LevelOne

FBR- 1100TX 1 Port BroadBand Router

User's Guide

P/N: 9590B502A0

FCC Statement:

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.

(2) This device must accept any interference received, including interference that may cause undesired operation.

CE Marking Warning

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Document Version: 1.6

TABLE OF CONTENTS

Chapter 1
Introduction

This Chapter provides an overview of the LevelOne Broadband Router's features and capabilities.

Congratulations on the purchase of your new LevelOne Broadband Router. The LevelOne Broadband Router will allow multiple LAN users to share an Internet user account, via a DSL or Cable modem. Once the LevelOne Broadband Router is installed and configured, the Internet is just a click away.

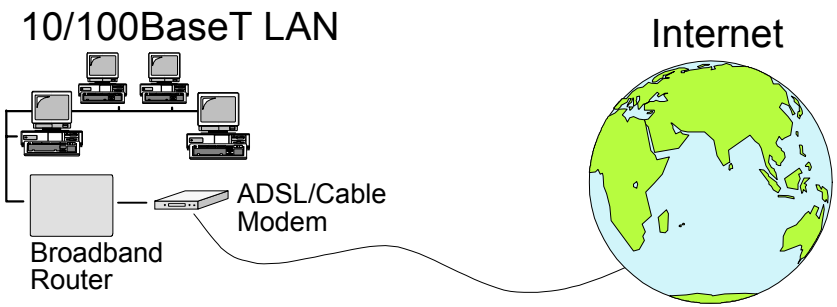

Figure 1: Office to Internet

Alternatively, the LevelOne Broadband Router can be used to connect your local LAN to a remote LAN or WAN, via the LevelOne Broadband Router's WAN port.

LevelOne Broadband Router Features

The LevelOne Broadband Router incorporates many advanced features, carefully designed to provide sophisticated functions while being easy to use.

LAN Features

- ***Dual Ethernet ports.*** The LevelOne Broadband Router has 2 Ethernet ports. One (the LAN port) is used to connect to your local LAN. The other (the WAN port) is used to connect the Internet. (Internet access requires a DSL or Cable modem.)
- ***DHCP Server Support.*** **D**ynamic **H**ost **C**onfiguration **P**rotocol provides a dynamic IP address to PCs and other devices upon request. The LevelOne Broadband Router can act as a **DHCP Server** for devices on your local LAN.
- ***DHCP Client Support.*** On the WAN port, the LevelOne Broadband Router can act as a **DHCP Client**. This allows the use of dynamic IP Addressing, as used by the majority of ISPs.
- ***Multi Segment LAN Support.*** LANs containing one or more segments are supported, via the LevelOne Broadband Router's built-in static routing table. If NAT (Network Address Translation) is disabled, the LevelOne Broadband Router will function as a static router.

Internet Access Features

- ***Shared Internet Access.*** All users on the LAN can access the Internet through the LevelOne Broadband Router using only a single external IP Address. The local (invalid) IP Addresses are hidden from external sources. This process is called NAT (Network Address Translation).
- ***PPPoE Support.*** Connect to your ISP using PPPoE (PPP over Ethernet), if your ISP uses this method.

Configuration & Management

- ***Easy Setup.*** Use your WEB browser from anywhere on the LAN for configuration.
- ***Remote Management.*** The LevelOne Broadband Router can be managed from a workstation anywhere on the LAN, using a WEB browser.

Advanced Functions

- ***Virtual Servers.*** This feature allows Internet users to access Internet servers on your LAN. The required setup is quick and easy.
- ***User-Defined Virtual Servers.*** Internet users can access non-standard Internet Servers on your LAN by using this feature.
- ***Special Internet Applications.*** Internet applications such as Internet Videoconferencing, Telephony, Games Servers, and other special-purpose Servers are supported.
- ***Exposed Computer.*** One (1) PC on your local LAN can be exposed to the Internet. This allows unrestricted 2-way communication between this PC and servers or users on the Internet.

Security Features

- ***Configuration Data***. Optional password protection is provided to prevent unauthorized users from modifying the configuration.
- ***Access Control Features***. The LAN Administrator can limit Internet and E-Mail access by individual workstations.
- ***Firewall Protection.*** All incoming data packets are monitored and all incoming server requests are filtered, thus protecting your network from malicious attacks from external sources. (This protection is lost if NAT is disabled.)

Firewall Protection

The firewall protection provided by the LevelOne Broadband Router is an intrinsic side effect of NAT (Network Address Translation). All users on the LAN share a single external IP address. From the external viewpoint, there is no network, only a single device.

For internal users, the LevelOne Broadband Router acts as a "transparent proxy server", translating the multiple internal IP addresses into a single external IP address.

For external requests, any attempt to connect to local resources is blocked. The LevelOne Broadband Router will not "reverse translate" from a global IP address to a local IP address.

This type of "natural" firewall provides an impregnable barrier against malicious attacks.

Package Contents

The following items should be included:

- The LevelOne Broadband Router Unit.
- Power Adapter.
- Quick Installation Guide.
- CD-ROM containing the on-line manual.

If any of the above items are damaged or missing, please contact your dealer as soon as possible.

LevelOne Broadband Router

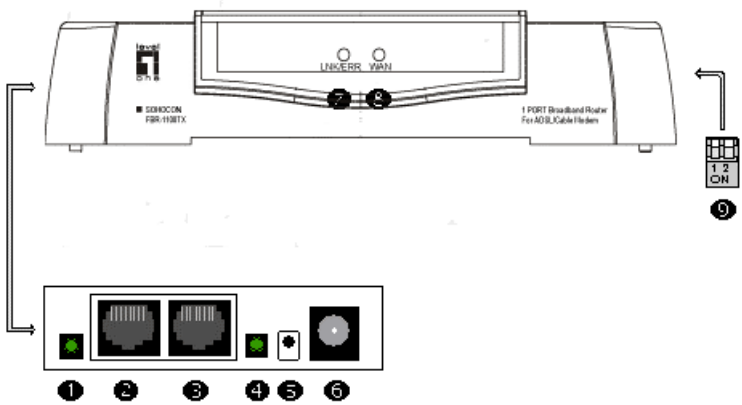

Figure 2: LevelOne Broadband Router

Components

❶ **LED Link Indicator (WAN Port)**	Flashes when data is transmitted or received.
❷ **WAN port (10BaseT)**	Connect the 10BaseT cabling (RJ45 connector) for the DSL/Cable Modem here.
❸ **LAN port (Auto-sensing 10/100BaseT)**	Connect the LAN cable (RJ45 connectors) from this port to a 10BaseT or 100BaseT hub.
❹ **LED Link Indicator (LAN Port)**	Flashes when data is transmitted or received.
❺ **Reset Button**	Used to reset (reboot) the LevelOne Broadband Router.
❻ **Power port (12V)**	Connect the power adapter here.

❼ **LINK/ERR LED**	On (Green) - Normal start up/power on sequence, or idle. The *LINK/ERR* LED will flash under the following conditions: • Flashing (Green) – Data is being transmitted or received through the *LAN* port. • Flashing (Orange, Green, Orange,…) – Hardware error. Contact your dealer for technical support.
❽ **WAN LED**	This will flash during normal operation, when data is transmitted or received through the WAN port.
❾ **DIP switches**	Refer to *DIP Switches* on page 8.

LED Table

The *LINK/ERR* LED will flash in GREEN during normal operation, as data is transmitted or received through the *LAN* port. YELLOW indicates an error. Possible LED states are shown below.

LINK/ERR LED	WAN LED	Description
On (Orange, then Green)	On	Normal start up (power ON) sequence.
On (Green)	On	Idle.
Flashing (Green)	Flashing	Normal Operation. The *LINK/ERR* LED will flash when data is transmitted or received through the *LAN* port. The *WAN* LED will flash when

		data is transmitted or received through the *WAN* port.
Flashing Orange, Green, Orange, Green, …		Hardware error. Contact your dealer for technical support.

DIP Switches

DIP Switch Setting			Description
A		1=off 2=off	Normal Operation
B		1=off 2=on	DHCP Server function disabled.
C		1=on 2=off	Restore Default IP Address and clear Password (See below)
D		1=on 2=on	Normal Operation.

Restore Default IP Address and Clear Password

If the LevelOne Broadband Router's IP Address or password is lost, the following procedure can be used to recover from this situation.

1. Turn the power to the LevelOne Broadband Router OFF.
2. Set the DIP switches to position "C" in the table above.
3. Turn the power to the LevelOne Broadband Router ON.
4. Operate DIP switch 1 in the following sequence (you have 15 seconds to complete the sequence):
   - OFF
   - ON
   - OFF

5. The LevelOne Broadband Router will now reset, and the Yellow LED flash. The following changes will have been made. (Other configuration data is unchanged.)
   - *IP Address* set to its default value of 192.168.0.1
   - *Network Mask* set to 255.255.255.0
   - The password cleared (no password).
6. You can now connect to the LevelOne Broadband Router and make any configuration changes required.

If the DIP switches are simply left at position "C", the LevelOne Broadband Router will function normally.

Chapter 2
Installation

This Chapter explains how to install the LevelOne Broadband Router in your LAN.

Requirements

- Ethernet Network employing 10BaseT and the TCP/IP protocol.
- For Internet Access, a DSL or Cable modem, and an Internet Access account with a local ISP (Internet Service Provider).

