UBIQUITI NETWORKS

EdgeRouter™ LITE

3-Port Router

Model: ERLite-3

EdgeMAX™

USER GUIDE

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Chapter 1: Overview

Introduction

Thank you for purchasing the Ubiquiti Networks ™ EdgeRouter™ Lite, model ERLite-3. It is part of the EdgeMAX™ platform. For more information, visit **www.ubnt.com/edgemax**

The EdgeRouter is a router that provides a variety of features, including routing, security, Virtual Private Networking (VPN), monitoring and management services, and Quality of Service (QoS). For more detailed specifications, refer to **"EdgeOS" on page 48**.

This User Guide is designed to provide instructions about installation of the EdgeRouter and to provide details about how to use the EdgeOS™ Configuration Interface.

Configuration

The intuitive interface allows you to conveniently manage your EdgeRouter using your web browser. (See **"Using EdgeOS" on page 5** for more information.) If you need to configure advanced features or prefer configuration by command line, you can use the Command Line Interface (CLI). (See **"Command Line Interface" on page 38** for more information.)

Package Contents

EdgeRouter Lite

EdgeRouter Lite

Power Adapter (12V, 1A)

Power Cord

M2.9x20 Screws (Qty. 2)

M2.9 Anchors (Qty. 2)

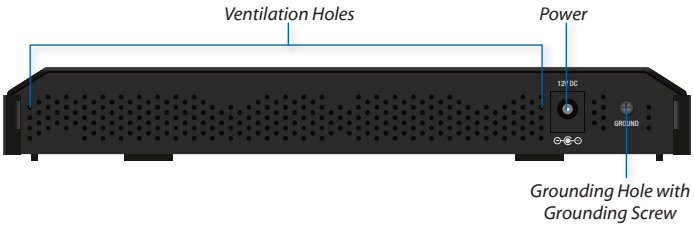
Quick Start Guide

Configuration Interface System Requirements

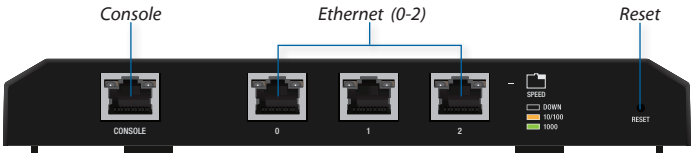
- Microsoft Windows XP, Windows Vista, Windows 7, Windows 8, Linux, or Mac OS X
- Web Browser: Google Chrome, Mozilla Firefox, or Microsoft Internet Explorer 8 (or above)

Hardware Overview

Back Panel



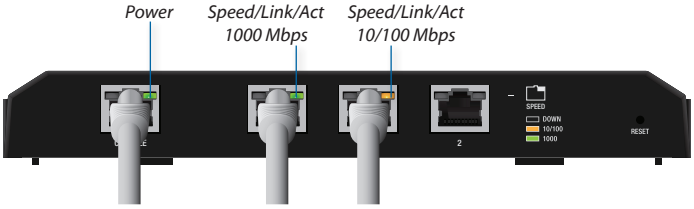
Front Panel Ports



Interface	Description
Console	RJ45 serial console port for Command Line Interface (CLI) management. Use a RJ45-to-DB9, serial console cable, also known as a rollover cable, to connect the *Console* port to your computer. (If your computer does not have a DB9 port, then you will also need a DB9 adapter.)
Ethernet (0-2)	10/100/1000 Mbps Ethernet ports.
Reset	To reset to factory defaults, disconnect the *Power Adapter* from the *Power* port. Press and hold the **Reset** button while connecting the *Power Adapter* to the *Power* port. Keep holding the button until the right LED on port 2 starts flashing and then stops after a few seconds.

Front Panel LEDs

The LEDs on the left side of each port are not used at this time. Below is a description of the right LED functionality:



	LED	State	Status
Console	Power	Off	EdgeRouter Lite not powered on.
		Green	EdgeRouter Lite is powered on.
Ethernet (0-2)	Speed/ Link/Act	Off	No Link
		Amber	Link Established at 10/100 Mbps
		Amber Flashing	Link Activity at 10/100 Mbps
		Green	Link Established at 1000 Mbps
		Green Flashing	Link Activity at 1000 Mbps

Chapter 2: Installation

Introduction

This chapter covers the installation instructions and a couple of typical deployment scenarios (see **"Typical Deployment Scenarios" on page 3**). After you install the EdgeRouter, refer to the instructions in **"Using EdgeOS" on page 5**, which explain how to access the Configuration Interface.

Installation of the EdgeRouter Lite

Mount the EdgeRouter on a wall, or place it on a bench top.

Note: Keep 20 mm of clearance next to the ventilation holes for adequate airflow.

Cabling Requirements

- For indoor applications, use Category 5 (or above) cabling approved for indoor use.
- For outdoor applications, shielded Category 5 (or above) cabling should be used for all wired Ethernet connections and should be grounded through the AC ground of the power supply. We recommend that you protect your outdoor networks from the most brutal environments and devastating ESD attacks with industrial-grade shielded Ethernet cable from Ubiquiti Networks™. For more details, visit: **www.ubnt.com/toughcable**

Note: Although the cabling can be located outdoors, the EdgeRouter Lite itself should be housed inside a protective enclosure.

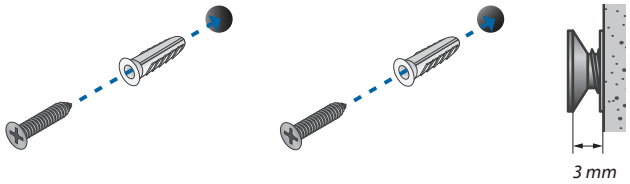
Terms of Use

All Ethernet cabling runs must use CAT5 (or above). It is the customer's responsibility to follow local country regulations, including operation within legal frequency channels, output power, indoor cabling requirements, and Dynamic Frequency Selection (DFS) requirements.

Wall-Mounting

To mount the EdgeRouter Lite on a wall you will need a drill, a 6 mm drill bit, and a Phillips screwdriver.

1. Use a 6 mm drill bit to drill two holes 100 mm apart. (You can use the template at the bottom of the page to mark the holes.)
2. Insert the *M2.9 Anchors* into the holes. Use a Phillips screwdriver to secure a *M2.9x20 Screw* to each anchor. Leave a clearance of approximately 3 mm between each screw head and its anchor.



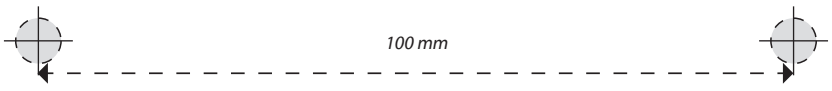
Note: You can also mount the EdgeRouter Lite in a vertical orientation.

3. Position the EdgeRouter Lite with the Ethernet ports facing down. Place the *Wall-Mount Slots* of the EdgeRouter Lite over the screw heads on the wall. Then slide the EdgeRouter Lite down to lock it into place.

Mounting Template

The recommended mounting orientation is horizontal with the ports facing down.

Note: The EdgeRouter Lite can also be mounted in a vertical orientation. Turn this page sideways to mark the holes for vertical placement.



Grounding the EdgeRouter Lite (Optional)

The EdgeRouter Lite is grounded through the *Power Adapter*; however, you can add optional ESD grounding for enhanced ESD protection.

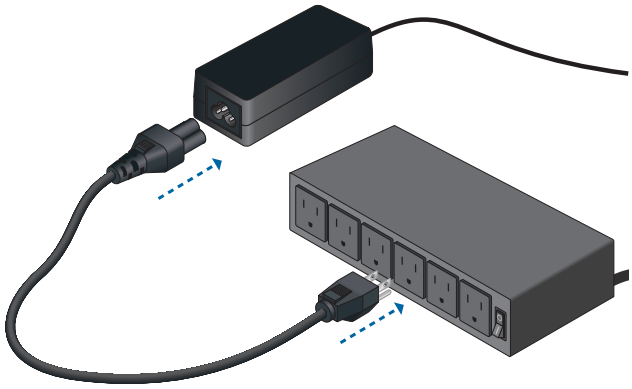
1. Loosen the *Grounding Screw* to secure a ground wire (not included) to the *Grounding Hole*.

2. Secure the other end of the ground wire to a grounding block.

Connecting Power

1. Connect the *Power Adapter* to the *Power* port.

2. Connect the *Power Cord* to the *Power Adapter*. Connect the other end of the *Power Cord* to a power outlet.



Typical Deployment Scenarios

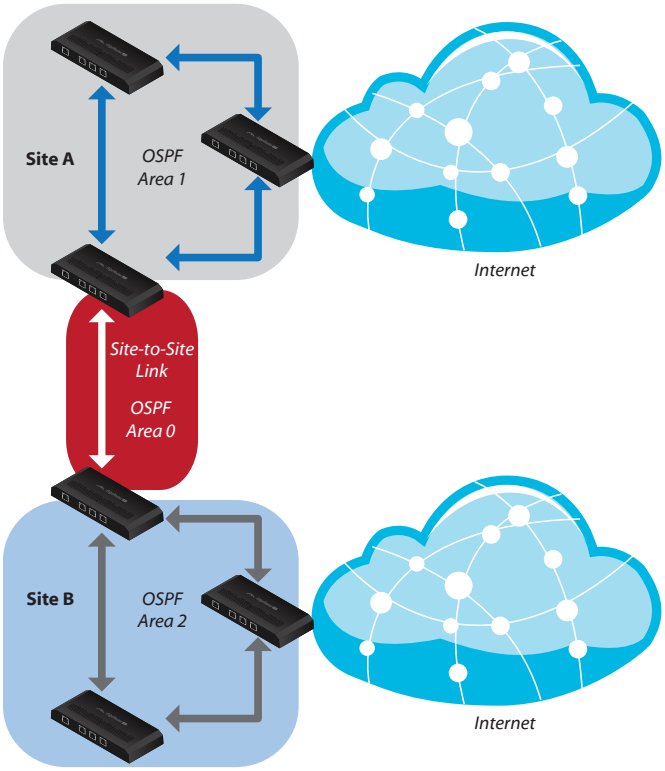
While there are numerous scenarios that are possible, this section highlights a couple of typical deployments:

- Service Provider Deployment
- Corporate Deployment

Service Provider Deployment

This scenario uses six EdgeRouter devices:

1. OSPF Area 0 to OSPF Area 1
2. OSPF Area 0 to OSPF Area 2
3. OSPF Area 1
4. OSPF Area 1 to Internet
5. OSPF Area 2
6. OSPF Area 2 to Internet



Here are the typical steps to follow:

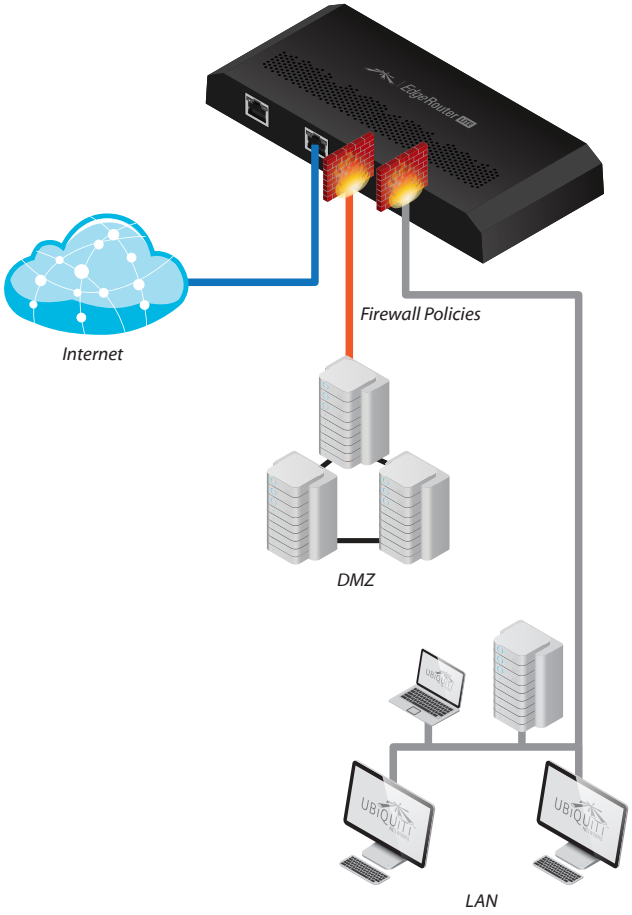
1. Configure the appropriate settings on the *System* tab (see **"System" on page 6** for more information):
   - *Host Name*
   - *Time Zone*
   - *Gateway*
   - *Name Server*
   - *Domain Name*
   - *NTP*
2. Configure the interfaces on the *Dashboard* tab; see **"Interfaces" on page 11** for more information.
3. Configure OSPF settings on the *Routing* > *OSPF* tab; see **"OSPF" on page 16** for more information.

4. Configure DHCP server(s) on the *Services* tab; see **"DHCP Server" on page 28** for more information.
5. Configure NAT rules on the *Security* > *NAT* tab; see **"NAT" on page 24** for more information.
6. Configure firewall rules on the *Security* > *Firewall Policies* tab; see **"Firewall Policies" on page 19** for more information.
7. Configure additional settings as needed for your network.

Corporate Deployment

This scenario uses a single EdgeRouter device. The three independent interfaces connect to the following:

- Internet
- DMZ
- LAN



Here are the typical steps to follow:

1. Configure the appropriate settings on the *System* tab (see **"System" on page 6** for more information):
   - *Host Name*
   - *Time Zone*
   - *Gateway*
   - *Name Server*
   - *Domain Name*
   - *NTP*
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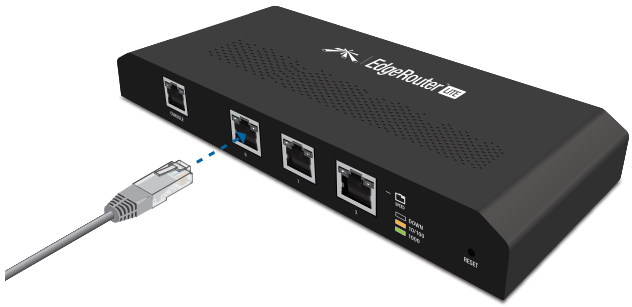
6. Configure additional settings as needed for your network.

Chapter 3: Using EdgeOS

EdgeOS is a powerful, sophisticated operating system that manages your EdgeRouter. It offers both a browser-based interface (EdgeOS Configuration Interface) for easy configuration and a Command Line Interface (CLI) for advanced configuration.

To access the EdgeOS Configuration Interface:

1. Connect an Ethernet cable from the Ethernet port of your computer to the port labeled *0* on the EdgeRouter.

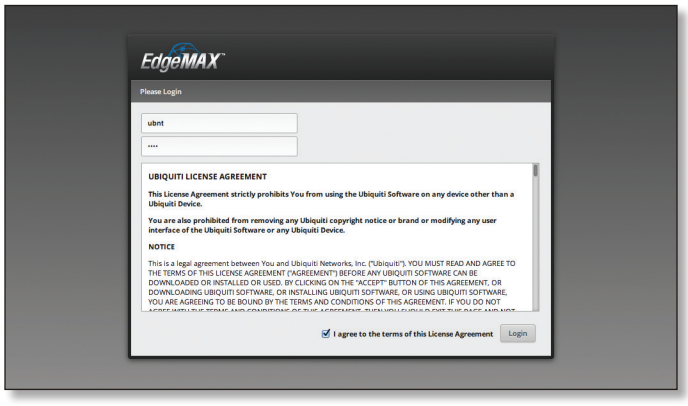


2. Configure the Ethernet adapter on your computer with a static IP address on the 192.168.1.x subnet (e.g., 192.168.1.100).

