USER GUIDE

ADSL2 BARRICADE™
1-Port ADSL/ADSL2+ Router

SMC7901BRA5
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FEDERAL COMMUNICATION COMMISSION INTERFERENCE STATEMENT

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

◆ Reorient or relocate the receiving antenna
◆ Increase the separation between the equipment and receiver
◆ Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
◆ Consult the dealer or an experienced radio/TV technician for help

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate this equipment.

FCC - PART 68

This equipment complies with Part 68 of the FCC rules and the requirements adopted by the ACTA. On the bottom of this equipment is a label that contains, among other information, a product identifier in the format US: 1KRDL09BSMC7800A. If requested, this number must be provided to the telephone company.

This equipment uses the following USOC jacks: RJ-11.

The REN is useful to determine the quantity of devices you may connect to your telephone line and still have those entire devices ring when your telephone number is called. In most, but not all areas, the sum of the REN
of all devices connected to one line should not exceed five (5.0). To be certain of the number of devices you may connect to you line, as determined by the REN, you should contact your local telephone company to determine the maximum REN for your calling area.

If your equipment causes harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, they will notify you in advance. But if advance notice is not practical, you will be notified as soon as possible. You will be informed of your right to file a complaint with the FCC. Your telephone company may make changes in its facilities, equipment, operations or procedures that could affect the proper functioning of your equipment. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.

If you experience trouble with this telephone equipment, please contact our company at the numbers shown on back of this manual for information on obtaining service or repairs. The telephone company may ask that you disconnect this equipment from the network until the problem has been corrected or until you are sure that the equipment is not malfunctioning.

This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

**REN (Ringer Equivalent Numbers) Statement**

Notice: The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.

**Attachment Limitations Statement**

Notice: This equipment meets telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). This is confirmed by marking the equipment with the Industry Canada certification number. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

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

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

**CE MARK DECLARATION OF CONFORMANCE FOR EMI AND SAFETY (EEC)**

SMC contact for these products in Europe is:

SMC Networks Europe,
C/Fructuós Gelabert 6-8, 2a, 2a,
Edificio Conata II,
08970 - Sant Joan Despí, Barcelona, Spain.

This information technology equipment complies with the requirements of the Council Directive 2004/108/EC on the Approximation of the laws of the Member States relating to Electromagnetic Compatibility and 2006/95/EC for electrical equipment used within certain voltage limits and the Amendment Directive 93/68/EEC. For the evaluation of the compliance with these Directives, the following standards were applied:

**RFI Emission:**
- Limit according to EN 55022:2007, Class A/B
- Limit for harmonic current emission according to EN 61000-3-2:2006, Class A
- Limitation of voltage fluctuation and flicker in low-voltage supply system according to EN 61000-3-3:2005

**Immunity:**
- Product family standard according to EN 55024:2001 + A2:2003
- Electrostatic Discharge according to IEC 61000-4-2:2008
- Radio-frequency electromagnetic field according to IEC 61000-4-3:2007
- Electrical fast transient/burst according to IEC 61000-4-4:2004
- Surge immunity test according to IEC 61000-4-5:2005
- Immunity to conducted disturbances, Induced by radio-frequency fields: IEC 61000-4-6:2008
- Power frequency magnetic field immunity test according to IEC 61000-4-8:2001

**LVD:**
- Voltage dips, short interruptions and voltage variations immunity test according to IEC 61000-4-11:2004
- EN60950-1 :2006+A11 :2009
ENVIRONMENTAL STATEMENT
The manufacturer of this product endeavours to sustain an environmentally-friendly policy throughout the entire production process. This is achieved though the following means:

◆ Adherence to national legislation and regulations on environmental production standards.
◆ Conservation of operational resources.
◆ Waste reduction and safe disposal of all harmful un-recyclable by-products.
◆ Recycling of all reusable waste content.
◆ Design of products to maximize recyclables at the end of the product’s life span.
◆ Continual monitoring of safety standards.

END OF PRODUCT LIFE SPAN
This product is manufactured in such a way as to allow for the recovery and disposal of all included electrical components once the product has reached the end of its life.

MANUFACTURING MATERIALS
There are no hazardous nor ozone-depleting materials in this product.

DOCUMENTATION
All printed documentation for this product uses biodegradable paper that originates from sustained and managed forests. The inks used in the printing process are non-toxic.
ABOUT THIS GUIDE

PURPOSE
This guide gives specific information on how to install the ADSL Gateway Router and its physical and performance related characteristics. It also gives information on how to operate and use the management functions of the ADSL Gateway Router.

AUDIENCE
This guide is for users with a basic working knowledge of computers. You should be familiar with Windows operating system concepts.

CONVENTIONS
The following conventions are used throughout this guide to show information:

**NOTE:** Emphasizes important information or calls your attention to related features or instructions.

**CAUTION:** Alerts you to a potential hazard that could cause loss of data, or damage the system or equipment.

**WARNING:** Alerts you to a potential hazard that could cause personal injury.

REVISION HISTORY
This section summarizes the changes in each revision of this guide.

**SEPTEMBER 2011 REVISION**
This is the first revision of this guide.
## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WARRANTY AND PRODUCT REGISTRATION</strong></td>
<td>4</td>
</tr>
<tr>
<td><strong>COMPLIANCES</strong></td>
<td>5</td>
</tr>
<tr>
<td><strong>ABOUT THIS GUIDE</strong></td>
<td>9</td>
</tr>
<tr>
<td><strong>FIGURES</strong></td>
<td>10</td>
</tr>
<tr>
<td><strong>CONTENTS</strong></td>
<td>13</td>
</tr>
<tr>
<td><strong>TABLES</strong></td>
<td>17</td>
</tr>
</tbody>
</table>

### SECTION I

#### GETTING STARTED

1 **INTRODUCTION**
   - Features and Benefits
   - Description of Hardware
     - Power Connector
     - Power Button
     - Reset Button

2 **INSTALLING THE ROUTER**
   - Package Contents
   - System Requirements
   - Cable Connections
   - Powering On
   - Configuring the TCP/IP Protocols

### SECTION II

#### WEB CONFIGURATION

3 **SYSTEM CONFIGURATION**
   - Using the Web Interface
     - Home Page
     - Setup Wizard
Step 1 - Getting Started 33
Step 2 - Time Zone 33
Step 3 - ADSL Settings 34
Step 4 - Configuration Saving 36

4 DEVICE INFORMATION 37
System Status 37
LAN Status 38
WAN Status 39
Port Mapping 40
Traffic Statistics 41
DSL Statistics 42
ARP Table 43

5 LAN SETTINGS 45
LAN Interface 46
DHCP Settings 47
  DHCP Disabled 47
  DHCP Relay 48
  DHCP Server 49
  DHCP Static IP 51

6 WAN SETTINGS 52
Channel Configuration 53
ATM Settings 55
ADSL Settings 57

7 SERVICES 59
DNS Settings 60
  DNS Server 60
  DDNS 61
Access Control Lists 63
  LAN ACLs 63
  WAN ACLs 64
IP/Port Filtering 66
NAT/NAPT Settings 68
  Virtual Servers 68
  NAT Exclude IP 70
  NAT Forwarding 70
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAT ALG and Pass-Through</td>
<td>71</td>
</tr>
<tr>
<td>NAT Port Trigger</td>
<td>72</td>
</tr>
<tr>
<td>FTP ALG Configuration</td>
<td>73</td>
</tr>
<tr>
<td>NAT IP Mapping</td>
<td>73</td>
</tr>
<tr>
<td>Quality of Service</td>
<td>74</td>
</tr>
<tr>
<td>MAC Filtering</td>
<td>76</td>
</tr>
<tr>
<td>DMZ</td>
<td>77</td>
</tr>
<tr>
<td>URL Blocking</td>
<td>78</td>
</tr>
<tr>
<td>Software Forbidden</td>
<td>79</td>
</tr>
<tr>
<td>DoS</td>
<td>80</td>
</tr>
<tr>
<td>IGMP Proxy Configuration</td>
<td>82</td>
</tr>
<tr>
<td>RIP Configuration</td>
<td>84</td>
</tr>
<tr>
<td>ARP Binding Configuration</td>
<td>85</td>
</tr>
<tr>
<td><strong>8 Advanced</strong></td>
<td></td>
</tr>
<tr>
<td>Bridge Setting</td>
<td>87</td>
</tr>
<tr>
<td>Log Setting</td>
<td>88</td>
</tr>
<tr>
<td>Routing Configuration</td>
<td>89</td>
</tr>
<tr>
<td>UPnP</td>
<td>91</td>
</tr>
<tr>
<td>SNMP Protocol Configuration</td>
<td>92</td>
</tr>
<tr>
<td>System Time Configuration</td>
<td>93</td>
</tr>
<tr>
<td>Other Advanced Configuration</td>
<td>94</td>
</tr>
<tr>
<td>Port Mapping</td>
<td>95</td>
</tr>
<tr>
<td><strong>9 Diagnostics</strong></td>
<td></td>
</tr>
<tr>
<td>Diagnostic Test</td>
<td>97</td>
</tr>
<tr>
<td>Ping</td>
<td>98</td>
</tr>
<tr>
<td>Traceroute</td>
<td>99</td>
</tr>
<tr>
<td>ADSL Tone Diagnostics</td>
<td>101</td>
</tr>
<tr>
<td><strong>10 Administration Settings</strong></td>
<td></td>
</tr>
<tr>
<td>Commit/Reboot</td>
<td>104</td>
</tr>
<tr>
<td>Backup/Restore Settings</td>
<td>105</td>
</tr>
<tr>
<td>Password Setup</td>
<td>106</td>
</tr>
<tr>
<td>Upgrade Firmware</td>
<td>107</td>
</tr>
<tr>
<td>TR-069 Configuration</td>
<td>108</td>
</tr>
</tbody>
</table>
### CONTENTS

#### SECTION III

**APPENDICES**

<table>
<thead>
<tr>
<th>A</th>
<th>TROUBLESHOOTING</th>
<th>112</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Diagnosing Gateway Indicators</td>
<td>112</td>
</tr>
<tr>
<td></td>
<td>If You Cannot Connect to the Internet</td>
<td>113</td>
</tr>
<tr>
<td></td>
<td>Problems Accessing the Management Interface</td>
<td>113</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B</th>
<th>HARDWARE SPECIFICATIONS</th>
<th>114</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Physical Characteristics</td>
<td>114</td>
</tr>
<tr>
<td></td>
<td>Software Features</td>
<td>115</td>
</tr>
<tr>
<td></td>
<td>Standards</td>
<td>116</td>
</tr>
<tr>
<td></td>
<td>Compliances</td>
<td>117</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C</th>
<th>CABLES AND PINOUTS</th>
<th>118</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Twisted-Pair Cable Assignments</td>
<td>118</td>
</tr>
<tr>
<td></td>
<td>10/100BASE-TX Pin Assignments</td>
<td>119</td>
</tr>
<tr>
<td></td>
<td>Straight-Through Wiring</td>
<td>119</td>
</tr>
<tr>
<td></td>
<td>Crossover Wiring</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>RJ-11 Port</td>
<td>121</td>
</tr>
</tbody>
</table>

**GLOSSARY**

**INDEX**

- 122
- 125
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>Top Panel</td>
<td>20</td>
</tr>
<tr>
<td>Figure 2</td>
<td>Rear Panel</td>
<td>21</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Connecting the Router</td>
<td>24</td>
</tr>
<tr>
<td>Figure 4</td>
<td>Web Login</td>
<td>29</td>
</tr>
<tr>
<td>Figure 5</td>
<td>Home Page</td>
<td>30</td>
</tr>
<tr>
<td>Figure 6</td>
<td>Wizard Step 1 - Getting Started</td>
<td>33</td>
</tr>
<tr>
<td>Figure 7</td>
<td>Wizard Step 2 - Time Zone Configuration</td>
<td>33</td>
</tr>
<tr>
<td>Figure 8</td>
<td>Wizard Step 3 - ADSL Settings</td>
<td>34</td>
</tr>
<tr>
<td>Figure 9</td>
<td>Wizard Step 3 - Configuration Saving</td>
<td>36</td>
</tr>
<tr>
<td>Figure 10</td>
<td>System Status</td>
<td>37</td>
</tr>
<tr>
<td>Figure 11</td>
<td>Status - LAN</td>
<td>38</td>
</tr>
<tr>
<td>Figure 12</td>
<td>Status - WAN</td>
<td>39</td>
</tr>
<tr>
<td>Figure 13</td>
<td>Status - Port Mapping</td>
<td>40</td>
</tr>
<tr>
<td>Figure 14</td>
<td>Status - Traffic Statistics</td>
<td>41</td>
</tr>
<tr>
<td>Figure 15</td>
<td>Status - DSL Statistics</td>
<td>42</td>
</tr>
<tr>
<td>Figure 16</td>
<td>Status - ARP Table</td>
<td>43</td>
</tr>
<tr>
<td>Figure 17</td>
<td>LAN Configuration</td>
<td>46</td>
</tr>
<tr>
<td>Figure 18</td>
<td>DHCP Disabled</td>
<td>47</td>
</tr>
<tr>
<td>Figure 19</td>
<td>DHCP Relay</td>
<td>48</td>
</tr>
<tr>
<td>Figure 20</td>
<td>DHCP Server</td>
<td>49</td>
</tr>
<tr>
<td>Figure 21</td>
<td>Device IP Range Table</td>
<td>50</td>
</tr>
<tr>
<td>Figure 22</td>
<td>DHCP Static IP Assignment</td>
<td>51</td>
</tr>
<tr>
<td>Figure 23</td>
<td>WAN Configuration</td>
<td>53</td>
</tr>
<tr>
<td>Figure 24</td>
<td>ATM Settings</td>
<td>55</td>
</tr>
<tr>
<td>Figure 25</td>
<td>ATM Settings</td>
<td>57</td>
</tr>
<tr>
<td>Figure 26</td>
<td>DNS Server Configuration</td>
<td>60</td>
</tr>
<tr>
<td>Figure 27</td>
<td>DDNS DynDns</td>
<td>61</td>
</tr>
<tr>
<td>Figure 28</td>
<td>LAN ACL Configuration</td>
<td>63</td>
</tr>
<tr>
<td>Figure 29</td>
<td>WAN ACL Configuration</td>
<td>64</td>
</tr>
<tr>
<td>Figure 30</td>
<td>IP/Port Filtering Settings</td>
<td>66</td>
</tr>
<tr>
<td>Figure 31</td>
<td>NAT — Virtual Servers</td>
<td>69</td>
</tr>
</tbody>
</table>
Figure 32: NAT — Exclude IP 70
Figure 33: NAT Forwarding Settings 70
Figure 34: NAT ALG and Pass-Through 71
Figure 35: NAT — Port Trigger 72
Figure 36: NAT — FTP ALG Configuration 73
Figure 37: NAT — IP Mapping 73
Figure 38: Quality of Service 74
Figure 39: MAC Filtering Settings 76
Figure 40: DMZ Settings 77
Figure 41: URL Blocking Settings 78
Figure 42: Software Forbidden Settings 79
Figure 43: DoS Settings 80
Figure 44: IGMP Proxy Configuration 83
Figure 45: RIP Configuration 84
Figure 46: ARP Binding Configuration 85
Figure 47: Bridge Setting 87
Figure 48: Log Setting 88
Figure 49: Routing Configuration 89
Figure 50: UPnP 91
Figure 51: SNMP Configuration 92
Figure 52: System Time Configuration 93
Figure 53: Other Advanced Configuration 94
Figure 54: Port Mapping Configuration 95
Figure 55: Diagnostic Test 97
Figure 56: Ping 98
Figure 57: Ping Result 98
Figure 58: Traceroute 99
Figure 59: Traceroute Result 100
Figure 60: ADSL Tone Diagnostics 101
Figure 61: Commit/Reboot 104
Figure 62: Rebooting 104
Figure 63: Backup/Restore Settings 105
Figure 64: Password Setup 106
Figure 65: Upgrade Firmware 107
Figure 66: TR-069 Configuration 108
Figure 67: RJ-45 Connector 118
Figure 68: Straight-through Wiring  
Figure 69: Crossover Wiring  
Figure 70: RJ-11 Wiring
<table>
<thead>
<tr>
<th>Table 1:</th>
<th>LED Display Indicators</th>
<th>21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 2:</td>
<td>Configuration Menu</td>
<td>30</td>
</tr>
<tr>
<td>Table 3:</td>
<td>LED Troubleshooting Chart</td>
<td>112</td>
</tr>
<tr>
<td>Table 4:</td>
<td>Web Access Troubleshooting Chart</td>
<td>113</td>
</tr>
<tr>
<td>Table 5:</td>
<td>10/100BASE-TX MDI and MDI-X Port Pinouts</td>
<td>119</td>
</tr>
<tr>
<td>Table 6:</td>
<td>RJ-11 Port Pinouts</td>
<td>121</td>
</tr>
</tbody>
</table>
This section provides an overview of the ADSL Gateway Router, and describes how to install and mount the unit.