Procedure

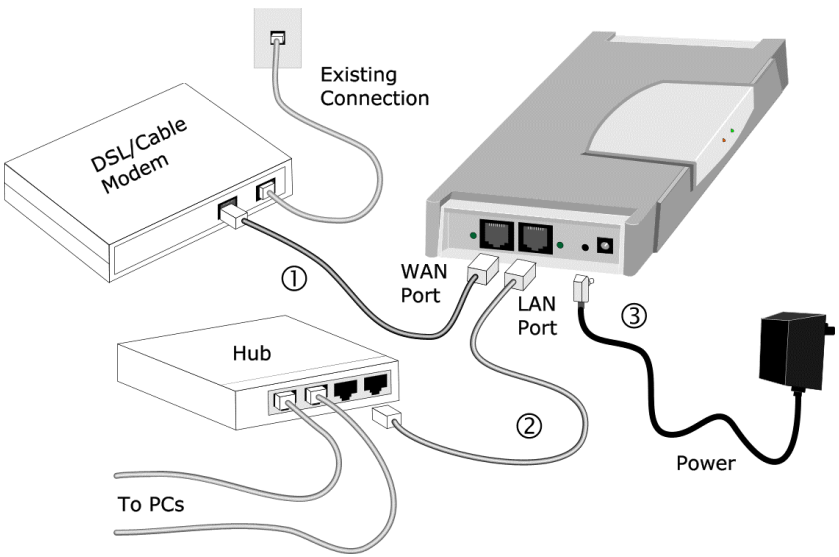

Figure 3: Installation Diagram

1. Choose an Installation Site

Select a suitable place on the network to install the LevelOne Broadband Router.

2. Connect LAN Cable

Connect a 10BaseT cable from a Hub on your LAN to the LAN port on the LevelOne Broadband Router.

3. Connect WAN Cable

Connect the 10BaseT cable from the DSL/Cable modem to the WAN port on the LevelOne Broadband Router. Use the cable supplied with your modem. If no cable was provided, use a standard network cable.

4. Connect Power Adapter

Connect the LevelOne Broadband Router's power adapter to the LevelOne Broadband Router and power it ON.

Only use the power adapter provided. Using a different one may cause hardware damage.

5. Check the LEDs

When the LevelOne Broadband Router is powered On, the *Data/Status* LED should flash Orange, then turn Green. If it stays Orange, or flashes Orange/Green there is a hardware problem. For more information on the LEDs, refer to LED Table in Chapter 1.

Chapter 3
Configuration

This Chapter provides details of the configuration process.

Overview

This chapter describes the configuration and checking of the LAN and WAN ports.

PCs on your local LAN may also require configuration. For details, see *Chapter 4 - PC Configuration*. Also, if you are using DHCP, please read *Chapter 5 - DHCP*.

Other LevelOne Broadband Router configuration may also be required, depending on which features and functions of the LevelOne Broadband Router you wish to use. Use the table below to locate detailed instructions for the required functions.

To Do this:	Refer to:
Configure PCs on your internal LAN.	Chapter 4: PC Configuration
Use DHCP on the internal LAN	Chapter 5: DHCP
Configure the LevelOne Broadband Router and routers for a LAN which has 1 or more routers.	Chapter 6: Routing
Set a password for the LevelOne Broadband Router, or disable NAT (Network Address Translation).	Chapter 7: Device Options

Use any of the following features: • Special Internet Applications • Virtual Servers • Exposed Computer	Chapter 8: Advanced Internet Features
Limit Internet Access by individual workstations	Chapter 9: Access Control

Where use of a certain feature requires that PCs or other LAN devices be configured, this is also explained in the relevant chapter.

Configuration Program

The LevelOne Broadband Router contains an HTTP server. This enables you to connect to it, and configure it, using your Web Browser.

Most Browsers should work, provided they support HTML tables and forms.

Preparation

Before attempting to configure the LevelOne Broadband Router, please check the following:

- Since configuration uses the LAN connection, the LevelOne Broadband Router must be installed and powered ON.
- If the LevelOne Broadband Router's default IP Address (192.168.0.1) is already used by another device, the other device must be turned OFF until the LevelOne Broadband Router is allocated a new IP Address during configuration.

Connecting to the LevelOne Broadband Router

To establish a connection from your PC to the device:

1. Start your WEB browser.
2. In the *Address* box, enter "HTTP://" and the IP Address of the LevelOne Broadband Router, as in the following example:

   HTTP://192.168.0.1

3. You should then see the *Home* screen. Select the desired option from the navigation bar.

If you can't connect

If the LevelOne Broadband Router does not respond, check the following:

- The LevelOne Broadband Router is properly installed, LAN connections are OK, and it is powered ON.
- Ensure that your PC and the LevelOne Broadband Router are on the same network segment. (If you don't have a router, this must be the case.)
- Ensure that your PC is using an IP Address within the range 192.168.0.2 to 192.168.0.254 and thus compatible with the LevelOne Broadband Router's default IP Address of 192.168.0.1. Also, check that the *Network Mask* is set to 255.255.255.0
  In Windows, the IP Address can be checked by using *Control Panel-Network* to check the *Properties* for the TCP/IP protocol.

Password

If a password has be set for the device, you will be prompted for the password, as shown below.

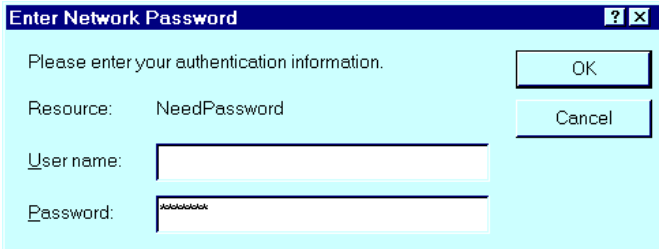

Figure 4: Password Dialog

- Leave the "User Name" blank.
- Enter the password for this device, if one has been set.

If no password has been set, this dialog will not appear. Instead, you will immediately see the ***Home*** screen, which contains helpful information for first-time users.

Navigation & Data Input

Most screens contain a navigation bar on the left of the screen allows you to move about. You can also use the "Back" button on your Browser.

Changing to another screen without clicking "Save" does NOT save any changes you may have made. HTML uses "forms based input"; you must submit (save) the form or your data will be ignored.

Home Screen

The *Home* screen is shown below. No data can be input from this screen.

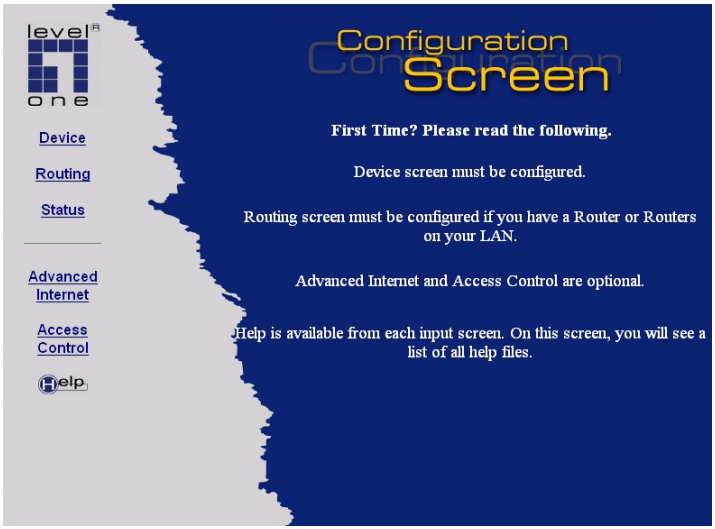

Figure 5: Home Screen

Note that the navigation bar contains a ***Help*** button. Context-sensitive help is available from each screen. From this screen, the ***Help*** file provides links to all help files.

LAN Port Configuration

To configure the LAN port, select *Device - LAN Port*. You will see a screen like the example below.

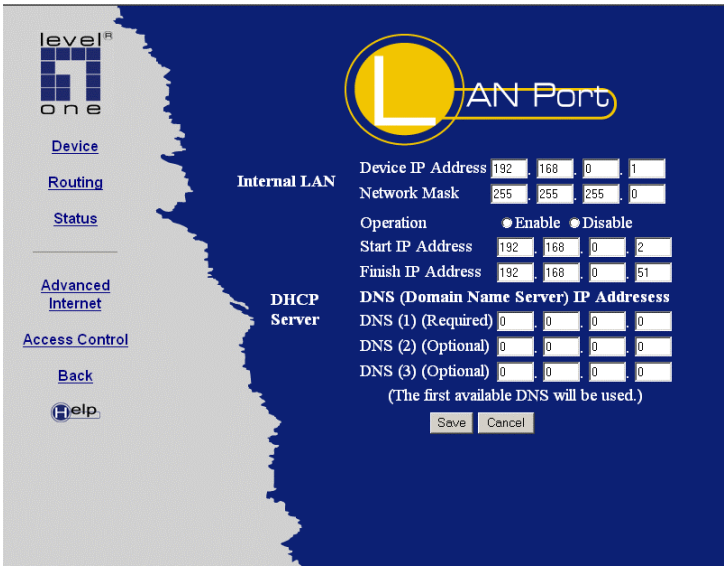

Figure 6: LAN Port

LAN Port Data

For most users, the default values for these fields should be satisfactory.

Data - LAN Port

Device IP Address	IP address for the LevelOne Broadband Router. Use the default value of 192.168.0.1 unless the address is already in use or your LAN is using a different IP address range. In the latter case, use an IP Address from within the range used by your LAN.
Network Mask	The default value 255.255.255.0 is standard for small (class "C") networks. For other networks, use the Network Mask for the LAN segment to which the LevelOne Broadband Router is attached. i.e. the same value as the PCs on that LAN segment.

Data - DHCP Server

A DHCP (Dynamic Host Configuration Protocol) server provides a valid IP address (and the Gateway and DNS addresses) to a DHCP client (PC or device) upon request. The LevelOne Broadband Router can act as a **DHCP server**.

To use this feature:

- The LevelOne Broadband Router must be configured with the following data.
- The PCs must be configured to act as DHCP **clients**. This procedure is explained in *Chapter 5 - DHCP*.

Operation	If Enabled, the LevelOne Broadband Router will function as a DHCP server. The default value is Enabled. **If you already have a DHCP Server, this must be DISABLED**.

Start IP Address **Finish IP Address**	The *IP Start Address* and *IP Finish Address* fields set the values used by the DHCP server. This range also determines the number of DHCP clients supported. (Maximum number of clients is 253.)
DNS (Domain Name Server) IP Addresses	Enter at least 1 DNS. Your ISP should recommend a DNS. If they don't, you can copy the public DNS entry from DNS (3) to DNS (1) Multiple DNS entries should be entered in the order you want them accessed. (The first available DNS will be used.)

