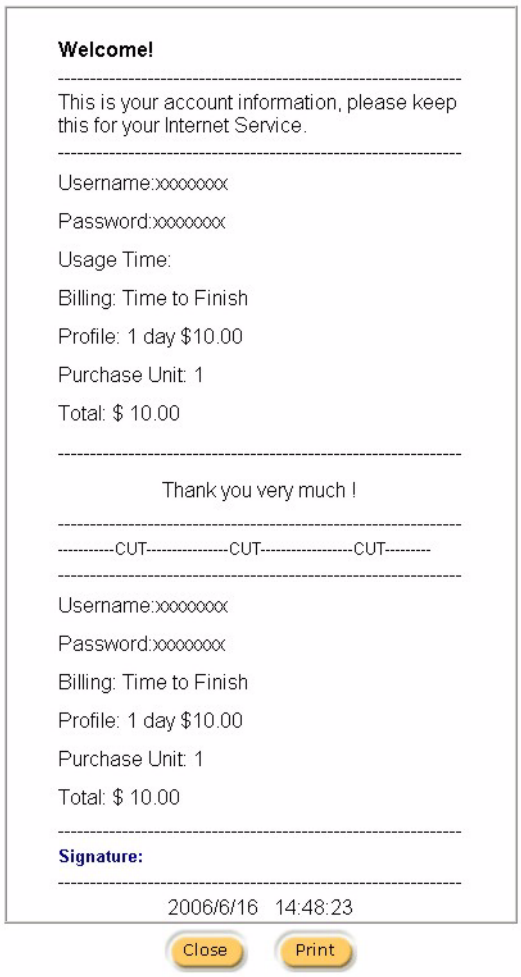


Figure 78 Static Account with PMS Billing Printout: Statement Printer Example

Figure 79 Dynamic Account Printout Example

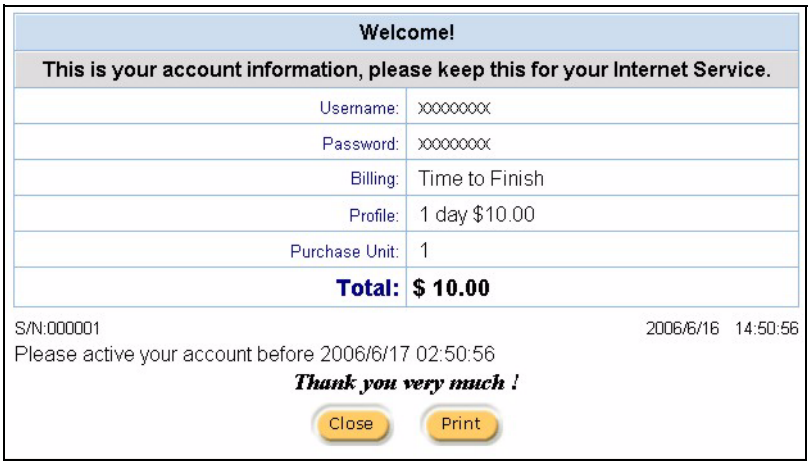
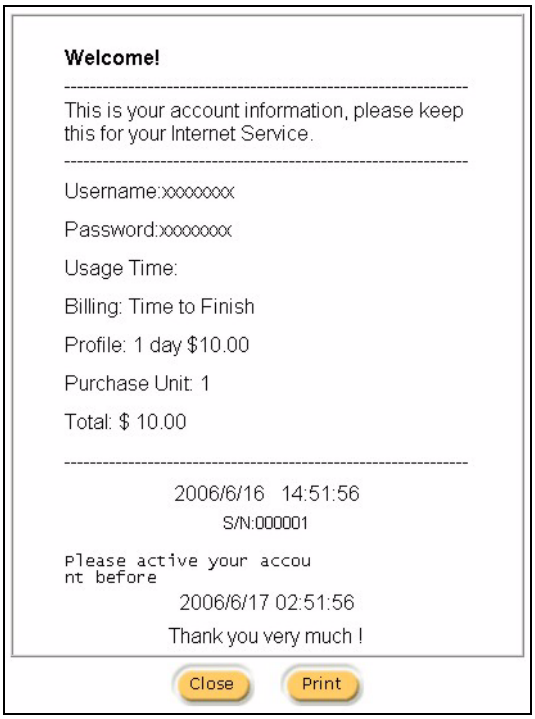


Figure 80 Dynamic Account Printout: Statement Printer Example

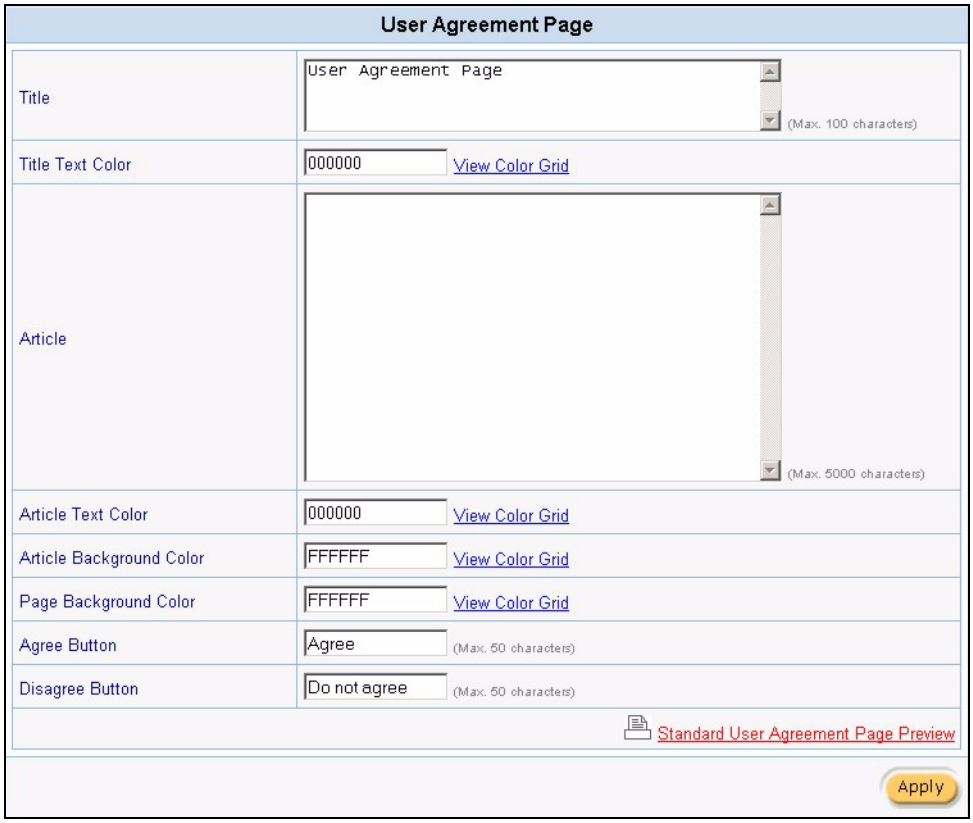


15.5 User Agreement Screen

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.

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

Figure 81 Customize: User Agreement



The following table describes the labels in this screen.

Table 38 Customization: Account Printout

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.
Article Background Color	Specify the background color of the article text color. For example, enter '000000' for black. 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 article. 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.

Table 38 Customization: Account Printout (continued)

LABEL	DESCRIPTION
Standard User Agreement 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 82 Customization: Account Printout: Preview

15.6 Credit Card

After you have entered your Authorize.net 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.

15.6.1 Standard Login Page

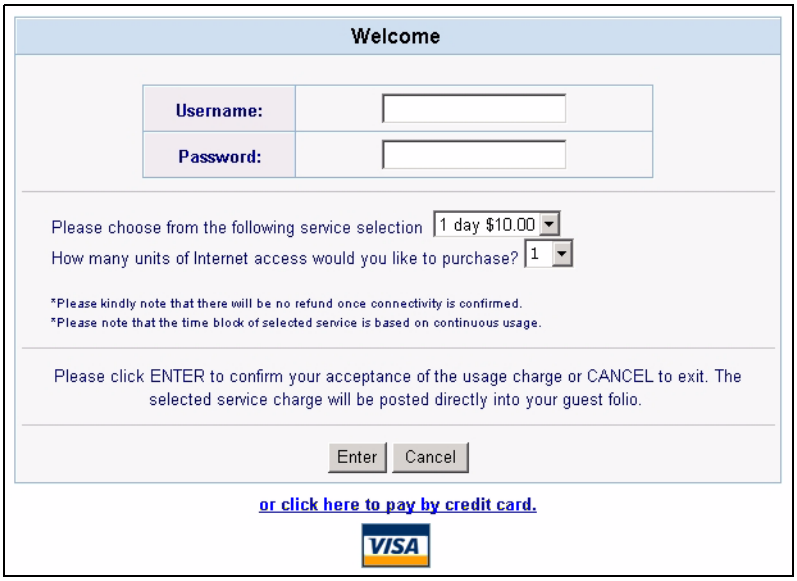
If you use the standard subscriber login screen, you can specify a message to re-direct credit-card-paying subscribers to the credit card information screen.

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

Figure 83 Credit Card Customization: Standard Login Screen Message

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

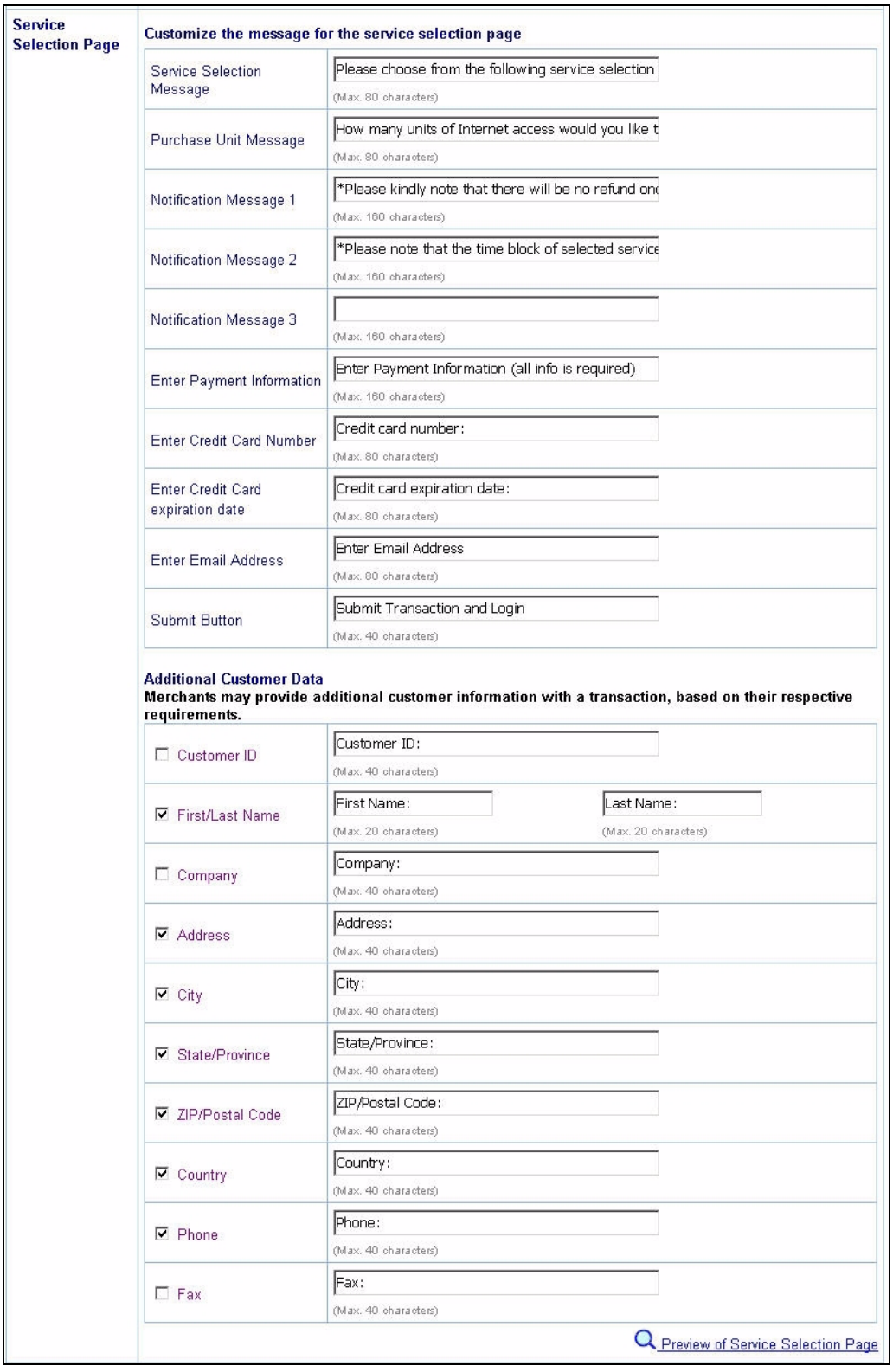
Figure 84 Credit Card Customization: Standard Login Screen Message: Preview



15.6.2 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 85 Credit Card Customization: Service Selection Page



The following table describes the labels in this screen.

Table 39 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.
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 14.2 on page 117 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 checkbox to display this field and enter the field label for customer ID information.
First/Last Name	Select this checkbox to display these two fields and specify the field labels for the subscriber to enter the first and last names.
Company	Select this checkbox to display this field and specify the label name of a field in which subscribers enter a company name.
Address	Select this checkbox to display this field and specify the label name of a field in which subscribers enter their addresses.
City	Select this checkbox to display this field and specify the label name of a the field in which subscribers enter the city.
State/Province	Select this checkbox 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 checkbox to display this field and specify the label name of the field in which subscribers enter the ZIP or postal code.
Country	Select this checkbox to display this field and specify the label name of the field in which subscribers enter the country.
Phone	Select this checkbox to display this field and specify the label name of a field in whish subscribers enter the phone numbers.

Table 39 Credit Card Customization: Service Selection Page (continued)

LABEL	DESCRIPTION
Fax	Select this checkbox 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 86 on page 139 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.

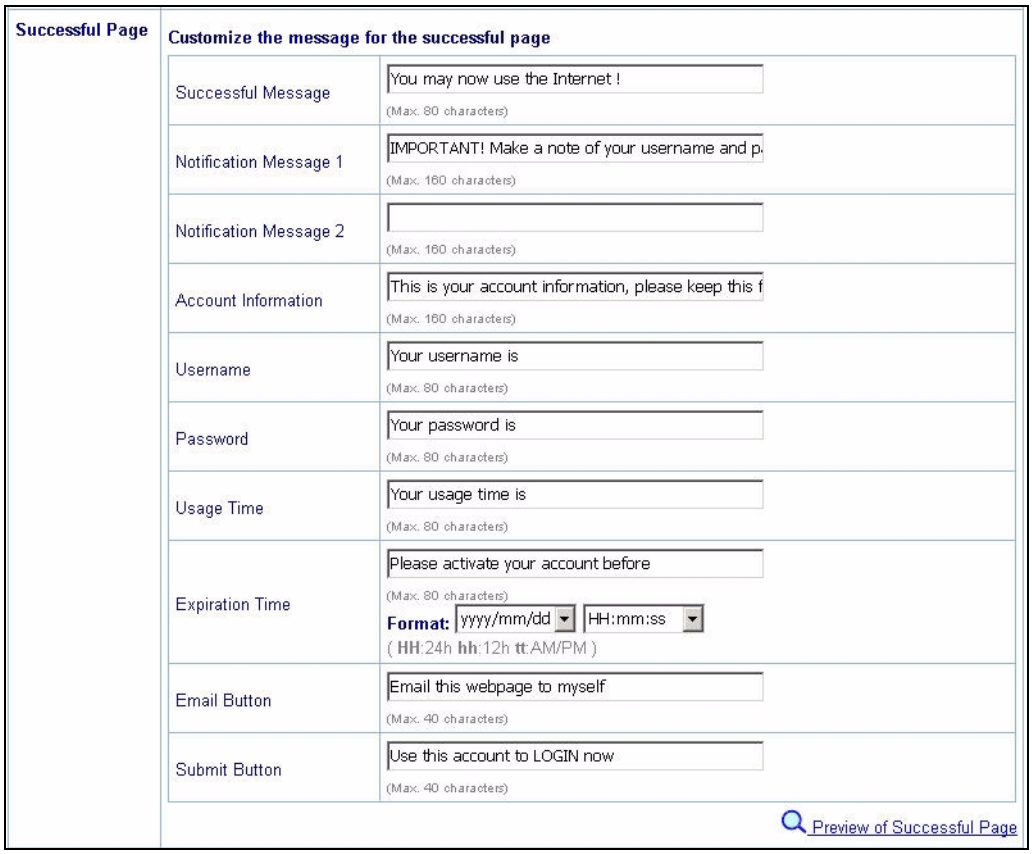
Figure 86 Credit Card Customization: Service Selection Page: Preview

15.6.3 Successful Page

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 87 Credit Card Customization: Successful Page



The following table describes the labels in this screen.

Table 40 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 88 on page 141 for an example).

The following figure shows an example.

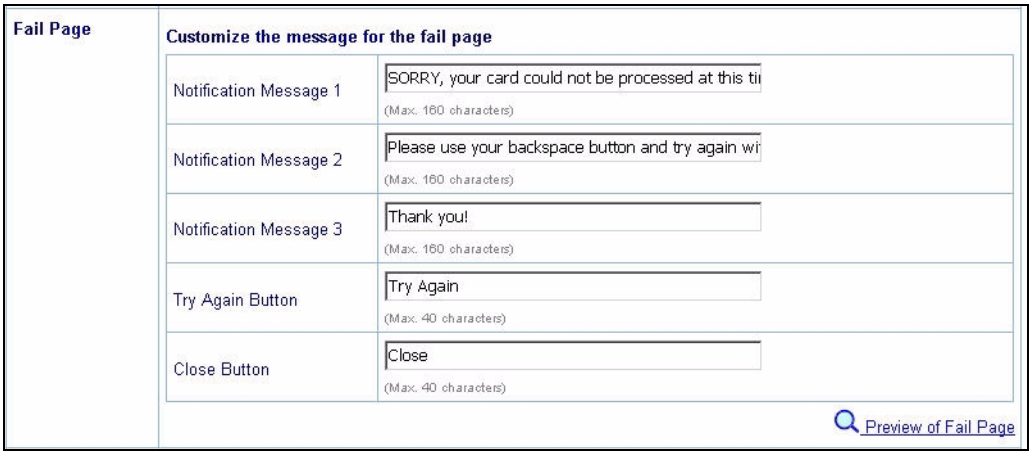
Figure 88 Credit Card Customization: Successful Page: Preview

15.6.4 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 89 Credit Card Customization: Fail Page



The following table describes the labels in this screen.

Table 41 Credit Card Customization: Fail Page

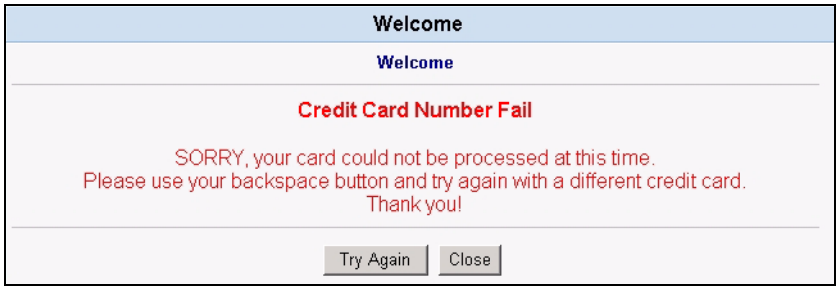
LABEL	DESCRIPTION
Notification Message 1 .. 3	Enter additional message(s). For example, why the transaction failed. .
Try Again Button	Enter the label name for the button subscribers click to display the screen in which the subscribers can enter the credit card information again.

Table 41 Credit Card Customization: Fail Page (continued)

LABEL	DESCRIPTION
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 90 on page 142 for an example).

The following figure shows an example.