This section includes these chapters:

- “Introduction” on page 19
- “Installing the Router” on page 23
1 INTRODUCTION

The Barricade ADSL Gateway Router (SMC7901BRA5) is an ADSL2/2+ modem contained in a compact unit. The router enables multiple wired users to securely access the Internet through a single-user account with the ADSL service provider. The router provides one 10/100 Mbps Ethernet port or USB port for connection to the end user, and one ADSL line for connection to the Internet service provider.

FEATURES AND BENEFITS

The features of the ADSL Gateway Router include:

◆ Full-rate ADSL router, support for Router and Bridge modes
◆ ITU G.992.3(ADSL2) and ITU G.992.5(ADSL2+)
◆ ANSI T1.413 Issue 2
◆ Provides 24 Mbps downstream and 1 Mbps upstream
◆ Maximum transmission range: 5.4 Kilometers
◆ One Ethernet port, 10/100 Mbps Auto-MDI/MDIX
◆ One USB port. Complies with USB 1.1
◆ Friendly web-based user interface for configuration
◆ Configurable as a DHCP server on your network
◆ Compatible with all standard Internet applications
◆ Industry standard and interoperable DSL interface
◆ Simple web-based status page displays a snapshot of your configuration, and links to the configuration pages.
◆ Downloadable flash software upgrades
◆ Support of up to 8 Permanent Virtual Circuits (PVC)
◆ Support of up to 8 PPPoE sessions
DESCRIPTION OF HARDWARE

This ADSL Gateway Router is a high bit-rate Digital Subscriber Line (DSL) modem that can connect to an ADSL Internet service provider.

This unit provides the following ports on the rear panel:

◆ One RJ-11 port for connection to your ADSL service provider’s incoming line.

◆ One RJ-45 port for connection to a PC, or to a 10/100BASE-TX Ethernet Local Area Network switch. This port operates at 10/100 Mbps, half/full duplex. It supports automatic MDI/MDI-X operation, so you can use straight-through cables for all network connections. (See “10/100BASE-TX Pin Assignments” on page 119.)

◆ One USB port for connection to a PC (if an RJ-45 Ethernet port is not available).

The following two figures show the components of the Gateway:

Figure 1: Top Panel
The ADSL Gateway Router includes key system and port indicators that simplify installation and network troubleshooting. The LEDs, which are located on the top of the unit for easy viewing, are described in the following table.

**Table 1: LED Display Indicators**

<table>
<thead>
<tr>
<th>LED</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>On Green</td>
<td>The router is being supplied with power.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>The router is not receiving power.</td>
</tr>
<tr>
<td>Link</td>
<td>On Green</td>
<td>The DSL Line port has a link with the service provider.</td>
</tr>
<tr>
<td></td>
<td>Blinking Green</td>
<td>The DSL line is training.</td>
</tr>
<tr>
<td>Data</td>
<td>Blinking Green</td>
<td>Data is crossing DSL link.</td>
</tr>
<tr>
<td>Ethernet</td>
<td>On Green</td>
<td>Ethernet port has a valid link with attached device.</td>
</tr>
<tr>
<td></td>
<td>Blinking Green</td>
<td>Data is being transmitted or received on the port.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Ethernet port has no link with an attached device.</td>
</tr>
<tr>
<td>USB</td>
<td>On Green</td>
<td>The USB port has a valid connection.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>The USB port has no connection.</td>
</tr>
</tbody>
</table>
**POWER CONNECTOR**  The ADSL Gateway Router must be powered with its supplied power adapter. Failure to do so results in voiding of any warranty supplied with the product. The power adapter automatically adjusts to any voltage between 100~240 volts at 50 or 60 Hz, and supplies 12 volts DC power to the unit. No voltage range settings are required.

**POWER BUTTON**  The ADSL Gateway Router has a power button. When the AC power adapter is attached and connected to a power source, the power button must be depressed to power on the unit.

**RESET BUTTON**  This button is used to restore the factory default configuration. If you press and hold down the button for 3 seconds or more, any configuration changes you may have made are removed, and the factory default configuration is restored to the unit.
Before installing the ADSL Gateway Router, verify that you have all the items listed in “Package Contents.” If any items are missing or damaged, contact your local distributor. Also, be sure you have all the necessary tools and cabling before installing the router.

**PACKAGE CONTENTS**

After unpacking the ADSL Gateway Router, check the contents of the box to be sure that you have received the following components:

◆ Barricade ADSL Gateway Router, SMC7901BRA5
◆ RJ-45 Category 5 network cable
◆ ADSL splitter
◆ AC power adapter
◆ Quick Installation Guide
◆ Documentation CD
◆ SMC warranty information card

Please inform your dealer if there are any incorrect, missing, or damaged parts. If possible, retain the carton, including the original packing materials in case there is a need to return the unit for repair.

**SYSTEM REQUIREMENTS**

Before you start installing the router, make sure you can provide the right operating environment. See the following installation requirements:

◆ A PC or Macintosh with a 10/100 Mbps Ethernet adapter card installed. Or, a Windows PC with an available USB port.
◆ For Internet access, the computer must be configured for TCP/IP.
◆ Power requirements: 12 VDC using the included AC power adapter. Make sure that a properly grounded power outlet is within 1.8 m (6 ft) of the router.
◆ The router should be located in a cool dry place, with at least 5 cm (2 in.) of space on all sides for ventilation.

◆ Place the router out of direct sunlight, and away from heat sources or areas with a high amount of electromagnetic interference. The temperature and humidity should be within the ranges listed in the specifications.

**CABLE CONNECTIONS**

The ADSL Gateway Router needs to be connected to the DSL telephone line from the service provider, and to a computer or LAN switch.

**Figure 3: Connecting the Router**

To install the router, follow these steps:

1. Using standard telephone cable, connect the Line port on the included ADSL splitter to the RJ-11 telephone wall jack providing the ADSL service.

2. Using standard telephone cable, connect the Modem port on the included ADSL splitter to the RJ-11 Line port on the ADSL Gateway Router.

3. The Phone port on the ADSL splitter can be connected to a standard telephone set using telephone cable.
4. Connect one end of the included Ethernet cable to the Ethernet port on the ADSL Gateway Router, and the other end to a PC’s RJ-45 network port. Alternatively, you can connect the Ethernet port to a LAN switch.

**CAUTION:** Do not plug a phone jack connector into any RJ-45 port. Use only twisted-pair cables with RJ-45 connectors that conform to FCC standards.

**NOTE:** When connecting to any network device (such as a PC, hub or switch), you can use either straight-through or crossover cabling. (Refer to “Cables and Pinouts” on page 118 for a description of cable types.)

**NOTE:** Make sure the twisted-pair Ethernet cable connected to the router’s Ethernet port does not exceed 100 meters (328 feet).

5. (Optional) For Windows PCs, you can also connect a USB cable from the router’s USB port directly to the PC. Then install the USB driver that is on the included CD.

**POWERING ON**

Plug the power adapter cord into the DC 12V power socket on the router, and then plug the power adapter directly into a power outlet. Check the LED marked Power on the top of the unit to be sure it is on. If the Power indicator does not light up, refer to “Troubleshooting” on page 112.

If the router is properly configured, it will take about 30 seconds to establish a connection with the ADSL service provider after powering up. During this time the Link indicator will blink during synchronization. After the ADSL connection has been established, the Link indicator will stay on.

**CONFIGURING THE TCP/IP PROTOCOLS**

To connect the router to a computer through its Ethernet port, the computer must have an Ethernet network adapter card installed, and be configured for the TCP/IP protocol. Your service provider will configure TCP/IP for client computers automatically using a networking technology known as Dynamic Host Configuration Protocol (DHCP).

Carry out the following steps to check that the computer’s Ethernet port is correctly configured for DHCP.

**WINDOWS 95/98/NT**

1. Click “Start/Settings/Control Panel.”

2. Click the “Network” icon.
3. For Windows NT, click the “Protocols” tab.

4. Select “TCP/IP” from the list of network protocols; this may include details of adapters installed in your computer.

5. Click “Properties.”

6. Check the option “Obtain an IP Address.”

**Windows 2000**

1. Click “Start/Settings/Network/Dial-up Connections.”

2. Click “Local Area Connections.”

3. Select “TCP/IP” from the list of network protocols.

4. Click on “Properties.”

5. Select the option “Obtain an IP Address.”

**Windows XP**

1. Click “Start/Control Panel/Network Connections.”

2. Right-click the “Local Area Connection” icon for the adapter you want to configure.

3. Highlight “Internet Protocol (TCP/IP).”

4. Click on “Properties.”

5. Select the option “Obtain an IP address automatically” and “Obtain DNS server address automatically.”

**Windows Vista**

1. Click Start/Control Panel.

2. Double-click “Network and Sharing Center.”

3. Click “View status.”

4. Click “Properties.” If the “User Account Control” window appears, click “Continue.”


6. Select the option “Obtain an IP address automatically” and “Obtain DNS server address automatically.”

**Mac OS**

1. Pull down the Apple Menu. Click “Control Panels” and select “TCP/IP.”
2. In the TCP/IP dialog box, verify that “Ethernet” is selected in the “Connect Via:” field.

3. If “Using DHCP Server” is already selected in the “Configure” field, your computer is already configured for DHCP. Otherwise, select “Using DHCP Server” in the “Configure” field and close the window.

4. Another box will appear asking whether you want to save your TCP/IP settings. Click “Save.”

5. Your service provider will now be able to automatically assign an IP address to your computer.
This section describes the basic settings required to access the web management interface and provides details on configuring the Gateway.

This section includes these chapters:

- “System Configuration” on page 29
- “Device Information” on page 37
- “Advanced Setup” on page 47
- “Wi-Fi Configuration” on page 109
- “Diagnostics” on page 96
- “Administration Settings” on page 103
USING THE WEB INTERFACE

The router provides a web-based management interface for configuring device features and viewing statistics to monitor network activity. This interface can be accessed by any computer on the network using a standard web browser (such as Internet Explorer 5.0, Netscape 6.2, Mozilla Firefox 2.0, or above).

To make an initial connection to the management interface, connect a PC to one of the router’s LAN ports. Set your PC with a static address within the same subnet as that used by the router (that is, 192.168.2.x with the subnet mask 255.255.255.0).

To access the configuration menu, follow these steps:

1. Use your web browser to connect to the management interface using the default IP address of 192.168.2.1.

![Figure 4: Web Login](image)

2. Log in to the router’s management interface using this account:

   User name: admin
   Password: smcadmin

**NOTE:** It is strongly recommended to change the default password the first time you access the web interface. For information on changing the password, see “Password Setup” on page 106.
HOME PAGE

When your web browser connects with the router’s web agent, the home page is displayed as shown below. Basic information can be viewed using the Status menu. To carry out detailed configuration tasks, use the other menu items.

Figure 5: Home Page

![Home Page Image]

The main menu is displayed on the left side of the screen. Click on any of these items to open the sub-menu list. The information in this chapter is organized to reflect the structure of the web management screens for easy reference. The configuration pages include the options listed in the table below. For details on configuring each feature, refer to the corresponding page number.

Table 2: Configuration Menu

<table>
<thead>
<tr>
<th>Menu</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wizard</td>
<td>Starts the setup wizard</td>
<td>33</td>
</tr>
<tr>
<td>Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>System</td>
<td>Shows hardware/software version numbers, DSL connection status, and Internet</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>connection settings</td>
<td></td>
</tr>
<tr>
<td>LAN</td>
<td>Shows the LAN IP and DHCP server settings</td>
<td>38</td>
</tr>
<tr>
<td>WAN</td>
<td>Shows WAN interface functional status (including connection mode – single or</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>multiple service, IGMP), and connection status</td>
<td></td>
</tr>
<tr>
<td>Port Mapping</td>
<td>Shows the port mapping settings</td>
<td>40</td>
</tr>
<tr>
<td>Statistics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statistics</td>
<td>Shows the network traffic statistics</td>
<td>41</td>
</tr>
<tr>
<td>DSL Statistics</td>
<td>Shows the ADSL line statistics</td>
<td>42</td>
</tr>
<tr>
<td>ARP</td>
<td>Shows entries in the ARP table</td>
<td>43</td>
</tr>
<tr>
<td>LAN Interface</td>
<td>Configures the LAN management interface, including IP address, and</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>IGMP snooping on LAN side</td>
<td></td>
</tr>
</tbody>
</table>
Table 2: Configuration Menu (Continued)

<table>
<thead>
<tr>
<th>Menu</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHCP Config</td>
<td>Sets DHCP server and DHCP relay settings</td>
<td>47</td>
</tr>
<tr>
<td>DHCP Mode</td>
<td>Sets DHCP server and DHCP relay settings</td>
<td></td>
</tr>
<tr>
<td>Static IP</td>
<td>Configures static DHCP assignments</td>
<td>51</td>
</tr>
<tr>
<td><strong>WAN Interface</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Channel Config</td>
<td>Configures the DSL channel settings</td>
<td>53</td>
</tr>
<tr>
<td>ATM Settings</td>
<td>Configures DSL ATM settings</td>
<td>55</td>
</tr>
<tr>
<td>ADSL Settings</td>
<td>Configures ADSL settings</td>
<td>57</td>
</tr>
<tr>
<td><strong>Services</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DNS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DNS Server</td>
<td>Configures DNS server settings</td>
<td>60</td>
</tr>
<tr>
<td>Dynamic DNS</td>
<td>Configures DDNS settings</td>
<td>61</td>
</tr>
<tr>
<td>Access Control List</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACL Config</td>
<td>Configures ACLs for LAN or WAN interfaces</td>
<td>63</td>
</tr>
<tr>
<td>IP/Port Filtering</td>
<td>Configures IP filtering settings</td>
<td>66</td>
</tr>
<tr>
<td><strong>NAT/NAPT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Virtual Server</td>
<td>Configures the virtual server forwarding table</td>
<td>68</td>
</tr>
<tr>
<td>NAT Exclude IP</td>
<td>Configures excluded IPs on the WAN interface</td>
<td>70</td>
</tr>
<tr>
<td>NAT Forwarding</td>
<td>Configures forwarding for access to local servers</td>
<td>70</td>
</tr>
<tr>
<td>NAT ALG and Pass-Through</td>
<td>Configures NAT passthrough for specific application protocols</td>
<td>71</td>
</tr>
<tr>
<td>NAT Port Trigger</td>
<td>Restricts Internet access for specific ports</td>
<td>72</td>
</tr>
<tr>
<td>FTP ALG Configuration</td>
<td>Configures FTP server and client ports</td>
<td>73</td>
</tr>
<tr>
<td>NAT IP Mapping</td>
<td>Configures IP address mapping for NAT</td>
<td>73</td>
</tr>
<tr>
<td>IP QoS</td>
<td>Configures IP-based QoS settings</td>
<td>74</td>
</tr>
<tr>
<td>MAC Filtering</td>
<td>Configures MAC address filtering</td>
<td>76</td>
</tr>
<tr>
<td>DMZ</td>
<td>Configures DMZ settings</td>
<td>77</td>
</tr>
<tr>
<td>URL Block</td>
<td>Sets URL key words to block</td>
<td>78</td>
</tr>
<tr>
<td>Software Forbidden</td>
<td>Blocks Internet access for specific software</td>
<td>79</td>
</tr>
<tr>
<td>DoS Setting</td>
<td>Configures denial-of-service settings</td>
<td>80</td>
</tr>
<tr>
<td>IGMP Proxy</td>
<td>Configures IGMP Proxy settings for multicast traffic</td>
<td>82</td>
</tr>
<tr>
<td>RIP</td>
<td>Configures Routing Information Protocol settings</td>
<td>84</td>
</tr>
<tr>
<td>ARP Binding</td>
<td>Configures Address Resolution Protocol binding</td>
<td>85</td>
</tr>
<tr>
<td><strong>Advance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bridge Setting</td>
<td>Configures aging time and Spanning Tree settings</td>
<td>87</td>
</tr>
<tr>
<td>Log Setting</td>
<td>Configures system log settings</td>
<td>88</td>
</tr>
<tr>
<td>Routing</td>
<td>Configures static routing</td>
<td>89</td>
</tr>
</tbody>
</table>
### Table 2: Configuration Menu (Continued)

<table>
<thead>
<tr>
<th>Menu</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPnP</td>
<td>Enables UPnP for the WAN interface</td>
<td>91</td>
</tr>
<tr>
<td>SNMP</td>
<td>Configures SNMP settings</td>
<td>92</td>
</tr>
<tr>
<td>System Time</td>
<td>Configures NTP time server settings</td>
<td>93</td>
</tr>
<tr>
<td>Others</td>
<td>Configures Half Bridge settings</td>
<td>94</td>
</tr>
<tr>
<td>Port Mapping</td>
<td>Maps LAN ports to WAN interfaces</td>
<td>95</td>
</tr>
<tr>
<td><strong>Diagnostic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diag-Test</td>
<td>Runs diagnostic tests for the ADSL link</td>
<td>97</td>
</tr>
<tr>
<td>Ping</td>
<td>Sends Ping echo requests to other devices</td>
<td>98</td>
</tr>
<tr>
<td>Traceroute</td>
<td>Checks routes to other devices</td>
<td>99</td>
</tr>
<tr>
<td>ADSL</td>
<td>Runs ADSL diagnostic tone tests</td>
<td>101</td>
</tr>
<tr>
<td><strong>Admin</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commit/Reboot</td>
<td>Reboots the unit and/or restores factory defaults</td>
<td>104</td>
</tr>
<tr>
<td>Backup/Restore</td>
<td>Backs up or restores configuration settings</td>
<td>105</td>
</tr>
<tr>
<td>Password Setup</td>
<td>Changes the web access passwords</td>
<td>106</td>
</tr>
<tr>
<td>Upgrade Firmware</td>
<td>Upgrades the unit’s software version</td>
<td>107</td>
</tr>
<tr>
<td>Configure TR-069</td>
<td>Configures parameters for establishing a connection between the router and</td>
<td>108</td>
</tr>
<tr>
<td></td>
<td>an auto-configuration server</td>
<td></td>
</tr>
</tbody>
</table>
SETUP WIZARD

The Wizard is designed to help you configure the basic settings required to get the ADSL Gateway Router up and running. Click “Wizard” in the main menu to get started.