Note: As an alternative, you can connect a serial cable to the *Console* port of the EdgeRouter. See **"Command Line Interface" on page 38** for more information.

3. Launch your web browser. Type **https://192.168.1.1** in the address field. Press **enter** (PC) or **return** (Mac).

4. The login screen will appear. Enter **ubnt** in the *Username* and *Password* fields. Read the Ubiquiti License Agreement, and check the box next to *I agree to the terms of this License Agreement* to accept it. Click **Login**.



The EdgeOS Configuration Interface will appear, allowing you to customize your settings as needed.

Note: To enhance security, we recommend that you change the default login using at least one of the following options:

- Set up a new user account on the *Users* > *Local* tab (preferred option). For details, go to **"Add User" on page 33**.
- Change the default password of the *ubnt* login on the *Users* > *Local* tab. For details, go to **"Configure the User" on page 34**.

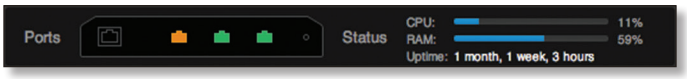
Ports and Status Information

The *Ports* image displays the active connections. An amber port indicates 10/100 Mbps, and a green port indicates 1000 Mbps. The *Status* bar graphs display the following:

CPU The percentage of processing power that the EdgeRouter is using is displayed.

RAM The percentage of RAM that the EdgeRouter is using is displayed.

Uptime The duration of the EdgeRouter's activity is displayed.



Place your mouse over a port to view the following:

Enabled/Disabled The administrative status is displayed.

Link The connection status is displayed.

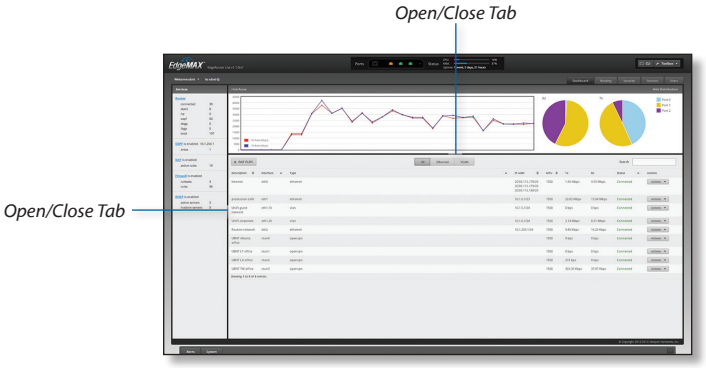
Speed The speed (in Mbps) and duplex mode are displayed.

Navigation

The EdgeOS software consists of five primary tabs, and some of these tabs have sub-tabs. This User Guide covers each tab with a chapter. For details on a specific tab, refer to the appropriate chapter.

- **Dashboard** The **"Dashboard Tab" on page 10** displays status information about services and interfaces. You can also configure interfaces and Virtual Local Area Networks (VLANs).
- **Routing** The **"Routing Tab" on page 13** configures static routes and Open Shortest Path First (OSPF) settings, including metrics, areas, and interfaces.
- **Security** The **"Security Tab" on page 19** configures firewall policies, firewall groups, Network Address Translation (NAT) rules, and PPTP VPN options.
- **Services** The **"Services Tab" on page 28** configures DHCP servers, DNS forwarding, and the PPPoE server.
- **Users** The **"Users Tab" on page 33** configures user accounts with administrator or operator access.

Depending on the tab you click, some of the screens display information and options in multiple sections. You can click the **open/close** tab to hide or display a section.



Common Interface Options

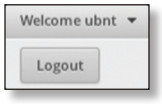
The common interface options are accessible from all tabs on the EdgeOS interface:

- Welcome
- CLI
- Toolbox
- Alerts
- System

Required fields are marked by a blue asterisk *. When the information ⓘ icon is displayed, you can click the icon for more information about an option.

Welcome

At the top left of the screen, click **Welcome** to view the *Logout* option:



Logout To manually log out of the EdgeRouter Configuration Interface, click this option.

CLI

Advanced users can make configuration changes using Linux commands. At the top right of the screen, click the **CLI** CLI button. See **"Command Line Interface" on page 38** for more information.

Toolbox

At the top right of the screen, click the **Toolbox** Toolbox button. The following network administration and monitoring tools are available:

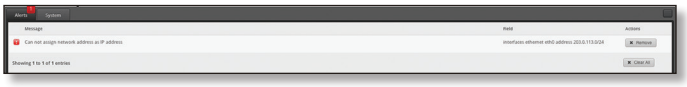
- **"Ping" on page 35**
- **"Trace" on page 36**
- **"Discover" on page 36**
- **"Packet Capture" on page 36**
- **"Log Monitor" on page 37**

Alerts

The number of new alerts is displayed in a red popup.

At the bottom of the screen, click the **Alerts** tab.

A table displays the following information about each important event.



Message A description of the event is displayed.

Field The settings that are affected by the event are displayed.

Actions The following options are available:

- **Remove** Click this button to clear an alert.
- **Clear All** Click this button to clear all alerts.

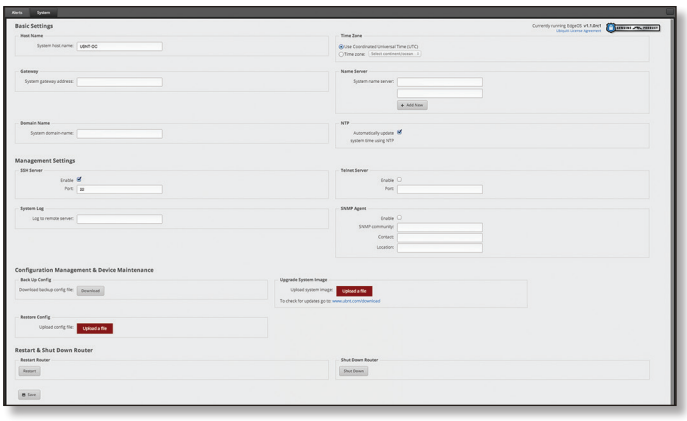
Click the top right corner of the *Alerts* tab to close it.

System

At the bottom of the screen, click the **System** tab to access the device settings.

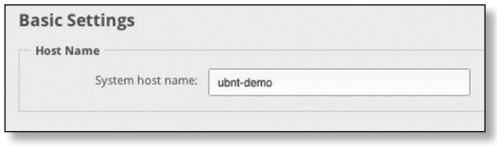
The device settings are organized into these sections:

- **"Basic Settings" on page 7**
- **"Management Settings" on page 7**
- **"Configuration Management & Device Maintenance" on page 8**
- **"Restart & Shut Down Router" on page 9**



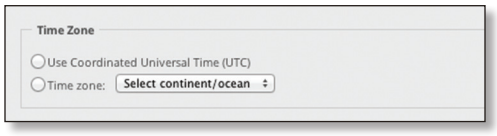
Basic Settings

Host Name



System host name Enter a name for the EdgeRouter. The host name identifies the EdgeRouter as a specific device. For example, a .com URL typically uses this format: <*host_name*>.domain_name.com

Time Zone

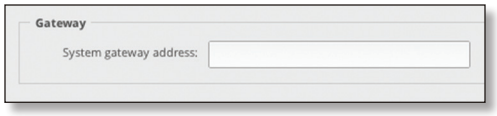


Use Coordinated Universal Time (UTC) UTC is the international time standard used by Network Time Protocol (NTP) servers. If your routers are located in multiple time zones, then you may want to use UTC.

Time zone To set your network to a specific time zone, select **Time zone** and configure the following:

- **Select continent/ocean** Select your location.
- **Select country/region** Select your location.
- **Select time zone** Select your time zone.

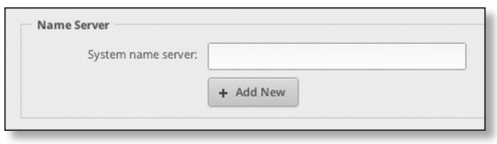
Gateway



System gateway address Enter the IP address of your gateway. This will set up your default route. If you want to set up additional default routes, configure them as static routes on the *Routing* tab. See **"Routing Tab" on page 13** for more information.

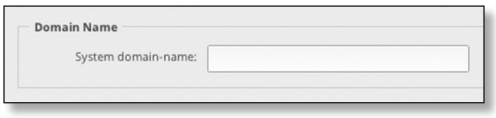
Name Server

Domain Name System (DNS) translates domain names to IP addresses; each DNS server on the Internet holds these mappings in its respective DNS database.



System name server Enter the IP address of your DNS server (example: *192.0.2.1* for IPv4 or *2001:db8::1* for IPv6). Click **Add New** to add additional servers.

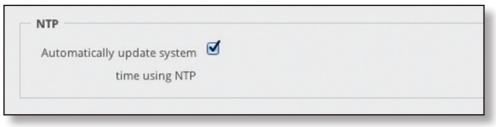
Domain Name



System domain name Enter the domain name of your EdgeRouter. The domain name identifies the EdgeRouter's network on the Internet. For example, a .com URL typically uses this format: host_name.<*domain_name*>.com

NTP

NTP is a protocol for synchronizing the clocks of computer systems over packet-switched, variable-latency data networks. You can use it to set the system time on the EdgeRouter. If the *System Log* option is enabled, then the system time is reported next to every log entry that registers a system event.

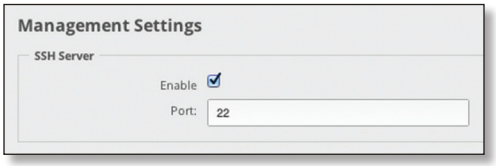


Automatically update system time using NTP By default, the EdgeRouter obtains the system time from a time server on the Internet.

Click **Save** to apply your changes.

Management Settings

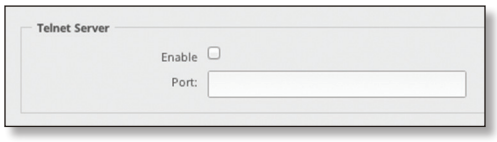
SSH Server



Enable Enabled by default. This option allows SSH (Secure Shell) access to the EdgeRouter for remote configuration by command line. SSH uses encryption and authentication, so it is a secure form of communication. See **"Command Line Interface" on page 38** for more information.

Port Specify the TCP/IP port of the SSH server. The default is *22*.

Telnet Server

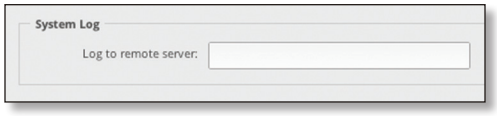


Enable Disabled by default. This option allows Telnet access to the EdgeRouter for remote configuration by command line. Telnet is not a secure form of communication, so we recommend SSH. See **"Command Line Interface" on page 38** for more information.

Port Specify the TCP/IP port of the Telnet server. The default is *23*.

System Log

Every logged message contains at least a system time and host name. Usually a specific service name that generates the system event is also specified within the message. Messages from different services have different contexts and different levels of detail. Usually error, warning, or informational system service messages are reported; however, more detailed debug level messages can also be reported. The more detailed the system messages reported, the greater the volume of log messages generated.



Log to remote server This option allows the EdgeRouter to send system log messages to a remote server. Enter the remote host IP address and TCP/IP port that should receive the system log (syslog) messages. *514* is the default port for the commonly used, system message logging utilities.

Note: Properly configure the remote host to receive syslog protocol messages.

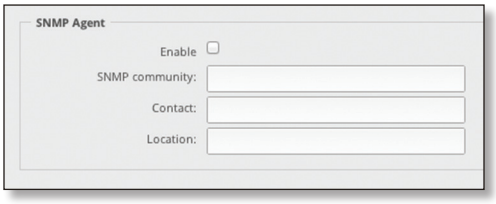
SNMP Agent

Simple Network Monitor Protocol (SNMP) is an application layer protocol that facilitates the exchange of management information between network devices. Network administrators use SNMP to monitor network-attached devices for issues that warrant attention.

The EdgeRouter contains an SNMP agent, which does the following:

- Provides an interface for device monitoring using SNMP
- Communicates with SNMP management applications for network provisioning
- Allows network administrators to monitor network performance and troubleshoot network problems

For the purpose of equipment identification, configure the SNMP agent with contact and location information:



Enable Disabled by default. This option activates the SNMP agent.

SNMP community Specify the SNMP community string. It is required to authenticate access to MIB (Management Information Base) objects and functions as an embedded password. The device supports a read-only community string; authorized management stations have read access to all the objects in the MIB except the community strings, but do not have write access. The device supports SNMP v1. The default is *public*.

Contact Specify the contact who should be notified in case of emergency.

Location Specify the physical location of the EdgeRouter.

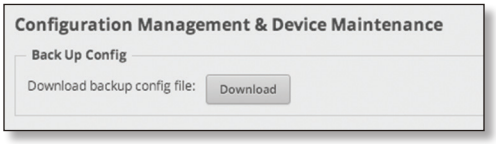
Click **Save** to apply your changes.

Configuration Management & Device Maintenance

The controls in this section manage the device configuration routines and firmware maintenance.

Back Up Config

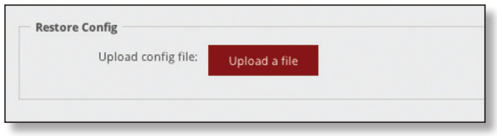
We recommend that you back up your current system configuration before updating the firmware or uploading a new configuration.



Download backup config file Click **Download** to download the current system configuration file.

Note: We strongly recommend that you save the configuration file in a secure location because it includes confidential information. The user login passwords are encrypted; however, other passwords and keys (such as those used for VPN, BGP, authentication, and RADIUS) are stored in plain text.

Restore Config

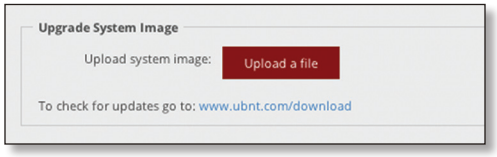


Upload config file Click **Upload a file** to locate the new configuration file. Select the file and click **Choose**. We recommend that you back up your current system configuration before uploading the new configuration.

Upgrade System Image

Download the firmware file from **downloads.ubnt.com** and save it on your computer.

The firmware update is compatible with all configuration settings. The system configuration is preserved while the EdgeRouter is updated with a new firmware version. However, we recommend that you back up your current system configuration before updating the firmware.



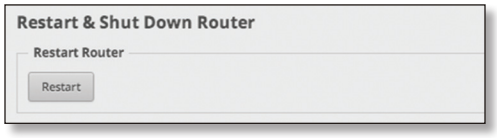
Upload system image To update the EdgeRouter with new firmware, click **Upload a file** and locate the new firmware file. Then click **Choose**.

Please be patient, as the firmware update routine can take three to seven minutes. You cannot access the EdgeRouter until the firmware update routine is completed.

WARNING: Do not power off, do not reboot, and do not disconnect the EdgeRouter from the power supply during the firmware update process as these actions will damage the EdgeRouter!