Figure 90 Credit Card Customization: Fail Page: Preview

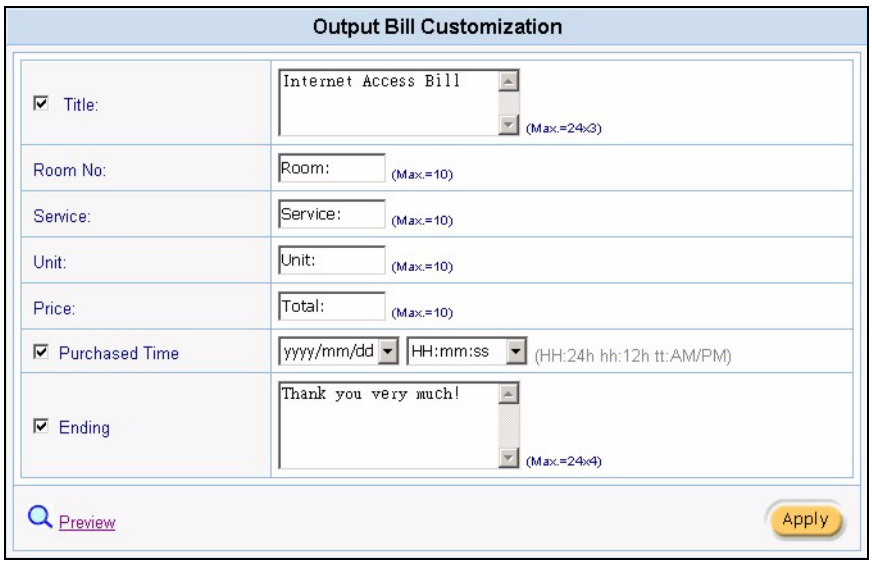


15.7 Bill Output

In a hotel, you have the option of printing a separate bill for Internet access service in a hotel room. You can customize how the bill will printout in the **Output Bill Customization** screen.

Click **Advanced Setting**, **Customization** and the **Output Bill** link to display the screen as shown.

Figure 91 Customization: Output Bill



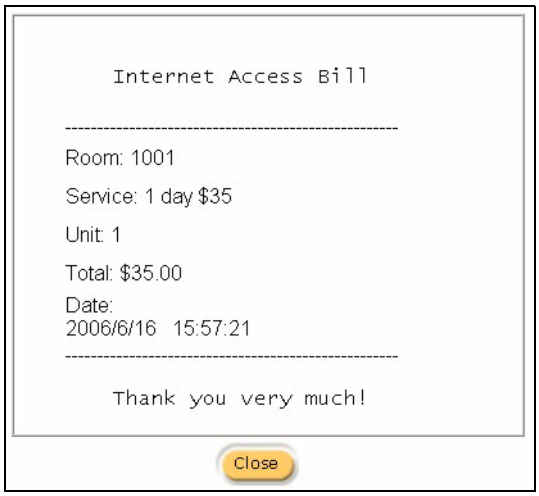
The following table describes the labels in this screen.

Table 42 Customization: Output Bill

LABEL	DESCRIPTION
Title	Select this checkbox to display this field and enter the field label for the screen title.
Room No.	Specify the field label name to display the hotel room number.
Service	Specify the field label name to display the service type. For example, "Internet Access".
Unit	Specify the field label name to display the number of time units purchased.
Price	Specify the field label name to display the total price.
Purchase Time	Select this checkbox to display this field and select the time and date format to display the purchase time.
Ending	Select this checkbox to display this field and specify a closing sentence for the bill printout.
Preview	Click this link to preview a bill printout in a new browser window.
Apply	Click **Apply** to save the changes.

The following figure shows a bill printout example.

Figure 92 Customization: Output Bill: 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.

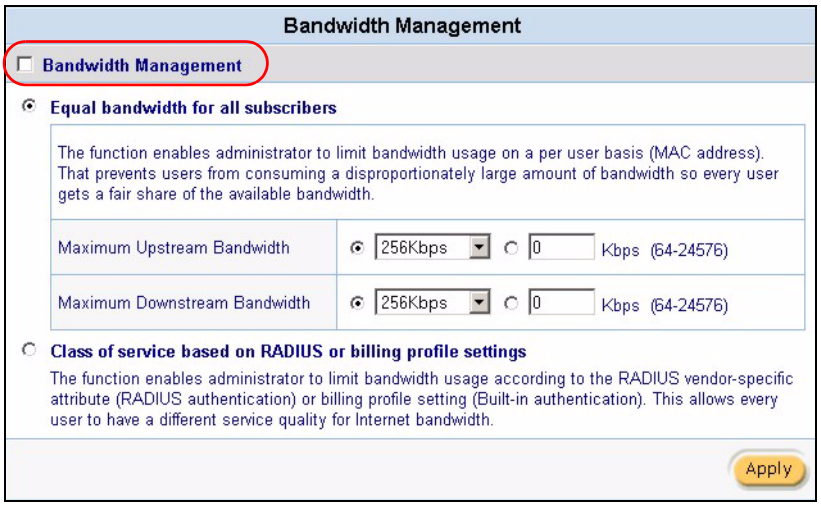
With equal share bandwidth allocation, the VSG allocates an equal amount of outgoing and incoming bandwidth for each subscriber on the LAN.

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

16.2 Activating Bandwidth Management

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

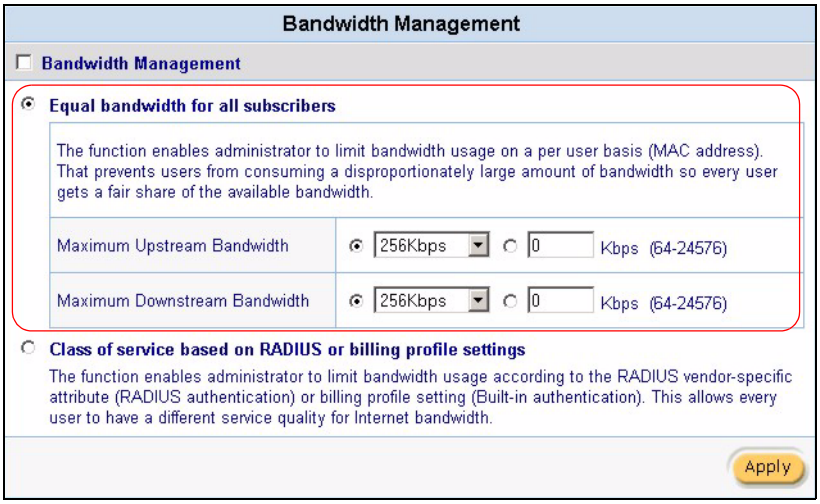
Figure 93 Bandwidth Management: Activate



16.2.1 Equal Bandwidth Setup

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 94 Bandwidth Management: Equal Share



The following table describes the related labels in this screen.

Table 43 Bandwidth Management: Equal Share

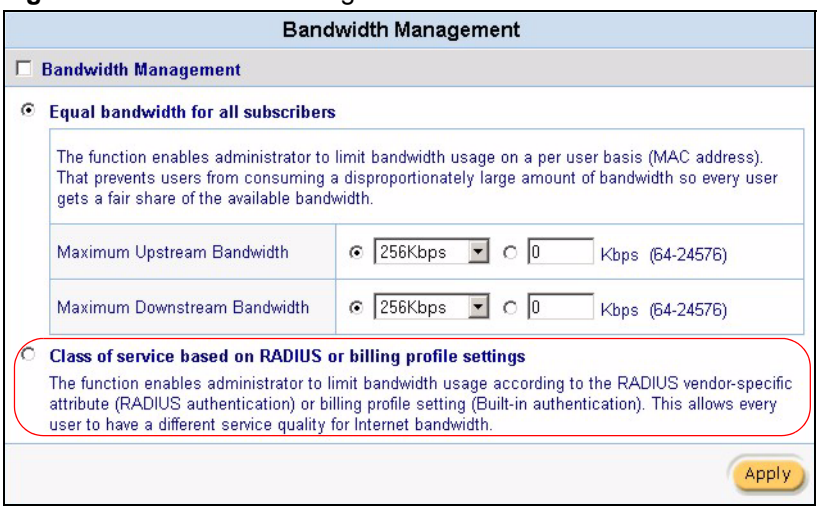
LABEL	DESCRIPTION
Maximum Upstream Bandwidth	To use a pre-defined option, select the first option and choose a bandwidth from the drop-down list box. To manually set the bandwidth, select the second option and specify the bandwidth in the field provided.
Maximum Downstream Bandwidth	To use a pre-defined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

16.2.2 Class of Service Bandwidth Setup

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 10 on page 88 to set the bandwidth limits in a billing profile.

Figure 95 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 Overview

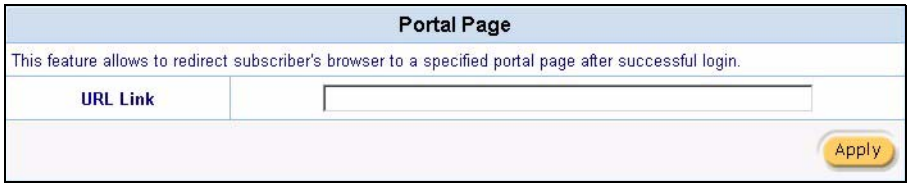
When you enable subscriber authentication in the **Authentication Configuration** screen, you can set the VSG to redirect a subscriber to a portal web site, display advertisement links or activate the walled garden feature for generating on-line advertising revenue.

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 96 Portal Page



The following table describes the labels in this screen.

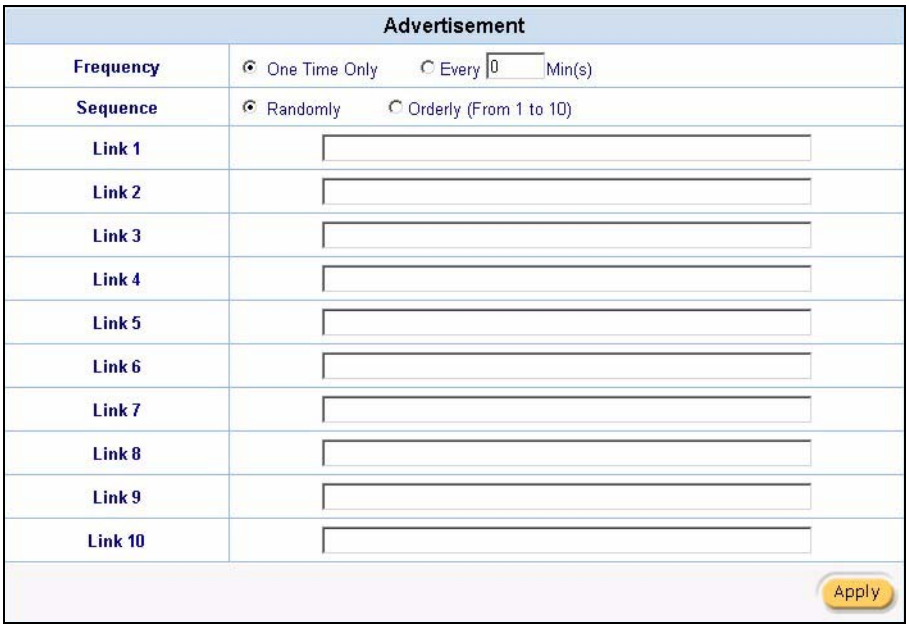
Table 44 Portal Page

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 97 Advertisement



The following table describes the labels in this screen.

Table 45 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.

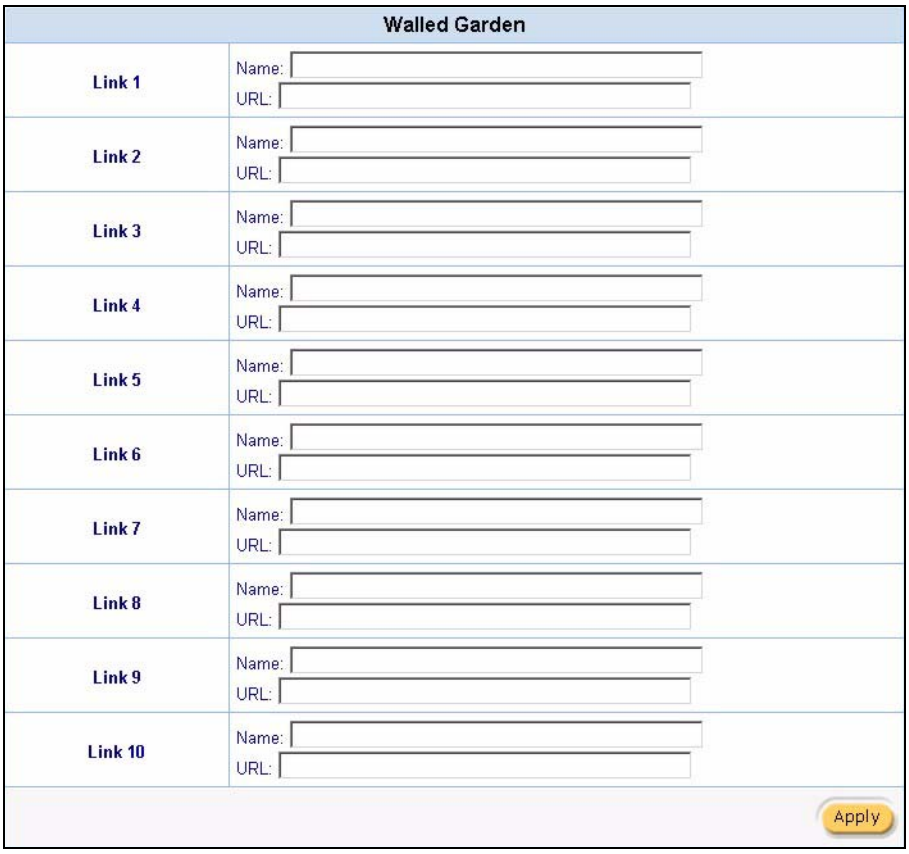
17.4 Walled Garden

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 98 Walled Garden



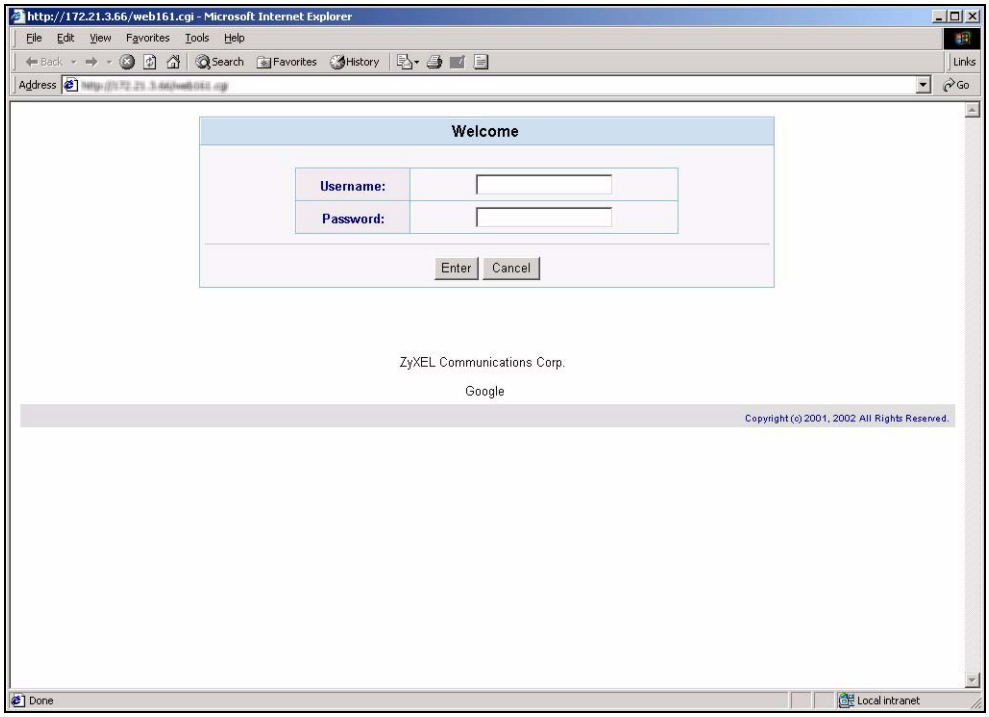
The following table describes the labels to configure the walled garden feature.

Table 46 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 99 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 Passthrough Overview

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.

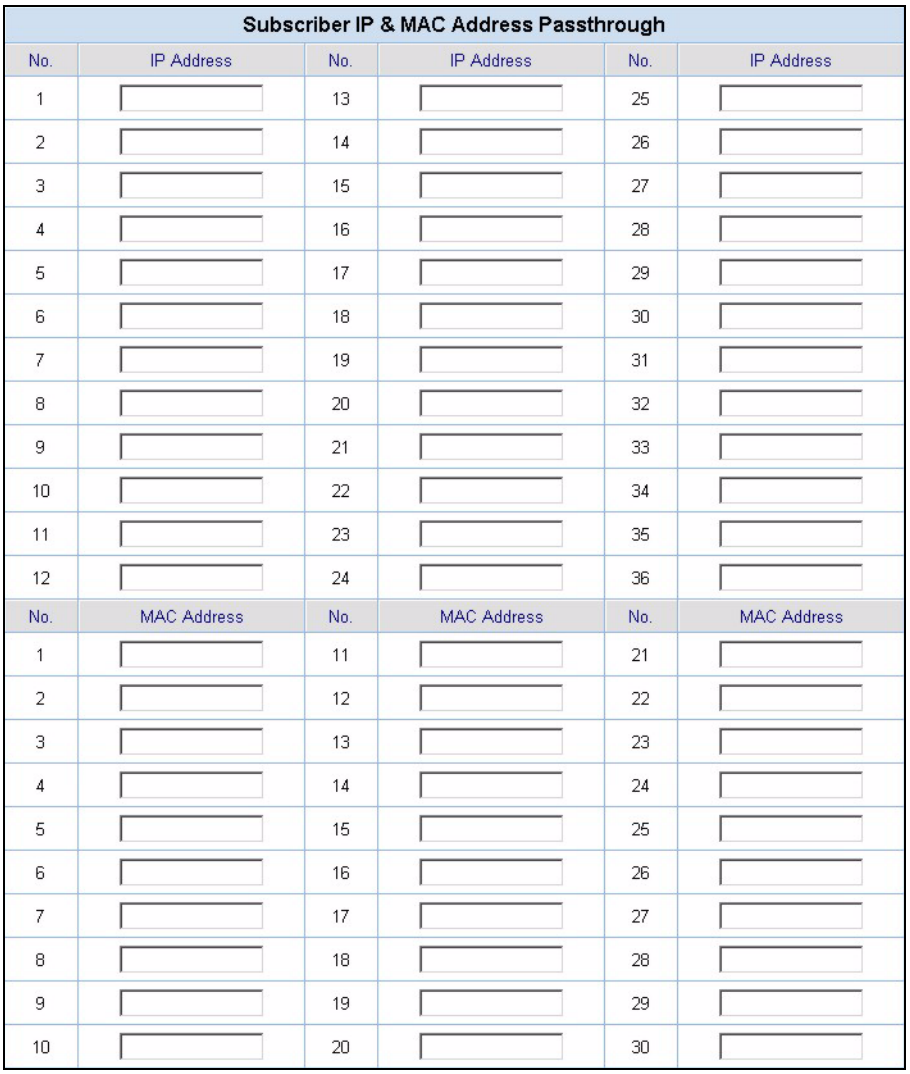
To allow global access to web sites, specify the web site address (by IP address or URL) that any user can access without logging in. This is similar to the walled garden feature, but without displaying the web site link(s) in the subscriber login screen. You have to inform the users about which web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

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

18.2 Computer IP and MAC Address 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 100 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.