STEP 1 - GETTING STARTED

After reading the wizard welcome message, click Next to continue.

Figure 6: Wizard Step 1 - Getting Started

1. Getting Started

Welcome!

Thank you for purchasing the SMC Barricade. After answering the following questions you will be online and free to enjoy high-speed Internet Access.

Before you begin please make sure the SMC Barricade is connected correctly. For a detailed description please refer to the user manual. This can be found on the documentation CD provided.

If everything is OK, click the ‘NEXT’ button to continue.

STEP 2 - TIME ZONE

Configure a Network Time Protocol (NTP) server to poll for time updates. To synchronize the router with an NTP server, specify the IP address of a public time server, select your local time zone, and click Next.

Figure 7: Wizard Step 2 - Time Zone Configuration

2. Time Zone

This page allows you to configure the localized time zone & automatic time maintenance. Automatic time maintenance synchronizes the Barricade with a public time server on the Internet. SMC recommend to use this function, click the ‘Next’ button to continue.

NTP Configuration:

State: Enable
Server IP: 
Interval: Every 0 hours
Time Zone: (GMT) Senegal, Liberia, Morocco, England
GMT Time: Thu Jan 1 8:42:25 1970

Back | Next
The following items are displayed on this page:

- **Status** - Enables or disables time synchronization with external servers.
- **Server IP** - Specifies the IP address of a public NTP time server on the Internet.
- **Interval** - Specifies the time interval for polling the NTP server.
- **Time Zone** - A drop-down box provides access to predefined time zones. Each choice indicates it's offset from GMT and lists at least one major city or commonly known zone name covered by the time zone.

**STEP 3 - ADSL SETTINGS**

The third page of the wizard configures the ADSL country settings, Internet service provider, protocol, connection type and username and password.

Figure 8: Wizard Step 3 - ADSL Settings

3. **ADSL Settings**

This page allows you to configure the ADSL settings. A predefined list of countries & Internet Service Providers (ISP) is available for easy configuration.

a. Select Country.

b. Select ISP.

Note: If Country or ISP is not listed select 'Other'. You will be required to manually select the Protocol & fill in blank fields. For correct values contact your ISP.

c. Enter required values.

d. Click 'Next' to continue.

The following items are displayed on the first page of the Wizard:

- **Country** — Choose your country of operation from the drop down menu. If your country is not listed, contact your service provider for detailed settings.

- **Internet Service Provider** — The chosen country will determine the list of available Internet Service Providers. Choose the service provider with which you have a contract.
◆ **Protocol** — The protocol used will be specified by your service provider. Choose from the following options:

- **PPPoE** — Point-to-Point Protocol over Ethernet (PPPoE).
- **PPPoA** — Point-to-Point Protocol over Asynchronous Transfer Mode (PPPoA).
- **1483 MER : DHCP** — 1483 MER is an RFC standard MAC Encapsulated Routing protocol.
- **1483 MER : Static IP** — 1483 MER is an RFC standard MAC Encapsulated Routing protocol.
- **1483 Bridged** — The Bridged RFC 1483 Encapsulated Traffic over ATM feature allows you to send bridged RFC 1483 encapsulated packets over ATM switched virtual circuits (SVCs).
- **1483 Routed** — Allows you to send routed RFC 1483 encapsulated packets over ATM switched virtual circuits (SVCs).
- **IPoA** — Dynamic IP over ATM (IPoA).

◆ **Connection Type** — Your connection type will also be specified by your service provider. Choose from the following options:

- **VC-Mux** — Virtual circuit multiplexing (VC-Mux).
- **LLC** — Logical Link Control (LLC).

◆ **VPI** — The ATM Virtual Path Identifier. (Range: 0-255)

◆ **VCI** — The ATM Virtual Channel Identifier. (Range: 32-65535)

◆ **Username** — Enter the username provided by your service provider.

◆ **Password** — Enter the password provided by your service provider.

◆ **Confirm Password** — Re-enter your password.
The final step in the setup wizard saves the configuration changes. Click Finish to complete the wizard, then click Save.

**Figure 9: Wizard Step 3 - Configuration Saving**

4. **Configuration Saving**

Click 'Finish' to save those settings, click 'Back' to make any modifications, click 'Reset' to drop those settings.

The parameters you set:

- **MTUP State**: Disable
- **VPI**: 0
- **VCI**: 35
- **Encapsulation**: LLC/SNAP
- **Channel Mode**: pppoe
- **ppp User Name**: adminintest
- **ppp Password**: admin
- **DNS Settings**: Obtain DNS Automatically

[Back] [Finish] [Reset]
The Status pages display information on hardware/software versions, LAN and WAN connection status, statistics, and the ARP table.

**SYSTEM STATUS**

The System Status page displays the hardware and software versions, and the WAN connection status and speed.

Click Status, System.

**Figure 10: System Status**

<table>
<thead>
<tr>
<th>System</th>
<th>Alias Name</th>
<th>SMC7901ERAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uptime</td>
<td>08:3:31</td>
<td></td>
</tr>
<tr>
<td>Software Version</td>
<td>SMC7901ERAS v1.0.0.0</td>
<td></td>
</tr>
<tr>
<td>DSP Version</td>
<td>25112024</td>
<td></td>
</tr>
</tbody>
</table>

The following items are displayed on this page:

**SYSTEM:**

◆ **Alias Name** – An alias for the ADSL Router, enabling the device to be uniquely identified on the network.

◆ **Uptime** – The length of time in minutes that the unit has been powered on.

◆ **Software Version** – The current version of firmware running on the unit.

◆ **DSP Version** – The current hardware version of the digital signal processor (DSP).
**LAN Status**

The ADSL Router LAN window displays basic LAN port settings including DHCP information.

**Figure 11: Status - LAN**

<table>
<thead>
<tr>
<th>LAN Configuration</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IP Address</td>
<td>192.168.2.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subnet Mask</td>
<td>255.255.255.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DHCP Server</td>
<td>Enable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAC Address</td>
<td>00:1F:A4:30:7F:3E</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DHCP Client Table</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IP Address</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The following items are displayed on this page:

**LAN Status**
Displays the basic information of the LAN port.

- **IP Address** — Displays an IP address for local area connection to the ADSL Router.
- **Subnet Mask** — Displays the local subnet mask.
- **DHCP Server** — Displays whether the DHCP server has been enabled or not.
- **MAC Address** — Displays the physical layer address of the LAN port.

**DHCP Client Table**
Displays information on the DHCP configuration and lease time.

- **Name** — Displays the name of the client device.
- **IP Address** — Displays the DHCP Client IP address.

**DSL:**
- **Operational Status** — Displays the status of the DSL connection.
- **Upstream Speed** — The current upload speed of the DSL connection.
- **Downstream Speed** — The current download speed of the DSL connection.
**CHAPTER 4 | Device Information**

**WAN Status**

The ADSL Router WAN window displays basic WAN port settings.

**Figure 12: Status - WAN**

<table>
<thead>
<tr>
<th>Interface</th>
<th>VPI/VCI</th>
<th>Encapsulation</th>
<th>Default Route</th>
<th>Protocol</th>
<th>IP Address</th>
<th>Gateway</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNS Servers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The following items are displayed on this page:

- **Interface** — Displays the interface identifier.
- **VPI/VCI** — Displays the ATM channel identifiers.
- **Encapsulation** — Displays the encapsulation type chosen, either LLC to VX-Mux.
- **Default Route** — Displays if a default route has been enabled.
- **Protocol** — Displays the protocol used for transmission of data packets
- **IP Address** — Displays the local IP address of the WAN port.
- **Default Gateway** — Displays the network route, or gateway used by the unit when no other known route exists for a given IP packet's destination address.
- **Status** — Specifies the status of the interface.
- **DNS Servers** — Specifies the IP addresses of DNS servers.
PORT MAPPING

The Port Mapping status shows the mapping of WAN and LAN interfaces to specific groups.

Figure 13: Status - Port Mapping

The following items are displayed on this page:

- **Status** — Indicates if port mapping is enabled or disabled.
- **Select** — Indicates the group identification.
- **Interfaces** — Specifies the WAN and LAN interfaces in the group.
- **Status** — Indicates if the group mapping is enabled.
CHAPTER 4 | Device Information
Traffic Statistics

TRAFFIC STATISTICS

The ADSL Router Traffic Statistics - Interfaces window displays received and transmitted packet statistics for all interfaces on the ADSL Router.

Figure 14: Status - Traffic Statistics

<table>
<thead>
<tr>
<th>Interface</th>
<th>Rx Packet</th>
<th>Rx Error</th>
<th>Rx Drop</th>
<th>Tx Packet</th>
<th>Tx Error</th>
<th>Tx Drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>a1</td>
<td>630</td>
<td>0</td>
<td>0</td>
<td>571</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>a0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>a1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>a2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>a3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>a4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>a5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>a6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>a7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>a8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

The following items are displayed on this page:

◆ **Interface** — Displays the interface on which traffic is being monitored.

◆ **Rx Packet** — Displays the total number of packets received by the specified interface.

◆ **Rx Error** — Displays the total number of packet errors received by the specified interface, if any.

◆ **Rx Drop** — Displays the total number of received packets dropped by the specified interface.

◆ **Tx Packet** — Displays the total number of packets transmitted by the specified interface.

◆ **Tx Error** — Displays the total number of packet errors occurred during transmission by the specified interface.

◆ **Tx Drop** — Displays the total number of packets transmitted but dropped by the specified interface.

◆ **Refresh** — Updates the statistical table for all interfaces.
The ADSL Router DSL Statistics window displays received and transmitted packet statistics for all interfaces on the ADSL Router.

**Figure 15: Status - DSL Statistics**

### ADSL Statistics

<table>
<thead>
<tr>
<th>ADSL Line Status</th>
<th>ACTIVATING.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADSL Mode</td>
<td>..</td>
</tr>
<tr>
<td>Upstream</td>
<td>..</td>
</tr>
<tr>
<td>Downstream</td>
<td>..</td>
</tr>
<tr>
<td>Attenuation Downstream(db)</td>
<td>..</td>
</tr>
<tr>
<td>Attenuation Upstream(db)</td>
<td>..</td>
</tr>
<tr>
<td>SNR Margin Downstream(db)</td>
<td>..</td>
</tr>
<tr>
<td>SNR Margin Upstream(db)</td>
<td>..</td>
</tr>
<tr>
<td>Vendor ID</td>
<td>RETK</td>
</tr>
<tr>
<td>DSP Version</td>
<td>2916b224</td>
</tr>
<tr>
<td>CRC Errors</td>
<td>..</td>
</tr>
<tr>
<td>Upstream BER</td>
<td>..</td>
</tr>
<tr>
<td>Downstream BER</td>
<td>..</td>
</tr>
<tr>
<td>Up Output Power</td>
<td>..</td>
</tr>
<tr>
<td>Down Output Power</td>
<td>..</td>
</tr>
<tr>
<td>ES</td>
<td>..</td>
</tr>
<tr>
<td>SES</td>
<td>..</td>
</tr>
<tr>
<td>UAS</td>
<td>..</td>
</tr>
</tbody>
</table>

**ADSL Retrain:**  
- [Retrain]  
- [Refresh]

The following items are displayed on this page:

- **ADSL Status** — Displays the ADSL connection status ("activating", "up" or null).

- **ADSL Mode** — Displays the connection mode for the ADSL Router, which is fixed at ADSL2+.

- **Upstream** — Displays the actual payload carried on the upstream channels.

- **Downstream** — Displays the actual payload carried on the downstream channels.

- **Attenuation Downstream/Upstream (db)** — Displays the amount of attenuation in signal strength due to conductive losses in transmission medium. Attenuation affects the propagation of waves and signals in electrical circuits, expressed in decibels (dB).
CHAPTER 4 | Device Information

ARP Table

◆ **SNR Margin Downstream/Upstream (db)** — Displays the current signal-to-noise margin expressed in decibels (dB). SNR is the ratio of signal power to the noise power corrupting the signal.

◆ **Vendor ID** — The vendor name of the digital signal processor (DSP).

◆ **DSP Version** — The current hardware version of the digital signal processor (DSP).

◆ **CRC Errors** — Displays the CRC (cyclic redundancy check) - a type of function that takes as input a data stream of any length, and produces as output a value of a certain space, commonly a 32-bit integer.

◆ **Upstream/Downstream BER** — The the rate at which bits in the data stream that have been altered by noise.

◆ **Up/Down Output Power** — Displays the upstream/downstream power level employed for ADSL port filtering.

◆ **ES** — Displays the total error seconds, the number of second intervals during which there was one or more CRC anomalies, or one or more Loss of Signal (LOS) or Loss of Framing (LOF) defects.

◆ **SES** — Displays the total severly errored seconds. The number of second intervals containing 18 or more CRC-8 anomalies, one or more Loss of Signal (LOS) defects, one or more Severely Errored Frame (SEF) defects, or one or more Loss of Power (LPR) defects.

◆ **UAS** — Displays the total unavailable errored seconds, the number of seconds during which the ADSL transceiver is powered up but not available.

◆ **ADSL Retrain** — Retrains the DSL line.

## ARP Table

The ARP page displays IP address to MAC address mapping entries determined by the Address Resolution Protocol.

*Figure 16: Status - ARP Table*

<table>
<thead>
<tr>
<th>IP Address</th>
<th>MAC Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>192.168.2.9</td>
<td>00:30:F1:2F:BE:30</td>
</tr>
<tr>
<td>192.168.2.1</td>
<td>00:1F:A4:90:7F:3E</td>
</tr>
</tbody>
</table>

This page shows current ARP entries by interrogating the current protocol data.

[Refresh]
The following items are displayed on this page:

- **IP Address** — IP address of a local entry in the cache.
- **MAC Address** — MAC address mapped to the corresponding IP address.
- **Refresh** — Sends a request to update the current parameters.
This chapter describes LAN configuration on the ADSL Router.

You can use the web browser interface to access IP addressing only if the ADSL Router already has an IP address that is reachable through your network.

◆ “LAN Interface” on page 46
◆ “DHCP Settings” on page 47
LAN INTERFACE

By default, the ADSL Router is configured with the IP address 192.168.2.1, subnet mask 255.255.255.0 and a default gateway of 192.168.2.1.