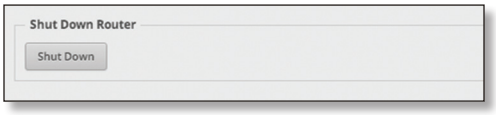
Restart & Shut Down Router

Restart Router



Restart To turn the EdgeRouter off and back on again, click this option.

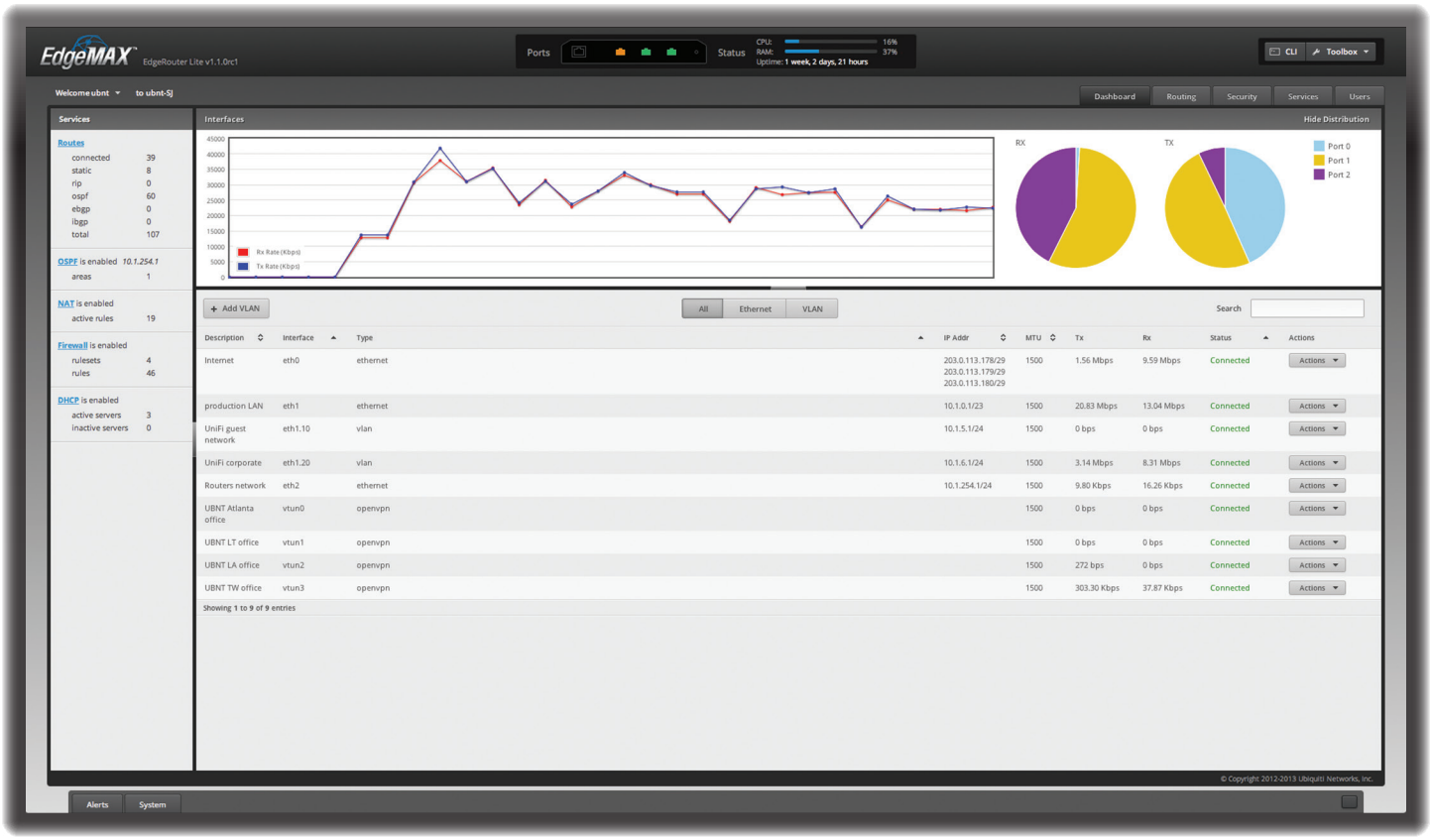
Shut Down Router



Shut Down To turn off the EdgeRouter, click this option.

WARNING: Click **Shut Down** to properly shut down the EdgeRouter. An improper shutdown, such as disconnecting the EdgeRouter from its power supply, runs the risk of data corruption!

Click the top right corner of the *System* tab to close it.

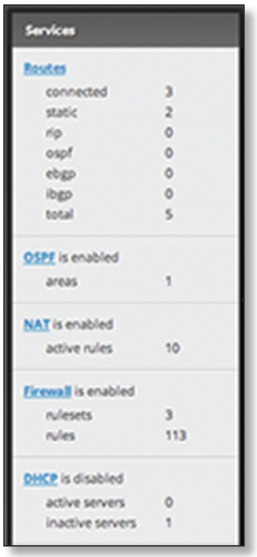


Chapter 4: Dashboard Tab

The *Dashboard* tab displays status information about services and interfaces. You can also configure interfaces and Virtual Local Area Networks (VLANs). Any setting marked with a blue asterisk * is required.

Services

Status information is displayed. Each heading is a convenient link to the appropriate tab.



Routes

The following route types are listed:

- Connected
- Static
- RIP (Routing Information Protocol)
- OSPF (Open Shortest Path First)
- EBGP (Exterior Border Gateway Protocol)
- IBGP (Interior Border Gateway Protocol)

The number of each route type and the total number of routes are displayed. Click **Routes** to display the *Routing* > *Routes* tab. Go to **"Routes" on page 14** for more information.

OSPF

The OSPF status, settings, and number of areas are displayed. Click **OSPF** to display the *Routing* > *OSPF* tab. Go to **"OSPF" on page 16** for more information.

NAT

The NAT (Network Address Translation) status and number of NAT rules are displayed. Click **NAT** to display the *Security* > *NAT* tab. Go to **"NAT" on page 24** for more information.

Firewall

The firewall status and numbers of sets and rules are displayed. Click **Firewall** to display the *Security* > *Firewall Policies* tab. Go to **"Firewall Policies" on page 19** for more information.

DHCP

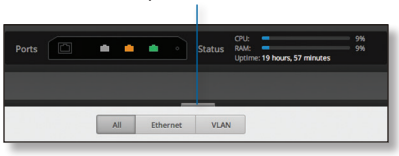
The DHCP server status and numbers of active and inactive servers are displayed. Click **DHCP** to display the *Services* tab. Go to **"DHCP Server" on page 28** for more information.

Interfaces

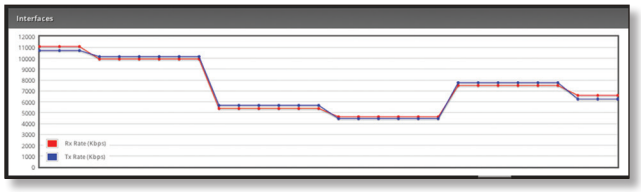
Distribution

Click **Hide Distribution** to hide the *Interfaces* > *Distribution* section. Click the remaining **open/close** tab to display the *Interfaces* > *Distribution* section again.

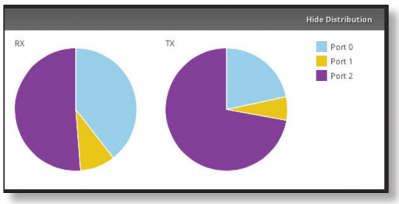
Open/Close Tab



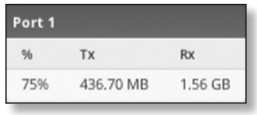
The *RX Rate* and *TX Rate* graph displays the current data traffic in both graphical and numerical form. The graph scale and throughput dimension (Mbps, for example) change dynamically depending on the mean throughput value. The statistics are updated automatically.



The *RX* and *TX* pie charts display the data traffic allocated among the ports of the EdgeRouter. The pie charts are updated automatically.



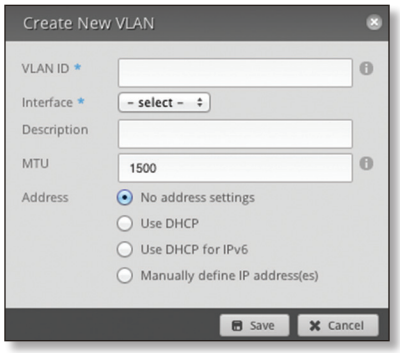
Place your mouse over a port's portion of the pie chart to view its percentage of data traffic allocation, *TX* (amount of transmitted data), and *RX* (amount of received data).



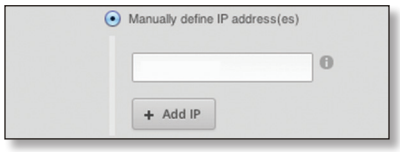
All/Ethernet/VLAN

Add VLAN To create a new VLAN, click **Add VLAN**.

The *Create a New VLAN* screen appears.



- **VLAN ID** The VLAN ID is a unique value assigned to each VLAN at a single device; every VLAN ID represents a different VLAN. The VLAN ID range is 2 to 4094.
- **Interface** Select the appropriate interface.
- **Description** Enter keywords to describe this VLAN.
- **MTU** Enter the MTU (Maximum Transmission Unit) value, which is the maximum packet size (in bytes) that a network interface can transmit. The default is *1500*.
- **Address** Select one of the following:
  - **No address settings** The VLAN uses no address settings. (In most cases, an address is needed.)
  - **Use DHCP** The VLAN acquires network settings from a DHCPv4 server.
  - **Use DHCP for IPv6** The VLAN acquires network settings from a DHCPv6 server.
  - **Manually define IP address(es)** Enter the static IP address (example: *192.0.2.1/24* for IPv4 or *2001:db8::1/32* for IPv6). Click **Add IP** to enter additional IP addresses.



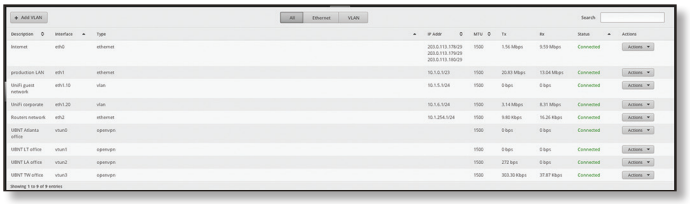
Click **Save** to apply your changes, or click *Cancel*.

Search Allows you to search for specific text. Begin typing; there is no need to press *enter*. The results are filtered in real time as soon as you type two or more characters.

All/Ethernet/VLAN Click the appropriate tab to filter the interfaces as needed.

- **All** All interfaces are displayed by default.
- **Ethernet** All of the Ethernet interfaces are displayed.
- **VLAN** All VLANs are displayed.

A table displays the following information about each interface. Click a column heading to sort by that heading.



Description The keywords you entered to describe the interface are displayed.

Interface The name of the interface is displayed.

Type The type of interface is displayed.

IP Addr The IP address of the interface is displayed.

MTU The MTU (Maximum Transmission Unit) value of the interface is displayed. This is the maximum packet size (in bytes) that the interface can transmit.

TX The transmit speed of the interface is displayed.

RX The receive speed of the interface is displayed.

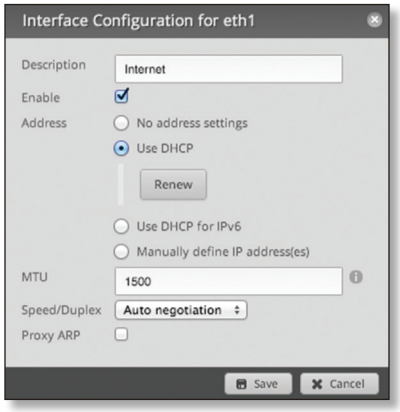
Status The connection status of the interface is displayed.

Actions Click the **Actions** button to access the following options:

- **Config** To configure the interface, click **Config**. Go to the *Configure the Interface* section.
- **Disable** Disable the interface while keeping its configuration.

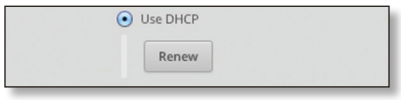
Configure the Interface

After you click *Config*, the *Interface Configuration* screen appears.

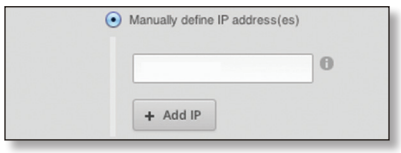


Make changes as needed.

- **Description** Enter keywords to describe this interface.
- **Enable** Check the box to enable the interface. All of the interfaces are saved in the system configuration file; however, only the enabled interfaces are active on the device.
- **Address** Select one of the following:
  - **No address settings** The interface uses no address settings. (In most cases, an address is needed.)
  - **Use DHCP** The interface acquires network settings from a DHCPv4 server. Click the **Renew** button to acquire fresh network settings.



  - **Use DHCP for IPv6** The interface acquires network settings from a DHCPv6 server.
  - **Manually define IP address(es)** Enter the static IP address (example: *192.0.2.1/24* for IPv4 or *2001:db8::1/32* for IPv6). Click **Add IP** to enter additional IP addresses.

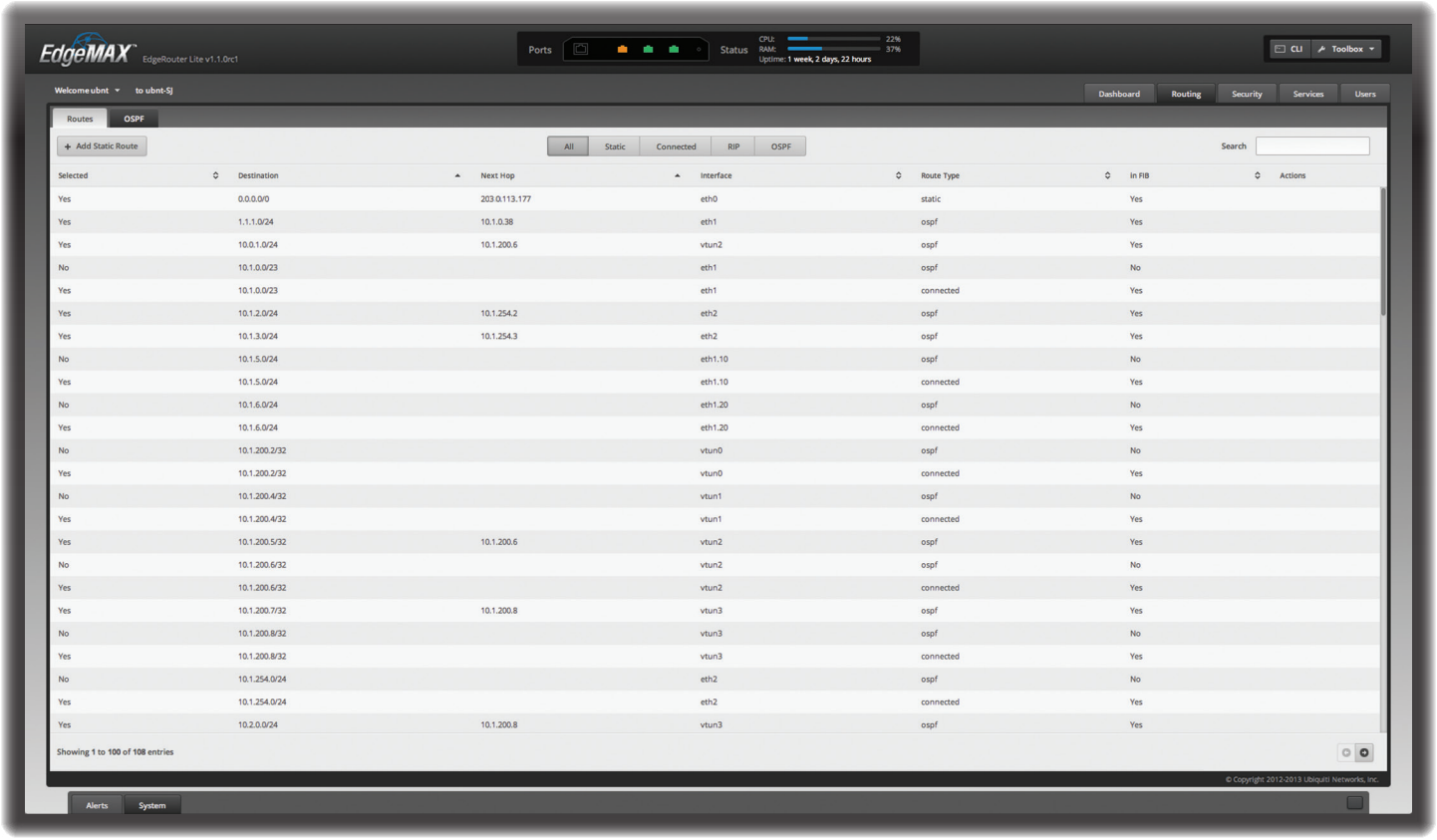


- **MTU** Enter the MTU (Maximum Transmission Unit) value, which is the maximum packet size (in bytes) that a network interface can transmit. The default is *1500*.
- **Speed/Duplex** The default is *Auto negotiation*. The EdgeRouter automatically negotiates transmission parameters, such as speed and duplex, with its counterpart. In this process, the networked devices first share their capabilities and then choose the fastest transmission mode they both supoprt.