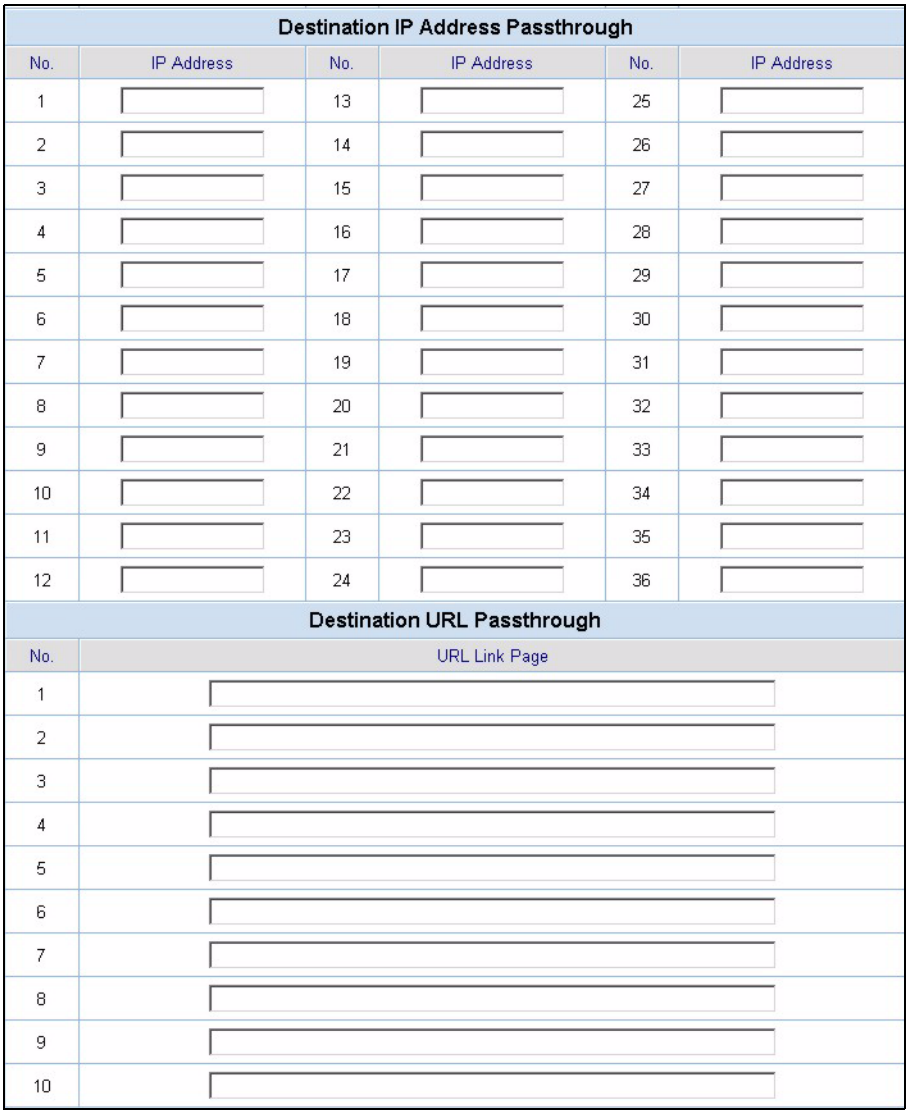
Table 47 Passthrough: Subscriber IP and MAC Address

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.

18.2.1 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 101 Passthrough: Destination URL and IP



The following table describes the fields in this screen.

Table 48 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	

Table 48 Passthrough: Destination URL and IP (continued)

FIELD	DESCRIPTION
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
Filter

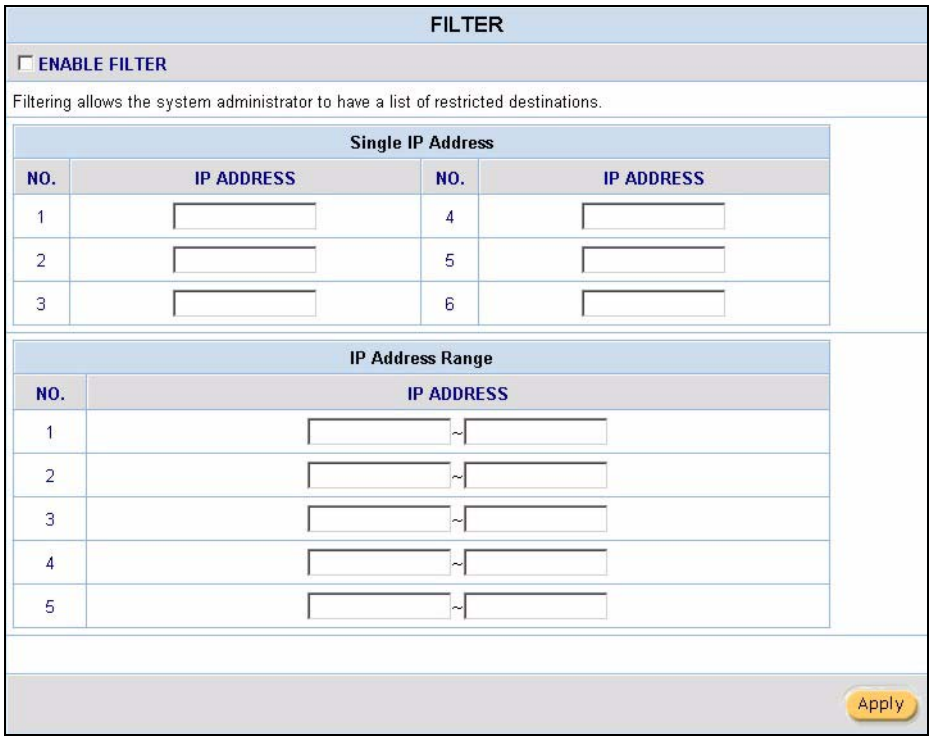
This chapter shows you how to configure filters to restrict access to the specified IP addresses through the VSG.

19.1 Filter Setup

You can set the VSG to restrict access to specified IP address(es) via the VSG. You can prevent subscribers from accessing certain web sites (for example, playboy) based on the IP address.

To configure a filter, click **Advanced** and **Filtering** in the navigation panel.

Figure 102 Advanced: Filter



The following table describes the fields in this screen.

Table 49 Filter

FIELD	DESCRIPTION
ENABLE FILTER	Select this option to activate this feature.
Single IP Address	

Table 49 Filter (continued)

FIELD	DESCRIPTION
No.	This read-only field displays the index number of an entry.
IP Address	Specify the IP address of a network device you want to block Internet access through the VSG. Enter the IP address in dotted decimal notation. For example, 10.59.1.10.
IP Address Range	
No.	This read-only field displays the index number of an entry.
IP Address	Specify a range of IP addressed for the network devices you want to block Internet access through the VSG. Enter the beginning and ending IP addresses in dotted decimal notation. For example, 10.59.1.10 to 10.59.1.20.
Apply	Click **Apply** to save the changes.

CHAPTER 20
Privilege User

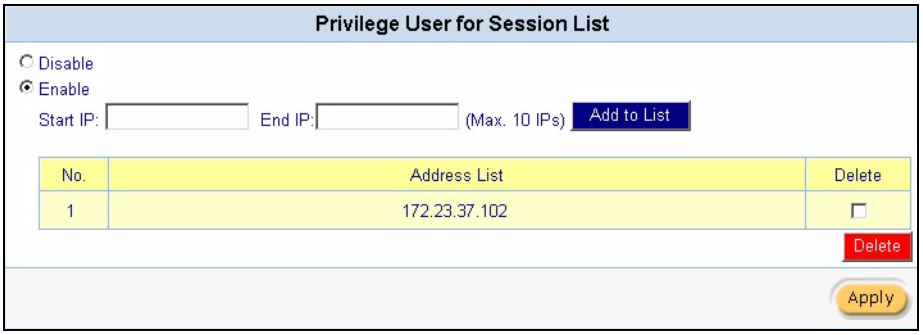
This chapter shows how to set the VSG to allow computers with the specified IP addresses to access the **Session List** screen.

20.1 Privilege User Setup

The VSG allows specified computer(s) to access the **Session List** screen without having to log in first. This allows administrators, network operators or supervisors to view the current connection information on the VSG instantly without having to enter the user name and password and navigating to the screen.

Click **Advanced Settings** and **Privilege User** to display the configuration screen.

Figure 103 Privilege User



The following table describes the fields in this screen.

Table 50 Privilege User

FIELD	DESCRIPTION
Disable	Select **Disable** to deactivate this feature. You need to log into the web configurator first to view the **Session List** screen.
Enable	Select **Enable** to allow the computer(s) with the specified IP address(es) to access the **Session List** screen without logging in. Set the IP address(es) in the fields below.
Start IP	Enter the IP address in dotted decimal notation. For example, 10.59.1.10.
End IP	If you want to specify one IP address, enter the same IP address as in the Start IP field. If you want to specify a range of IP addresses, enter the last IP address in the range.
Add to List	Click **Add to List** to save the settings to the table below.
No.	This read-only field displays the index number of an entry.

Table 50 Privilege User

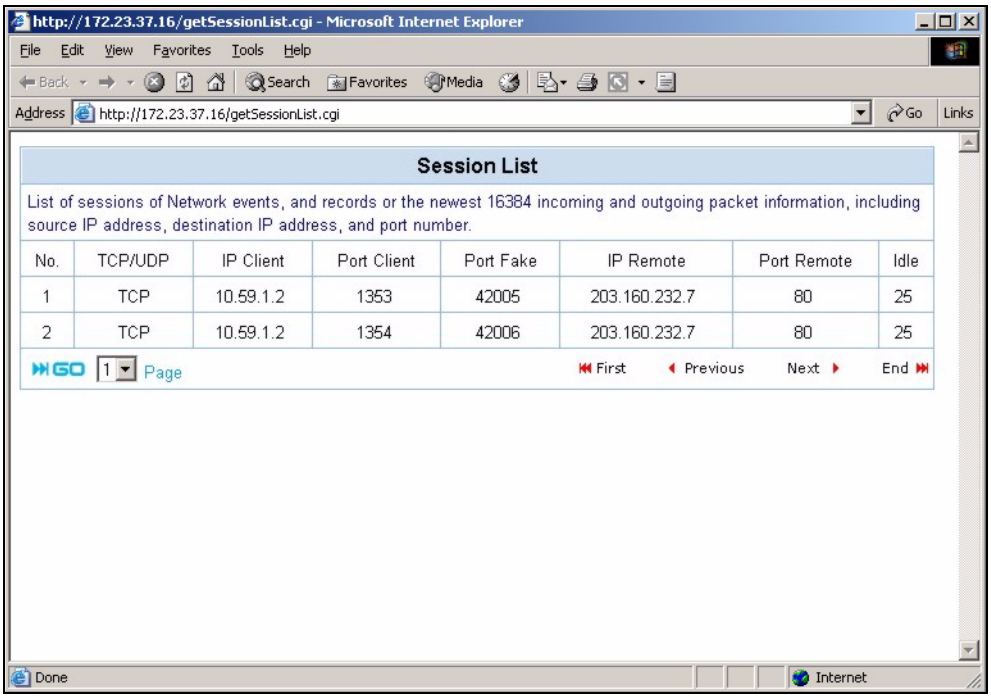
FIELD	DESCRIPTION
Address List	This field displays one or a range of privilege IP address(es).
Delete	Click **Delete** to remove the selected IP address(es).
Apply	Click **Apply** to save the changes.

20.1.1 Accessing Session List As a Privilege User

On the computer whose IP address is included in the **Privilege User** screen, enter http://VSG-IP/getSessionList.cgi (where VSG-IP is the WAN or LAN IP address of the VSG) in the web browser. The **Session List** screen displays. Refer to Section 28.5 on page 188 for the field descriptions.

The following figure shows an example where the WAN IP address of the VSG is 172.23.37.16.

Figure 104 Privilege User: Access Session List Example



CHAPTER 21
LAN Devices

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

21.1 LAN Devices 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.

21.1.1 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.

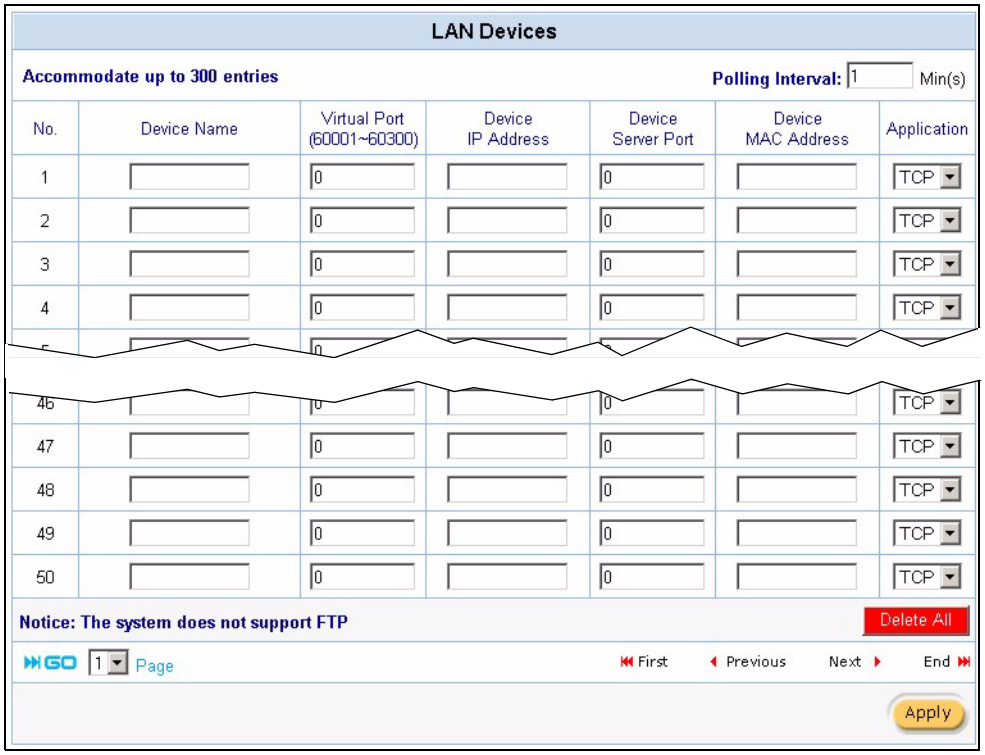
In addition, centralized LAN device management is possible through the VSG using port mapping. You can access the management interface on the LAN device remotely provided that the LAN device has allowed remote management.

21.2 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 105 LAN Devices



The following table describes the labels in this screen.

Table 51 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.
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.

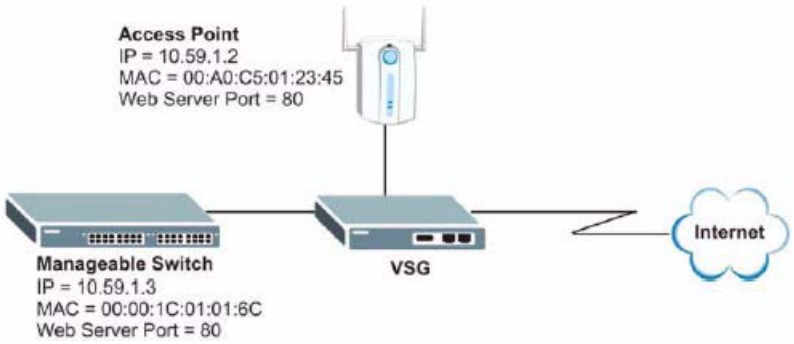
Table 51 LAN Devices (continued)

LABEL	DESCRIPTION
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.

21.2.1 LAN Device Management Example

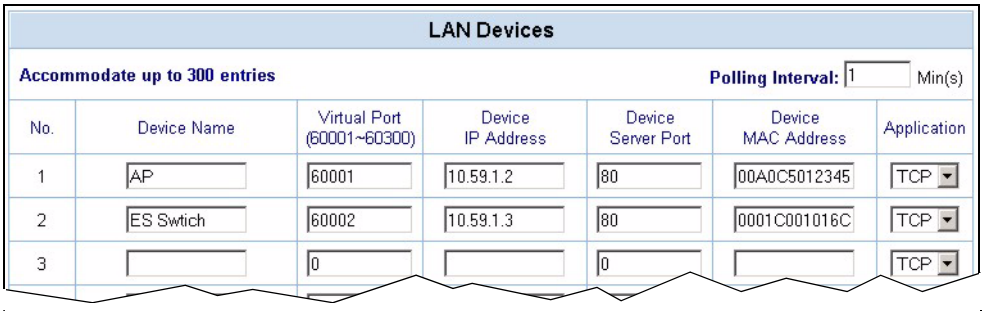
In this example, there is a manageable switch and a wireless access point behind the VSG and you want to be able to remotely access the web-based management interfaces on the manageable switch and access point over the Internet.

Figure 106 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 107 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 28.7.1 on page 190 for more information.

21.2.2 Specifying an Inside Server Example

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

Figure 108 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 109 LAN Devices: Example 2

LAN Devices

Accommodate up to 300 entries Polling Interval: 1 Min(s)

No.	Device Name	Virtual Port (60001~60300)	Device IP Address	Device Server Port	Device MAC Address	Application
1	web server	6010	10.59.1.10	80	0050BA6D2296	TCP
2		0		0		TCP

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 28.7.1 on page 190 for more information.

CHAPTER 22
Static Route

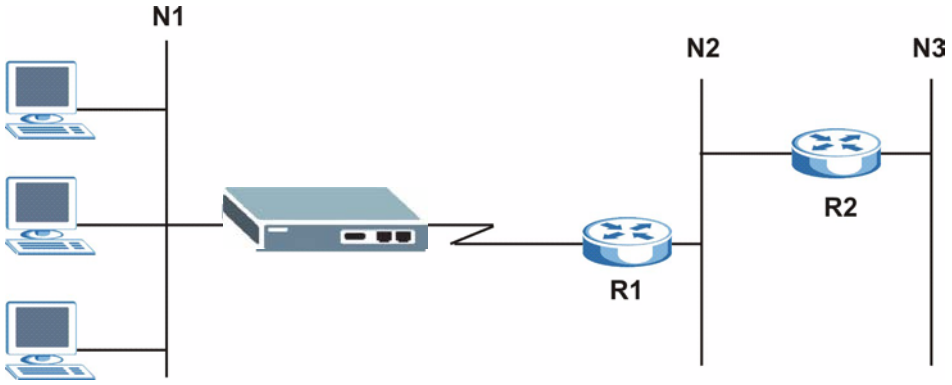
This chapter shows you how to configure static routes to specified destinations.

22.1 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 110 Sample Static Routing Topology

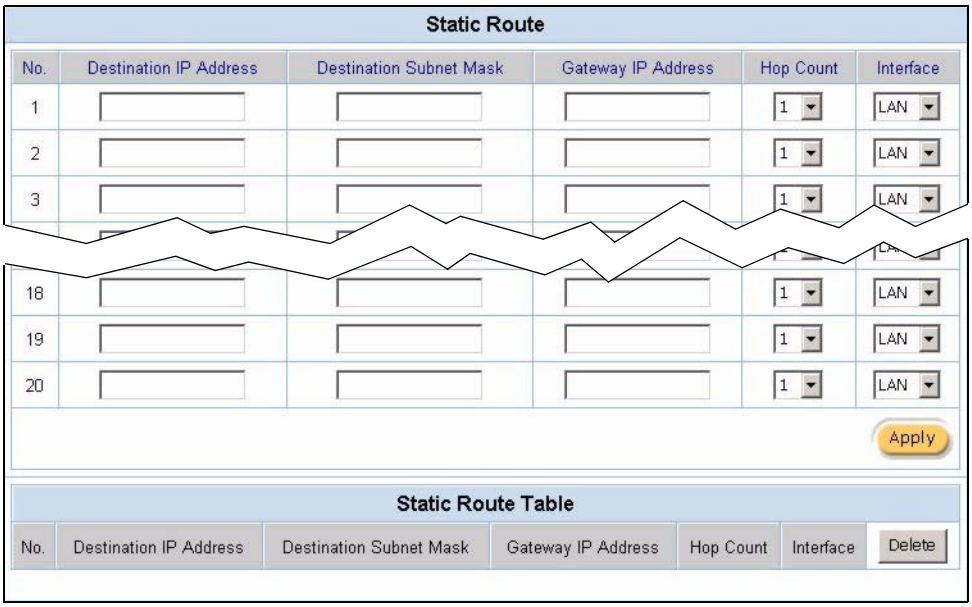


22.2 Static Route Setup

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

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

Figure 111 Advanced: Static Route



The following table describes the labels in this screen.

Table 52 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.
Interface	Specify whether the static route setting applies to the **LAN** or the **WAN** interface.
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.
Destination Subnet Mask	This field displays the subnet mask of the final destination.