WAN Port Configuration

Data on the WAN port screen is used to identify this device to the remote LAN. The IP Address seen by the remote LAN is different to the IP Address on the local LAN.

To configure the WAN port, first select the appropriate connection type (*Direct Connection* or *PPPoE*) on the *Device* screen (below) and then click the “Configure” button.

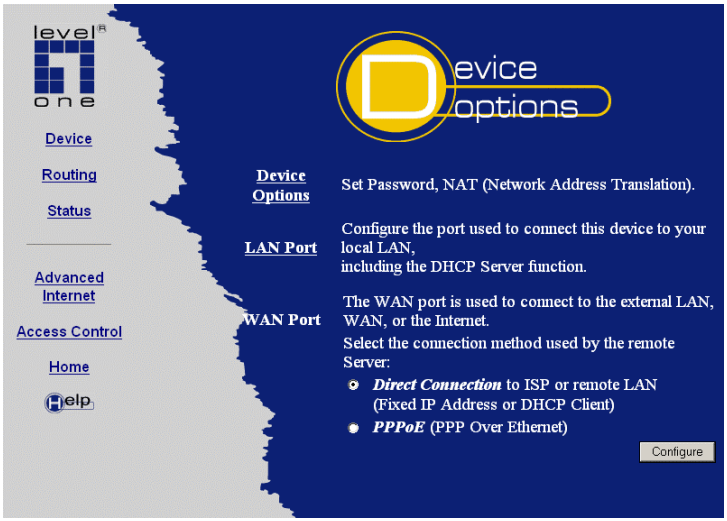

Figure 7: Device Screen

Tip:

If your connection documentation does not refer to *PPPoE*, select ***Direct Connection***.

Direct Connection Screen

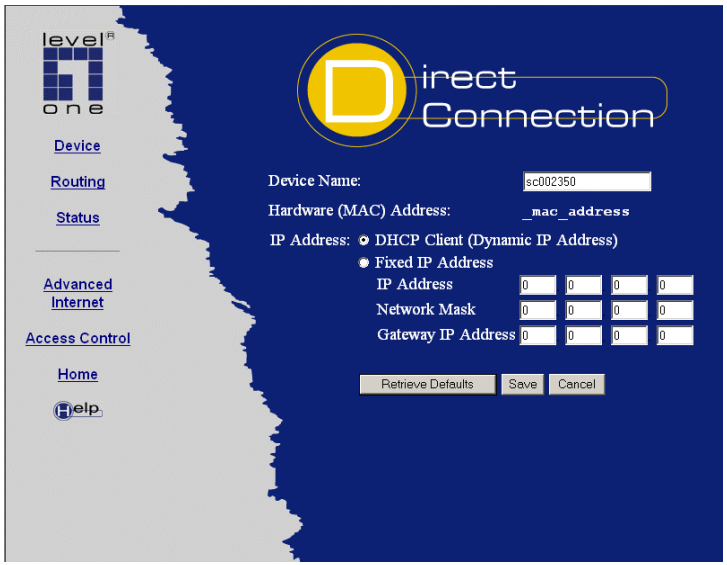

Figure 8: WAN Port - Direct Connection

- Note that if IP Address entries are shown when *DHCP Client* is selected, then these values were supplied by the DHCP server on the remote LAN.
- The *Retrieve Defaults* button will recover the default *Device Name* and clear the other items. After clicking this button, you must click *Save* to restore the default values to the LevelOne Broadband Router.

Data - WAN Port

Device Name	Used for identification. Normally, there is no need to change the default name, but if your ISP requests that you use a particular name, enter it here. This name will be provided to, and recorded by, the remote DHCP Server.

Hardware (MAC) Address	If your ISP asks for the *Network Adapter Address*, *Physical Address*, *Hardware Address*, or *MAC Address* for the PC the DSL/Cable modem is connected to, provide this value.
DHCP Client	Leave this enabled if you want the LevelOne Broadband Router to be allocated an IP Address by the DHCP server on the remote LAN, WAN, or ISP account. If this is enabled, the IP Address information below is NOT required.
Fixed IP Address	Select this if using a fixed IP Address. If this option is selected, the following data must be entered. • **IP Address**. This is the address allocated by your ISP. • **Network Mask** This must be compatible with the IP Address above • **Gateway IP Address** The address of the router or gateway, as supplied by your ISP.

In some cases, your ISP needs to know the Hardware (MAC) address of this device. If in doubt, check with your ISP.

PPPoE Screen

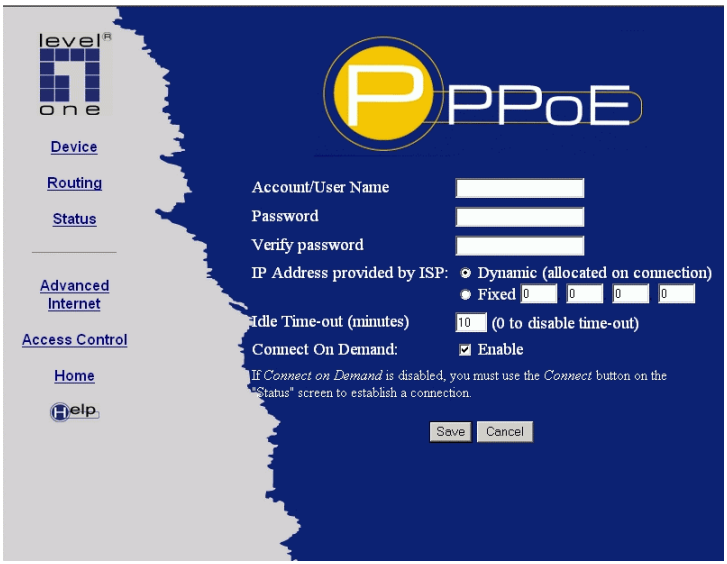

Figure 9: WAN Port - PPPoE

These settings must be correct in order to complete the remote connection. This data is provided by your ISP (Internet Service Provider).

Data - PPPoE Screen

Account/User Name	The name of the Internet account provided by your ISP.
Password	Enter the password for the above account.
Verify Password	Re-enter the password, to ensure it is correct.

IP Address provided by ISP	Normally, this is Dynamic; use this setting if your ISP's data does not mention an IP Address. If your ISP did provide an IP Address, select Fixed and enter the value they provided.
Idle Time-out	If a connection is inactive for longer than this time period, it will be terminated.
Connect on Demand	Normally, this should be Enabled. If disabled, you must use the Connect button on the Status screen to establish a connection.
Buttons	• **Save** - save any data you have entered on this screen. Remember to save before changing to another screen. • **Cancel** - cancel any data you have entered since the last "Save" operation.

Status Screens

Clicking ***Status*** on the menu bar will take you to the ***WAN Status*** screen. The screen shown will depend on whether you are using a **Fixed Connection** or **PPPoE**.

In either case the screen contains a hyperlink to jump to the ***Device/LAN Status*** screen.

WAN Status – Direct Connection

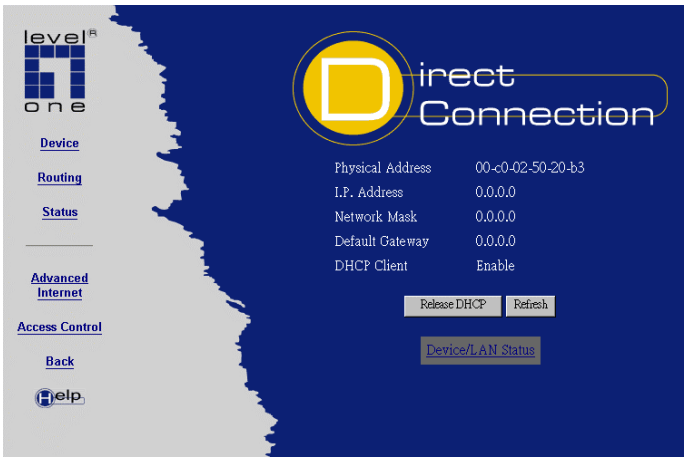

Figure 10: WAN Status - Direct Connection

Data

Physical Address	The "Hardware" address of this device, as seen by other devices on the Internet.
IP Address	The IP Address of this device, as seen by devices on the Internet. (This device has 2 IP Addresses; one for the local LAN, and another for the WAN port.)
Network Mask	The Network Mask for the above IP Address.
Default Gateway	IP address of the Router/Gateway on the WAN port.
DHCP Client	Displays "Enabled" or "Disabled", indicating whether this device is acting as a DHCP client on the WAN port.

Buttons	• **Reconnect** - use this button if the connection seems to have been lost, and no data is being transferred. (This button has no effect unless acting as a DHCP Client.) • **Refresh** - Update the data on screen.

WAN Status - PPPoE

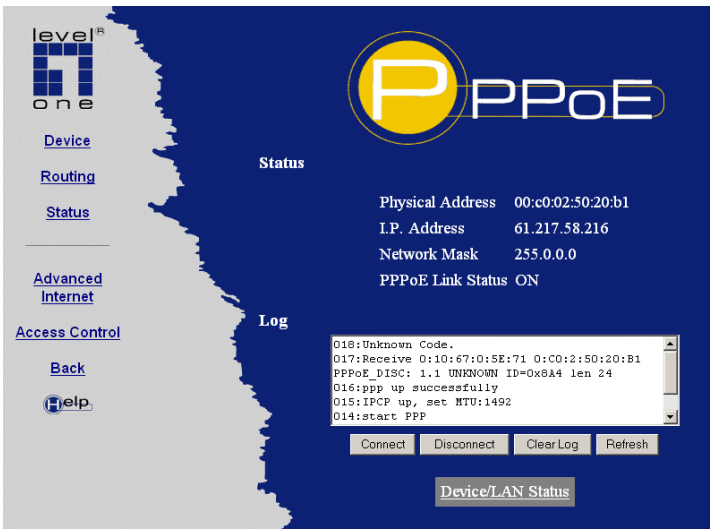

Figure 11: WAN Status - PPPoE

Data

Physical Address	The hardware address of this device.
IP Address	The IP Address of this device, as seen by devices on the WAN. (This device has 2 IP Addresses; one for the local LAN, and another for the WAN port.)

