

IBR650

PRODUCT MANUAL

CradlePoint COR Integrated Broadband Router
Hardened for Machine to Machine

with VPN Support



for additional information, visit:

knowledgebase.cradlepoint.com

Preface

CradlePoint reserves the right to revise this publication and to make changes in the content thereof without obligation to notify any person or organization of any revisions or changes.

Manual Revisions

Revision	Date	Description	Author
1.0	Sept. 13, 2011	Initial release for Firmware version 3.3.0	Jeremy Cramer

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1 INTRODUCTION

1.1 Package Contents

- CradlePoint COR: Integrated Broadband Router (IBR650) with embedded high-speed 3G EV-DO rev A modem
- Two external 3G EV-DO modem antennas
- AC power adapter (12V, 1.5A)
- Mounting Hardware
- Quick Start Guide

1.2 System Requirements

- Either an active subscription for the embedded 3G EV-DO modem or an Ethernet-based modem.
- Windows 2000/XP/7, Mac OS X, or Linux Computer.
- Internet Explorer v6.0 or higher, Firefox v2.0 or higher, Safari v1.0 or higher.

1.3 IBR650 Overview

COR: THE HEART OF YOUR M2M NETWORK

- For use in business critical high-availability installations such as ATMs, Kiosks, Surveillance, Vehicles, etc. that require 24x7 connectivity
- Increase your network availability with WiPipe™-powered automatic failover/failback internal functionality
- Supports both wireless and wired Internet connections (two Ethernet ports for either LAN/LAN or WAN/LAN)
- Secure IPsec VPN (5 concurrent sessions maximum)
- Centralize the administration and monitoring of distributed routers using WiPipe Central.

ADDITIONAL FEATURES

- Standardized platform and centralized remote management
- Built-in GPS
- IP passthrough
- Up to 5 concurrent VPN endpoint sessions
- Compatible with Cisco, Juniper, SonicWall, and other VPN termination systems
- Establish continuous uptime with optimum total cost of ownership for broad deployment
- Simple to install, configure and maintain with minimal impact on IT
- Virtual LAN capabilities
- Data Usage section that allows users to track and manage modem use relative to data plans
- NAT-less routing
- VPN NAT traversal

The CradlePoint IBR650E is a highly-featured, compact and robust router designed for deployment in critical business and enterprise applications that require 24x7 connectivity via Ethernet. The router features a built-in high-speed 3G EV-DO modem as well as support for wired networks such as DSL or Cable. With its compact size, sleek metal case and mounting bracket, and external Cellular antennas the IBR650E is ideal for use in high-availability portable or fixed applications (ATM, kiosk, surveillance, vehicle). With failover/failback capability, the IBR650E supports wired and wireless internet.

The router increases internet availability and business continuity by detecting network failures and seamlessly switching over to the other network(s). It is also ideal for deployment as a primary connection solution where wired internet is not available. The IBR650E provides secure and reliable VPN functionality, allowing users to create, manage, and terminate up to 5 concurrent IPsec VPN sessions. It allows for secure access to company networks for enterprise applications and provides a secure way to transmit sensitive data to and from a remote site.

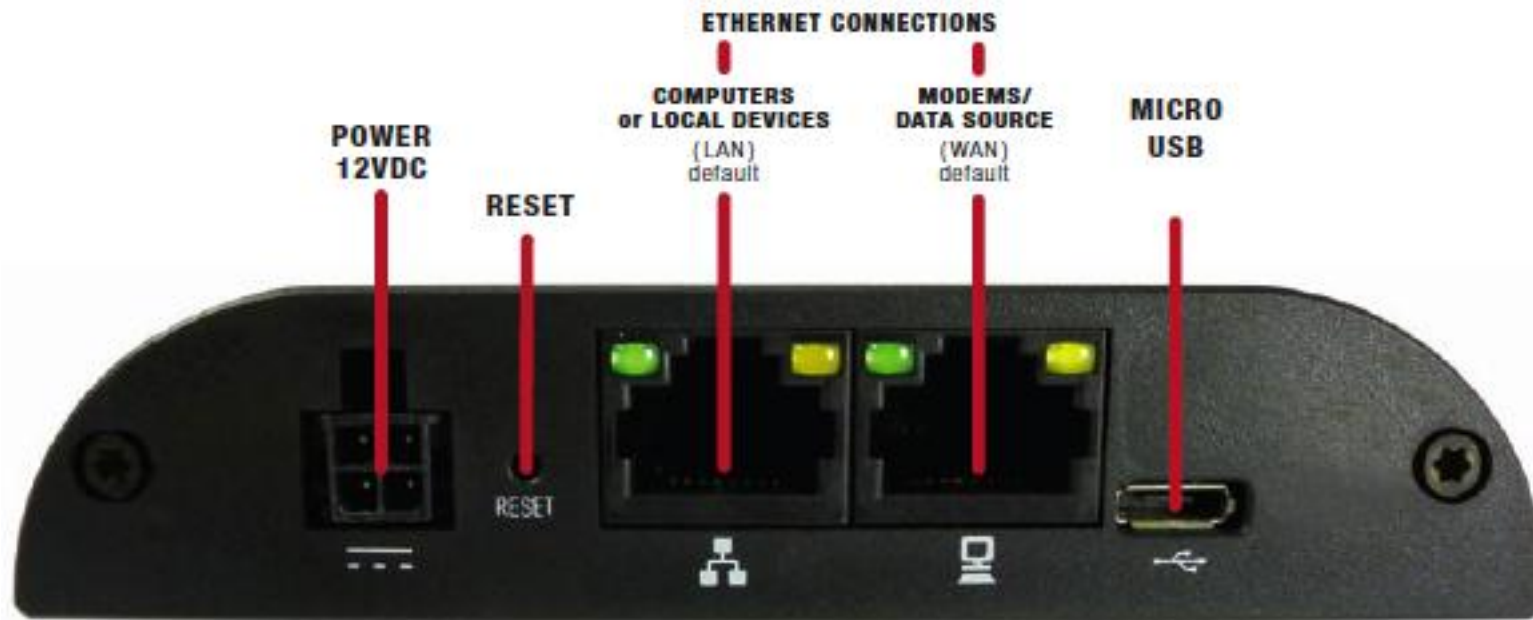
1.3.1 WiPipe Central

CradlePoint's cloud-based router management service allows for remote monitoring, configuration, and firmware updates of deployed routers like the IBR650. WiPipe Central drastically simplifies router administration for businesses using multiple routers. WiPipe Central can be purchased separately at <http://cradlepoint.com/support/wipipe-central>.

2 HARDWARE OVERVIEW



2.1 Ports, LEDs, and Switches



Power 12VDC: The power connector includes two pins for power and two pins for GPIO (General Purpose Input/Output) functionality. The included power adapter, however, only connects to the power pins. You will need a separate adapter for GPIO functionality.

Reset: You can return your router to factory default settings by pressing and holding the **Reset** button. This button is recessed, so it requires a pointed object such as a paper clip to press. Press and hold for 10 seconds to initiate reset.

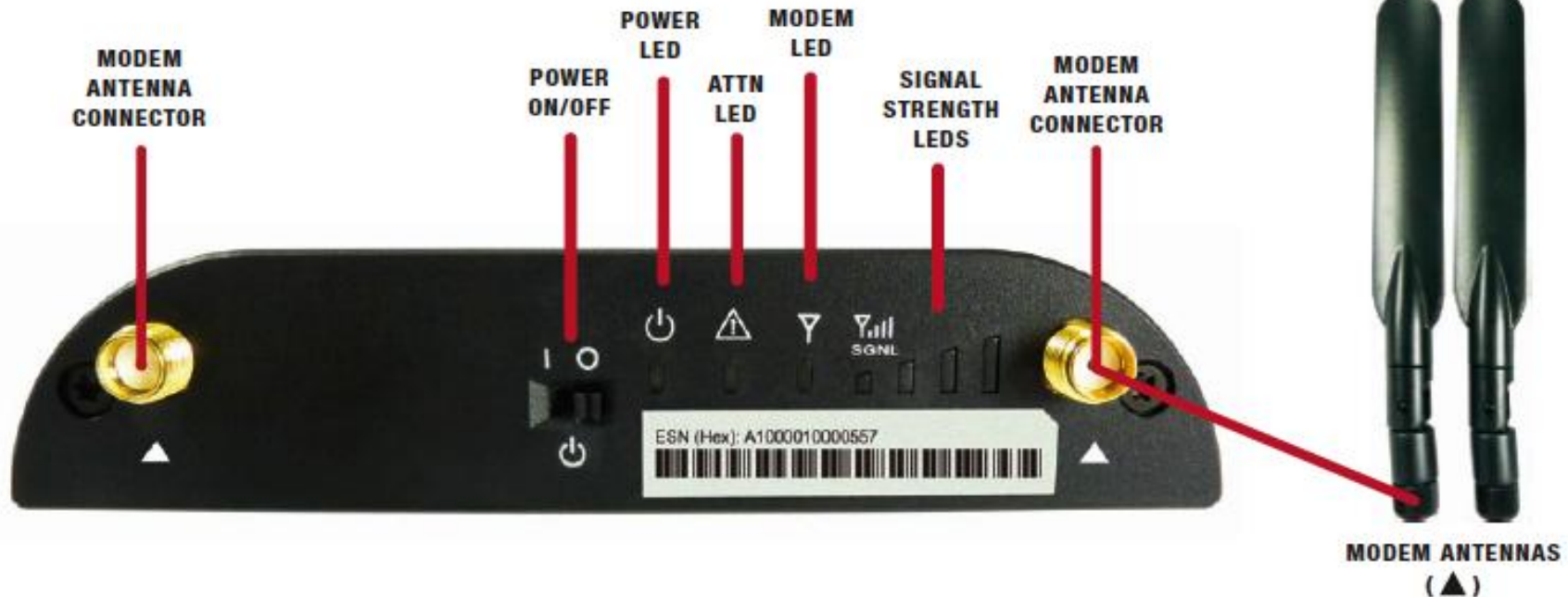


Ethernet Ports: By default, the IBR650 has one WAN (Wide Area Network—your internet source) port and one LAN (Local Area Network) port. Each of these ports can be reconfigured, however, if you need two LAN or two WAN Ethernet ports.

Ethernet LED:

- Solid Green – connected
- Blinking Green – data transfer activity

Micro USB: This port can be used to attach a direct firmware upgrade to enable manual firmware upgrades if necessary.



Modem Antennas: The IBR650 comes with two modem antennas to enhance reception for the embedded modem. These antennas are simple to attach and adjust.

Power On/Off:

- I = On
- O = Off

Power LED:

- Blue = On
- No light = Off

ATTN LED:

- Used with Modem LED for additional LED indications below.

Modem LED:

- Green = On and operating normally
- Blinking Green = Connecting
- Amber = Not available (idle, for example)
- Blinking Amber = Cellular data connection error
- No light = Off

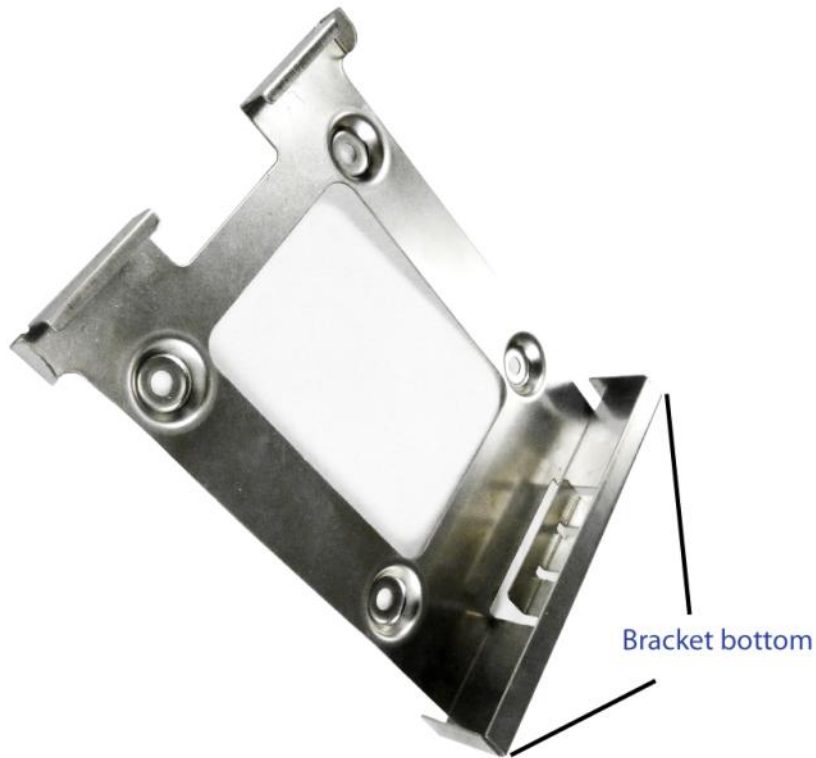
Additional LED Indications:

Factory reset button detected	ATTN and modem LEDs blink amber twice
Error during USB firmware upgrade	ATTN and modem LEDs blink red

2.2 Mounting Bracket



2.2.1 Attaching the IBR650 to the Mounting Bracket



1) Attach the bracket to the wall or other surface with screws.

NOTE: Screws are not provided because the type of screw required depends on the mounting surface.

2) Place the router's edge against the bottom of the bracket.

3) Press the router down firmly, then push it inside the bracket. It should latch.



2.2.2 Removing the IBR650 from the Mounting Bracket

From the top of the bracket, press down firmly on the router using your thumb(s) and pull the device out.



3 QUICK START

3.1 Basic Setup

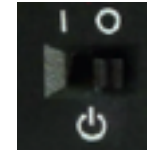
1. Attach the modem antennas.



2. Plug the power supply into an electrical outlet and connect it to the IBR650.



3. Make sure the power is switched on.



O = OFF I = ON

3.1.1 Activate Your Modem

A wireless broadband data plan must be added to your IBR650. Wireless broadband data plans are available from wireless carriers such as Sprint and Verizon. A new line of service can be added or a data plan can be transferred from an existing account. You will need the ESN number from your product label on your router to add or transfer a line of service.

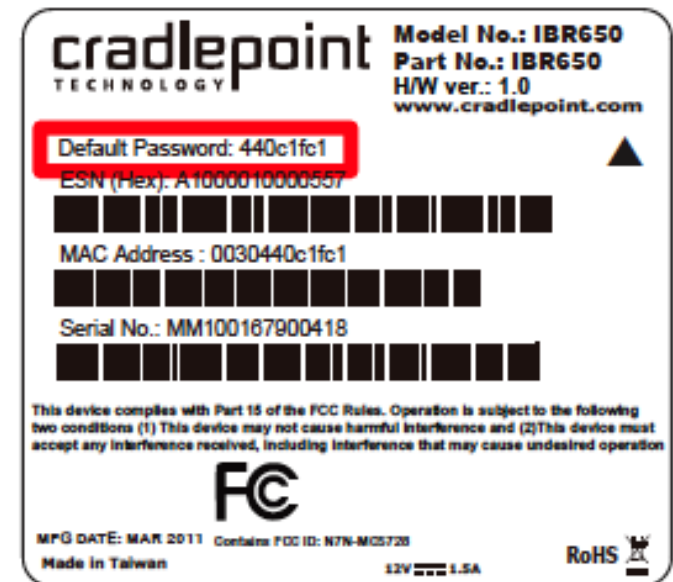
After adding a data plan to the modem, the modem may need to be activated. To activate the modem:

1. Log in to the IBR650 administration pages (see [Accessing the Administration Pages](#)).
2. Select **Internet** from the top navigation bar and **Modem Settings** from the dropdown menu (**Internet** → **Modem Settings**).
3. Find and select the CradlePoint modem.
4. Click Update/Activate.
5. Click Activate in the popup.

3.1.2 Accessing the Administration Pages

For most users the IBR650 Router can be used immediately without any special configuration changes. Simply connect a computer or similar device to the router's Ethernet LAN port with an Ethernet cable. If you would like to change your administration password or configure any of the advanced features of the IBR650, you will need to log in to the administration pages:

- Access your router's **Administrator Login** screen by opening a web browser window and typing "[cp/](#)" (your router's default hostname) or the IP address "[192.168.0.1](#)" into the address bar.
- Enter your **Default Password**. This password can be found on the bottom of the IBR650. Then click the **LOGIN** button.
- When you log in for the first time, you will be automatically directed to the **First Time Setup Wizard**. Follow the instructions given with the Wizard or see [Getting Started – First Time Setup](#) for more information about using the **First Time Setup Wizard**.



3.2 Common Problems

Please visit CradlePoint Knowledgebase at <http://knowledgebase.cradlepoint.com/> for more help and answers to your other questions.

3.2.1 You are Connected to the Router but Cannot Connect to the Internet

Make sure that you have an active data plan and that your modem has been activated. A wireless broadband data plan must be added to your IBR650. Wireless broadband data plans are available from wireless carriers such as Sprint and Verizon. A new line of service can be added or a data plan can be transferred from an existing account. You will need the ESN number from your product label on your router to add or transfer a line of service.

After adding a data plan to the modem, you must activate the modem:

1. Log in to the IBR650 administration pages (see [Accessing the Administration Pages](#)).
2. Select **Internet** from the top navigation bar and **Modem Settings** from the dropdown menu (**Internet** → **Modem Settings**).
3. Find and select the CradlePoint modem.
4. Click Update/Activate.
5. Click Activate in the popup.

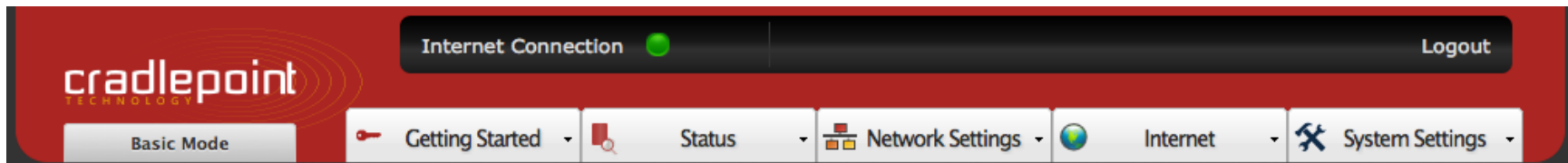
Finally, if you have an active data plan and you have already activated your modem, you may be out of range of your service provider. Check your signal strength in the Internet section of the **Dashboard** (**Status** → **Dashboard**). If you have a weak signal in your location, contact your service provider.

If you are still not online after activating the modem, call CradlePoint Technical Support for further assistance.

4 WEB INTERFACE – ESSENTIALS

The IBR650 has a Web interface for configuration and administration of all features. The interface is organized with a button for toggling between **Basic Mode** and **Advanced Mode** and 5 tabs at the top of the screen:

- Getting Started
- Status
- Network Settings
- Internet
- System Settings

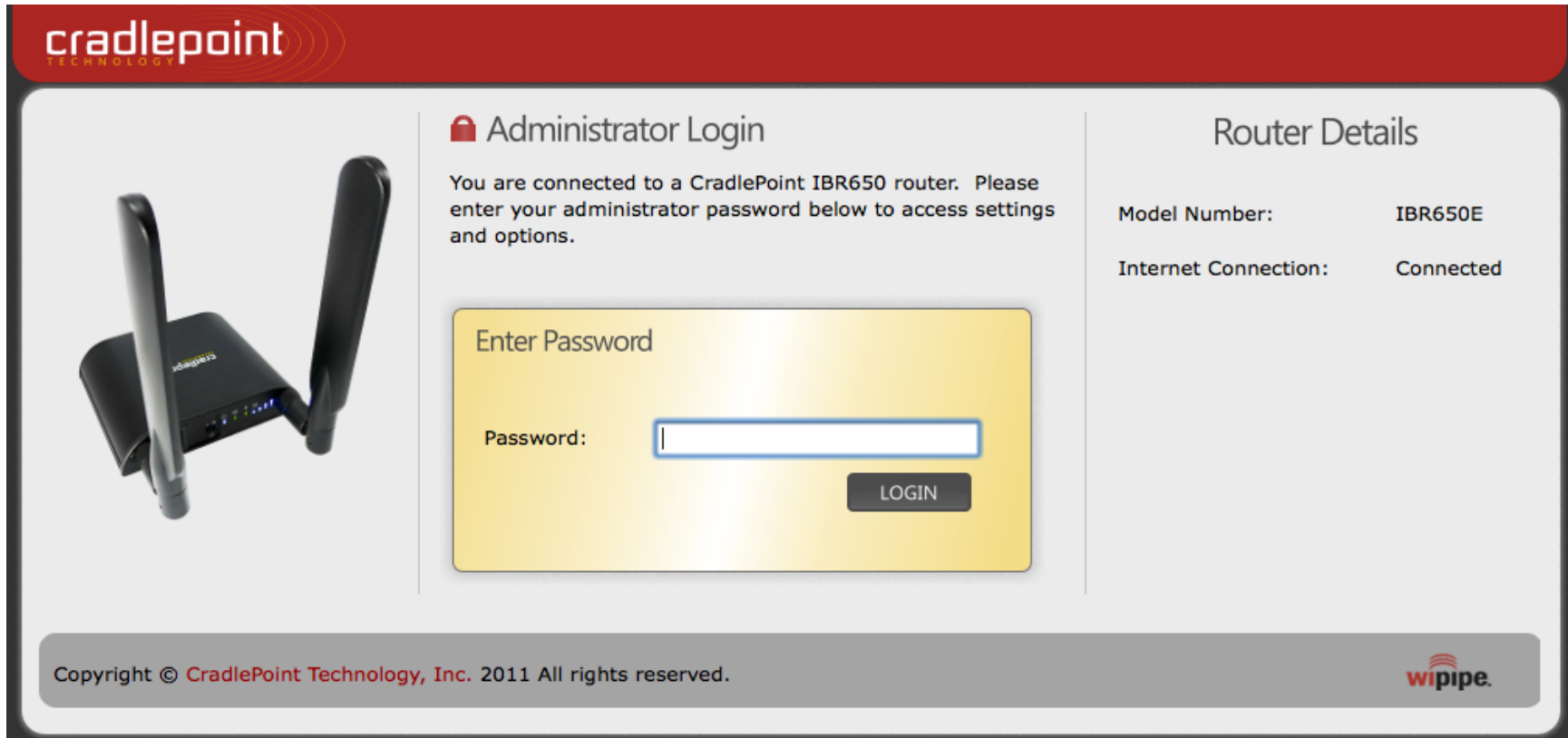


Web Interface – Essentials contains the following sections to help you more quickly and easy navigate these administration pages:

- 4.1 Administrator Login
- 4.2 Getting Started – First Time Setup
- 4.3 Quick Links
- 4.4 Basic Mode vs. Advanced Mode
- 4.5 Network Settings vs. Internet

4.1 Administrator Login

To access the administration pages, open a Web browser and type the hostname “[cp/](#)” or IP address “<http://192.168.0.1>” into the address bar. The Administrator Login page will appear.



Administrator Login

You are connected to a CradlePoint IBR650 router. Please enter your administrator password below to access settings and options.

Enter Password

Password:

LOGIN

Router Details

Model Number:	IBR650E
Internet Connection:	Connected

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wipe.

Log in using your administrator password. Initially, this password can be found on the bottom of the IBR650 unit as the **Default Password**. This password is also the last eight digits of the unit’s MAC address.

You may have changed the administrator password during initial setup using the First Time Setup Wizard. Log in using your personalized administrator password.

If you have forgotten your personalized password, you can reset the IBR650 to factory defaults. When you reset the router, the administrator password will revert back to the **Default Password**. Press and hold the **reset button** on the router unit until the lights flash (Approximately 10-15 seconds). You can then log in using the **Default Password** (found on the bottom of your router).

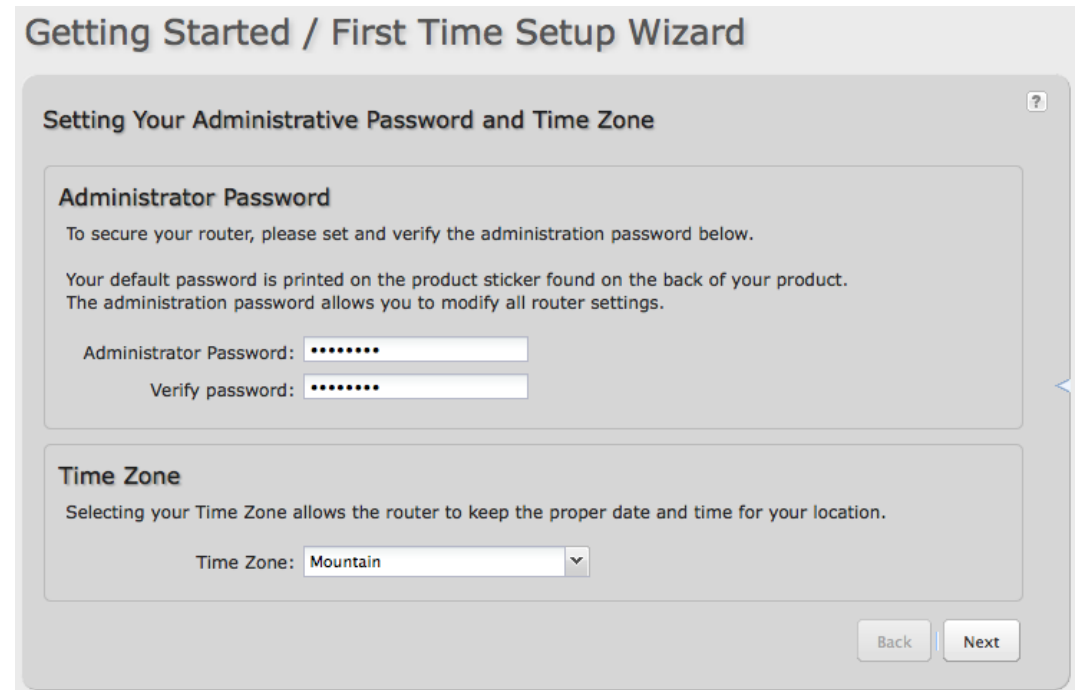
4.1.1 Router Details

The Administrator Login page includes a section that shows the following **Router Details**:

- **Model Number:** IBR650E
- **Internet Connection:** Connected/Disconnected

4.2 Getting Started – First Time Setup

- 1) Open a browser window and type “[cp/](#)” or “[192.168.0.1](#)” into the address bar. Press enter/return.
- 2) When prompted for your password, type the eight character **Default Password** found on the product label on the bottom of the IBR650 (this is also the last 8 digits of the router’s MAC address).
- 3) When you log in for the first time, you will be automatically directed to the **FIRST TIME SETUP WIZARD**. (Otherwise, go to [Getting Started → First Time Setup](#)).
- 4) CradlePoint recommends that you change the router’s **ADMINISTRATOR PASSWORD**, which is used to log in to the administration pages.
- 5) You can select your **TIME ZONE** from a dropdown list. (This may be necessary to properly show time in your router log, but typically your router will automatically determine your time zone through your browser.) Click **NEXT**.



Getting Started / First Time Setup Wizard

Setting Your Administrative Password and Time Zone

Administrator Password

To secure your router, please set and verify the administration password below.

Your default password is printed on the product sticker found on the back of your product. The administration password allows you to modify all router settings.

Administrator Password:

Verify password:

Time Zone

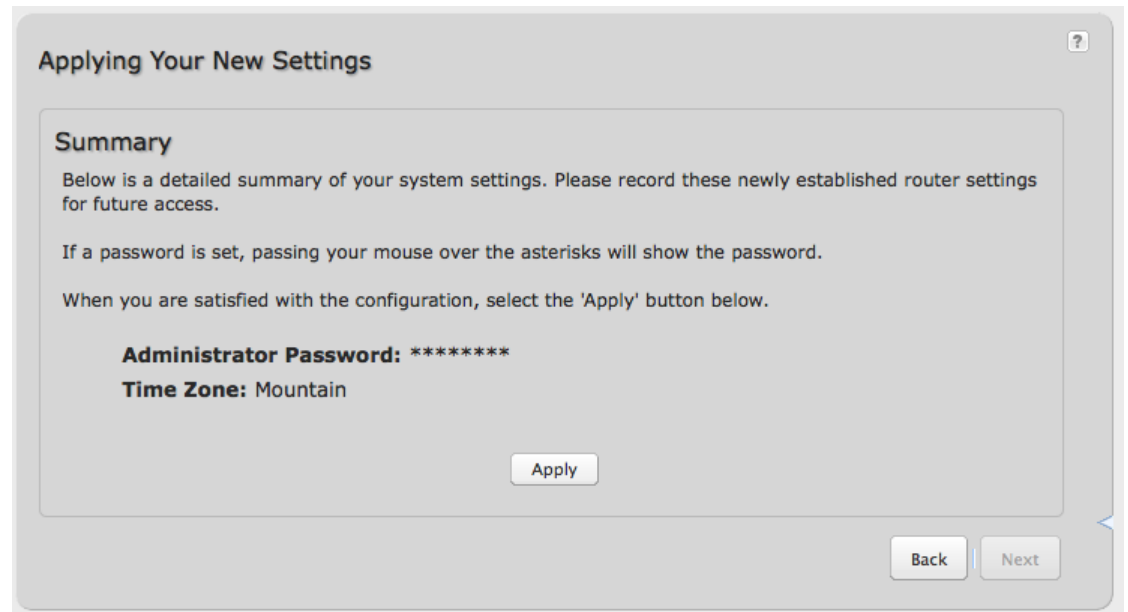
Selecting your Time Zone allows the router to keep the proper date and time for your location.

Time Zone:

Back Next

- 6) Review your settings and record your administrator password. You will need this password to log in to these administration pages. Move your mouse over the asterisks to reveal the password.

Click **APPLY** to save the settings and update your router.



4.3 Quick Links

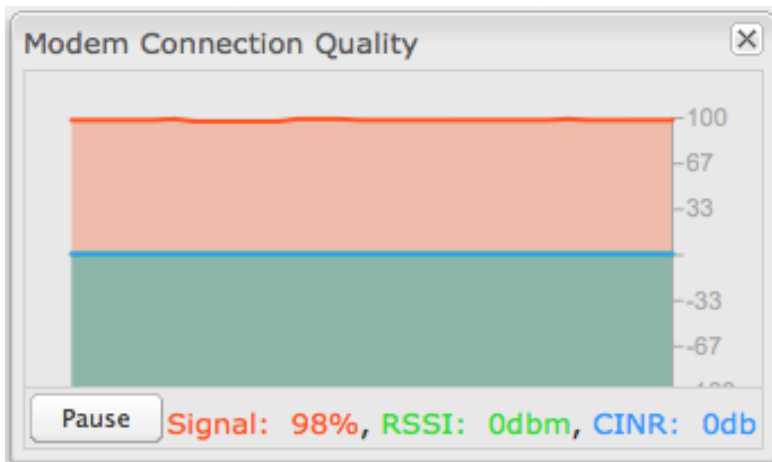


The CradlePoint logo in the upper left-hand corner of all the administration pages is a link to the Dashboard (**Status → Dashboard**), which displays fundamental information about the router.

The black bar across the top provides quick access to important information and controls.



Click on the image of four signal bars to open a “Modem Connection Quality” popup window that shows the strength of your internet signal:



(**Internet → Connection Manager**) where you can manage your internet sources.

Logout Click to log out of the administration pages.



This links to the Connection Manager

4.4 Basic Mode vs. Advanced Mode

For less complex uses, the IBR650 can be controlled within **Basic Mode**. Clicking on the **Basic Mode** button switches the complete Web interface to **Advanced Mode**. **Advanced Mode** provides several additional features.

The following chart shows the complete list of features found in **Basic Mode** and found exclusively in **Advanced Mode**:

	Getting Started	Status	Network Settings	Internet	System Settings
Basic Mode	First Time Setup	Client List Dashboard GPS Internet Connections Statistics System Logs	Content Filtering Local Networks	Connection Manager Ethernet Settings Modem Settings	Administration GPIO Connector System Control System Software
Advanced Mode (also includes all options in Basic Mode)		GRE Tunnels VPN Tunnels	DHCP Server DNS Firewall Routing WiPipe QoS	Data Usage GRE Tunnels Load Balance VPN Tunnels	Device Alerts Managed Services

Since **Advanced Mode** includes all features found in both modes, **ALL REMAINING INSTRUCTIONS IN THIS MANUAL WILL ASSUME YOU ARE IN ADVANCED MODE.**

If an expected feature is missing from the user interface, be sure to check that you are using **Advanced Mode**.

4.5 Network Settings vs. Internet

When using the Web interface, it will be important to pay attention to the difference between the **internet source** for your IBR650 and the **network** created by the IBR650. The “**Internet**” tab broadly refers to the router’s source of internet, while the “**Network Settings**” tab broadly refers to the network created by the router.

The following chart highlights this difference:

<p>Network Settings tab</p> <p>Internet “output”</p> <p>Network created by IBR650</p> <p>LAN (Local Area Network)</p>	<p>Internet tab</p> <p>Internet “input”</p> <p>Source for IBR650</p> <p>WAN (Wide Area Network)</p>
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Examples:

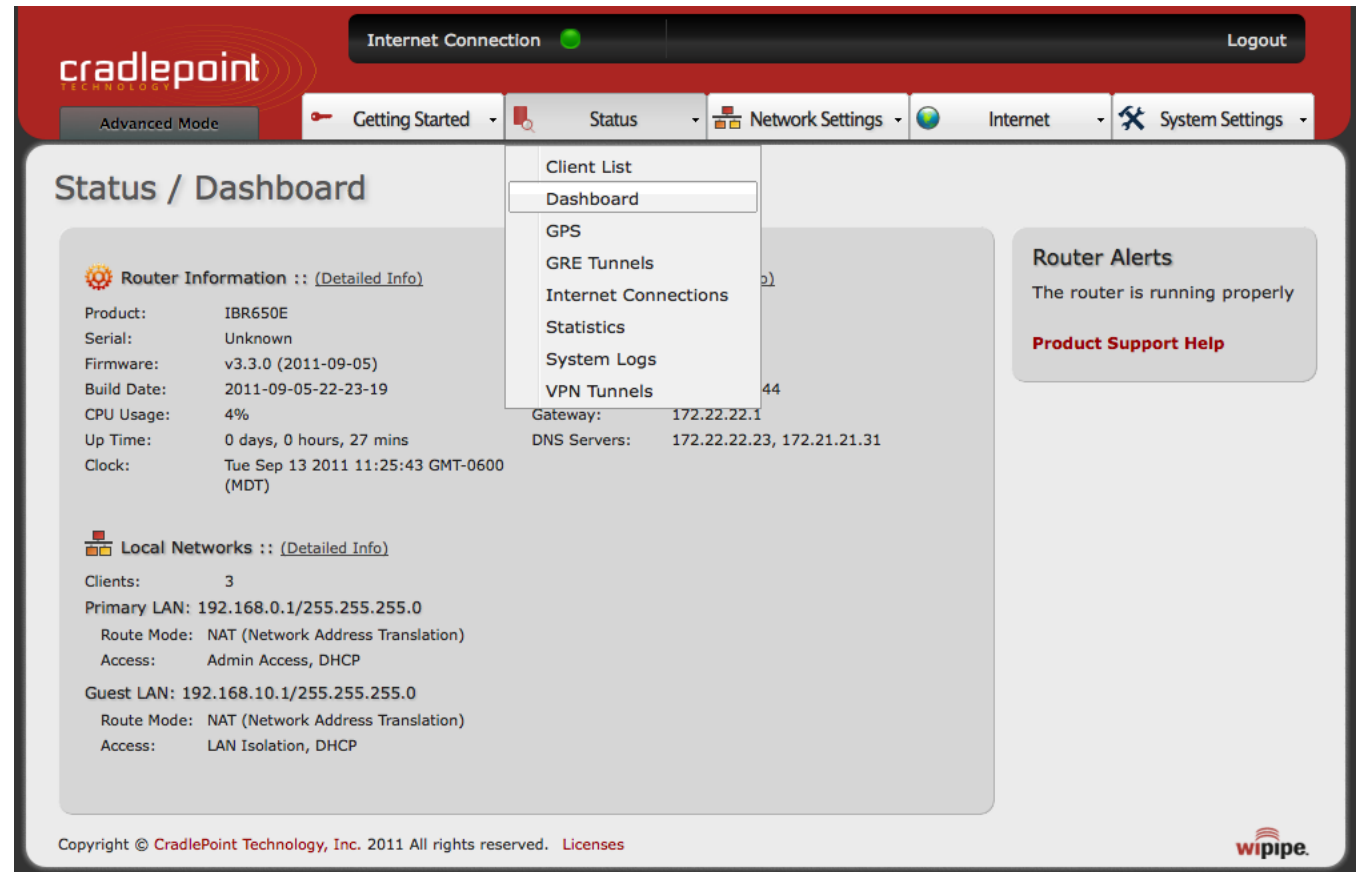
- If you want to change the content filtering settings for the network created by the IBR650, go to the **Network Settings** tab.
- If you have multiple internet sources—such as the embedded modem and an Ethernet connection—for which you would like to set priority levels, go to the **Internet** tab.