Table 52 Advanced: Static Route (continued)

LABEL	DESCRIPTION
Gateway IP Address	This field displays the IP address of the gateway device.
Hop Count	This field displays the "cost" of this static route.
Interface	This field displays whether the static routing setting is applied on the **LAN** or **WAN** interface.
Delete	Select this option and click **Delete** to remove the selected static route(s).

CHAPTER 23
Private LAN

This chapter shows you how to set up a private LAN that allows specified devices to communicate with each other.

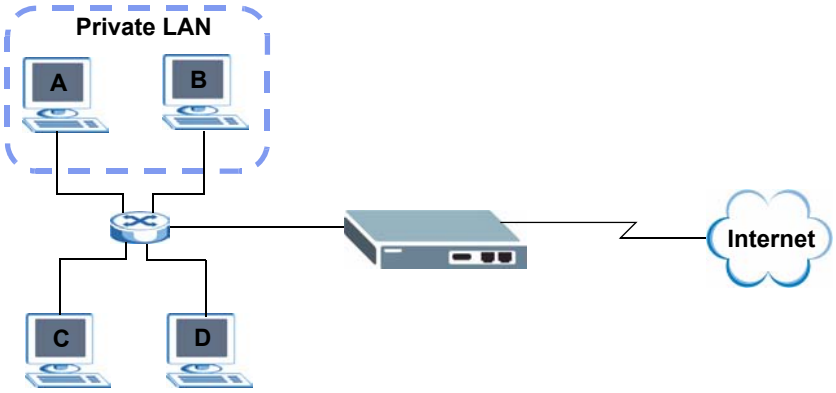
23.1 Private LAN Overview

By default the IP Plug and Play (iPnP) and layer-2 isolation features (see Section 5.1 on page 56) are enabled to prevent devices on the LAN from communicating with each other. These features provide additional security protection.

However, you can configure a private LAN to allow communication between devices with the specified IP addresses in the **Private LAN** screen. The VSG does not apply iPnP or layer-2 isolation on the devices in a private LAN.

The following figure shows a network example where computers **A** and **B** can communicate with each other in the private LAN. Since computers **C** and **D** are not in the private LAN, the VSG disallows communication between the two.

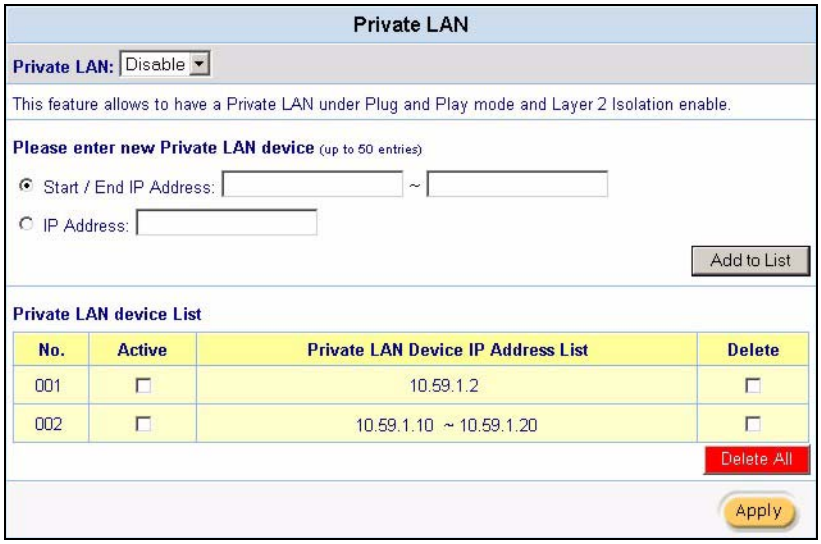
Figure 112 Private LAN Network Example



23.2 Configuring a Private LAN

To specify the IP address(es) to belong to the private LAN, click **Advanced** and **Private LAN** in the navigation panel.

Figure 113 Private LAN



The following table describes the labels in this screen.

Table 53 Advanced: Private LAN

LABEL	DESCRIPTION
Private LAN	Select **Enable** to activate the private LAN settings. This allows Select **Disable** to deactivate this feature.
Start/End IP Address	Select this option to specify a range of IP addresses to belong to the private LAN. Enter the beginning and the ending IP addresses in the fields provided.
IP Address	Select this option to specify one IP address to belong to the private LAN. Enter the IP address in field provided.
Add to List	Click **Add to List** to insert the new setting in the table below.
Private LAN device List	This table displays the IP addresses or ranges of IP addresses in the private LAN.
No.	This field displays the index number.
Active	Select this option to set the selected entry to participate in the private LAN.
Private LAN Device IP Address List	This field displays one or a range of device IP addresses to belong in the private LAN.
Delete	Click **Delete All** to remove all accounts. Click **Delete** to remove the selected account.
Apply	Click **Apply** to save the changes.

CHAPTER 24
Syslog

This chapter shows you how to configure syslog logging.

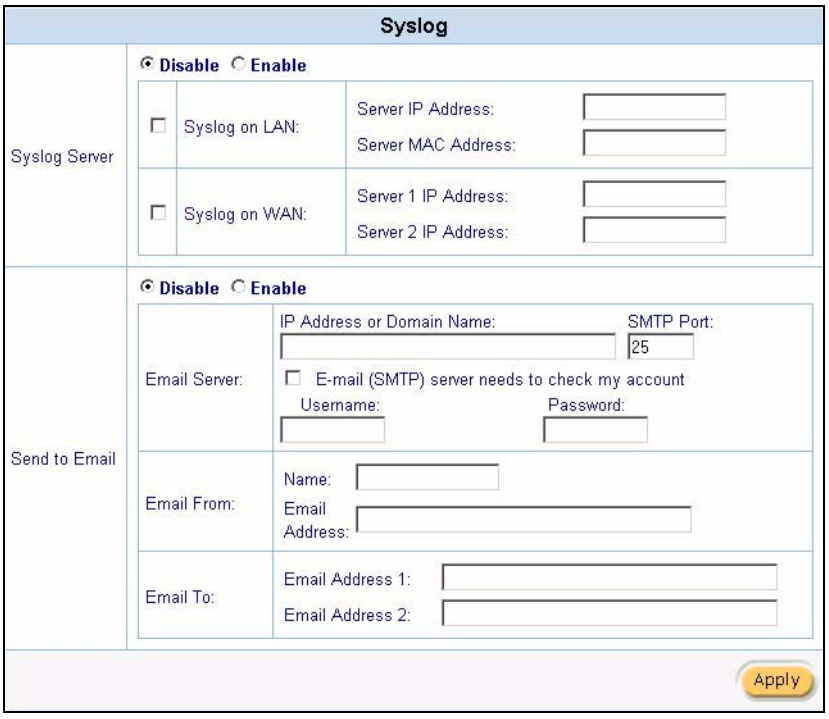
24.1 Syslog Overview

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

24.1.1 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 114 Logs: Syslog



The following table describes the labels in this screen.

Table 54 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.
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.
Send to Email	Select Enable to have the VSG send logs to the specified email address. Select Disable to deactivate this feature. In this case, you can only view the log information on the VSG or the syslog server(s).
Email Server	
IP Address or Domain Name	Enter the IP address or domain name of the mail server.
SMTP Port	Enter the port number for SMTP email service on the mail server.
E-mail (SMTP) server needs to check my account	Select this option if you need to enter a user name and password to log into the mail server.
Username	Enter the username for your email account.
Password	Enter the password associated with the username above.
Email from	Specify the information of the email sender.
Name	Enter a descriptive name (up to 20 printable characters) of the sender. This is for identification purposes.
Email Address	Enter the email address of the sender. For example, vsg-1200@change.com
Email To	
Email Address 1..2	Enter the email addresses to which the VSG sends the logs.
Apply	Click **Apply** to save the settings.

24.1.2 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 115 Logs: Log Settings

The following table describes the labels in this screen.

Table 55 Logs: Log Settings

LABEL	DESCRIPTION
Syslog	Select this option to record and send this type of logs to the syslog server(s). Configure syslog server settings in the **Syslog** screen.
Email	Selec this option to send this type of logs to the specified email address(es). Configure email address settings in the **Syslog** screen.
Syslog Name	This field displays the name (or type) of the log. Select the check box(es) to send the syslog.

Table 55 Logs: Log Settings (continued)

LABEL	DESCRIPTION
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 56 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.
User Agreement		
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

Table 56 Logs: Log Format (continued)

SYSLOG NAME	FORMAT	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.

CHAPTER 25
Session Trace

This chapter shows you how to view subscriber session information on the VSG.

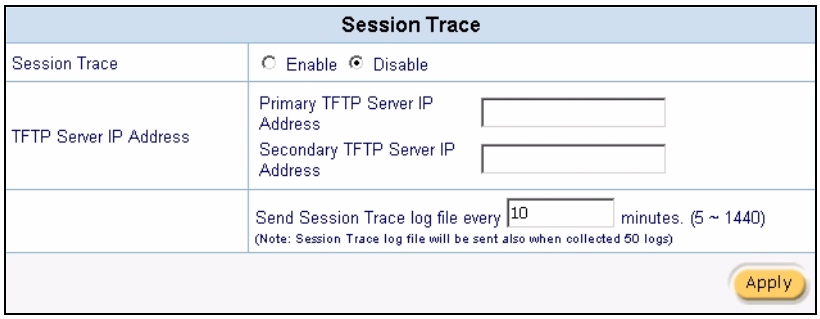
25.1 Session Trace Overview

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.

25.1.1 Configuring Session Trace

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

Figure 116 Advanced: Session Trace



The following table describes the labels in this screen.

Table 57 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.

Table 57 Advanced: Session Trace (continued)

LABEL	DESCRIPTION
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.

25.1.2 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 117 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 58 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 9 on page 80 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 13 on page 112 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.

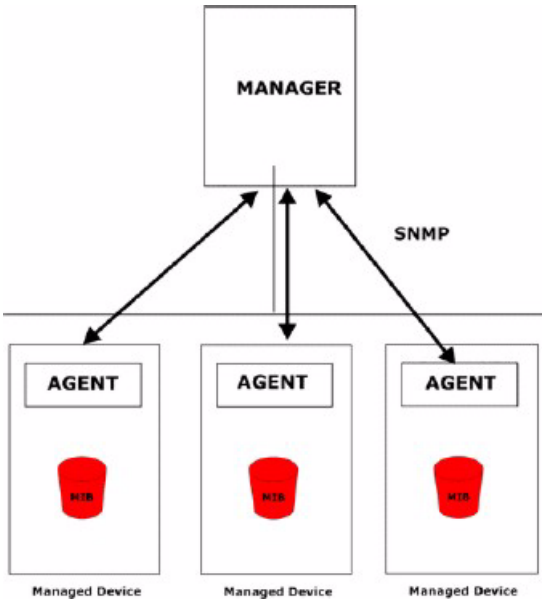
CHAPTER 26
SNMP

This chapter shows you how to set up SNMP on the VSG in order to use a third-party management software to remotely manage the VSG.

26.1 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 118 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.

26.1.1 Network Management System (NMS)

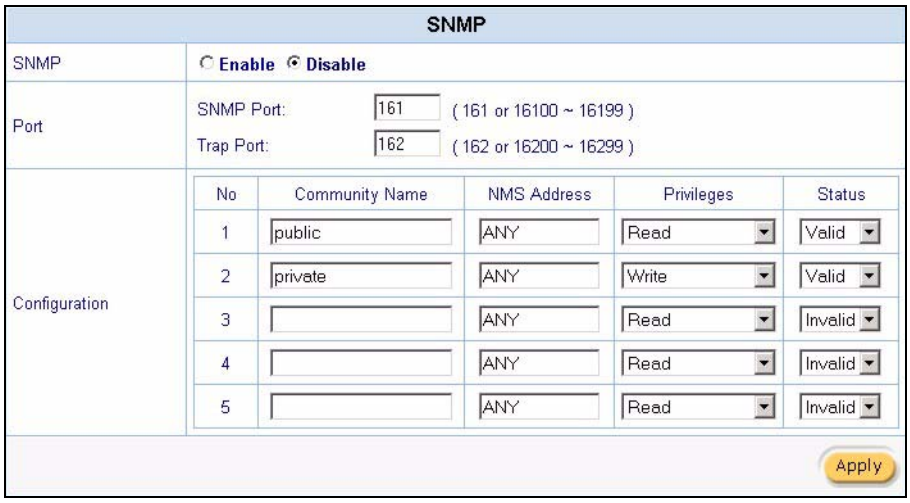
An NMS (Network Management System) is a management station that receives traps (the system alerts generated).

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

26.2 Configuring SNMP

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

Figure 119 SNMP



The following table describes the labels in this screen.

Table 59 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 27
Miscellanea

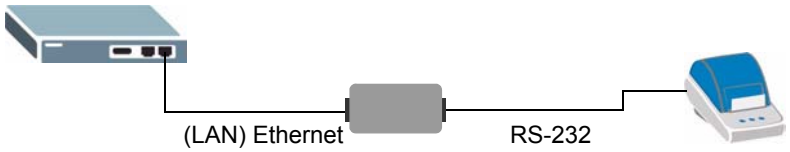
This chapter shows you how to configure TCP/IP-to-RS-232 convertor settings on the VSG to extend the connection to the account statement printer.

27.1 Overview

In cases where you need to install the VSG and the statement print in different locations and the RS-232 console cable is not long enough for the connection, you can use a TCP/IP-RS-232 convertor to make an extension. The TCP/IP-RS-232 convertor is a hardware device installed between the VSG and the statement printer on the LAN.

The following figure shows a network example where the VSG connects to the statement printer via the TCP/IP-RS-232 convertor.

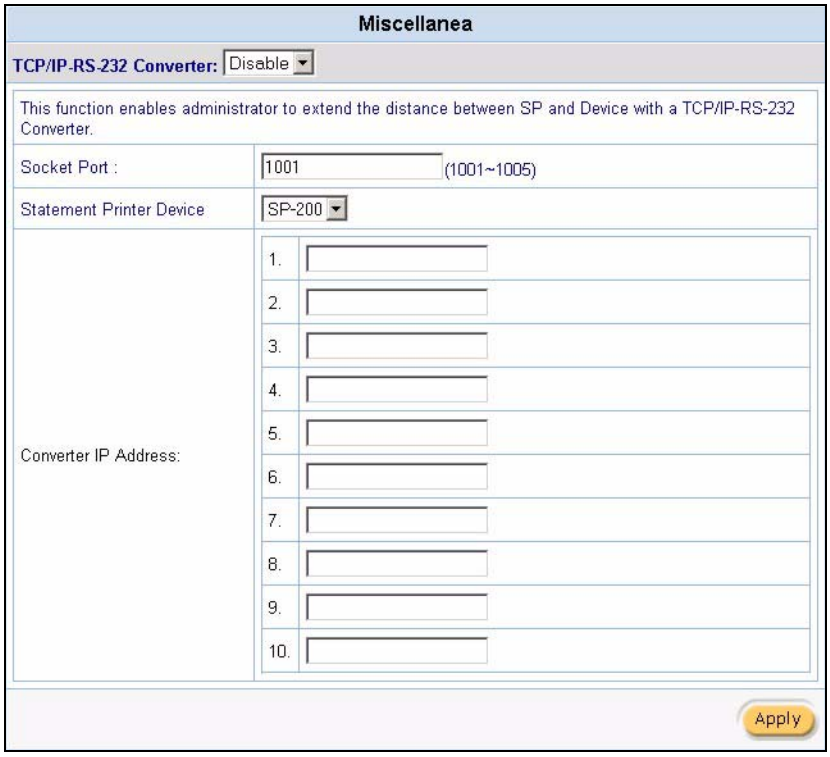
Figure 120 Network Example Using TCP/IP-RS232 Convertor



27.2 TCP/IP-RS-232 Converter Setup

Configure the TCP/IP-RS-232 converter settings in the **Miscellanea** screen. Click **Advanced Setup** and **Miscellanea** to display the screen as shown.

Figure 121 Advanced Setup: Miscellanea



The following table describes the labels in this screen.

Table 60 Miscellanea

LABEL	DESCRIPTION
TCP/IP-RS-232 Convertor	Select **Enable** to activate this feature. Select **Disable** to deactivate this feature.
Socket Port	Enter the number of the service port for the IP-serial conversion service.
Statement Printer Device	Select the model name of your statement printer.
Convertor IP Address	Specify the IP address of the converter. Enter the IP address in dotted decimal notation. For example, 10.59.1.100.
Apply	Click **Apply** to save the changes.

CHAPTER 28
System Status

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

28.1 System Status Overview

Use the **System Status** screen to view current device status such as the WAN/LAN settings, current online user list, session lists, etc.

28.2 System Information

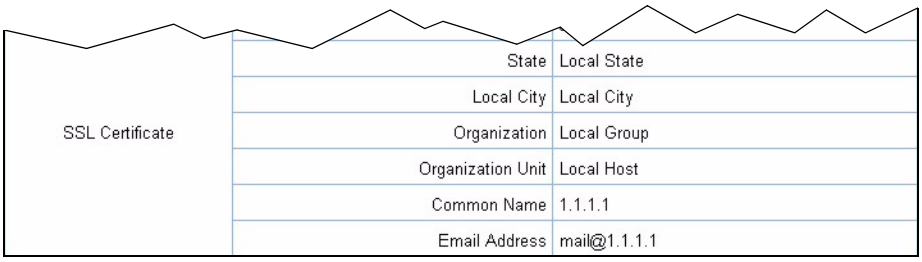
Click **System Status** and **System** to display the screen as shown next. The **System** screen automatically updates every 5 seconds.

Figure 122 System Status: System

System

refresh

System Status	Host Name:	
	Domain Name:	
	Bootrom Version:	1.00
	Firmware Version:	1.00.02
	Concurrent Users Limitation:	1024
	WAN MAC Address:	00:13:49:7D:39:A1
	LAN MAC Address:	00:13:49:7D:39:A0
WAN IP Settings	WAN Port Mode:	Get automatically from a DHCP server
	IP Address:	172.23.37.16
	Subnet Mask:	255.255.255.0
	Default IP Gateway:	172.23.37.254
DNS	Primary DNS Server:	172.23.5.2
	Secondary DNS Server:	172.23.5.1
DHCP	DHCP Status	Server
	Start IP Address (Private):	10.59.1.2
	End IP Address (Private):	10.59.1.254
	Lease Time (Private):	1440
E-Mail	Server IP Address:	
	Country	00
	State	Local State
	Local City	Local Cit



The following table describes the fields in this screen.

Table 61 System Status: System

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.
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 (Private)	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.

Table 61 System Status: System (continued)

FIELD	DESCRIPTION
End IP Address (Private)	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 (Private)	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.

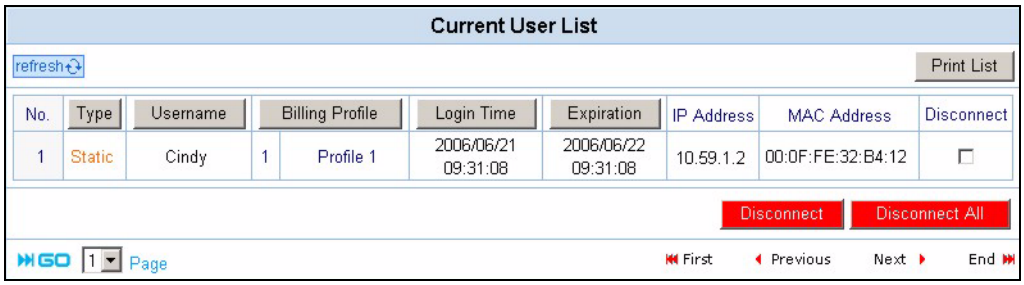
28.3 Current User List

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.

Note: The fields displayed in the **Current User List** screen vary depending on the subscriber account type or authentication method.

Figure 123 System Status: Current User List



The following table describes the labels in this screen.

Table 62 System Status: 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. This field displays **Static** for a static subscriber account. This field displays **Dynamic** for a dynamic subscriber account. This field displays **Location** for a subscriber accessing using port-location mapping. This field displays **Agreement** for a subscriber accessing through the agreement screen. This field displays **Non_Auth** for a subscriber accessing without authentication.
Username	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 field displays the time the subscriber logs in.
Expiration	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 9.1.4.2 on page 82 and Appendix D on page 242 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	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.
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.

28.4 DHCP Client

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 5 seconds.