Network Mask	The Network Mask (Subnet Mask) for the IP Address above.
PPPoE Link Status	This indicates whether or not the connection is currently established. If the connection does not exist, the ***Connect*** button can be used to establish a connection. If the connection currently exists, the ***Disconnect*** button can be used to break the connection.

Log

- The Connection Log shows status messages relating to the existing connection.
- The most common messages are listed in the table below.
- The ***Clear Log*** button will restart the Log, while the ***Refresh*** button will update the messages shown on screen.

Message	Description
Connect on Demand	Connection attempt has been triggered by the "Connect on Demand" setting.
Manual connection	Connection attempt started by the "Connect" button.
Reset physical connection	Preparing line for connection attempt.
Connecting to remote server	Attempting to connect to the the ISP's server.
Remote Server located	ISP's Server has responded to connection attempt.
Start PPP	Attempting to login to ISP's Server and establish a PPP connection.

PPP up successfully	Able to login to ISP's Server and establish a PPP connection.
Idle time-out reached	The connection has been idle for the time period specified in the "Idle Time-out" field. The connection will now be terminated.
Disconnecting	The current connection is being terminated, due to either the "Idle Time-out" above, or "Disconnect" button being clicked.
Error: Remote Server not found	ISP's Server did not respond. This could be a Server problem, or a problem with the link to the Server.
Error: PPP Connection failed	Unable to establish a PPP connection with the ISP's Server. This could be a login problem (name or password) or a Server problem.
Error: Connection to Server lost	The existing connection has been lost. This could be caused by a power failure, a link failure, or Server failure.
Error: Invalid or unknown packet type	The data received from the ISP's Server could not be processed. This could be caused by data corruption (from a bad link), or the Server using a protocol which is not supported by this device.

Buttons and Links

- **Connect** - If not connected, establish a connection to your ISP.
- **Disconnect** - If connected to your ISP, hang up the connection.
- **Clear Log** - Delete all data currently in the Log. This will make it easier to read new messages.
- **Refresh** - Contact this device and update the Log data.
- **Device/LAN Status** - Use this link to jump to the "Device/LAN Status" screen.

Device/LAN Status Screen

The ***Device/LAN Status*** screen can be reached via the *Device/LAN status* hyperlink on the ***WAN Status*** screen. An example screen is shown below.

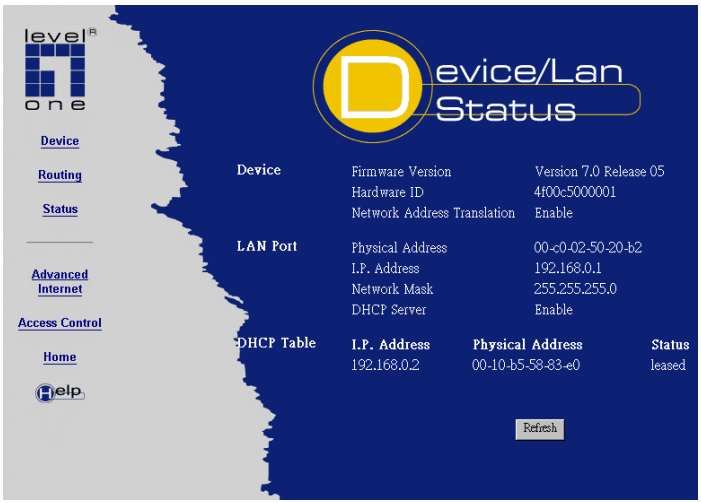

Figure 12: Status Screen

Device

Firmware Version	Version of the firmware (embedded software, including this program) which is currently installed.
Hardware ID	The hardware ID of this device, used by the manufacturer.
Network Address Translation	This will display "Enabled" or "Disabled".

LAN Port

Physical Address	The "Hardware" address of this device, as seen by other devices on the Internal LAN.
IP Address	The IP Address of this device, as seen by other devices on the Internal LAN.
Network Mask	The Network Mask (Subnet Mask) for the IP Address above.
DHCP Server	This shows the status of the DHCP Server function. The value will be "Enabled" or "Disabled".

DHCP Table

This table will be empty unless the DHCP Server function is being used. If it is being used, this table lists the devices on the local LAN which have been allocated IP Addresses by the DHCP server function. Only IP Addresses in use will be listed.

IP Address	The IP Address which has been allocated by the DHCP server to the other device.
Physical Address	The Physical Address (Hardware Address) of the device which has been allocated a IP Address.
Status	Possible Status values are "Leased" (the IP Address is allocated to the device shown) or "Reserved" (the IP Address is not available).

Chapter 4
PC Configuration

This Chapter details the PC Configuration required on the local ("Internal") LAN.

Overview

For each PC, the following needs to be checked and configured if necessary.

- TCP/IP
- Internet Access

TCP/IP Settings

To check your PC's TCP/IP Settings:

1. Select *Control Panel - Network*. You should see a screen like the following:

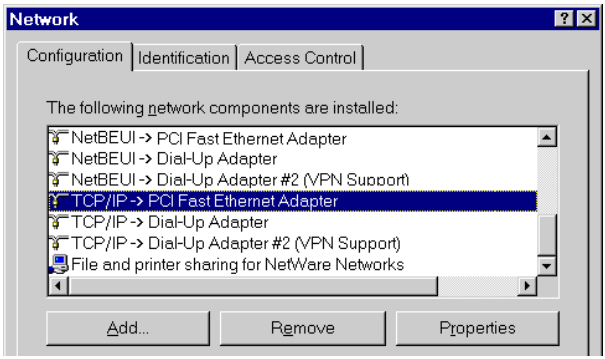

Figure 13: Network Configuration

2. Select the *TCP/IP* protocol for your network card.

3. Click on the *Properties* button. You should then see a screen like the following.

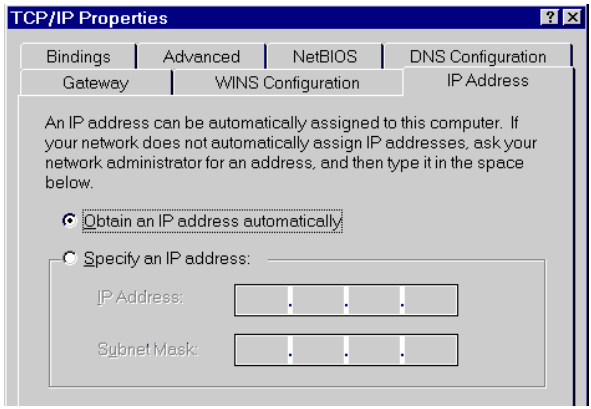

Figure 14: IP Address (Win 95)

The correct TCP/IP will vary according to your situation, as explained in the following sections.

If you have a Router

If your LAN contains 1 or more Routers, do NOT change any TCP/IP settings on your PCs unless advised to do so by your LAN Administrator.

*The Router itself must be configured. Refer to **Chapter 6 - Routing** for details.*

Using DHCP

- If you are already using DHCP, the radio button *Obtain an IP Address automatically* (in Figure 14) will be checked, and no changes are required.
- If you already have a DHCP Server, the LAN Administrator should check the DHCP Server configuration, as described in *Checking your DHCP Server* on page 40. Also, the DHCP Server function in the LevelOne Broadband Router should be turned OFF. This setting is on the *Internal LAN Port* screen.
- If you were not using DHCP, but now wish to do so, click on the radio button "Obtain an IP address automatically" (as in Figure 14). For more details, refer to *Using the* DHCP Server on page 41.

No Router, no DHCP

If **your LAN is NOT using DHCP** and **does NOT contain a router,** check the following settings for each PC:

IP Address

Ensure that the IP Address for each PC is unique, and is from the same address range as the LevelOne Broadband Router's *Device IP Address*, as set on the *LAN Port* screen.
For example, if the LevelOne Broadband Router uses the default IP Address (192.168.0.1) and Network Mask (255.255.255.0), the PCs must use addresses from 192.168.0.2 to 192.168.0.254.

Network Mask

All PCs, and the LevelOne Broadband Router, need to be using the same value for the *Network Mask*. The default value is 255.255.255.0. On the LevelOne Broadband Router, this value is set on the *LAN Port* screen.

Gateway

Set the *Default Gateway Address* to the LevelOne Broadband Router's IP address (*Device IP Address*, as set on the *LAN Port* screen). The default IP Address is 192.168.0.1.

DNS (Domain Name Server) Address

This should match the DNS address entered into the *DNS IP Address* field on the *LAN Port* screen.

Internet Access

If you are using the LevelOne Broadband Router, for Internet access:

- Ensure that the DSL modem, Cable modem, or other permanent connection is functional.
- Use the following procedure to configure your Browser and E-Mail client to access the Internet via the LAN, rather than by a Dial-up connection.

1. Select *Start Menu - Settings - Control Panel - Internet Options*.
2. Select the *Connection* tab, and click the *Setup* button.
3. Select "I want to set up my Internet connection manually, or I want to connect through a local area network (LAN)" and click "Next".
4. Select "I connect through a local area network (LAN)" and click "Next".
5. Ensure all of the boxes on the following *Local area network Internet Configuration* screen are **unchecked**.
6. Check the "No" option when prompted “Do you want to set up an Internet mail account now?”.
7. Click "Finish" to close the Internet Connection Wizard.
8. Then simply use your Browser, FTP client, or other Internet client to connect to the desired Internet site.