5 STATUS

The Status tab displays information—no adjustments can be made from within these pages. It provides access to 8 submenu options:

- Client List
- Dashboard
- GPS
- **GRE Tunnels**
- Internet Connections
- Statistics
- System Logs
- **VPN Tunnels**

(GRE Tunnels and VPN Tunnels:
Advanced Mode only)



5.1 Client List

The Client List displays the specifications of each device connected to your router.

Wired Clients. For each device using a wired connection to your IBR650, the following information is displayed:

Hostname, **IP**, and **MAC**.

Wired Clients		
Hostname	IP	MAC
00-23-32-b4-b2-ca	192.168.0.159	00:23:32:b4:b2:ca
	192.168.0.157	1c:65:9d:07:85:be
	192.168.0.131	c4:17:fe:de:5d:a2

Hostname: The name by which each computer or device in a network is known.

IP: The "IP address," or "Internet Protocol address," specifies a location for each device.

MAC: This is the "MAC address", a factory-assigned identifier used to identify a specific attached computer or device.

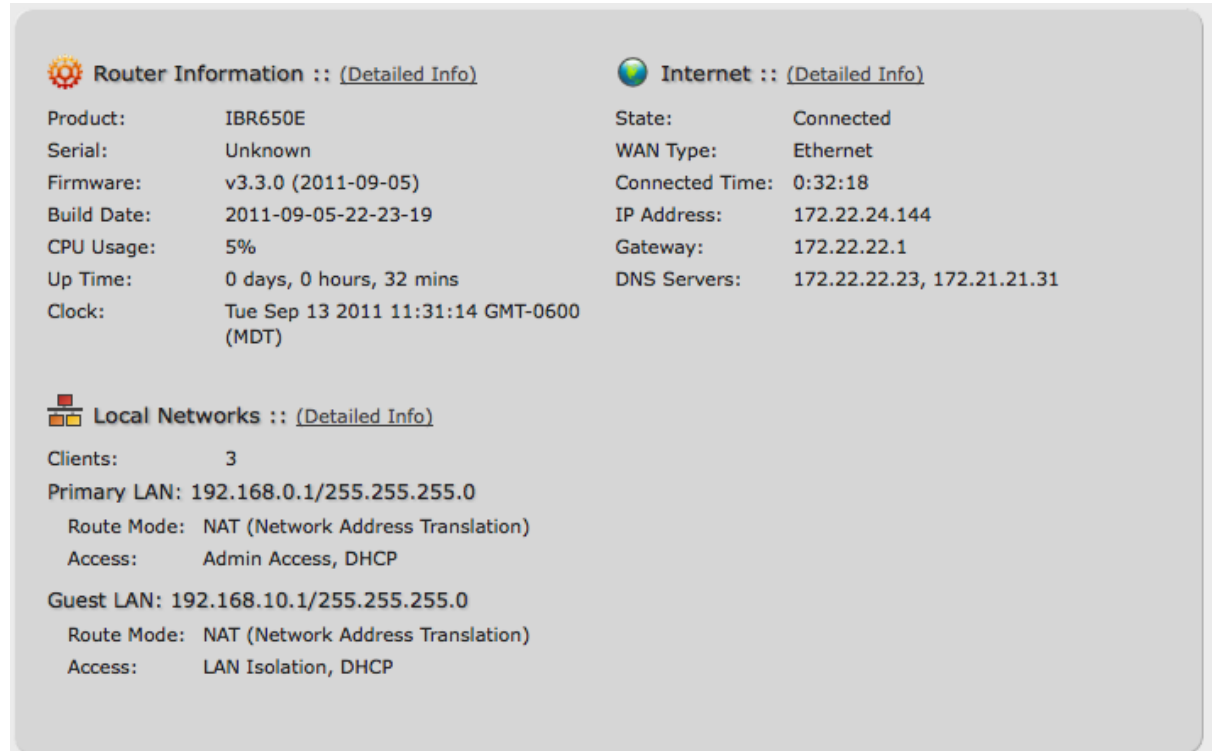
5.2 Dashboard

The **Dashboard** shows fundamental information about your router, divided into the following basic categories:

- **Router Information**
- **Internet**
- **Local Networks**

For more in-depth information and/or configuration options, click on the Detailed Info link beside the category title. For each category, this links to:

- Router Information: **System Settings** → **Administration**
- Internet: **Internet** → **Connection Manager**
- Local Networks: **Network Settings** → **Local Networks**



Router Information :: ([Detailed Info](#))

Product:	IBR650E
Serial:	Unknown
Firmware:	v3.3.0 (2011-09-05)
Build Date:	2011-09-05-22-23-19
CPU Usage:	5%
Up Time:	0 days, 0 hours, 32 mins
Clock:	Tue Sep 13 2011 11:31:14 GMT-0600 (MDT)

Internet :: ([Detailed Info](#))

State:	Connected
WAN Type:	Ethernet
Connected Time:	0:32:18
IP Address:	172.22.24.144
Gateway:	172.22.22.1
DNS Servers:	172.22.22.23, 172.21.21.31

Local Networks :: ([Detailed Info](#))

Clients:	3
Primary LAN:	192.168.0.1/255.255.255.0
Route Mode:	NAT (Network Address Translation)
Access:	Admin Access, DHCP
Guest LAN:	192.168.10.1/255.255.255.0
Route Mode:	NAT (Network Address Translation)
Access:	LAN Isolation, DHCP



After the initial setup of the router, every time you log in you will automatically be directed to this **Dashboard**. Also, you can click on the CradlePoint logo in the upper left-hand corner to return to the **Dashboard** from any page.

Router Information: “Detailed Info” links to **System Settings → Administration.**

- **Product:** IBR650
- **Serial:** The product serial number.
- **Firmware:** Gives the number of the current firmware version.
- **Build Date:** Year-month-day-hours-minutes-seconds for the most recent firmware upgrade.
- **CPU Usage:** Expressed as a percentage.
- **Up Time:** Total time for current session.
- **Clock:** Current local date and time.

To check for Firmware upgrades, see **System Settings → System Software.**

Internet: “Detailed Info” links to **Internet → Connection Manager.**

- **State:** Connected/Disconnected
- **Signal Strength:** Expressed as a percentage. (Signal Strength is not included if Ethernet is the WAN type.)
- **WAN Type:** Ethernet or Modem.
- **Connected Time:** The time the current Internet source (WAN) has been connected.
- **IP Address**
- **Gateway**
- **DNS Servers**

For general configuration options, see **Internet → Connection Manager.** For more in-depth Internet source configuration options see the appropriate settings page for your WAN type.

- **Internet → Ethernet Settings**
- **Internet → Modem Settings**

The IP address and gateway describe your active WAN source.

For DNS server configuration options, see **Network Settings → DNS.**

Local Networks: “Detailed Info” links to **Network Settings** → **Local Networks**.

- **Clients**: The number of current clients.

For each network, the following information is displayed:

- **Network Name: IP Address/Netmask**
 - **Route Mode**: NAT (Network Address Translation), Standard (NAT-less), IP Passthrough, or Disabled.
 - **Access**: Admin Access, LAN Isolation, UPnP (Universal Plug and Play), and/or DHCP.

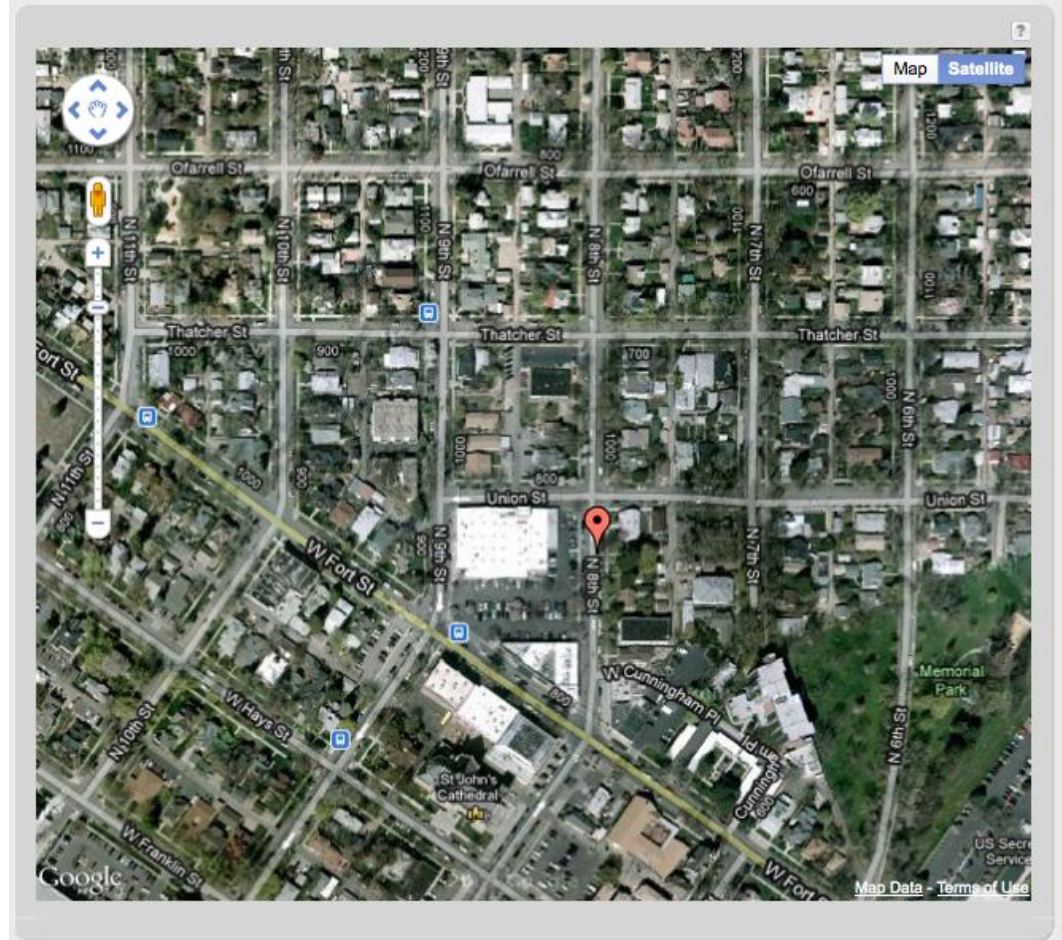
To configure a network, see **Network Settings** → **Local Networks**.

5.3 GPS

If GPS support is enabled and the embedded modem is connected, this page will show a graphical view of your router's location. See the GPS section in **System Settings** → **Administration** to enable GPS support.

GPS information is only displayed if the modem has sufficient GPS signal strength. Make sure the modem is in an area where it can receive a signal from the GPS satellites.

Status / GPS Status

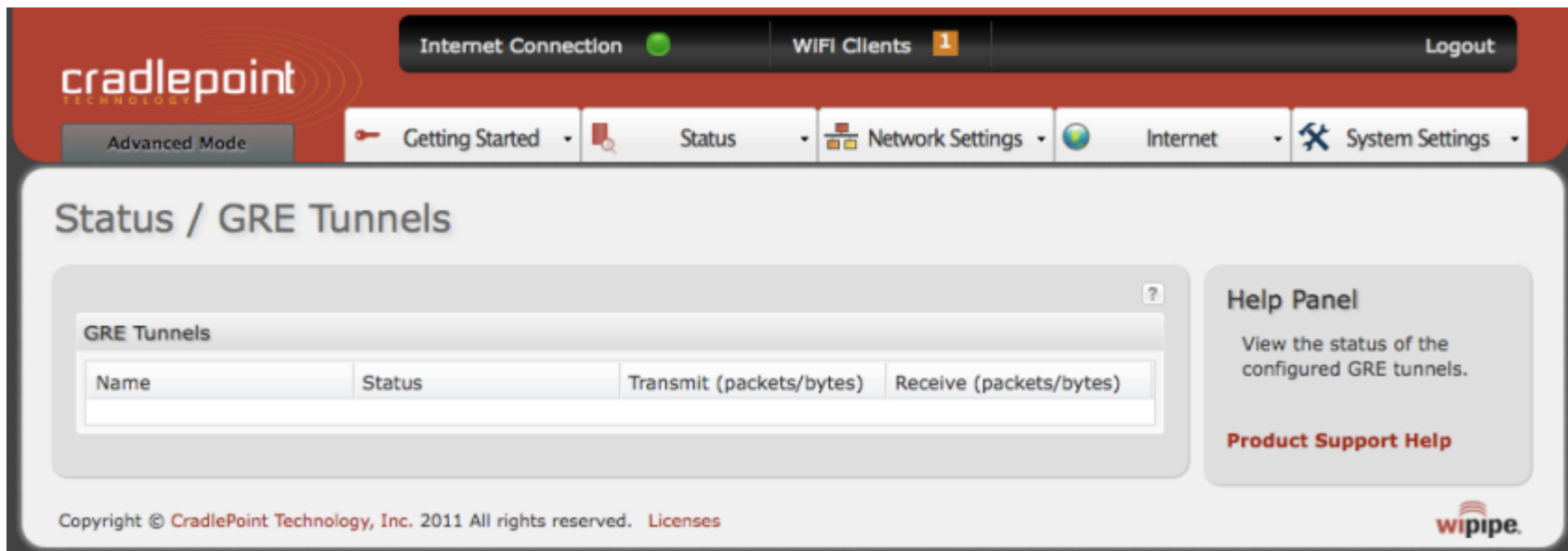


5.4 GRE Tunnels (Advanced Mode only)

View the status of configured GRE Tunnels. To set up or edit a GRE tunnel, go to **Internet** → **GRE Tunnels**.

Included information:

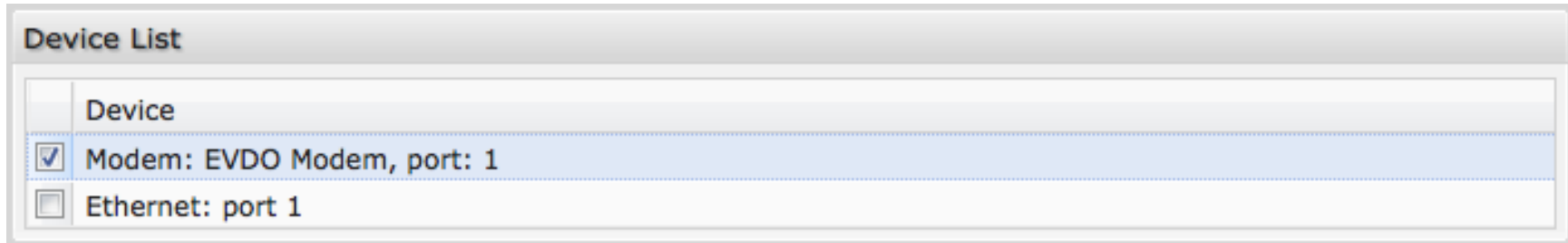
- Name
- Status
- Transmit (packets/bytes)
- Receive (packets/bytes)



The screenshot shows the Cradlepoint management interface. At the top, there is a navigation bar with the Cradlepoint logo, "Internet Connection" (green dot), "WIFI Clients" (1), and "Logout". Below this is a secondary navigation bar with "Advanced Mode" and menu items: "Getting Started", "Status", "Network Settings", "Internet", and "System Settings". The main content area is titled "Status / GRE Tunnels". It features a table with the following columns: "Name", "Status", "Transmit (packets/bytes)", and "Receive (packets/bytes)". The table is currently empty. To the right of the table is a "Help Panel" with the text "View the status of the configured GRE tunnels." and a link for "Product Support Help". At the bottom of the page, there is a copyright notice: "Copyright © CradlePoint Technology, Inc. 2011 All rights reserved. Licenses" and the "wipipe." logo.

5.5 Internet Connections

The Internet Connections submenu option provides a list of attached WAN devices used as the internet source for the IBR650. Select one of these devices to see detailed information about that particular device.



For each type of device, different information will be included in the **Device Information** section. Possible devices include:

- [Ethernet](#)
- [EVDO Modem](#) (embedded modem)

Depending on the device, possible information will be in the following sections: Diagnostics, General Information, IP Information, and Statistics. For the embedded modem, the Diagnostics section provides specific information about how the modem is communicating with its carrier.

5.5.1 Ethernet

Diagnostics

- **Connection State** (connected, idle, etc.)

General Information

- **Protocol** *Ethernet Static*
- **Product** *Built-in Ethernet*
- **Type** *Ethernet*
- **Port**
- **Unique Identifier**

Statistics

- **Outgoing Bits/Second**
- **Incoming Bits/Second**
- **Incoming Bytes**
- **Outgoing Bytes**

Device Information: Built-in Ethernet	
Property	Value
[-] Diagnostics	
Connection State	idle
[-] General Information	
Protocol	Ethernet Static
Product	Built-in Ethernet
Type	ethernet
Port	0
Unique Identifier	422875064
[-] Statistics	
Outgoing Bits/Second	0
Incoming Bits/Second	0
Incoming Bytes	627432813
Outgoing Bytes	10965885



5.5.2 EVDO Modem (embedded modem)

Diagnostics

- **Signal Strength (dBm)**
- **PRL Version**
- **Service Display** *1xEV-DO, 1X*
- **Carrier Status** *UP or DOWN*
- **Connection Type** *CDMA*
- **Connection State** (connected, idle, etc.)
- **Connection Uptime**

General Information

- **Product** *EVDO Modem*
- **Protocol** *PPP*
- **Unique Identifier**
- **ESN/IMEI**
- **Model** *MC100E-VZ*
- **Type** *modem*
- **Port** *1*
- **Manufacturer** *CradlePoint Inc.*

IP Information

- **Netmask**
- **IP Address**
- **Gateway**

Statistics

- **Outgoing Bits/Second**
- **Incoming Bits/Second**
- **Incoming Bytes**

Device List

<input type="checkbox"/>	Device
<input checked="" type="checkbox"/>	Modem: EVDO Modem, port: 1
<input type="checkbox"/>	Ethernet: port 1

Device Information: EVDO Modem

Property	Value
Diagnostics	
Signal Strength(dBm)	-66 dBm
PRL Version	52337
Service Display	1xEV-DO,1X
Carrier Status	UP
Connection Type	CDMA
Connection State	connected
Connection Uptime	0:03:16
General Information	
Product	EVDO Modem
Protocol	PPP
Unique Identifier	1438832383
Carrier ID	5
ESN/IMEI	██████████
Model	MC100E-VZ
Type	modem
Port	1
Manufacturer	CradlePoint Inc.
IP Information	
Netmask	255.255.255.0
IP Address	75.220.77.172
Gateway	66.174.192.64
Statistics	
Outgoing Bits/Second	890
Incoming Bits/Second	25001
Incoming Bytes	952305
Outgoing Bytes	277278



- **Outgoing Bytes**

5.6 Statistics

The Statistics submenu option displays basic traffic statistics for both LAN and WAN connections, separating Outgoing Traffic and Incoming Traffic.

Data Rate: A measure of the amount of information that is currently being sent or received through the network.

Data: A measure of the total amount of information that has been sent or received.

Packets: The number of network packets that have been sent or received.

Errors: The number of network packets that failed to be sent or received.

NOTE: Data, Packets, and Errors statistics include only the numbers since the router was most recently turned on or reset, not lifetime for the router.

Reset All: Press this button to zero all statistics. Counting restarts immediately.

Reminder: **LAN** vs. **WAN**

- **LAN**, or **Local Area Network**, is the network you have created through the IBR650.
- **WAN**, or **Wide Area Network**, is the internet source the IBR650 is using to create a new LAN. Possible WAN sources include Ethernet or the embedded modem.



5.7 System Logs

The router automatically logs (records) events of possible interest in its internal memory. If there is not enough internal memory for all events, logs of older events are deleted, but logs of the latest events are retained. The log options allow you to filter the router logs so you can easily find relevant messages. This router also has external Syslog Server support so you can send the log files to a computer on your network that is running a Syslog utility.

Auto Update: The logs automatically refresh whenever the router creates a new message.

Update: Click to check for new router messages.

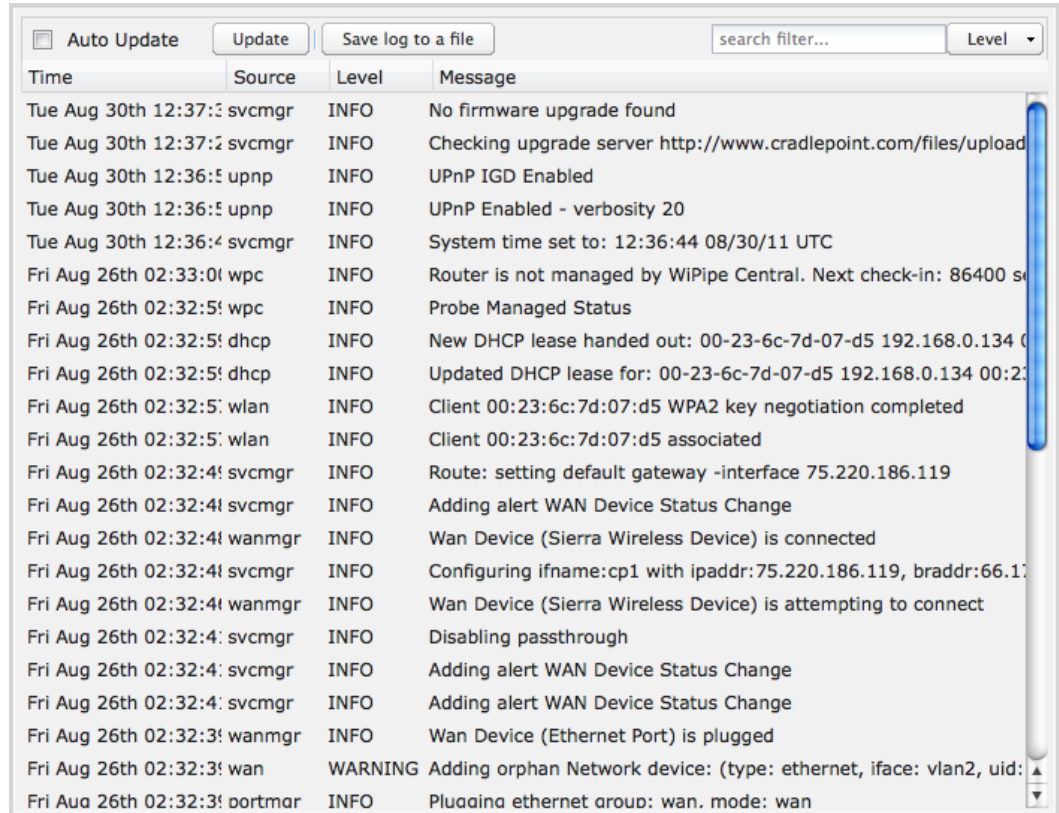
Save log to a file: This will open a dialog in your browser that will allow you to save the router's log to your computer.

Search: Enter keywords to find specific events.

Level: Select/Deselect from the following levels to filter messages by priority.

- Critical
- Error
- Warning
- Info

NOTE: The logs are erased whenever the router is rebooted or loses power.



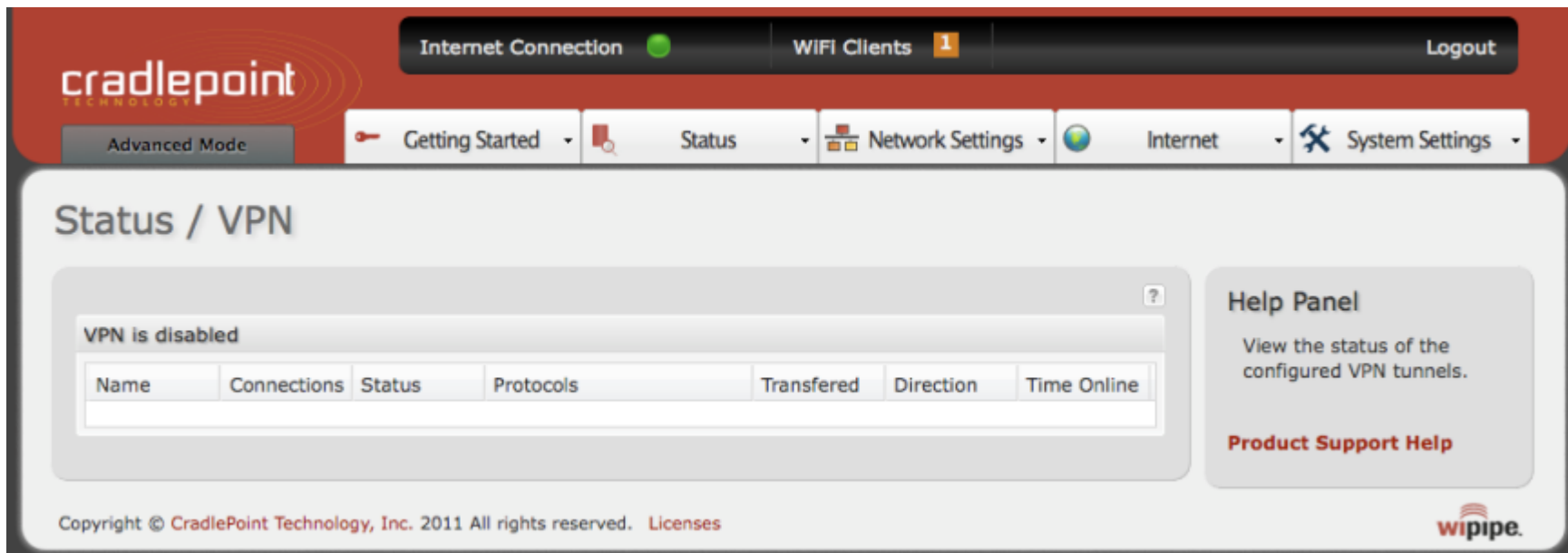
Time	Source	Level	Message
Tue Aug 30th 12:37:1	svcmgr	INFO	No firmware upgrade found
Tue Aug 30th 12:37:2	svcmgr	INFO	Checking upgrade server http://www.cradlepoint.com/files/upload
Tue Aug 30th 12:36:5	upnp	INFO	UPnP IGD Enabled
Tue Aug 30th 12:36:5	upnp	INFO	UPnP Enabled - verbosity 20
Tue Aug 30th 12:36:4	svcmgr	INFO	System time set to: 12:36:44 08/30/11 UTC
Fri Aug 26th 02:33:0	wpc	INFO	Router is not managed by WiPipe Central. Next check-in: 86400 s
Fri Aug 26th 02:32:5	wpc	INFO	Probe Managed Status
Fri Aug 26th 02:32:5	dhcp	INFO	New DHCP lease handed out: 00-23-6c-7d-07-d5 192.168.0.134 0
Fri Aug 26th 02:32:5	dhcp	INFO	Updated DHCP lease for: 00-23-6c-7d-07-d5 192.168.0.134 00:23
Fri Aug 26th 02:32:5	wlan	INFO	Client 00:23:6c:7d:07:d5 WPA2 key negotiation completed
Fri Aug 26th 02:32:5	wlan	INFO	Client 00:23:6c:7d:07:d5 associated
Fri Aug 26th 02:32:4	svcmgr	INFO	Route: setting default gateway -interface 75.220.186.119
Fri Aug 26th 02:32:4	svcmgr	INFO	Adding alert WAN Device Status Change
Fri Aug 26th 02:32:4	wanmgr	INFO	Wan Device (Sierra Wireless Device) is connected
Fri Aug 26th 02:32:4	svcmgr	INFO	Configuring ifname:cp1 with ipaddr:75.220.186.119, braddr:66.17
Fri Aug 26th 02:32:4	wanmgr	INFO	Wan Device (Sierra Wireless Device) is attempting to connect
Fri Aug 26th 02:32:4	svcmgr	INFO	Disabling passthrough
Fri Aug 26th 02:32:4	svcmgr	INFO	Adding alert WAN Device Status Change
Fri Aug 26th 02:32:4	svcmgr	INFO	Adding alert WAN Device Status Change
Fri Aug 26th 02:32:3	wanmgr	INFO	Wan Device (Ethernet Port) is plugged
Fri Aug 26th 02:32:3	wan	WARNING	Adding orphan Network device: (type: ethernet, iface: vlan2, uid:
Fri Aug 26th 02:32:3	portmgr	INFO	Plugging ethernet aroup: wan. mode: wan

5.8 VPN Tunnels (Advanced Mode only)

View the status of configured VPN tunnels. To set up or edit a VPN tunnel, go to **Internet** → **VPN Tunnels**.

Included information:

- Name
- Connections
- Status
- Protocols
- Transferred
- Direction
- Time Online



Internet Connection ● | WIFI Clients 1 | Logout


Advanced Mode | Getting Started | Status | Network Settings | Internet | System Settings

Status / VPN

VPN is disabled

Name	Connections	Status	Protocols	Transferred	Direction	Time Online
------	-------------	--------	-----------	-------------	-----------	-------------

Help Panel
View the status of the configured VPN tunnels.
[Product Support Help](#)

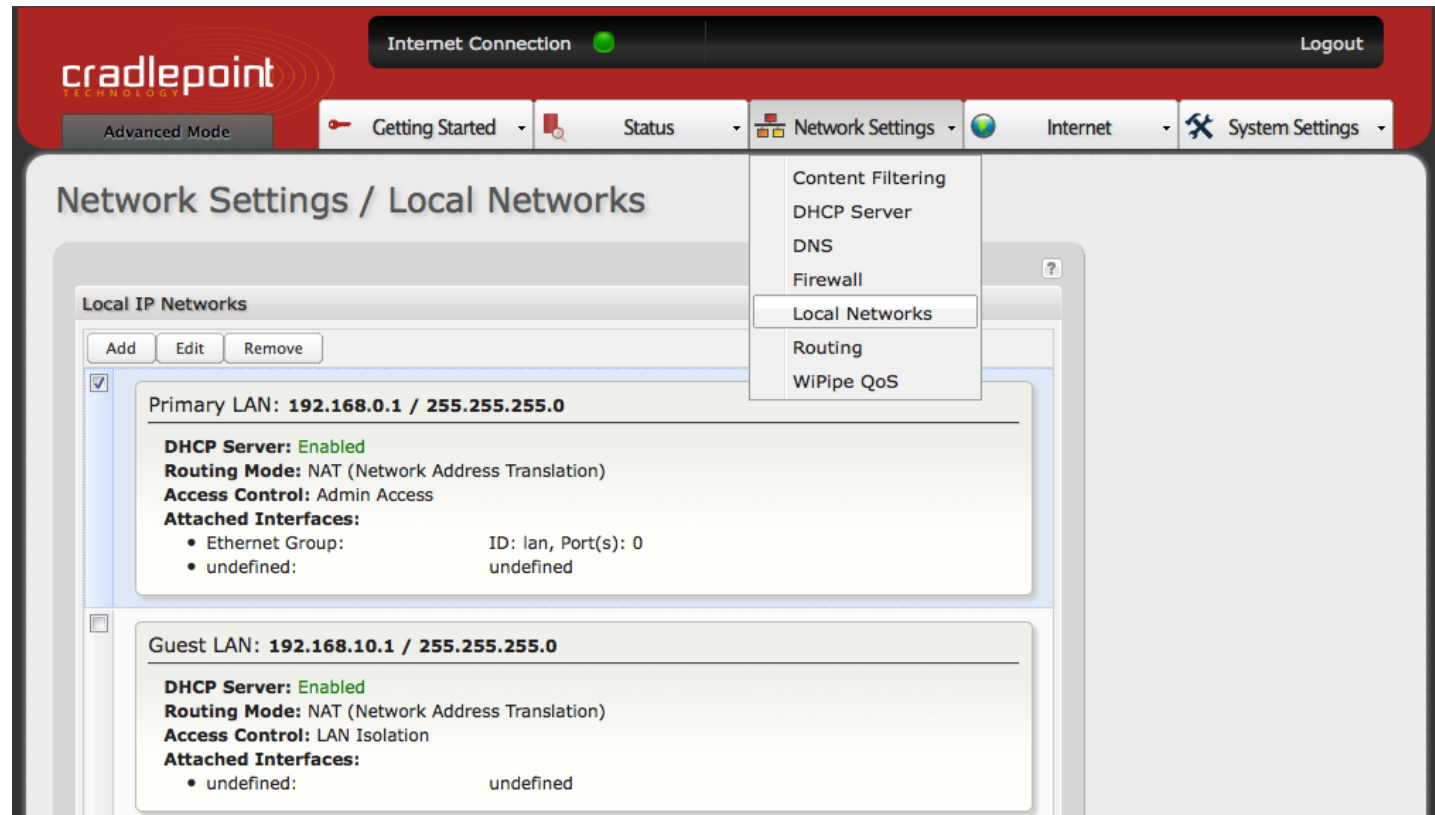
Copyright © CradlePoint Technology, Inc. 2011 All rights reserved. [Licenses](#) 

6 NETWORK SETTINGS

The Network Settings tab provides access to 7 submenu options for administering the following functions/tasks. These functions are all related to controlling the LAN (Local Area Network), the network you set up with the IBR650.

- Content Filtering
- **DHCP Server**
- **DNS**
- **Firewall**
- Local Networks
- **Routing**
- **WiPipe QoS**

(DHCP Server, DNS, Firewall, Routing, and WiPipe QoS: Advanced Mode only)



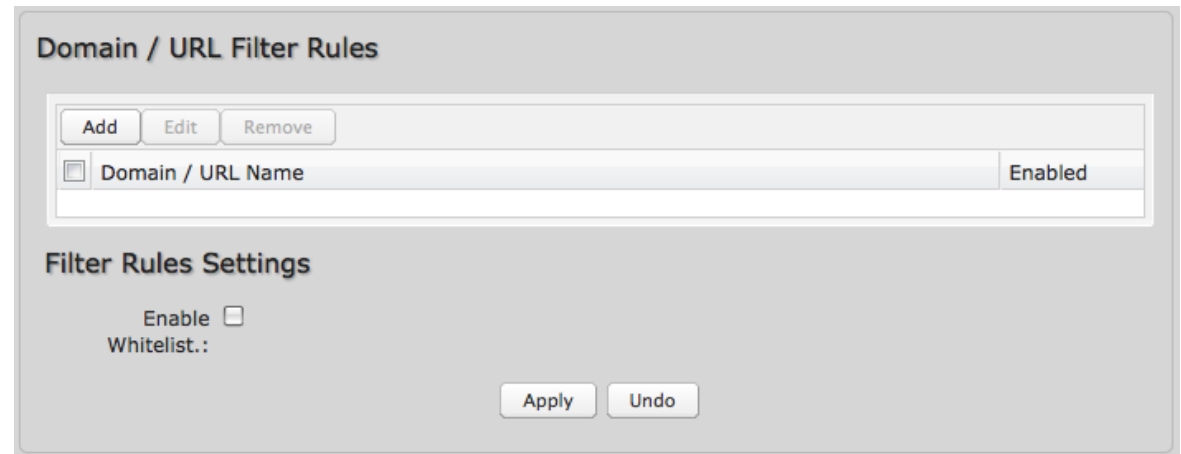
The screenshot shows the 'Network Settings / Local Networks' page in the Cradlepoint management interface. At the top, there's a navigation bar with 'Internet Connection' (green indicator) and 'Logout'. Below it, a menu bar includes 'Getting Started', 'Status', 'Network Settings' (selected), 'Internet', and 'System Settings'. A dropdown menu from 'Network Settings' lists: Content Filtering, DHCP Server, DNS, Firewall, Local Networks (highlighted), Routing, and WiPipe QoS. The main content area is titled 'Local IP Networks' and has 'Add', 'Edit', and 'Remove' buttons. It lists two networks:

- Primary LAN: 192.168.0.1 / 255.255.255.0**
 - DHCP Server: Enabled
 - Routing Mode: NAT (Network Address Translation)
 - Access Control: Admin Access
 - Attached Interfaces:
 - Ethernet Group: ID: lan, Port(s): 0
 - undefined: undefined
- Guest LAN: 192.168.10.1 / 255.255.255.0**
 - DHCP Server: Enabled
 - Routing Mode: NAT (Network Address Translation)
 - Access Control: LAN Isolation
 - Attached Interfaces:
 - undefined: undefined

6.1 Content Filtering

You have two main options for filtering content in a network created through your IBR650.