Figure 124 System Status: DHCP Clients

DHCP Clients (Private IP)		
No.	MAC Address	IP Address
1	00:0F:FE:32:B4:12	10.59.1.2

The following table describes the labels in this screen.

Table 63 System Status: 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.

28.5 Session List

To display a list 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 125 System Status: Session List

Session List

List of sessions of Network events, and records or the newest 16384 incoming and outgoing packet information, including source IP address, destination IP address, and port number.

No.	TCP/UDP	IP Client	Port Client	Port Fake	IP Remote	Port Remote	Idle
1	TCP	10.59.1.2	1353	42005	203.160.232.7	80	25
2	TCP	10.59.1.2	1354	42006	203.160.232.7	80	25

GO 1 Page First Previous Next End

The following table describes the labels in this screen.

Table 64 System Status: 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.

Table 64 System Status: Session List (continued)

LABEL	DESCRIPTION
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.

28.6 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 126 System Status: NAT Pool Table

NAT Pool Table

NAT Pool information. Source IP address, Source MAC address and Translated IP address

No.	Source IP Address	Source MAC Address	Translated IP Address	VPN Type
1	192.168.100.1	OE-90-80-90-EE-12	211.21.185.240	PPTP
2	192.168.100.2	OE-90-80-90-EE-13	211.21.185.241	PPTP
3	192.168.100.3	OE-90-80-90-EE-14	211.21.185.242	PPTP

The following table describes the labels in this screen.

Table 65 System Status: NAT Tool Table

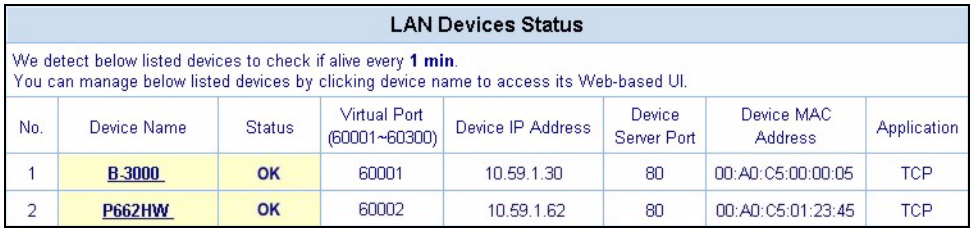
LABEL	DESCRIPTION
No	This field displays the index number of an entry.
Source IP Address	This field displays the IP address of the subscriber device on the LAN that is using the VPN.
Source MAC Address	This field displays the MAC address of the subscriber device on the LAN that is using the VPN.
Translated 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**).

28.7 LAN Device Status

The **LAN Devices Status** screen displays the status of LAN devices configured in the **LAN Devices** screen (refer to Chapter 21 on page 160).

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

Figure 127 System Status: LAN Device Status



LAN Devices Status

We detect below listed devices to check if alive every **1 min**.
You can manage below listed devices by clicking device name to access its Web-based UI.

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 66 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 28.7.1 on page 190.
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.
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.

28.7.1 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.

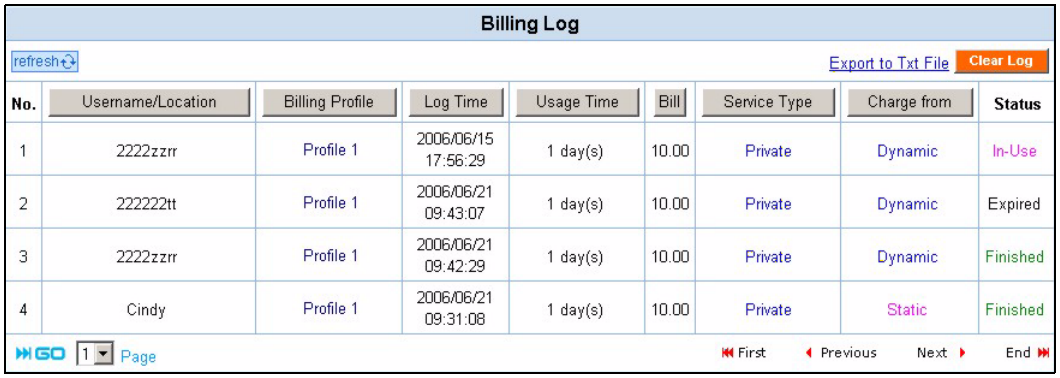
- To access the LAN device through the web configurator, open the **LAN Device Status** screen and click the device name. A new Internet browser should display showing the login screen of the LAN device management interface.

- 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.

28.8 Billing Log

Click **System Status** and **Billing Log** in the navigation panel to display the screen as shown. Refer to Section 28.8.1 on page 192 for information on backing up the billing logs to a computer.

Figure 128 System Status: Billing Log



The following table describes the labels in this screen.

Table 67 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 28.8.1 on page 192 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 (**Dynamic**, **PMS** or **Static**).
Status	This field displays the billing status or account status.
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 67 System Status: Billing Log (continued)

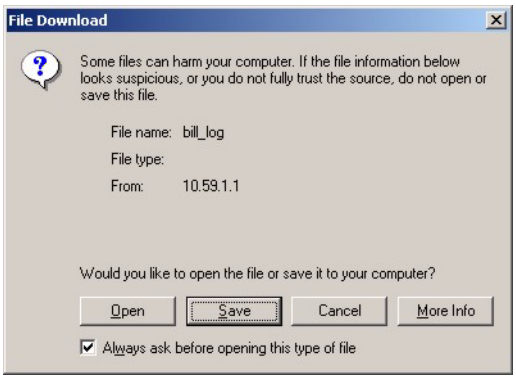
LABEL	DESCRIPTION
Next	Click **Next** to go to the next page.
End	Click **End** to go to the last page.

28.8.1 Billing Logs Backup

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

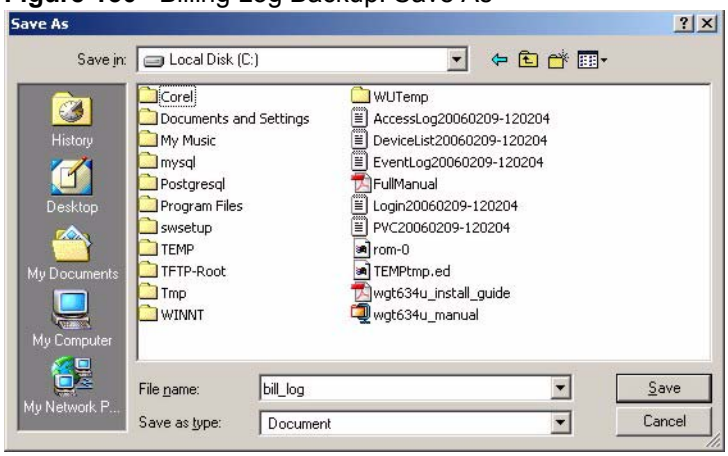
1 In the **Billing Log** screen, click the **Export to Txt File** link. A **File Download** screen displays.

Figure 129 Billing Log Backup: File Download



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

Figure 130 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 131 Billing Log Backup: Example File Content

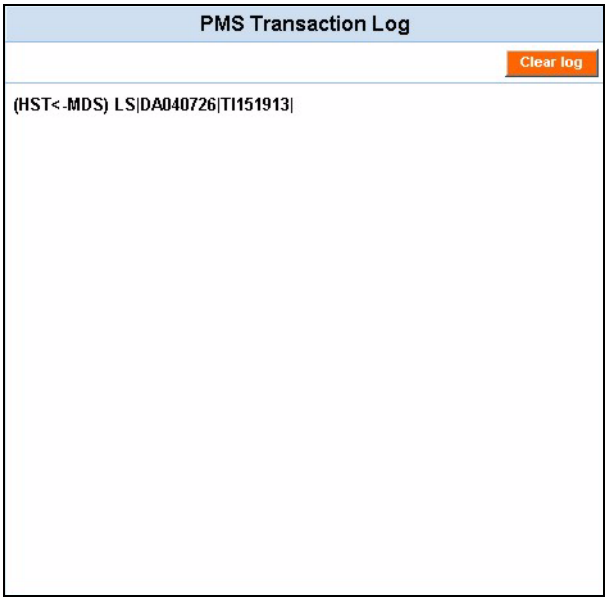
```
[Billing Log Profile]
NO. Username/Location  BillingProfile   Log Time    Usage Time  Bill Charge from Status
1   222222tt       Profile 1   2006/06/21 09:43:07 1 day(s)  10.00  Dynamic Un-used
2   2222zzrr       Profile 1   2006/06/21 09:42:29 1 day(s)  10.00  Dynamic Un-used
3   2222zzrr       Profile 1   2006/06/15 17:56:29 1 day(s)  10.00  Dynamic In-Use
4   Cindy          Profile 1   2006/06/21 09:31:08 1 day(s)  10.00  Static  In-Use
```

28.9 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 132 System Status: PMS Transaction Log



28.10 Static Route Table

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

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

Figure 133 System Status: Static Route Table

Static Route Table

No.	Destination IP Address	Destination Subnet Mask	Gateway IP Address	Hop Count	Interface
1	192.168.2.1	255.255.255.0	192.168.1.254	1	WAN

The following table describes the labels in this screen.

Table 68 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.
Interface	This field displays the name of the interface this static route is applied.

CHAPTER 29
Configuration

This chapter shows you how to back up, restore or reset the configuration on the VSG.

29.1 Configuration Overview

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.

There is not a specific file extension or filename conventions that you need to follow. Therefore, you can specify any name or file extension the configuration files. It is recommended that you to use the ".rom" file extension for the configuration file for management purposes.

You can use the **Configuration** screen in the web configurator to back up and restore configuration or reset the device to the factory defaults.

You can back up and restore the configuration file either through the web configurator or using an external TFTP server.

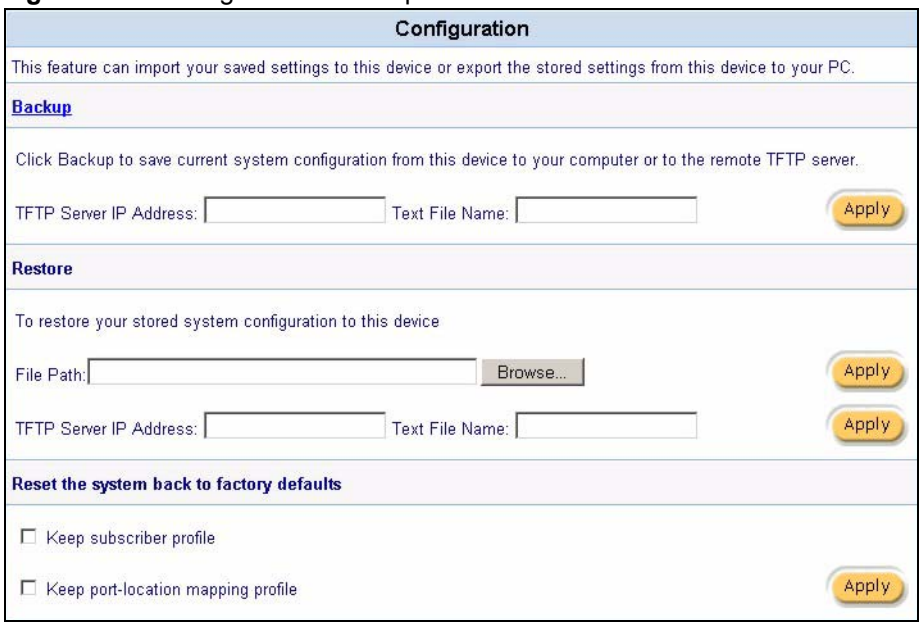
Note: Do NOT interrupt the file transfer process as this may permanently damage your device.

29.2 Configuration Backup

Backup is highly recommended once your VSG is functioning properly.

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

Figure 134 Configuration: Backup

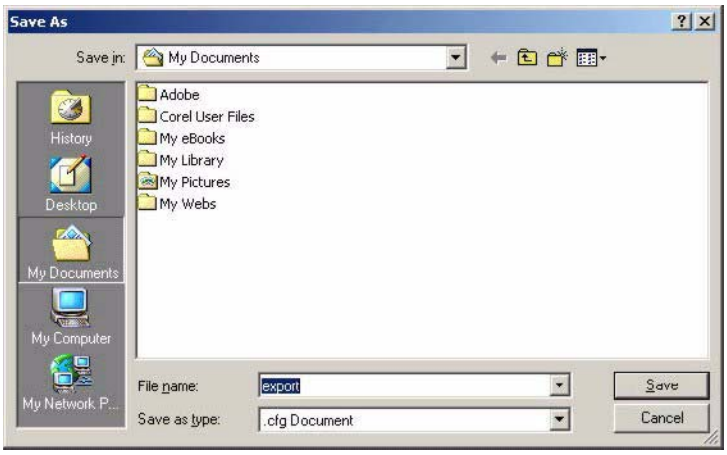


2 Click **Backup**. A **File Download** window displays as shown next.

Figure 135 Configuration Backup: File Download

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

Figure 136 Configuration Backup: Save As



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

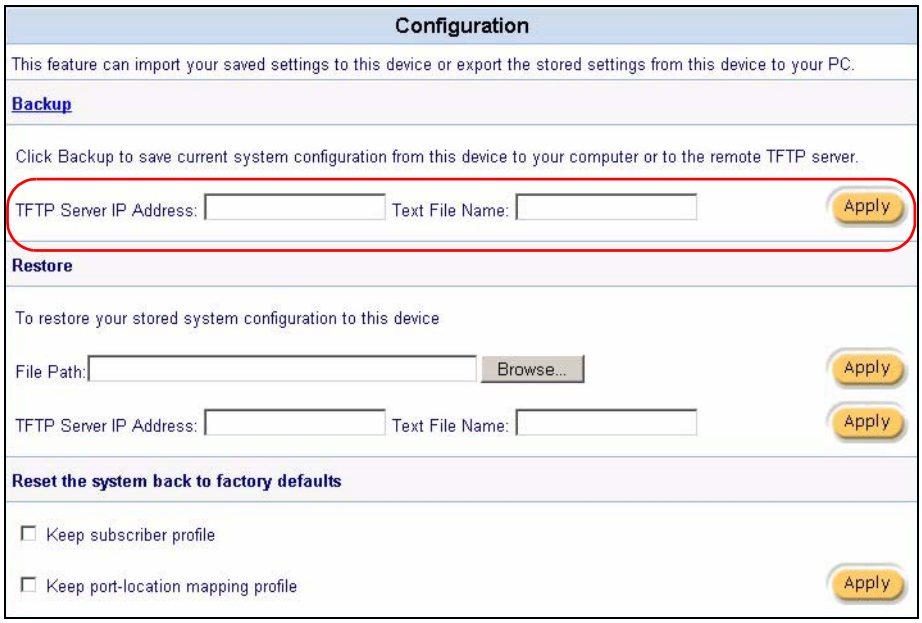
29.2.1 Configuration Backup Using TFTP

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 137 Configuration: Backup using TFTP



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

Figure 138 Configuration Backup: TFTP: Successful

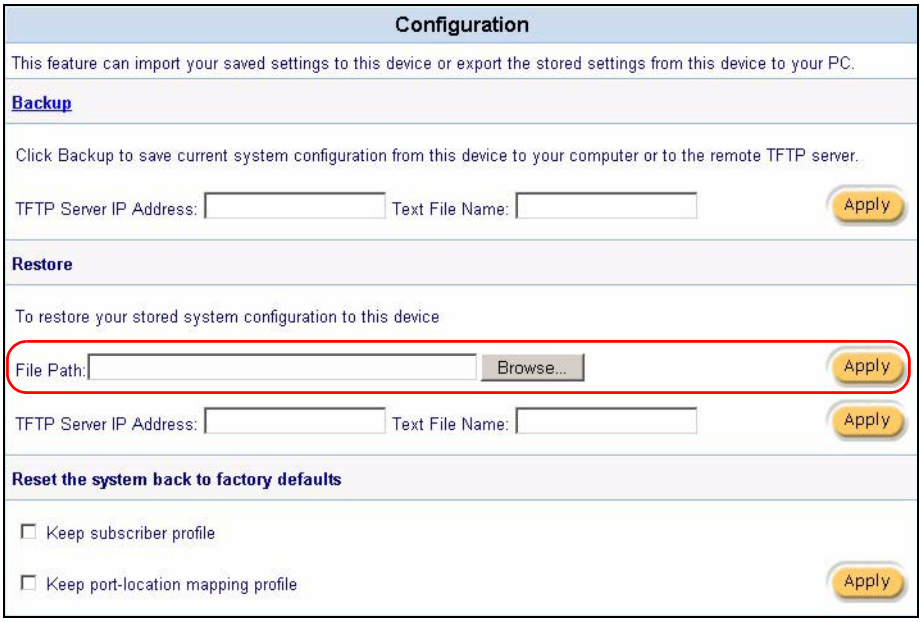
29.3 Restore Configuration

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 139 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.

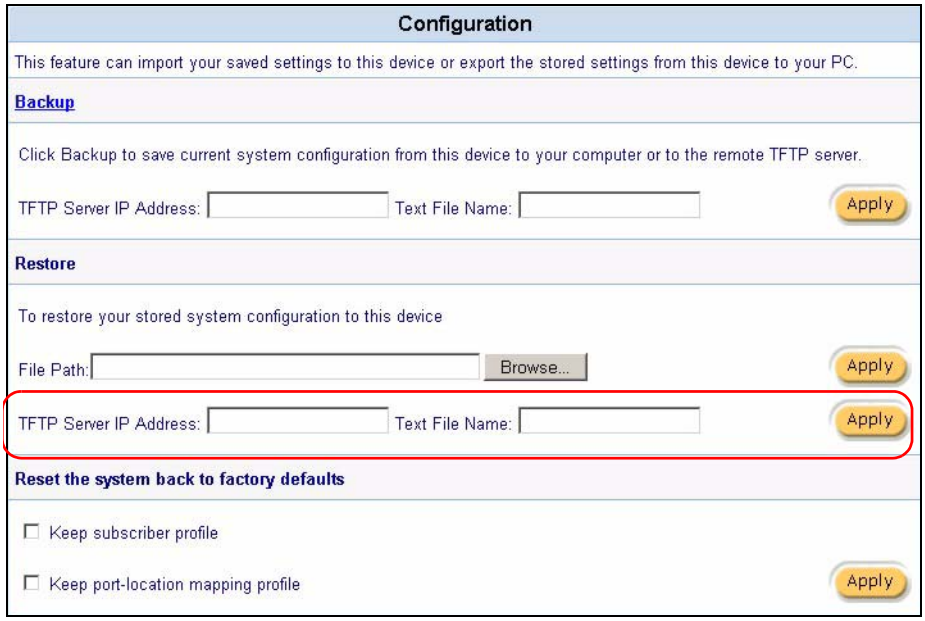
29.3.1 Restore Configuration Using TFTP

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 140 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.

29.4 Reset to the Factory Defaults

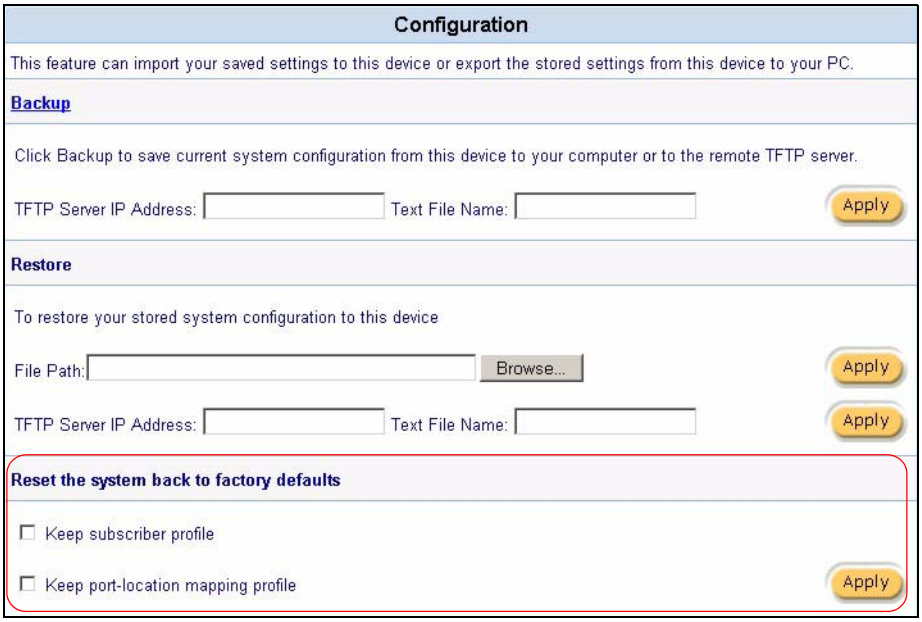
This section shows you how to reset the device configuration back to the factory defaults. If you have forgotten the administrator login password or username, you need to use the **RESET** button.