Accessing AOL

To access AOL (America On Line) through the LevelOne Broadband Router, the *AOL for Windows* software must be configured to use TCP/IP network access, rather than a dial-up connection. The configuration process is as follows:

- Start the *AOL for Windows* communication software. Ensure that it is Version 2.5, 3.0 or later. This procedure will not work with earlier versions.
- Click the *Setup* button.
- Select *Create Location*, and change the location name from "New Locality" to " LevelOne Broadband Router ".
- Click *Edit Location*. Select *TCP/IP* for the *Network* field. (Leave the *Phone Number* blank.)
- Click *Save*, then *OK*.
  Configuration is now complete.
- Before clicking "Sign On", always ensure that you are using the " LevelOne Broadband Router " location.

Chapter 5
DHCP

This Chapter covers the use of DHCP, using either an existing DHCP Server or the LevelOne Broadband Router's DHCP Server function.

Overview

If your (internal) LAN does not use DHCP, and you do not wish to use DHCP, you can ignore this chapter.

What DHCP Does

A DHCP (Dynamic Host Configuration Protocol) **server** allocates a valid IP address to a DHCP **client** (PC or device) upon request.

- The client request is normally made when the client device boots.
- The DHCP Server provides the *Gateway* and *DNS* addresses to the client, as well as allocating an IP Address.
- Windows 95 includes all the software required to act as a DHCP **client**.
- The LevelOne Broadband Router can act as a **DHCP server**.

Checking if your PC uses DHCP

Under Windows 95, you can check if your PC is acting as a DHCP client by using the following procedure. For other operating systems, check your system documentation.

1. Select *Control Panel - Network*. You should see a screen like the following:

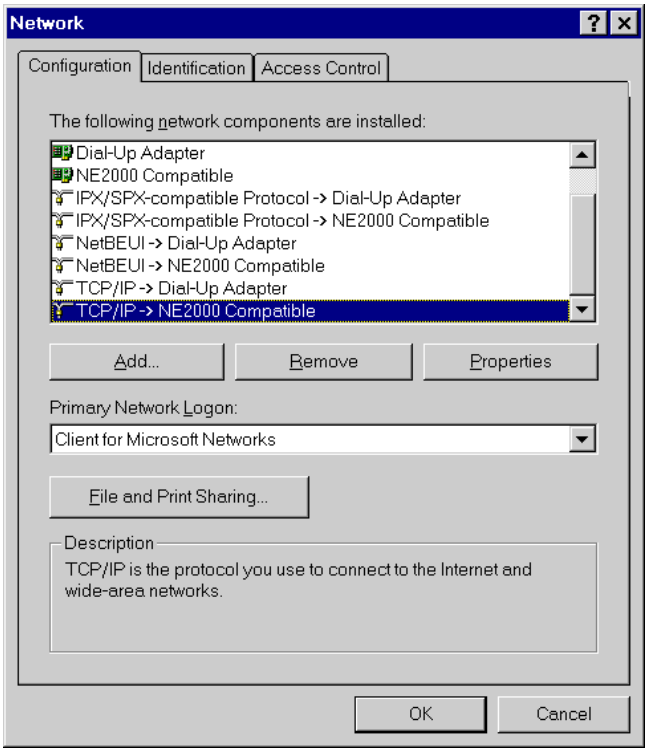

Figure 15: Network Configuration

2. Select the TCP/IP protocol for your network card.

3. Click on the Properties button. You should then see a screen like the following.

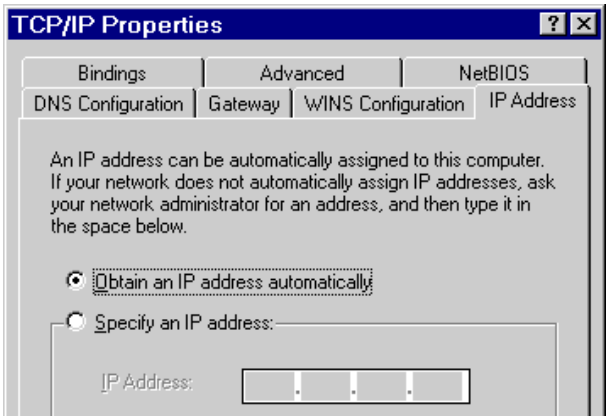

Figure 16: IP Address (Win 95)

4. If the radio button for "Obtain an IP address automatically" is checked, as shown above, then your PC is acting as a DHCP client.

Checking your DHCP Server

If you already have a DHCP Server:

- Check that the DHCP Server function in the LevelOne Broadband Router is ***Disabled***. This setting is on the *LAN Port* screen.
- Check your DHCP Server, and ensure that:
  - ***IP Address*** assigned to LevelOne Broadband Router (*Device IP Address*, set on the *LAN Port* screen) is compatible with the Address range used by the DHCP Server.
  - ***Network Mask*** matches the value entered on the LevelOne Broadband Router's *LAN Port* screen.
  - ***DNS IP Address*** matches the value entered on the LevelOne Broadband Router's *LAN Port* screen.
  - ***Gateway*** is set correctly. This depends on whether or not you have a router installed on your LAN, as shown by the following table.

No Router	Set the *Default Gateway Address* to the IP address (*Device IP Address*, set on the *LAN Port* screen) assigned to the LevelOne Broadband Router. The default IP Address is 192.168.0.1.
Router	Do not change the *Default Gateway Address*. Instead, the router must be configured as explained in *Chapter 6 - Routing*.

Using the DHCP Server

To use the LevelOne Broadband Router's built-in DHCP Server function:

- Ensure that the LevelOne Broadband Router's *DHCP Server* is **Enabled**, and the other DHCP data is correct. (Check the *Internal LAN Port* screen).
- Configure your PCs to act as DHCP clients, as described below.

To configure your PCs to use DHCP

Your PCs must be configured to act as DHCP clients. For Windows 95, the procedure is detailed below. For other operating systems, check your system documentation.

Windows 95 DHCP Client Setup

1. Select *Control Panel - Network*. You should see a screen like the following:

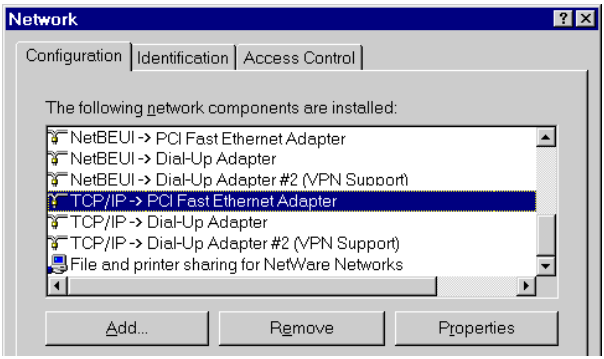

Figure 17: Network Configuration

2. Select the *TCP/IP* protocol for your network card.
3. Click on the *Properties* button. You should then see a screen like the following.

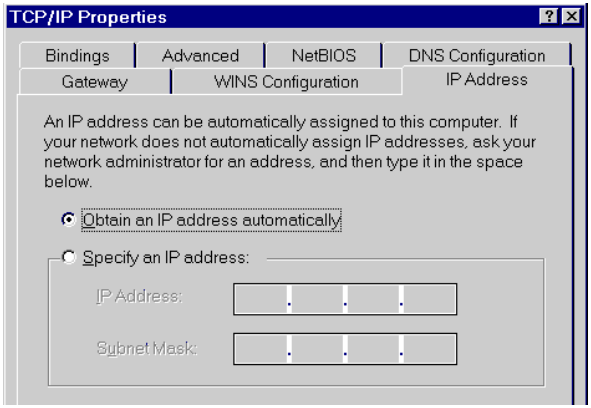

Figure 18: IP Address (Win 95)

4. Click on the radio button "Obtain an IP address automatically", as shown above. This sets the DHCP client ON.

To reserve an IP Address for a particular DHCP client, so that it always receives the same IP Address, refer to ***Workstations*** *on page 69.*

Chapter 6
Routing

This Chapter explains the Routing features of the LevelOne Broadband Router.

Overview

While the LevelOne Broadband Router includes a standard (static) routing table, this feature can be completely ignored if you do not have a router in your LAN.

If you DO have a router, it is necessary to configure BOTH the Router and the Routing table in the LevelOne Broadband Router correctly, as described in the following sections.

See page 47 for an example of configuring both the LevelOne Broadband Router and the Router.

LevelOne Broadband Router Configuration

The routing table is accessed by the *Routing* link on the navigation bar. An example screen is shown below.

Figure 19: Routing Screen

Routing Table Data

An entry in the routing table is required for each LAN segment on your Network, other than the segment to which this device is attached. The data in the Routing Table is as follows.

Destination IP Address	The network address of the remote LAN segment. For standard class "C" LANs, the network address is the first 3 fields of this *Destination IP Address*. The 4th (last) field can be left at 0.

Network Mask	The Network Mask used on the remote LAN segment. For class "C" networks, the standard Network Mask is 255.255.255.0
Gateway IP Address	The IP Address of the Router on the LAN segment to which this device is attached. (NOT the router on the remote LAN segment.)
Interface	Select the appropriate interface - LAN (Internal LAN) or WAN from the drop-down list.
Metric	The number of routers which must be traversed to reach the remote LAN segment. The default value is 1.

Router Configuration

It is essential that all IP packets for devices not on the local LAN be passed to the LevelOne Broadband Router, so that they can be forwarded to the Internet. To achieve this, the local LAN must be configured to use the LevelOne Broadband Router as the *Default Route* or *Default Gateway*.

Local Router

The local router is the Router installed on the same LAN segment as the LevelOne Broadband Router. This router requires that the *Default Route* is the LevelOne Broadband Router itself. Typically, routers have a special entry for the *Default Route*. It should be configured as follows.

Destination IP Address	Normally 0.0.0.0, but check your router documentation.
Network Mask	Normally 0.0.0.0, but check your router documentation.

Gateway IP Address	The IP Address of the LevelOne Broadband Router.
Metric	1

Other Routers on the Local LAN

Other routers on the local LAN must use the LevelOne Broadband Router's *Local Router* as the *Default Route*. The entries will be the same as the LevelOne Broadband Router's local router, with the exception of the *Gateway IP Address*.