- 1) **Domain / URL Filter Rules:** Create a list of websites that will be either disallowed (facebook.com, for example) or allowed exclusively (your company's website, for example).
- 2) **OpenDNS Content Filtering:** Allows several options for filtering rules.



Domain / URL Filter Rules

Add Edit Remove

<input type="checkbox"/>	Domain / URL Name	Enabled
--------------------------	-------------------	---------

Filter Rules Settings

Enable

Whitelist:

Apply Undo

To create **Domain / URL Filter Rules**, simply input one or more website domain names or URLs. By default, these websites will be disallowed as part of a Blacklist. You can change this to a Whitelist to exclusively allow these sites.

Enable Whitelist: Domain / URL filters allow you to **block** access from your network to any external domain or website. Enabling this as a Whitelist will allow access to only those sites in the list.

6.1.1 OpenDNS

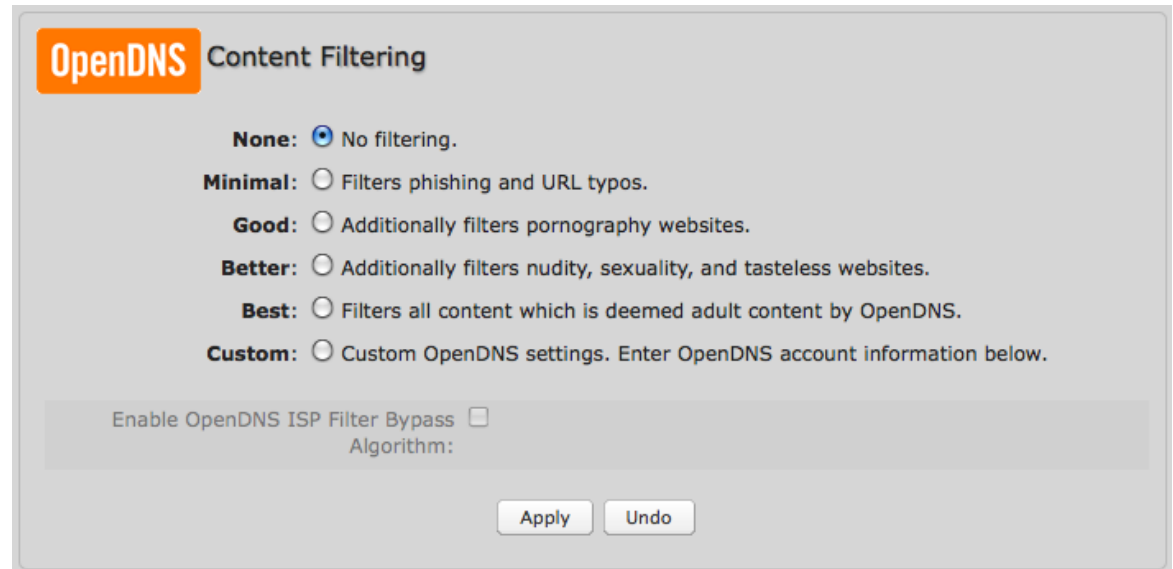
OpenDNS is a service that protects you online by filtering websites. OpenDNS protects you from phishing websites and URL typos once you select a filtering level.

- **None:** Disables Web filtering that uses OpenDNS,
- **Minimal:** Filters phishing and URL typos.
- **Good:** Filters any Web site containing pornography and enables typo and phishing redirection.
- **Better:** Filters more nudity, sexuality, and tasteless content.
- **Best:** Filters more nudity, sexuality, and tasteless content. Selecting “Best” will filter all content that is deemed adult content by OpenDNS.
- **Custom:** Custom OpenDNS settings. See below for more information.

In addition to the standard filtering levels, you have the following options for filter control:

Custom OpenDNS: To use the Custom OpenDNS setting you need to first create an OpenDNS account. You can create an account at [OpenDNS](#) and click on the “Create Account” link. Follow the onscreen instructions to create an account.

Once you have an OpenDNS account, enter your account information in order to use your Custom OpenDNS settings. Custom OpenDNS settings use the [DNS-O-MATIC](#) (an OpenDNS Service) API to update the IP address of your



OpenDNS Content Filtering

None: No filtering.

Minimal: Filters phishing and URL typos.

Good: Additionally filters pornography websites.

Better: Additionally filters nudity, sexuality, and tasteless websites.

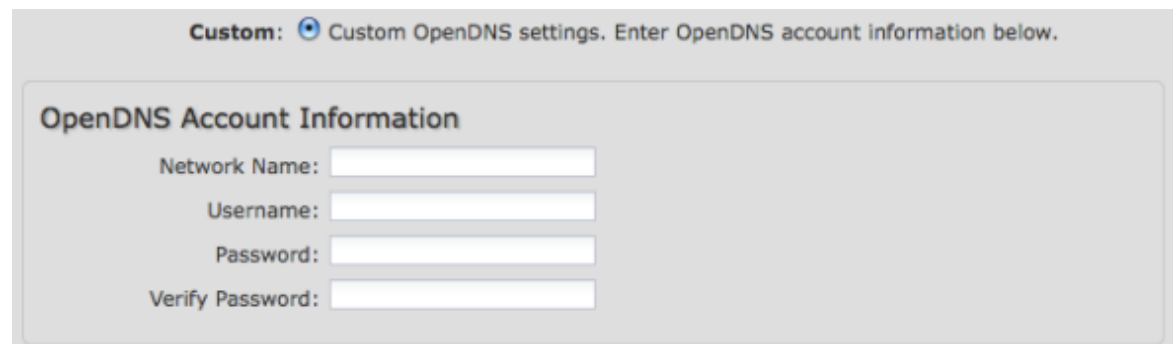
Best: Filters all content which is deemed adult content by OpenDNS.

Custom: Custom OpenDNS settings. Enter OpenDNS account information below.

Enable OpenDNS ISP Filter Bypass

Algorithm:

Apply Undo



Custom: Custom OpenDNS settings. Enter OpenDNS account information below.

OpenDNS Account Information

Network Name:

Username:

Password:

Verify Password:

OpenDNS network. In order for Custom settings to work you need to login to [DNS-O-MATIC](#) using your OpenDNS credentials and "Add A Service" for the network specified above.

Enable OpenDNS ISP Filter Bypass Algorithm: It is possible that your Internet Service Provider (ISP) uses the port that OpenDNS is configured to access, port 53, which will prevent OpenDNS filtering. If OpenDNS does not appear to be working correctly, enabling this will attempt to bypass those ports when using an OpenDNS content filtering level.

6.2 DHCP Server (Advanced Mode only)

DHCP stands for Dynamic Host Configuration Protocol. The built-in DHCP server automatically assigns IP addresses to the computers and other devices on each local area network (LAN). In this section you can view a list of assigned IP addresses and reserve IP addresses for particular devices.

Active Leases: A list of devices that have been provided DHCP leases. The DHCP server automatically assigns these leases. This list will not include any devices that have static IP addresses on the network.

Reservations: This option lets you reserve IP addresses; you can assign the same IP address to the network device with the specified MAC address any time it requests an IP address. This is almost the same as

when a device has a static IP address except that the device must still request an IP address from the router. The router will provide the device the same IP address every time. DHCP Reservations are helpful for server computers on the local network that are hosting applications such as Web and FTP. Servers on your network should either use a static IP address or a reservation.

While you have the option to manually input the information to reserve an IP address (Hostname, Hardware Addr, IP Addr), it is much simpler to select a device under the **Active Leases** section and click “**Reserve**.” The selected device’s information will automatically be added under **Reservations**.

Active Leases					
Reserve					
	Hostname	IP Addr	Hardware Addr	Client ID	Expiration
<input type="checkbox"/>	00-23-6c-7d-07-d5	192.168.2.134	00:23:6c:7d:07:d5	01:00:23:6c:7d:07:c	9 hours, 20 mins

Reservations				
Add Edit Remove				
	Hostname	Hardware Addr	IP Addr	Enabled
<input type="checkbox"/>				

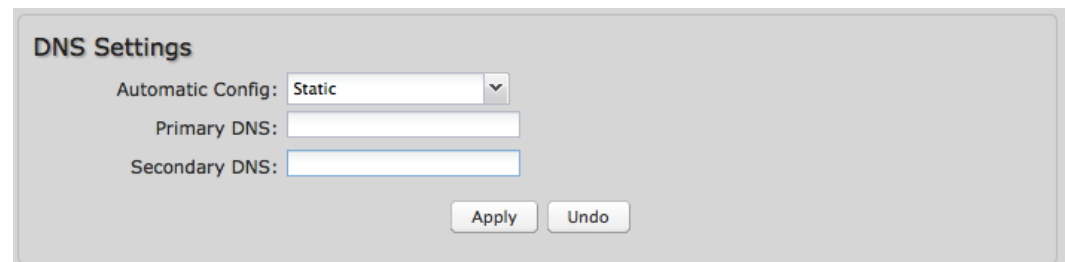
6.3 DNS (Advanced Mode only)

DNS, or Domain Name System, is a naming system that translates between domain names (www.cradlepoint.com, for example) and internet IP addresses (206.207.82.197). A DNS server acts as an internet phone book, translating between names that make sense to people and the more complex numerical identifiers. The DNS page for the IBR650 has these distinct functions:

- **DNS Settings:** By default your router is set to automatically acquire DNS servers through your internet provider (Automatic). **DNS Settings** allows you to specify DNS servers of your choosing instead (Static).
- **Dynamic DNS Configuration:** Allows you to host a server (Web, FTP, etc.) using a domain name that you have purchased (www.yourname.com) with your dynamically assigned IP address.
- **Known Hosts Configuration:** Allows you to map a name (printer, scanner, laptop, etc.) to an IP address of a device on the network.

6.3.1 DNS Settings

You have the option to choose specific DNS servers for your network instead of using the DNS servers assigned by your internet provider. The default DNS servers are usually adequate. You may want to assign DNS servers if the default DNS servers are performing poorly, if you want clients to access DNS servers that you use for customized addressing, or if you have a local DNS server on your network.



Automatic Config: Automatic or Static (default: Automatic). Switching to “Static” enables you to set specific DNS servers in the **Primary DNS** and **Secondary DNS** fields.

Primary DNS and **Secondary DNS:** If you choose to specify your DNS servers, then enter the IP addresses of the servers you want as your primary and secondary DNS servers in these fields. For example, Google Public DNS servers have the IP addresses 8.8.8.8 and 8.8.4.4 while 4.2.2.2 and 4.2.2.3 are servers from Level 3 Communications.

6.3.2 Dynamic DNS Configuration

The Dynamic DNS feature allows you to host a server (Web, FTP, etc.) using a domain name that you have purchased (www.yourname.com) with your dynamically assigned IP address. Most broadband Internet Service Providers assign dynamic (changing) IP addresses. When you use a Dynamic DNS service provider, you can enter your host name to connect to your server, no matter what your IP address is.

Enable Dynamic DNS Service: Enable this option only if you have purchased your own domain name and registered with a Dynamic DNS service provider.

Server Type. Select a Dynamic DNS service provider from the pull-down list:

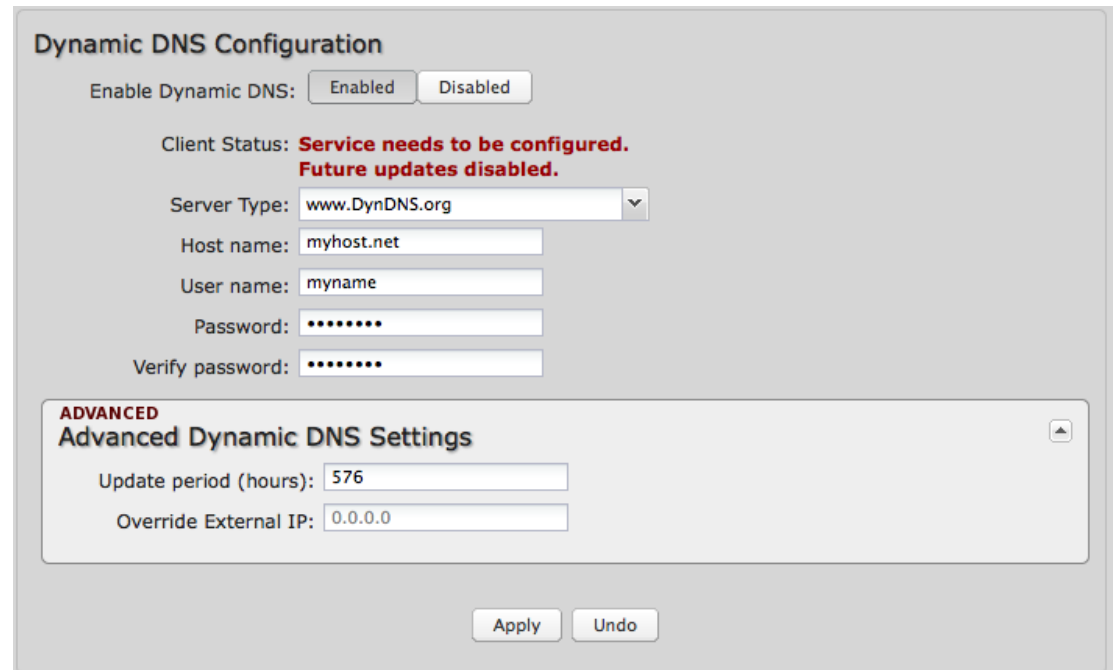
- www.DynDNS.org
- www.DNSomatic.com
- www.ChangeIP.com
- www.NO-IP.com
- Custom Server (DynDNS clone)

Custom Server Address. Only available if you select Custom Server from the Server Address dropdown list. Enter your custom dynamic DNS server address here. The server must support the Dynamic DNS protocol. See www.dyndns.org for details. Example: **myserver.mydomain.net**.

Host name: Enter your host name, fully qualified. For example: **myhost.mydomain.net**.

User name: Enter the user name or key provided by the Dynamic DNS service provider. If the Dynamic DNS provider supplies only a key, enter that key for both the **User name** and **Password** fields.

Password: Enter the password or key provided by the Dynamic DNS service provider.



Dynamic DNS Configuration

Enable Dynamic DNS:

Client Status: **Service needs to be configured. Future updates disabled.**

Server Type: www.DynDNS.org

Host name: myhost.net

User name: myname

Password:

Verify password:

ADVANCED
Advanced Dynamic DNS Settings

Update period (hours): 576

Override External IP: 0.0.0.0

6.3.3 Advanced Dynamic DNS Settings

Update period (hours). (Default: 576.) The time between periodic updates to the Dynamic DNS if your dynamic IP address has not changed. The timeout period is entered in hours so valid values are from 1 to 8760.

Override External IP. The external IP is usually configured automatically during connection. However, in situations where the unit is within a private network behind a firewall or router, the network's external IP address will have to be manually configured in this field.

You may find out what your external IP address is by going to <http://myip.dnsomatic.com/> in a web browser.

6.3.4 Known Hosts Configuration

The Known Hosts Configuration feature allows you to map a name (printer, scanner, laptop, etc.) to an IP address of a device on the network. This assigns a new hostname that can be used to conveniently identify a device within the network, such as an office printer.

Click **Add** to name a device in your network.

Fill in the following fields:

- **Hostname:** Choose a name that is meaningful to you. No spaces are allowed in this field.
- **IP address:** The address of the device within your network.

EXAMPLE: a personal laptop with IP address 192.168.0.164 could be assigned the name "MyLaptop".

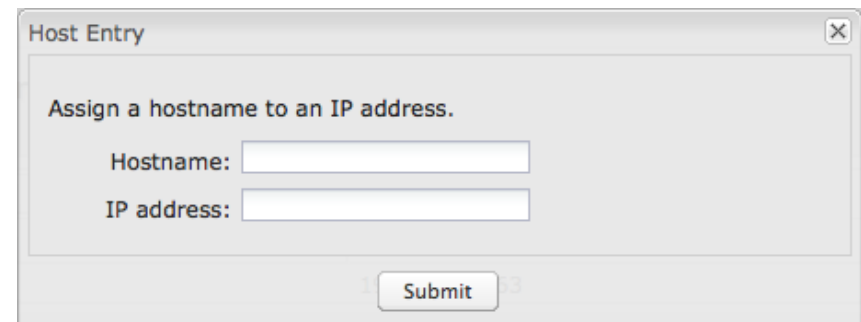
Since the assigned name is mapped to an IP address, the device's IP address should not change. To ensure that the device keeps the same IP address, go to the "Reservations" section under **Network Settings** → **DHCP Server** and reserve the IP address for the device.



Known Hosts Configuration

Buttons: Add, Edit, Remove

Hostname	IP address
<input type="checkbox"/> MyLaptop	192.168.0.164



Host Entry

Assign a hostname to an IP address.

Hostname:

IP address:

Submit

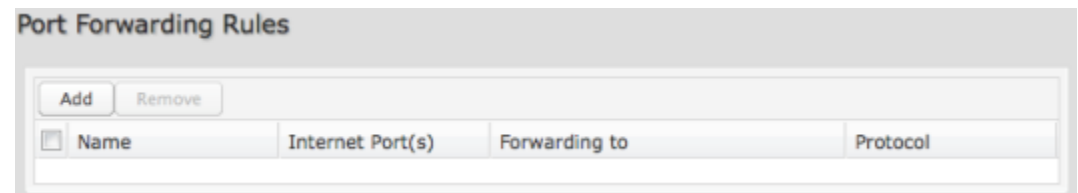
6.4 Firewall (Advanced Mode only)

The router automatically provides a firewall. Unless you configure the router to the contrary, the router does not respond to unsolicited incoming requests on any port, thereby making your LAN invisible to cyber attackers.

However, some network applications cannot run with a tight firewall. Those applications need to selectively open ports in the firewall to function correctly. The options on this page control ways of opening the firewall to address the needs of specific types of applications.

6.4.1 Port Forwarding Rules

A port forwarding rule allows traffic from the internet to reach a computer on the inside of your network. For example, a port forwarding rule might be used to run a Web server.



Exercise caution when adding new rules as they impact the security of your network.

Click **Add** to create a new port forwarding rule.

Add New Port Forwarding Rule: page 1

- **Name:** Name your rule.
- **Description:** Enter a short description of this rule for future reference.
- Click **Next** to continue.



Add New Port Forwarding Rule: page 2

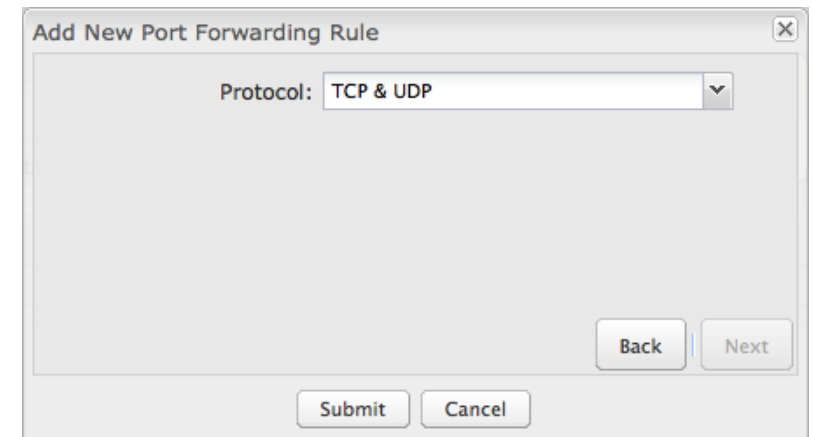
- **Use Port Range:** Changes the selection options to allow you to input a range of ports (if desired).
- **Internet Port(s):** The port number(s) as you want it defined on the internet. Typically these will be the same as the local port numbers, but they do not have to be. These numbers will be mapped to the local port numbers.
- **Local Computer:** Select the IP address of an attached device from the dropdown menu, or manually input the IP address of a device.
- **Local Port(s):** The port number(s) that corresponds to the service (Web server, FTP, etc) on a local computer or device.

For example, you might input “80” in the **Local Port(s)** field to open a port for a Web server on a computer within your network. The **Internet Port(s)** field could then also be 80, or you could choose another port number that will be used across the internet to access your Web server. If you choose a number other than 80 for the internet Port, connections to that number will be mapped to 80—and therefore the Web server—within your network.



Add New Port Forwarding Rule: page 3

- **Protocol:** Select from the following options in the dropdown menu:
 - TCP
 - UDP
 - TCP & UDP
- Click **Submit** to save your completed port forwarding rule.



6.4.2 IP Filter Rules

An "Incoming" IP filter rule restricts remote access to computers on your local network. "Outgoing" filter rules prevent computers on your local network from initiating communication to the address range specified in the rule.

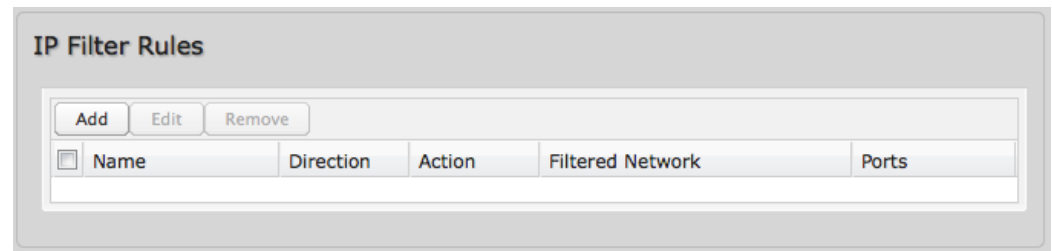
This feature is especially useful when combined with port forwarding and/or DMZ to restrict remote access to a specified host or network range. For example, in order to host a server you might have opened ports with a port forwarding rule that could expose your LAN to cyber attacks. With an incoming IP filter rule, you can restrict the access to your LAN to only known devices.

- **Name:** Name your rule.
- **Direction:** "Incoming" or "Outgoing"
- **Action:** "Allow" or "Deny"
- **Start Port:** Use for a single port or a range of ports.
- **End Port:** Use for a single port or a range of ports.
- **Network Address**
- **Subnet Mask**

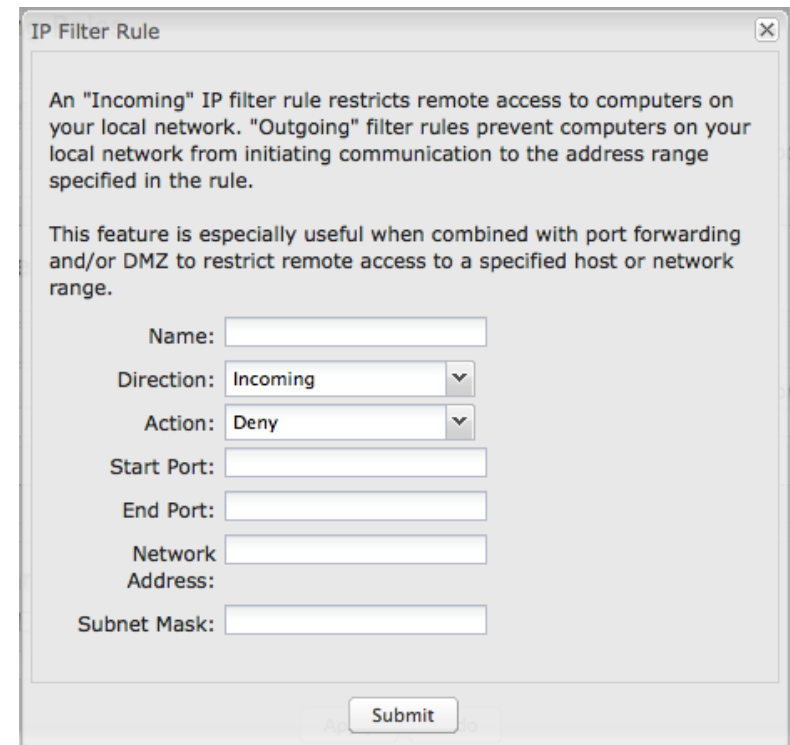
Use **Start Port**, **End Port**, **Network Address**, and **Subnet Mask** to specify the ports and addresses for which the rule applies. You can specify a range of ports or a single port (by inputting the same value in both port fields). Similarly, the subnet mask can be used to define either a range of addresses (i.e. 255.255.255.0) or a single address (255.255.255.255).

Example of an IP Filter Rule: Suppose you have opened a port in your firewall in order to run a server. Someone, Johnny, is abusing that opening, so you would like to restrict his access. Create a rule that will deny Johnny's IP address.

- **Name:** No more Johnny
- **Direction:** Incoming
- **Action:** Deny



Name	Direction	Action	Filtered Network	Ports



IP Filter Rule

An "Incoming" IP filter rule restricts remote access to computers on your local network. "Outgoing" filter rules prevent computers on your local network from initiating communication to the address range specified in the rule.

This feature is especially useful when combined with port forwarding and/or DMZ to restrict remote access to a specified host or network range.

Name:

Direction:

Action:

Start Port:

End Port:

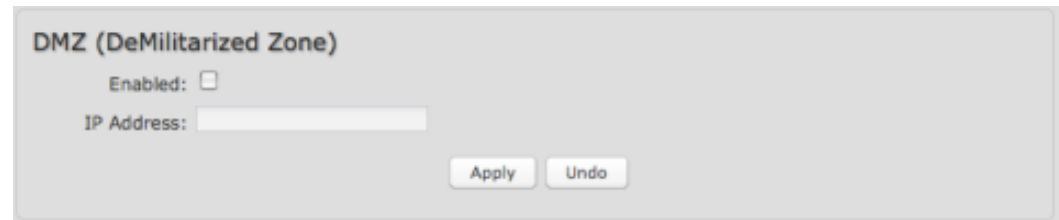
Network Address:

Subnet Mask:

- **Start Port:** 80
- **End Port:** 80
- **Network Address:** 172.22.24.160 (Johnny's IP address)
- **Subnet Mask:** 255.255.255.255 (This subnet mask restricts the rule to one single address).

6.4.3 DMZ (DeMilitarized Zone)

A DMZ host is effectively not firewalled in the sense that any computer on the internet may attempt to remotely access network services at the DMZ IP address. Typical uses involve running a public Web server or sharing files.

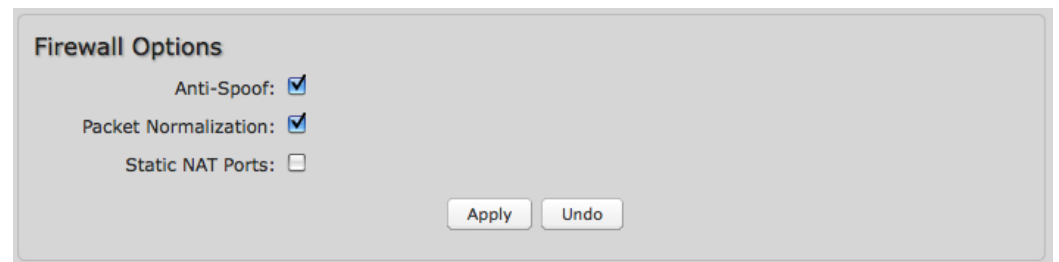


Input the **IP Address** of a single device in your network to create a DeMilitarized Zone for that device. To ensure that the IP address of the selected device remains consistent, go to the “Reservations” section under **Network Settings** → **DHCP Server** and reserve the IP address for the device.

As with port forwarding, use caution when enabling the DMZ feature as it can threaten the security of your network. Only use DMZ as a last resort.

6.4.4 Firewall Options

Anti-Spoof: Anti-Spoof checks help protect against malicious users faking the source address in packets they transmit in order to either hide themselves or to impersonate someone else. Once the user has spoofed their address they can launch a network attack without revealing the true source of the attack or attempt to gain access to network services that are restricted to certain addresses.



Packet Normalization: Normalizing packets helps secure the router in untrusted environments. It does so by "scrubbing" packets that are ambiguous or might represent a break-in attempt. Packet Normalization also helps insure reliable connectivity for some WAN devices such as WiMAX modems. Only disable this option if you are sure you do not need it.

Static NAT Ports: If enabled the source port does not translate in TCP and UDP packets during NAT. Some NAT traversal protocols such as STUN(T) require that the source port stay the same when traversing the firewall.

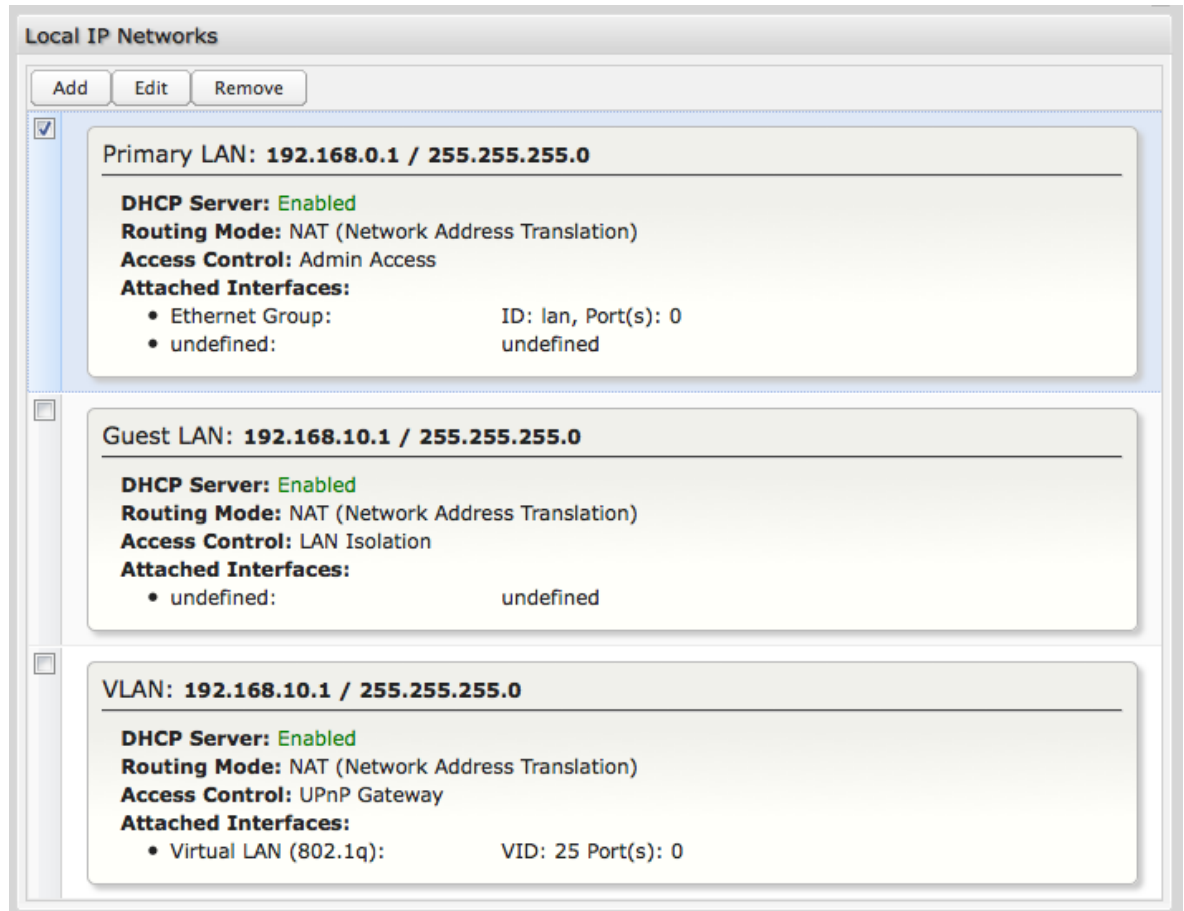
6.5 Local Networks

This section is used to configure the settings for networks created by your router.

The user can set up multiple networks on the IBR650, each with its own unique configuration and its own selection of interfaces. Each local network can be attached to either of the following types of interfaces:

- Ethernet
- VLAN

For example, one network might be just an isolated network for guests, while another might be the main network with administrative access and a VLAN interface.



The screenshot displays the 'Local IP Networks' configuration window. It features three network entries, each with a checkbox on the left and a set of configuration details on the right. The 'Primary LAN' entry is selected (checkbox checked). The 'Guest LAN' and 'VLAN' entries are not selected (checkboxes unchecked).

Network Name	IP Address / Subnet	DHCP Server	Routing Mode	Access Control	Attached Interfaces
Primary LAN	192.168.0.1 / 255.255.255.0	Enabled	NAT (Network Address Translation)	Admin Access	Ethernet Group: ID: lan, Port(s): 0 undefined: undefined
Guest LAN	192.168.10.1 / 255.255.255.0	Enabled	NAT (Network Address Translation)	LAN Isolation	undefined: undefined
VLAN	192.168.10.1 / 255.255.255.0	Enabled	NAT (Network Address Translation)	UPnP Gateway	Virtual LAN (802.1q): VID: 25 Port(s): 0

6.5.1 Local IP Networks

Local IP Networks displays the following information for each network:

- **Network Name**
- **IP address/Netmask**
- **DHCP Server** (Enabled/Disabled)
- **Routing Mode** (NAT, Standard, IP Passthrough, Disabled)
- **Access Control** (Admin Access, UPnP Gateway, LAN Isolation)
- **Attached Interfaces** (Ethernet group(s) and/or VLAN)

Primary LAN: **192.168.0.1 / 255.255.255.0**

DHCP Server: Enabled

Routing Mode: NAT (Network Address Translation)

Access Control: Admin Access

Attached Interfaces:

- Ethernet Group: ID: lan, Port(s): 0
- undefined: undefined

Click **Add** to configure a new network, or select an existing network and click **Edit** to view configuration options.

6.5.2 Local Network Editor

The **Local Network Editor** contains the following tabs: IP Settings, Interfaces, Access Control, and DHCP Server.

IP Settings:

Name: This primarily helps to identify this network during other administration tasks.

Hostname: [Default: cp (for CradlePoint)] The hostname is the DNS name associated with the router's local area network IP address.

NOTE: You can access the router's administration pages by typing the hostname into your browser, so if you change "cp" to another hostname, you can access the administration pages through the new hostname.

IP Address: This is the address used by the router for local area network communication. Changes to this parameter may require a restart to computers on this network.

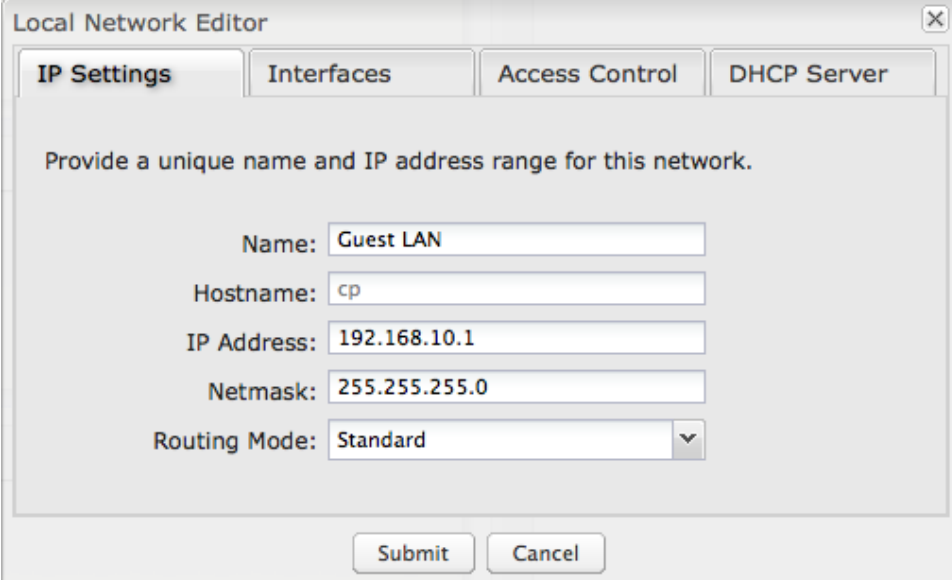
Each network must have a distinct IP address. Most users will want an address from one of the following private IP ranges:

- 10.0.0.1 - 10.255.255.1
- 172.16.0.1 - 172.31.255.1
- 192.168.0.1 - 192.168.255.1

NOTE: The final number does not have to be 1, but it is a simple, logical convention for routers that leaves higher numbers free for other devices.

Netmask: (Default: 255.255.255.0) The netmask controls how many IP addresses can be used in this network. The default value allows for 254 IP addresses, which is enough in most cases.