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 141 Configuration: 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.

CHAPTER 30
Firmware

This chapter shows you how to upgrade firmware on the VSG using the web configurator.

Note: o NOT interrupt the file upload process as this may PERMANENTLY damage the device.

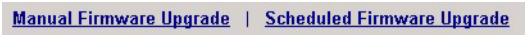
30.1 Firmware Overview

In the web configurator you can manually upgrade the firmware on the VSG or have it done automatically by setting up a schedule.

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 links in the **Firmware** screen.

Figure 142 Firmware: Links

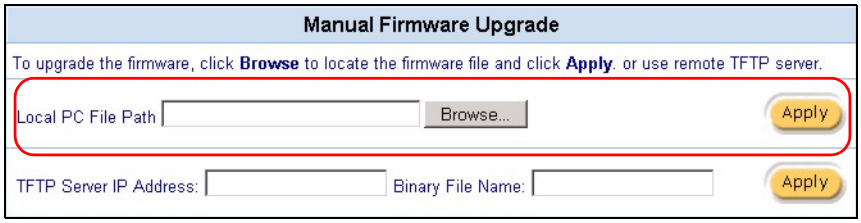


30.2 Manual Firmware Upgrade

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 143 Firmware: Manual Upgrade

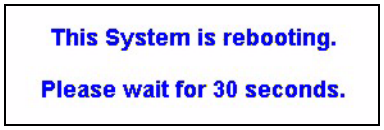


4 Specify the firmware file name in the **Local PC File Path** field (or click **Browse** to locate it).

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 144 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.

30.2.1 Manual Firmware Upgrade via a TFTP Server

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

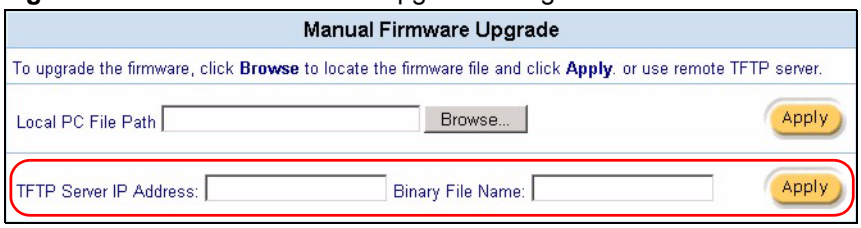
1 Download the latest firmware from www.zyxel.com and store it in a TFTP server. Unzip the file if it is zipped.

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 145 Firmware: Manual Upgrade Using TFTP



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.

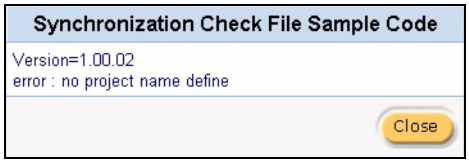
8 When the file transfer is completed successfully, the following message displays and the VSG automatically restarts to complete the firmware upgrade process.

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

30.3 Scheduled Firmware Upgrade

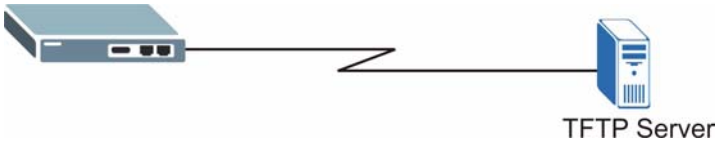
You can set the VSG to automatically check and download a new firmware from a TFTP server. This allows you to automate the firmware upgrade process if you have more than one VSG on your network. A synchronization file contains information on firmware version and filename. A sample synchronization file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

Figure 146 Scheduled Firmware Upgrade: 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 147 Scheduled Firmware Upgrade Example



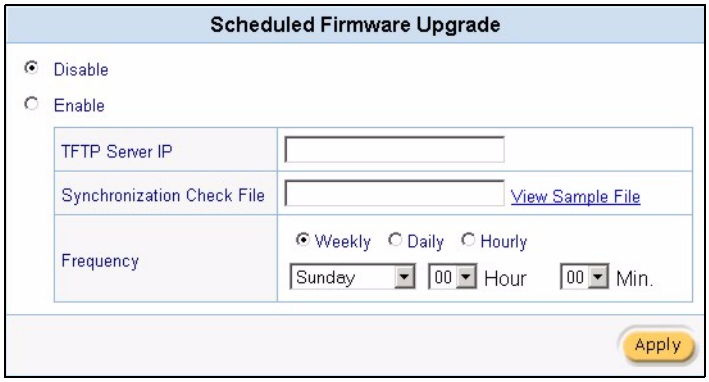
The following describes the automatic firmware upgrade process.

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 148 Firmware: Scheduled Upgrade



The following table describes the labels in this screen.

Table 69 Firmware: Scheduled Upgrade

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.
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.

CHAPTER 31
SSL Certificate

This chapter shows you how to set up Secure Socket Layer (SSL) certificates on the VSG.

31.1 SSL Certificate Overview

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.

31.1.1 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.

31.1.2 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.

31.2 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 149 SSL Certificate

The following table describes the labels in this screen.

Table 70 SSL Certificate

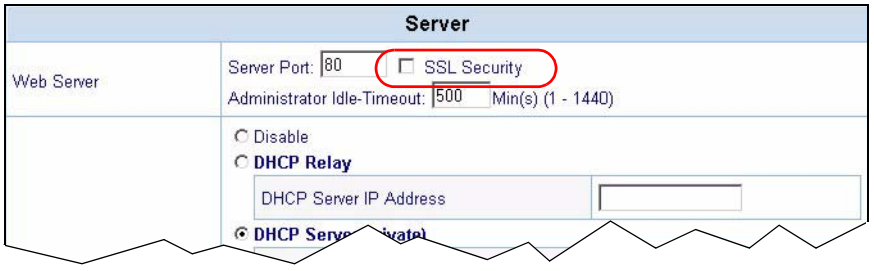
LABEL	DESCRIPTION
Password	Enter the secret password you used when applying for the certificate. **Note:** This password must be the same as the one you entered at the CA's site when creating a certificate.
Certificate File	Specify the certificate sent to you by a CA.
Private Key File	Specify the file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

31.3 Activating SSL Security

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

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

Figure 150 System Settings: Server Configuration: Enable SSL Security

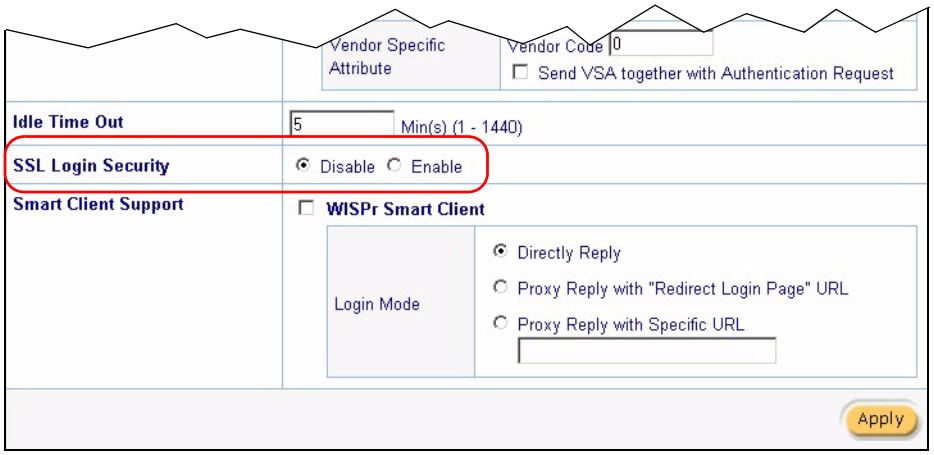


2 Click **Apply** to save the changes and restart the VSG when prompted.

3 Enable SSL security in the **Authentication** screen. Click **System Setting** and **Authentication** in the navigation panel

4 A screen displays as shown. Select **Enable** in the **SSL Login Security** field

Figure 151 System Settings: Authentication: Activate SSL Login



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

31.4 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 152 Installing the SSL Security Certificate: First Security Alert

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

Figure 153 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 154 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 155 Installing the SSL Security Certificate: Certificate Import Wizard

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

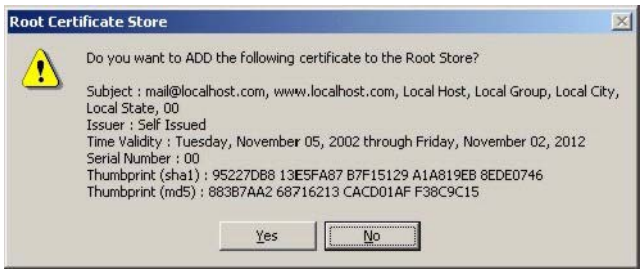
Figure 156 Certificate Import Wizard: Location

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

Figure 157 Certificate Import Wizard: Finish

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

Figure 158 Root Certificate Store



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

Figure 159 Certificate Import Wizard

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

Figure 160 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 161 Security Alert: Trusted

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

CHAPTER 32
Using The SMT

This chapter introduces the SMT (System Management Terminal) and shows you how to use the SMT to configure the VSG.

32.1 About 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).

Make sure the CONSOLE port is set to the correct mode. Refer to Chapter 3 on page 42 on system settings using the web configurator.

Use the SMT to set general system settings, configure the LAN and WAN settings, change the administrator login password, upgrade firmware or reset the device to the factory defaults.

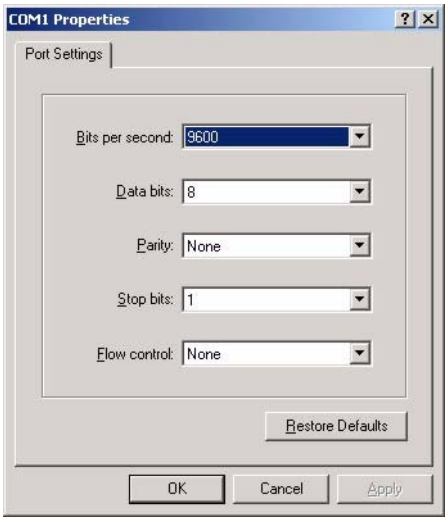
For advanced configuration, use the web configurator. Refer to the corresponding web configurator chapters for background information.

32.1.1 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 162 HyperTerminal Communication Parameter Settings Example



32.2 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 163 SMT: Login Screen

```
                Internet Subscriber Server III

          Copyright (c) 2005~2015 All Rights Reserved.

                          Version 1.00.02


             Username:

             Password:
```

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

32.3 The SMT Main Menu Summary

The SMT main menu is shown next.

Figure 164 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 71 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.

32.4 Navigating the SMT Interface

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

32.4.1 The Navigation Keys

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

Table 72 SMT: Control Key Descriptions

KEY	DESCRIPTION
[ENTER]	To go to the selected menu.
[ESC]	In any SMT screen. press [ESC] and enter **Y** (yes) to discard any changes and return to the main screen.
[TAB]	To move to the next configuration field.
[SPACE]	To toggle between field choices.

32.5 System Configuration

Use the **System Configuration** menu to set general system settings such as the system name, the domain name or change the console port speed.

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

Figure 165 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 73 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 73 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.	

32.6 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.

Refer to Chapter 6 on page 60 for background information.

32.6.1 WAN Type: Static/Dynamic

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

Figure 166 SMT: WAN Configuration: Static/Dynamic

```
                          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 74 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 on page 268 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.	

32.6.2 WAN Type: PPPoE

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 167 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 75 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.	

32.6.3 WAN Type: PPTP

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 168 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 76 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 76 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.	

32.7 LAN Configuration

From the **Main Menu** screen, enter 3 to display the **LAN Configuration** menu as shown next. Refer to Chapter 6 on page 60 for background information.

Figure 169 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 77 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 77 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.	

32.8 System Status

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

Figure 170 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)       :DHCP Client
      IP Address            :172.21.3.66
      Subnet Mask           :255.255.0.0
      Gateway               :172.21.0.254
      Primary DNS Server    :172.20.0.63
      Secondary DNS Server  :172.20.0.27
DHCP Configuration
  DHCP Service? (D/R/S)     :Disable



Press any key to return.
```

The following table describes the fields in this screen.

Table 78 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.

Table 78 SMT: System Status (continued)

FIELD	DESCRIPTION
Console Port Speed	This field displays the console port speed.
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.	

32.9 System Utilities

Use the **System Utilities** menus to upgrade firmware on the VSG or change the administrator login password.

In the SMT main menu, type 5 and press [ENTER] to display the **Utilities Menu** screen. To return to the **Main Menu** screen, press 3.

Figure 171 SMT: Utilities Menu

```
                        Utilities Menu


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



                            Enter selection:

Enter a numeric between 1 and 3.
```

32.9.1 Firmware Upgrade

Note: You MUST run a TFTP server on a computer where a firmware file is stored to upgrade the firmware on the VSG.

You MUST have a WAN/LAN connection between the VSG and the TFTP server computer at the same time.

Follow the steps below to configure the TFTP settings in the SMT.

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.
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 172 SMT: Firmware Upgrade

```
                            Firmware Upgrade


                  TFTP Server IP Address :172.21.4.72
                  Download Filename      :vsg1200v105.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 173 SMT: Firmware Upgrade Process

```
                        Firmware Upgrade


              TFTP Server IP Address :172.21.4.72
              Download Filename      :vsg1200v105.bin




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

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

32.9.2 Changing the Administrator Login Password

Note: It is recommended you change the default administrator login password.

To change other system login passwords, use the web configurator.

Follow the steps below to change the administrator login 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 174 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.

32.10 Restart

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 175 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.

32.11 SMT Logout

To log out of the SMT, enter 7 in the main menu screen. A "`Logout System (Y/N)?`" prompt displays. Enter **Y** to log out.

Figure 176 SMT: System Logout

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

32.12 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 on page 38.

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.

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 177 SMT: Reset to Factory Defaults

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

CHAPTER 33
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.

33.1 Using the LEDs to Diagnose Problems

The LEDs are useful aides for finding possible problem causes.

33.1.1 The Power LED

The LED on the front panel does not light up.

Table 79 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.

33.1.2 The LAN Port LEDs

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

Table 80 Troubleshooting the LAN LED

STEPS	CORRECTIVE ACTION
1	Make sure you are using the correct Ethernet cable. Connect the LAN port to a hub/switch using a crossover Ethernet cable or directly to a computer using a straight-through Ethernet cable.
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.

33.1.3 The WAN Port LEDs

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

Table 81 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.

33.2 The Console Port

I cannot access the VSG through the console port.

Table 82 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.

33.3 Web Configurator

I cannot access the web configurator.

Table 83 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 84 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.)

33.4 Internet Access

A subscriber cannot connect to the Internet through the VSG.

Table 85 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.

33.5 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 86 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 **Statement Printer 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 87 Product Specifications: General

Standard	IEEE 802.3 10BASE-T Ethernet IEEE 802.3u 100BASE-TX Fast Ethernet
Interface	One 10/100 Ethernet WAN port One 10/100 Ethernet LAN port 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 250 simultaneous users NAT (RFC1631) LAN DHCP server (with client pool size of 512) and DHCP relay HTTP proxy SMTP/DNS redirection WAN connection (static IP/DHCP client /PPPoE/PPTP) NAT for VPN (IPSec/PPTP)
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 MAC address filter Session limit
Billing	Flexible, time-based billing Port-Location Mapping Credit cards (via Authorize.net, iValidate and WorldPay)

Table 87 Product Specifications: General (continued)

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 Customizable subscriber login page and login messages MAC/IP/URL passthrough

Table 88 Product Specifications: Performance and Management

Maximum Throughput	72 Mbps
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 89 Product Specifications: Physical and Environmental

LED	Power SYS WAN/LAN: 10, 100
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 CSA RoHS VCCI WEEE

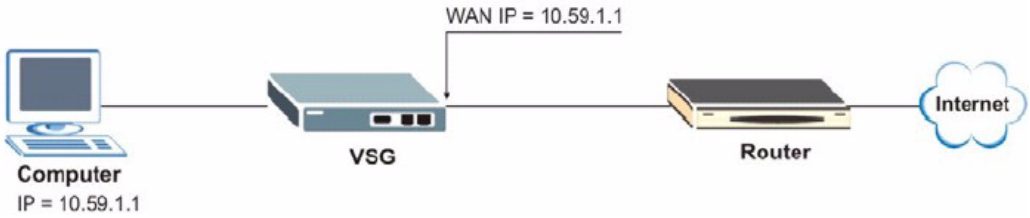
Appendix B
IP Address Assignment Conflicts

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 178 IP Address Conflicts: Scenario 1



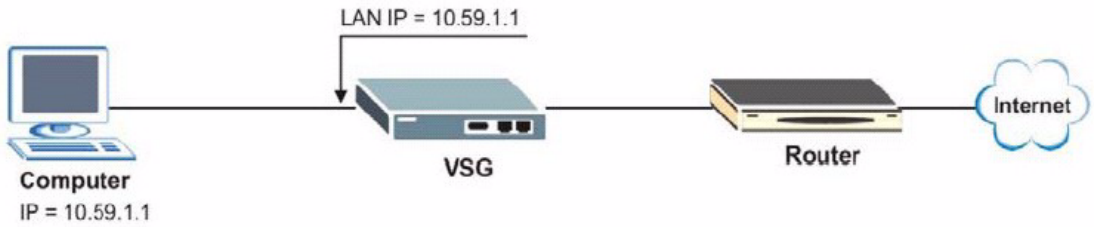
You must set the VSG to use different LAN and WAN IP addresses on different subnets if you enable DHCP server on the VSG. For example, you set the WAN IP address to 192.59.1.1 and the LAN IP address to 10.59.1.1.

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 179 IP Address Conflicts: Scenario 2

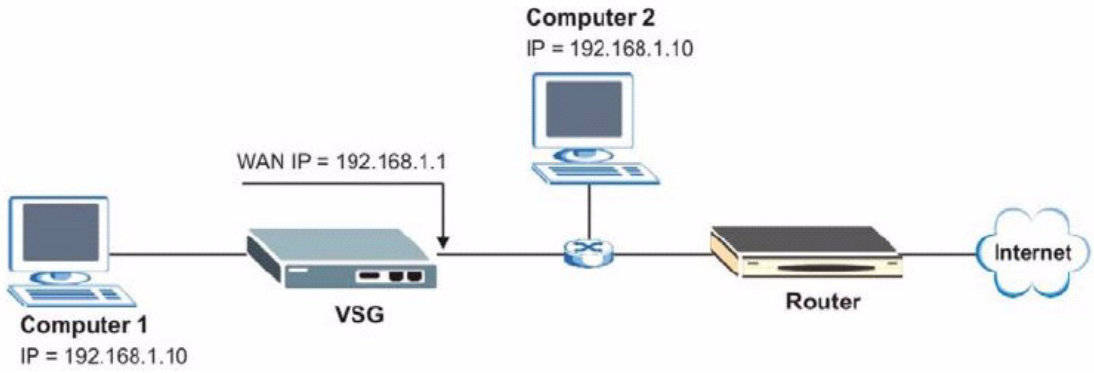


To solve this problem, make sure the VSG LAN IP address is not in the DHCP IP address pool.

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 180 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.