Figure 17: LAN Configuration

<table>
<thead>
<tr>
<th>Interface Name:</th>
<th>e1</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP Address:</td>
<td>192.168.2.1</td>
</tr>
<tr>
<td>Subnet Mask:</td>
<td>255.255.255.0</td>
</tr>
</tbody>
</table>

IGMP Snooping: [ ] Disable [ ] Enable

Apply Changes

LAN Port: [ ]
Link Speed/Duplex Mode: [ ]
Modify

ETHERNET Status Table:

<table>
<thead>
<tr>
<th>Select</th>
<th>Port</th>
<th>Link Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑</td>
<td>LAN</td>
<td>Auto Negotiation</td>
</tr>
</tbody>
</table>

MAC Address Control: [ ] LAN [ ] USB

Apply Changes

New MAC Address: [ ] Add

Current Allowed MAC Address Table:

<table>
<thead>
<tr>
<th>MAC Addr</th>
<th>Action</th>
</tr>
</thead>
</table>

The following items are displayed on this page:

- **Interface Name** — Displays the name assigned to the interface.

- **IP Address** — Specifies an IP address for management of the ADSL Router. Valid IP addresses consist of four decimal numbers, 0 to 255, separated by periods. (Default: 192.168.2.1.)

- **Subnet Mask** — Indicates the local subnet mask. (Default: 255.255.255.0)
◆ **Secondary IP Address** — Specifies a secondary IP address for management of the unit.

◆ **IGMP Snooping** — Enables Internet Group Management Protocol (IGMP) multicast filtering.

◆ **LAN Port** — Selects the LAN port.

◆ **Link Speed/Duplex Mode** — Selects the port speed and duplex mode, or sets the port for auto-negotiation.

◆ **MAC Address Control** — Filters out traffic with source MAC addresses not configured in the table. For devices that need Internet access through the LAN port, enter the MAC address and click Add.

---

**DHCP SETTINGS**

The ADSL Router includes a Dynamic Host Configuration Protocol (DHCP) server that can assign temporary IP addresses to any attached host requesting the service, as well as a DHCP relay service that will route the DHCP service to other subnets than that of the unit.

**DHCP DISABLED** By selecting “None,” you can disable DHCP on the ADSL Router.

**Figure 18: DHCP Disabled**

The following items are displayed on this page:

◆ **DHCP Mode** — When set to “None,” disables DHCP on the unit.
DHCP RELAY  Dynamic Host Configuration Protocol (DHCP) can dynamically allocate an IP address and other configuration information to network clients that broadcast a request. To receive the broadcast request, the DHCP server would normally have to be on the same subnet as the client. However, when the access point’s DHCP relay agent is enabled, received client requests can be forwarded directly by the access point to a known DHCP server on another subnet. Responses from the DHCP server are returned to the access point, which then broadcasts them back to clients.

Figure 19: DHCP Relay

The following items are displayed on this page:

◆ **DHCP Mode** — When set to “DHCP Relay,” enables routing of the DHCP service to units on a different subnet.

◆ **Relay Server** — Enter the address of the DHCP server for routing to other units.
DHCP Server

The unit can support up to 253 local clients. Addresses are assigned to clients from a common address pool configured on the unit. Configure an address pool by specifying start and end IP addresses. Be sure not to include the unit’s IP address in the address pool range.

Figure 20: DHCP Server

The following items are displayed on this page:

- **LAN IP Address** — Displays the LAN IP address for management of the ADSL Router. (Default: 192.168.2.1.)

- **Subnet Mask** — Displays the local subnet mask. (Default: 255.255.255.0)

- **DHCP Mode** — When set to “DHCP Server,” enables the ADSL Router to act as a DHCP server.

- **Interface** — Selects either the RJ-45 LAN port, or the USB port.

- **IP Pool Range** — Configures the IP address pool for the DHCP server and determines how many IP addresses can be assigned.

**NOTE:** Do not enter the ADSL Router’s LAN IP address as part of the IP Pool range.

- **Show Client** — Displays the current DHCP client table.
**Default Gateway** — Specifies the gateway address through which traffic is routed from. Usually the LAN IP address of the ADSL Router

**MAX Lease Time** — Select a time limit for the use of an IP address from the IP pool. When the time limit expires, the client has to request a new IP address. The lease time is expressed in seconds. (Default: 86400 seconds; Range: 60~86400 seconds; -1 indicates an infinite lease time)

**Domain Name** — Specifies the unique name used to identify the ADSL Router on the network.

**DNS Servers** — Sets up to three domain name server IP addresses.

**Set VendorClass IP Range** — Click on this option to assign IP address ranges to specific device types.

- **Device Name** — Describes the device type.
- **Start/End Address** — Specifies the IP addresses from the DHCP IP pool to assign to this device type.
- **Router Address** — Specifies a default router IP address to use for traffic from this device.
- **Option 60** — Specifies the DHCP Option 60 vendor class identifier that indicates the device type.

*Figure 21: Device IP Range Table*
**DHCP Static IP** Assigns a physical MAC address to the DHCP pool by mapping it to a corresponding IP address.

**Figure 22: DHCP Static IP Assignment**

<table>
<thead>
<tr>
<th>DHCP Static IP Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>This page lists the static IP address and MAC address on your LAN. The device assigns the IP addresses to hosts on your network when they request Internet access.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IP Address:</th>
<th>0.0.0.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAC Address:</td>
<td>00:00:00:00:00:00 (ex. 00:00:00:00:00:00)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Add</th>
<th>Delete Selected</th>
<th>Reset</th>
</tr>
</thead>
</table>

**DHCP Static IP Table:**

<table>
<thead>
<tr>
<th>Select</th>
<th>IP Address</th>
<th>MAC Address</th>
</tr>
</thead>
</table>

The following items are displayed on this page:

- **IP Address** — Enter the IP address from the DHCP address pool to assign to the specified MAC address.

- **MAC Address** — Enter the MAC address to be assigned to a static IP address from the DHCP address pool.

- **Add** — Selecting this option enters the mapped MAC address and IP address into the DHCP Static IP Table.

- **Delete Selected** — Once you select and entry in the table by clicking its corresponding radio button, this option deletes the entry.

- **Reset** — Clears the IP and MAC address fields.
This chapter describes WAN configuration on the ADSL Router. The WAN pages are used to configure standard WAN services, including VPI, VCI, encapsulation, service type (PPPoE, IPoE, bridging), ATM settings and ADSL settings. It includes the following sections:

- “Channel Configuration” on page 53
- “ATM Settings” on page 55
- “ADSL Settings” on page 57
The Channel Configuration page configures channel operation modes of the ADSL Router.

**Figure 23: WAN Configuration**

The following items are displayed on this page:

- **Default Route Selection** – Enables the default route to be specified or selected automatically.

- **VPI** (Virtual Path Identifier) – A grouping of virtual channels which connect the same end-points, and which share a traffic allocation.

- **VCI** (Virtual Channel Identifier) – A specific virtual channel connecting two end-points.

- **Encapsulation:**
  - **LLC** (Logical Link Control) – This encapsulation method allows multiplexing of multiple protocols over a single ATM virtual connection. In some cases, the LLC header is followed by a SNAP header which uniquely identifies a routed or bridged protocol. (This is the default packet encapsulation format used for carrying IP datagrams over AAL5 ATM.)
VC/MUX (Virtual Circuit Multiplexing) – When using this mode, the communicating hosts agree on the high-level protocol for a given circuit, which tends to reduce fragmentation overhead. This allows a sender to pass each datagram directly to AAL5 for transfer, and requires nothing to be sent besides the datagram and the AAL5 trailer. The chief disadvantage of this scheme is that a host must create a separate virtual circuit for each high-level protocol if more than one protocol is used. Because most carriers charge for each virtual circuit, customers try to avoid using multiple circuits because it adds unnecessary cost.

Channel Mode — The protocol used on the channel, as specified by the service provider. Choose from the following options:

- **1483 Bridged** — The Bridged RFC 1483 Encapsulated Traffic over ATM feature allows you to send bridged RFC 1483 encapsulated packets over ATM switched virtual circuits (SVCs).
- **1483 MER** — 1483 MER is an RFC standard MAC Encapsulated Routing protocol.
- **PPPoE** — Point-to-Point Protocol over Ethernet (PPPoE).
- **PPPoA** — Point-to-Point Protocol over Asynchronous Transfer Mode (PPPoA).
- **1483 Routed** — Allows you to send routed RFC 1483 encapsulated packets over ATM switched virtual circuits (SVCs).
- **IPoA** — Dynamic IP over ATM (IPoA).

Enabled NAPT — Enables Network Address Port Translation for the channel.

Enable IGMP — Enables IGMP for the channel.

PPP Settings — Configures settings for PPPoE and PPPoA modes.

- **User Name** — The PPP access user name provided by the ISP.
- **Password** — The PPP access password provided by the ISP.
- **Type** — Selects the connection type; Continuous, Connect on Demand, or Manual.
- **Idle Time** — The number of minutes you want to have elapsed before your Internet access disconnects in Connect-on-Demand mode.

WAN IP Settings — Configures settings for 1483 MER, 1483 Routed, and IPoA modes.

- **Type** — Selects fixed IP or DHCP. When fixed IP is selected, enter the local IP address, gateway, and subnet mask. When DHCP is
selected, the WAN interface IP address is assigned by the remote DHCP server.

- **Local IP address** — The IP address of the WAN interface provided by the ISP.
- **Gateway** — The IP address of the remote gateway router provided by the ISP.
- **Netmask** — The subnet mask for the local IP address.
- **Default Route** — Enables or disables the default route IP address.
- **Unnumbered** — Enables the IP unnumbered feature.

---

**ATM Settings**

The ATM Settings page is used to configure the settings between your ADSL Router and the remote ATM PVC switch, including connection mode (single or multiple service over one connection), and packet level QoS.

The ATM Settings parameters form a Traffic Contract that informs the network what type of traffic is to be transported and the performance requirements of the traffic.

**Figure 24: ATM Settings**

The following items are displayed on this page:

- **Select** — Clicking the radio button associated with the connection makes the parameters editable.
- **VPI** (Virtual Path Identifier) — Adds a VPI entry to the table. (Range: 0-255; Default: 0)
◆ **VCI** (Virtual Channel Identifier) — Adds a VCI entry to the table. (Range: 32-65535; Default: 35)

◆ **QoS** — Selects packet level Quality of Service (QoS) for the connection. Options are:
  - **UBR** (Unspecified Bitrate): Configures a PVC with a Peak Cell Rate indicating the maximum number of ATM cells that can be sent in a burst.
  - **CBR** (Constant Bitrate): Configures a PVC at a constant bit rate. This option may be required for connections that depend on precise clocking to ensure undistorted delivery.
  - **nrt-VBR** (non-realtime Variable Bitrate): Configures a PVC at a non-realtime variable bit rate. This option may be used for applications not sensitive to changes in available bandwidth, such as data.
  - **rt-VBR** (realtime Variable Bitrate): Configures a PVC at a real-time variable bit rate. This option may be used for applications that have a lot of variance in required bandwidth, such as voice.

◆ **PCR** (Peak Cell Rate) — Configures the maximum allowable rate at which cells can be transported along a connection in the ATM network. The PCR is the determining factor in how often cells are sent in relation to time in an effort to minimize jitter.

◆ **CDVT** (Cell Delay Variation Tolerance) — Configures the maximum amount of jitter permissible.

◆ **SCR** (Sustainable Cell Rate) — Configures the average allowable, long-term cell transfer rate on a specific connection.

◆ **MBS** (Maximum Burst Size) — Configures the maximum allowable burst size of cells that can be transmitted contiguously on a particular connection.

◆ **Current ATM VC Table** — The Current ATM VC Table lists the current ATM settings configured on your ADSL Router. By selecting the connection using the radio button associated with it you can edit the connection parameters.
The ADSL Settings page configures the ADSL modulation type, ADSL2+ related parameters, capabilities and the ADSL tone mask.

**Figure 25: ATM Settings**

<table>
<thead>
<tr>
<th>ADSL Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>This page is used to configure ADSL settings of the device.</td>
</tr>
</tbody>
</table>

**ADSL Modulation:**
- G.Lite
- G.Dmt
- T1.413
- ADSL2
- ADSL2+

**AnnexL Option:**
- Enable

**AnnexM Option:**
- Enable

**ADSL Capability:**
- Bitswap Enable
- SRA Enable

The following items can be enabled on this page:

- **ADSL Modulation** — ADSL Modulation refers to a frequency-division multiplexing (FDM) scheme utilized as a digital multi-carrier modulation method for DSL. A large number of closely-spaced orthogonal sub-carriers are used to carry data. The data is divided into several parallel data streams or channels, one for each sub-carrier. Each sub-carrier is modulated with a conventional modulation scheme (such as G.lite, ADSL2, etc. or more commonly ADSL2+).

- **G.lite** — A standard that defines the more economical splitterless ADSL connection that transmits data at up to 1.5 Mbps downstream and 512 Kbps upstream. This ADSL option can be installed without an on-site visit by the service provider.

- **G.dmt** — A standard that defines full-rate ADSL, and utilizes Discrete Multi-Tone (DMT) signaling to transmit data at up to 8 Mbps downstream and 640 Kbps upstream.

- **T1.413** — ANSI standard that defines the requirements for ADSL for the interface between the telecommunications network and the customer installation in terms of their interaction and electrical characteristics. (The Gateway complies with Issue 2 of this standard.)
- **ADSL2** — This standard extends the capability of basic ADSL data rates to 12 Mbit/s downstream and 3 Mbit/s upstream (with a mandatory capability of ADSL2 transceivers of 8 Mbit/s downstream and 800 Kbit/s upstream.

- **ADSL2+** — This standard extends the capability of basic ADSL data rates to 24 Mbit/s downstream and 1.4 Mbit/s upstream depending on the distance from the DSLAM to the customer's home.

- **AnnexL Option** — Annex L is an optional specification in the ITU-T ADSL2 recomendation G.992.3 titled “Specific requirements for a Reach Extended ADSL2 (READSL2) system operating in the frequency band above POTS.” It is often referred to as Reach Extended ADSL2 or READSL2. Once enabled AnnexL increases the range of DSL service, enabling the link to work at a distance of 7 kilometers, or 23,000 feet.

- **AnnexM Option** — Annex M is an optional specification in ITU-T recomendations G.992.3 (ADSL2) and G.992.5 (ADSL2+), also referred to as ADSL2 M and ADSL2+ M. This specification extends the capability of commonly deployed Annex A by more than doubling the number of upstream bits.

  Once enabled AnnexM increases upload speeds by the shifting the upstream/downstream frequency split from 138 kHz up to 276 kHz, allowing the maximum upstream bandwidth to be increased from 1.4 Mbit/s to 3.3 Mbit/s.

- **ADSL Capability** — ADSL Capability refers to means of manipulating the bit loading of a connection to increase quality of signal or transmission rate.

  - **Bitswap** — Enables bit swapping. Bit swapping is a way of swapping the bit-loading of a noisy tone with another tone in the symbol which is not as noisy. The bit loading from a specific tone can be increased or decreased. In addition, the TX power can be increased or decreased for a specific tone. However, there is no change in the overall payload rate after the bit swap operation.

  - **SRA** — Enables seamless rate adaptation to set the optimal transmission rate based on existing line conditions.
The Advanced Configuration settings for the ADSL Router contain advanced system management configuration settings such as DNS setup, routing configuration, bridging, SNMP and TR-069 settings.

The following sections are contained in this chapter:

- “DNS Settings” on page 60
- “Access Control Lists” on page 63
- “IP/Port Filtering” on page 66
- “NAT/NAPT Settings” on page 68
- “Quality of Service” on page 74
- “MAC Filtering” on page 76
- “DMZ” on page 77
- “URL Blocking” on page 78
- “Software Forbidden” on page 79
- “DoS” on page 80
- “IGMP Proxy Configuration” on page 82
- “RIP Configuration” on page 84
- “ARP Binding Configuration” on page 85
DNS SETTINGS

Sets Domain Name Server (DNS) and Dynamic DNS settings.

DNS SERVER

The Domain Name Server (DNS) implements a human recognizable web address to a numerical IP address. DNS can be set automatically or manually.

Figure 26: DNS Server Configuration

The following items are displayed on this page:

- **Obtain DNS Automatically** — The DNS server IP address is automatically configured during dynamic IP assignment.
- **Set DNS Manually** — Allows the user to set up to three DNS server IP addresses.
DDNS  Dynamic DNS (DDNS) provides users on the Internet with a method to tie a specific domain name to the unit’s dynamically assigned IP address. DDNS allows your domain name to follow your IP address automatically by changing your DNS records when your IP address changes.

The ADSL Router provides access to two DDNS service providers, DynDns.org, and TZO. To set up an DDNS account, visit the websites of these service providers at www.dyndns.org, or www.tzo.com.