Routing Mode: (Default: NAT) Each network can use a unique routing mode to connect to the internet and other local networks. NAT is desirable for most configurations. Select from the following options in the dropdown list:



Local Network Editor

IP Settings | Interfaces | Access Control | DHCP Server

Provide a unique name and IP address range for this network.

Name:

Hostname:

IP Address:

Netmask:

Routing Mode:

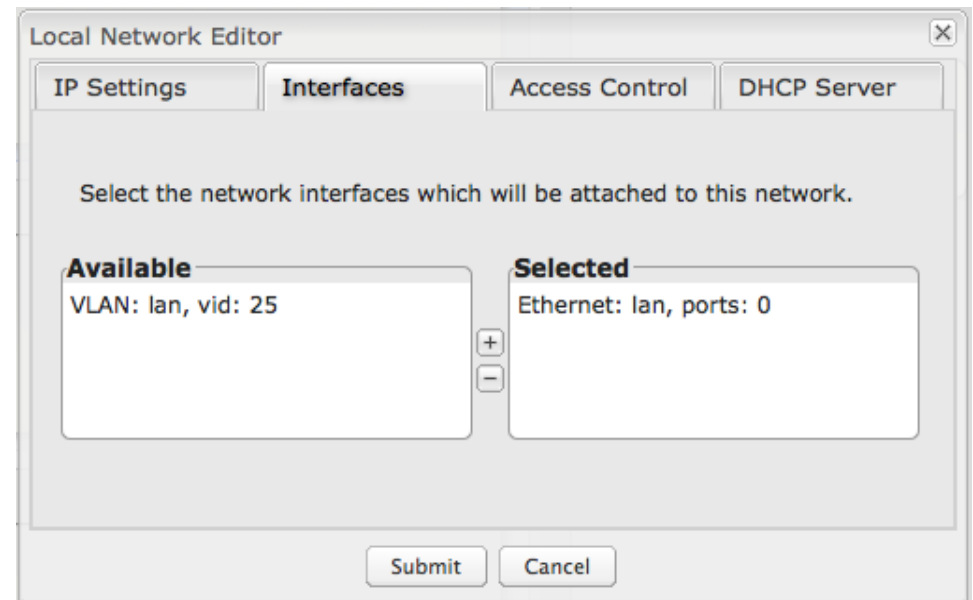
Submit Cancel

- **NAT:** Network Address Translation hides private IP addresses behind the router's IP address. This is the simplest and most common choice for users, because NAT does the translation work for you.
- **Standard:** NAT-less routing. If you select **Standard**, you must separately configure your IP addresses so that they will be publically accessible. Typically you will not select this option unless you have a specific reason to bypass NAT.
- **IP Passthrough:** IP Passthrough passes the IP address given by the modem WAN through the router. All Ethernet ports must be in LAN mode or Disabled mode, and Hotspot, VPN, and GRE must be disabled.
- **Disabled:** Disable this network.

Interfaces:

Select network interfaces to attach to this network. Choose from Ethernet ports and VLAN interfaces. Double-click on any of the interfaces shown on the left in the **Available** section to move them to the **Selected** section on the right (or highlight an interface and click the + button). To deselect an interface, double-click on an interface in the **Selected** section (or highlight the interface and click the – button).

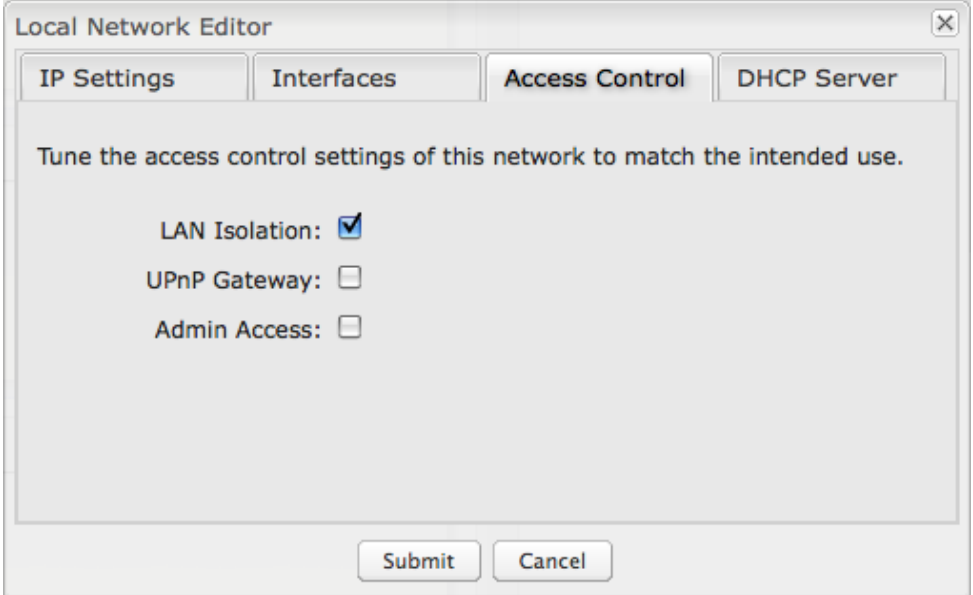
If you want more interface options, you must configure additional Ethernet port groups and VLAN interfaces separately. See the **Local Network Interfaces** section below (on this same administration page: **Network Settings** → **Local Networks**).



Access Control:

Tune the access control settings of this network to match the intended use. Simply select or deselect any of the following:

- **LAN Isolation:** When checked, this network will NOT be allowed to communicate with other local networks.
- **UPnP Gateway:** Select the UPnP (Universal Plug and Play) option if you want to enable the UPnP Gateway service for computers on this network.
- **Admin Access:** When enabled, users may access these administration pages on this network.



Local Network Editor

IP Settings | Interfaces | **Access Control** | DHCP Server

Tune the access control settings of this network to match the intended use.

LAN Isolation:

UPnP Gateway:

Admin Access:

Submit Cancel

DHCP Server:

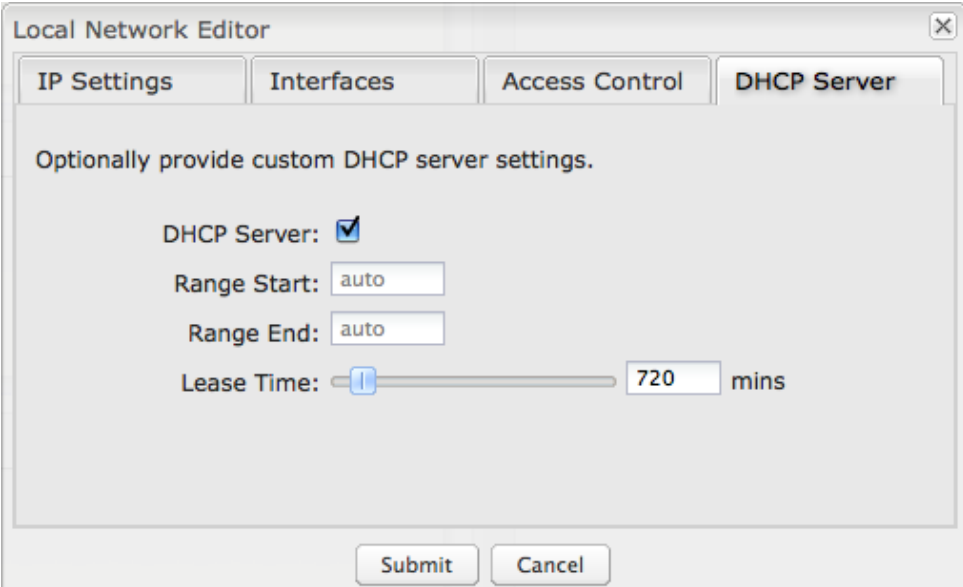
Changing settings for the DHCP server is optional. The default selections are almost always sufficient.

DHCP Server: (Default: Enabled) When the DHCP server is enabled, users of your network will be able to automatically connect to the internet without any special configuration. **It is recommended that you leave this enabled.** Disabling the DHCP server is only recommended if you have another DHCP server on your network and it is configured properly.

Range Start and Range End: These designate the range of values in the reserved pool of IP addresses for the DHCP server. Values within this range will be given to any DHCP enabled computers on your network. The default values are almost always sufficient (default: 72 to 200, as in 192.168.0.72 to 192.168.0.200).

Example: The IBR650 uses an IP address of 192.168.0.1 for its primary network by default. A computer designated as a Web server has a static IP address of 192.168.0.3. Another computer is designated as an FTP server with a static IP address of 192.168.0.4. The starting IP address for the DHCP server needs to be 192.168.0.5 or higher.

Lease Time: [Default: 720 minutes (12 hours)] The lease time specifies how long DHCP-enabled computers will wait before requesting a new DHCP lease. Smaller values are better suited to busy environments.



The screenshot shows the 'Local Network Editor' window with the 'DHCP Server' tab selected. The settings are as follows:

- DHCP Server:** (checked)
- Range Start:** auto
- Range End:** auto
- Lease Time:** 720 mins (indicated by a slider and a text box)

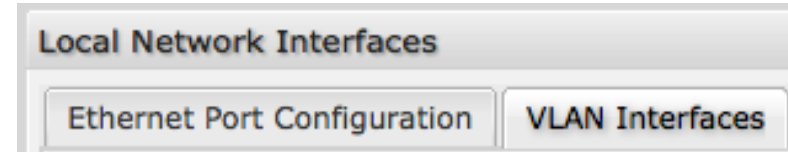
Buttons for 'Submit' and 'Cancel' are visible at the bottom of the window.

6.5.3 Local Network Interfaces

Each LAN type—Ethernet and VLAN—has a separate section with configuration options. Unless the default configuration is sufficient, **YOU MUST CONFIGURE EACH INTERFACE SEPARATELY** in order to create the desired interface options for a network. You can then select these interfaces to add to a network in the **Local Network Editor** (see above).

Select from the following tabs:

- **Ethernet Port Configuration**
- **VLAN Interfaces**



Ethernet Port Configuration

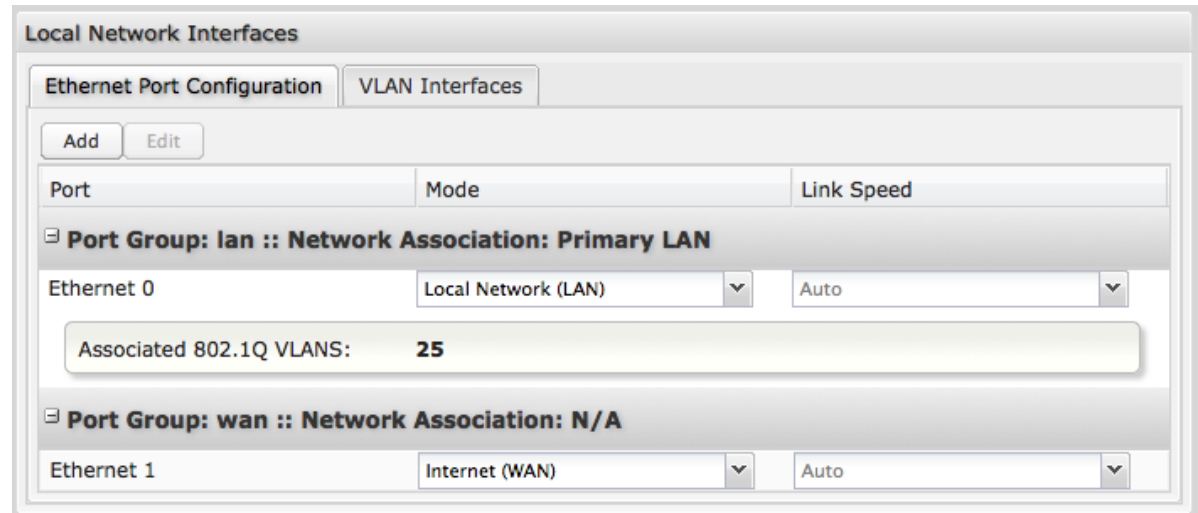
Ethernet Port Configuration provides controls for your router's Ethernet ports. There are two ports: one set as LAN and one set as WAN. While default settings will be sufficient in most circumstances, you have the ability to control: **Mode** (WAN or LAN) and **Link Speed**. Additional controls for WAN ports are available in [Internet](#) → [Ethernet Settings](#).

Mode: WAN or LAN.

- **Internet (WAN)** is used to connect to another network such as a hotel or office wired network. The WAN connection is used as a possible source of internet for the IBR650.
- **Local Network (LAN)** is for connecting a computer or similar device directly to the router with an Ethernet cable.

Link Speed: Default setting is Auto. The Auto setting is preferred in most cases.

- Auto
- 10Mbps - Half Duplex
- 10Mbps - Full Duplex
- 100Mbps - Half Duplex
- 100Mbps - Full Duplex
- 1000Mbps - Full Duplex



Port	Mode	Link Speed
Port Group: lan :: Network Association: Primary LAN		
Ethernet 0	Local Network (LAN)	Auto
Associated 802.1Q VLANs: 25		
Port Group: wan :: Network Association: N/A		
Ethernet 1	Internet (WAN)	Auto

Ethernet Port Group Editor

A Port Group represents a logical grouping of Ethernet ports. Any computers physically connected to ports in a group will be allowed to freely communicate with each other.

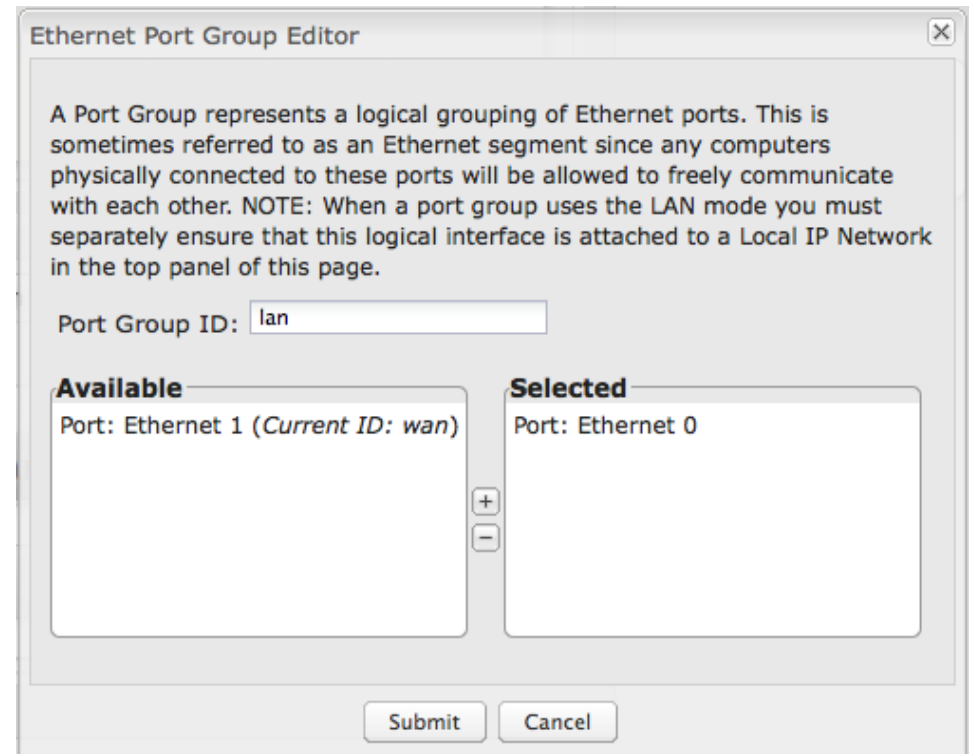
Since the IBR650 has only 2 Ethernet ports, this feature will rarely be necessary. It is possible, however, to set both ports as LAN ports (or both ports as WAN ports) and then either separate them or group them together. (For example, you could use one for the primary network and one for a guest network, or you could use both for the primary network.)

NOTE: When a port group uses the LAN mode you must separately ensure that this logical interface is attached to a **Local IP Network** in the top panel of this page.

Port Group ID: The Group ID field provides a reference to this grouping of ports to be used in other parts of the router configuration. For example, this ID is referenced in the

Local IP Networks configuration to attach this logical group of Ethernet ports with a network configuration. Use a simple short text phrase to describe a group, such as "main", "guestports", "backup_wan", etc.

Select one or more ports to create a port group that you can subsequently attach to a network in the **Local Network Editor**. Double-click on any of the Ethernet ports shown on the left in the **Available** section to move them to the **Selected** section on the right (or highlight a port and click the + button). To deselect an Ethernet port, double-click on an interface in the **Selected** section (or highlight the port and click the – button).



VLAN Interfaces

A virtual local area network, or VLAN, functions as any other physical LAN, but it enables computers and other devices to be grouped together even if they are not physically attached to the same network switch.

To enable a VLAN, select a VID (virtual LAN ID) and a group of Ethernet ports through which users can access the VLAN. Then go back up to the **Local Network Editor** to attach your new VLAN to a network. To use a VLAN, the VID must be shared with another router or similar device so that multiple physical networks have access to the one virtual network.

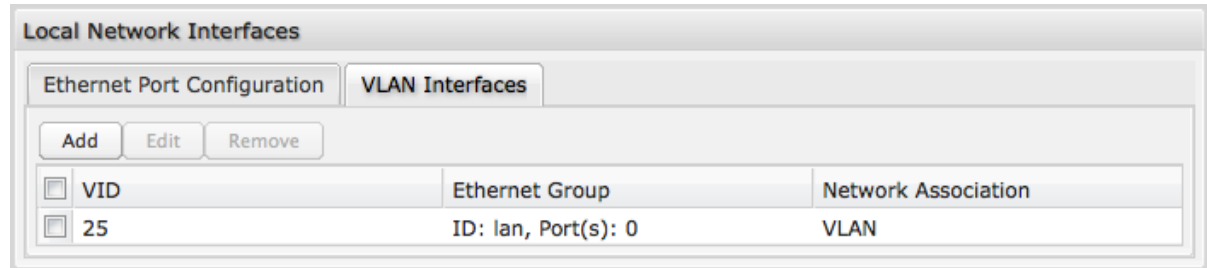
Click **Add** to create a new VLAN interface.

VLAN Editor

VID: An integer value that is the Virtual LAN ID.

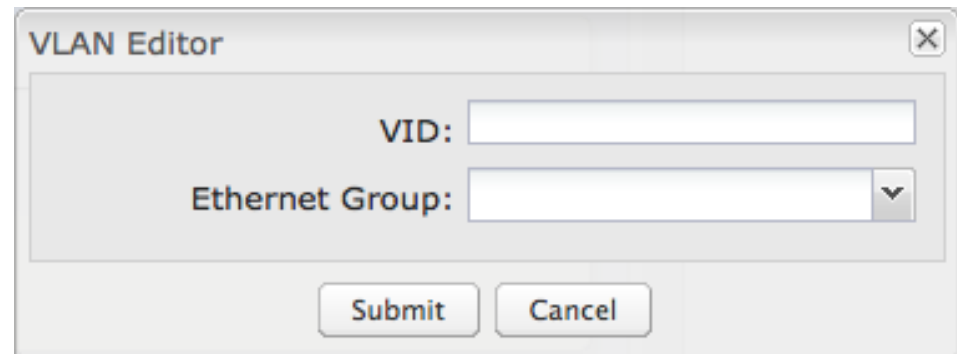
Ethernet Group: Select the LAN ports with which you want to associate the VLAN ID from a dropdown list. Your Ethernet group must be created separately under **Ethernet Port Configuration**.

Click **Submit** to save your configured VLAN.



The screenshot shows the 'Local Network Interfaces' configuration window. It has two tabs: 'Ethernet Port Configuration' and 'VLAN Interfaces'. The 'VLAN Interfaces' tab is active. Below the tabs are three buttons: 'Add', 'Edit', and 'Remove'. A table below the buttons lists the configured VLANs.

<input type="checkbox"/>	VID	Ethernet Group	Network Association
<input type="checkbox"/>	25	ID: lan, Port(s): 0	VLAN



The screenshot shows the 'VLAN Editor' dialog box. It contains two input fields: 'VID:' followed by a text box, and 'Ethernet Group:' followed by a dropdown menu. At the bottom of the dialog are two buttons: 'Submit' and 'Cancel'.

6.6 Routing (Advanced Mode only)

Add a new static route to the IP routing table or edit/remove an existing route.

Static routes are unnecessary for most users. They are typically only used in networks with more than one layer, such as when there is a network within a network so that packet destinations are hidden behind an additional router. Adding a static route is a way of telling the router about an additional step that packets will need to take to reach their destination.

Click **Add** to create a new static route.

IP/Network Address: The IP address of the target network or host.

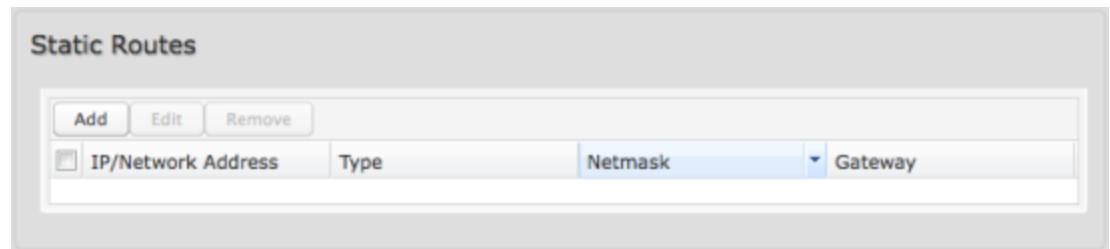
Type: Select from a dropdown list to specify the type of the target:

- Network
- Host

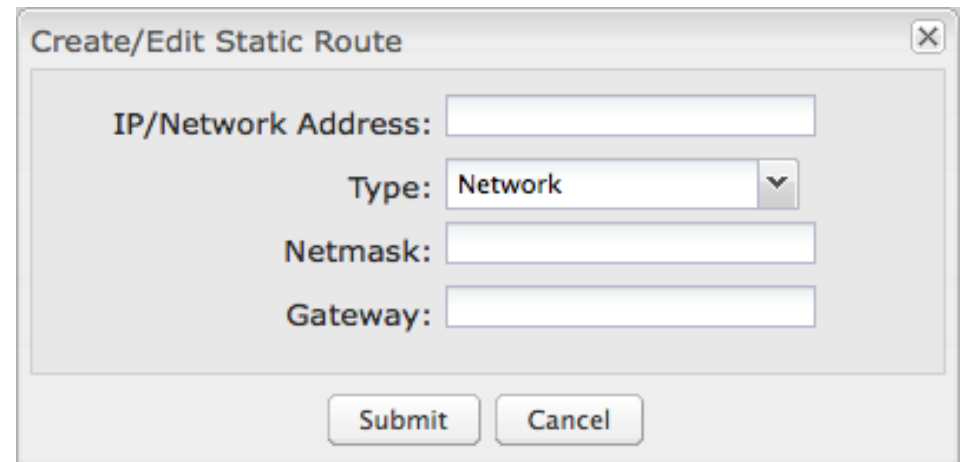
Netmask: The Netmask, along with the IP address, defines the network the computer belongs to and which other IP addresses the computer can see in the same LAN. An IP address of 192.168.0.1 along with a Netmask of 255.255.255.0 defines a network with 256 available IP addresses from 192.168.0.0 to 192.168.0.255.

NOTE: 255.255.255.255 is used to signify only the host that was entered in the IP/Network Address field.

Gateway: Specifies the next hop to be taken if this route is used. A gateway of 0.0.0.0 implies there is no next hop, and the IP address matched is directly connected to the router on the interface specified: **LAN** or **WAN**.



IP/Network Address	Type	Netmask	Gateway



IP/Network Address:
 Type: Network
 Netmask:
 Gateway:

6.7 WiPipe QoS (Advanced Mode only)

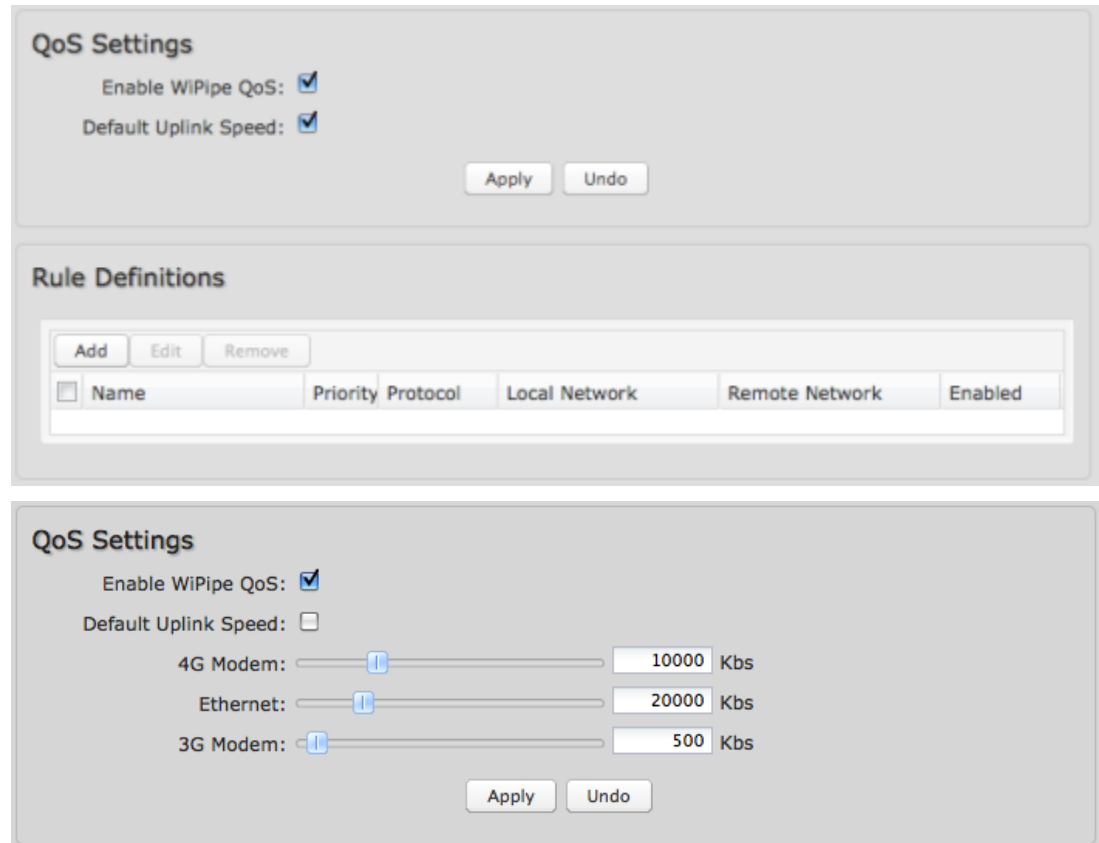
When WiPipe QoS (Quality of Service/Traffic Shaping) is enabled, the router will control the flow of internet traffic according to the user-defined rules. In other words, Traffic Shaping improves performance by allowing the user to prioritize applications.

Enable WiPipe QoS: Click on this box to open options for controlling internet traffic. You can control Uplink Speed values or define your own Traffic Shaping rules. When WiPipe QoS is enabled, the router restricts the flow of outbound traffic so as not to exceed the WAN uplink bandwidth.

Default Uplink Speed: By default, the Uplink Speed values are set as fast as possible. Click to deselect default values if you want to restrict the maximum uplink speed for the internet source(s) you are using (4G Modem, Ethernet, and/or 3G Modem).

You might do this to reduce overall bandwidth use for cost reasons or to prioritize available bandwidth for download. It is recommended that you experiment with different values for your particular internet connection to yield the best results.

NOTE: Uplink speed is the speed at which data can be transferred to your ISP. You can test your uplink speed with a service such as speedtest.net.



6.7.1 Add Traffic Shaping Rule

A Traffic Shaping Rule identifies a specific message flow and assigns a priority to that flow. For most applications, automatic classification will be adequate, and specific Traffic Shaping Rules will not be required.

Traffic Shaping supports overlap between rules, where more than one rule can match for a specific message flow. If more than one rule matches, the rule with the highest priority will be used.

Name. Create a name for the rule that is meaningful to you.

Protocol. The protocol used by the messages: TCP, UDP, or ICMP. Select “Any” if your rule does not control a specific type of message that uses a specific protocol.

Priority. The priority of the message flow is entered here—15 receives the highest priority (most urgent) and 0 receives the lowest priority (least urgent).

Enable. Specifies whether the entry will be active or inactive.

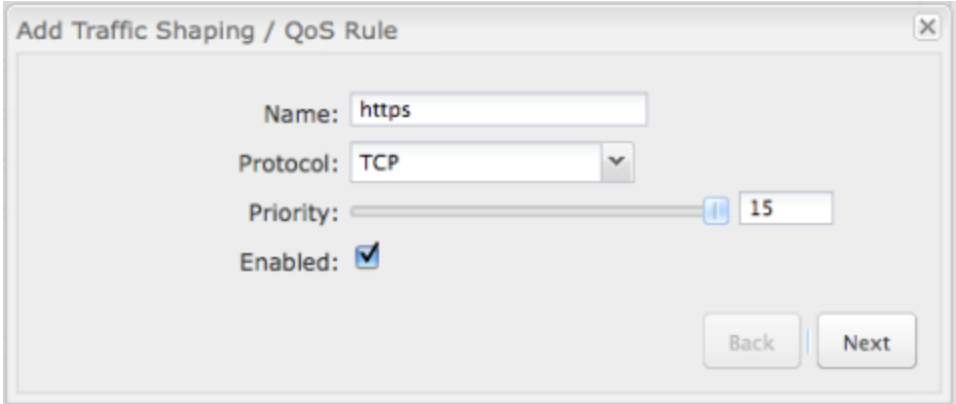
Click **Next** to continue to the next page.

Example: You sometimes work from home, and you share bandwidth with your children. You can set a rule to prioritize your computer and a rule to reduce priority for their computer. To prioritize your computer, you might use the following settings:

- **Name:** My Computer
- **Protocol:** Any (Your computer will use all three protocols; there’s no reason to restrict this rule to just one protocol)
- **Priority:** 15

To lower the priority of your children’s computer, you might use these settings:

- **Name:** Kids’ Computer
- **Protocol:** Any
- **Priority:** 2



The second page allows you to designate the computer(s) on the local network for which you want to adjust traffic priority.

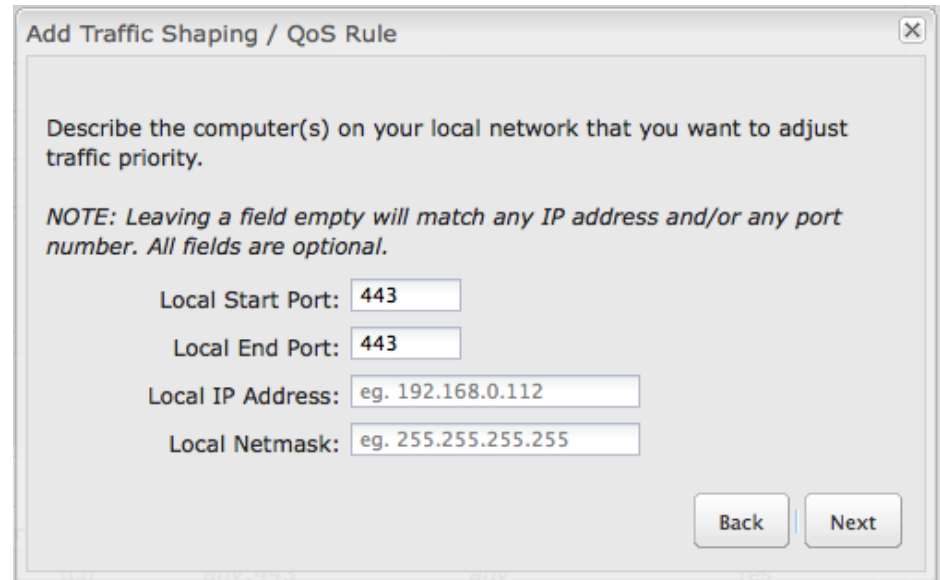
NOTE: Leaving a field empty will match any IP address and/or any port number. **All fields are optional.**

Local Start Port and **Local End Port:** The rule applies to a flow of messages whose LAN-side port number is within the range set here.

Local IP Address: The rule applies to a flow of messages with this LAN-side IP address.

Local Netmask: The rule applies to a flow of messages with this LAN-side netmask.

Example (continued from previous page): To select your computer or your kids' computer, you only need to input the Local IP Address. You can ignore the other settings on this page.



Add Traffic Shaping / QoS Rule

Describe the computer(s) on your local network that you want to adjust traffic priority.

NOTE: Leaving a field empty will match any IP address and/or any port number. All fields are optional.

Local Start Port:

Local End Port:

Local IP Address:

Local Netmask:

The third and last page allows you to designate the network or server on the internet for which you want to shape traffic.

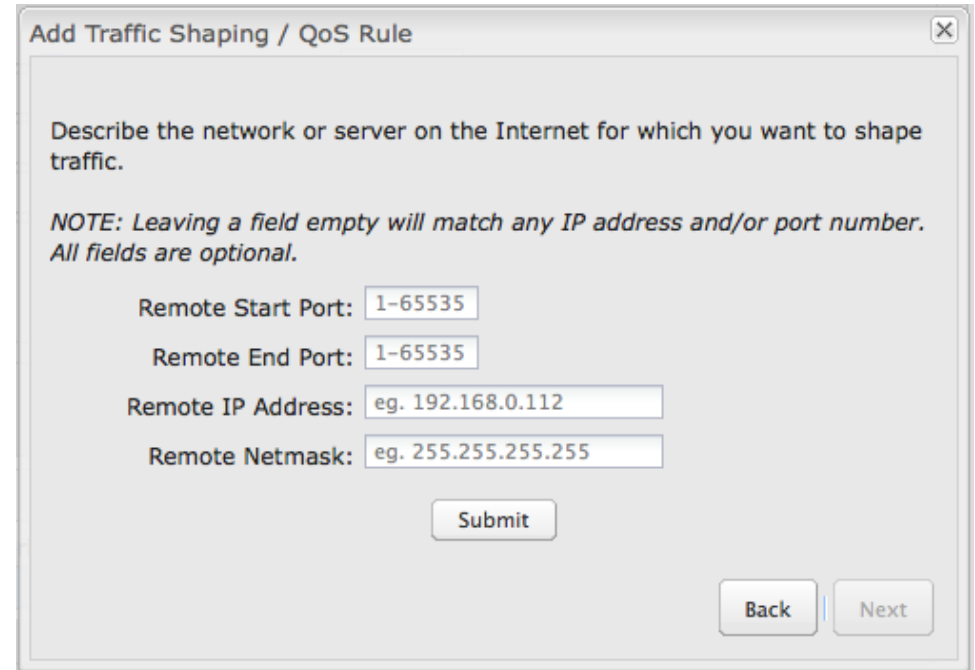
NOTE: Leaving a field empty will match any IP address and/or any port number. **All fields are optional.**

Remote Start Port and Remote End Port: The rule applies to a flow of messages whose WAN-side port number is within the range set here.

Remote IP Address. The rule applies to a flow of messages with this WAN-side IP address.

Remote Netmask. The rule applies to a flow of messages with this WAN-side Netmask.

Submit. Click to record the changes you have made.



Add Traffic Shaping / QoS Rule

Describe the network or server on the Internet for which you want to shape traffic.

NOTE: Leaving a field empty will match any IP address and/or port number. All fields are optional.