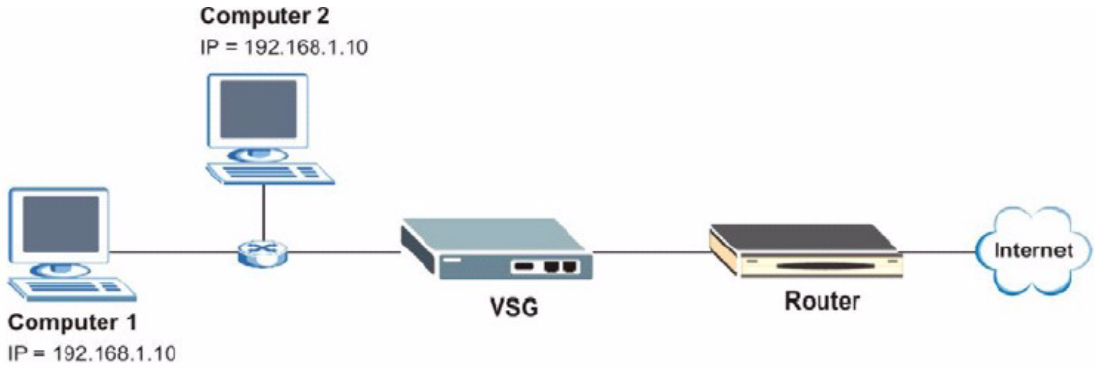
Otherwise, It is recommended the VSG use a public WAN IP address.

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 181 IP Address Conflicts: Scenario 4



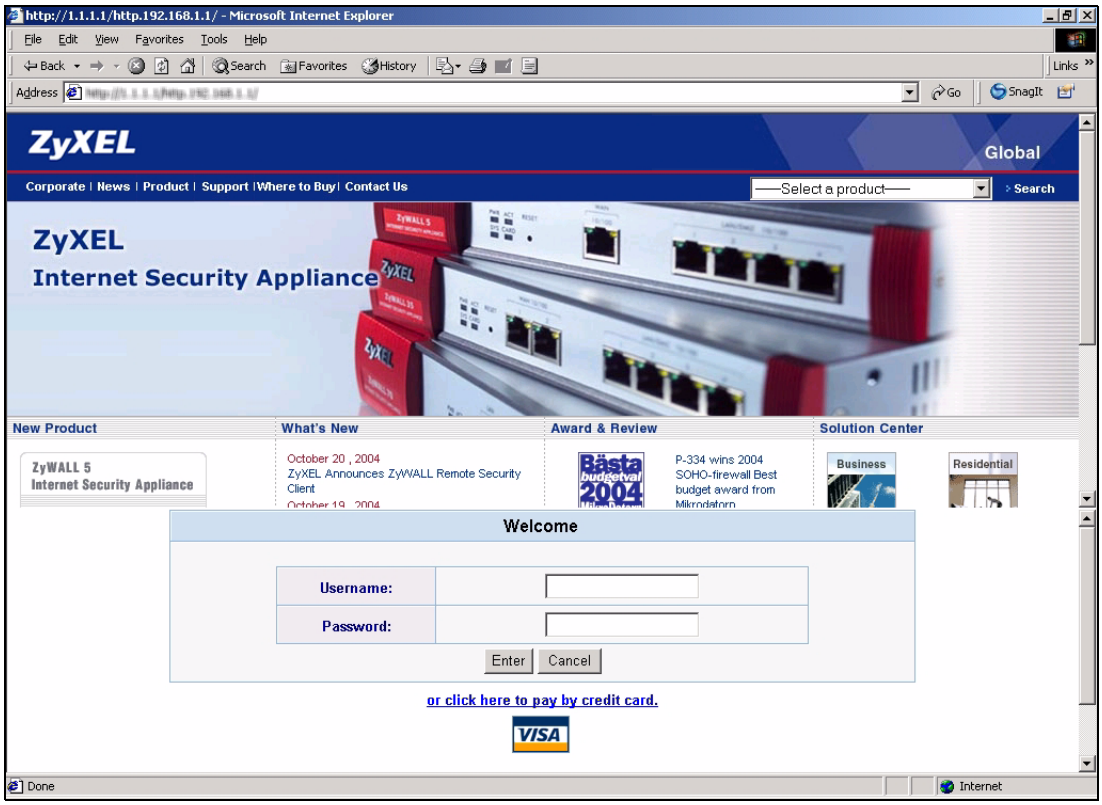
This problem can be solved by adding a VLAN-enabled switch or setting the computers to obtain IP addresses dynamically.

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 182 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 183 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 V2 Supported VSAs

The following table describes the VSGs specific to the VSG-1200 V2.

Table 90 VSG-1200 V2 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 "Server" on page 70 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 144 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 144 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 91 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 5.1 "General System Setting" on page 56).
3. Connect the SP-200 to the **CONSOLE** port on the VSG (see Section 2.2 "Hardware Connections" on page 39).
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 54 on page 106 for button labels on the SP-200.

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

Table 92 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 184 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 185 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 186 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 93 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 93 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 187 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 94 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 95 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.

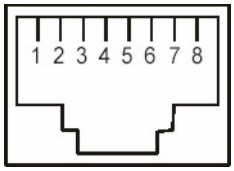


Table 96 WAN Port Cable Ping Assignments

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 188 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.

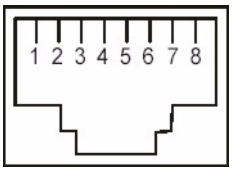


Table 97 LAN Port Cable Pin Assignments

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 189 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.

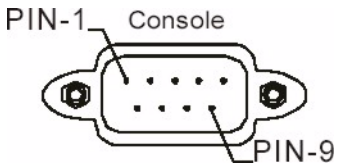


Table 98 Console Port Pin Assignment

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 190 DB25 Male to DB9 Male Connector

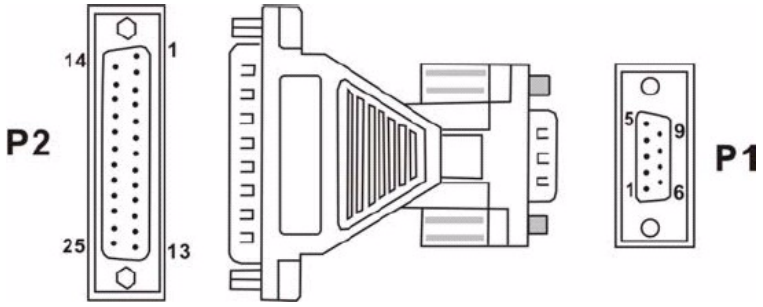


Table 99 DB25 Male to DB9 Male Connector Ping Assignment

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.

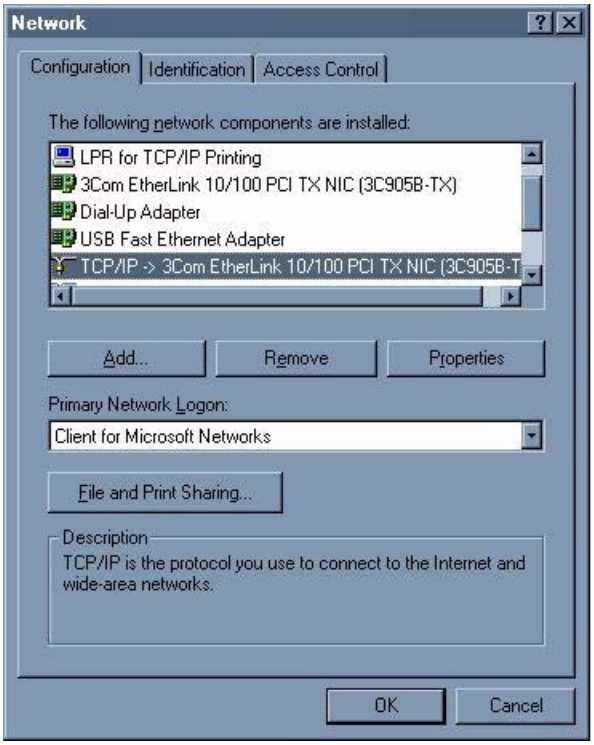
After the appropriate TCP/IP components are installed, configure the TCP/IP settings in order to "communicate" with your network.

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 V2's LAN port.

Windows 95/98/Me

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

Figure 191 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.

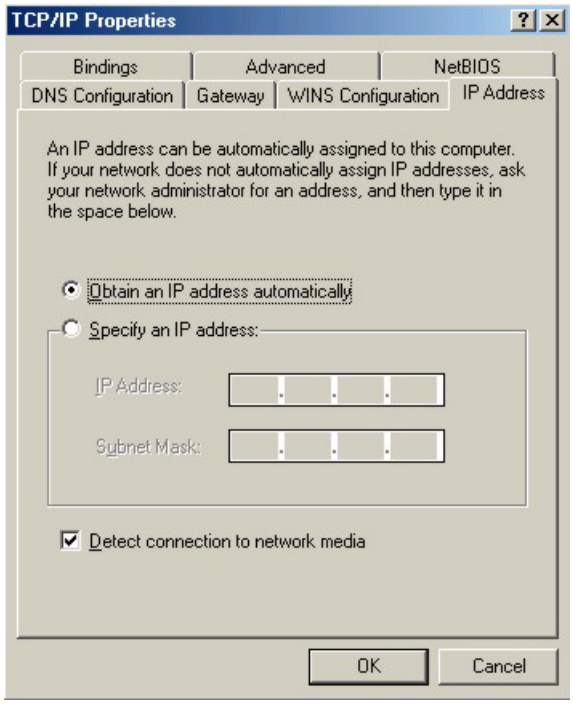
Configuring

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.

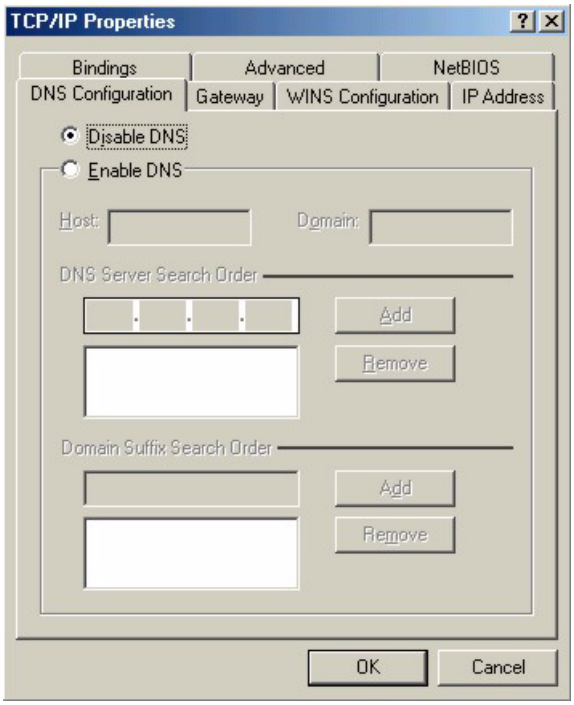
Figure 192 Windows 95/98/Me: TCP/IP Properties: IP Address



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 193 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 V2 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**.

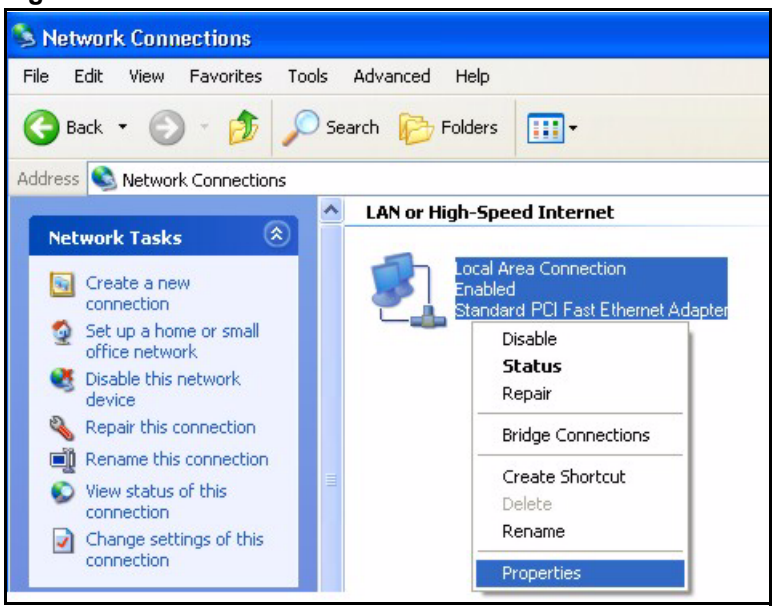
Figure 194 Windows XP: Start Menu

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

Figure 195 Windows XP: Control Panel

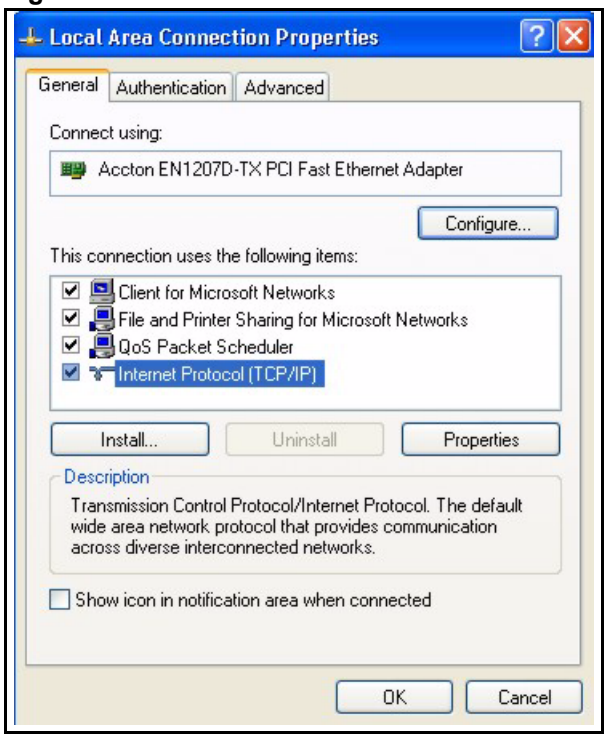
3 Right-click **Local Area Connection** and then click **Properties**.

Figure 196 Windows XP: Control Panel: Network Connections: Properties



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

Figure 197 Windows XP: Local Area Connection Properties

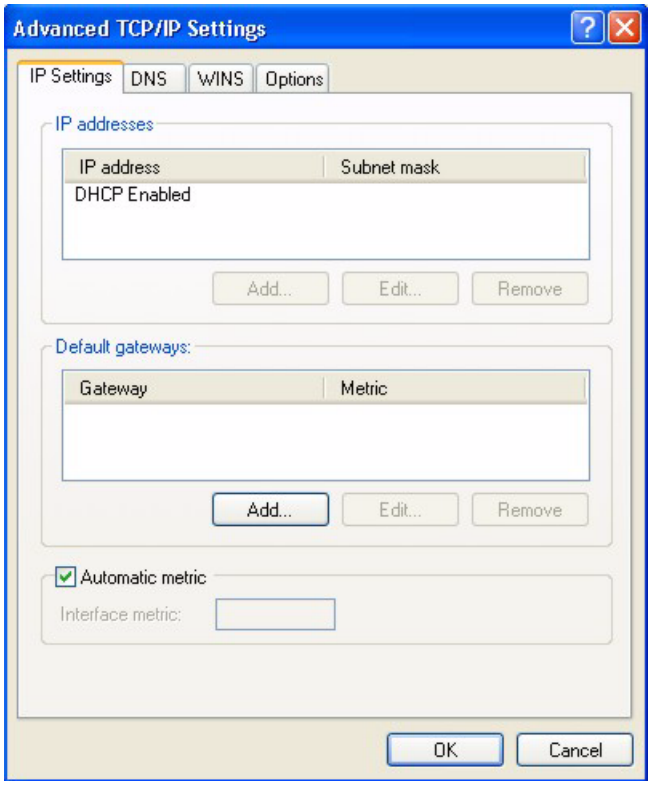


5 The **Internet Protocol TCP/IP Properties** window opens (the **General tab** in Windows XP).

- 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 198 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:

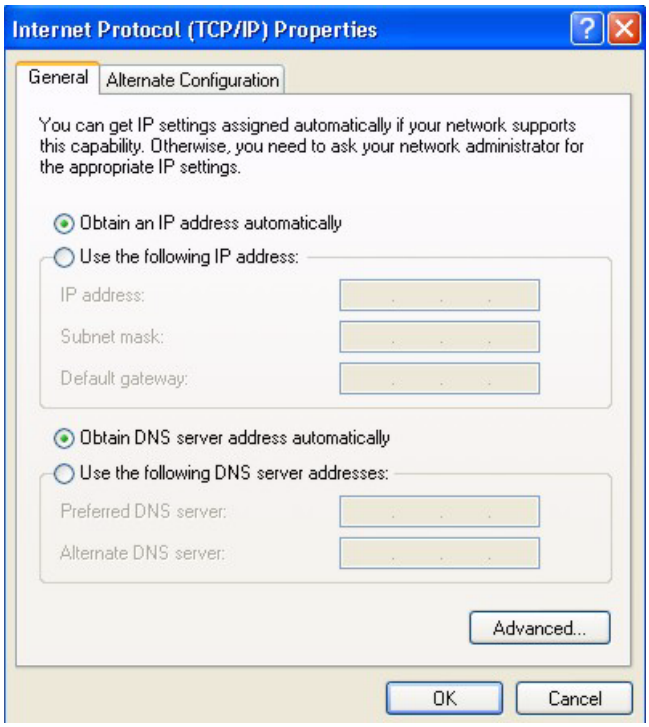
- In the **IP Settings** tab, in IP addresses, click **Add**.
- In **TCP/IP Address**, type an IP address in **IP address** and a subnet mask in **Subnet mask**, and then click **Add**.
- Repeat the above two steps for each IP address you want to add.
- Configure additional default gateways in the **IP 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 199 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 V2 and restart your computer (if prompted).

Verifying Settings

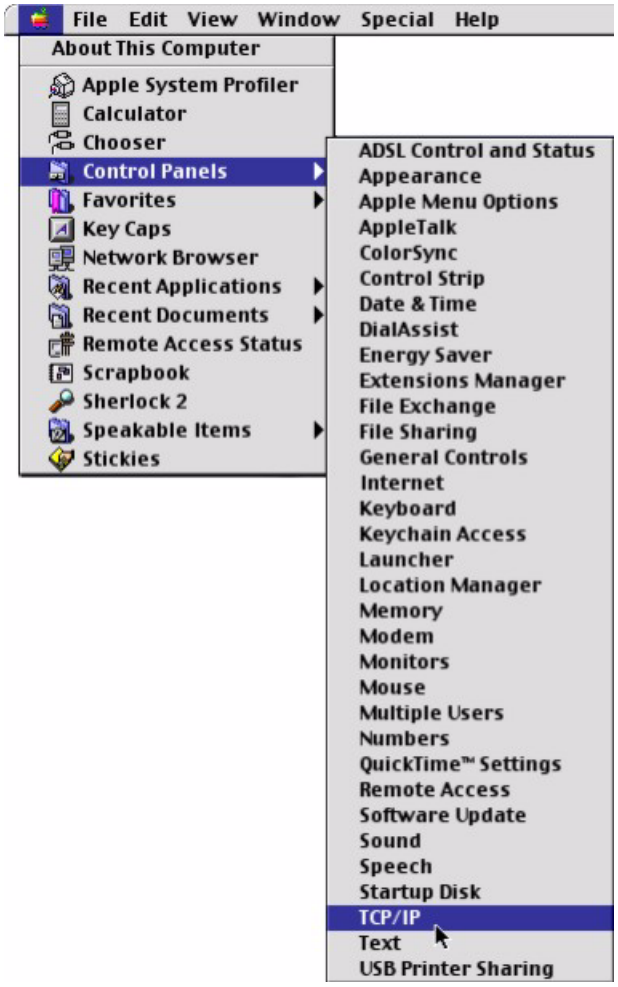
1 Click **Start**, **All Programs**, **Accessories** and then **Command Prompt**.

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

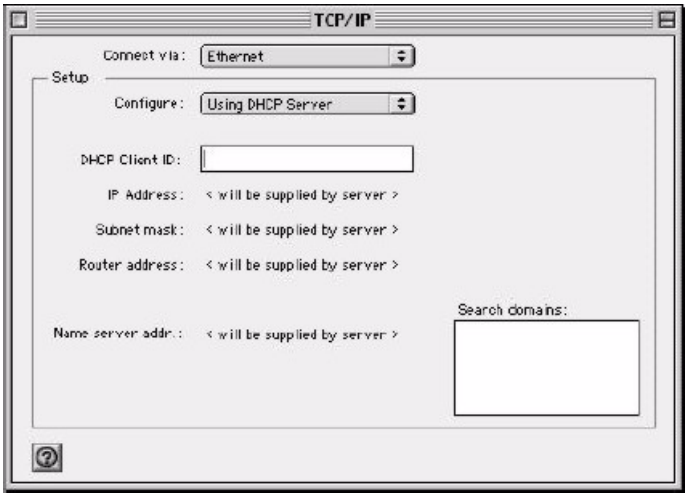
1 Click the **Apple** menu, **Control Panel** and double-click **TCP/IP** to open the **TCP/IP Control Panel**.