- For a router with a direct connection to the LevelOne Broadband Router's local Router, the *Gateway IP Address* is the address of the LevelOne Broadband Router's local router.
- For routers which must forward packets to another router before reaching the LevelOne Broadband Router's local router, the *Gateway IP Address* is the address of the intermediate router.

Routing Example

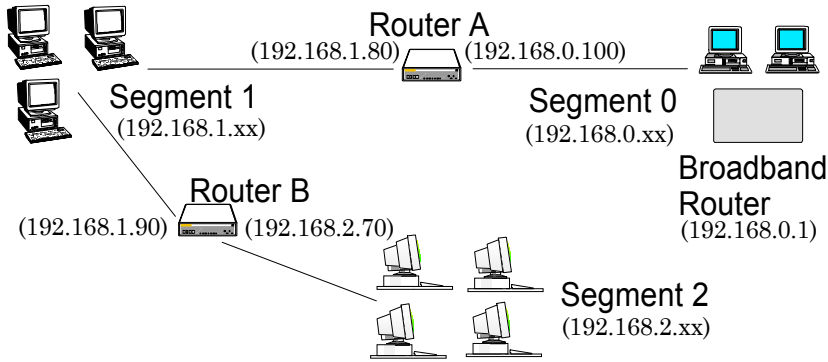

Figure 20: Routing Example

For the LAN shown above, with 2 routers and 3 LAN segments, the required entries would be as follows.

For the LevelOne Broadband Router's Routing Table

The LevelOne Broadband Router requires 2 entries as follows.

Entry 1 (Segment 1)	
Destination IP Address	192.168.1.0
Network Mask	255.255.255.0 (Standard Class C)
Gateway IP Address	192.168.0.100 (LevelOne Broadband Router's local Router)
Entry 2 (Segment 2)	
Destination IP Address	192.168.2.0
Network Mask	255.255.255.0
Gateway IP Address	192.168.0.100

For Router A's Default Route

Destination IP Address	0.0.0.0
Network Mask	0.0.0.0
Gateway IP Address	192.168.0.1 (LevelOne Broadband Router's IP Address)

For Router B's Default Route

Destination IP Address	0.0.0.0
Network Mask	0.0.0.0
Gateway IP Address	192.168.1.80 (LevelOne Broadband Router's local router)

Chapter 7
Device Options

This Chapter details the options available on the LevelOne Broadband Router's "Device Options" screen.

Overview

The *Device* screen is reached by selecting the *Device* on the navigation bar, then *Device Options*

The options available on this screen are:

- Password
- NAT (Network Address Translation)

An example screen is shown below.

Figure 21: Device Options Screen

Device Password

Once a password is entered, it is required in order to change the device configuration. Passwords are case sensitive and can be up to 8 alphanumeric characters (no spaces or punctuation).

To create or change the password, enter the required password in both the *New Password* and *Verify Password* input fields.

When prompted for the password, leave the "User Name" blank.

If the password is lost, a DIP switch setting is available to clear the password. See the DIP Switch table on page 7 for details.

NAT (Network Address Translation)

NAT allows PCs on your LAN to use a local (internal) IP Address which is invalid on the Internet NAT ensures that the local IP Addresses are invisible to external sources. Use the following to determine whether or nor you need NAT.

- If using this device for Internet access, NAT **must be left On** unless PCs on your LAN have valid external IP Addresses.
- If this device is not being used to provide shared Internet access, NAT is not normally required.
- If NAT is disabled, the LevelOne Broadband Router will act as a static router, and the *Advanced Internet* features (Virtual Servers, Special Applications, and Exposed Computer) are no longer available.
- If NAT is disabled, the Firewall protection provided by the LevelOne Broadband Router is lost.

Chapter 8
Advanced Internet

This Chapter explains how to use the LevelOne Broadband Router's "Advanced Internet" features.

Overview

For situations where the LevelOne Broadband Router is being used to provide shared Internet access, the following advanced features are provided.

- Special Applications
- Virtual Servers
- Exposed Computer

This chapter contains details of the configuration and use of each of these features.

Advanced Internet Screen

This screen provides access to the advanced Internet features, and provides a convenient overview and control center. A sample screen is shown below.

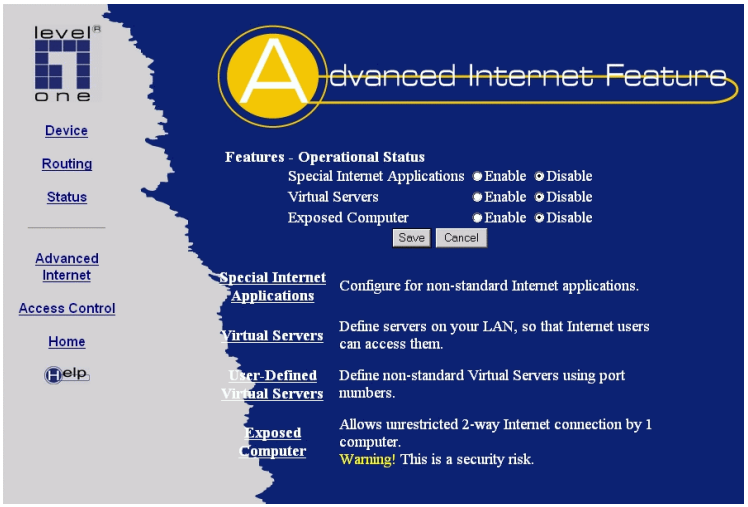

Figure 22: Advanced Internet Screen

On this screen, you can enable any required feature. By default, all features are disabled.

Special Applications

This feature is only required if you wish to use Internet applications which require 2-way communication, multiple connections, or combined TCP/UDP connections.

Examples of such applications are Internet Videoconferencing, Telephony, Games Servers, and other special-purpose Servers.

Generally, you will become aware of the need for this feature when an Internet application is unable to function correctly.

At any time, only one (1) PC can use each Special Application.

Special Applications Screen

This screen can be reached by selecting *Advanced Internet - Special Applications*. An example screen is shown below.

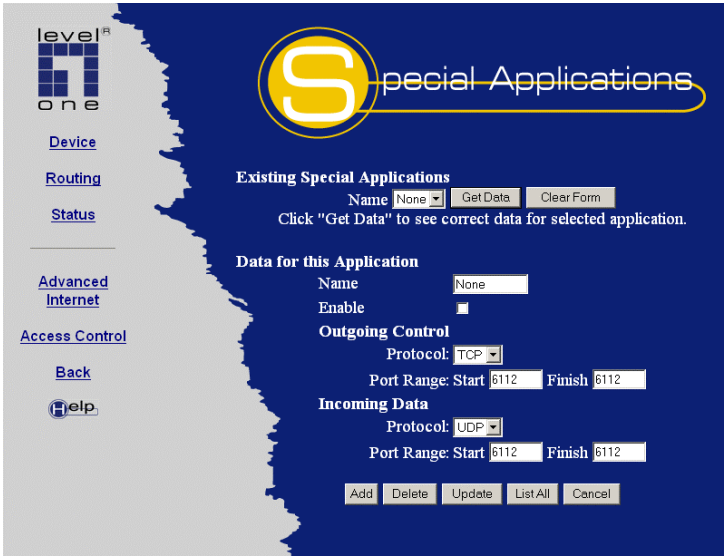

Figure 23: Special Applications Screen

Using a Special Application

- Ensure that *Special Applications* has been enabled on the *Advanced Internet* screen.
- Configure the *Special Applications* screen as required.

Configuration data must be obtained from the Service/Application provider.
If an application still cannot function correctly, try using the "Exposed Computer" feature.

Some Special Applications have been defined not enabled.

- **To Enable a defined Application**
  Select it from the drop-down list
  Click "Get Data"
  Check the *Enable* checkbox
  Click "Update"
- **To Disable a defined Application**
  As above, but uncheck the *Enable* checkbox.
- **To Delete a defined Application**
  Select it from the drop-down list,
  Click "Delete"
- **To Modify (Edit) a defined Application**
  Select it from the drop-down list,
  Click "Get Data"
  Make any desired changes
  Click "Update"
- **To Create a new Application**
  Click "Clear Form"
  Enter the required data, as described below
  Click "Add"
- **To List all Applications**
  Click "List All"

Configuration Data (from Service Provider)

This data must be obtained from the service provider.

Name	Enter a descriptive name to identify this application entry.
Enable	Use this to Enable or Disable support for this application, as required.
Outgoing Control	
Protocol	The protocol (TCP or UDP) used when you connect to the special application service.
Port Range: Start	The beginning of the range of port numbers used by the application server, for data you send to it. If the

	application uses a single port number, enter it in both the "Start" and "Finish" fields.
Port Range: Finish	The end of the range of port numbers used by the application server, for data you send.
Incoming Data	
Protocol	The protocol (TCP or UDP) used when the application or service sends data to you.
Port Range: Start	The beginning of the range of port numbers used by the application server when data is sent to you. If the application uses a single port number, enter it in both the "Start" and "Finish" fields.
Port Range: Finish	The end of the range of port numbers used by the application server, when data is sent to you.

Virtual Servers

This feature allows you to make a server on your LAN accessible to Internet users. Normally, Internet users would not be able to access a server on your LAN because:

- Your Server does not have a valid external IP Address.
- Attempts to connect to devices on your LAN are blocked by the firewall in this device.

The "Virtual Server" feature solves these problems and allows Internet users to connect to your servers, as illustrated below.