Figure 27: DDNS DynDns

<table>
<thead>
<tr>
<th>Dynamic DNS Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDNS provider: DynDns.org</td>
</tr>
<tr>
<td>Host Name:</td>
</tr>
<tr>
<td>Interface:</td>
</tr>
<tr>
<td>Enable:</td>
</tr>
</tbody>
</table>

DynDns Settings:

<table>
<thead>
<tr>
<th>User Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password:</td>
</tr>
</tbody>
</table>

TZO Settings:

<table>
<thead>
<tr>
<th>Email:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key:</td>
</tr>
</tbody>
</table>

The following items are displayed on these pages:

◆ **DDNS provider** — Specify the DDNS provider from the drop down menu. Options are: DynDns, or TZO. (Default: DynDns.org)

◆ **Host Name** — Specifies the prefix to identify your presence on the DDNS server, either URL or IP address.

◆ **Interface** — Selects the WAN interface for the DDNS service.

◆ **Enable** — Enables DDNS. (Default: Enabled)

**DynDNS Settings**

The following parameters apply to the default DynDns setting.

◆ **User Name** — Specifies your username for the DDNS service.

◆ **Password** — Specifies your password for the DDNS service.
TZO
The following parameters apply to the TZO setting.

◆ **Email** — Specifies your contact email address for the DDNS service.

◆ **Key** — Specifies an encryption key for the DDNS service.

**Dynamic DDNS Table**
This table displays the configured servers in the DDNS setup.

◆ **Select** — Highlights an entry in the Dynamic DDNS Table.

◆ **State** — Displays the state of the server entry, enabled or disabled.

◆ **Service** — Displays the type of DDNS service.

◆ **Host Name** — Displays the URL or IP address of the DDNS service provider.

◆ **User Name** — Displays the user name or contact email of the DDNS user.

◆ **Interface** — The WAN interface for the DDNS service.
ACCESS CONTROL LISTS

The ADSL Router supports Access Control Lists that filter IP addresses allowed access on the unit’s LAN and WAN interfaces. Only traffic from IP addresses in the ACL table are allow access to the ADSL Router.

LAN ACLs  When you select LAN for the ACL “direction,” you can configure ACLs that apply to the LAN interfaces.

Figure 28: LAN ACL Configuration

The following items are displayed on this page:

◆ **LAN ACL Switch** — Enables LAN ACLs on the ADSL Router. (Default: Disabled)

**NOTE:** Do not enable ACLs without first configuring your host IP address in the ACL table, otherwise you will not be able to access the unit.

◆ **Apply Changes** — Implements the ACL settings on the ADSL Router.

◆ **IP Address** — Specify a LAN IP address or range of addresses that are allowed access to the ADSL Router.

◆ **Services Allowed** — Specifies services that are allowed access from LAN interfaces, or allows “any.”

◆ **Add** — Adds the ACL to the ACL Table.
CURRENT ACL TABLE
Lists the configured ACLs on the LAN ports.

- **Select** — The number of the entry in the table.
- **Direction** — Displays if the ACL is applied to a LAN or WAN interface.
- **IP Address/Interface** — Displays the allowed IP address or range.
- **Service** — Displays the allowed service.
- **Port** — Displays the TCP/UDP port of the allowed service.
- **Action** — Click the button to remove the entry from the table.

WAN ACLS  When you select WAN for the ACL “direction,” you can configure ACLs that apply to WAN interfaces.

Figure 29:  WAN ACL Configuration

The following items are displayed on this page:

- **WAN Setting** — Selects a WAN interface or IP address.
  - **WAN Interface** — Specifies a configured WAN interface for the ACL.
  - **IP Address** — Specify a LAN IP address or range of addresses that are allowed access to the ADSL Router.
- **Services Allowed** — Specifies services that are allowed access from LAN interfaces, or allows “any.”
◆ **Add** — Adds the ACL to the ACL Table.

**CURRENT ACL TABLE**
Lists the configured ACLs on the LAN ports.

◆ **Select** — The number of the entry in the table.

◆ **Direction** — Displays if the ACL is applied to a LAN or WAN interface.

◆ **IP Address/Interface** — Displays the allowed IP address or range.

◆ **Service** — Displays the allowed service.

◆ **Port** — Displays the TCP/UDP port of the allowed service.

◆ **Action** — Click the button to remove the entry from the table.
IP/PORT FILTERING

IP/Port filtering restricts connection parameters to limit the risk of intrusion and defends against a wide array of common hacker attacks. IP/Port filtering allows the unit to permit, deny or proxy traffic through its ports and IP addresses.

Figure 30: IP/Port Filtering Settings

The following items are displayed on this page:

◆ **Outgoing Default Action** — Sets the default filtering action for outgoing packets that do not match a rule in the filter table. (Default: Permit, maximum 32 entries are allowed.)

◆ **Incoming Default Action** — Sets the default filtering action for incoming packets that do not match a rule in the filter table. (Default: Deny, maximum 32 entries are allowed.)

**NOTE:** The default incoming action denies all packets from the WAN port.

◆ **Rule Action** — Specifies if traffic should be permitted or denied. (Default: Permit)

◆ **Protocol** — Specifies the destination port type, TCP, UDP or ICMP. (Default: TCP).

◆ **Direction** — Specifies the packet destination. (Default: Outgoing)
◆ **Source IP Address** — Specifies the source IP address to block or allow traffic from.

◆ **Destination IP Address** — Specifies the destination IP address to block or allow traffic from.

◆ **Subnet Mask** — Specifies a subnet mask.

◆ **Source Port** — Specifies a range of ports to block traffic from the specified LAN IP address.

◆ **Destination Port** — Specifies a range of ports to block traffic from the specified LAN IP address from reaching.

◆ **Apply Changes** — Adds a newly configured packet filter that denies forwarding in to the local area network to the list.

**CURRENT FILTER TABLE**
The Current Filter Table displays the configured IP addresses and ports that are permitted or denied access to and from the ADSL Router.

◆ **Rule** — Displays if the specified traffic is allowed or denied.

◆ **Protocol** — Displays the destination port type.

◆ **Source IP/Mask** — Displays the source IP address.

◆ **SPort** — Displays the source port range.

◆ **Dest IP/Mask** — Displays the destination IP address.

◆ **DPort** — Displays the destination port range.

◆ **State** — Indicates if an entry is enabled.

◆ **Direction** — Displays the direction in which the rule has been applied.

◆ **Action** — Enables/disables or deletes the selected entry from the table.
NAT/NAPT SETTINGS

Network Address Translation (NAT) is a standard method of mapping multiple “internal” IP addresses to one “external” IP address on devices at the edge of a network. For the router, the internal (local) IP addresses are the IP addresses assigned to local PCs by the DHCP server, and the external IP address is the IP address assigned to the specified WAN interface.

The NAT function on the router enables the support of Virtual Servers, Port Triggering, and other features.

Some applications, such as Internet gaming, videoconferencing, Internet telephony and others, require multiple connections. These applications may not work with Network Address Translation (NAT) enabled. If you need to run applications that require multiple connections, use Port Triggering to specify the additional public ports to be opened for each application. Alternatively, you can open up a client to unrestricted two-way Internet access by defining it as DMZ (demilitarized-zone) host.

VIRTUAL SERVERS

Using the NAT Virtual Server feature, remote users can access different servers on your local network using your single public IP address.

Remote users accessing services such as web or FTP at your local site through your public IP address, are redirected (mapped) to other local server IP addresses and TCP/UDP port numbers. For example, if you set Type/Public Port to TCP/80 (HTTP or web) and the Private IP/Port to 192.168.7.9/80, then all HTTP requests from outside users forwarded to 192.168.7.9 on port 80. Therefore, by just using your external IP address provided by your ISP, Internet users can access the services they need at the local addresses to which you redirect them.

The more common TCP service port numbers include: HTTP: 80, FTP: 21, Telnet: 23, and POP3: 110. Up to 32 entries can be configured in the Virtual Servers table.
The following items are displayed on this page:

- **Service Type** – Sets a name to describe the virtual server service.
  - **Usual Service Name** – Select a name from the list of common applications.
  - **User-defined Service Name** – Set a custom name to describe the service.

- **Protocol** – Specifies the port type. (Options: TCP or UDP; Default: TCP)

- **WAN Setting** – Selects a WAN interface or IP address. Depending on the selection, either the WAN Interface or WAN IP Address setting displays.
  - **WAN Interface** – Select the WAN interface for the virtual server.
  - **WAN IP Address** – Specify the WAN IP address for the virtual server.

- **WAN Port** – Specifies the public TCP/UDP port number, or port range, used for the service on the WAN interface. (Range: 1-65535)

- **LAN Open Port** – Specifies the TCP/UDP port number, or port range, used on the local server for the service. (Range: 1-65535)

- **LAN IP Address** – The IP address of the server on the local Ethernet network. The specified address must be in the same subnet as the router and its DHCP server address pool. (Range: 192.168.2.2 to 192.168.2.254)
**NAT EXCLUDE IP** You can use the Exclude IP feature to block an IP address or range of IP addresses from accessing WAN interfaces.

**Figure 32: NAT — Exclude IP**

<table>
<thead>
<tr>
<th>NAT EXCLUDE IP</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the page, you can configure some source IP address which uses the pure route mode when accessing the internet through the specified interface.</td>
</tr>
<tr>
<td>Interface: <img src="image1" alt="Interface" /></td>
</tr>
<tr>
<td>IP Range: <img src="image2" alt="IP Range" /></td>
</tr>
<tr>
<td><img src="image3" alt="Apply Changes" /></td>
</tr>
<tr>
<td>Current NAT Exclude IP Table:</td>
</tr>
<tr>
<td>WAN Interface</td>
</tr>
<tr>
<td><img src="image5" alt="Table" /></td>
</tr>
</tbody>
</table>

The following items are displayed on this page:

- **Interface** – Select the WAN interface for the Exclude IP service.
- **IP Range** – Specifies an IP address range to block on the WAN interface.

**NAT FORWARDING** Forwarding allows an external user to reach a private IP address (inside a LAN) from the outside through a NAT-enabled router.

**Figure 33: NAT Forwarding Settings**

<table>
<thead>
<tr>
<th>NAT Forwarding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entries in this table allow you to automatically redirect common network services to a specific machine behind the NAT firewall. These settings are only necessary if you wish to host some sort of server (like a web server or mail server) on the private local network behind your Gateway’s NAT firewall.</td>
</tr>
<tr>
<td>Local IP Address: <img src="image6" alt="Local IP Address" /></td>
</tr>
<tr>
<td>Remote IP Address: <img src="image7" alt="Remote IP Address" /></td>
</tr>
<tr>
<td>Enable: <img src="image8" alt="Enable" /></td>
</tr>
<tr>
<td><img src="image9" alt="Apply Changes" /></td>
</tr>
<tr>
<td>Current NAT Port Forwarding Table:</td>
</tr>
<tr>
<td>Local IP Address</td>
</tr>
<tr>
<td><img src="image11" alt="Table" /></td>
</tr>
</tbody>
</table>

The following items are displayed on this page:

- **Local IP Address** — Specifies the IP address of a computer on the local network.
◆ **Remote IP Address** — Specifies the source IP address on the WAN to allow access from. Leaving this parameter blank allows access from all traffic.

◆ **Enable** — Checking this box activates the parameters configurated once added to the Current NAT Port Forwarding Table.
  (Default: Enabled)

**NAT ALG AND PASS-THROUGH**

Application Layer Gateway (ALG) and passthrough is a useful feature when a host computer or server on the Local Area Network must be accessible from the Internet using specific protocols. This can be necessary with certain software applications that do not function reliably through Network Address Translation.

**Figure 34: NAT ALG and Pass-Through**

The following items are displayed on this page:

◆ **IPSec Pass Through** — Enables IPsec passthrough.  
  (Default: Enabled)

◆ **L2TP Pass Through** — Enables L2TP passthrough. (default: Enabled)

◆ **PPTP Pass Through** — Enables PPTP passthrough. (Default: Enabled)

◆ **FTP** — Enables FTP passthrough. (Default: Enabled)

◆ **H.323** — Enables H.323 (Windows Netmeeting) passthrough.  
  (Default: Enabled)

◆ **SIP** — Enables SIP passthrough. (Default: Enabled)

◆ **RTSP** — Enables RTSP passthrough. (Default: Enabled)

◆ **ICQ** — Enables ICQ passthrough. (Default: Enabled)
◆ **MSN** — Enables MSN passthrough. (Default: Enabled)

**NAT PORT TRIGGER**

Port triggering is a way to automate port forwarding in which outbound traffic on predetermined ports ("triggering ports") causes inbound traffic to specific incoming ports to be dynamically forwarded to the initiating host while the outbound ports are in use.

Figure 35: NAT — Port Trigger

The following items are displayed on this page:

◆ **Port Trigger** — Enables the feature. (Default: Disabled)

◆ **Application Type** — Select a name from the list of common applications, or set a custom name to describe the service.

◆ **Start/End Match Port** — Specifies the trigger port range. (Range: 1-65535)

◆ **Trigger Protocol** — Specifies the trigger port type used, TCP, UDP, or both.

◆ **Start/End Relate Port** — Specifies the public port range. (Range: 1-65535).

◆ **Open Protocol** — Specifies the public port type used, TCP, UDP, or both.

◆ **NAT Type** — Specifies outgoing or incoming traffic.
FTP ALG Configuration specifies a non-standard FTP port for passthrough traffic. The standard port for FTP connections is TCP port 21, and the router monitors port 21 to ensure the NAT passthrough of FTP. When the FTP server port is not 21, you must specify the TCP port to ensure NAT passthrough of FTP.

**Figure 36: NAT — FTP ALG Configuration**

The following items are displayed on this page:

- **FTP ALG Port** – Specifies a non-standard FTP port for passthrough traffic. (Range: 0~65535)
- **Add Dest Ports** – Adds the specified port to the FTP ALG Ports Table.
- **Delete Selected Dest Port** – Removes the selected port from the FTP ALG Ports Table.

**NAT IP MAPPING** IP Mapping enables a pool of local LAN IP addresses to be dynamically mapped to a pool of external (global) IP addresses.

**Figure 37: NAT — IP Mapping**

Entries in this table allow you to configure an IP pool for specified source IP address from LAN, so one packet which’s source IP is in range of the specified address will select one IP address from pool for NAT.
The following items are displayed on this page:

- **Type** – Selects the type of mapping to use. Either one-to-one, one-to-many, many-to-many, or many-to-one.
- **Local Start/End IP** – Defines a local IP address pool range.
- **Global Start/End IP** – Defines an external IP address pool range.

**Quality of Service**

The Quality of Service page is used to enable or disable QoS, and set the default priority for packets not matching any classification rules.

Click Services, IP QoS. If QoS is enabled, the default priority should also be set to an appropriate value. After setting any of the attributes on this page, click Apply.

**Figure 38: Quality of Service**
The following items are displayed on this page:

- **IP QoS** – If enabled, QoS rules will be applied to traffic entering the Gateway.

- **QoS Policy** – Selects Stream-based, 802.1p-based, or DSCP-based policy.

- **Schedule Mode** – Selects either Strict or Weighted Fair Queueing (WFQ) as the port priority mode.

- **802.1p Configuration** – When the QoS Policy is 802.1p-based, you can map the 802.1p values to port priority queues.

- **DSCP Configuration** – When the QoS Policy is DSCP-based, you can map the DSCP values to port priority queues

- **Add QoS Rule** – Specifies traffic classification rules based on protocol type and destination/source MAC address; and to set the resulting priority queue, re-marked IP Precedence, IP ToS, or 802.1p priority.
  - **Source IP/ Mask** – The source IP address and network mask.
  - **Destination IP/ Mask** – The destination IP address and network mask.
  - **Source Port** – The TCP/UDP source port.
  - **Destination Port** – The TCP/UDP destination port.
  - **Protocol** – The network protocol; TCP, UDP, or ICMP.
  - **Physical Port** – Select the physical interface; LAN or USB.
  - **Set Priority** – The port queue to which a matching packet is assigned.
  - **Insert or Modify QoS Mark** – Re-marks the matching packet with the selected IP Precedence, IP ToS, or 802.1p value.
MAC FILTERING

MAC based packet filtering enables the router to filter clients based on their physical layer address.

Figure 39: MAC Filtering Settings

The following items are displayed on this page:

- **Outgoing Default Policy** — A default action for MAC addresses not configured in the filter table. (Default: Allow, maximum 32 entries are allowed.)