Figure 200 Macintosh OS 8/9: Apple Menu



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

Figure 201 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 V2 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 V2 and restart your computer (if prompted).

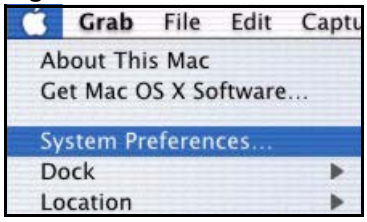
Verifying Settings

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 202 Macintosh OS X: Apple Menu

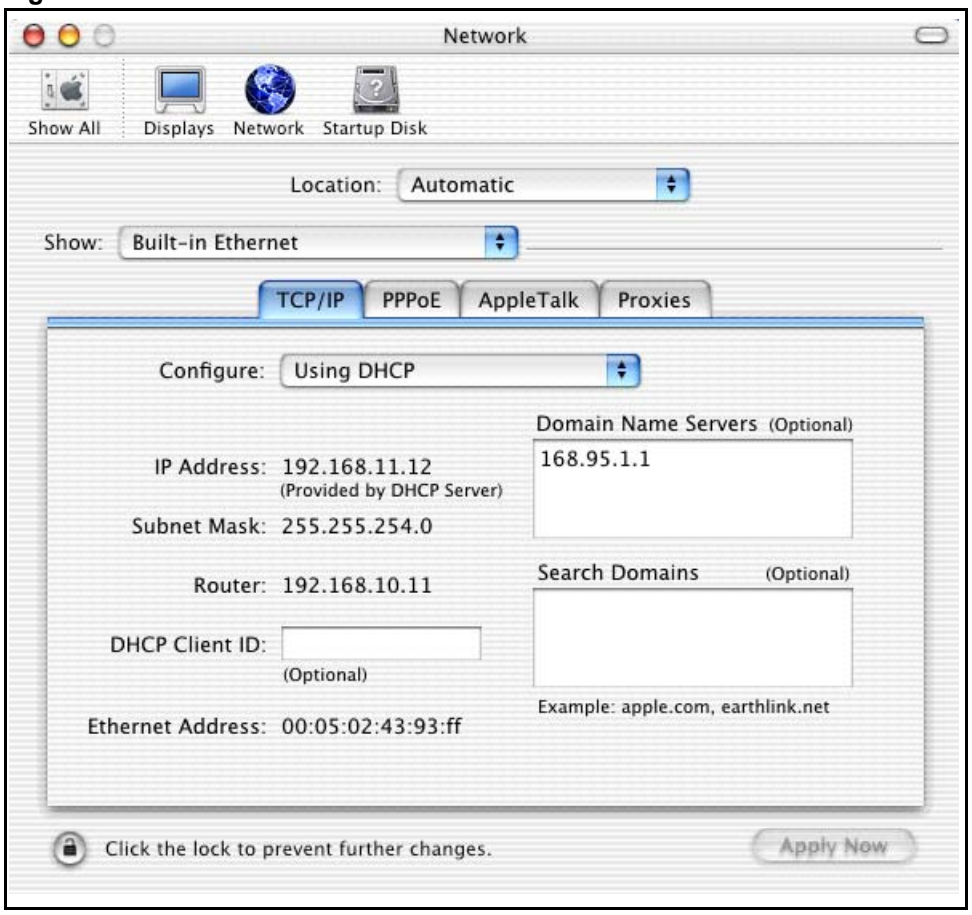


2 Click **Network** in the icon bar.

- 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 203 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 V2 in the **Router address** box.

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

6 Turn on your VSG-1200 V2 and restart your computer (if prompted).

Verifying Settings

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

APPENDIX H
IP Addresses and Subnetting

This appendix introduces IP addresses, IP address classes and subnet masks. You use subnet masks to subdivide a network into smaller logical networks.

Introduction to IP Addresses

An IP address has two parts: the network number and the host ID. Routers use the network number to send packets to the correct network, while the host ID identifies a single device on the network.

An IP address is made up of four octets, written in dotted decimal notation, for example, 192.168.1.1. (An octet is an 8-digit binary number. Therefore, each octet has a possible range of 00000000 to 11111111 in binary, or 0 to 255 in decimal.)

There are several classes of IP addresses. The first network number (192 in the above example) defines the class of IP address. These are defined as follows:

- Class A: 0 to 127
- Class B: 128 to 191
- Class C: 192 to 223
- Class D: 224 to 239
- Class E: 240 to 255

IP Address Classes and Hosts

The class of an IP address determines the number of hosts you can have on your network.

- In a class A address the first octet is the network number, and the remaining three octets are the host ID.
- In a class B address the first two octets make up the network number, and the two remaining octets make up the host ID.
- In a class C address the first three octets make up the network number, and the last octet is the host ID.

The following table shows the network number and host ID arrangement for classes A, B and C.

Table 100 Classes of IP Addresses

IP ADDRESS	OCTET 1	OCTET 2	OCTET 3	OCTET 4
Class A	**Network number**	Host ID	Host ID	Host ID
Class B	**Network number**	**Network number**	Host ID	Host ID
Class C	**Network number**	**Network number**	**Network number**	Host ID

An IP address with host IDs of all zeros is the IP address of the network (192.168.1.0 for example). An IP address with host IDs of all ones is the broadcast address for that network (192.168.1.255 for example). Therefore, to determine the total number of hosts allowed in a network, deduct two as shown next:

- A class C address (1 host octet: 8 host bits) can have $2^8 - 2$, or 254 hosts.
- A class B address (2 host octets: 16 host bits) can have $2^{16} - 2$, or 65534 hosts.

A class A address (3 host octets: 24 host bits) can have $2^{24} - 2$ hosts, or approximately 16 million hosts.

IP Address Classes and Network ID

The value of the first octet of an IP address determines the class of an address.

- Class A addresses have a **0** in the leftmost bit.
- Class B addresses have a **1** in the leftmost bit and a **0** in the next leftmost bit.
- Class C addresses start with **1 1 0** in the first three leftmost bits.
- Class D addresses begin with **1 1 1 0**. Class D addresses are used for multicasting, which is used to send information to groups of computers.
- There is also a class E. It is reserved for future use.

The following table shows the allowed ranges for the first octet of each class. This range determines the number of subnets you can have in a network.

Table 101 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
Class E (reserved)	**1111**0000 to **1111**1111	240 to 255

Subnet Masks

A subnet mask is used to determine which bits are part of the network number, and which bits are part of the host ID (using a logical AND operation).

A subnet mask has 32 bits. If a bit in the subnet mask is a "1" then the corresponding bit in the IP address is part of the network number. If a bit in the subnet mask is "0" then the corresponding bit in the IP address is part of the host ID.

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

Table 102 "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 leftmost 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 103 Alternative Subnet Mask Notation

SUBNET MASK	SUBNET MASK "1" BITS	LAST OCTET BIT VALUE	DECIMAL
255.255.255.0	/24	0000 0000	0
255.255.255.128	/25	1000 0000	128
255.255.255.192	/26	1100 0000	192
255.255.255.224	/27	1110 0000	224

Table 103 Alternative Subnet Mask Notation (continued)

SUBNET MASK	SUBNET MASK "1" BITS	LAST OCTET BIT VALUE	DECIMAL
255.255.255.240	/28	1111 0000	240
255.255.255.248	/29	1111 1000	248
255.255.255.252	/30	1111 1100	252

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 104 Two Subnets Example

IP/SUBNET MASK	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").

To make two 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 make 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 105 Subnet 1

IP/SUBNET MASK	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

Table 105 Subnet 1 (continued)

IP/SUBNET MASK	NETWORK NUMBER	LAST OCTET BIT VALUE
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 106 Subnet 2

IP/SUBNET MASK	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	

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 (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 zeroes is the subnet itself, all ones is the broadcast address on the subnet).

Table 107 Subnet 1

IP/SUBNET MASK	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

Table 107 Subnet 1 (continued)

IP/SUBNET MASK	NETWORK NUMBER	LAST OCTET BIT VALUE
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 108 Subnet 2

IP/SUBNET MASK	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 109 Subnet 3

IP/SUBNET MASK	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 110 Subnet 4

IP/SUBNET MASK	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 eight subnets (000, 001, 010, 011, 100, 101, 110 and 111).

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

Table 111 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 112 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 100 on page 269) available for subnetting.

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

Table 113 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

A

AAA 234
access control 34
access point (AP) 36
accessing a LAN device 190
  methods 190
  requirements 190
account billing
account expiration 103
account printout 95, 129
  customize 129
  examples 130
  preview 130
account printout preview 101
accounting 34
  Accumulation 81
  Time to Finish 81
accounting port 84
Accumulation 81, 84
advanced subscriber login screen 123
advertisement link 149, 243
  frequency 149
  sequence 149
alternative subnet mask notation 270
assign IP address to a computer 256
authentication 34, 80
  Built-in Authentication 81
  CAS 80
  RADIUS 81
  types 80
  User Agreement 80
authentication port 84
authentication setup 82
automate firmware upgrade 204
automatic firmware upgrade
  process 204

B

backing up billing logs 192
bandwidth control 144
bandwidth limit
  downlink 90
  uplink 90
Bandwidth Management 90, 144
  activate 144
  class-based 144
  equal share 144
  RADIUS 146
  types 144
bandwidth management 243
billing 88, 234
  account
  credit card 32
billing logs 191
  backup 192
  charge type 191
  delete all 191
  export 191
  opening 192
  sample 193
billing profile 88
  bandwidth limit 90
  create 88
  currency 89
  duration 90
  edit 89
  setting 89
built-in authentication 34, 84
  information window 127
  scenario options 85

C

CA 206
CAS 80
Central Authentication Service
  See CAS
certificate 206
  private key 207
  secret password 207
Certification Authority (CA) 206
certifications 3
  notices 3
  viewing 3
class-based bandwidth allocation 144
  activate 146
community 180
Concurrent Access 95
concurrent access 103
concurrent user 95, 235

allowable 185
set 95
configuration file
backup 196
backup via TFTP 198
restore 199
restore via TFTP 199
configuration file management 35
console port 35, 40, 214, 253
cable pin assignments 253
change function 59
communication parameters 214
DB25 male connector 254
DB9 male connector 254
establish a connection 214
SMT interface 214
speed 217, 224
statement printer 59
Copyright 2
Cost Of Transmission 165
create billing profiles 88
create dynamic subscriber account 106
create port-location mapping 112
create static subscriber account 95
create static subscriber accounts manually 97
credit card billing 32, 116
authentication scenario option 87
configuration steps 116
credit card icons 119
how it works 116
service selection message 136
setup 117
subscriber login message 135
successful notification 139
transaction failed message 141
current user list 186
Customer Support 8
customize subscriber login screen 120

D

daily account summary 247
desktop installation 38
device reset 33, 40, 47
DHCP 33
lease time 222
mode
DHCP client 56
pool size 234
DHCP client table 187
update interval 187
DHCP pool size 222
DHCP relay 223
DHCP server 56, 222, 236
DHCP services 222
digital certificate 206
digital signature 206
dimension 235
disclaimer 2
display subscriber account 102
DNS 258
DNS proxy 34
DNS server 219, 223
document feedback 30
domain name 56, 217, 223
Dynamic Host Configuration Protocol
See DHCP
dynamic IP address 219
dynamic subscriber account 104
backup 109
configuration 105
create using statement printer 107
create using web configurator 106
display 108
general settings 104
method to create 104
print 108

E

edit a subscriber account 100
edit billing profiles 89
EIA standard size rack 38
e-mail forwarding 34
e-mail server
redirect 218
equal-share bandwidth allocation 144
configure 145
error messages 244
Ethernet cable 230
length specifications 252
types 252
Ethernet port 252
speed 252
export billing logs 191

F

FCC interference statement 3
feature 32

feedback 30
firmware
  download to TFTP server 204
firmware download 202
firmware upgrade 35
  about subscriber connection 204
  automatic 204
  from a TFTP Server 203
  from computer 202
  from TFTP server 225
  important note on SMT 225
  manual 202
  schedule frequency 205
  scheduled 204
firmware version 185, 249
forward e-mails 34

G

Gateway 165
general setup 56
generate static subscriber accounts automatically 96
glossary 30

H

hardware installation 38
  desktop 38
  rack mounting 38
hardwired address 188
High Speed Internet Access
  See HSIA
Hilton Group Corporation
Hop Count 165
host name 56
hotspot 32
HSIA 80

I

IANA (Internet Assigned Numbers Authority) 85
idle timeout 43
IEEE802.1q VLAN 112
information window 127
  example 128
  session timeout messages 127
  setup 128
in-room billing 91
install SSL certificate 208
installation option 38
interface 234
IP Address 165
IP address 236
  setup 256
IP address assignment 224, 236
  important note 256
IP address conflicts 236
  scenario 1 236
  scenario 2 236
  scenario 3 237
  scenario 4 237
IP address setup 256
  DNS information 258, 263
  install components 257
  Macintosh OS 8/9 263
  Macintosh OS X 265
  verify settings 259, 263, 266
  Windows 2000/NT/XP 259
  Windows 95/98/Me 256
IP Static Route 164
ipconfig 263

L

LAN bandwidth management 144
LAN device
  accessing via the VSG 190
  management example 162
  port mapping 160
  remote management 160, 190
  status 189
LAN device management 160
LAN devices 160
LAN port 40
  cable pin assignment 253
LAN port, the 253
local management 40
Location Identifier 113
log schedule 171
login
  subscriber 35
logs 170, 171
  formats 173
  name 172
  time interval 173

M

MAC (Media Access Control) **188**
maintenance **35**
Management Information Base (MIB) **179**
management interface **30**, **35**
manual firmware upgrade **202**
mapping profiles to buttons on the statement printer **104**
Maximum Segment Size (MSS). **222**
Maximum Transmission Unit (MTU) **221**
merchant password **118**
MIB **179**
monthly account summary **247**

N

NAT **34**, **74**, **160**
  Definitions **74**
  How it works **75**
  on LAN **160**
  What it does **75**
  What NAT does **75**
NAT address pool **78**
NAT examples **76**
NAT Mapping Types **76**
NAT Pool **78**
NAT-enabled device **160**
navigation panel **43**
Network Address Translation
  See NAT
network application **35**
  hotel with PMS **36**
  Internet access **35**
network cable **252**
Network Management System (NMS) **179**
network statistics **250**
NMS **179**, **180**

O

online glossary **30**

P

passthrough **152**
  destination URL or IP **154**
  subscriber computer IP or MAC **152**
  types **152**
pin assignment **252**
pin assignments **252**
PMS **40**, **88**, **91**
  Based on Room **91**
  Based on Subscriber **91**
  charge modes **91**
  connection speed **93**
  port-location mapping **91**
  type of **92**
PMS billing **88**
  service selection messages **125**
PMS port connector **40**
PMS port settings **93**
PMS setup **92**
PMS transaction **193**
PMS transaction messages **193**
Point-to-Point Protocol over Ethernet
  See PPPoE
Point-to-Point Tunneling Protocol
  See PPTP
Port Identifier **113**
port mapping **161**
  application type **161**
  port number **161**
portal page **148**
portal web site **148**
Port-Location Mapping **92**, **112**
  backup **114**
  configuring **112**
  create mapping **113**, **114**
  restore **114**
power connection **41**
power specification **235**
PPPoE **33**, **219**
  connect on demand **220**
  idle timeout **220**
  keep alive **220**
  Redial Period **220**
PPTP **33**, **220**
  connect on demand **221**
  connection ID **221**
  idle timeout **221**
  keep alive **221**
  Redial Period **221**
print dynamic subscriber account **108**
print reports **246**
printout preview **106**
problems **230**
product certifications **235**
product registration **7**
product specifications **234**

environmental 235
general 234
management 235
performance 235
physical 235
Property Management System
See PMS

R

rack mounting installation 38
rack mounting kit 38
RADIUS 84
accounting methods 81
secret key 84
RADIUS authentication
information window 127
RADIUS server 242
rear panel 41
redirect subscriber login screen 122
registration
product 7
related document 30
Remote Authentication Dial-In User Service
See RADIUS
report printing on SP-200 246
daily account summary 247
initial setup 246
key combination 246
monthly account summary 247
network statistics 250
system status 248
reset 227, 231
reset button 33, 40
reset to the factory defaults 40, 47
restart the VSG 227
restore configuration file 199
RFC 1631 34, 74
RFC2516 33
RJ-45 252

S

safety warnings 5
scenario option 85
scheduled firmware upgrade 204
Secure Socket Layer 206
See SSL
security 234
serial console port 253
server port 160
server port number 232
service selection messages 125
session information 188
client computer 188
total entries 188
update interval 188
session timeout messages 127
session trace 176
example 177
filename convention 177
number of records 176
setup 176
TFTP server 177
Setting up your computer's IP address 256
Simple Network Management Protocol (SNMP) 178
SMT 30, 214
accessing 214
basic configuration 214
idle timeout period 215
LAN setup 222
login 215
main menu 216
menu overview 215
navigating 216
navigation keystrokes 217
system status 223
WAN setup 218
SNMP 178
community 180
components 178
Get 179
GetNext 179
management model 178
object variables 179
overview 178
privilege 180
protocol operations 179
Set 179
setup 179
Trap 179
versions supported 178
SNMP agent 178
SNMP manager 178
SNMP port 180
SP-200 246
button labels 106
creating dynamic accounts 107
mapping profiles to buttons 104
report printing 246
specifications 234
SSL 85, 206
activate 207
certificate 206
download certificate to VSG 206

install certificate 208
requirement 206
SSL certificate information 186
standard subscriber login screen 121
statement printer 40, 95, 104, 106, 246
statement printer port 35, 40
static IP address 219
static route 34
Static Routing Topology 164
static subscriber account 94
auto create 96
backup 98
create 95
display 102
edit 100
global settings 94
manual create 97
printout preview 101
restore 99
status 184
subnet 268
subnet mask 270
subnetting 270
subscriber
idle-timeout 85
subscriber account 93
backup 98, 109
dynamic 93, 104
expiration 108
printout 129
restore 98
static 93, 94
types 93
subscriber account first login 103
subscriber authentication 120
subscriber database 34
subscriber login 240
information window 240
subscriber login page 35
subscriber login screen
credit card billing 135
customize 120
standard 121
synchronization check file 205
synchronization file 204, 205
example 204
syntax convention 30
syslog 170
on the LAN 171
on the WAN 171
syslog server 171
syslog settings 170
system information 184
System Management Terminal
See SMT
System Management Terminal (SMT) 214
system name 56
system reset 33, 40, 47
system setup 56
system status 184, 248

T

TCP/IP components 256
TCP/IP protocol 257
TCP/IP settings 256
TFTP server 205
throughput 235
Time to Finish 81, 84
trademarks 2
transaction key 118
trap port 180
traps 179
troubleshooting 230
console port 231
Internet access 232
LAN port LEDs 230
Power LED 230
statement printer 233
WAN port LEDs 231
Web Configurator 232
Web Configurator display 232

U

uplink port 253
User Agreement 84

V

Vendor Specific Attribute 242
See VSA
vendor specific attributes (VSAs) 82
ventilation 38
ventilation hole 41
virtual port 160, 161, 190
Virtual Private Network 75
Virtual Private Network (VPN) 33
VLAN 177
VLAN-enabled switch 112

VPN
connection type 34
single-connection-per-source limitation 76, 78
VSA 82, 85, 242
format 243
related error messages 244
vendor ID 85
VSG
reset to factory defaults 227

W

walled garden 34, 149
example 150
important note 150
WAN port 40
cable pin assignment 252
WAN port, the 252
warranty
note 7
web configurator 35, 42
configuration menu 44
idle timeout 43
menu summary 44
navigation panel 43
supported browser 35
web redirect 34
web server port 218
winipcfg 259