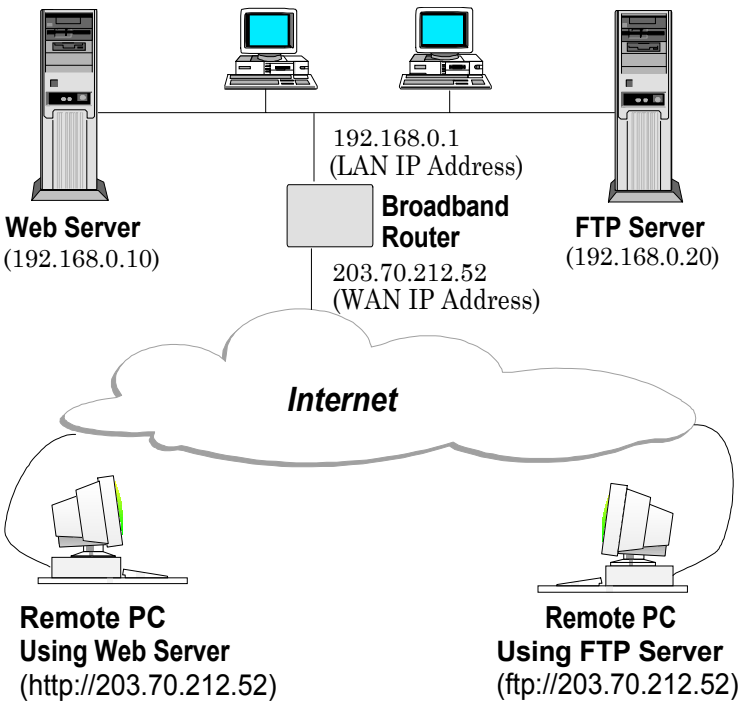

Figure 24: Virtual Servers

IP Address seen by Internet Users

Note that, in this illustration, both Internet users are connecting to the same IP Address, but using different protocols.

To Internet users, all virtual Servers on your LAN have the same IP Address.

This IP Address is the *IP Address* on the *WAN Port* screen. This address should be static, rather than dynamic, to make it easier for Internet users to connect to your Servers.

Types of Virtual Servers

The LevelOne Broadband Router, supports two (2) types of Virtual Servers:

- **Pre-defined** - Standard server types. The only data required is the IP Address of the server on your LAN.
- **User-defined** - Non-standard servers. You must provide additional information about the server.

Note that the TOTAL number of Virtual Servers which can be used is 10.

Virtual Server Configuration

The *Virtual Server* screen is reached by the *Advanced Internet - Virtual Server* link. An example screen is shown below.

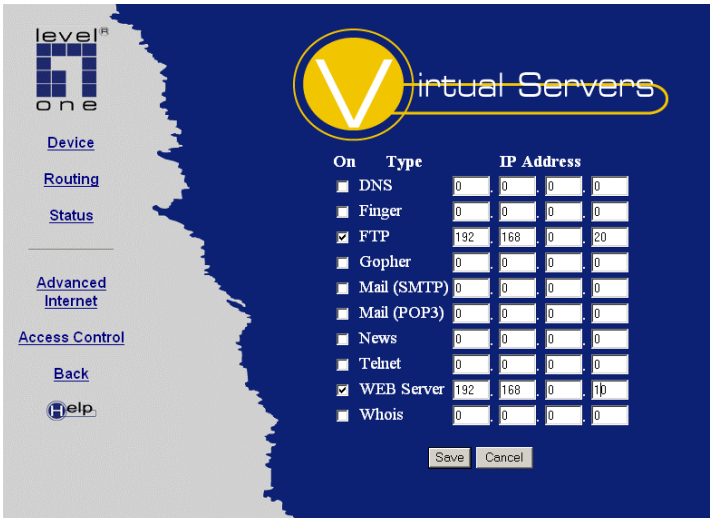

Figure 25: Virtual Server Screen.

Simply select the Server type or types you wish to use, enter the IP Address of the server on your LAN, and click "Save".

User Defined Virtual Servers

If the type of Server you wish to use is not listed on the *Virtual Server* screen, you can define it using this feature.

The screen for this function is reached by selecting *Advanced Internet - User Defined Virtual Servers*. An example screen is shown below.

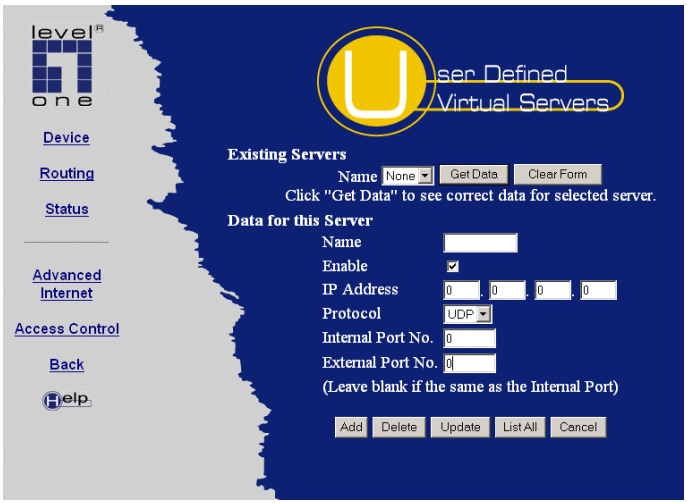

Figure 26: User Defined Virtual Servers

This database operates in the same way as the other databases:

- **To Create a new Server**
  Click "Clear Form"
  Enter the required data (See next section)
  Click "Add"
- **To Modify (Edit) a defined Server**
  Select it from the drop-down list,
  Click "Get Data"
  Make any desired changes. Note that you can "Enable" and "Disable" a Server using this process.
  Click "Update"

- **To Delete a defined Server**
  Select it from the drop-down list,
  Click "Delete"
- **To List all Servers**
  Click "List All"

Configuration Data

Name	Enter a descriptive name to identify this Server entry.
Enable	Use this to Enable or Disable support for this Server, as required.
IP Address	The IP Address of the PC on your LAN which is running the Server software.
Protocol	Select the protocol (TCP or UDP) used by the Server.
Internal Port Number	Enter the port number used by the Server to connect to clients.
External Port Number	The port number used by clients when connecting to the Server. This is normally the same as the *Internal Port Number*. If it is different, this device will perform a "mapping" or "translation" function, allowing you to configure the server to use one port address, while clients use a different port address

Connecting to the Virtual Servers

Once configured, anyone on the Internet can connect to your Virtual Servers. They must enter the IP Address shown in the *IP Address* on the *WAN Port* screen as the destination.
e.g.

```
http://203.70.212.52
```

Using this Device as a Virtual Web Server

It is possible to configure the LevelOne Broadband Router itself as a Virtual Web Server. Once this is done, you can configure this device through the Internet.

For the remote PC, the destination IP Address is the *IP Address* shown on the *WAN Port* screen.
Upon connecting to the LevelOne Broadband Router, you will be prompted for the device password.

Ensure that a password has been set!

To make the LevelOne Broadband Router a *Virtual Web Server*:

- Enable *Virtual Server* on the *Advanced Internet* screen
- Enable *Web Server* on the *Virtual Servers* screen.
- Enter the *Device IP Address* (from the *Internal LAN Port* screen) as the IP Address of the Web Server.

Exposed Computer

This feature, if enabled, allows one (1) computer on your LAN to be exposed to all users on the Internet, allowing unrestricted 2-way communication between the "Exposed Computer" and other Internet users or Servers.

- Internet users will see the PC as having the *IP Address* shown on the *WAN Port* screen of this device. (This is the same IP Address used by the Virtual Servers.)
- Any Internet user who knows this address can connect to the *Exposed Computer*. (What happens after connection depends on what software both computers are using).

This allows connection to special-purpose servers which require proprietary client software, or 2-way user connections such as Video-conferencing, which requires both users to run special software.

To allow unrestricted access, the Firewall in this device is disabled, creating a security risk.

- **You should use this feature only if the "Special Applications" feature is insufficient to allow an application to function correctly.**
- **This feature should be turned ON only when needed, and left OFF the rest of the time.**

Configuring the Exposed Computer

Select *Advanced Internet* from the navigation bar, then *Exposed Computer*. You will see a screen like the following:

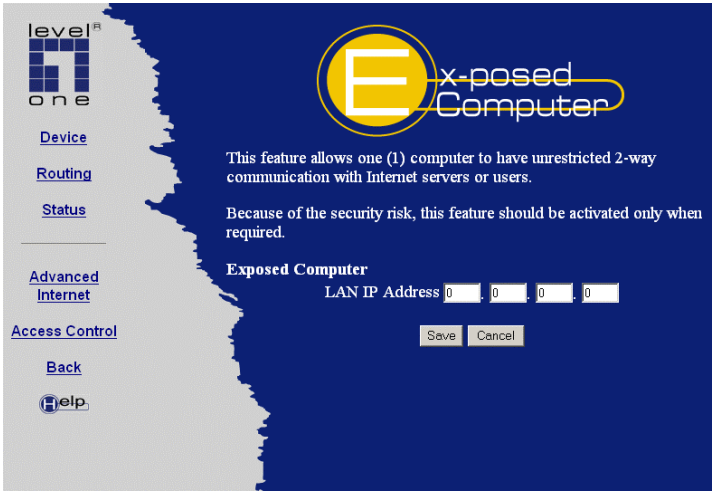

Figure 27: Exposed Computer Screen

Data

The only data required is the *LAN IP Address*. Enter the IP Address of the PC on your LAN which will become the "Exposed Computer".

Checking

Once configured and enabled, the *Exposed Computer* should respond to a "ping" from any PC connected to the Internet. The "ping" command can be entered in the *Run* dialog, as follows:

```
ping ip_address
```

Where `ip_address` is the *IP Address* shown on the *WAN Port* screen of this device.

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Chapter 9
Access Control

This Chapter explains how to configure and use the LevelOne Broadband Router's "Access Control" feature.

Overview

The Access Control feature allows administrators to restrict Internet Access by individual workstations. The process uses "Packet Filtering" to block or discard data packets. By default, no packets are blocked or discarded.

To use this feature:

- Set the desired restrictions on the "Everyone" group. By default, all PCs are in the "Everyone" group unless explicitly moved to another group, using the *Workstation* screen.
- Set the desired restrictions on the other groups ("Group 1", "Group 2", etc) as needed.
- For each Workstation you wish to move from the "Everyone" group, enter their details on the *Workstation* screen, and assign them to the desired group

You can limit Internet access for ALL PCs without entering ANY workstation data. Simply apply the desired restrictions to the "Everyone" group.

It is also possible to define your own packet filters, and use these filters in addition to the pre-defined filters. Defining your own filters is optional.