Remote Start Port: 1-65535

Remote End Port: 1-65535

Remote IP Address: eg. 192.168.0.112

Remote Netmask: eg. 255.255.255.255

Submit

Back | Next

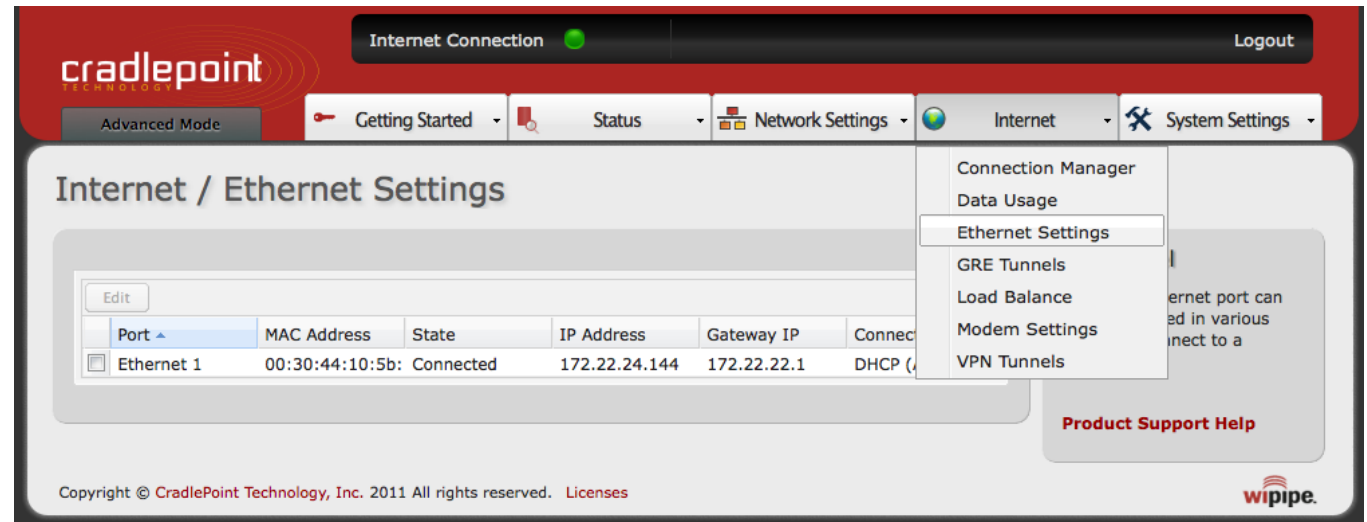
Example (continued from previous page): Since the goal is simply to control which devices in your network get priority, you can ignore all of the remote settings. Leave them blank to include all possibilities.

7 INTERNET

The Internet tab provides access to 7 submenu items for managing a variety of internet connection options.

- Connection Manager
- **Data Usage**
- Ethernet Settings
- **GRE Tunnels**
- **Load Balance**
- Modem Settings
- **VPN Tunnels**

(Data Usage, GRE Tunnels, Load Balance, and VPN Tunnels: Advanced Mode only)



7.1 Connection Manager

The router can establish an uplink via the Ethernet WAN port or the embedded modem. If the primary WAN connection fails the router will automatically attempt to bring up a new link on another device. This feature is called failover. If Load Balance is enabled, multiple WAN devices may be plugged in and each may establish a link.

7.1.1 WAN Interfaces

This is a list of the available interfaces used to access the internet. You can enable, stop, or start devices from this section. By using the priority arrows (the arrows in the red boxes; these show if you have more than one available interface), you can set the interface the router uses by default and the order that it allows failover. To configure a specific interface, use the settings page for that type of interface (e.g. Ethernet Settings page for wired connections).

(ordered by failover priority)

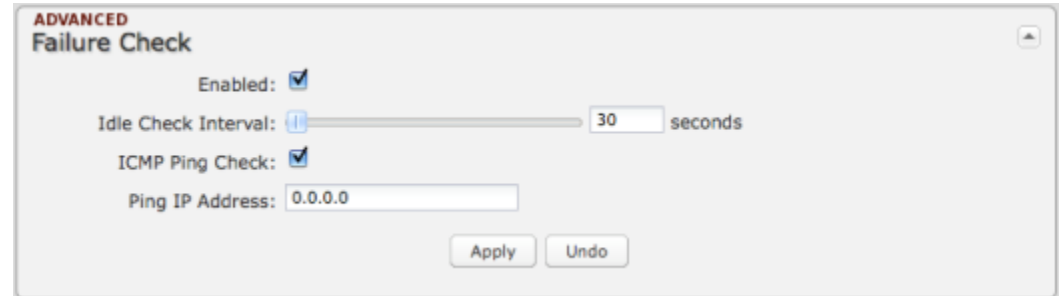
	Device	State	Load Balance	Enabled	Control
↓	Ethernet: port 1	Connected	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Stop
↑	Modem: EVDO Modem, port: 1	Idle	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Start

In the example shown, Ethernet is set as the primary internet source, while the embedded modem is a backup. The Ethernet is “Connected” while the modem is “Idle.”

Load Balance: If this is enabled, the router will use multiple WAN interfaces to increase the data transfer throughput by using any connected WAN interface consecutively. Selecting Load Balance will automatically start the WAN interface and add it to the pool of WAN interfaces to use for data transfer. Turning off Load Balance for an active WAN interface may require the user to restart any current browsing session.

7.1.2 Failure Check (Advanced Mode Only)

If this is enabled, the router will check that the highest priority active WAN interface can get to the internet even if the WAN connection is not actively being used. If the interface goes down, the router will switch to the next highest priority interface available. If this is not selected, the router will still failover to the next highest priority interface but only after the user has attempted to get out to the internet and failed.



Idle Check Interval: The amount of time between each check. (Default: 30 seconds. Range: 10-3600 seconds.)

ICMP Ping Check and **Ping IP Address:** Enable and configure an IP address that the router will use to check if the WAN connection is available. For best results, select an established public IP address.

For example, you might ping Google Public DNS at 8.8.8.8 or Level 3 Communications at 4.2.2.2.

7.1.3 Failback Configuration (Advanced Mode Only)

This is used to configure failback, which is the ability to go back to a higher priority WAN interface if it regains connection to its network.

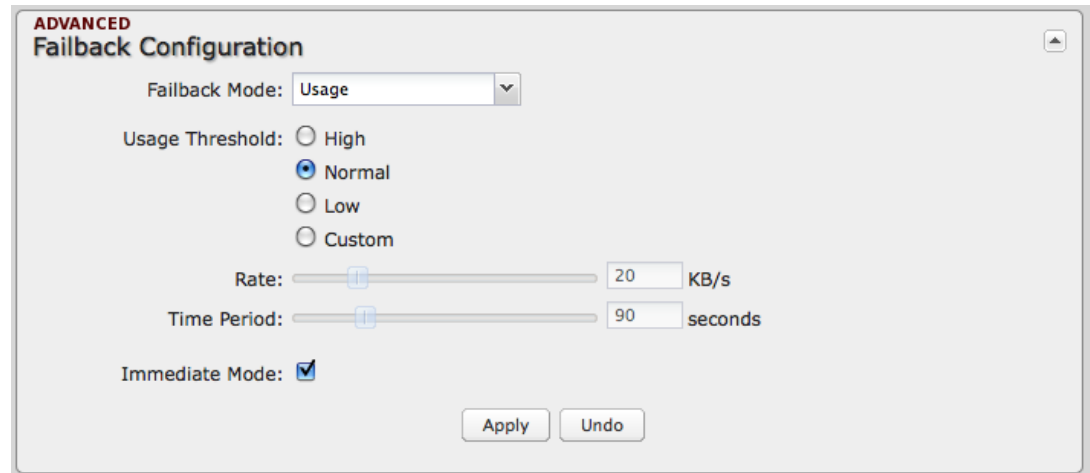
Usage: Fail back based on the amount of data passed over time. This is a good setting for when you have a dual-mode EVDO/WiMAX modem and you are going in and out of WiMAX coverage. If the router has failed over to EVDO it will wait until you have low data usage before bringing down the EVDO connection to check if a WiMAX connection can be made.

- **High** (Rate: 80 KB/s. Time Period: 30 seconds.)
- **Normal** (Rate: 20 KB/s. Time Period: 90 seconds.)
- **Low** (Rate: 10 KB/s. Time Period: 240 seconds.)
- **Custom** (Rate range: 1-100 KB/s. Time Period range: 10-300 seconds.)

Time: Fail back only after a set period of time. (Default: 90 seconds. Range: 10-300 seconds.) This is a good setting if you have a primary wired WAN connection and only use a modem for failover when your wired connection goes down. This ensures that the higher priority interface has remained online for a set period of time before it becomes active (in case the connection is dropping in and out, for example).

Disabled: Deactivate failback mode.

Immediate Mode: Fail back immediately whenever a higher priority interface is plugged in or when there is a priority change. Immediate failback returns you to the use of your preferred internet source more quickly which may have advantages such as reducing the cost of a failover data plan, but it may cause more interruptions in your network than **Usage** or **Time** modes.



ADVANCED
Failback Configuration

Failback Mode: Usage

Usage Threshold: High Normal Low Custom

Rate: 20 KB/s

Time Period: 90 seconds

Immediate Mode:

Apply Undo

7.2 Data Usage (Advanced Mode Only)

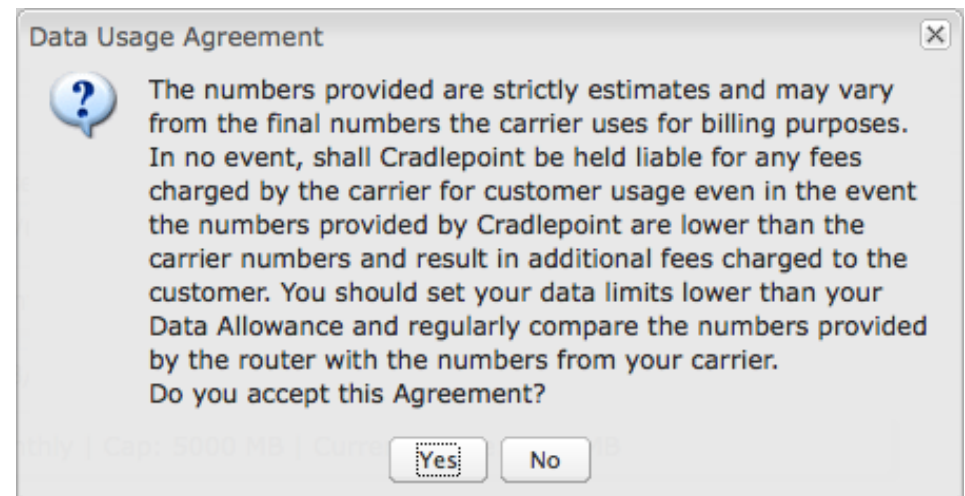
Data Usage Management & Alerts allows you to create and manage rules that help control the data usage of a modem. If you have a limited data plan or a price increase on your plan after a certain amount of usage, a **Data Usage Rule** can help you track these amounts. You can set a rule to shut down use of a modem and/or send a message when you reach a data usage amount you set.

Enable Data Usage: Enabled Disabled

Enable Data Usage: Enabled/Disabled. (Default: Disabled.)

When you select **Enabled**, you will see the **Data Usage Agreement** shown to the right. The purpose of this agreement is to ensure that you understand that the data numbers for the IBR650 may not perfectly match those of your carrier: CradlePoint cannot be held responsible. You must accept the agreement by clicking **Yes** in order to begin creating data usage rules.

Warning: You should set your data limits lower than your Data Allowance and regularly compare the numbers provided by the router with the numbers from your carrier.



7.2.1 Data Usage Rules

The Data Usage Rule display shows basic information for each rule you have created (including rules created with a template). The following information is displayed:

- **Rule Name**
- **Enabled:** True/False
- **Date for Rule Reset**
- **Cycle Type:** Daily, Weekly, or Monthly
- **Cap:** Amount in MB.
- **Current Usage:** Shown as an amount in MB, as a percentage of the cap, and in a bar graph.

<input type="checkbox"/>	Rule Name	Rule resets on	Current Usage percent
<input checked="" type="checkbox"/>	Embedded Modem	(Wed) 10/05/2011	18%
Enabled: True Cycle Type: Monthly Cap: 2000 MB Current Usage: 350 MB			
<input type="checkbox"/>	Ethernet	(Wed) 10/05/2011	33%
Enabled: True Cycle Type: Monthly Cap: 5000 MB Current Usage: 1650.75 MB			

Click **Add** to configure a new Data Usage Rule.

Usage Rule Configuration – page 1

Rule Name: Give your rule a name for later recognition.

WAN Selection: Select from the dropdown list of currently attached WAN devices.

Assigned Usage in MB: Enter a cap amount in megabytes. 1024 megabytes equals 1 gigabyte.

Rule Enabled: (Default: Enabled.) Click to disable.

Click **Next** to continue to page 2.

Data Usage Rule ✕

Usage Rule Configuration

Rule Name:

Wan Selection:

Assigned Usage in MB:

Rule Enabled:

Usage Rule Configuration – page 2

Cycle Type: How often the rule will reset. The data usage amount will be reset at the end of each cycle. Select the length of a cycle from a dropdown menu with the following choices:

- Daily
- Weekly
- Monthly

Cycle Start Date: Select the date you wish the rule to begin. This date will be used to track when the rule will be reset.

August 2011						
S	M	T	W	T	F	S
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3
4	5	6	7	8	9	10

Today

Shutdown WAN on Cap: If selected, the WAN device will shut down when the assigned usage is reached. A cycle reset or a rule deletion will re-enable the device.

Send Alert on Cap: An email alert will be generated and sent when the assigned usage is reached.

WARNING: The SMTP mail server must be configured in System Settings → Device Alerts.

Custom Alert: When checked you enable a second email to be configured for a percentage of the assigned usage.

Percent of Usage (1-1000): If selected, a custom alert will be sent when your data usage reaches this percentage of your usage cap. For example, you could set this at 90 percent so that you know when your usage is nearing 100 percent of the cap.

Data Usage Rule ✕

Usage Rule Configuration

Cycle Type: Monthly ▼

Cycle Start Date:

Shutdown Wan on Cap:

Send Alert on Cap:

Extra Email Alert:

Percent of Usage (1-1000):

Back | Next

Submit | Cancel

7.2.2 Template Configuration

Templates allow you to control multiple WAN devices with the same rule. Each WAN device that matches a template will automatically have its own rule created.

Template configuration				
<input type="button" value="Add"/> <input type="button" value="Edit"/> <input type="button" value="Remove"/>				
<input type="checkbox"/>	Template Name	WAN type	Assigned Usage in MB	Cycle Type
<input type="checkbox"/>	USB data plans	modem	5000	monthly

Click **Add** to configure a new Template rule.

Create a **Template Name** that you can recognize.

The template will apply to one of the following

WAN types:

- All WAN
- All Ethernet
- All Modems

Select one of these types.

The rest of the rule settings options match those in the **Data Usage Rules**. See the section above for additional information about how to configure your template usage rules.

Template Rule Creation ✕

Template Name:

WAN type: All WAN All Ethernet All Modems

Assigned Usage in MB:

Cycle Type: ▾

Cycle Start Date: 1

Shutdown WAN on Cap:

Send Alert on Cap:

Extra Email Alert:

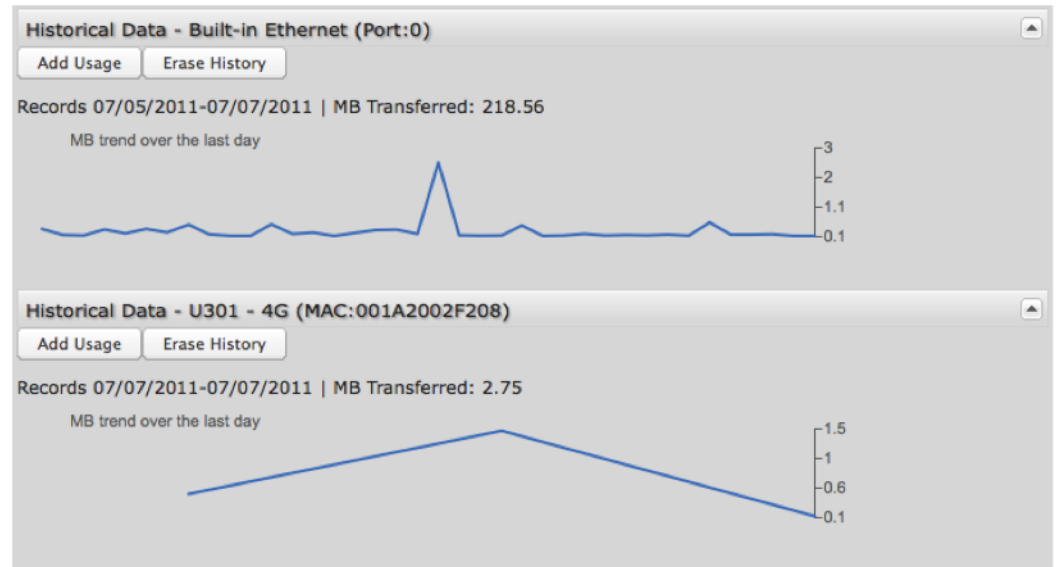
Percent of Usage (1-1000):

7.2.3 Historical Data

Historical Data shows a graph of data usage for each attached WAN source that has an assigned Data Usage Rule. The graph shows the usage trend for one day.

Click **Add Usage** to manually input additional usage for an attached data source. You might do this if you used your modem while not attached to your router and you want to keep an accurate count of your data usage.

Enter the date of usage by using the pop-up calendar. Then enter the total data in MB—both in and out—to update the usage amounts.



Add data usage ✕

Select Date:

Total MB In:

Total MB Out:

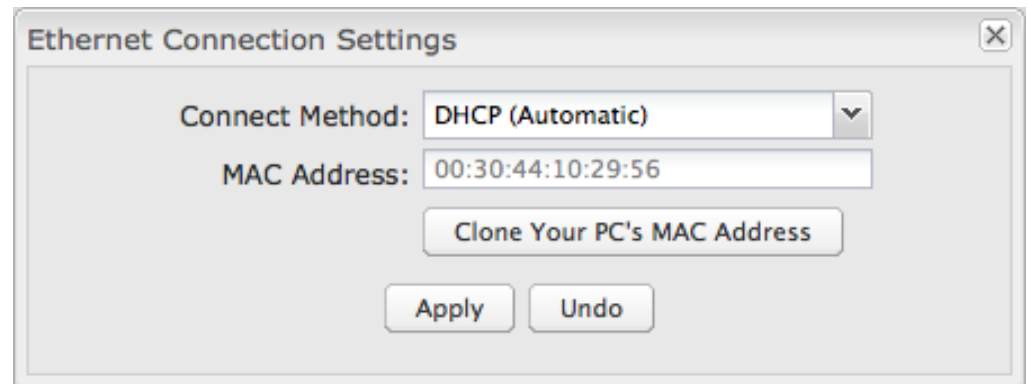
7.3 Ethernet Manager

The Ethernet Manager provides controls for your router's Ethernet WAN ports. By default, only one port is set as a WAN port, but the other port can be reconfigured as a WAN port in **Network Settings** → **Local Networks**.

Edit					
Port	MAC Address	State	IP Address	Gateway IP	Connect Method
<input type="checkbox"/> Ethernet 1	00:30:44:10:5b:	Connected	172.22.24.220	172.22.22.1	DHCP (Automatic)

While default settings for each WAN Ethernet port will be sufficient in most circumstances, you have the ability to control:

- **Connect Method:** DHCP (Automatic), Static (Manual), or PPPoE (Point-to-Point Protocol over Ethernet).
- **MAC Address:** You have the ability to change the MAC address, but typically this is unnecessary. You can match this address with your device's address by clicking: "**Clone Your PC's MAC Address**".



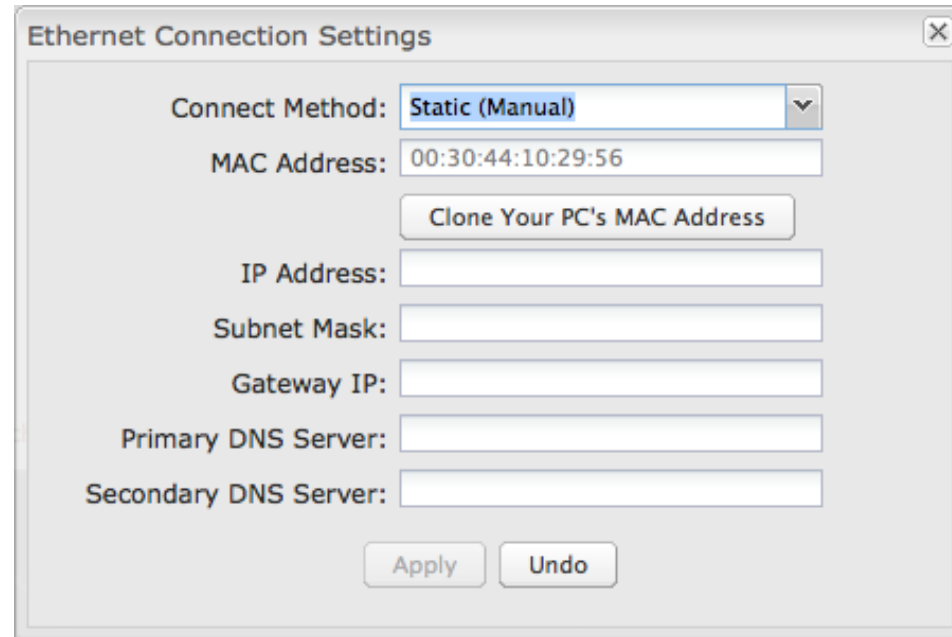
7.3.1 Connect Method

Your router's Ethernet ports are automatically configured for DHCP connection. DHCP (Dynamic Host Configuration Protocol) automatically assigns dynamic IP addresses to devices in your networks. This is preferable in most circumstances.

If you want to use a Static (Manual) or PPPoE connection instead, you will need to fill out additional information.

Static (Manual):

- IP Address
- Subnet Mask
- Gateway IP
- Primary DNS Server
- Secondary DNS Server



Ethernet Connection Settings

Connect Method: **Static (Manual)**

MAC Address: 00:30:44:10:29:56

IP Address:

Subnet Mask:

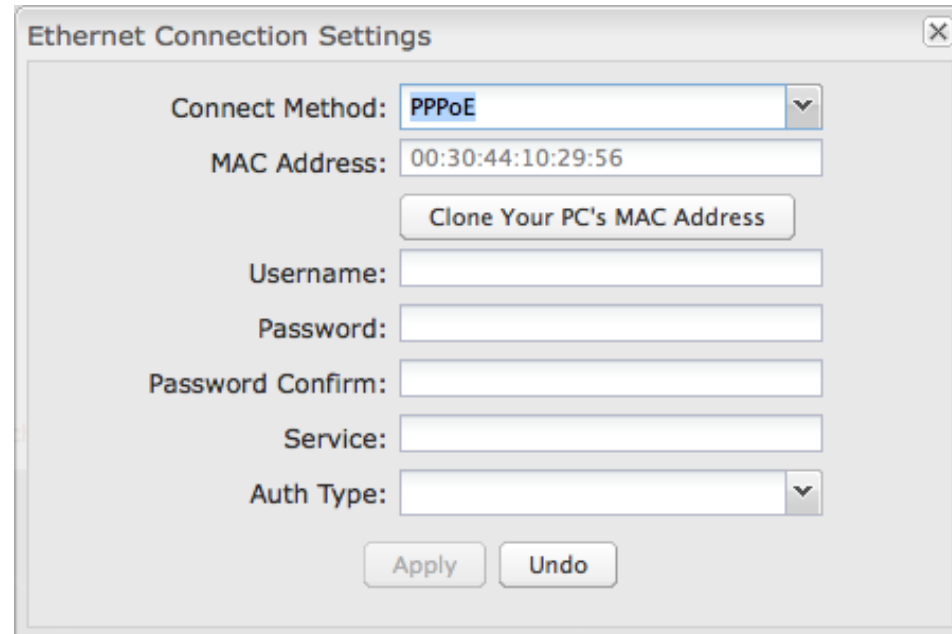
Gateway IP:

Primary DNS Server:

Secondary DNS Server:

PPPoE:

- Username
- Password
- Password Confirm
- Service
- Auth Type: None, PAP, CHAP



Ethernet Connection Settings

Connect Method: **PPPoE**

MAC Address: 00:30:44:10:29:56

Username:

Password:

Password Confirm:

Service:

Auth Type:

7.4 GRE Tunnels (Advanced Mode only)

Generic Routing Encapsulation (GRE) tunnels can be used to create a connection between two private networks. The IBR650 is enabled for either GRE or VPN tunnels. GRE tunnels are simpler to configure and more flexible for different kinds of packet exchanges, but VPN tunnels are much more secure.

GRE Tunnels							
<input type="button" value="Add"/> <input type="button" value="Edit"/> <input type="button" value="Remove"/>							
<input type="checkbox"/>	Name	Local Network	Remote Network	Remote Gateway	Routes	Keep Alive	Enabled
<input type="checkbox"/>	office_tunnel	10.1.1.1 255.255.255.0	10.1.1.2 255.255.255.0	172.22.22.1	1	Yes	Yes

In order to set up a tunnel you must know the following:

- **Local Network** and **Remote Network** addresses for the “**Glue Network**,” the network that is created by the administrator that serves as the “glue” between the networks of the tunnel. Each address must be a different IP address from the same private network, and these addresses together form the endpoints of the tunnel.
- **Remote Gateway**, the public facing WAN IP address that the local gateway is going to connect to.
- Optionally, you might also want to enable the tunnel **Keep Alive** feature to monitor the status of a tunnel and more accurately determine if the tunnel is alive or not.

Click **Add** to configure a new GRE tunnel.

Page 1: General

Tunnel Name: Choose a name that is meaningful to you.

Local Network: This is the local side of the “Glue Network,” a network created by the administrator to form the tunnel. The user creates the IP address inputted here. It must be different from the IP addresses of the networks it is gluing together.

Choose any private IP address from the following three ranges that doesn't match either network:

- 10.0.0.0 - 10.255.255.255
- 172.16.0.0 - 172.31.255.255
- 192.168.0.0 - 192.168.255.255

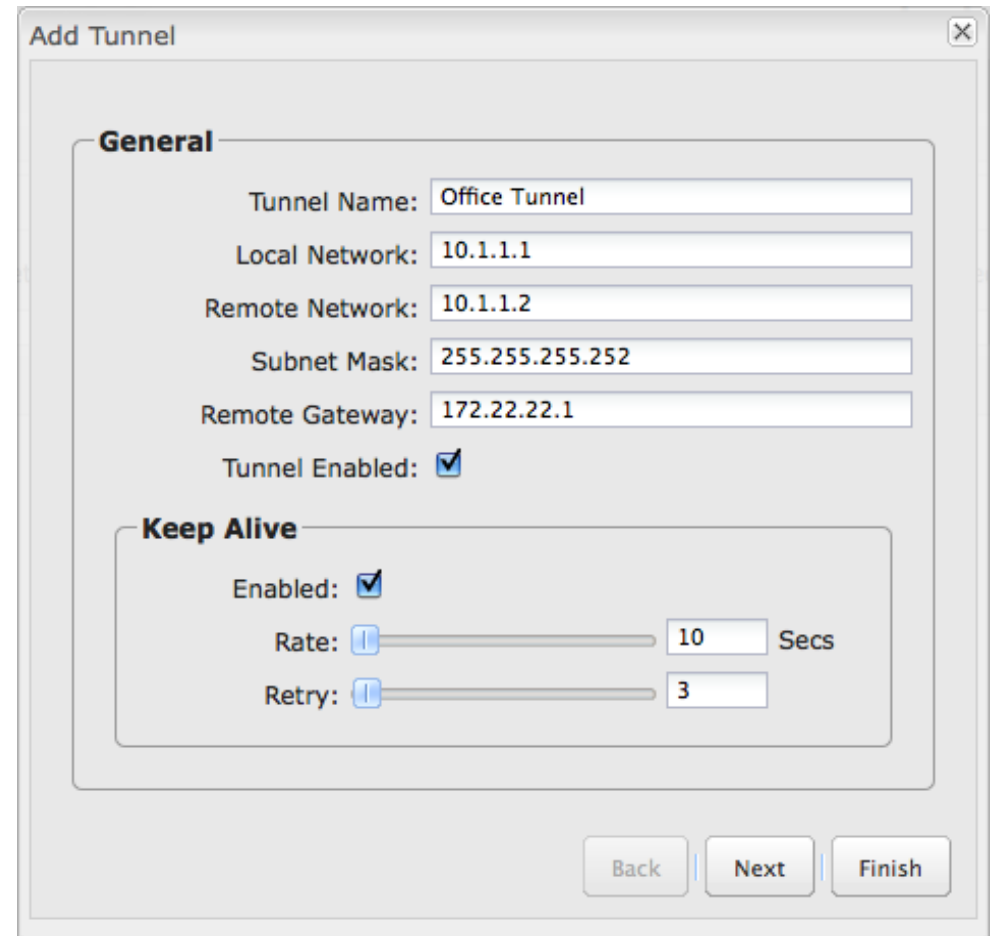
Remote Network: This is the remote side of the “Glue Network.” Again, the user must create an IP address that is distinct from the IP addresses of the networks that are being glued together.

The Remote Network and Local Network values will be flipped when inputted for the other side of the tunnel configuration.

Subnet Mask: This is the subnet mask for the Glue Network. The Local and Remote Network addresses must fit with this mask. 255.255.255.0 is a logical choice for most users.

Remote Gateway: This is the public facing, WAN-side IP address of the network that the local gateway is going to connect to.

Tunnel Enabled: Select to activate the tunnel.



Add Tunnel

General

Tunnel Name: Office Tunnel

Local Network: 10.1.1.1

Remote Network: 10.1.1.2

Subnet Mask: 255.255.255.252

Remote Gateway: 172.22.22.1

Tunnel Enabled:

Keep Alive

Enabled:

Rate: 10 Secs

Retry: 3

Back | Next | Finish

Keep Alive: This feature monitors the status of a tunnel. This will more accurately determine if the tunnel is alive or not. Choose the **Rate** in seconds for each check (Default: 10 seconds. Range: 2 – 3600 seconds) and the number of **Retry** attempts (Default: 3. Range: 1 – 255).

Page 2: Routes

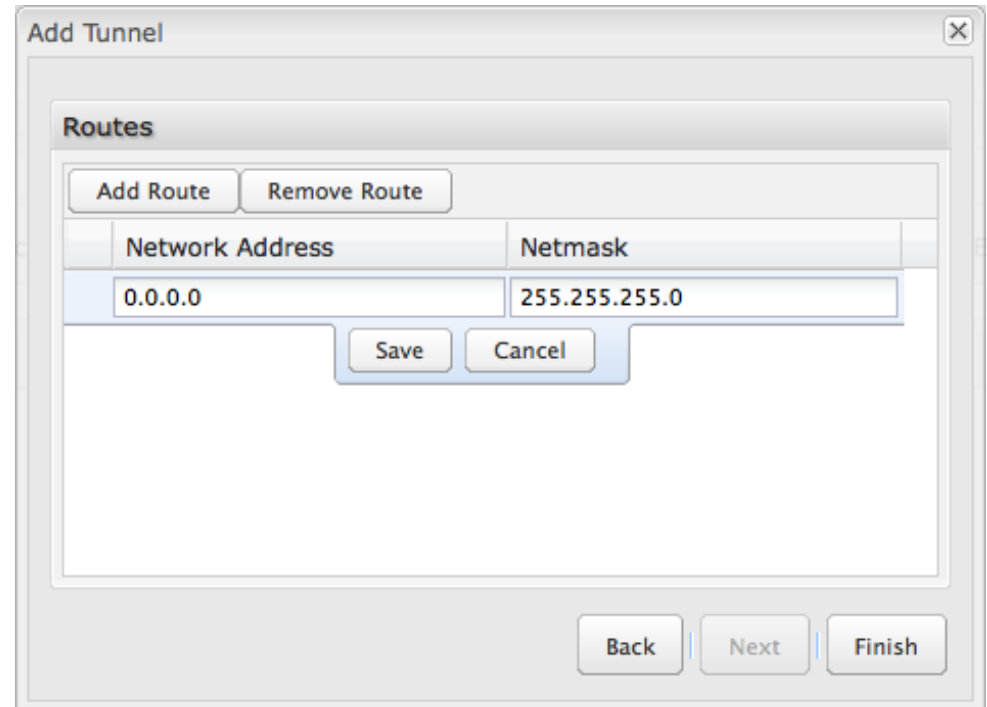
Adding routes allows you to configure what types of network traffic from the local host or hosts will be allowed through the tunnel.

Click **Add Route** to configure a new route. You will need to input the following information, defined by the remote network:

- **Network Address**
- **Netmask:** (Default: 255.255.255.0)

You can set the tunnel to connect to a range of IP addresses or to a single IP address. For example, you could input **192.168.0.0** and **255.255.255.0** to connect your tunnel to all the addresses of the remote network in the **192.168.0.x** range. Alternatively, you could select a single address by inputting that address along with a Netmask of **255.255.255.255**.

Click **Save** to record each new route.



The screenshot shows a window titled "Add Tunnel" with a close button (X) in the top right corner. Inside the window, there is a section titled "Routes". At the top of this section are two buttons: "Add Route" and "Remove Route". Below these buttons is a table with two columns: "Network Address" and "Netmask". The "Network Address" column contains the text "0.0.0.0" and the "Netmask" column contains "255.255.255.0". Below the table are two buttons: "Save" and "Cancel". At the bottom of the window, there are three buttons: "Back", "Next", and "Finish".

When you have finished adding routes, click **Finish** to save your GRE tunnel configuration.

7.5 Load Balance (Advanced Mode only)

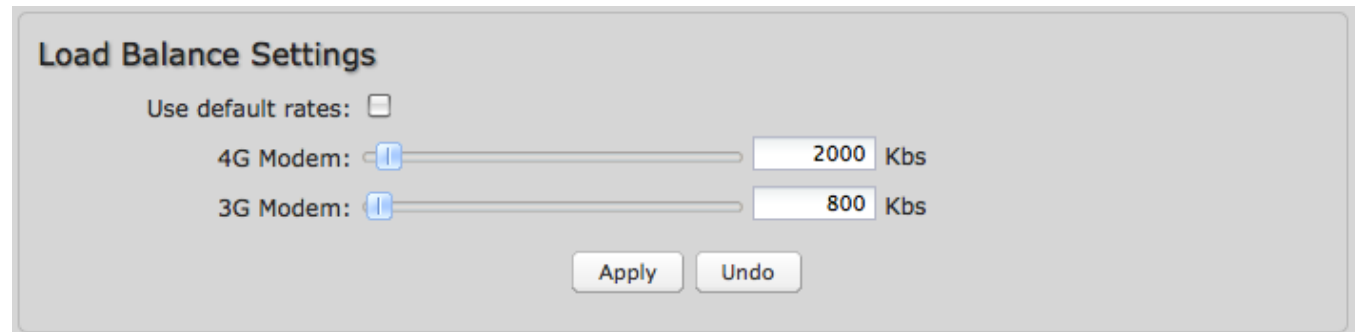
When enabled in **Connection Manager (Internet → Connection Manager)**, the router will use multiple WAN interfaces to increase the data transfer throughput by using any connected WAN interface consecutively. Connections are load balanced between interfaces based on a dynamic measurement of bandwidth available.

Leave “Use default rates” selected for automatically defined bandwidth values for Load Balance.

The default minimum rate can be changed to reflect the minimum bandwidth used during dynamic measurement. The dynamic measurement will assume that the interface has at least the specified minimum bandwidth available. You have the ability to set these minimum rates for:

- 4G Modem
- 3G Modem

Range: 100-50000 Kbs.



Load Balance Settings

Use default rates:

4G Modem: Kbs

3G Modem: Kbs

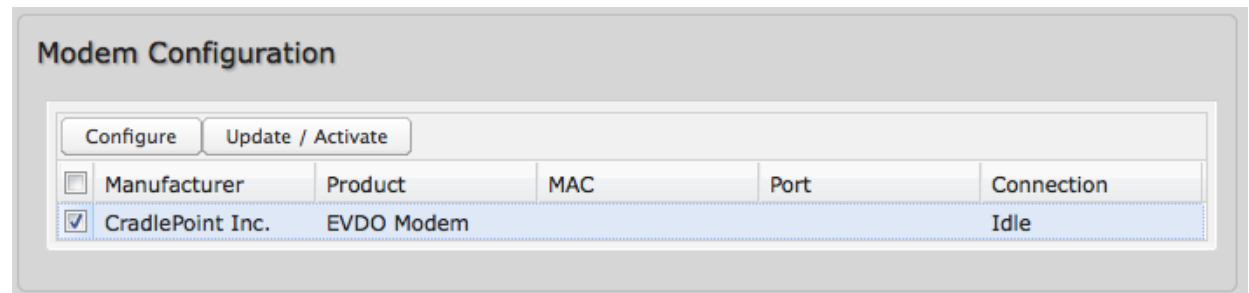
Apply Undo

7.6 Modem Settings

This section allows you to change the settings for your embedded modem.

7.6.1 Update/Activate a Modem

The embedded modem can be activated (or reactivated/upgraded). Select the checkbox next to the CradlePoint device and click “Update / Activate”.