- **Incoming Default Policy** — A default action for MAC addresses not configured in the filter table. (Default: Allow, maximum 32 entries.)

**NOTE:** The default outgoing and incoming defaults allow traffic from all MAC addresses.

- **Direction** — Specifies the packet destination. (Default: Outgoing)

- **Action** — Specifies if traffic should be permitted or denied. (Options: Deny, Allow; Default: Deny)

- **Source MAC Address** — Specifies a source MAC address.

- **Destination MAC Address** — Specifies a destination MAC Address.
DMZ enables a specified host PC on the local network to access the Internet without any firewall protection. Some Internet applications, such as interactive games or videoconferencing, may not function properly behind the router's firewall. By specifying a Demilitarized Zone (DMZ) host, the PC's TCP ports are completely exposed to the Internet, allowing open two-way communication. The host PC should be assigned a static IP address.

**Figure 40: DMZ Settings**

![DMZ Settings](image)

The following items are displayed on this page:

- **Enable DMZ** — Sets the DMZ status to enabled, but changes do not take affect until the Apply changes button has been pressed and changes are saved to the running configuration. (Default: disabled)

- **DMZ Host IP Address** — Specifies an IP address on the local network allowed unblocked access to the WAN.
URL BLOCKING

By filtering inbound Uniform Resource Locators (URLs) the risk of compromising the network can be reduced. URLs are commonly used to point to websites. By specifying a URL or a keyword contained in a URL traffic from that site may be blocked.

Figure 41: URL Blocking Settings

The following items are displayed on this page:

- **URL Blocking Capability** — Enables or disables URL blocking. (Default: Enabled)

- **Apply Changes** — Implements the selected URL blocking.

- **Keyword** — Specifies a string that traffic is to be blocked from. May be in the form of a text or number string with no spaces.

- **Add Keyword** — Adds a defined URL keyword to the blocking table.
SOFTWARE FORBIDDEN

The Software Forbidden page enables traffic from listed application software to be blocked by the router.

Figure 42: Software Forbidden Settings

The following items are displayed on this page:

◆ **Current Forbidden Software List** — Software applications that are currently blocked by the router.

◆ **Add Forbidden Software** — Lists pre-defined software applications that can be added to the Forbidden Software table.
DoS

Denial of Service (DoS) is an attempt by a hacker to flood an IP address, domain, or server with repeated external communication requests, effectively saturating the system with an information flood that renders it slow or effectively inoperable for genuine users to access it. DoS attacks are also referred to as non-intrusion attacks, the goal of which is to cripple your system but not steal data.

The DoS Settings on the router enable the user to block many of the common DoS attacks a network might suffer.

**Figure 43: DoS Settings**

- **Enable DoS Blocking** — Activates the DoS check boxes and configurable parameters associated with them. (Default: Disabled)
  - **Whole System Flood: SYN**: Prevents a SYN (synchronise) attack in which the process of the common three way TCP handshake is interrupted and the acknowledge response gets sent to a malicious IP address, or the system is flooded with false SYN requests.
- **Whole System Flood: FIN:** Prevents a FIN (no more data from sender) flood in which part of a TCP packet from an invalid (or spoofed) IP address floods the network with connection resets.

- **Whole System Flood: UDP:** Prevents a flood of large numbers of raw UDP (User Datagram Protocol) packets targeted at the unit.

- **Whole System Flood: ICMP:** Prevents a flood of ICMP (internet control message protocol) messages from an invalid IP address causing all TCP requests to be halted.

- **Per Source IP Flood: SYN:** Prevents a SYN attach on a specified IP address, usually that of the LAN port.

- **Per Source IP Flood: FIN:** Prevents a FIN attach on the LAN port IP address.

- **Per Source IP Flood: UDP:** Prevents a UDP attack on the LAN port IP address.

- **Per Source IP Flood: ICMP:** Prevents an ICMP attack on the LAN port IP address.

- **TCP/UDP Port Scan:** Prevents a situation whereby a hacker sends a series of systematic queries to the unit for open ports through which to route traffic.

- **TCMP Smurf:** Prevents a situation whereby a hacker forges the IP address of the unit and sends repeated ping requests to it flooding the network.

- **IP Land:** Prevents an attack that involves a synchronise request being sent as part of the TCP handshake to an open port specifying the port as both the source and destination effectively locking the port.

- **IP Spoof:** Prevents a situation where a hacker by a hacker creates an alias (spoof) of the units IP address to which all traffic is redirected.

- **IP Teardrop:** Prevents a Teardrop attack that involves sending mangled IP fragments with overlapping, over-sized, payloads to the unit. The fragmented packets are processed by the unit causing it to crash.

- **PingofDeath:** Prevents the receiveal of an oversized ping packet that the unit cannot handle. Normal ping packets are 56 bytes, or 84 bytes with the IP header attached. The Ping of Death will exceed the maximum IP packet size of 65,535 bytes.

- **TCP Scan:** Prevents the probing of the unit by a hacker for open TCP ports to then block.
**TCP SynWithData:** Prevents the hacker sending a volume of requests for connections that cannot be completed.

**UDP Bomb:** Also called a UDP Flood or packet storm. Prevents the hacker congesting the network by generating a flood of UDP packets between it and the unit using the UDP chargen service (a testing utility that generates a character string for every packet it receives).

**UDP EchoChargen:** Prevents the hacker from sending a UDP packet to the echo server with a source port set to the chargen port.

**packets/second:** Enter the number of packets per second that you want to scan for malicious activity.

**Sensitivity:** Specifies the sensitivity of the TCP/UDP port scan prevention. (Options: High, Low; Default: Low)

- **Select All** — Selects all DoS prevention measures listed.
- **Clear All** — Clears all fields.
- **Enable Source IP Blocking** — When multiple attacks are detected from each of the fields listed above, or the packet threshold has been exceeded - the IP address of the hacker is blocked.
- **Block Time (sec)** — Sets the length of time in seconds the IP address should remain blocked.

**IGMP Proxy Configuration**

Multicasting is useful when the same data needs to be sent to more than one host. Using multicasting as opposed to sending the same data to the individual hosts uses less network bandwidth. The multicast feature also enables you to receive multicast video stream from multicast servers.

IP hosts use Internet Group Management Protocol (IGMP) to report their multicast group memberships to neighboring routers. Similarly, multicast routers use IGMP to discover which of their hosts belong to multicast groups. This device supports IGMP proxy that handles IGMP messages. When enabled, this device acts as a proxy for a LAN host making requests to join and leave multicast groups, or a multicast router sending multicast packets to multicast group on the WAN side.

When you enable IGMP Proxy, make sure IGMP is also enabled on the WAN interface (upstream) that connects to a router running IGMP. You must also enable IGMP on the LAN interface (downstream) that is connected to hosts.
The following items are displayed on this pages:

- **IGMP Proxy** — Enables IGMP proxy. When enabled, the upstream interface acts as a host interface, sending query messages periodically to the downstream interfaces, sending join and leave messages to the upstream multicast router when a first join or last leave message is received from a downstream interface, and sending membership reports in response to query messages from the multicast router.

- **Multicast Allowed** — Enables multicast forwarding. (Default: Enabled)

- **Robustness Count** — Specifies the robustness (or expected packet loss) for interfaces. The robustness value is used in calculating the appropriate range for other IGMP variables. (Range: 1-255; Default: 2)

- **Last Member Query Count** — The number of query messages sent before the router determines that there are no remaining members of the specific host group being queried on the interface. (Range: 1-255; Default: 2)

- **Query Interval** — The interval between sending IGMP general queries. (Range: 2-31744 seconds; Default: 60 seconds)

- **Query Response Interval** — The maximum time the system waits for a response to general queries. (Range: 10-31744 tenths of a second; Default: 10 seconds)

- **Group Leave Delay** — The time duration it takes a device to stop forwarding multicast frames after an IGMP Leave Group message has been successfully sent to the device. (Default: 2000 ms)
RIP is an Internet protocol you can set up to share routing table information with other routing devices on your LAN, at your ISP’s location, or on remote networks connected to your network via the ADSL line. Most small home or office networks do not need to use RIP; they have only one router, such as the router, and one path to an ISP. In these cases, there is no need to share routes, because all Internet data from the network is sent to the same ISP gateway.

Figure 45: RIP Configuration

The following items are displayed on this page:

- **RIP** — Enables or disables RIP on the unit. (Default: Disabled)
- **Interface** — The name of the interface on which you want to enable RIP. (Default: br0)
- **Receive Version** — Indicate the RIP version in which information must be passed to the DSL device in order for it to be accepted into its routing table.
- **Send Version** — Indicate the RIP version this interface will use when it sends its route information to other devices.
The router uses its tables to make routing decisions, and uses Address Resolution Protocol (ARP) to forward traffic from one hop to the next. ARP is used to map an IP address to a physical layer MAC address. When an IP frame is received by the router, it first looks up the MAC address corresponding to the destination IP address in the ARP cache. If the address is found, the router writes the MAC address into the appropriate field in the frame header, and forwards the frame on to the next hop. IP traffic passes along the path to its final destination in this way, with each routing device mapping the destination IP address to the MAC address of the next hop toward the recipient, until the packet is delivered to its final destination.

For devices that do not respond to ARP requests or do not respond in a timely manner, traffic will be dropped because the IP address cannot be mapped to a MAC address. If this occurs, you can use ARP Binding to manually map an IP address to the corresponding MAC address in the ARP cache.

**Figure 46: ARP Binding Configuration**

The following items are displayed on this pages:

- **IP Address** – IP address statically mapped to a physical MAC address. (Valid IP addresses consist of four numbers, 0 to 255, separated by periods, and must match a known network interface)

- **MAC Address** – MAC address statically mapped to the corresponding IP address. (Valid MAC addresses are hexadecimal numbers in the format: xxxxxxxxxxxxx)
The Advanced Configuration settings for the ADSL Router contain advanced system management configuration settings.

The following sections are contained in this chapter:

- “Bridge Setting” on page 87
- “Log Setting” on page 88
- “Routing Configuration” on page 89
- “UPnP” on page 91
- “SNMP Protocol Configuration” on page 92
- “System Time Configuration” on page 93
- “Other Advanced Configuration” on page 94
- “Port Mapping” on page 95
BRIDGE SETTING

This feature allows you to set the bridge aging time and to enable Spanning Tree.

The Spanning Tree Protocol (STP) can be used to detect and disable network loops, and to provide backup links between bridges. This allows a wireless bridge to interact with other bridging devices (that is, an STP-compliant switch, bridge or router) in your network to ensure that only one route exists between any two stations on the network, and provide backup links which automatically take over when a primary link goes down.

Figure 47: Bridge Setting

The following items are displayed on this page:

- **Ageing Time** — Sets the MAC address ageing time, in seconds. After the aging time has been reached with no traffic received, the unit will delete the address from the forwarding database. (Default: 300 seconds)

- **802.1d Spanning Tree** — Enables/disables the Spanning Tree Protocol on the ADSL Router. (Default: Disabled)
LOG SETTING

The ADSL Router supports a logging process that controls error messages saved to memory. The logged messages serve as a valuable tool for isolating ADSL Router and network problems.

The Log Setting page displays the latest messages logged in chronological order. Log messages saved in the ADSL Router’s memory are erased when the device is rebooted.

Figure 48: Log Setting

The following items are displayed on this page:

- **Error:** Selects the Error level of messages to be displayed by the ADSL Router.
- **Notice:** Selects the Notice level of messages to be displayed by the ADSL Router.
- **Save Log to File** — Saves the currently recorded system logs to file.
- **Clear Log Table** — Clears the system log table.
- **Old/New** — Displays the previous or next page of log entries.
**EVENT LOG TABLE**
Displays the current entries in the System Log table.

◆ **Time** — Displays the date and time the log entry was created.
◆ **Index** — The number of the log entry.
◆ **Type** — Displays the source of the log message.
◆ **Log Information** — Information that identifies the cause of the event that prompted the system log message.

**ROUTING CONFIGURATION**
This page displays the information necessary to forward a packet along the best path toward its destination. Each packet contains information about its origin and destination. When a packet is received, a network device examines the packet and matches it to the routing table entry providing the best match for its destination. The table then provides the device with instructions for sending the packet to the next hop on its route across the network.

**Figure 49: Routing Configuration**

The following items are displayed on this page:

◆ **Enable** — Enables static routing on the ADSL Router.
  (Default: Enabled)
◆ **Destination** — The network IP address of the subnet. The destination can be specified as the IP address of a subnet or a specific host in the subnet. It can also be specified as all zeros to indicate that this route should be used for all destinations for which no other route is defined.
◆ **Subnet Mask** — The network mask of the destination subnet. The default gateway uses a mask of 0.0.0.0.

◆ **Next Hop** — The IP address of the next hop through which traffic will flow towards the destination subnet.

◆ **Metric** — Defines the number of hops between network nodes that data packets travel. The default value is 0, which means that the subnet is directly one hop away on the local LAN network.

◆ **Interface** — The WAN interface to which a static routing subnet is to be applied.

◆ **Add Route** — Adds a static route to the Static Route Table.

◆ **Update** — Clears the above fields.

◆ **Delete Selected** — Deletes the specified static route.

**STATIC ROUTE TABLE**
This table displays all the configured static routes.

◆ **Select** — Highlights an entry in the Static Route Table.

◆ **State** — Displays if the route is enabled or disabled.

◆ **Destination** — Displays the final destination of the routed packets.

◆ **Subnet Mask** — Displays the subnet mask.

◆ **Next Hop** — The next hop that the packets will be routed to on their way to their final destination.

◆ **Metric** — Displays the number of hops from router to router that the packets must make before reaching their final destination.

◆ **Interface** — Displays the interface the packets will be routed on.
UPnP

UPnP (Universal Plug and Play) provides inter-connectivity between devices supported by the same standard. UPnP is based on standard Internet protocols, such as TCP/IP, UDP, and HTTP.

Figure 50: UPnP

The following items are displayed on this page:

- **UPnP** — Enables UPnP on the ADSL Router. (Default: Enabled)

- **WAN Interface** — Selects the WAN interface for the UPnP service.
SNMP PROTOCOL CONFIGURATION

Simple Network Management Protocol (SNMP) is a communication protocol designed specifically for managing devices on a network. SNMP is typically used to configure devices for proper operation in a network environment, as well as to monitor them to evaluate performance or detect potential problems.

The ADSL Router can be managed locally or remotely by SNMP.

**Figure 51: SNMP Configuration**

<table>
<thead>
<tr>
<th>SNMP Protocol Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>This page is used to configure the Simple Network Management Protocol (SNMP). In this page, you can modify the settings of system description, trap IP address, and community name and so on.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

The following items are displayed on this pages:

- **SNMP** — Enables/disables SNMP. (Default: Enabled)
- **System Description** — A name given to identify the ADSL Router.
- **System Contact** — The name of the system contact person.
- **System Name** — A description of the unit. (Default: Wireless ADSL Modem/Router)
- **System Location** — The location of the ADSL Router.
- **Trap IP Address** — Destination IP address of the SNMP trap.
- **Community Name (Read-only)** — Name of the read-only community. This read-only community allows read operation to all objects in the Management Information Base (MIB).
- **Community Name (Read-Write)** — Name of the write-only community. This write-only community allows write operations to objects defined as read-writable in the MIB.
SYSTEM TIME CONFIGURATION

The System Time page allows you to manually configure time settings or enable the use of an NTP server.

Figure 52: System Time Configuration

The following items are displayed on this page:

- **System Time** — Displays the current date and time and allows you to manually configure time settings.

- **DayLight** — Enables daylight saving time to be configured.

- **State** — Enables NTP (Network Time Protocol). (Default: Disabled)

- **Primary/Secondary Server** — Specifies NTP servers to poll for time updates.

- **Interval** — Specifies the interval to poll for time updates.

- **Time Zone** — Allows you to select your current location or nearest city. All time zones are given in Greenwich Mean Time (GMT).

- **Local Time** — Displays the current date and time and allows you to manually configure time settings.

- **NTP Start** — Initiates a time update from an NTP server.
OTHER ADVANCED CONFIGURATION

Enables the Half Bridge feature for PPPoE (PPPoA) connections. When the router is set to Half Bridge, it establishes the PPPoE/PPPoA connection with the ISP, then forwards all other traffic to DHCP clients connected to the router.