  To manually specify the transmission link speed and duplex mode, select one of the following options: **100/full**, **100/half**, **10/full**, or **10/half**.

  Full-duplex mode allows communication in both directions simultaneously. Half-duplex mode allows communication in both directions, but not simultaneously and only in one direction at a time.
- **Proxy ARP** Enable the EdgeRouter to answer a source host's ARP (Address Resolution Protocol) requests for the IP address of a destination host that is not located on the source host's network. ARP allows hosts on the same network to discover each other's IP address via a layer 2 broadcast to all MAC addresses. If they are not on the same network, the layer 2 broadcast will not reach its destination; however, the EdgeRouter can serve as the go-between if *Proxy ARP* is enabled.

  Click **Save** to apply your changes, or click *Cancel*.



Chapter 5: Routing Tab

The *Routing* tab displays status information about a variety of connected, static, RIP, and OSPF routes. You can also configure static routes and OSPF options. Any setting marked with a blue asterisk * is required.

You have two sub-tabs:

Routes View route information and create static routes.

OSPF Configure OSPF options.

IPv6 Routing

IPv6 (Internet Protocol version 6) is gaining popularity and is bound to grow as IP addressing demands increase. The EdgeOS Configuration Interface supports IPv6 for the following options:

- *System* > *Name Server* configuration (Refer to **"Name Server" on page 7**.)
- *Dashboard* > *VLAN* configuration (Refer to **"Add VLAN" on page 11**.)
- *Dashboard* > *Interface* configuration (Refer to **"Configure the Interface" on page 12**.)

For IPv6 addresses, the EdgeOS Configuration Interface supports "::" (double-colon) notation, which substitutes "::" for a contiguous sequence of 16-bit blocks set to zero. Here is an example: *2001:db8::1*

If written out, the IPv6 address becomes: *2001:db8:0000:0000:0000:0000:0000:0001*

The EdgeOS Configuration Interface displays IPv6 addresses only in two locations:

- *System* > *Name Server* section
- *Dashboard* tab

The EdgeOS Configuration Interface will increase its support of IPv6 in future releases. For other options, you can use the CLI, which has comprehensive IPv6 support.

Note: Use the CLI to view IPv6 options configured in the CLI but not supported by the EdgeOS Configuration Interface.

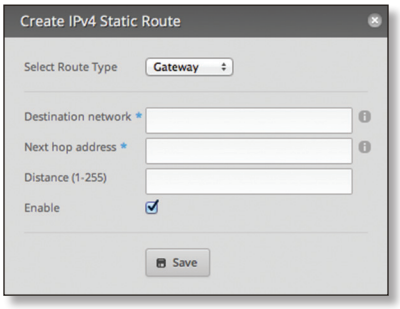
Routes

A route determines how traffic travels to its destination network. If more than one route is suitable, the EdgeRouter uses administrative distance as a metric to compare all available routes, including directly connected routes, manually configured static routes, dynamic routes, and the default route. The EdgeRouter uses the route with the lowest administrative distance.

All/Static/Connected/RIP/OSPF

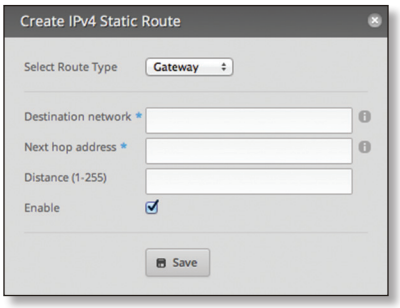
Add Static Route To create a new static route, click **Add Static Route**.

The *Create Static Route* screen appears.



Complete the following:

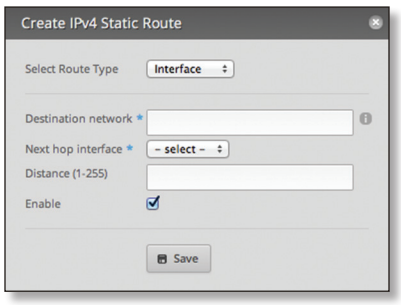
- **Select Route Type** You have three options: *Gateway*, *Interface*, or *Black Hole*.
  - **Gateway** Define a route using the IP address and subnet mask of the next hop gateway.



    - **Destination network** Enter the IP address and subnet mask using slash notation: *<network_IP_address>/<subnet_mask_number>* (example: *192.0.2.0/24*).

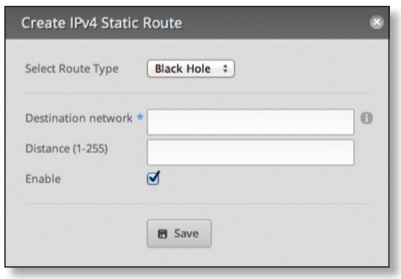
      The first default route is configured on the *System* tab; see **"System gateway address" on page 7** for more information. To create multiple default routes, set up static routes and enter **0.0.0.0/0**.
    - **Next hop address** Enter the IP address.
    - **Distance (1-255)** Enter the administrative distance. If there are identical routes from different sources (such as static, RIP, or OSPF), the EdgeRouter compares the routes and uses the route with the lowest distance.
    - **Enable** Check the box to enable the route.

    Click **Save** to apply your changes.
  - **Interface** Define a route using a next hop interface.



    - **Destination network** Enter the IP address and subnet mask using slash notation: *<network_IP_address>/<subnet_mask_number>* (example: *192.0.2.0/24*).
    - **Next hop interface** Select the appropriate interface from the drop-down list.
    - **Distance (1-255)** Enter the administrative distance. If there are identical routes from different sources (such as static, RIP, and OSPF), the EdgeRouter compares the routes and uses the route with the lowest distance.
    - **Enable** Check the box to enable the route.

    Click **Save** to apply your changes.
  - **Black Hole** Define a route that drops unwanted traffic.



    - **Destination network** Enter the IP address and subnet mask using slash notation: *<network_IP_address>/<subnet_mask_number>* (example: *192.0.2.0/24*).
    - **Distance (1-255)** Enter the administrative distance. If there are identical routes from different sources (such as static, RIP, and OSPF), the EdgeRouter compares the routes and uses the route with the lowest distance.
    - **Enable** Check the box to enable the route.

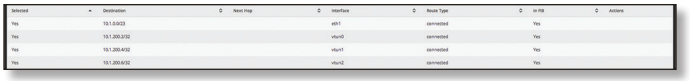
    Click **Save** to apply your changes.

Search Allows you to search for specific text. Begin typing; there is no need to press *enter*. The results are filtered in real time as soon as you type two or more characters.

All/Static/Connected/RIP/OSPF Click the appropriate tab to filter the routes as needed.

- **All** All routes are displayed by default.
- **Static** All static routes that you have configured are displayed.
- **Connected** All routes that are directly connected to the EdgeRouter are displayed.
- **RIP** All RIP (Routing Information Protocol) routes are displayed. RIP is an interior, distance vector routing protocol that uses hop count as a metric to determine the best route.
- **OSPF** All OSPF (Open Shortest Path First) routes are displayed. OSPF is an interior, link-state routing protocol that uses cost as a metric to determine the best route. The bandwidth of an interface determines the cost – the higher the bandwidth, the lower the cost.

A table displays the following information about each route. Click a column heading to sort by that heading.



Selected The status of the route, whether it has been selected for the routing table, is displayed.

Destination The destination IP address is displayed.

Next Hop The IP address of the next-hop interface is displayed.

Interface The name of the interface is displayed.

Route Type The type of route is displayed.

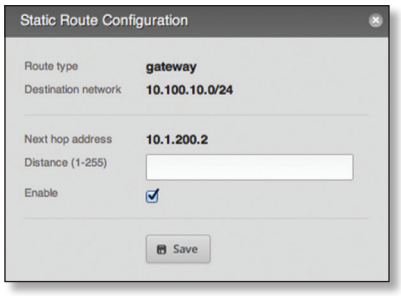
In FIB The forwarding status of the route, whether it is in the FIB (Forwarding Information Base), is displayed.

Actions Click the **Actions** button to access the following options:

- **Config** To configure the route, click **Config**. Go to the *Configure the Static Route section* below.
- **Delete** Delete the route; its configuration will be removed.
- **Disable** Disable the route while keeping its configuration. (This option is not available for black hole routes.)

Configure the Static Route

After you click *Config*, the *Static Route Configuration* screen appears.



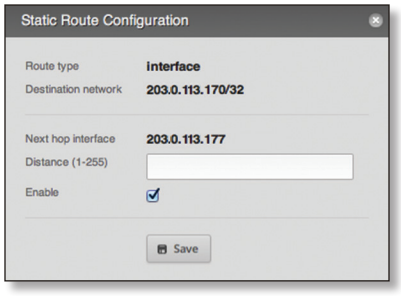
Follow the instructions for your route type:

Gateway

- **Route type** The *gateway* route uses the IP address and subnet mask of the next hop gateway.
- **Destination network** The IP address and subnet mask are displayed in slash notation.
- **Next hop address** The IP address of the next hop gateway is displayed.
- **Distance (1-255)** Enter the administrative distance. If there are identical routes from different sources (such as static, RIP, and OSPF), the EdgeRouter compares the routes and uses the route with the lowest distance.
- **Enable** Check the box to enable the route.

Click **Save** to apply your changes.

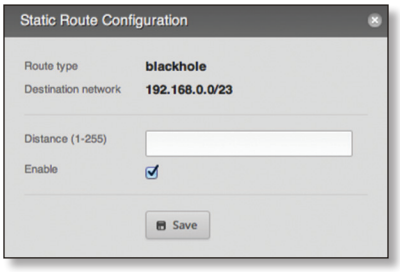
Interface



- **Route type** The *interface* route uses the next hop interface.
- **Destination network** The IP address and subnet mask are displayed in slash notation.
- **Next hop interface** The name of the next hop interface is displayed.
- **Distance (1-255)** Enter the administrative distance. If there are identical routes from different sources (such as static, RIP, and OSPF), the EdgeRouter compares the routes and uses the route with the lowest distance.
- **Enable** Check the box to enable the route.

Click **Save** to apply your changes.

Black Hole

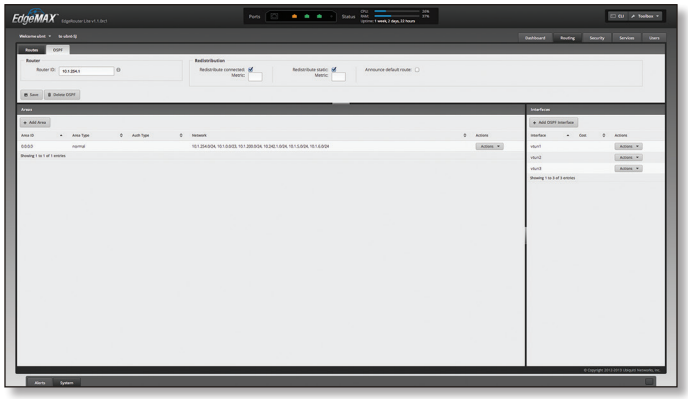


- **Route type** The *black hole* route drops unwanted traffic.
- **Destination network** The IP address and subnet mask are displayed in slash notation.
- **Distance (1-255)** Enter the administrative distance. If there are identical routes from different sources (such as static, RIP, and OSPF), the EdgeRouter compares the routes and uses the route with the lowest distance.
- **Enable** Check the box to enable the route.

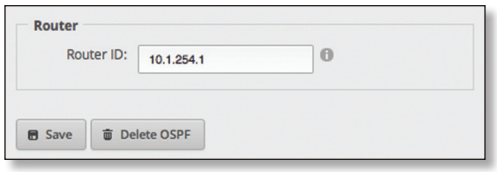
Click **Save** to apply your changes.

OSPF

Using Link State Advertisements, routers communicate with each other when there is a router or link status change. Each router maintains the information in a database, which is used to create and update a network map from the router's point of view. Each router then uses the map to build and update a routing table.



Router

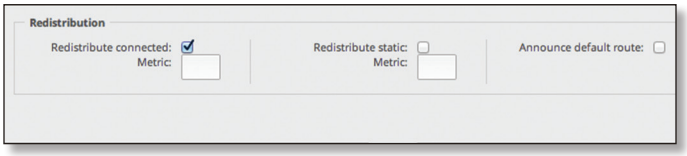


Router ID Enter the IP address that identifies a specific router in an OSPF network. In OSPF, the highest *Router ID* determines which router is the Designated Router (DR), which distributes updates to the other OSPF routers.

Click **Save** to apply your changes, or click *Delete OSPF* to remove the *Router*, *Redistribution*, and *Area* settings (*Interfaces* settings are retained).

Redistribution

A single router can use multiple routing protocols, such as OSPF and RIP, which use incompatible metrics. It must reconcile information from multiple protocols to determine which route to use for a specific destination network. You can change the metrics of the distributed protocol to create protocol compatibility.



Redistribute connected If enabled, the EdgeRouter connects an OSPF area to a network using a different routing protocol and redistributes the other protocol's directly connected routes into the OSPF area. These routes become external OSPF routes.

- **Metric** If there are multiple routes to the same destination, OSPF uses the metric to select a route for the routing table. Assign a cost value to the redistributed connected routes. The EdgeRouter can then use this metric to compare these routes to other OSPF routes.

Redistribute static If enabled, the EdgeRouter connects an OSPF area to a network using a different routing protocol and redistributes the other protocol's static routes into the OSPF area. These routes become external OSPF routes.

- **Metric** If there are multiple routes to the same destination, OSPF uses the metric to select a route for the routing table. Assign a cost value to the redistributed static routes. The EdgeRouter can then use this metric to compare these routes to other OSPF routes.