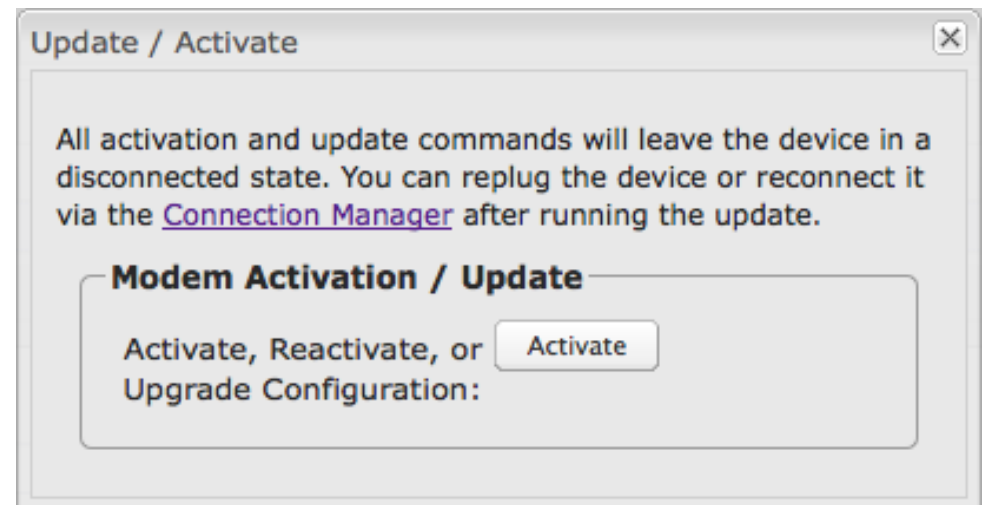
- Modem Activation / Update:** Activate, Reactivate, or Upgrade Configuration. Click **Activate** to start the process.

If the modem is connected when you start an operation the router will automatically disconnect it. The router may start another device as a failover measure. When the operation is done the modem will go back to an idle state, at which point the router may restart it depending on failover and fallback settings.

NOTE: Only one operation is supported at a time. If you try to start the *same* operation on the *same* modem twice the UI will not report failure and the request will finish normally when the original request is done. However if you try to start a *different* operation or use a *different* modem, this second request will fail without interfering with the pending operation.

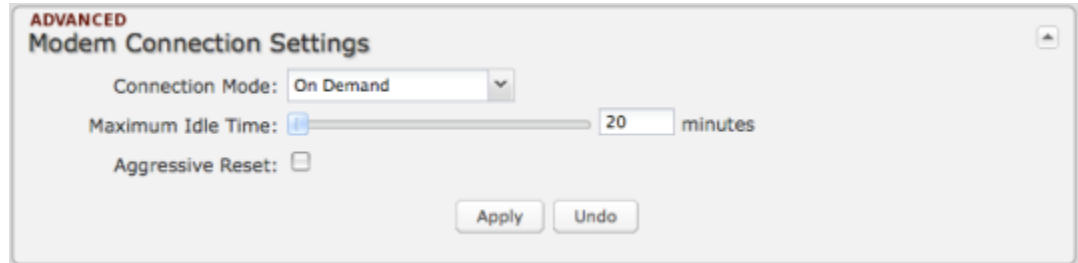
Process Timeout: If the process fails an error message will display.

Activation has a 3-minute timeout.



7.6.2 Modem Connection Settings (Advanced Mode Only)

This section changes settings that affect how modems attempt to connect to the service provider's network.



Connection Mode: Typically modem connections are not set to remain on. The router allows you to set the type of reconnection mode.

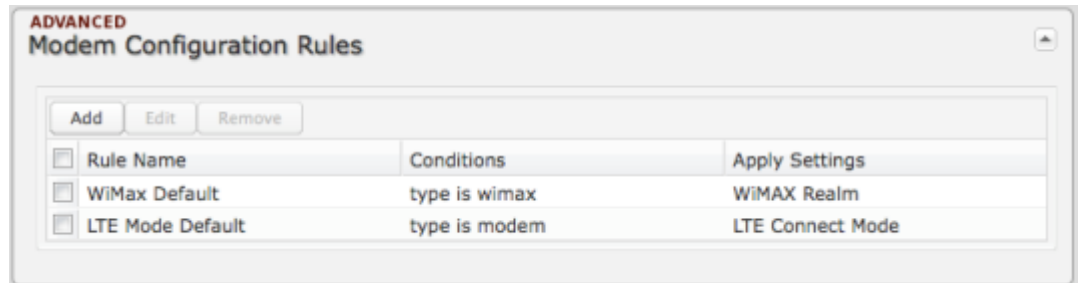
- **Always On:** A connection to the internet is continuously maintained.
- **On Demand:** A connection to the internet is made as needed.
- **Manual:** The administrator has to navigate to the Connection Manager (**Internet → Connection Manager**) page and use the control buttons shown in the WAN Interfaces table.

Maximum Idle Time: The interval at which the machine can be idle before the modem connection is disconnected. This setting is only valid for the "On Demand" and "Manual" connection modes.

Aggressive Reset: When Aggressive Reset is enabled the system will attempt to maintain a good modem connection. If the internet has been unreachable for a period of time a reset of the modem will occur in attempt to re-establish the connection.

7.6.3 Modem Configuration Rules (Advanced Mode Only)

This section allows you to create simple or complex rules that affect how individual modems or classes of modems behave in the router.



Click **Add** to create a new rule.

Configuration Rule: First page. Create a name for your rule and the condition for which the rule applies.

Rule Name: Create a name meaningful to you.

Select each of the following to create a condition for your rule. The condition will be of the following form:

“ ___ (When) ___ is/is not ___ (value) ___ ”

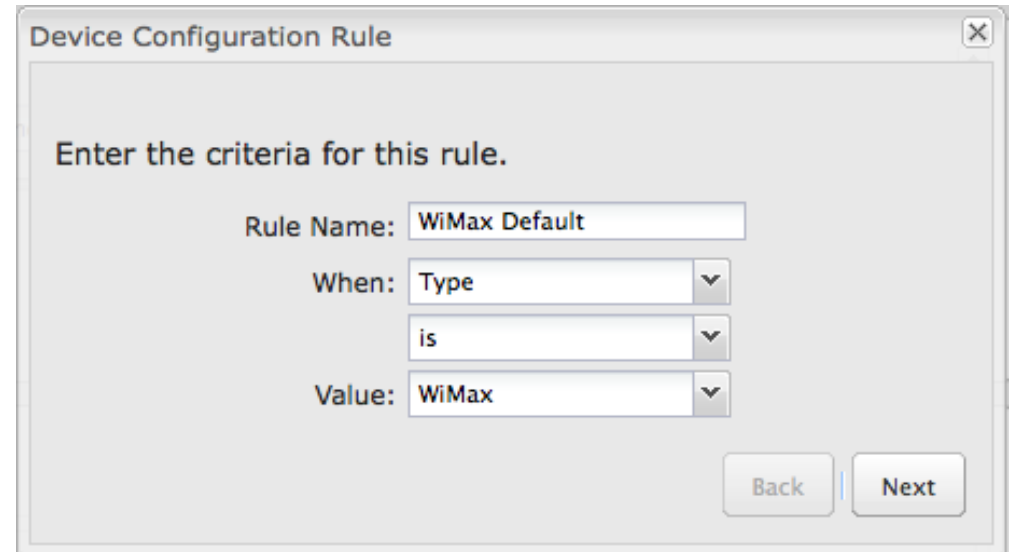
For example:

“Type is not WiMAX”

When:

- Port (Internal USB Port)
- Manufacturer
- Model
- Type (WiMAX, Modem, HSPA)
- Serial Number
- MAC Address
- Unique ID

Value: If you chose Port or Type, select from the dropdown list. If you chose Manufacturer, Model, Serial Number, MAC Address, or Unique ID, you will need to manually input the information.



Device Configuration Rule

Enter the criteria for this rule.

Rule Name:

When: ▼

▼

Value: ▼

Configuration Rule: WiMAX Settings

WiMAX Realm: Select from the following dropdown options:

- Clear – clearwire-wmx.net
- Rover – rover-wmx.net
- Sprint 3G/4G – sprintpcs.com
- Xohm –xohm.com
- BridgeMAXX – bridgeMAXX.com
- Time Warner Cable – mobile.rr.com
- Comcast – mob.comcast.net

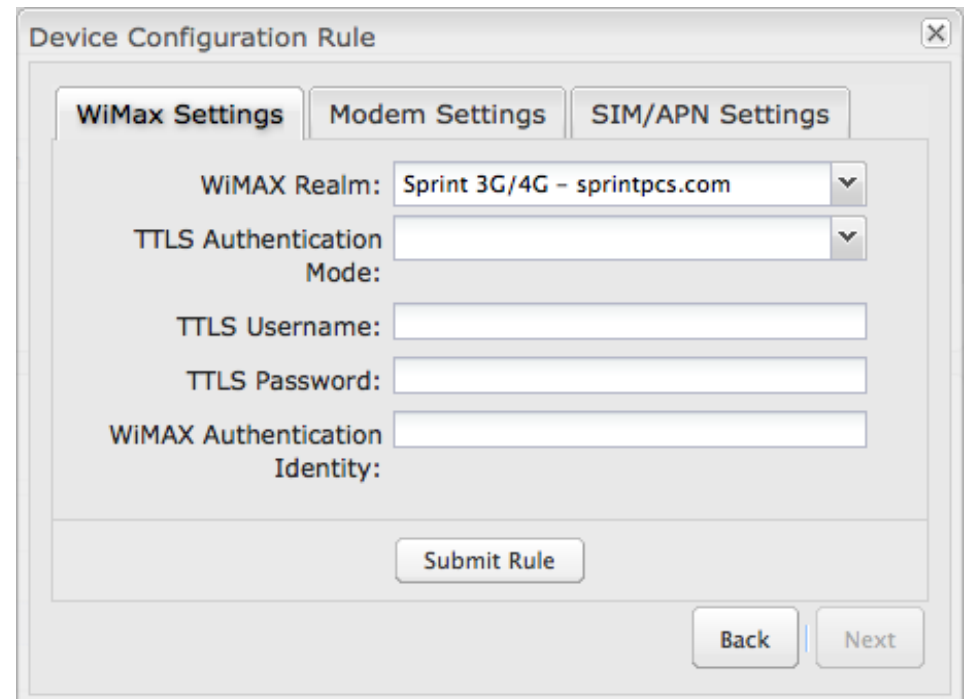
TTLS Authentication Mode: TTLS inner authentication protocol. Select from the following dropdown options:

- **MSCHAPv2/MD5** (Microsoft Challenge Handshake Authentication Protocol version2/Message-Digest Algorithm 5)
- **PAP** (Password Authentication Protocol)
- **CHAP** (Challenge Handshake Authentication Protocol)

TTLS Username: Username for TTLS authentication.

TTLS Password: Password for TTLS authentication.

WiMAX Authentication Identity: User ID on the network. Leave this blank unless your provider tells you otherwise.



The screenshot shows a 'Device Configuration Rule' dialog box with three tabs: 'WiMax Settings', 'Modem Settings', and 'SIM/APN Settings'. The 'WiMax Settings' tab is active. It contains the following fields:

- WiMAX Realm:** A dropdown menu with 'Sprint 3G/4G - sprintpcs.com' selected.
- TTLS Authentication Mode:** A dropdown menu.
- TTLS Username:** A text input field.
- TTLS Password:** A text input field.
- WiMAX Authentication Identity:** A text input field.

At the bottom of the dialog, there are three buttons: 'Submit Rule', 'Back', and 'Next'.

Configuration Rule: Modem Settings

AT Dial Script: Enter the AT commands to be used in establishing a network connection. Each command must be entered on a separate line. All command responses must include “OK” except the final command response, which must include “CONNECT”.

Example:

```
AT
AT+CGDCONT=2,"IP","isp.cingular"
ATCT*99***2#
```

PPP Authentication Protocol: Set this only if your service provider requires a specific protocol and the **Auto** option chooses the wrong one.

- **Auto**
- **PAP** (Password Authentication Protocol)
- **CHAP** (Challenge Handshake Authentication Protocol)

PPP Password: Password for PPP authentication.

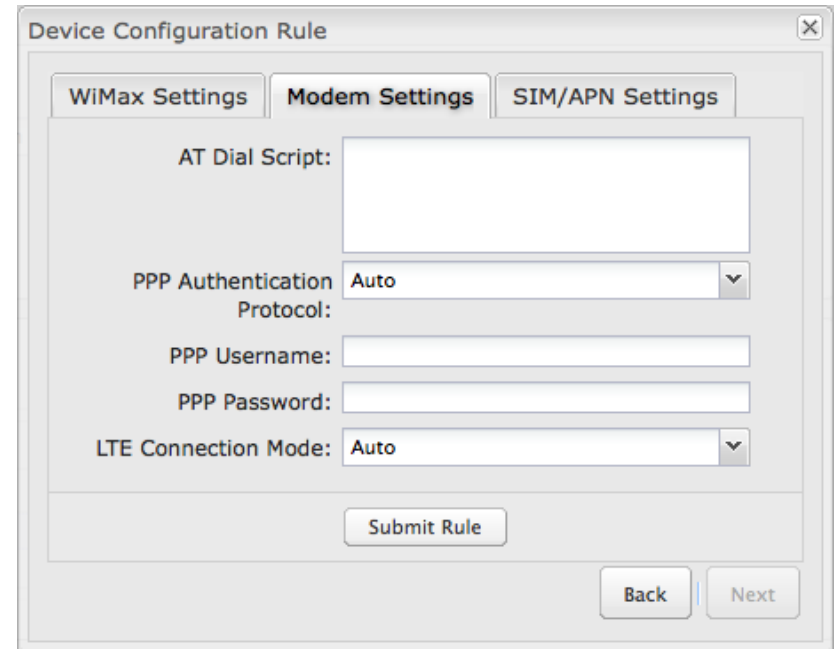
PPP Username: Username for PPP authentication.

SIM PIN: PIN number for GSM modem with a locked SIM.

Access Point Name (APN): Some wireless carriers provide multiple Access Point Names that a modem can connect to. If you wish to specify an APN, enter it into this field. Some examples of APN are ‘isp.cingular’ and ‘vpn.com’. This APN will be set in the first profile position.

LTE Connection Mode: Specify how the LTE Multi Mode modem should connect to the network.

- **Auto:** Let the modem decide which network to use.
- **Auto EVDO/1xRTT:** Connect to CDMA, letting the modem decide which 3G network to use. Do not attempt to connect to LTE.
- **Force LTE:** Connect to LTE only (do not attempt to connect to CDMA/GSM).
- **Force EVDO:** Connect to CDMA EVDO network only.
- **Force 1xRTT:** Connect to CDMA 1xRTT network only.



The screenshot shows a 'Device Configuration Rule' dialog box with three tabs: 'WiMax Settings', 'Modem Settings' (selected), and 'SIM/APN Settings'. The 'Modem Settings' tab contains the following fields:

- AT Dial Script:** A large text area for entering AT commands.
- PPP Authentication Protocol:** A dropdown menu currently set to 'Auto'.
- PPP Username:** A text input field.
- PPP Password:** A text input field.
- LTE Connection Mode:** A dropdown menu currently set to 'Auto'.

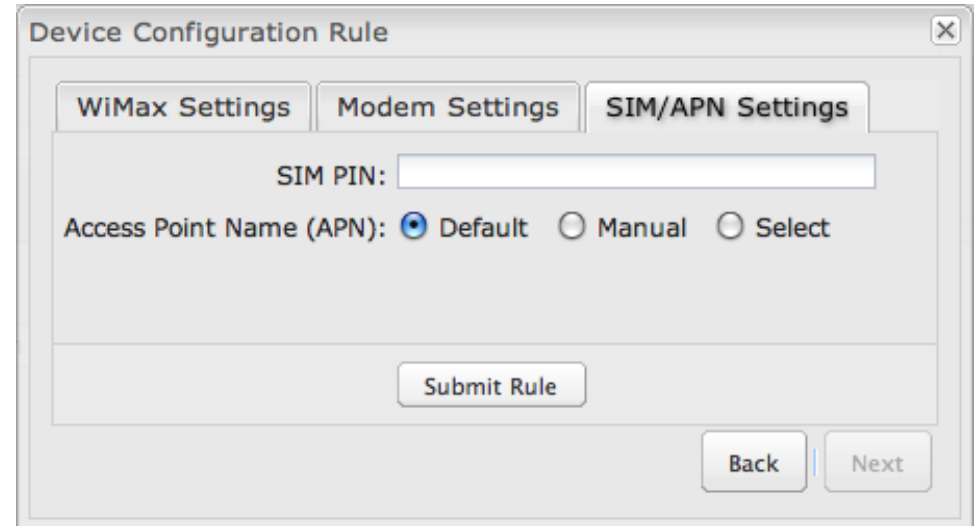
At the bottom of the dialog, there are three buttons: 'Submit Rule', 'Back', and 'Next'.

Configuration Rule: SIM/APN Settings

SIM PIN: PIN number for a GSM modem with a locked SIM.

Access Point Name (APN): Some wireless carriers provide multiple Access Point Names that a modem can connect to.

- **Default:** Let the router choose an APN automatically.
- **Manual:** Enter an APN by hand.
- **Select:** Select from a dropdown menu of the profiles already on the SIM.



The screenshot shows a dialog box titled "Device Configuration Rule" with a close button (X) in the top right corner. It has three tabs: "WiMax Settings", "Modem Settings", and "SIM/APN Settings", with the latter being the active tab. Inside the dialog, there is a text input field for "SIM PIN:". Below it, the "Access Point Name (APN):" section has three radio button options: "Default" (which is selected), "Manual", and "Select". At the bottom of the dialog, there are three buttons: "Submit Rule", "Back", and "Next".

7.7 VPN Tunnels (Advanced Mode only)

VPN (virtual private network) tunnels are used to establish a secure connection to a remote network over a public network. For example, VPN tunnels can be used across the internet by an individual to connect to an office network while traveling or by two office networks to function as one network. The two networks set up a secure connection across the (normally) unsecure internet by assigning VPN encryption protocols.

VPN Tunnels						
<input type="button" value="Add"/> <input type="button" value="Edit"/> <input type="button" value="Remove"/> <input type="button" value="Disable VPN Service"/>						
<input type="checkbox"/>	Name	Local Network	Remote Network	IKE Phase 1	IKE Phase 2	Enabled
<input type="checkbox"/>	MyTunnel Tunnel Mode Always On / Boo	192.168.0.0 255.255.255.0	184.3.3.100 10.1.1.0 255.255.255.0	Main AES 256, AES 128, DE MD5, SHA1, SHA2 256 Group 1, Group 2, Gro Lifetime: 28800	PFS Enabled AES 128, AES 256, Blc MD5, SHA1, SHA2 256 Group 1 Lifetime: 3600	Yes

The IBR650 uses IPsec (Internet Protocol security) to authenticate and encrypt packets exchanged across the tunnel. To set up a VPN tunnel with the IBR650 on one end, there must be another device (usually a router) that also supports IPsec on the other end.

IKE (Internet Key Exchange) is the security protocol in IPsec. IKE has two phases, Phase 1 and Phase 2. The IBR650 has several different security protocol options for each phase, but the default selections will be sufficient for most users.

The VPN tunnel status page allows you to view the state of the VPN tunnels. If a tunnel fails to connect to the remote site, check the System Logs for more information. You may double click on a cell to directly edit that information.

Click **Add** to configure a new VPN tunnel.

7.7.1 Page 1: General

Tunnel Name: Choose a name meaningful to you.

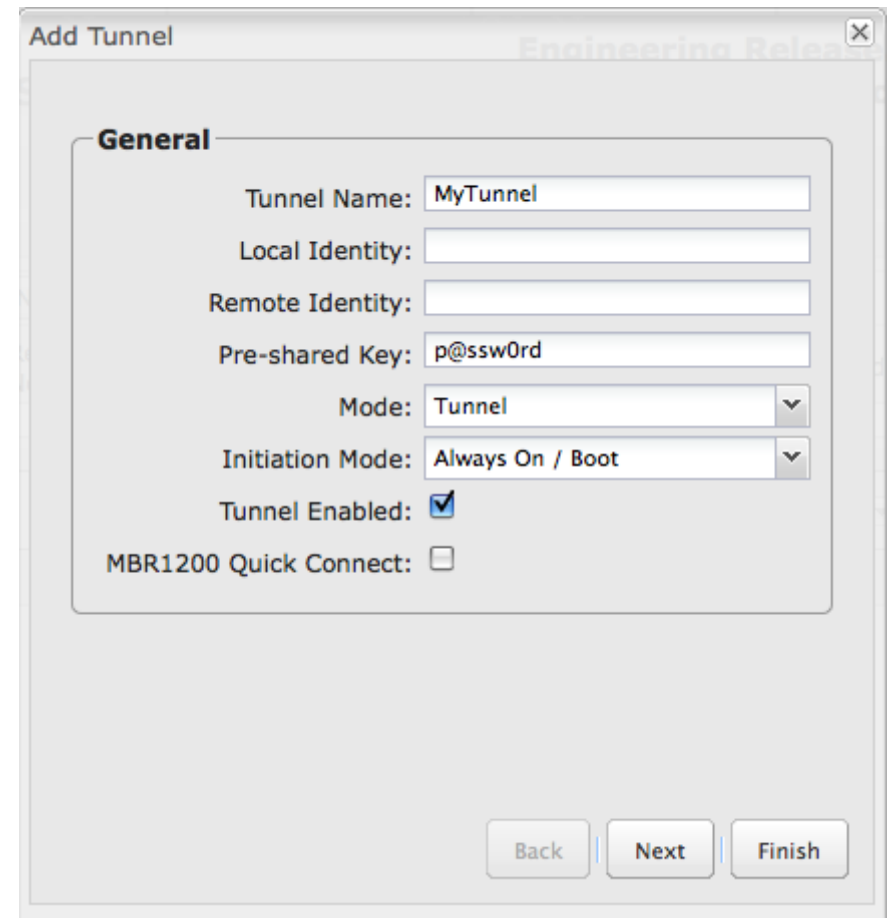
Local Identity: This can be left blank for most users. If left blank it will default to the IP address of the WAN connection. Currently we only support identifiers in the form of an **IP address**, a **user fully qualified domain name** (user@mydomain.com) or just a **fully qualified domain name** (www.mydomain.com). If the remote side of the tunnel is configured to expect an identifier, then both **must match** in order for the negotiation to succeed.

Remote Identity: This can be left blank for most users. If left blank it will default to the IP address of the WAN connection. Currently we only support identifiers in the form of an **IP address**, a **user fully qualified domain name** (user@mydomain.com) or just a **fully qualified domain name** (www.mydomain.com). If no identifier is defined then no verification of the remote peer's identification will be done.

Pre-shared Key: Create a password or key. The routers on both sides of the tunnel must use this same key.

Mode: **Tunnel** or **Transport**. **Tunnel Mode** is used for protecting traffic between different networks, when traffic must pass through an intermediate, untrusted network. **Transport Mode** is used for end-to-end communications (for example, for communications between a client and a server).

Initiator Mode: “**Always On/Boot**” or “**On Demand.**” “**Always On/Boot**” is used if you want the tunnel to initiate the tunnel connection whenever the WAN becomes available. **On Demand** is used if you want the tunnel to initiate a connection if and only if there is data traffic bound for the remote side of the tunnel.



The screenshot shows a configuration window titled "Add Tunnel" with a close button in the top right corner. The window is divided into a "General" section. Inside this section, there are several input fields and dropdown menus:

- Tunnel Name:** A text box containing "MyTunnel".
- Local Identity:** An empty text box.
- Remote Identity:** An empty text box.
- Pre-shared Key:** A text box containing "p@ssw0rd".
- Mode:** A dropdown menu with "Tunnel" selected.
- Initiation Mode:** A dropdown menu with "Always On / Boot" selected.
- Tunnel Enabled:** A checked checkbox.
- MBR1200 Quick Connect:** An unchecked checkbox.

 At the bottom right of the window, there are three buttons: "Back", "Next", and "Finish".

Tunnel Enabled: Enabled or Disabled.

MBR1200 Quick Connect: VPN tunnels in the IBR650 have more choices than they do in the MBR1200, so it is more complex to configure. Check this box to simplify setup by streamlining your options.

7.7.2 Page 2: Networks

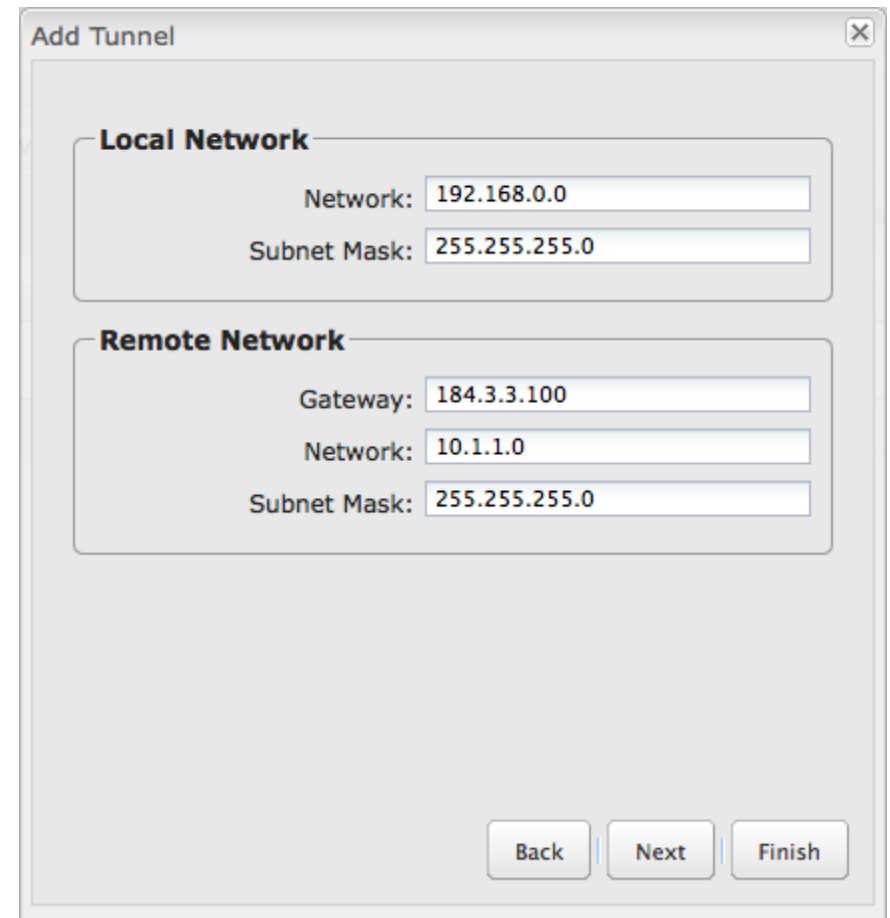
Local Network: The **Network** IP address and the **Subnet Mask** define what local devices have access to or can be accessed from the VPN tunnel. The IBR650 will automatically fill in the values for your network, but you can change the values to limit the tunnel to only some of the devices in your network.

NOTE: The local network IP address *must* be different from the remote network IP address.

Remote Network: Enter the remote **Gateway's** IP address or fully qualified domain name (my.domain.com). It is recommended you use a dynamic DNS host name instead of the static IP address. By using the dynamic DNS host name updates of the remote WAN IP are compensated for while connecting to a VPN tunnel.

Enter the **Network** IP address with the **Subnet Mask** to define the remote network subnet that the local devices will have access to.

NOTE: The remote network IP address *must* be different from the local network IP address.



The screenshot shows a web-based configuration window titled "Add Tunnel". It contains two main sections: "Local Network" and "Remote Network".

Local Network:

- Network: 192.168.0.0
- Subnet Mask: 255.255.255.0

Remote Network:

- Gateway: 184.3.3.100
- Network: 10.1.1.0
- Subnet Mask: 255.255.255.0

At the bottom of the window, there are three buttons: "Back", "Next", and "Finish".

7.7.3 Page 3: IKE Phase 1

IKE security has two phases, Phase 1 and Phase 2. You have the ability to distinctly configure each phase, but the default settings will be sufficient for most users.

To set up a tunnel with a remote site, you need to match your tunnel's IKE negotiation parameters with the remote site. By selecting several encryption, hash, and DH group options, you improve your chances for a successful tunnel negotiation. For greatest compatibility, select all options; for greatest security, select only the most secure options that your devices support.

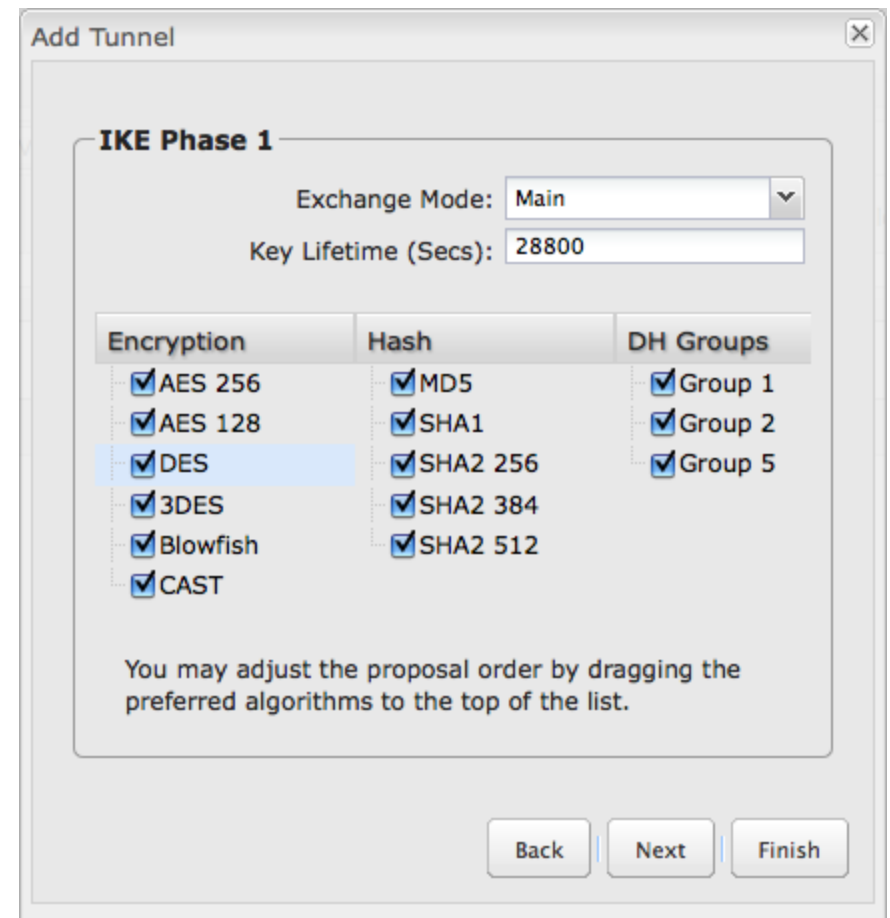
Exchange Mode: The IKE protocol has 2 modes of negotiating phase 1 - **Main** (also called Identity Protection) and **Aggressive**.

- In **Main** mode, IKE separates the key information from the identities, allowing for the identities of peers to be secure at the expense of extra packet exchanges.
- In **Aggressive** mode, IKE tries to combine as much information into fewer packets while maintaining security. Aggressive mode is slightly faster but less secure.

Because it has better security, **Main** mode is recommended for most users.

Key Lifetime: The lifetime of the generated keys of Phase 1 of the IPsec negotiation from IKE. After the time has expired, IKE will renegotiate a new set of Phase 1 keys.

Encryption, Hash, and DH Groups: Each IKE exchange uses one encryption algorithm, one hash function, and one DH group to make a secure exchange.



The screenshot shows the 'Add Tunnel' configuration window. Under the 'IKE Phase 1' section, the 'Exchange Mode' is set to 'Main' and the 'Key Lifetime (Secs)' is set to 28800. Below these are three columns of options: Encryption, Hash, and DH Groups. All options in these columns are checked. At the bottom of the window are 'Back', 'Next', and 'Finish' buttons.

Encryption	Hash	DH Groups
<input checked="" type="checkbox"/> AES 256	<input checked="" type="checkbox"/> MD5	<input checked="" type="checkbox"/> Group 1
<input checked="" type="checkbox"/> AES 128	<input checked="" type="checkbox"/> SHA1	<input checked="" type="checkbox"/> Group 2
<input checked="" type="checkbox"/> DES	<input checked="" type="checkbox"/> SHA2 256	<input checked="" type="checkbox"/> Group 5
<input checked="" type="checkbox"/> 3DES	<input checked="" type="checkbox"/> SHA2 384	
<input checked="" type="checkbox"/> Blowfish	<input checked="" type="checkbox"/> SHA2 512	
<input checked="" type="checkbox"/> CAST		

You may adjust the proposal order by dragging the preferred algorithms to the top of the list.

Back | Next | Finish

- **Encryption:** Used to encrypt messages sent and received by IPsec.
 - AES 128
 - AES 256
 - Blowfish
 - CAST
 - DES
 - 3DES
- **Hash:** Used to compare, authenticate, and validate that data across the VPN arrives in its intended form and to derive keys used by IPsec.
 - MD5
 - SHA1
 - SHA2 256
 - SHA2 384
 - SHA2 512
- **DH Groups:** The DH (Diffie-Hellman) Group is a property of IKE and is used to determine the length of prime numbers associated with key generation. The strength of the key generated is partially determined by the strength of the DH Group. Group 5, for instance, has greater strength than Group 2.
 - DH group 1: 768-bit key.
 - DH group 2: 1024-bit key.
 - DH group 5: 1536-bit key.

In Phase 1, only one DH group can be selected while using **Aggressive** exchange mode.

By default, all the algorithms (encryption, hash, and DH groups) supported by the IBR650 are checked, which means they are *allowed* for any given exchange. Deselect these options to limit which algorithms will be accepted. Be sure to check that the router (or similar device) at the other end of the tunnel has matching algorithms.

The algorithms are listed in order by priority. You can reorder this priority list by clicking and dragging algorithms up or down. Any selected algorithm may be used for IKE exchange, but the algorithms on the top of the list are more likely to be used more often.

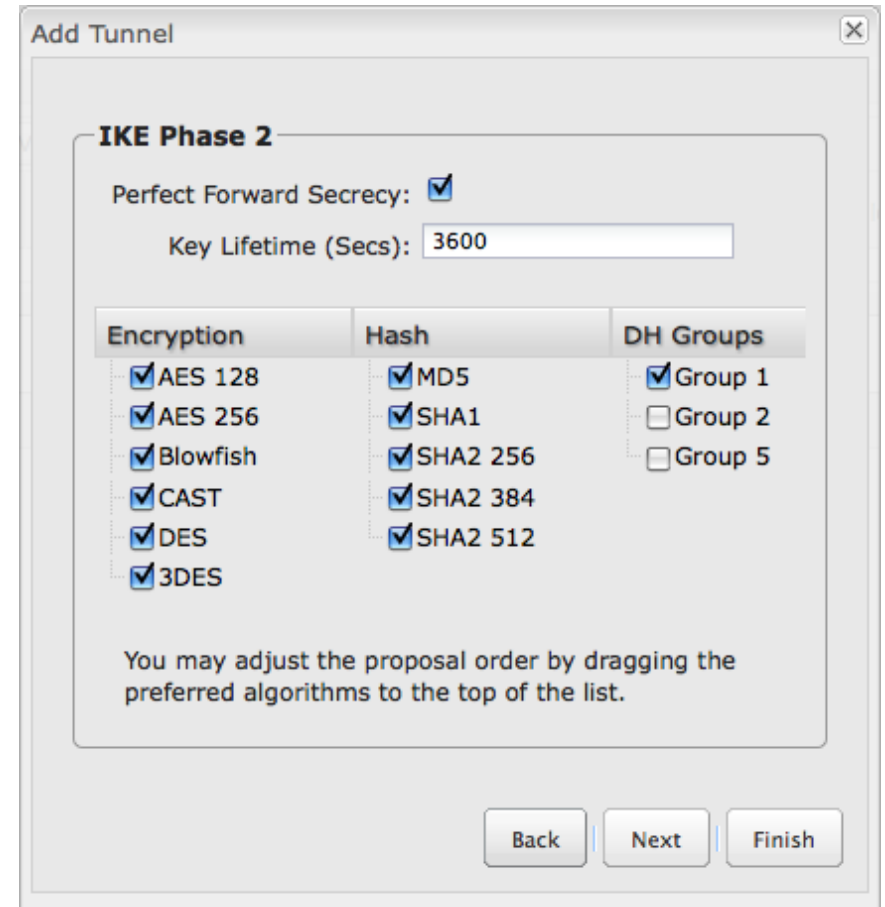
7.7.4 Page 4: IKE Phase 2

Perfect Forward Secrecy (PFS): Enabling this feature will require IKE to generate a new set of keys in Phase 2 rather than using the same key generated in Phase 1.