**Figure 53: Other Advanced Configuration**

<table>
<thead>
<tr>
<th>Other Advanced Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Here you can set other miscellaneous advanced settings.</td>
</tr>
<tr>
<td>Half Bridge: When enable Half Bridge, that PPPoE(PPPoA)'s connection type will set to continuous.</td>
</tr>
<tr>
<td><strong>Half Bridge:</strong></td>
</tr>
<tr>
<td><strong>Interface:</strong></td>
</tr>
<tr>
<td>[Apply Changes]</td>
</tr>
</tbody>
</table>

The following items are displayed on this page:

- **Half Bridge** — Displays the current date and time and allows you to manually configure time settings.

- **Interface** — Selects the WAN interface for the Half Bridge feature.
PORT MAPPING

Port Mapping supports multiple ports to WAN interfaces and bridging groups. Each group performs as an independent network. You can create up to four groups on the router.

Figure 54: Port Mapping Configuration

The following items are displayed on this page:

- **WAN** – The WAN interfaces that can be grouped.
- **LAN** – The LAN interfaces that can be grouped.
- **Interfaces Group** — The grouped WAN and LAN interfaces.
- **Apply Changes** — Sets the Interfaces Group as the selected group in the table.
The Diagnostics page is used to test the local Ethernet connection, or the WAN connection for the DSL signal and the connection to DSL provider network.

This chapter contains the following sections:

◆ “Diagnostic Test” on page 97
◆ “Ping” on page 98
◆ “Traceroute” on page 99
◆ “ADSL Tone Diagnostics” on page 101
CHAPTER 9 | Diagnostics

DIAGNOSTIC TEST

The diagnostic test shows the test results for the connectivity of the physical layer and protocol layer for both LAN and WAN sides.

Figure 55: Diagnostic Test

DIAGNOSTIC TEST
The device is capable of testing your ADSL connection. After selecting an interface, click “Run Diagnostic Test.” The result of each test item is listed below. If a test shows a fail status, click “Run Diagnostic Test” again to ensure that the the fail status is consistent.

Select the Interface: [ ]
Run Diagnostic Test

The following items are displayed on this page:

◆ **Select the Interface** — Selects the WAN connection. (Default: vc0)

◆ **Run Diagnostic Test** — Performs a diagnostic test on the LAN and WAN side connections.

LAN CONNECTION CHECK
Displays the result of a test for connectivity on the LAN port.

◆ **Test Ethernet LAN Connection** — Displays the connectivity of the Ethernet LAN port.

ADSL CONNECTION TEST
Displays the results of a test for connectivity on the WAN port.

◆ **Test ADSL Synchronization** — Displays the connectivity of the ADSL synchronisation.

◆ **Test ATM OAM F5 Segment Loopback** — Displays the connectivity of an F5 segment loopback of the permanent virtual circuit (PVC) connection with your service provider.

◆ **Test ATM OAM F5 End-to-end Loopback** — Displays the connectivity of an F5 end-to-end loopback integrity test of the permanent virtual circuit (PVC) connected to your service provider.

◆ **Test ATM OAM F4 Segment Loopback** — Displays the connectivity of an F4 segment loopback of the permanent virtual circuit (PVC) connection with your service provider.

◆ **Test ATM OAM F4 End-to-end Loopback** — Displays the connectivity of an F4 end-to-end loopback integrity test of the permanent virtual circuit (PVC) connected to your service provider.
The ADSL Router provides the function of “pinging” its own IP address or URL to test for connectivity.

**Figure 56: Ping**

![Ping Diagnostic](image)

The following items are displayed on this page:

- **Host** — The host IP address or URL to test for connectivity.
- **Run Ping** — Sends the ping request, resulting in the following page:

**Figure 57: Ping Result**

![Ping Diagnostic](image)

PING 192.168.2.9:

1st: 64 bytes from 192.168.2.9: icmp_seq=1 ttl=10 time=100 ms
2nd: 64 bytes from 192.168.2.9: icmp_seq=2 ttl=10 time=100 ms
3rd: 64 bytes from 192.168.2.9: icmp_seq=3 ttl=10 time=100 ms

Back
**TRACEROUTE**

Traceroute discovers the routes that packets take when traveling to a destination. Traceroute works by taking advantage of the error messages generated by routers when a packet exceeds its time-to-live (TTL) value.

The traceroute command first sends probe datagrams with the TTL value set at one. This causes the first router to discard the datagram and return an error message. The trace function then sends several probe messages at each subsequent TTL level and displays the roundtrip time for each message. Not all devices respond correctly to probes by returning an “ICMP port unreachable” message. If the timer goes off before a response is returned, the trace function prints a series of asterisks and the “Request Timed Out” message. A long sequence of these messages, terminating only when the maximum timeout has been reached, may indicate this problem with the target device. A trace terminates when the destination responds, when the maximum timeout (TTL) is exceeded, or the maximum number of hops is exceeded.

**Figure 58: Traceroute**

![Traceroute Diagnostic](image)

The following items are displayed on this page:

- **Host** — The IP address of the destination host.

- **Number of Tries** — The number of datagrams to be sent at each TTL level. The default count is 3. (Range: 1–10)

- **Timeout** — The number of seconds to wait for a response to a probe packet. The default is 5000 ms. (Range: 1–65535)

- **Datasize** — Number of bytes in the packet. The default is 38 bytes. (Range: 64-1518)

- **DSCP** — The DSCP value in the IP Header of the packet. (Range: 0-63)

- **Max Hop Count** — The largest TTL value that can be used. The traceroute terminates when the destination is reached or when this value is reached. The default is 30. (Range: 1–255)

- **Interface** — Selects the interface on which to run the traceroute.
Figure 59: Traceroute Result

Traceroute Diagnostic

Traceroute 192.168.2.9:
1 192.168.2.9 ***

trace route finished!
ADSL TONE DIAGNOSTICS

The ADSL page displays diagnostic testing for the ADSL connection.

**Figure 60: ADSL Tone Diagnostics**

<table>
<thead>
<tr>
<th>Diagnostic ADSL</th>
</tr>
</thead>
<tbody>
<tr>
<td>This page is used to diagnose the ADSL tone.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start</td>
<td>Starts the diagnostics test.</td>
</tr>
<tr>
<td>Downstream/Upstream</td>
<td>Displays downstream and upstream traffic.</td>
</tr>
<tr>
<td>Hlin Scale</td>
<td>Displays the scaling factor for H.Real and H.Image represented in fixed-point format.</td>
</tr>
<tr>
<td>Loop Attenuation (dB)</td>
<td>Displays the attenuation of the link to the ADSL Router and the service provider in decibels.</td>
</tr>
<tr>
<td>Signal Attenuation (dB)</td>
<td>Displays the signal attenuation of the link which determines the frequency in decibels.</td>
</tr>
<tr>
<td>SNR Margin (dB)</td>
<td>Displays the signal-to-noise ratio of the link in decibels.</td>
</tr>
<tr>
<td>Attainable Rate (Kbps)</td>
<td>Displays the attainable rate of the link to the service provider in kilobits per second.</td>
</tr>
</tbody>
</table>

The following items are displayed on this page:

- **Start** — Starts the diagnostics test.
- **Downstream/Upstream** — Displays downstream and upstream traffic.
- **Hlin Scale** — Displays the scaling factor for H.Real and H.Image represented in fixed-point format.
- **Loop Attenuation (dB)** — Displays the attenuation of the link to the ADSL Router and the service provider in decibels.
- **Signal Attenuation (dB)** — Displays the signal attenuation of the link which determines the frequency in decibels.
- **SNR Margin (dB)** — Displays the signal-to-noise ratio of the link in decibels.
- **Attainable Rate (Kbps)** — Displays the attainable rate of the link to the service provider in kilobits per second.
◆ **Output Power (dBm)** — Displays the output power of the unit in decibels per milliwatt.

◆ **Tone Number** — Displays the tone number of the ADSL signal. (Range: 0~255)

◆ **H.Real** — Displays the real part of channel transfer function of each subcarrier.

◆ **H.Image** — Displays the imaginary part of channel transfer function of each subcarrier.

◆ **SNR** — Displays the SNR (Signal to Noise Ratio) of each subcarrier expressed in decibels.

◆ **QLN** — Displays the Quite Line Noise of each subcarrier, expressed in dBm/Hz.

◆ **Hlog** — Displays the amplitude response of channel transfer function of each subcarrier, expressed in decibels.
The Admin pages are used to manage configuration files, system logs, TR-069 ACS, passwords; and also to update software and reboot the system.

This chapter contains the following sections:

- “Commit/Reboot” on page 104
- “Backup/Restore Settings” on page 105
- “Password Setup” on page 106
- “Upgrade Firmware” on page 107
- “TR-069 Configuration” on page 108
COMMIT/REBOOT

Use this page to save the current configuration and reboot the system.

Figure 61: Commit/Reboot

The following items are displayed on this page:

- **Reboot from** — Select the option for router’s configuration:
  - **Save the current configuration** — Select this option if you want to save your changes for the next reboot.
  - **Restore to the factory default configuration** — Select this option if you want to return all changes to default values.

- **Commit Changes** — Sets the selected configuration option.
- **Reset** — Resets the selected option on the page.
- **Reboot** — Restarts the router.

When rebooting the system the following page displays and a countdown from 64 seconds begins.

Figure 62: Rebooting

<table>
<thead>
<tr>
<th>Reboot System</th>
</tr>
</thead>
<tbody>
<tr>
<td>You click &quot;Reboot&quot; button! the system is rebooting now...</td>
</tr>
<tr>
<td>Please wait for 57 s</td>
</tr>
</tbody>
</table>
REFERENCES

The Backup/Restore Settings page allows you to backup current settings to a local file, and load previously saved settings to the unit.

Figure 63: Backup/Restore Settings

The following items are displayed on this page:

- **Save Settings to File** — Saves the current configuration to a file locally on the management PC.

- **Load Settings from File** — Allows the user to load previously saved configuration files from a local file on the management PC.
**PASSWORD SETUP**

Management access to the ADSL Router is controlled through different levels of user name and password.

To protect access to the management interface, you need to configure a new Administrator’s password as soon as possible. If a new password is not configured, then anyone having access to the ADSL Router may be able to compromise the unit’s security by entering the default values.

**Figure 64: Password Setup**

![User Account Configuration](image)

The following items are displayed on this page:

- **User Name** — Specifies the user name to configure:

- **Privilege** — Configures the access privileges that the user has. Select between:
  - **Admin**: Grants administrator level access, no restrictions.
  - **User**: Grants user level access, some configuration restrictions.

- **Old Password** — The password for management access. The default passwords preset for access to the unit is “smcadmin” for admin and user level. (Length: 3-16 characters, case sensitive)

- **New Password** — Enter a new password.

- **Confirmed Password** — Enter the new password again for verification.
**UPGRADE FIRMWARE**

You can update the ADSL Router’s firmware by using the Upgrade Firmware facility which allows you to upload new firmware manually by specifying a file path. Make sure the firmware file you want to use is on the local computer by clicking Browse to search for the file to be used for the update.

Figure 65: Upgrade Firmware

The following items are displayed on this page:

- **Select File** — Specifies the firmware file for the upgrade. The file location must be on the local management PC. You can use the Browse button to find the file.

- **Browse** — Opens a directory on the local hard drive for specifying the path of file required for uploading.

- **Upload** — Starts the upload procedure.

- **Reset** — Clears all file directory fields.
TR-069 Configuration

The Technical Report 069 (TR069) protocol defines a specification for remote management of CPE devices. The protocol uses HTTP for two-way communication between the CPE device and an Auto Configuration Server (ACS), allowing service providers to provide CPE configuration, software upgrades, and other service functions for end-users.

The ADSL Router’s TR-069 parameters need to be defined to allow communication with the remote ACS.

**Figure 66: TR-069 Configuration**

<table>
<thead>
<tr>
<th>TR-069 Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>This page is used to configure the TR-069 customer premises equipment (CPE). In this page, you can configure the parameters of auto-configuration server (ACS).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACS:</td>
<td></td>
</tr>
<tr>
<td>Enable:</td>
<td></td>
</tr>
<tr>
<td>URL:</td>
<td><a href="http://20.20.20.9999/acs/069">http://20.20.20.9999/acs/069</a></td>
</tr>
<tr>
<td>User Name:</td>
<td>User</td>
</tr>
<tr>
<td>Password:</td>
<td></td>
</tr>
<tr>
<td>Periodic Inform Enable:</td>
<td></td>
</tr>
<tr>
<td>Periodic Inform Interval:</td>
<td>300</td>
</tr>
<tr>
<td>Connection Request:</td>
<td></td>
</tr>
<tr>
<td>User Name:</td>
<td>User</td>
</tr>
<tr>
<td>Password:</td>
<td></td>
</tr>
<tr>
<td>Path:</td>
<td>/acs</td>
</tr>
<tr>
<td>Port:</td>
<td>7547</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Debug:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACS Certificates CPE:</td>
</tr>
<tr>
<td>Show Message:</td>
</tr>
<tr>
<td>CPE Sends GetRPC:</td>
</tr>
<tr>
<td>Skip TRoBoRT:</td>
</tr>
<tr>
<td>Delay:</td>
</tr>
<tr>
<td>Auto-Execution:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Certificate Management:</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPE Certificate:</td>
</tr>
<tr>
<td>Password:</td>
</tr>
<tr>
<td>CA Certificate:</td>
</tr>
<tr>
<td>CPE Certificate:</td>
</tr>
<tr>
<td>CA Certificate:</td>
</tr>
</tbody>
</table>
The following items are displayed on this page:

**ACS**
Defines the Auto Configuration Server parameters.
- **Enable** — Enables/disables TR-069 support. (Default: Enabled)
- **URL** — Specifies the URL required for the CPE to connect to the ACS.
- **User Name** — Enter the user name that the ADSL Router should use when connecting to the ACS.
- **Password** — Enter the password that the ADSL Router should use when connecting to the ACS.
- **Periodic Inform Enable** — When this field is enabled, the DSL device will send an Inform RPC to the ACS server at the system startup, and will continue to send it periodically at an interval defined in Periodic Inform Interval field; When this field is disabled, the DSL device will only send Inform RPC to the ACS server once at the system startup. (Default: Enabled)
- **Periodic Inform Interval** — Time interval in seconds to send Inform RPC.

**Connection Request**
Defines the connection from the ADSL Router to the ACS.
- **User Name** — The user name the remote ACS should use when connecting to this device.
- **Password** — The password the remote ACS should use when connecting to this device.
- **Path** — The path of the device ConnectionRequestURL. The device ConnectionRequestURL should be configured based on the Device_IP, Path and Port as follows: http://Device_IP:Port/Path
- **Port** — The port of the device ConnectionRequestURL.

**Debug**
Sets options for displaying debug messages for the ACS connection.
- **ACS Certificates CPE** — Selects if digital certificates are used on the CPE.
- **Show Message** — Displays ACS SOAP messages on the serial console.
- **CPE sends GetRPC** — The router contacts the ACS to obtain Remote Procedure Call methods.
◆ **Skip MReboot** — Specifies whether to send an MReboot event code in the inform message.

◆ **Delay** — Specifies whether to start TR-069 after a short delay.

◆ **Auto-Execution** — Specifies whether to automatically start TR-069 after the router is powered on.

**CERTIFICATE MANAGEMENT**

Defines the digital certificate files used for authentication between the ADSL Router and the ACS.

◆ **CPE Certificate Password** — The password to use with the ADSL Router's digital certificate file.

◆ **CPE Certificate** — The unique digital security certificate used by the ADSL Router to authenticate with the ACS server. Click the “Browse” button to locate the file on your local PC and upload it to the unit using the “Upload” button.

◆ **CA Certificate** — The digital security certificate issued by a Certified Authority to be used by the unit when authenticating the ACS server. Click the “Browse” button to locate the file on your local PC and upload it to the unit using the “Upload” button.
This section provides additional information and includes these items:

- “Troubleshooting” on page 112
- “Hardware Specifications” on page 114
- “Cables and Pinouts” on page 118
**DIAGNOSING GATEWAY INDICATORS**

Gateway operation is easily monitored via the LED indicators to identify problems. The table below describes common problems you may encounter and possible solutions. If the solutions in the table fail to resolve the problem, contact technical support for advice.