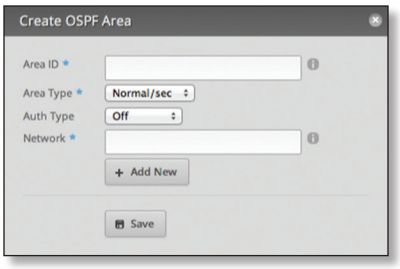
Announce default route If enabled, the EdgeRouter communicates the default route to the other routers of the OSPF network, eliminating the need to configure the default route on the other routers. The default route connects the OSPF network to an outside network.

Areas

To enhance scalability, an OSPF network is comprised of smaller sections called areas. At the minimum, there is the backbone area, called Area 0.

Add Area To create a new area, click **Add Area**.

The *Create OSPF Area* screen appears.



Complete the following:

- **Area ID** This is the number that identifies an area. It can be an integer or use a format similar to an IPv4 address.
- **Area Type** This defines the routes that are acceptable inside the area. Select the appropriate option:
  - **Normal/sec** The default type accepts all routes.
  - **NSSA** A NSSA (Not So Stubby Area) network is a variation of a stub network. It can import external routes from type 7 Link State Advertisements, which are NSSA-specific.
  - **Stub** The network has no external routes. Typically, it has a default route for outbound traffic.
- **Auth Type** Authentication helps secure communication between routers. Select the appropriate option:
  - **Off** No authentication is used.
  - **MD5/sec** Each router uses a key (password) and key ID. This is the most secure option because the key is never transmitted.
  - **Plain text** Each router uses a key. This provides minimal security because the key is transmitted in plain text format.
- **Network** Enter the IP address and subnet mask using slash notation:
  <network_IP_address>/<subnet_mask_number>
  (example: *192.0.2.0/24*).

  Click **Add New** to enter more network addresses.

  Click **Save** to apply your changes.

A table displays the following information about each OSPF Area. Click a column heading to sort by that heading.

Area ID The identification number of the area is displayed.

Area Type The type of area is displayed.

Auth Type The authentication type of the area is displayed.

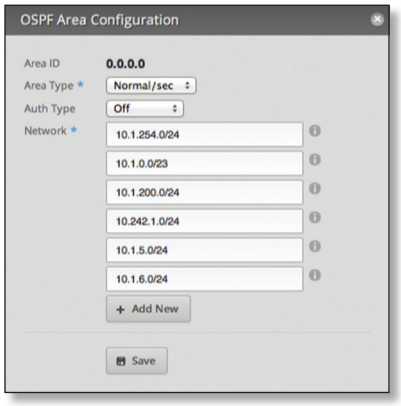
Network The network address of the area is displayed.

Actions Click the **Actions** button to access the following options:

- **Config** To configure the OSPF Area, click **Config**. Go to the *Configure the OSPF Area* section.
- **Delete** Delete the OSPF Area.

Configure the OSPF Area

After you click *Config*, the *OSPF Area Configuration* screen appears.



Make changes as needed.

- **Area ID** This is the number that identifies an area. It can be an integer or use a format similar to an IPv4 address.
- **Area Type** This defines the routes that are acceptable inside the area. Select the appropriate option:
  - **Normal/sec** The default type accepts all routes.
  - **NSSA** A NSSA (Not So Stubby Area) network is a variation of a stub network. It can import external routes from type 7 Link State Advertisements, which are NSSA-specific.
  - **Stub** The network has no external routes. Typically, it has a default route for outbound traffic.
- **Auth Type** Authentication helps secure communication between routers. Select the appropriate option:
  - **Off** No authentication is used.
  - **MD5/sec** Each router uses a key (password) and key ID. This is the most secure option because the key is never transmitted.
  - **Plain text** Each router uses a key. This provides minimal security because the key is transmitted in plain text format.

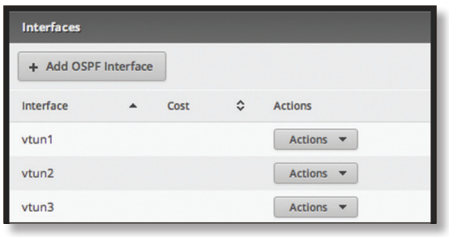
- **Network** Enter the IP address and subnet mask using slash notation:
  <network_IP_address>/<subnet_mask_number>
  (example: *192.0.2.0/24*).

  Click **Add New** to enter more network addresses.

  Click **Save** to apply your changes.

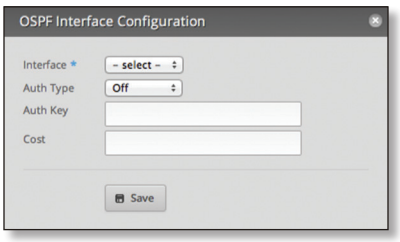
Interfaces

You can configure interfaces with specific OSPF options.



Add OSPF Interface To create a new interface, click **Add OSPF Interface**.

The *OSPF Interface Configuration* screen appears.



Complete the following:

- **Interface** Select the appropriate interface from the drop-down list.
- **Auth Type** OSPF authentication helps secure communication between routers. Select the appropriate option:
  - **Off** No authentication is used.
  - **MD5/sec** Each router uses a key (password) and key ID. This is the most secure option because the key is never transmitted.
  - **Plain text** Each router uses a key. This provides minimal security because the key is transmitted in plain text format.
- **Auth Key** Enter the key used for authentication.
- **Cost** By default, the cost of an interface is based on its bandwidth; however, you can manually assign a cost to the interface.

  Click **Save** to apply your changes.

A table displays the following information about each OSPF Interface. Click a column heading to sort by that heading.

Interface The name of the interface is displayed.

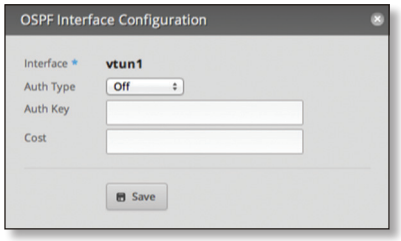
Cost The cost of the interface is displayed. OSPF uses cost as a metric to determine the best route.

Actions Click the **Actions** button to access the following options:

- **Config** To configure the OSPF Interface, click **Config**. Go to the *Configure the OSPF Interface* section.
- **Delete** Delete the OSPF Interface.

Configure the OSPF Interface

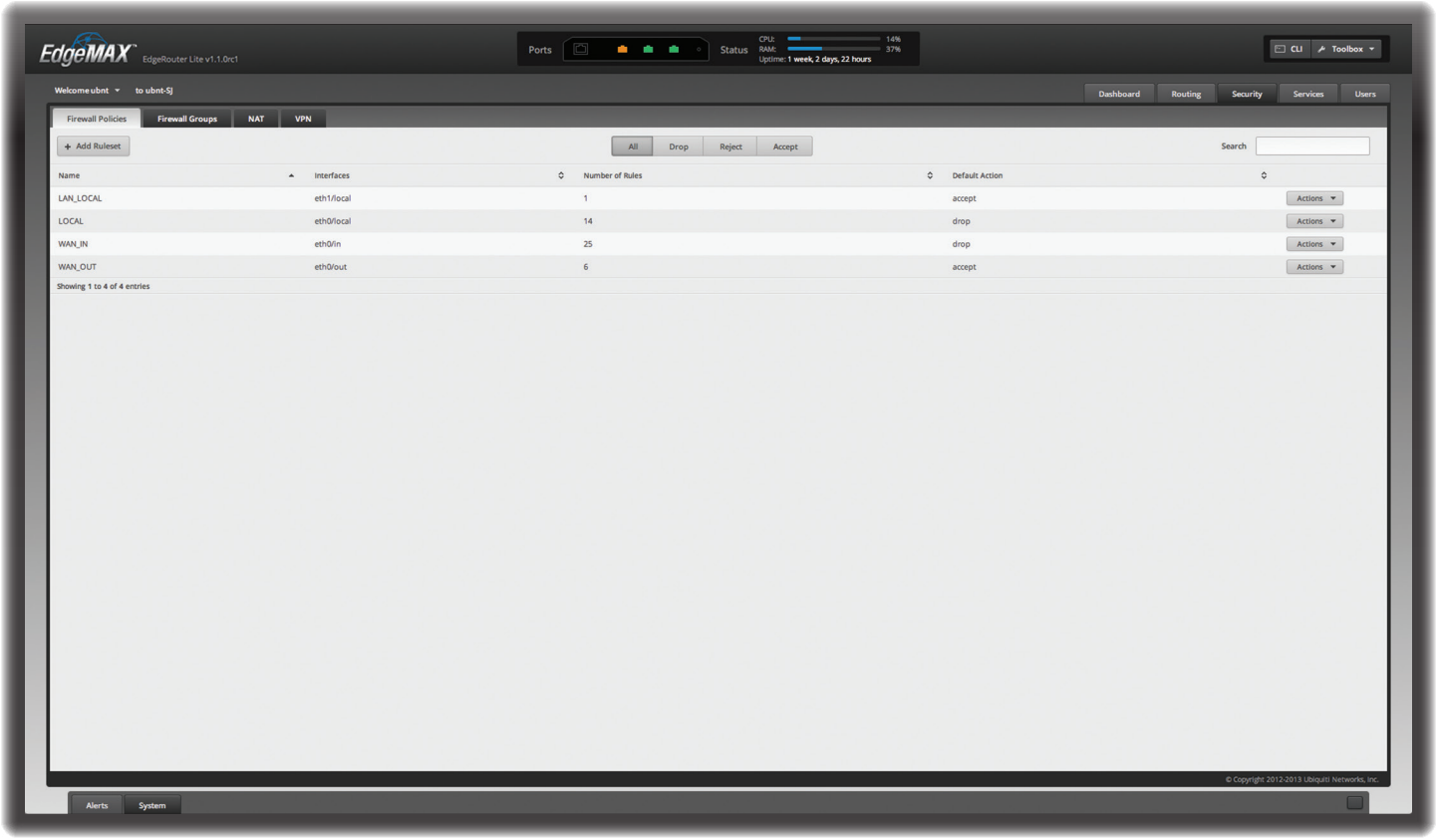
After you click *Config*, the *OSPF Interface Configuration* screen appears.



Make changes as needed.

- **Interface** The name of the interface is displayed.
- **Auth Type** Authentication helps secure communication between routers. Select the appropriate option:
  - **Off** No authentication is used.
  - **MD5/sec** Each router uses a key (password) and key ID. This is the most secure option because the key is never transmitted.
  - **Plain text** Each router uses a key. This provides minimal security because the key is transmitted in plain text format.
- **Auth Key** Enter the key used for authentication.
- **Cost** By default, the cost of an interface is based on its bandwidth; however, you can manually assign a cost to the interface.

  Click **Save** to apply your changes.



Chapter 6: Security Tab

The *Security* tab displays status information about firewall policies, firewall groups, (Network Address Translation) rules, and PPTP VPN options. You can also configure these policies, groups, rules, and options. Any setting marked with a blue asterisk * is required.

You have four sub-tabs:

Firewall Policies Each firewall policy is a set of rules applied in the order you specify.

Firewall Groups Create groups defined by IP address, network address, or port number.

NAT View and create NAT rules.

VPN Configure the EdgeRouter as a PPTP VPN server.

Firewall Policies

A firewall policy is a set of rules with a default action. Firewall policies are applied before SNAT (Source Network Address Translation) and after DNAT (Destination Network Address Translation).

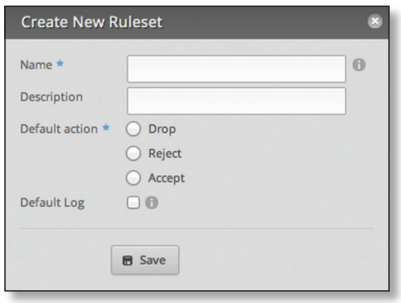
To create a firewall policy:

1. Click the **Firewall Groups** tab, and create the applicable firewall groups. See **"Firewall Groups" on page 23** for more information.
2. Click the **Firewall Policies** tab, and then click **Add Policy**. Configure the basic parameters. See the *Add Policy* description in the next column for more information.
3. Configure the details of the firewall policy. See **"Configure the Firewall Policy" on page 20** for more information.

All/Drop/Reject/Accept

Add Policy To create a new policy, click **Add Policy**.

The *Create New Ruleset* screen appears.



Complete the following:

- **Name** Enter a name for this policy.
- **Description** Enter keywords to describe this policy.
- **Default action** All policies have a default action if the packets do not match any rule. Select the appropriate default action:
  - **Drop** Packets are blocked with no message.
  - **Reject** Packets are blocked, and an ICMP (Internet Control Message Protocol) message is sent saying the destination is unreachable.
  - **Accept** Packets are allowed through the firewall.

- **Default Log** Check this box to log packets that trigger the default action.

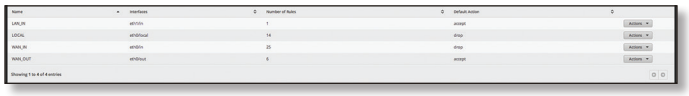
  Click **Save** to apply your changes.

Search Allows you to search for specific text. Begin typing; there is no need to press *enter*. The results are filtered in real time as soon as you type two or more characters.

All/Drop/Reject/Accept Click the appropriate tab to filter the policies by default action.

- **All** All policies are displayed by default.
- **Drop** All of the drop policies are displayed.
- **Reject** All of the reject policies are displayed.
- **Accept** All of the accept policies are displayed.

A table displays the following information about each policy. Click a column heading to sort by that heading.



Name The name of the policy is displayed.

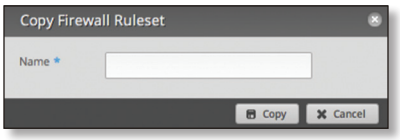
Interfaces The specified interface and direction of traffic flow are displayed.

Number of Rules The number of rules in the policy is displayed.

Default Action The action that the policy will execute if the packets do not match any rule is displayed.

Actions Click the **Actions** button to access the following options:

- **Edit Rules** To configure the rules, click **Edit Rules**. Go to the *Rules* section in the next column.
- **Configuration** To configure the policy, click **Configuration**. Go to **"Configuration" on page 23**.
- **Interfaces** To select interfaces and direction of traffic flow for your policy, click **Interfaces**. Go to **"Interfaces" on page 23**.
- **Stats** To view statistics on firewall usage, click **Stats**. Go to **"Stats" on page 23**.
- **Copy Policy** To create a duplicate, click **Copy Policy**. The *Copy Firewall Ruleset* screen appears.



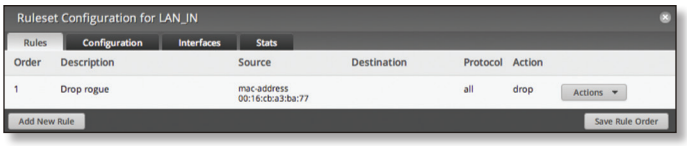
  - **Name** Enter a new name for this policy.

  Click **Copy** to confirm, or click *Cancel*.

- **Delete Policy** Remove the policy.

Configure the Firewall Policy

The *Ruleset Configuration for _* screen appears.



You have four tabs available:

- Rules (see below)
- **"Configuration" on page 23**
- **"Interfaces" on page 23**
- **"Stats" on page 23**

Add New Rule To create a new rule, click **Add New Rule**. Go to **"Add or Configure a Rule" on page 21**.