Security Groups

The *Security Groups* screen is reached from the *Access Control* link on the navigation bar. An example screen is shown below.

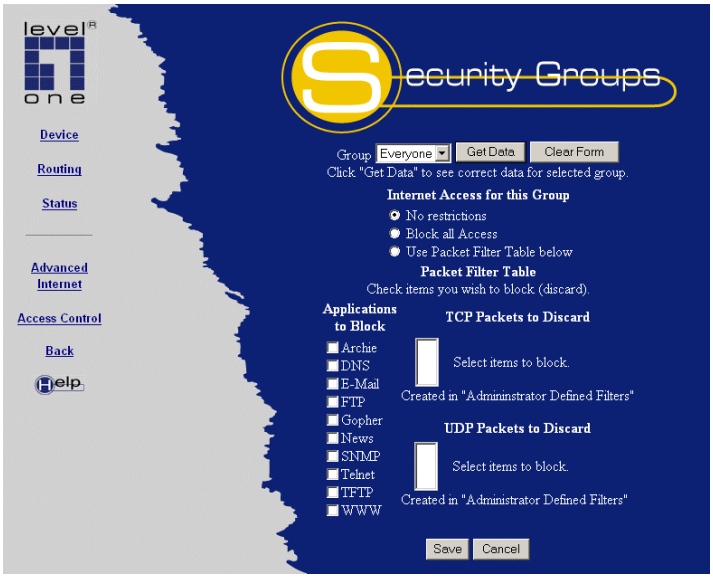

Figure 28: Security Groups Screen

Note that the Security groups are pre-named "Everyone", "Group 1", "Group 2", "Group 3", and "Group 4".

Operations

- **To Define a Security Group:**
  Select the group from the drop-down box, then enter the required data. If necessary, click *Clear Form* to remove the existing information shown on screen.
  Click the *Save* button when finished.
- **To Change Access for an Existing Group**:
  Select the group from the drop-down box, click *Get Data* to view

their information, then change any fields you wish.
Click *Save* when finished.

- **To Assign Workstations to a Security Group**
  All Workstations are automatically in the "Everyone" group. Use the *Workstations* screen to move them to another group if required.

Data

The following data is required.

Internet Access for this Group

There are 3 options:

- **No restrictions** - No packets are blocked. Use this to create an "Unlimited Access" group, or to temporarily remove restrictions from a group.
- **Block all Access** - Groups members cannot access the Internet at all. Use this to create the most restrictive group.
- **Use Packet Filter Table below** - Use this to define intermediate levels of access. Using the Packet Filter table gives you fine control over Internet access.

Packet Filter Table

Simply select the items you wish to block. You can choose from the pre-defined filters in the *Applications to Block* column, or your own filters in the *TCP Packets to Discard* and *UPD Packets to Discard* column.

Applications to Block	Any items checked will be blocked. Users will not be able to use the application.
TCP Packets to Discard	This lists any TCP filters you have defined on the *Administrator Defined Filters* screen. If no filters have been defined, this is empty. Multiple items can be selected (or deselected) by holding down the Ctrl key while selecting items. Selected items can NOT be accessed by members of this group.
UDP Packets to Discard	This lists any UDP filters you have defined on the *Administrator Defined Filters* screen. If no filters have been defined, this is empty. Multiple items can be selected (or deselected) by holding down the Ctrl key while selecting items. Selected items can NOT be accessed by members of this group.

If you have not defined your own filters, but wish to do so, refer to "Administrator Defined Filters" on page 74.

Workstations

The *Workstations* screen is reached from the *Access Control* link on the navigation bar. An example screen is shown below.

Figure 29: Workstations Screen

Note that the drop-down box lists all Workstations previously entered. If none have been entered, this box will be empty.

Operations

- **To Add a New Workstation**:
  Ignore the drop-down box, click the *Clear Form* button, and enter the Workstation details in the fields provided.
  Click *Add* when finished.
- **To Delete an Existing Workstation:**
  Select the Workstation from the drop-down box, click *Get Data* to view the information and confirm that this is the correct Workstation, then click the *Delete* button.

- **To Change an Existing Workstation's Details**:
  Select the Workstation from the drop-down box, click *Get Data* to view their information, then change any fields you wish.
  Click *Update* when finished.
- **To Generate a List of all Workstations:**
  Just click on the *List All* button.

Data

Workstation Name	Enter a name to identify this workstation.
Network Adapter Address	Hardware address for this workstation. You can use the Windows "Winipcfg" program or your LAN management program to find this address.
Reserve entry in DHCP Table	Check this if you wish to reserve an IP address for this workstation. This is useful if you have to provide the IP Address for other programs or users. If this is left unchecked, the following entry can be ignored.
Reserved IP Address	This relates to the entry above. Enter the reserved address here. This MUST be within the range used by the DHCP server (set on the *Device - Internal LAN Port* screen).
Security Group	Select the security group for this workstation. If you only wish to reserve an IP Address, and are not using the security (access control) features, simply leave this at "Everyone".

Administrator Defined Filters

The *Administrator Defined Filters* screen is reached from the *Access Control* link on the navigation bar. An example screen is shown below.

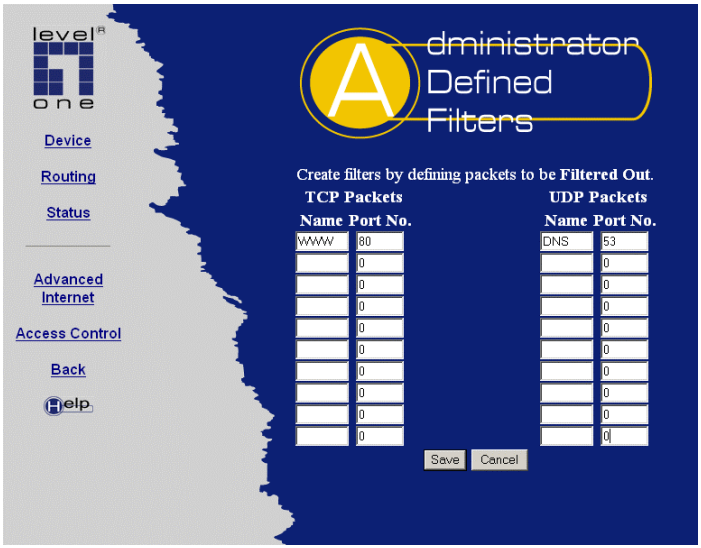

Figure 30: Administrator Defined Filters

This screen allows you to define packet filters. When you define security groups, on the "Security Groups" screen, you can select from any filters defined here, as well as the pre-defined filters.

Data

TCP Packets

Define the packets you wish to be filtered out, by entering the following data.

Name	Enter a descriptive name for this entry.
Port No.	Enter an integer representing the Port Number for this type of packet. A Network Analyzer or Packet Sniffer can be used to determine the correct port number.

UDP Packets

Define the packets you wish to be filtered out, by entering the following data.

Name	Enter a descriptive name for this entry.
Port No.	Enter an integer representing the Port Number for this type of packet. A Network Analyzer or Packet Sniffer can be used to determine the correct port number.

Appendix A
Troubleshooting

This Appendix covers the most likely problems and their solutions.

Overview

This chapter covers some common problems that may be encountered while using the LevelOne Broadband Router and some possible solutions to them. If you follow the suggested steps and the LevelOne Broadband Router still does not function properly, contact your dealer for further advice.

General Problems

Problem 1: Can't connect to the LevelOne Broadband Router to configure it.

Solution 1: Check the following:

- The LevelOne Broadband Router is properly installed, LAN connections are OK, and it is powered ON.
- Ensure that your PC and the LevelOne Broadband Router are on the same network segment. (If you don't have a router, this must be the case.)
- If your PC is a *DHCP Client* (set to obtain an IP Address automatically), restart it so it will obtain an IP Address from the LevelOne Broadband Router.

- If your PC uses a Fixed IP Address, ensure that your PC is using an IP Address within the range 192.168.0.2 to 192.168.0.254 and thus compatible with the LevelOne Broadband Router's default IP Address of 192.168.0.1.
  Also, the Network Mask should be set to 255.255.255.0 to match the LevelOne Broadband Router.
  In Windows, you can check these settings by using *Control Panel-Network* to check the *Properties* for the TCP/IP protocol.

Internet Access

Problem 1: When I enter a URL or IP address I get a time out error.

Solution 1: A number of things could be causing this. Try the following troubleshooting steps.

- Check if other PCs on your LAN work. If they do, ensure that your workstations IP settings are correct (IP address, Network Mask, Default gateway and DNS).
- If the PCs are configured correctly, but still not working, check the LevelOne Broadband Router. Ensure that it is connected and ON. Connect to it and check its settings. (If you can't connect to it, check the LAN and power connections.)
- If the LevelOne Broadband Router is configured correctly, check your Internet connection (DSL/Cable modem etc) to see that it is working correctly.

Problem 2: Some applications do not run properly when using the LevelOne Broadband Router.

Solution 2: The LevelOne Broadband Router processes the data passing through it, so it is not transparent.

Use the *Special Applications* feature to allow the use of Internet applications which do not function correctly. Note that at any time, only one (1) PC can use each Special Application.

If this does solve the problem you can use the *Exposed Computer* function. This should work with almost every application, but:

- It is a security risk, since the firewall is disabled.

- Only one (1) PC can use this feature.
- When the *Exposed Computer* feature is being used, the *Special Applications* and *Virtual Server* features should be disabled.

Appendix B
Specifications

LevelOne Broadband Router

Model No.:	LevelOne FBR-1100TX 1 Port BroadBand Router
Dimensions	120mm(W) * 93mm(D) * 30mm(H)
Operating Temperature	0° C to 40° C
Storage Temperature	-10° C to 70° C
Network Protocol:	TCP/IP
Network Interface:	2 Ethernet: 1 * 10/100BaseT (RJ45) 1 * 10BaseT (RJ45)
LEDs	4
External Power Adapter	12 V DC