**Table 3: LED Troubleshooting Chart**

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
</table>
| **Power** indicator does not light up after power on. | Power outlet, power cord, or external power adapter may be defective. | ◆ Check the power outlet by plugging in another device that is functioning properly.  
◆ Check the power adapter with another router. |
| **Ethernet** link indicator does not light up after making a connection. | Network interface (e.g., a network adapter card in the attached computer), network cable, or router LAN port may be defective. | ◆ Verify that the router and computer are powered on.  
◆ Be sure the cable is plugged into both the router and the computer.  
◆ Verify that the proper cable type is used and its length does not exceed specified limits.  
◆ Check the network adapter in the computer and cable connections for possible defects. Replace the defective adapter or cable if necessary. |
| **Link** indicator is off or does not stop blinking (i.e., synchronizing) after making a connection. | Cabling or router DSL port may be defective. | ◆ Be sure the cable is plugged into both the router, ADSL Splitter, and an RJ-11 telephone jack.  
◆ Verify that the cable length does not exceed specified limits. (Check with your service provider for this information.)  
◆ Check the cable connections on the router, ADSL Splitter, and wall jack for possible defects. Replace the defective cable if necessary. |
IF YOU CANNOT CONNECT TO THE INTERNET

◆ Check that your computer is properly configured for TCP/IP. For more information, see “Configuring the TCP/IP Protocols” on page 25.

◆ Make sure the correct network adapter driver is installed for your PC operating system. If necessary, try reinstalling the driver.

◆ Check that the network adapter’s speed or duplex mode has not been configured manually. We recommend setting the adapter to auto-negotiation when installing the network driver.

PROBLEMS ACCESSING THE MANAGEMENT INTERFACE

Table 4: Web Access Troubleshooting Chart

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot connect using a web browser</td>
<td>◆ Be sure the router is powered up.</td>
</tr>
<tr>
<td></td>
<td>◆ Check the network cabling between the management station and the router.</td>
</tr>
<tr>
<td></td>
<td>◆ Check that you have a valid network connection to the router and that the port you are using has not been disabled.</td>
</tr>
<tr>
<td></td>
<td>◆ Be sure the management station has an IP address in the same subnet as the router’s IP interface to which it is connected.</td>
</tr>
<tr>
<td>Forgot or lost the password</td>
<td>◆ Press and hold down the Reset button for 3 seconds or more to restore the unit’s factory default settings, then use the default password to access the web interface.</td>
</tr>
</tbody>
</table>
B HARDWARE SPECIFICATIONS

PHYSICAL CHARACTERISTICS

**PORTS**
1 RJ-11 VDSL line (to phone jack in the wall)
1 RJ-45 10/100BASE-TX (Ethernet connection to PC)
1 USB (optional connection to PC)

**ETHERNET INTERFACE**
- RJ-45 connector, auto MDI/X pinout detection
- 10BASE-T: 100-ohm, UTP cable; Category 3 or better
- 100BASE-TX: 100-ohm, UTP cable; Category 5 or better
- *Maximum Cable Length - 100 m (328 ft)*

**DSL INTERFACE**
- RJ-11 connector, using standard phone cable (26 AWG)

**LED INDICATORS**
- Power, Link, Data, Ethernet, USB

**INPUT POWER**
12 VDC (via AC power adapter), 1 A maximum

**SIZE**
140 x 104 x 28.5 mm (5.51 x 4.09 x 1.12 in.)

**WEIGHT**
177 g (6.2 oz)

**TEMPERATURE**
- Operating: 0 °C to 40 °C (32 °F to 104 °F)

**HUMIDITY**
- Operating: 10% to 85% (non-condensing)
SOFTWARE FEATURES

ATM FEATURES
- Support up to 8 ATM PVCs
- Support ATM Forum UNI 3.1/4.0 PVC
- Support UBR, CBR, and rt-VBR and nrt-VBR service classes
- Provide ATM layer functionality
- Support up to 8 PVCs – traffic shaping (CBR, UBR, rt/nrt-VBR)
- Support PPPoA (RFC2364)
- Support MPoA functionality (RFC2684)
- Support IP over ATM (IPoA)
- Support ATM cell format ITU-T 1.361
- Support OAM F4/F5 loopback

PPP FUNCTIONS
- Point-to-Point Protocol (RFC1661)
- PPP over ATM (RFC2364)
- PPP over Ethernet (RFC2516)
- User Authentication
  - CHAP (RFC1994)
  - PAP (RFC1334)

BRIDGE FEATURES
- Ethernet bridging
- Support for transparent bridging
  - MAC address learning
  - MAC address filtering and protocol filtering for up-link

ROUTING FEATURES
- RIP v1/v2
- Static routing
- PPP/PPPoE (RFC 2516)
- NAT with ALGs
- NAPT
- IGMP v1/v2
- IGMP proxy and snooping
- IPv4
- IP pass-through
- ARP binding
- Port mapping

SECURITY
- Stateful Packet Inspection (SPI)
- Management Access Control for WAN
User authentication for PPP (PAP/CHAP)
DDoS (Dynamic DoS) Protection

**FIREWALL**
- NAT
- DMZ
- Filtering – IP Filtering, MAC Filtering, URL Filtering
- ACL (Access Control List)
- VPN (IPSec, PPTP, L2TP) pass-through
- Software Forbidden

**MANAGEMENT**
- Access administration
- Web-based configuration - HTTP server
- System configuration backup and restore
- SNMP Support (V.1 and V.2C) – MIB I, MIB II (RFC1213)
- Firmware upgrade by Web/TFTP
- Remote firmware upgrade
- UPnP
- EZ Setup Wizard
- TR069 remote management diagnostic
- TR067 ensures product meets all ADSL IOT tests

**QoS**
- IP ToS function (RFC 1349)
- 802.1p bit remarking
- Traffic classification by port, 802.1p, ToS, and DSCP

**STANDARDS**

**ETHERNET STANDARDS**
- IEEE 802.3-2005 Ethernet Access
- Ethernet, Fast Ethernet
- Full-duplex flow control (ISO/IEC 8802-3)
- IEEE 802.1D Spanning Tree Protocol
- IEEE 802.1p priority tags

**ADSL COMPLIANCE**
- ANSI T1.413 Issue 2
- G.992.1 (G.dmt) Annex A
- G.992.2 (G.lite) Annex A
- G.992.3 ADSL2 (G.dmt.bis) Annex A/J/K/L/M
- G.992.4 ADSL2 (G.lite.bis)
- G.992.5 ADSL2+
COMPLIANCES

EMISSIONS  FCC Part 15B Class B
            FCC Part 68
            CE Mark

ENVIRONMENTAL  RoHS compliant

Safety  EN60950-1 :2006+A11 :2009
TWISTED-PAIR CABLE ASSIGNMENTS

For 10/100BASE-TX connections, a twisted-pair cable must have two pairs of wires. For 1000BASE-T connections the twisted-pair cable must have four pairs of wires. Each wire pair is identified by two different colors. For example, one wire might be green and the other, green with white stripes. Also, an RJ-45 connector must be attached to both ends of the cable.

**NOTE:** Each wire pair must be attached to the RJ-45 connectors in a specific orientation.

**CAUTION:** DO NOT plug a phone jack connector into the RJ-45 port. Use only twisted-pair cables with RJ-45 connectors that conform with FCC standards.

The following figure illustrates how the pins on the RJ-45 connector are numbered. Be sure to hold the connectors in the same orientation when attaching the wires to the pins.

**Figure 67: RJ-45 Connector**
10/100BASE-TX PIN ASSIGNMENTS

Use unshielded twisted-pair (UTP) or shielded twisted-pair (STP) cable for RJ-45 connections: 100-ohm Category 3 or better cable for 10 Mbps connections. Also be sure that the length of any twisted-pair connection does not exceed 100 meters (328 feet).

The RJ-45 port on the router supports automatic MDI/MDI-X operation, so you can use straight-through or crossover cables for all network connections to PCs, switches, or hubs. In straight-through cable, pins 1, 2, 3, and 6, at one end of the cable, are connected straight through to pins 1, 2, 3, and 6 at the other end of the cable.

Table 5: 10/100BASE-TX MDI and MDI-X Port Pinouts

<table>
<thead>
<tr>
<th>PIN</th>
<th>MDI Signal Name</th>
<th>MDI-X Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Transmit Data plus (TD+)</td>
<td>Receive Data plus (RD+)</td>
</tr>
<tr>
<td>2</td>
<td>Transmit Data minus (TD-)</td>
<td>Receive Data minus (RD-)</td>
</tr>
<tr>
<td>3</td>
<td>Receive Data plus (RD+)</td>
<td>Transmit Data plus (TD+)</td>
</tr>
<tr>
<td>6</td>
<td>Receive Data minus (RD-)</td>
<td>Transmit Data minus (TD-)</td>
</tr>
<tr>
<td>4, 5, 7, 8</td>
<td>Not used</td>
<td>Not used</td>
</tr>
</tbody>
</table>

a. The “+” and “-” signs represent the polarity of the wires that make up each wire pair.

STRAIGHT-THROUGH WIRING

If the twisted-pair cable is to join two ports and only one of the ports has an internal crossover (MDI-X), the two pairs of wires must be straight-through. (When auto-negotiation is enabled for any RJ-45 port on this gateway, you can use either straight-through or crossover cable to connect to any device type.)

Figure 68: Straight-through Wiring

EIA/TIA 568B RJ-45 Wiring Standard
10/100BASE-TX Straight-through Cable
CROSSOVER WIRING

If the twisted-pair cable is to join two ports and either both ports are labeled with an “X” (MDI-X) or neither port is labeled with an “X” (MDI), a crossover must be implemented in the wiring. (When auto-negotiation is enabled for any RJ-45 port on this gateway, you can use either straight-through or crossover cable to connect to any device type.)

Figure 69: Crossover Wiring

EIA/TIA 568B RJ-45 Wiring Standard
10/100BASE-TX Crossover Cable

[Diagram showing the wiring connections for a crossover cable.]
**RJ-11 PORT**

Standard telephone RJ-11 connectors and cabling can be found in several common wiring patterns. These six-pin connectors can accommodate up to three wire-pairs (three telephone lines), but usually only one or two pairs of conductor pins and wires are implemented.

The RJ-11 port on this device contains one wire-pair, an inner pair on pins 3 and 4. This wire-pair carries the digital data.

**Figure 70: RJ-11 Wiring**

![RJ-11 Wiring Diagram]

**Table 6: RJ-11 Port Pinouts**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal Name</th>
<th>Wire Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not used</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Not used</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Line 1 Ring</td>
<td>Red or Blue/White</td>
</tr>
<tr>
<td>4</td>
<td>Line 1 Tip</td>
<td>Green or White/Blue</td>
</tr>
<tr>
<td>5</td>
<td>Not used</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Not used</td>
<td></td>
</tr>
</tbody>
</table>
10BASE-T  IEEE 802.3-2005 specification for 10 Mbps Ethernet over two pairs of Category 3 or better UTP cable.

100BASE-TX  IEEE 802.3-2005 specification for 100 Mbps Fast Ethernet over two pairs of Category 5 or better UTP cable.

1000BASE-T  IEEE 802.3ab specification for 1000 Mbps Gigabit Ethernet over four pairs of Category 5 or better UTP cable.

BACKBONE  The core infrastructure of a network. The portion of the network that transports information from one central location to another central location where it is unloaded onto a local system.

DHCP  Dynamic Host Configuration Protocol: Provides a framework for passing configuration information to hosts on a TCP/IP network. DHCP is based on the Bootstrap Protocol (BOOTP), adding the capability of automatic allocation of reusable network addresses and additional configuration options.

ETHERNET  A popular local area data communications network, which accepts transmission from computers and terminals.

FIREWALL  A firewall is designed to prevent unauthorized access to or from a private network.

FTP  File Transfer Protocol: A TCP/IP protocol used for file transfer.

HTTP  Hypertext Transfer Protocol: HTTP is a standard used to transmit and receive all data over the World Wide Web.

ISP  Internet Service Provider. A company that provides access to the Internet. This may be your local telephone company, or a dedicated Internet service company.
**ITU**  International Telecommunication Union

**ITU-T**  Telecommunication Standardization Section of ITU

**LAN**  Local Area Network: A group of interconnected computers and support devices.

**MAC ADDRESS**  The physical layer address used to uniquely identify network nodes.

**MTU**  Maximum Transfer Unit. The maximum transfer unit for traffic crossing this device. MTU should be set to a value that minimizes unnecessary fragmentation and maximizes the transfer of large sequential data streams.

**NTP**  Network Time Protocol: NTP provides the mechanisms to synchronize time across the network. The time servers operate in a hierarchical-master-slave configuration in order to synchronize local clocks within the subnet and to national time standards via wire or radio.

**PING**  A utility used to determine whether a specific IP address is accessible. It works by sending a packet to the specified address and waiting for a reply.

**POTS**  Plain Old Telephone Service. One of the services using voice band. Sometimes used as a descriptor for all voice band services.

**PPP**  Point-to-Point Protocol. A protocol for connecting remote hosts to the Internet using TCP/IP.

**PPPoE**  PPP over Ethernet. A protocol for connecting remote hosts to the Internet over an always-on connection by simulating a dial-up connection.

**PSTN**  Public Switched Telephone Network.

**QoS**  Quality of Service. A network protocol used to specify a guaranteed throughput level. This protocol is often used by Internet service providers to guarantee their customers a minimum end-to-end latency.

**RATE ADAPTIVE**  A DSL service that automatically adjusts the transmission rate depending on line quality and loading to ensure data quality (such as, keeping within a maximum error rate).
**RJ-45 Connector**  A connector for twisted-pair wiring.

**Splitter**  A filter to separate DSL signals from POTS signals to prevent mutual interference.

**SNTP**  Simple Network Time Protocol: SNTP allows a device to set its internal clock based on periodic updates from a Network Time Protocol (NTP) server. Updates can be requested from a specific NTP server, or can be received via broadcasts sent by NTP servers.

**TCP/IP**  Transmission Control Protocol/Internet Protocol. Protocol suite that includes TCP as the primary transport protocol, and IP as the network layer protocol.

**TIA**  Telecommunications Industry Association

**UDP**  User Datagram Protocol. UDP provides a datagram mode for packet-switched communications. It uses IP as the underlying transport mechanism to provide access to IP-like services. UDP packets are delivered just like IP packets – connection-less datagrams that may be discarded before reaching their targets. UDP is useful when TCP would be too complex, too slow, or just unnecessary.

**UPnP**  Universal Plug-and-Play. A set of protocols that allows devices to connect seamlessly and simplifies the deployment of home and office networks, using auto-discovery of other network devices, acquiring information about device capabilities, and requests for services.

**UTP**  Unshielded twisted-pair cable.

**VPN**  Virtual Private Network. A secure tunnel used to protect data passing from one network to another over the Internet.

**WAN**  Wide Area Network. A computer network that spans a relatively large geographical area. Typically, a WAN consists of two or more local-area networks (LANs).
INDEX

NUMERICS
10/100BASE-TX pin assignments 119
100BASE-TX 20
10BASE-T 20

A
ACLS 63
ADSL capability 58
ADSL modulation 57
ADSL settings 57
ADSL tone diagnostics 101
AnnexL option 58
AnnexM option 58
ARP table 43
ATM settings 55

B
backup/restore settings 105
bridge configuration 87
buttons
  Reset 22

C
cable connections 24
channel configuration 53
commit/reboot 104
compliances
  emissions 117
  environmental 117
crossover cables 120
current ATM VC table 56

D
DDNS 61
default settings, reset 22
denial of service (DoS) 80
DHCP settings 47
  DHCP relay 48
  DHCP server 49
  no DHCP 47
DMZ 77
DNS server 60
DSL statistics 42

E
Ethernet 20

F
factory defaults, resetting 22
  front panel 20, 21

G
Gateway
  features 19

H
hardware, description 20

I
IGMP proxy configuration 82
installation
  connecting cables 24
  powering on 25
IP/Port filtering 66

L
LAN interface 46
LAN status 38
LAN/WAN diagnostics test 97
LED indicators 21

M
MAC filtering 76

P
package contents 23
password setup 106
pin assignments
  RJ-11 121
ping 98
pinouts, cable 118
port
  RJ-11 20
  RJ-45 20
port indicators 21
power adapter, details 22
power connector 22
powering on 25
problems, troubleshooting 112

R
rear panel 20, 21
Reset button 22
RIP configuration 84
RJ-11
  pin assignments 121
  port 20
RJ-45 connector pins 118
RJ-45 port 20
routing configuration 89

S
SNMP protocol configuration 92
specifications
  component 114
  environmental 114
  power 114
specifications, hardware 114
standards
  IEEE 116
  ITU-T 116
straight-through cables 119
system
  indicators 21
  requirements 23
  system log 88

T
TCP/IP, PC configuration 25
time zone 93
TR-069 configuration 108
traffic statistics 41
troubleshooting 112
  Internet connection 113
  management access 113
twisted-pair cable assignments 118

U
upgrade firmware 107
UPnP 91
URL blocking 78
UTP cable pinouts 119

W
WAN status 39
Web interface
  access requirements 29
  home page 30