Save Rule Order To change the rule order, click and drag a rule up or down the sequence, and then release the rule. When you are finished, click **Save Rule Order**.

Rules

A rule tells the EdgeRouter what action to take with a specific packet. Define the following:

- Criteria for matching packets
- Action to take with matching packets

Rules are organized into a set and applied in the specified *Rule Order*. If the packets match a rule's criteria, then its action is triggered. If not, then the next rule is applied.

A table displays the following information about each rule. Click a column heading to sort by that heading.

Order The rules are applied in the order specified. The number of the rule in this order is displayed.

Description The keywords you entered to describe this rule are displayed.

Source The source specified by this rule is displayed.

Destination The destination specified by this rule is displayed.

Protocol The protocol that matches the rule is displayed.

Action The action specified by this rule is displayed.

Actions Click the **Actions** button to access the following options:

- **Basic** To configure the basic options of a rule, click **Basic**. Go to **"Basic" on page 21**.
- **Advanced** To configure the advanced options of a rule, click **Advanced**. Go to **"Advanced" on page 21**.
- **Source** To configure the source options of a rule, click **Source**. Go to **"Source" on page 22**.
- **Destination** To configure the destination options of a rule, click **Destination**. Go to **"Destination" on page 22**.
- **Time** To configure the time options of a rule, click **Time**. Go to **"Time" on page 22**.

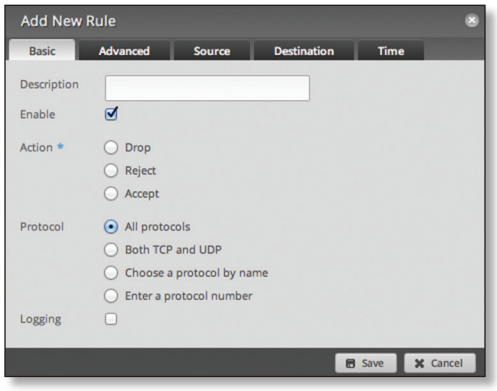
- **Copy Rule** To create a duplicate, click **Copy Rule**. The duplicate rule appears at the bottom of the list.
- **Delete Rule** Remove the rule.

Add or Configure a Rule

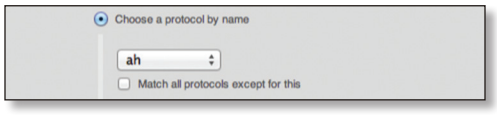
The *Rule Configuration for _* screen appears. You have five tabs available:

- Basic (see below)
- Advanced (see the next column)
- **"Source" on page 22**
- **"Destination" on page 22**
- **"Time" on page 22**

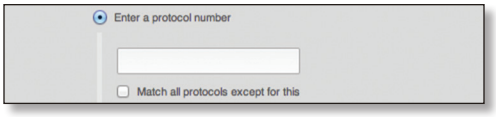
Basic



- **Description** Enter keywords to describe this rule.
- **Enable** Check the box to enable this rule.
- **Action** Select the action for packets that match this rule's criteria.
  - **Drop** Packets are blocked with no message.
  - **Reject** Packets are blocked, and an ICMP (Internet Control Message Protocol) message is sent saying the destination is unreachable.
  - **Accept** Packets are allowed.
- **Protocol**
  - **All protocols** Match packets of all protocols.
  - **Both TCP and UDP** Match TCP and UDP packets.
  - **Choose a protocol by name** Select the protocol from the drop-down list. Match packets of this protocol.
    - **Match all protocols except for this** Match packets of all protocols except for the selected protocol.



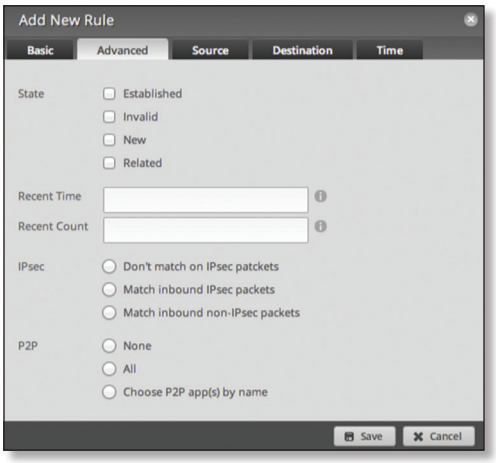
  - **Enter a protocol number** Enter the port number of the protocol. Match packets of this protocol.
    - **Match all protocols except for this** Match packets of all protocols except for the selected protocol.



- **Logging** Check this box to log instances when the rule is matched.

Click **Save** to apply your changes, or click *Cancel*.

Advanced

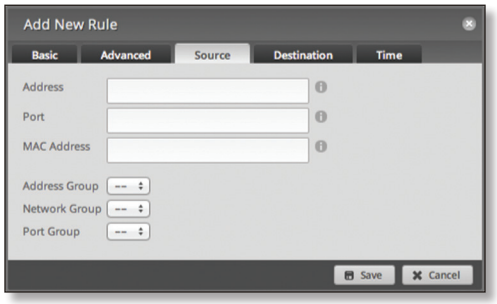


- **State** This describes the connection state of a packet.
  - **Established** Match packets that are part of a two-way connection.
  - **Invalid** Match packets that cannot be identified.
  - **New** Match packets creating a new connection.
  - **Related** Match packets related to established connections.
- **Recent Time** Enter the number of seconds to monitor for attempts to connect from the same source.
- **Recent Count** Enter the number of times the same source is detected within the *Recent Time* duration. This helps thwart attacks using continual attempts to connect.
- **IPsec** IPsec (Internet Protocol security) helps secure packet routing.
  - **Don't match on IPsec packets** Do not match any IPsec packets.
  - **Match inbound IPsec packets** Match IPsec packets that are entering the EdgeRouter.
  - **Match inbound non-IPsec packets** Match non-IPsec packets that are entering the EdgeRouter.

- **P2P** Match P2P (Peer-to-Peer) applications.
  - **None** Do not match P2P connections.
  - **All** Match all P2P connections.
  - **Choose P2P app(s) by name** Match packets of the selected P2P application(s). Check the box of any P2P application on this list to select it.

Click **Save** to apply your changes, or click *Cancel*.

Source

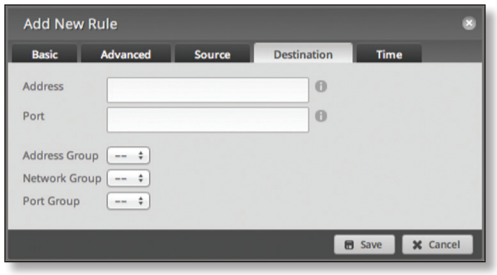


- **Address** Enter the IP address of the source.
- **Port** Enter the port number or range of the source.
- **MAC Address** Enter the MAC address of the source.
- **Address Group / Network Group / Port Group** Firewall groups are created on the *Firewall Groups* tab; see **"Firewall Groups" on page 23** for more information. Select the appropriate group(s); you can specify up to two groups maximum in these combinations:
  - An address group and port group
  - A network group and port group

  The packets must match both groups to apply the rule.

  Click **Save** to apply your changes, or click *Cancel*.

Destination

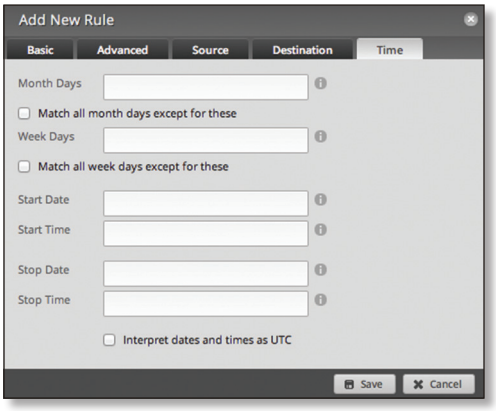


- **Address** Enter the IP address of the destination.
- **Port** Enter the port number of the destination.
- **Address Group / Network Group / Port Group** Firewall groups are created on the *Firewall Groups* tab; see **"Firewall Groups" on page 23** for more information. Select the appropriate group(s); you can specify up to two groups maximum in these combinations:
  - An address group and port group
  - A network group and port group

  The packets must match both groups to apply the rule.

  Click **Save** to apply your changes, or click *Cancel*.

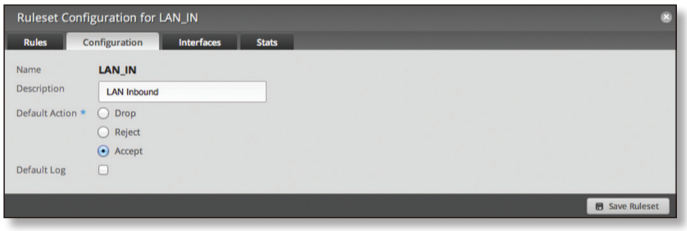
Time



- **Month Days** Enter the days of the month when the rule should be applied. Enter numbers in the range 1 to 31. If you enter more than one day, use commas to separate the numbers (example: *3, 4, 5*).
  - **Match all month days except for these** Match all days of the month except for the selected days.
- **Week Days** Enter the days of the week when the rule should be applied. Enter *Sun*, *Mon*, *Tue*, *Wed*, *Thu*, *Fri*, or *Sat*. If you enter more than one day, use commas to separate the days (example: *Mon, Tue, Wed*).
  - **Match all week days except for these** Match all days of the week except for the selected days.
- **Start Date** Enter the date the rule should start being applied. Use the YYYY-MM-DD (year-month-day) format.
- **Start Time** Enter the time the rule should start being applied. Use the 24-hour format, HH:MM:SS (hours:minutes:seconds).
- **Stop Date** Enter the date the rule should stop being applied. Use the YYYY-MM-DD (year-month-day) format.
- **Stop Time** Enter the time the rule should stop being applied. Use the 24-hour format, HH:MM:SS (hours:minutes:seconds).
- **Interpret dates and times as UTC** Check the box if your network uses UTC.

  Click **Save** to apply your changes, or click *Cancel*.

Configuration



Name The name of this policy is displayed.

Description Enter keywords to describe this policy.

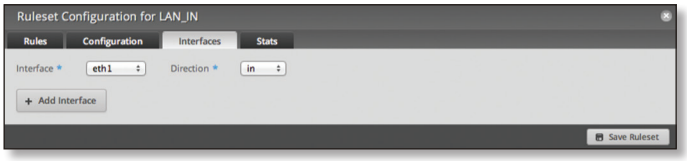
Default action All policies have a default action if the packets do not match any rule. Select the appropriate default action:

- **Drop** Packets are blocked with no message.
- **Reject** Packets are blocked, and an ICMP (Internet Control Message Protocol) message is sent saying the destination is unreachable.
- **Accept** Packets are allowed.

Default Log Check this box to log packets that trigger the default action.

Click **Save Ruleset** to apply your changes.

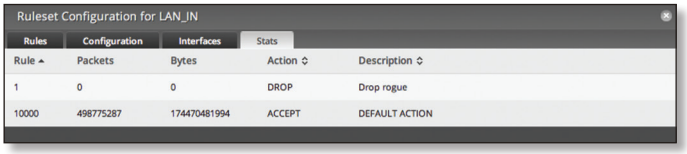
Interfaces



- **Interface** Select the appropriate interface from the drop-down list.
- **Direction** Select the direction of the traffic flow.
  - **in** Match inbound packets.
  - **out** Match outbound packets.
  - **local** Match local packets.
- **Add Interface** Click **Add Interface** to enter more interfaces.

Click **Save Ruleset** to apply your changes.

Stats



A table displays the following statistics about each rule. Click a column heading to sort by that heading.

Rule The rules are applied in the order specified. The number of the rule in this order is displayed.

Packets The number of packets that triggered this rule is displayed.

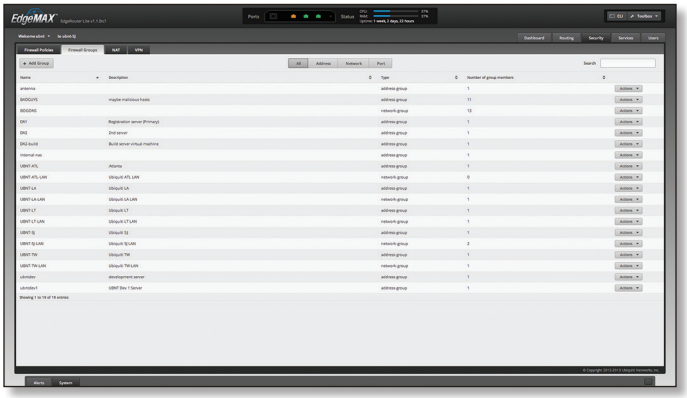
Bytes The number of bytes that triggered this rule is displayed.

Action The action specified by this rule is displayed.

Description The keywords you entered to describe this rule are displayed.

Firewall Groups

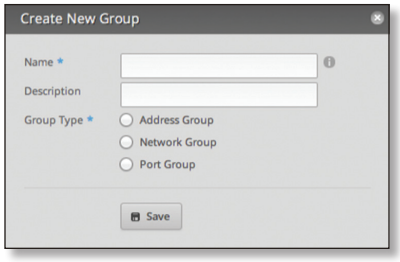
Create groups organized by IP address, network address, or port number.



All/Address/Network/Port

Add Group To create a new group, click **Add Group**.

The *Create New Group* screen appears.



Complete the following:

- **Name** Enter a name for this group.
- **Description** Enter keywords to describe this group.
- **Group Type** Select the appropriate option:
  - **Address Group** Define a group by IP address.
  - **Network Group** Define a group by network address.
  - **Port Group** Define a group by port numbers.

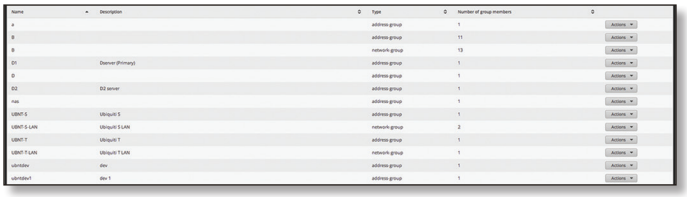
  Click **Save** to apply your changes.

Search Allows you to search for specific text. Begin typing; there is no need to press *enter*. The results are filtered in real time as soon as you type two or more characters.

All/Address/Network/Port Click the appropriate tab to filter the groups as needed.

- **All** All groups are displayed by default.
- **Address** All of the address groups are displayed.
- **Network** All of the network groups are displayed.
- **Port** All of the port groups are displayed.

A table displays the following information about each group. Click a column heading to sort by that heading.



Name The name of the group is displayed.

Description The keywords you entered to describe the group are displayed.

Type The type of group is displayed.

Number of group members The number of members is displayed.

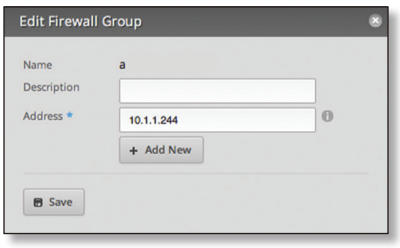
Actions Click the **Actions** button to access the following options:

- **Config** To configure the group, click **Config**. Go to the *Configure the Firewall Group* section below.
- **Delete** Remove the group.

Configure the Firewall Group

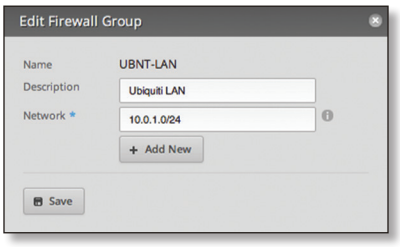
After you click *Config*, the *Edit Firewall Group* screen appears. Follow the instructions for your group type:

- **Address Group** Make changes as needed.