Additionally, the new keys generated in Phase 2 (with this option enabled) are exchanged in an encrypted session. Enabling this feature affords the policy greater security.

Key Lifetime: The lifetime of the generated keys of Phase 2 of the IPsec negotiation from IKE. After the time has expired, IKE will renegotiate a new set of Phase 2 keys.

Phase 2 has the same selection of **Encryption**, **Hash**, and **DH Groups** as Phase 1, but you are restricted to only one DH Group. Phase 2 and Phase 1 selections do not have to match.



Add Tunnel

IKE Phase 2

Perfect Forward Secrecy:

Key Lifetime (Secs):

Encryption	Hash	DH Groups
<input checked="" type="checkbox"/> AES 128	<input checked="" type="checkbox"/> MD5	<input checked="" type="checkbox"/> Group 1
<input checked="" type="checkbox"/> AES 256	<input checked="" type="checkbox"/> SHA1	<input type="checkbox"/> Group 2
<input checked="" type="checkbox"/> Blowfish	<input checked="" type="checkbox"/> SHA2 256	<input type="checkbox"/> Group 5
<input checked="" type="checkbox"/> CAST	<input checked="" type="checkbox"/> SHA2 384	
<input checked="" type="checkbox"/> DES	<input checked="" type="checkbox"/> SHA2 512	
<input checked="" type="checkbox"/> 3DES		

You may adjust the proposal order by dragging the preferred algorithms to the top of the list.

Back Next Finish

7.7.5 Page 5: Dead Peer Detection

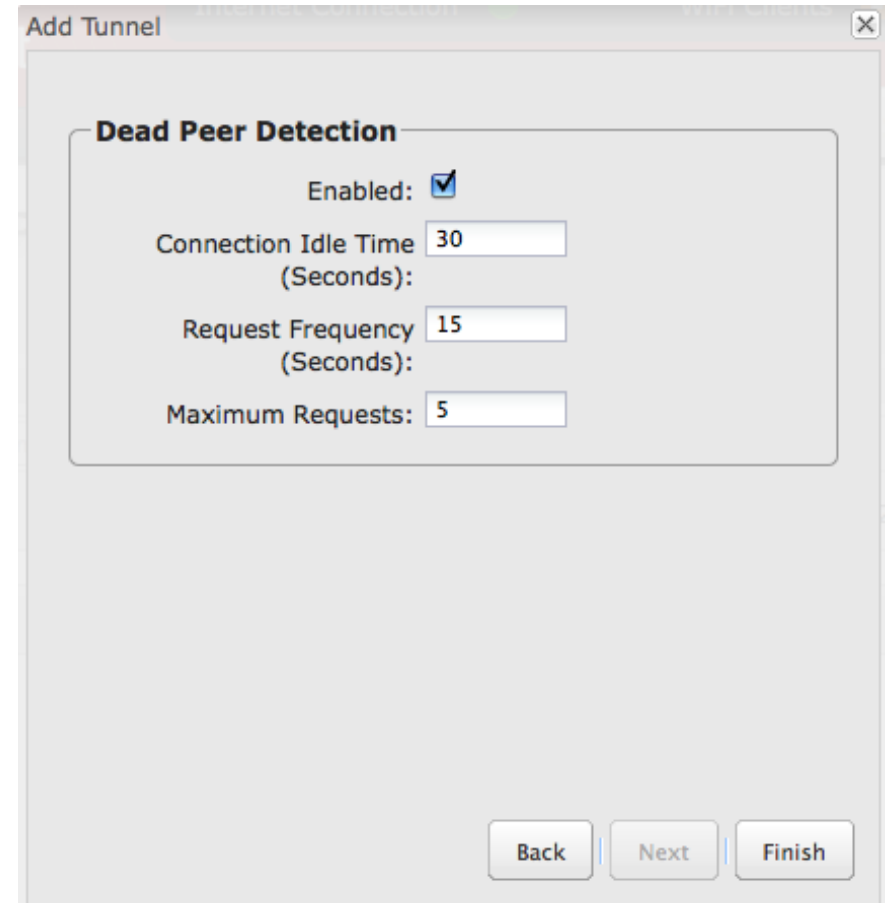
Dead Peer Detection (DPD) defines how the router will detect when one end of the IPsec session loses connection while a policy is in use.

Connection Idle Time allows you to configure how long the router will allow an IPsec session to be idle before beginning to send Dead Peer Detection (DPD) packets to the peer machine.

Request Frequency allows you to adjust the delay between these DPD packets to send as quickly as every 2 seconds up to 30 seconds apart.

Additionally, you can specify how many **Maximum Requests** to send at the selected time interval before the tunnel is considered dead.

You must click **Finish** to save your VPN tunnel.



The screenshot shows a configuration window titled "Add Tunnel" with a close button in the top right corner. Inside the window, there is a section titled "Dead Peer Detection" with a rounded border. The settings are as follows:

- Enabled:
- Connection Idle Time (Seconds):
- Request Frequency (Seconds):
- Maximum Requests:

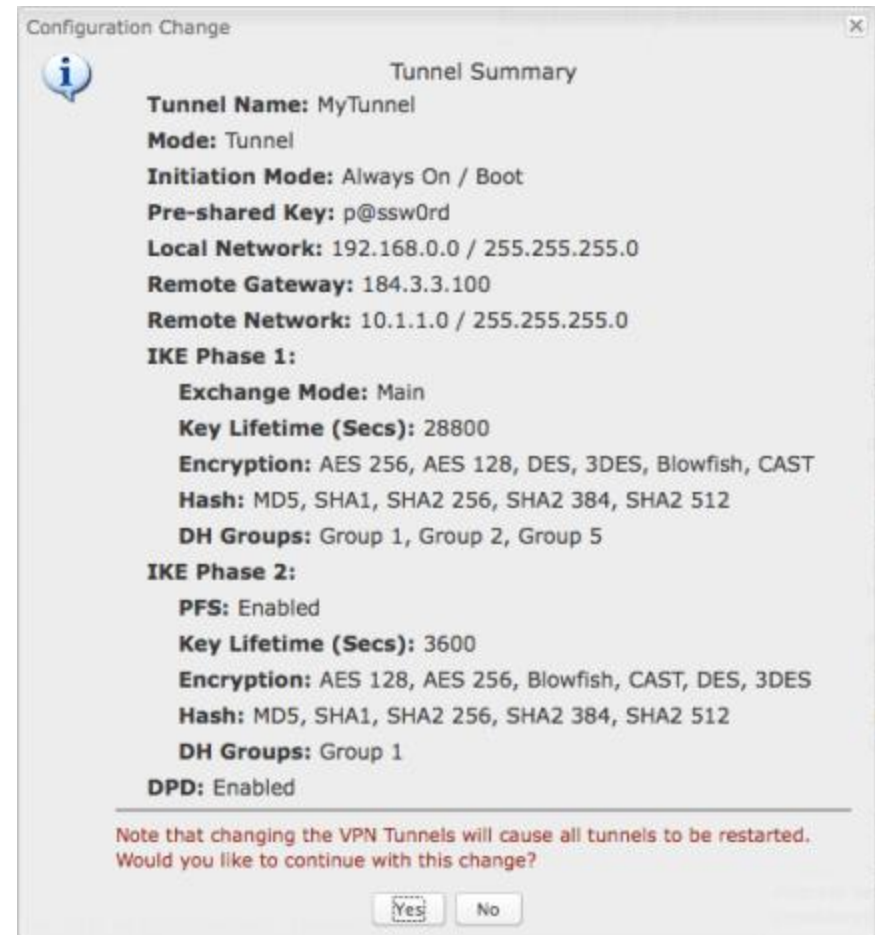
At the bottom right of the window, there are three buttons: "Back", "Next", and "Finish".

7.7.6 Page 6: Tunnel Summary

The final page of the tunnel configuration interface is a summary of the tunnel specifications. This is especially helpful for matching this information with the router (or similar device) at the other end of the tunnel.

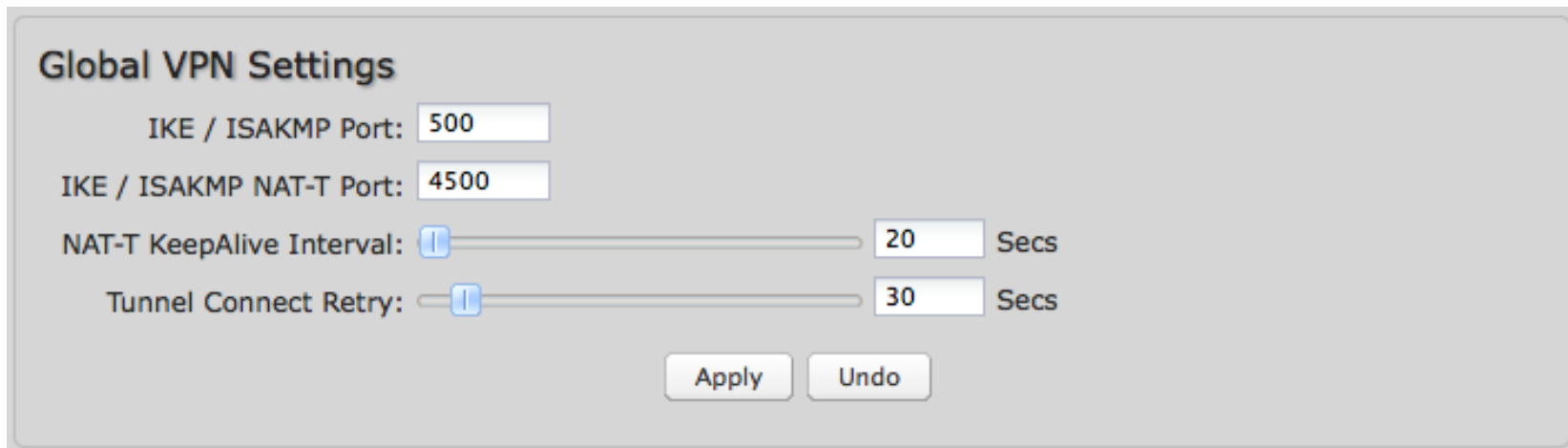
- Tunnel Name
- Mode
- Initiation Mode
- Pre-shared Key
- Local Network
- Remote Gateway
- Remote Network
- IKE Phase 1:
 - Exchange Mode
 - Key Lifetime (Secs)
 - Encryption
 - Hash
 - DH Groups
- IKE Phase 2:
 - PFS
 - Key Lifetime (Secs)
 - Encryption
 - Hash
 - DH Groups
- DPD

Click **Yes** at the bottom of the Tunnel Summary page to save your configuration changes. This will cause active tunnels to restart.



7.7.7 Global VPN Settings

These settings apply to all configured VPN tunnels. Changing the Global VPN Settings is rarely necessary; the default values are almost always sufficient.



Global VPN Settings

IKE / ISAKMP Port:

IKE / ISAKMP NAT-T Port:

NAT-T KeepAlive Interval: Secs

Tunnel Connect Retry: Secs

- **IKE / ISAKMP Port:** Internet Key Exchange / Internet Security Association and Key Management Protocol port. Default: 500. This is a standard VPN port that usually does not need to be changed.
- **IKE / ISAKMP NAT-T Port:** Internet Key Exchange / Internet Security Association and Key Management Protocol network address translation traversal port. Default: 4500. This is a standard VPN NAT-T port that usually does not need to be changed.
- **NAT-T KeepAlive Interval:** Default: 20 seconds. Range: 0-3600 seconds. 20 seconds will be sufficient in almost all cases.
- **Tunnel Connect Retry:** Default: 30 seconds. Range: 10-255 seconds. 30 seconds will be sufficient in almost all cases.

7.7.8 VPN with NAT-T

If one side of a planned VPN tunnel is behind a NAT (network address translation) firewall, the setup of your tunnel requires the following specifications:

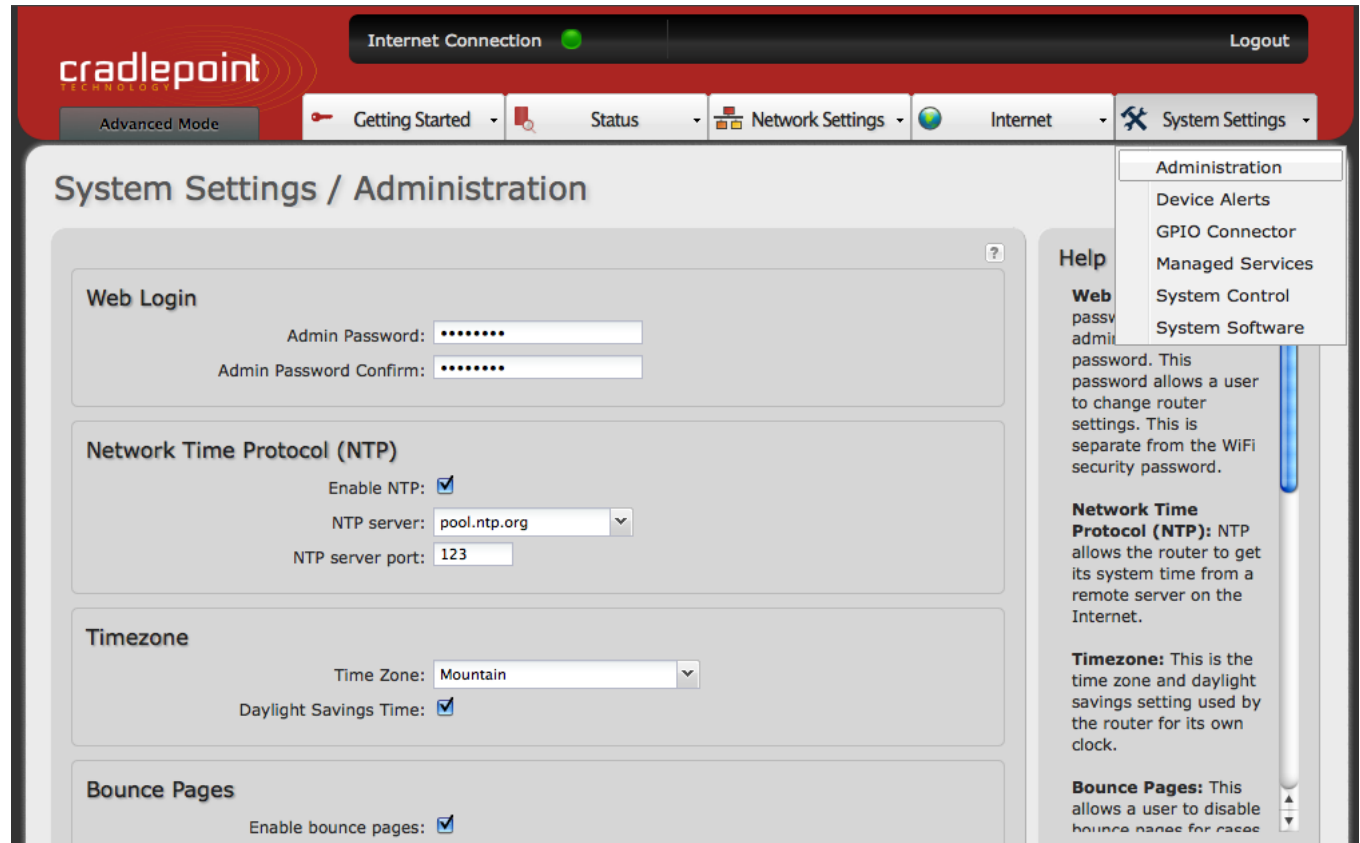
1. Each side of the tunnel must use both a **Local Identity** and a **Remote Identity**. These must match the identities on the other side: The Local Identity must match the Remote Identity on the other side of the tunnel, and vice versa. In this case, these identities can each be a simple word.
2. The **Tunnel Name** for the side of the tunnel that is not behind the NAT firewall must be “anonymous”.
3. The VPN tunnel must be initiated from the side that is behind the NAT firewall.

8 SYSTEM SETTINGS

The System Settings tab has 6 submenu options that provide access to tools for broad administrative control of the IBR650:

- Administration
- **Device Alerts**
- GPIO Connector
- **Managed Services**
- System Control
- System Software

(Device Alerts and Managed Services: Advanced Mode only)



The screenshot displays the 'System Settings / Administration' page. The top navigation bar includes 'Getting Started', 'Status', 'Network Settings', 'Internet', and 'System Settings'. The main content area is divided into several sections:

- Web Login:** Contains fields for 'Admin Password' and 'Admin Password Confirm', both masked with dots.
- Network Time Protocol (NTP):** Includes a checked 'Enable NTP' checkbox, an 'NTP server' dropdown menu set to 'pool.ntp.org', and an 'NTP server port' field set to '123'.
- Timezone:** Features a 'Time Zone' dropdown menu set to 'Mountain' and a checked 'Daylight Savings Time' checkbox.
- Bounce Pages:** Includes a checked 'Enable bounce pages' checkbox.

A 'Help' sidebar on the right provides additional information for each section:

- Web Login:** Explains that the admin password is used to change router settings and is separate from the WiFi security password.
- Network Time Protocol (NTP):** States that NTP allows the router to get its system time from a remote server on the Internet.
- Timezone:** Notes that this is the time zone and daylight savings setting used by the router for its own clock.
- Bounce Pages:** Indicates that this allows a user to disable bounce pages for cases.

8.1 Administration

Select the Administration submenu item in order to control any of the following functions:

- Web Login
- Network Time Protocol
- Timezone
- Bounce Pages
- UPnP
- Remote Management
- GPS
- Syslog Settings

8.1.1 Web Login

This password is the administration password. It allows a user to change router settings. This password can also be changed through the First Time Setup Wizard. The default password is found on the bottom of the router.



The image shows a screenshot of the 'Web Login' configuration page. It features two input fields: 'Admin Password' and 'Admin Password Confirm', both containing masked characters (dots).

8.1.2 Network Time Protocol

Enabling NTP will tell the router to get its system time from a remote server on the internet. If you do not enable NTP then the router time will be based on when the router firmware was built, which is guaranteed to be wrong. Whenever the internet connection is re-established and once a week thereafter the router will ask the server for the current time so it can correct itself.



The image shows a screenshot of the 'Network Time Protocol (NTP)' configuration page. It includes a checkbox for 'Enable NTP' which is checked. Below it, there is a dropdown menu for 'NTP server' with 'pool.ntp.org' selected, and a text input field for 'NTP server port' with the value '123' entered.

You then have the option of selecting an NTP server and adjusting the NTP server port. Any of the given NTP servers will be sufficient unless, for example, you need to synchronize your router's time with other devices in a network.

8.1.3 Timezone

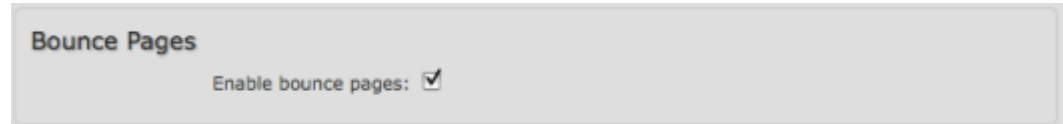
This is the time zone and daylight savings setting used by the router for its own clock. You can also select this in the First Time Setup Wizard, but normally the router will automatically select the correct time zone from the browser.



Daylight Savings Time: Select this checkbox if your location observes daylight savings time.

8.1.4 Bounce Pages

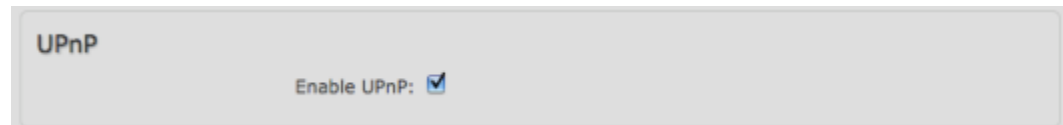
Bounce pages show up in your web browser when the router is not connected to the internet. They inform you that you are not connected and try to explain why. If you disable bounce pages then you will just get the usual browser timeout. In the normal case when the router is connected to the internet you don't see them at all.



This allows a user to disable bounce pages for cases where the router WAN link is down.

8.1.5 UPnP

Universal Plug and Play is a set of networking protocols standardized by the UPnP Forum. UPnP enables clients to determine network configuration and configure the network to allow traffic through the firewall without direct user interaction. UPnP can simplify the use of special applications or devices that require network configuration, but can also allow unprivileged users to manipulate network configuration.



8.1.6 Remote Management

Allows a user to enable incoming WAN pings or to change settings for the router from the internet using the router's internet address.

Allow WAN pings: When enabled the functionality allows an external WAN client to ping the router.

WAN Hostname: This hostname is the DNS name associated with the router's internet connection interface. If DHCP is used on the interface this hostname will be used when requesting a DHCP lease.

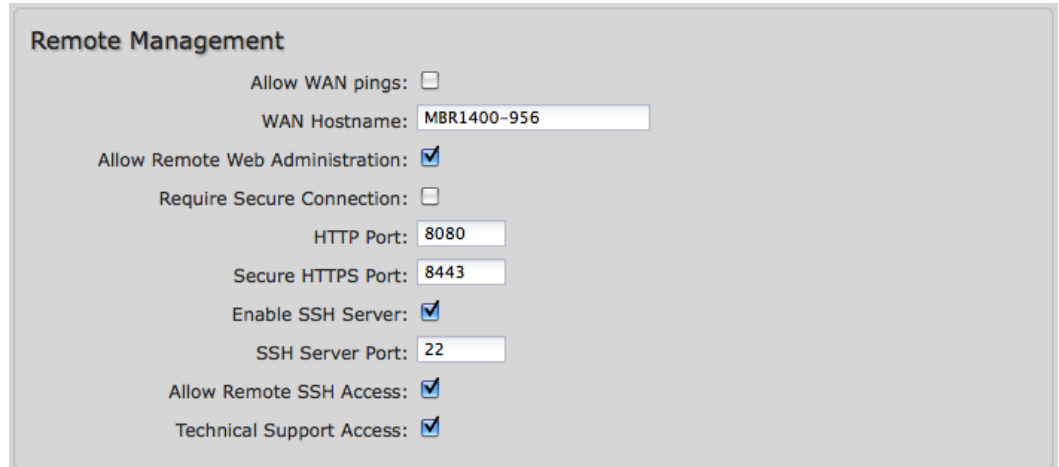
Allow Remote Web Administration: When remote administration is enabled it allows access to these administration web pages from the internet. With it disabled, you must be a client on the local network to access the administration website. For security, remote access is usually done via a non-standard http port. Additionally, encrypted connections can be required for an added level of security. Requiring a secure (**https**) connection is recommended.

- **Require Secure Connection**
- **HTTP Port:** Default: 8080. This option is disabled if you select "Require Secure Connection".
- **Secure HTTPS Port:** Default: 8443.

Enable SSH Server: When the router's SSH server is enabled you may access the router's command line interface (CLI) using the standards based SSH protocol. Use the username "admin" and the standard system password to login.

- **SSH Server Port:** Default: 22.
- **Allow Remote SSH Access**

Technical Support Access: Only enable this option if instructed by a CradlePoint support agent.



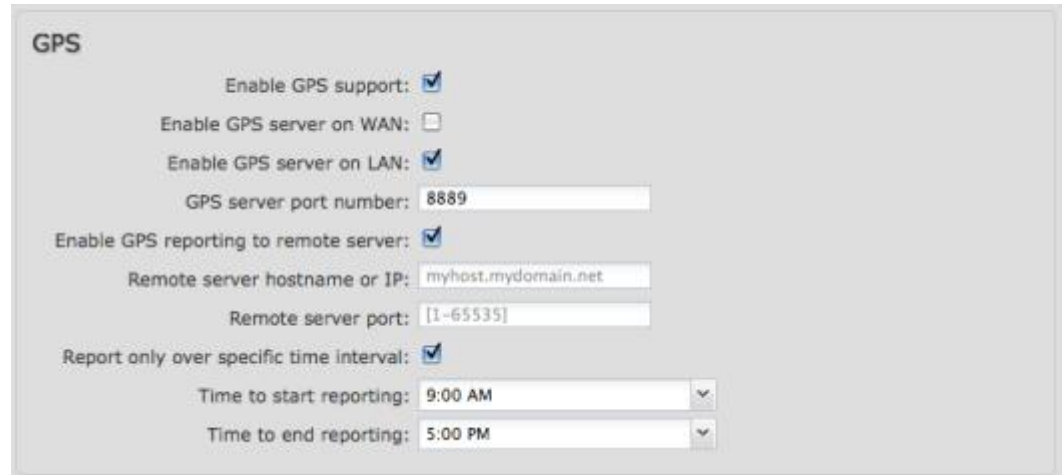
8.1.7 GPS

If you have an attached device with GPS support, you can enable a graphical view of your router's location which will appear in **Status** → **GPS Status**.

Users can configure GPS NMEA GGA format sentence reporting, available through a router-based server and/or a remote server.

NOTE: Some carriers disable GPS support in otherwise supported modems. If you encounter issues with obtaining a fix, contact your carrier and ensure that GPS is supported.

- **Enable GPS support:** Enables support for querying GPS information from supported modems.
- **Enable GPS server on WAN:** Enables a TCP server on the WAN side of the firewall, which will periodically send GPS NMEA sentences to connected clients.
- **Enable GPS server on LAN:** Enables a TCP server on the LAN side of the firewall, which will periodically send GPS NMEA sentences to connected clients.
 - **GPS server port number**
- **Enable GPS reporting to remote server:** Enables periodic reporting of GPS NMEA sentences to a remote server. The router will buffer NMEA data if errors are encountered or if the internet connection goes down and send the buffered sentences when the connection is restored.
 - **Remote server hostname or IP**
 - **Remote server port**
 - **Report only over specific time interval:** Restricts the NMEA sentence reporting to a remote server to a specific time interval.



The following GPS spec is copied from <http://aprs.gids.nl/nmea/>

8.1.8 \$GPGGA – Global Positioning System Fix Data

Name	Example Data	Description
Sentence Identifier	\$GPGGA	Global Positioning System Fix Data
Time	170834	17:08:34 Z
Latitude	4124.8963, N	41d 24.8963' N or 41d 24' 54" N
Longitude	08151.6838, W	81d 51.6838' W or 81d 51' 41" W
Fix Quality: - 0 = Invalid - 1 = GPS fix - 2 = DGPS fix	1	Data is from a GPS fix
Number of Satellites	05	5 Satellites are in view
Horizontal Dilution of Precision (HDOP)	1.5	Relative accuracy of horizontal position
Altitude	280.2, M	280.2 meters above mean sea level
Height of geoid above WGS84 ellipsoid	-34.0, M	-34.0 meters
Time since last DGPS update	blank	No last update
DGPS reference station id	blank	No station id
Checksum	*75	Used by program to check for transmission errors

Courtesy of [Brian McClure](#), N8PQI.

Global Positioning System Fix Data. Time, position, and fix related data for a GPS receiver.

eg2. \$--GGA,hhmmss.ss,llll.ll,a,yyyyy.yy,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx

hhmmss.ss = UTC of position

llll.ll = latitude of position

a = N or S

yyyyy.yy = Longitude of position

a = E or W

x = GPS Quality indicator (0=no fix, 1=GPS fix, 2=Dif. GPS fix)

xx = number of satellites in use

x.x = horizontal dilution of precision

x.x = Antenna altitude above mean-sea-level

M = units of antenna altitude, meters

x.x = Geoidal separation

M = units of geoidal separation, meters

x.x = Age of Differential GPS data (seconds)

xxxx = Differential reference station ID

eg3. \$GPGGA,hhmmss.ss,llll.ll,a,yyyyy.yy,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx*hh

1 = UTC of Position

2 = Latitude

3 = N or S

4 = Longitude

5 = E or W

6 = GPS quality indicator (0=invalid; 1=GPS fix; 2=Diff. GPS fix)

7 = Number of satellites in use [not those in view]

8 = Horizontal dilution of position

9 = Antenna altitude above/below mean sea level (geoid)

10 = Meters (Antenna height unit)

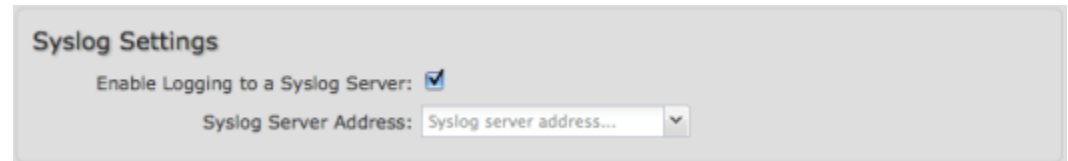
11 = Geoidal separation (Diff. between WGS-84 earth ellipsoid and mean sea level. -=geoid is below WGS-84 ellipsoid)

12 = Meters (Units of geoidal separation)

- 13 = Age in seconds since last update from diff. reference station
- 14 = Diff. reference station ID#
- 15 = Checksum

8.1.9 Syslog Settings

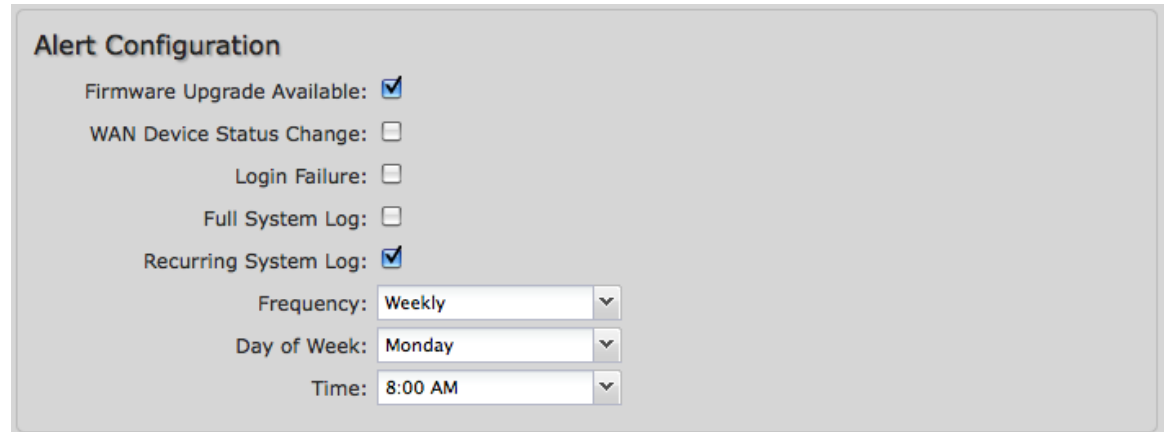
Enabling this option will send log messages to a specified Syslog server. After enabling, type the Hostname or IP address of the Syslog server.



8.2 Device Alerts (Advanced Mode only)

The Device Alerts submenu choice allows you to receive email notifications of specific system events. YOU MUST ENABLE AN SMTP EMAIL SERVER TO RECEIVE ALERTS. Alerts can be included for the following:

- **Firmware Upgrade Available:** A firmware update is available for this device.
- **WAN Device Status Change:** An attached WAN device has changed status. The possible statuses are plugged, unplugged, connected, and disconnected.
- **Login Failure:** A failed login attempt has been detected.
- **Full System Log:** The system log has filled. This alert contains the contents of the system log.
- **Recurring System Log:** The system log is sent periodically. This alert contains all of the system events since the last recurring alert. It can be scheduled for daily, weekly and monthly reports. You also choose the time you want the alert sent.



Alert Configuration

Firmware Upgrade Available:

WAN Device Status Change:

Login Failure:

Full System Log:

Recurring System Log:

Frequency: Weekly

Day of Week: Monday

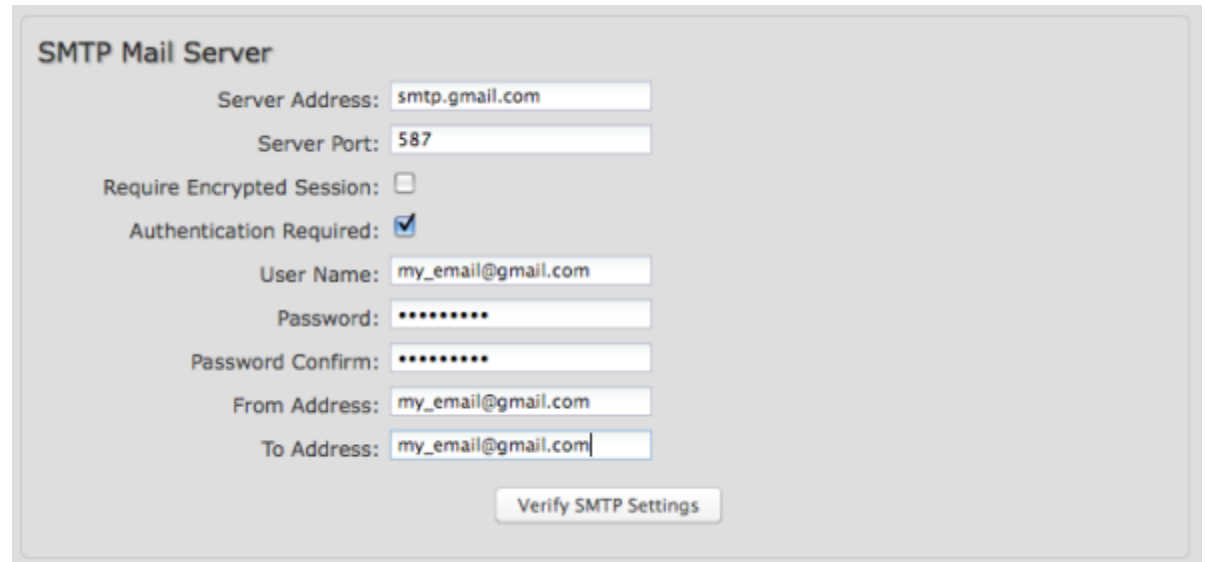
Time: 8:00 AM

8.2.1 SMTP Mail Server

Since the IBR650 does not have its own email server, to receive alerts you must enable an SMTP server. This is possible through most email services (Gmail, Yahoo, etc.).

Each SMTP server will have different specifications for setup, so you have to look those up separately. The following is an example using Gmail:

- **Server Address:** smtp.gmail.com
- **Server Port:** 587 (for TLS, or Transport Layer Security port; the IBR650 does not support SSL).
- **Authentication Required:** For Gmail, mark this checkbox.
- **User Name:** Your full email address
- **Password:** Your Gmail password
- **From Address:** Your email address
- **To Address:** Your email address



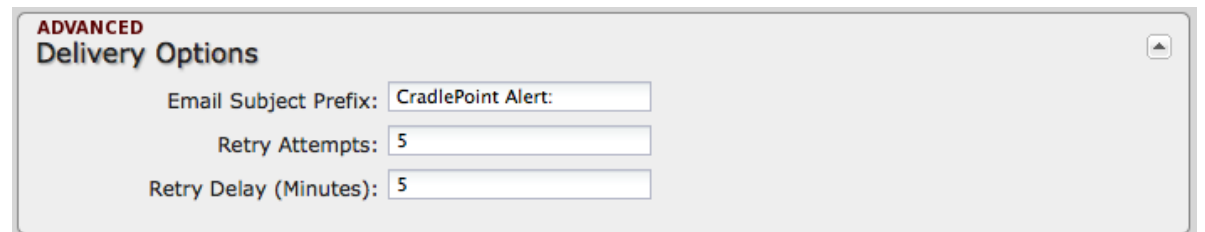
Once you have filled in the information for the SMTP server, click on the “Verify SMTP Settings” button. You should receive a test email at your account.

Advanced: **Delivery Options**

Email Subject Prefix: This optional string is prefixed to the alert subject. It can be customized to help you identify alerts from specific routers.

Retry Attempts: The number of attempts made to send an alert to the mail server. After the attempts are exhausted, the alert is discarded.

Retry Delay: The delay between retry attempts.

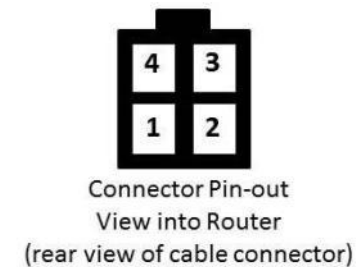


8.3 GPIO Connector

The power connector includes two pins defined for general purpose LVTTTL compatible input and output. These pins are ESD protected and the input is 5V tolerant.