  - **Name** The name of this group is displayed.
  - **Description** Enter keywords to describe this group.
  - **Address** Enter the IP address or range of addresses (examples: *192.0.2.1* or *192.0.2.1-15*). Click **Add New** to enter more IP addresses.

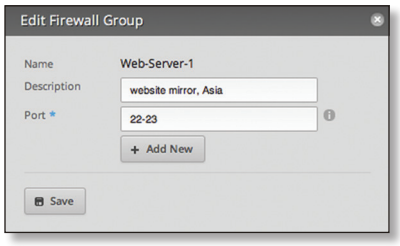
  Click **Save** to apply your changes.
- **Network Group** Make changes as needed.



  - **Name** The name of this group is displayed.
  - **Description** Enter keywords to describe this group.
  - **Network** Enter the IP address and subnet mask using slash notation: *<network_IP_address>/<subnet_mask_number>* (example: *192.0.2.0/24*).

    Click **Add New** to enter more network addresses.

  Click **Save** to apply your changes.
- **Port Group** Make changes as needed.



  - **Name** The name of this group is displayed.
  - **Description** Enter keywords to describe this group.
  - **Port** Enter the port name, number, or range. Click **Add New** to enter more ports.

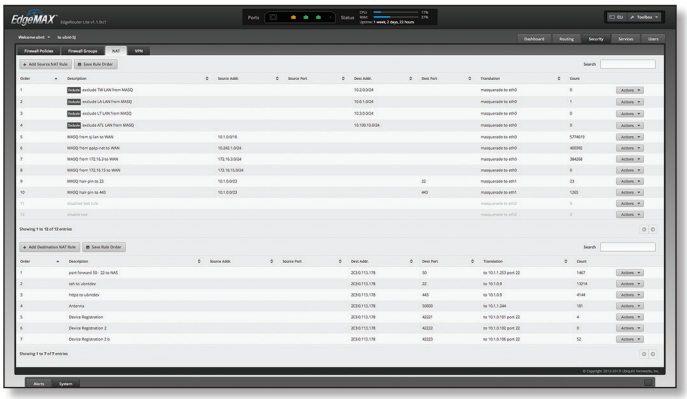
  Click **Save** to apply your changes.

NAT

NAT changes the addressing of packets. A NAT rule tells the EdgeRouter what action to take with a specific packet. Define the following:

- Criteria for matching packets
- Action to take with matching packets

Rules are organized into a set and applied in the specified *Rule Order*. If the packets match a rule's criteria, then its action is performed. If not, then the next rule is applied.



Source NAT Rules

Source NAT changes the source address of packets; a typical scenario is that a private source needs to communicate with a public destination. A Source NAT Rule goes from the private network to the public network and is applied after routing.

Add Source NAT Rule To create a new rule, click **Add Source NAT Rule**. Go to **"Add or Configure a Source NAT Rule" on page 25**.

Save Rule Order To change the rule order, click and drag a rule up or down the sequence, and then release the rule. When you are finished, click **Save Rule Order**.

Search Allows you to search for specific text. Begin typing; there is no need to press *enter*. The results are filtered in real time as soon as you type two or more characters.

A table displays the following information about each rule. Click a column heading to sort by that heading.

Order The rules are applied in the order specified. The number of the rule in this order is displayed.

Description The keywords you entered to describe this rule are displayed.

Source Addr. The source IP address is displayed.

Source Port The source port number is displayed.

Dest. Addr. The destination IP address is displayed.

Dest. Port The destination port number is displayed.

Translation A description of the translation (such as *masquerade to eth_*) is displayed.

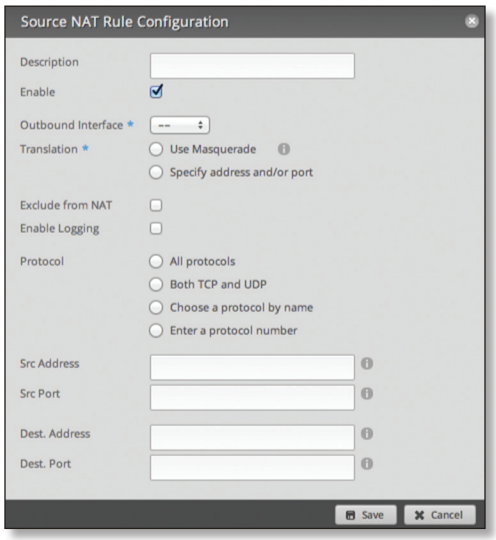
Count The number of translations is displayed.

Actions Click the **Actions** button to access the following options:

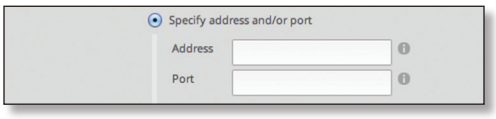
- **Config** To configure the rule, click **Config**. Go to the *Add or Configure a Source NAT Rule* section below.
- **Copy** To create a duplicate, click **Copy**. The duplicate rule appears at the bottom of the list.
- **Delete** Remove the rule.

Add or Configure a Source NAT Rule

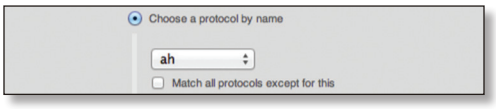
After you click *Config*, the *Source NAT Rule Configuration* screen appears.



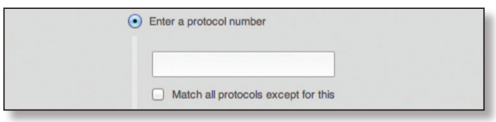
- **Description** Enter keywords to describe this rule.
- **Enable** Check the box to enable this rule.
- **Outbound Interface** Select the interface through which the outgoing packets exit the EdgeRouter. This is required only for Source NAT Rules that use Masquerade.
- **Translation** Select one of the following:
  - **Use Masquerade** Masquerade is a type of Source NAT. If enabled, the source IP address of the packets becomes the public IP address of the outbound interface.
  - **Specify address and/or port** If enabled, the source IP address of the packets becomes the specified IP address and port.
    - **Address** Enter the IP address that will replace the source IP address of the outgoing packet. You can also enter a range of IP addresses; one of them will be used.
    - **Port** Enter the port number that will replace the source port number of the outgoing packet. You can also enter a range of port numbers; one of them will be used.



- **Exclude from NAT** Check the box to exclude packets that match this rule from NAT.
- **Enable Logging** Check this box to log instances when the rule is matched.
- **Protocol** Select one of the following:
  - **All protocols** Match packets of all protocols.
  - **Both TCP and UDP** Match TCP and UDP packets.
  - **Choose a protocol by name** Select the protocol from the drop-down list. Match packets of this protocol.
    - **Match all protocols except for this** Match packets of all protocols except for the selected protocol.



  - **Enter a protocol number** Enter the port number of the protocol. Match packets of this protocol.
    - **Match all protocols except for this** Match packets of all protocols except for the selected protocol.



- **Src Address** Enter the IP address or network address of the source. You can also enter a range of IP addresses; one of them will be used.

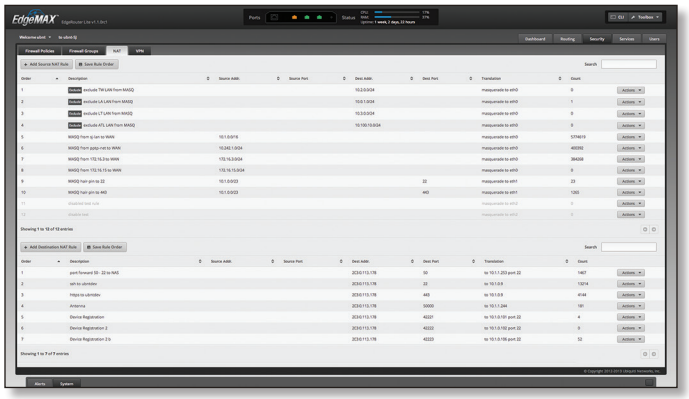
  Note: If you enter a network address, enter the IP address and subnet mask using slash notation: *<network_IP_address>/<subnet_mask_number>* (example: *192.0.2.0/24*).
- **Src Port** Enter the port name or number of the source. You can also enter a range of port numbers; one of them will be used.
- **Dest. Address** Enter the IP address or network address of the destination. You can also enter a range of IP addresses; one of them will be used.

  Note: If you enter a network address, enter the IP address and subnet mask using slash notation: *<network_IP_address>/<subnet_mask_number>* (example: *192.0.2.0/24*).
- **Dest. Port** Enter the port name or number of the destination. You can also enter a range of port numbers; one of them will be used.

Click **Save** to apply your changes, or click *Cancel*.

Destination NAT Rules

Destination NAT changes the destination address of packets; a typical scenario is that a public source needs to communicate with a private destination. A Destination NAT Rule goes from the public network to the private network and is applied before routing.

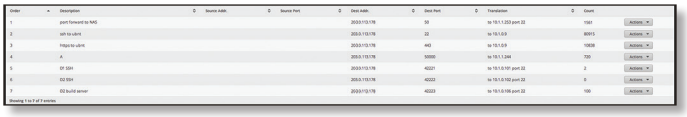


Add Destination NAT Rule To create a new rule, click **Add Destination NAT Rule**. Go to the *Add or Configure a Destination NAT Rule* section.

Save Rule Order To change the rule order, click and drag a rule up or down the sequence, and then release the rule. When you are finished, click **Save Rule Order**.

Search Allows you to search for specific text. Begin typing; there is no need to press *enter*. The results are filtered in real time as soon as you type two or more characters.

A table displays the following information about each rule. Click a column heading to sort by that heading.



Order The rules are applied in the order specified. The number of the rule in this order is displayed.

Description The keywords you entered to describe this rule are displayed.

Source Addr. The source IP address is displayed.

Source Port The source port number is displayed.

Dest. Addr. The destination IP address is displayed.

Dest. Port The destination port number is displayed.

Translation A description of the translation (such as *to <IP_address>*) is displayed.

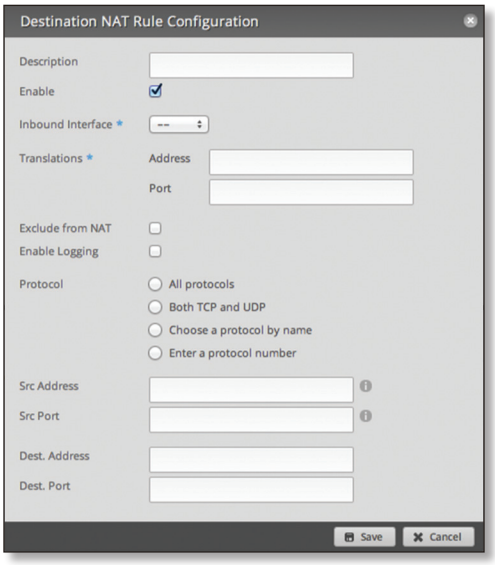
Count The number of translations is displayed.

Actions Click the **Actions** button to access the following options:

- **Config** To configure the rule, click **Config**. Go to the *Add or Configure a Destination NAT Rule* section below.
- **Copy** To create a duplicate, click **Copy**. The duplicate rule appears at the bottom of the list.
- **Delete** Remove the rule.

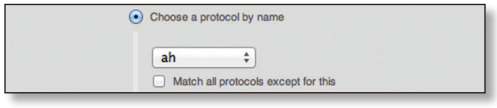
Add or Configure a Destination NAT Rule

After you click *Config*, the *Destination NAT Rule Configuration* screen appears.

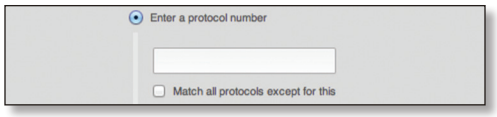


- **Description** Enter keywords to describe this rule.
- **Enable** Check the box to enable this rule.
- **Inbound Interface** Select the interface through which the incoming packets enter the EdgeRouter.

- **Translations** Complete the following:
  - **Address** Enter the IP address that will replace the destination IP address of the incoming packet.
  - **Port** Enter the port number that will replace the destination port number of the incoming packet.
- **Exclude from NAT** Check the box to exclude packets that match this rule from NAT.
- **Enable Logging** Check this box to log instances when the rule is matched.
- **Protocol**
  - **All protocols** Match packets of all protocols.
  - **Both TCP and UDP** Match TCP and UDP packets.
  - **Choose a protocol by name** Select the protocol from the drop-down list. Match packets of this protocol.
    - **Match all protocols except for this** Match packets of all protocols except for the selected protocol.



  - **Enter a protocol number** Enter the port number of the protocol. Match packets of this protocol.
    - **Match all protocols except for this** Match packets of all protocols except for the selected protocol.



- **Src Address** Enter the IP address or network address of the source. You can also enter a range of IP addresses; one of them will be used.

Note: If you enter a network address, enter the IP address and subnet mask using slash notation: *<network_IP_address>/<subnet_mask_number>* (example: *192.0.2.0/24*).

- **Src Port** Enter the port name or number of the source. You can also enter a range of port numbers; one of them will be used.
- **Dest. Address** Enter the IP address or network address of the destination. You can also enter a range of IP addresses; one of them will be used.

Note: If you enter a network address, enter the IP address and subnet mask using slash notation: *<network_IP_address>/<subnet_mask_number>* (example: *192.0.2.0/24*).

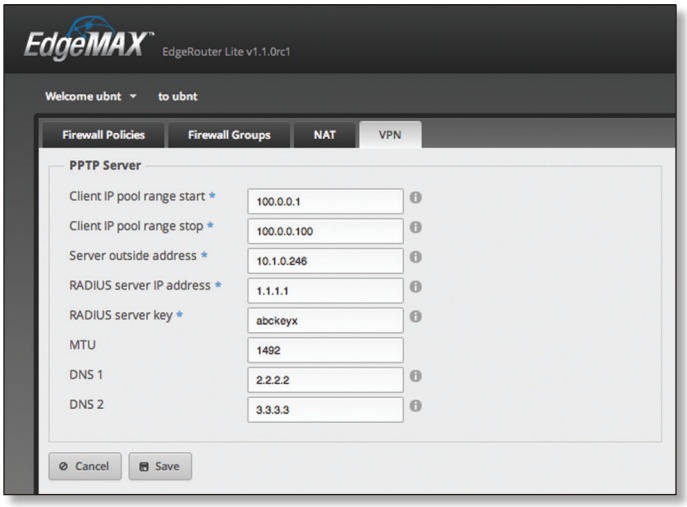
- **Dest. Port** Enter the port name or number of the destination. You can also enter a range of port numbers; one of them will be used.

Click **Save** to apply your changes, or click *Cancel*.

VPN

A common type of VPN uses PPTP (Point-to-Point Tunneling Protocol). The EdgeRouter can function as a PPTP VPN server so a remote VPN client can access the LAN using a PPTP VPN tunnel over the Internet.

PPTP Server



Client IP pool range start The client IP pool is the pool of IP addresses that remote VPN clients will use. Enter the starting IP address of the range (this address must in a /24 subnet).

Client IP pool range stop Enter the last IP address of the range.

Server outside address Enter the IP address that VPN clients will connect to; this is the outside or external address of the PPTP server.