NOTE: GPIO functionality requires a separate adapter to connect to the I/O pins.

Pin	Definition
1	Ground
2	12VDC Power
3	Input: LVTTTL Digital Input with 50K ohm pullup to 3.3VDC (5V tolerant)
4	Output: LVTTTL Digital Output (capable of source/sink of 50mA)



This section is used to configure these Input and Output General Purpose I/O pins.

Input Pin

Current Value: HIGH

Input Mode:

Output Pin

Current Value: LOW

Output Mode:

Current Value: Displays HIGH or LOW for both the Input Pin and Output Pin.

Input Pin – The Input Pin can be used to read a value—either high or low—from an external device and either display that value on this administration page (as the Current Value) or cause the router to reset. Select one of the following options from the dropdown menu:

- **Default/Ignored:** In this mode the input pin is not used.
- **Input Sensing:** In this mode the logic state (high or low) is automatically sensed by the router and is readable as the Current Value.
- **Router Reset:** In this mode an external device can reset the router by holding the input low for 10-seconds.

Output Pin – The Output Pin can be used to allow an external device to read either whether the router is running or whether the modem is connected. Select one of the following options from the dropdown menu:

- **Default/Low:** In this mode the output pin is not used and is at 0V (ground potential).
- **Set High/Router Running:** In these modes the output pin is logic low while the router is booting and transitions to logic high when the router is fully running. If the router is reset, the output returns to low until the router has fully rebooted.
- **Modem Connected:** In this mode the output pin is logic low until the modem has connected to a tower. If the connection drops, this output is set low until the connection is restored.

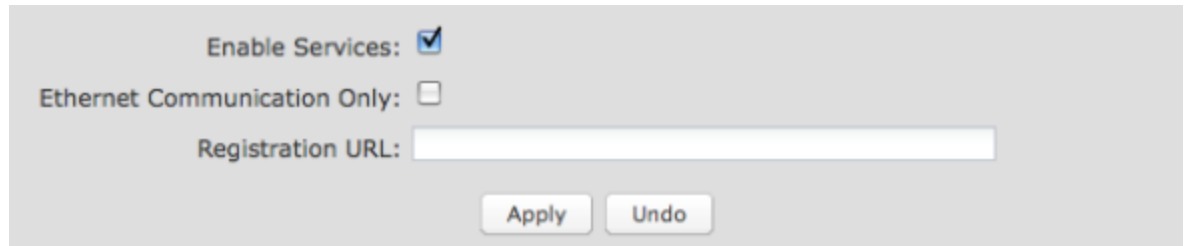
8.4 Managed Services (Advanced Mode only) ASK YOUR CRADLEPOINT SALES REPRESENTATIVE FOR DETAILS

Managed Services allow you to centralize your router configuration using the WiPipe Central server. WiPipe Central services must be purchased separately.

Enable Services: Enables the WiPipe Central client to contact the server.

Ethernet Communication Only: The WiPipe Central client will not start unless the WAN is Ethernet.

Registration URL: Register your router using the code provided by CradlePoint when you purchase WiPipe Central.



The screenshot shows a configuration panel with the following elements:

- Enable Services:** A checkbox that is checked.
- Ethernet Communication Only:** An unchecked checkbox.
- Registration URL:** A text input field that is currently empty.
- Apply** and **Undo** buttons are located at the bottom right of the panel.

8.5 System Control

Restore to Factory Defaults: This changes all settings back to their default values.

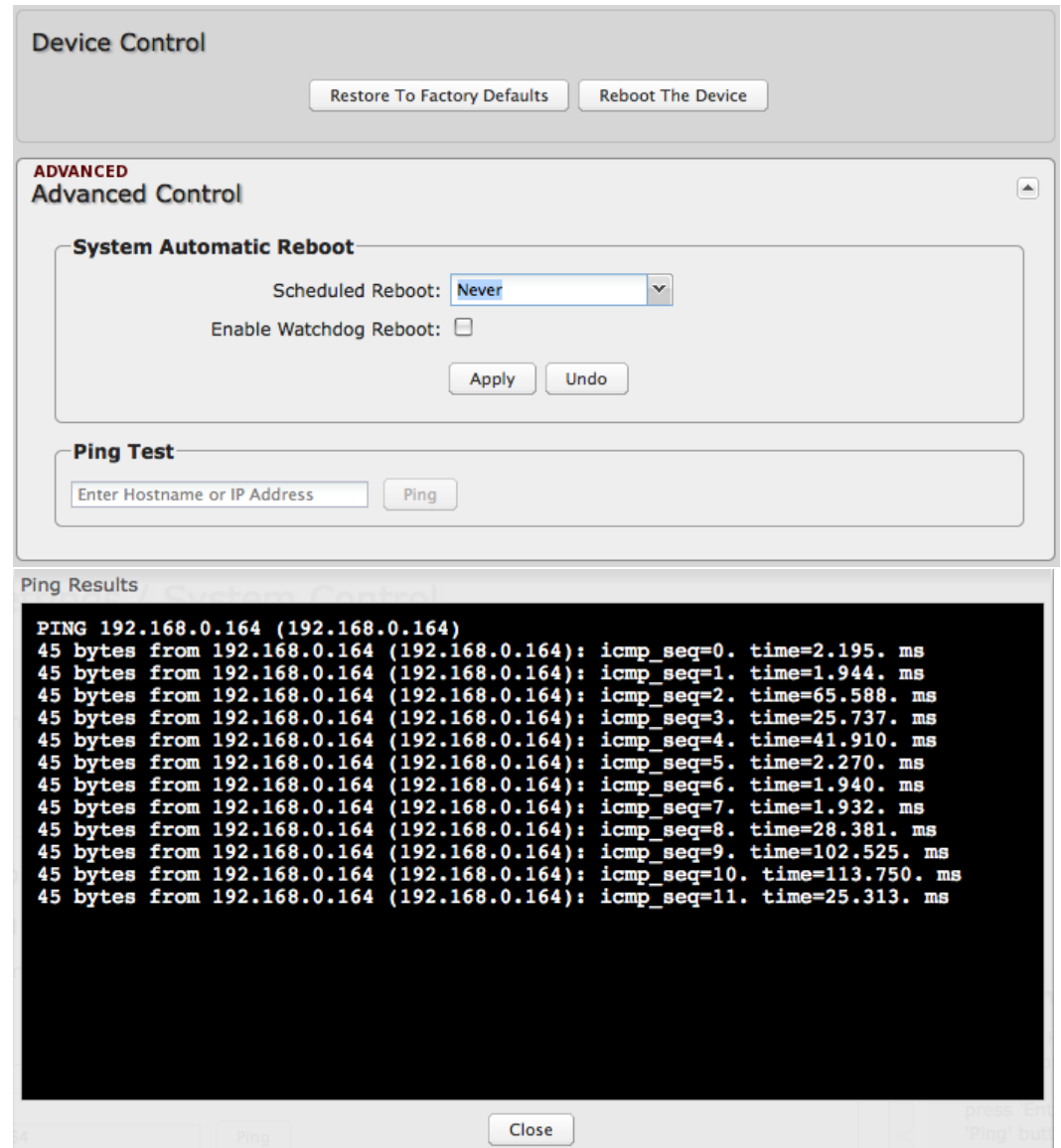
Reboot The Device: This causes the router to restart.

Advanced: System Automatic Reboot and Ping Test

Scheduled Reboot: This causes the router to restart at a user-determined time.

Watchdog Reboot: This causes the router to automatically restart when it determines an unrecoverable error condition has occurred.

Ping Test: A simple test to check internet connectivity. Type the Hostname or IP address of the computer you want to ping and press 'Enter' or click the 'Ping' button.



The screenshot shows the 'Device Control' web interface. At the top, there are two buttons: 'Restore To Factory Defaults' and 'Reboot The Device'. Below this is the 'ADVANCED' section, titled 'Advanced Control'. Underneath, there is a 'System Automatic Reboot' section with a dropdown menu for 'Scheduled Reboot' set to 'Never' and a checkbox for 'Enable Watchdog Reboot' which is unchecked. There are 'Apply' and 'Undo' buttons. Below that is a 'Ping Test' section with an input field for 'Enter Hostname or IP Address' and a 'Ping' button. At the bottom, there is a 'Ping Results' section displaying a terminal window with the following output:

```
PING 192.168.0.164 (192.168.0.164)
45 bytes from 192.168.0.164 (192.168.0.164): icmp_seq=0. time=2.195. ms
45 bytes from 192.168.0.164 (192.168.0.164): icmp_seq=1. time=1.944. ms
45 bytes from 192.168.0.164 (192.168.0.164): icmp_seq=2. time=65.588. ms
45 bytes from 192.168.0.164 (192.168.0.164): icmp_seq=3. time=25.737. ms
45 bytes from 192.168.0.164 (192.168.0.164): icmp_seq=4. time=41.910. ms
45 bytes from 192.168.0.164 (192.168.0.164): icmp_seq=5. time=2.270. ms
45 bytes from 192.168.0.164 (192.168.0.164): icmp_seq=6. time=1.940. ms
45 bytes from 192.168.0.164 (192.168.0.164): icmp_seq=7. time=1.932. ms
45 bytes from 192.168.0.164 (192.168.0.164): icmp_seq=8. time=28.381. ms
45 bytes from 192.168.0.164 (192.168.0.164): icmp_seq=9. time=102.525. ms
45 bytes from 192.168.0.164 (192.168.0.164): icmp_seq=10. time=113.750. ms
45 bytes from 192.168.0.164 (192.168.0.164): icmp_seq=11. time=25.313. ms
```

At the bottom of the terminal window, there is a 'Close' button.

8.6 System Software

Firmware Upgrade: This allows the administrator to load new firmware onto the router to add new features or fix defects. If you are happy with the operation of the router, you may not want to upgrade just because a new version is available. Check the firmware release notes for information to decide if you should upgrade or not.

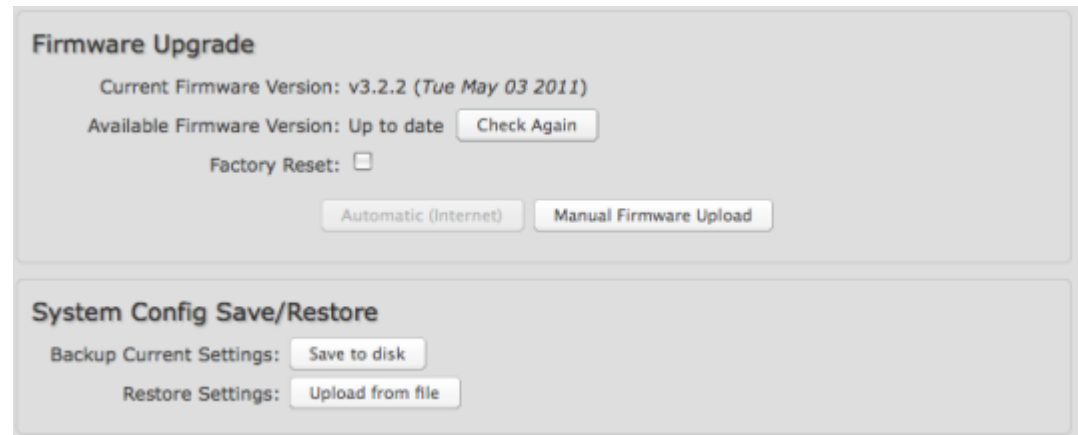
Automatic (Internet): Have the router download the file and perform the upgrade with no user interaction.

Manual Firmware Upload: Upload the router firmware from an attached computer.

Factory Reset: Set default settings to match the new firmware. This is safest, as settings may have changed. You should back up your current settings and restore them after the new firmware is loaded.

Backup Current Settings: Save your current settings to a file on a computer.

Restore Settings: Restore your previous settings from a file on a computer.



The screenshot shows a web interface with two main sections. The top section is titled "Firmware Upgrade" and displays the current firmware version as "v3.2.2 (Tue May 03 2011)". Below this, it shows "Available Firmware Version: Up to date" with a "Check Again" button. There is a "Factory Reset:" checkbox which is currently unchecked. At the bottom of this section are two buttons: "Automatic (Internet)" and "Manual Firmware Upload". The bottom section is titled "System Config Save/Restore" and contains two rows of options. The first row is "Backup Current Settings:" with a "Save to disk" button. The second row is "Restore Settings:" with an "Upload from file" button.

9 GLOSSARY

802.11

A family of specifications for wireless local area networks (WLANs) developed by a working group of the Institute of Electrical and Electronics Engineers (IEEE).

Access Control List

ACL. This is a database of network devices that are allowed to access resources on the network.

Access Point

AP. Device that allows wireless clients to connect to it and access the network.

ActiveX

A Microsoft specification for the interaction of software components.

Ad-hoc network

Peer-to-Peer network between wireless clients.

Address Resolution Protocol

ARP. Used to map MAC addresses to IP addresses so that conversions can be made in both directions.

ADSL

Asymmetric Digital Subscriber Line.

Advanced Encryption Standard

AES. Government encryption standard.

Alphanumeric

Characters A-Z and 0-9.

Antenna

Used to transmit and receive RF signals.

AppleTalk

A set of Local Area Network protocols developed by Apple for their computer systems.

AppleTalk Address Resolution Protocol

AARP. Used to map the MAC addresses of Apple computers to their AppleTalk network addresses, so that conversions can be made in both directions.

Application layer

7th Layer of the OSI model. Provides services to applications to ensure that they can communicate properly with other applications on a network.

ASCII

American Standard Code for Information Interchange. This system of characters is most commonly used for text files.

Attenuation

The loss in strength of digital and analog signals. The loss is greater when the signal is being transmitted over long distances.

Authentication

To provide credentials, like a Password, in order to verify that the person or device is really who they are claiming to be.

Automatic Private IP Addressing

APIPA. An IP address that a Windows computer will assign itself when it is configured to obtain an IP address automatically but no DHCP server is available on the network.

Backward Compatible

The ability for new devices to communicate and interact with older legacy devices to guarantee interoperability.

Bandwidth

The maximum amount of bytes or bits per second that can be transmitted to and from a network device.

Basic Input/Output System

BIOS. A program that the processor of a computer uses to startup the system once it is turned on.

Baud

Data transmission speed.

Beacon

A data frame by which one of the stations in a WiFi network periodically broadcasts network control data to other wireless stations.

Bit rate

The amount of bits that pass in given amount of time.

Bit/sec

Bits per second.

BOOTP

Bootstrap Protocol. Allows for computers to be booted up and given an IP address with no user intervention.

Bottleneck

A time during processes when something causes the process to slowdown or stop all together.

Broadband

A wide band of frequencies available for transmitting data.

Broadcast

Transmitting data in all directions at once.

Browser

A program that allows you to access resources on the web and provides them to you graphically.

Cable modem

A device that allows you to connect a computer up to a coaxial cable and receive internet access from your Cable provider.

CardBus

A newer version of the PC Card or PCMCIA interface. It supports a 32-bit data path, DMA, and consumes less voltage.

CAT 5

Category 5. Used for 10/100 Mbps or 1Gbps Ethernet connections.

Client

A program or user that requests data from a server.

Collision

When do two devices on the same Ethernet network try and transmit data at the exact same time.

Cookie

Information that is stored on the hard drive of your computer that holds your preferences to the site that gave your computer the cookie.

Data

Information that has been translated into binary so that it can be processed or moved to another device.

Data Encryption Standard

Uses a randomly selected 56-bit key that must be known by both the sender and the receiver when information is exchanged.

Data-Link layer

The second layer of the OSI model. Controls the movement of data on the physical link of a network.

Database

Organizes information so that it can be managed updated, as well as easily accessed by users or applications.

DB-25

A 25-pin male connector for attaching External modems or RS-232 serial devices.

DB-9

A 9-pin connector for RS-232 connections

dBd

Decibels related to dipole antenna.

dBi

Decibels relative to isotropic radiator.

dBm

Decibels relative to one milliwatt.

Decrypt

To unscramble an encrypted message back into plain text.

Default

A predetermined value or setting that is used by a program when no user input has been entered for this value or setting.

Demilitarized zone

DMZ: A single computer or group of computers that can be accessed by both users on the internet as well as users on the Local Network, but that is not protected by the same security as the Local Network.

DHCP

Dynamic Host Configuration Protocol: Used to automatically assign IP addresses from a predefined pool of addresses to computers or devices that request them.

Digital certificate

An electronic method of providing credentials to a server in order to have access to it or a network.

Direct Sequence Spread Spectrum

DSSS: Modulation technique used by 802.11b wireless devices.

DMZ

“Demilitarized Zone”. A computer that logically sits in a “no-mans-land” between the LAN and the WAN. The DMZ computer trades some of the protection of the router’s security mechanisms for the convenience of being directly addressable from the internet.

DNS

Domain Name System: Translates Domain Names to IP addresses.

Domain name

A name that is associated with an IP address.

Download

To send a request from one computer to another and have the file transmitted back to the requesting computer.

DSL

Digital Subscriber Line. High bandwidth internet connection over telephone lines.

Duplex

Sending and Receiving data transmissions at the same time.

Dynamic DNS service

Dynamic DNS is provided by companies to allow users with Dynamic IP addresses to obtain a Domain Name that will always be linked to their changing IP address. The IP address is updated by either client software running on a computer or by a router that supports Dynamic DNS, whenever the IP address changes.

Dynamic IP address

IP address that is assigned by a DHCP server and that may change. Cable internet providers usually use this method to assign IP addresses to their customers.

EAP

Extensible Authentication Protocol.

Email

Electronic Mail is a computer-stored message that is transmitted over the internet.

Encryption

Converting data into cyphertext so that it cannot be easily read.

Ethernet

The most widely used technology for Local Area Networks.

Fiber optic

A way of sending data through light impulses over glass or plastic wire or fiber.

File server

A computer on a network that stores data so that the other computers on the network can all access it.

File sharing

Allowing data from computers on a network to be accessed by other computers on the network with different levels of access rights.

Firewall

A device that protects resources of the Local Area Network from unauthorized users outside of the local network.

Firmware

Programming that is inserted into a hardware device that tells it how to function.

Fragmentation

Breaking up data into smaller pieces to make it easier to store.

FTP

File Transfer Protocol. Easiest way to transfer files between computers on the internet.

Full-duplex

Sending and Receiving data at the same time.

Gain

The amount an amplifier boosts the wireless signal.

Gateway

A device that connects your network to another, like the internet.

Gbps

Gigabits per second.

Gigabit Ethernet

Transmission technology that provides a data rate of 1 billion bits per second.

GUI

Graphical user interface.

H.323

A standard that provides consistency of voice and video transmissions and compatibility for video conferencing devices.

Half-duplex

Data cannot be transmitted and received at the same time.

Hashing

Transforming a string of characters into a shorter string with a predefined length.

Hexadecimal

Characters 0-9 and A-F.

Hop

The action of data packets being transmitted from one router to another.

Host

Computer on a network.

HTTP

Hypertext Transfer Protocol is used to transfer files from HTTP servers (web servers) to HTTP clients (web browsers).

HTTPS

HTTP over SSL is used to encrypt and decrypt HTTP transmissions.

Hub

A networking device that connects multiple devices together.

ICMP

Internet Control Message Protocol.

IEEE

Institute of Electrical and Electronics Engineers.

IGMP

Internet Group Management Protocol is used to make sure that computers can report their multicast group membership to adjacent routers.

IIS

Internet Information Server is a WEB server and FTP server provided by Microsoft.

IKE

Internet Key Exchange is used to ensure security for VPN connections.

Infrastructure

In terms of a wireless network, this is when wireless clients use an access point to gain access to the network.

Internet

A system of worldwide networks that use TCP/IP to allow for resources to be accessed from computers around the world.

Internet Explorer

A World Wide Web browser created and provided by Microsoft.

Internet Protocol

The method of transferring data from one computer to another on the internet.

Internet Protocol Security

IPsec provides security at the packet processing layer of network communication.

Internet Service Provider

An ISP provides access to the internet to individuals or companies.

Intranet

A private network.

Intrusion Detection

A type of security that scans a network to detect attacks coming from inside and outside of the network.

IP

Internet Protocol.

IP address

A 32-bit number, when talking about Internet Protocol Version 4, that identifies each computer that transmits data on the internet or on an intranet.

IPsec

Internet Protocol Security.

IPX

Internetwork Packet Exchange is a networking protocol developed by Novell to enable their Netware clients and servers to communicate.

ISP

Internet Service Provider.

Java

A programming language used to create programs and applets for web pages.

Kbps

Kilobits per second.

Kbyte

Kilobyte.

L2TP

Layer 2 Tunneling Protocol.

LAN

Local Area Network.

Latency

The amount of time that it takes a packet to get from the one point to another on a network. Also referred to as delay.

LED

Light Emitting Diode.

Legacy

Older devices or technology.

Local Area Network

LAN. A group of computers in a building that usually access files from a server.

LPR/LPD

“Line Printer Requestor”/“Line Printer Daemon”. A TCP/IP protocol for transmitting streams of printer data.

MAC Address

A unique hardware ID assigned to every Ethernet adapter by the manufacturer.

Mbps

Megabits per second.

MDI

Medium Dependent Interface is an Ethernet port for a connection to a straight-through cable.

MDIX

Medium Dependent Interface Crossover is an Ethernet port for a connection to a crossover cable.

MIB

Management Information Base is a set of objects that can be managed by using SNMP.

Modem

A device that modulates digital signals from a computer to an analog signal in order to transmit the signal over phone lines. It also demodulates the analog signals coming from the phone lines to digital signals for your computer.

MPPE

Microsoft Point-to-Point Encryption is used to secure data transmissions over PPTP connections.

MTU

Maximum Transmission Unit is the largest packet that can be transmitted on a packet-based network like the internet.

Multicast

Sending data from one device to many devices on a network.

NAT

Network Address Translation allows many private IP addresses to connect to the internet, or another network, through one IP address.

NetBEUI

NetBIOS Extended User Interface is a Local Area Network communication protocol. This is an updated version of NetBIOS.

NetBIOS

Network Basic Input/Output System.

Netmask

Determines what portion of an IP address designates the Network and which part designates the Host.

Network Interface Card

NIC. A card installed in a computer or built onto the motherboard that allows the computer to connect to a network.

Network Layer

The third layer of the OSI model which handles the routing of traffic on a network.

Network Time Protocol

Used to synchronize the time of all the computers in a network.

NIC

Network Interface Card.

NTP

Network Time Protocol.

OFDM

Orthogonal Frequency-Division Multiplexing is the modulation technique for both 802.11a and 802.11g.

OSI

Open Systems Interconnection is the reference model for how data should travel between two devices on a network.

OSPF

Open Shortest Path First is a routing protocol that is used more than RIP in larger scale networks because only changes to the routing table are sent to all the other

routers in the network as opposed to sending the entire routing table at a regular interval, which is how RIP functions.

Password

A sequence of characters that is used to authenticate requests to resources on a network.

Personal Area Network

The interconnection of networking devices within a range of 10 meters.

Physical layer

The first layer of the OSI model. Provides the hardware means of transmitting electrical signals on a data carrier.

Ping

A utility program that verifies that a given internet address exists and can receive messages. The utility sends a control packet to the given address and waits for a response.

PoE

Power over Ethernet is the means of transmitting electricity over the unused pairs in a category 5 Ethernet cable.

POP3

Post Office Protocol 3 is used for receiving email.

Port

A logical channel endpoint in a network. A computer might have only one physical channel (its Ethernet

channel) but can have multiple ports (logical channels) each identified by a number.

PPP

Point-to-Point Protocol is used for two computers to communicate with each over a serial interface, like a phone line.

PPPoE

Point-to-Point Protocol over Ethernet is used to connect multiple computers to a remote server over Ethernet.

PPTP

Point-to-Point Tunneling Protocol is used for creating VPN tunnels over the internet between two networks.

Preamble

Used to synchronize communication timing between devices on a network.

QoS

Quality of Service.

RADIUS

Remote Authentication Dial-In User Service allows for remote users to dial into a central server and be authenticated in order to access resources on a network.

Reboot

To restart a computer and reload its operating software or firmware from nonvolatile storage.

Rendezvous

Apple's version of UPnP, which allows for devices on a network to discover each other and be connected without the need to configure any settings.

Repeater

Retransmits the signal of an access point in order to extend its coverage.

RIP

Routing Information Protocol is used to synchronize the routing table of all the routers on a network.

RJ-11

The most commonly used connection method for telephones.

RJ-45

The most commonly used connection method for Ethernet.

RS-232C

The interface for serial communication between computers and other related devices.

RSA

Algorithm used for encryption and authentication.

Server

A computer on a network that provides services and resources to other computers on the network.

Session key

An encryption and decryption key that is generated for every communication session between two computers.

Session layer

The fifth layer of the OSI model which coordinates the connection and communication between applications on both ends.

Simple Mail Transfer Protocol

Used for sending and receiving email.

Simple Network Management Protocol

Governs the management and monitoring of network devices.

SIP

Session Initiation Protocol. A standard protocol for initiating a user session that involves multimedia content, such as voice or chat.

SMTP

Simple Mail Transfer Protocol.

SNMP

Simple Network Management Protocol.

SOHO

Small Office/Home Office.

SPI

Stateful Packet Inspection.

SSH

Secure Shell is a command line interface that allows for secure connections to remote computers.

SSID

Service Set Identifier is a name for a wireless network.

Stateful Packet Inspection

A feature of a firewall that monitors outgoing and incoming traffic to make sure that only valid responses to outgoing requests are allowed to pass through the firewall.

Subnet mask

Determines what portion of an IP address designates the Network and which part designates the Host.

Syslog

System Logger -- a distributed logging interface for collecting in one place the logs from different sources. Originally written for UNIX, it is now available for other operating systems, including Windows.

TCP

Transmission Control Protocol.

TCP Raw

A TCP/IP protocol for transmitting streams of printer data.

TCP/IP

Transmission Control Protocol/Internet Protocol.

TFTP

Trivial File Transfer Protocol is a utility used for transferring files that is simpler to use than FTP but with less features.

Throughput

The amount of data that can be transferred in a given time period.

Traceroute

A utility displays the routes between your computer and specific destination.

UDP

User Datagram Protocol.

Unicast

Communication between a single sender and receiver.

Universal Plug and Play

UPnP. A standard that allows network devices to discover each other and configure themselves to be a part of the network.

Update

To install a more recent version of a software or firmware product.

Upgrade

To install a more recent version of a software or firmware product.

Upload

To send a request from one computer to another and have a file transmitted from the requesting computer to the other.

UPnP

Universal Plug and Play.

URL

Uniform Resource Locator is a unique address for files accessible on the internet.

USB

Universal Serial Bus.

UTP

Unshielded Twisted Pair.

Virtual Private Network

VPN: A secure tunnel over the internet to connect remote offices or users to their company's network.

VLAN

Virtual LAN.

Voice over IP

Sending voice information over the internet as opposed to the PSTN

VoIP

Voice over IP.

Wake on LAN

Allows you to power up a computer through it's Network Interface Card.

WAN

Wide Area Network.

WCN

Windows Connect Now. A Microsoft method for configuring and bootstrapping wireless networking hardware (access points) and wireless clients, including PCs and other devices.

WDS

Wireless Distribution System. A system that enables the interconnection of access points wirelessly.

Web browser

A utility that allows you to view content and interact with all of the information on the World Wide Web.

WEP

Wired Equivalent Privacy is security for wireless networks that is supposed to be comparable to that of a wired network.

WiFi

Wireless Fidelity. Used to describe any of the 802.11 wireless networking specifications.

WiFi Protected Access

An updated version of security for wireless networks that provides authentication as well as encryption.

Wide Area Network

The larger network that your LAN is connected to, which may be the internet itself, or a regional or corporate network.

Wireless (WiFi) LAN

Connecting to a Local Area Network over one of the 802.11 wireless standards.

Wireless ISP

WISP. A company that provides a broadband internet connection over a wireless connection.

WISP

Wireless Internet Service Provider.

WLAN

Wireless Local Area Network.

WPA

WiFi Protected Access. A WiFi security enhancement that provides improved data encryption, relative to WEP.

xDSL

A generic term for the family of digital subscriber line (DSL) technologies, such as ADSL, HDSL, RADSL, and SDSL.

Yagi antenna

A directional antenna used to concentrate wireless signals on a specific location.

10 APPENDIX

10.1 Product Information and Safety Guide

This important Product Information and Safety Guide contains safety, handling, disposal, regulatory, trademark, copyright, and software licensing information. Read all safety information below and operating instructions before using the IBR650 3G device to avoid injury.

SAFETY AND HAZARDS

Under no circumstances should the IBR650 3G device be used in any areas (a) where blasting is in progress, (b) where explosive atmospheres may be present, or (c) that are near (i) medical or life support equipment, or (ii) any equipment which may be susceptible to any form of radio interference. In such areas, the IBR650 3G device **MUST BE POWERED OFF AT ALL TIMES** (since the device otherwise could transmit signals that might interfere with such equipment). In addition, under no circumstances should the IBR650 3G device be used in any aircraft, regardless of whether the aircraft is on the ground or in flight. In any aircraft, the IBR650 3G device **MUST BE POWERED OFF AT ALL TIMES** (since the device otherwise could transmit signals that might interfere with various onboard systems on such aircraft). Furthermore, under no circumstances should the IBR650 3G device be used by the driver or operator of any vehicle. Such use of the device will detract from the driver or operator's control of that vehicle. In some jurisdictions, use of the IBR650 3G device while driving or operating a vehicle constitutes a civil and/or criminal offense.

Due to the nature of wireless communications, transmission and reception of data by the IBR650 3G device can never be guaranteed, and it is possible that data communicated or transmitted wirelessly may be delayed, corrupted (i.e., contain errors), or totally lost. The IBR650 3G device is not intended for, and CradlePoint recommends the device not be used in any critical applications where failure to transmit or receive data could result in property damage or loss or personal injury of any kind (including death) to the user or to any other party. CradlePoint expressly disclaims liability for damages of any kind resulting from: (a) delays, errors, or losses of any data transmitted or received using the device; or (b) any failure of the device to transmit or receive such data.

Warning: This product is only to be installed by qualified personnel!

To comply with FCC/IC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain must not exceed 5 dBi in the Cellular band and 4 dBi in the PCS band.

ANTENNA CONSIDERATIONS

Although the antenna model(s) used with these devices meet(s) the Industry Canada Radio Frequency requirements, it is possible that the future customers may swap them for different ones without network providers knowledge and approval. Such customers must be made aware of, and follow, the Radio Frequency requirements applied in the Technical Approval:

- RSS-102 "Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)"
- RSS-129 "800 MHz Dual-Mode CDMA Cellular Telephones"
- RSS-132e "Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz"
- RSS-133 r1 "2 GHz Personal Communications Services"

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. 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.

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.

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.

This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.

IMPORTANT NOTE

FCC Radiation Exposure Statement: This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

OPEN SOURCE SOFTWARE

This product contains software distributed under one or more of the following open source licenses: GNU General Public License Version 2, NetBSD Foundation License, and PSF License Agreement for Python 3.1.1. For more information on this software, including licensing terms and your rights to access source code, contact CradlePoint at www.cradlepoint.com/opensource.

WARRANTY INFORMATION

Limited 1 Year Warranty included featuring 5x12 technical support + access to software updates + hardware repair or replacement. Optional Enterprise Support Agreement available with 24x7 technical support + software updates and upgrades + advanced hardware exchange.

CradlePoint, Inc. warrants this product against defects in materials and workmanship to the original purchaser (or the first purchaser in the case of resale by an authorized distributor) for a period of one (1) year from the date of shipment. This warranty is limited to a repair or replacement of the product, at CradlePoint's discretion. CradlePoint does not warrant that the operation of the device will meet your requirements or be error free. Within thirty (30) days of receipt should the product fail for any reason other than damage due to customer negligence, purchaser may return the product to the point of purchase for a full refund of the purchase price. If the purchaser wishes to upgrade or convert to another CradlePoint, Inc. product within the thirty (30) day period, purchaser may return the product and apply the full purchase price toward the purchase of another CradlePoint product. Any other return will be subject to CradlePoint, Inc.'s existing return policy.

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The information contained in this Quick Start Guide is subject to change without notice and does not represent any commitment on the part of CradlePoint or its affiliates. CRADLEPOINT AND ITS AFFILIATES HEREBY SPECIFICALLY DISCLAIM LIABILITY FOR ANY AND ALL: (A) DIRECT, INDIRECT, SPECIAL, GENERAL, INCIDENTAL, CONSEQUENTIAL, PUNITIVE OR EXEMPLARY DAMAGES, INCLUDING WITHOUT LIMITATION FOR LOSS OF PROFITS OR REVENUE OR OF ANTICIPATED PROFITS OR REVENUE ARISING OUT OF THE USE OR INABILITY TO USE THE IBR650 3G DEVICE, EVEN IF CRADLEPOINT AND/OR ITS AFFILIATES HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, AND EVEN IF SUCH DAMAGES ARE FORESEEABLE; OR (B) CLAIMS BY ANY THIRD PARTY. Notwithstanding the foregoing, in no event shall the aggregate liability of CradlePoint and/or its affiliates arising under or in connection with the IBR650 3G device, regardless of the number of events, occurrences, or claims giving rise to liability, exceed the price paid by the original purchaser of the IBR650 3G device.

PRIVACY

CradlePoint may collect general data pertaining to the use of CradlePoint products via the Internet including, by way of example, IP address, device ID, operating system, browser type and version number, etc. To review CradlePoint's privacy policy, please visit: <http://www.cradlepoint.com/privacy>.

OTHER BINDING DOCUMENTS; TRADEMARKS; COPYRIGHT

By activating or using your IBR650 3G device, you agree to be bound by CradlePoint's Terms of Use, User License and other Legal Policies, all as posted at www.cradlepoint.com/legal. Please read these documents carefully. CradlePoint, the CradlePoint logo, and IBR650 are trademarks of CradlePoint, Inc.

10.2 Specifications

MODEL NAME

CradlePoint COR Integrated Broadband Router IBR650

DATA IN

3G via internal EVDO Rev. A modem, backwards compatible to EVDO Rev 0 and 1xRTT, 10/100 Ethernet Port

DATA OUT

Two 10/100 Ethernet Ports (WAN/LAN Switchable)

ANTENNAS

2 external 3G EV-DO modem antennas

BUTTONS / SWITCHES

Power Switch, Reset

LED INDICATORS

Power, Attention, Modem, Signal Strength, Ethernet LAN, Ethernet WAN

DIMENSIONS

3.3-in x 4-in x 0.9-in (85mm x 102mm x 22mm)

WEIGHT: 7.2 oz (200g)

CERTIFICATIONS: FCC, IC, CE, PTCRB, 802.3, plus Carrier specific certifications

OPERATING TEMPERATURE

-10°C to 60°C (14°F to 140°F) Operating Modem as WAN

-10°C to 50°C (14°F to 122°F) Operating Ethernet as WAN

-20°C to 70°C (-4°F to 158°F) Storage

DETAILS

- **WAN Security** NAT, SPI, ALG, inbound filtering of IP Addresses (future), Port Blocking, Service Filtering (FTP, SMTP, HTTP, RPL, SNMP, DNS, ICMP, NNTP, POP3, SSH), Protocol filtering, WAN ping (allow/ignore)
- **Redundancy and Load Balancing** Failover/Failback with 3G/ Ethernet, Load Balancing, WAN Failure Detection via ping
- **Intelligent Routing** UPnP, DMZ, Virtual Server/Port Forwarding, Routing Rules, Route Management, Content Filtering, Website Filtering, Local DHCP server, DHCP Client, DNS, DNS Proxy. ALGs: PPTP, L2TP, PPPoE pass-through, IPSec pass-through, FTP (passive), FTP (active), Dynamic DNS
- **Management** Remote WAN Web-based Management Access (HTTP, HTTPS), Web-based GUI (Easy Management), One-button firmware upgrade, USB firmware upgrade, Modem Configuration and Management, Server-based centralized Management (WiPipe™ Central), Modem configuration and management
- **Performance & Health Monitoring** WiPipe™ QoS, with Traffic Shaping, SSID-based priority, WAN port speed control
- **VPN (IPSec)**. Device to CradlePoint, Cisco/Linksys, Linux system, Transfer Modes, Hash (MD5, SHA128, SHA256, SHA384, SHA512), Cipher (AES, 3DES, DES), Support for 5 concurrent connections, GRE Tunneling

A large version of the Cradlepoint logo, featuring the word "cradlepoint" in white lowercase letters on a red rectangular background.

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