RADIUS server IP address The RADIUS (Remote Access Dial-In User Service) server provides authentication to help secure VPN tunnels. Enter the IP address of the RADIUS server.

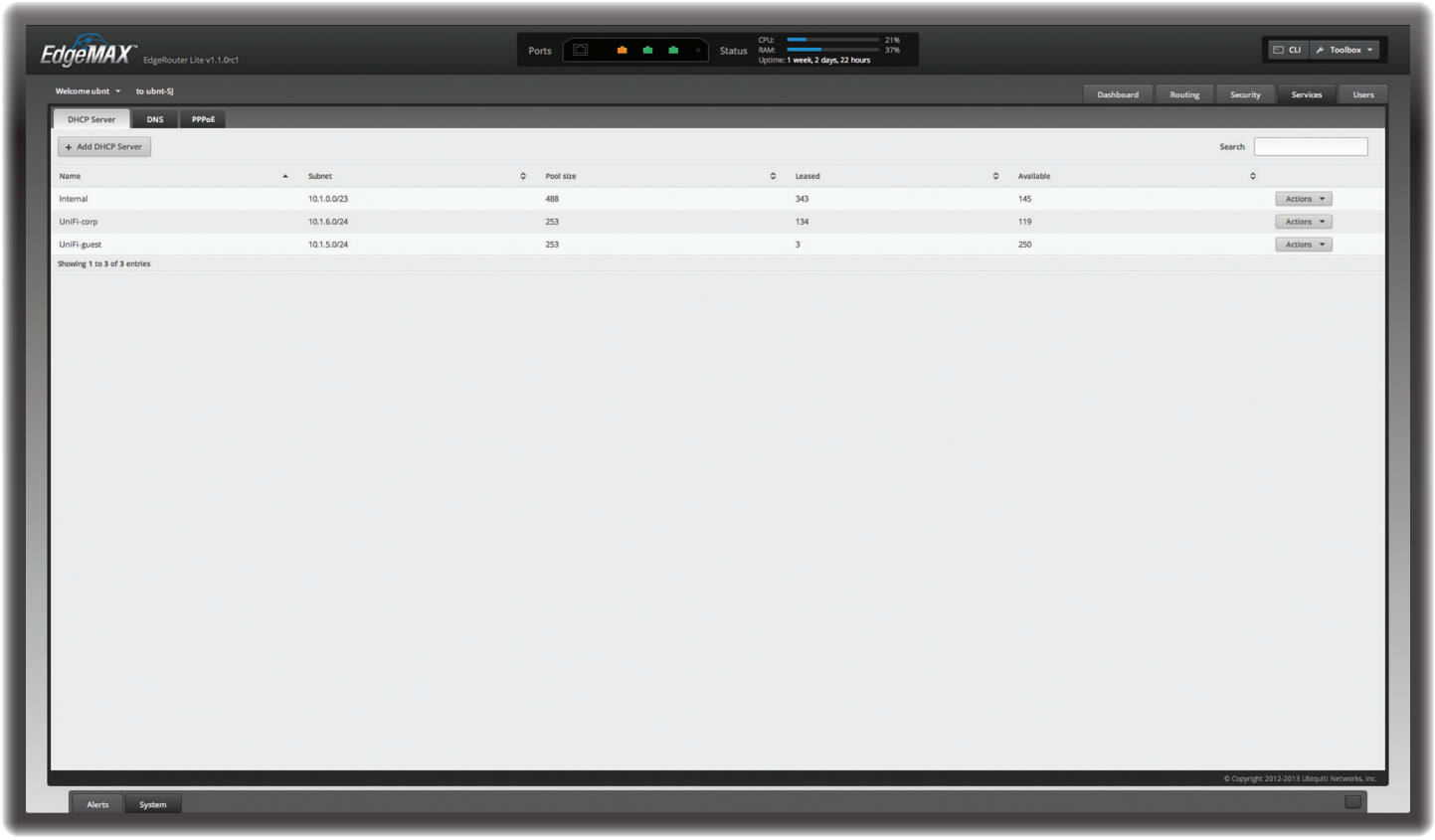
RADIUS server key Enter the key shared with the RADIUS server.

MTU Enter the MTU for the PPTP VPN connection.

DNS 1 Enter the IP address of the primary remote access DNS server that your VPN client will use.

DNS 2 Enter the IP address of the secondary remote access DNS server.

Click **Save** to apply your changes, or click *Cancel*.



Chapter 7: Services Tab

The *Services* tab displays status information about DHCP servers, DNS forwarding, and the PPPoE server. Any setting marked with a blue asterisk * is required.

You have three sub-tabs:

DHCP Server Configure DHCP servers to implement different subnets on the independent interfaces.

DNS Configure DNS forwarding so the EdgeRouter receives all LAN DNS requests and forwards them to the service provider's DNS server.

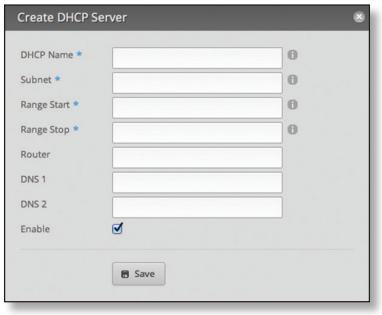
PPPoE Server Configure the PPPoE server so a remote PPPoE client can establish a tunnel to the EdgeRouter for network access.

DHCP Server

A DHCP server assigns IP addresses to DHCP clients. You can configure multiple DHCP servers to assign IP ranges in different subnets on the different interfaces.

Add DHCP Server To create a new DHCP server, click **Add DHCP Server**.

The *Create DHCP Server* screen appears.



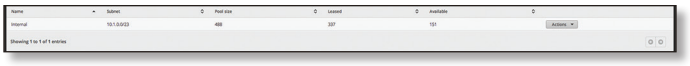
Complete the following:

- **DHCP Name** Enter a name for this DHCP server.
- **Subnet** Enter the IP address and subnet mask using slash notation: *<network_IP_address>/<subnet_mask_number>* (example: *192.0.2.0/24*).
- **Range Start** Enter the starting IP address of the range.
- **Range Stop** Enter the last IP address of the range.
- **Router** Enter the default route of the DHCP clients. The DHCP clients route all packets to this IP address, which is the EdgeRouter's own IP address in most cases.
- **DNS 1** Enter the IP address of the primary DNS server. Your ISP may provide this information, or you can use Google's DNS server at *8.8.8.8*.
- **DNS 2** Enter the IP address of the secondary DNS server.
- **Enable** Check the box to enable this DHCP server.

Click **Save** to apply your changes, or click *Cancel*.

Search Allows you to search for specific text. Begin typing; there is no need to press *enter*. The results are filtered in real time as soon as you type two or more characters.

A table displays the following information about each DHCP server. Click a column heading to sort by that heading.



Name The name of the DHCP server is displayed.

Subnet The IP address and subnet mask of the DHCP server are displayed.

Pool size The total number of IP addresses is displayed.

Leased The number of leased IP addresses is displayed.

Available The number of available IP addresses is displayed.

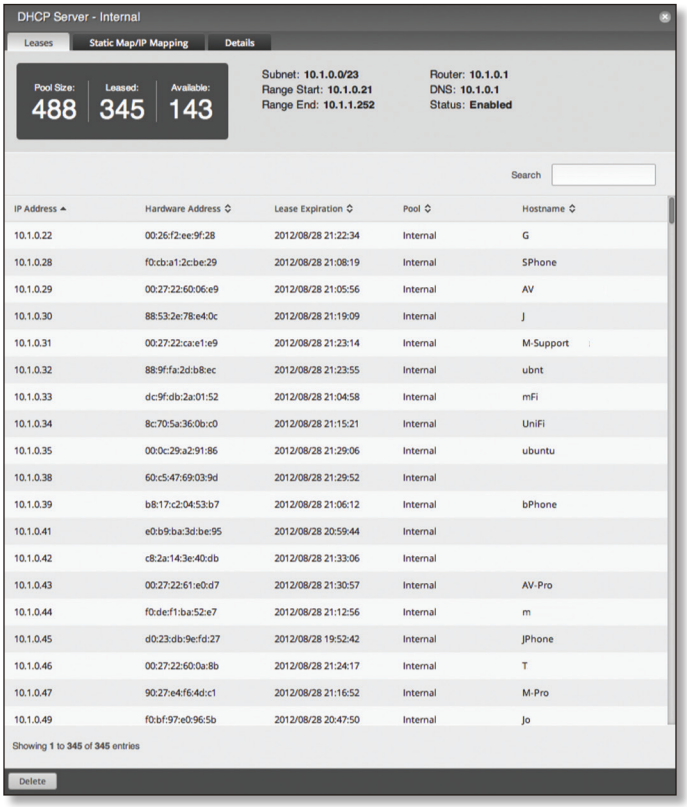
Actions Click the **Actions** button to access the following options:

- **View Leases** To view the current DHCP leases, click **View Leases**. Go to the *Configure the DHCP Server > Leases* section.
- **Configure Static Map** To map static IP addresses to MAC addresses, click **Configure Static Map**. Go to **"Static MAC/IP Mapping" on page 30**.
- **View Details** To configure the DHCP server, click **View Details**. Go to **"Details" on page 31**.
- **Delete** Delete the DHCP server; its configuration will be removed.
- **Disable** Disable the DHCP server while keeping its configuration.

Configure the DHCP Server

The *DHCP Server* - screen appears. You have three tabs available.

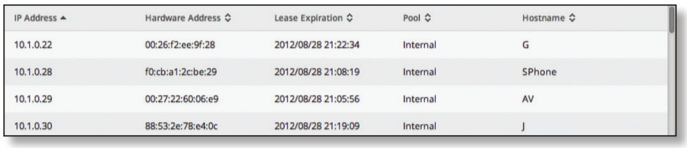
Leases



The top section displays the following status information:

- **Pool Size** The total number of IP addresses is displayed. The DHCP server assigns IP address from the pool (or group) of IP addresses.
- **Leased** The number of used IP addresses is displayed.
- **Available** The number of available IP addresses is displayed.
- **Subnet** The IP address and subnet mask of the DHCP server are displayed in slash notation.
- **Range Start** The starting IP address of the range is displayed.
- **Range End** The last IP address of the range is displayed.
- **Router** The default route of the DHCP clients is displayed. The DHCP clients route all packets to this IP address, which is the EdgeRouter's own IP address in most cases.
- **DNS** The IP address of the DNS server is displayed.
- **Status** The *Enabled*/*Disabled* status of the DHCP server is displayed.
- **Search** Allows you to search for specific text. Begin typing; there is no need to press *enter*. The results are filtered in real time as soon as you type two or more characters.

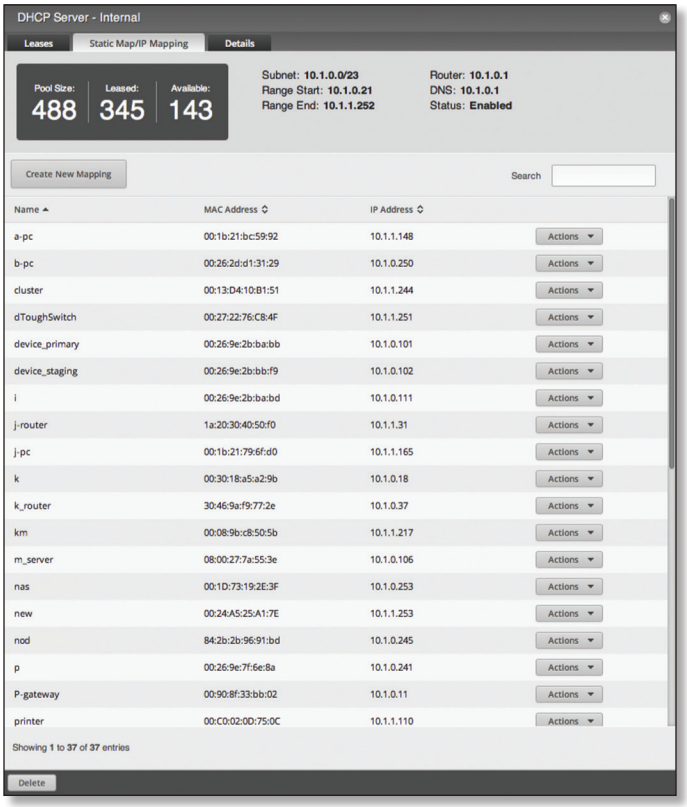
A table displays the following information about each DHCP client. Click a column heading to sort by that heading.



- **IP Address** The IP address assigned to the DHCP client is displayed.
- **Hardware Address** The MAC address of the DHCP client is displayed.
- **Lease Expiration** The date and time when the DHCP lease will expire is displayed.
- **Pool** The name of the DHCP server is displayed.
- **Hostname** The name used to identify the DHCP client is displayed.

  At the bottom of the screen, you can click *Delete* to delete the DHCP server and its configuration.

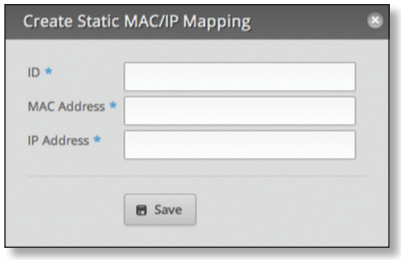
Static MAC/IP Mapping



The top section displays the following status information:

- **Pool Size** The total number of IP addresses is displayed.
- **Leased** The number of used IP addresses is displayed.
- **Available** The number of available IP addresses is displayed.
- **Subnet** The IP address and subnet mask of the DHCP server are displayed in slash notation.
- **Range Start** The starting IP address of the range is displayed.
- **Range End** The last IP address of the range is displayed.
- **Router** The default route of the DHCP clients is displayed. The DHCP clients route all packets to this IP address, which is the EdgeRouter's own IP address in most cases.
- **DNS** The IP address of the DNS server is displayed.
- **Status** The *Enabled*/*Disabled* status of the DHCP server is displayed.
- **Create New Mapping** To map a static IP address to a specific MAC address, click **Create New Mapping**.

  The *Create Static MAC/IP Mapping* appears.



  Complete the following:

  - **ID** Enter a name for this mapping.
  - **MAC Address** Enter the MAC address of the DHCP client.
  - **IP Address** Enter the IP address that should be assigned.

  Click **Save** to apply your changes.

- **Search** Allows you to search for specific text. Begin typing; there is no need to press *enter*. The results are filtered in real time as soon as you type two or more characters.

A table displays the following information about each static MAC/IP mapping. Click a column heading to sort by that heading.

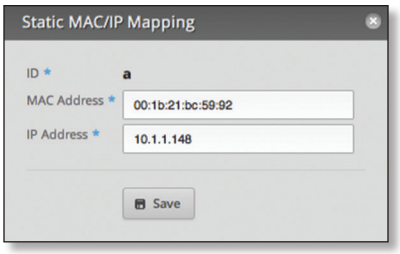
- **Name** The name of the mapping is displayed.
- **MAC Address** The MAC address of the DHCP client is displayed.
- **IP Address** The IP address assigned to the corresponding MAC address is displayed.
- **Actions** Click the **Actions** button to access the following options:

  - **Config** To configure the mapping, click **Config**. Go to **"Configure Static MAC/IP Mapping" on page 31**.
  - **Delete** Remove the selected mapping.

  At the bottom of the screen, you can click *Delete* to delete the DHCP server and its configuration.

Configure Static MAC/IP Mapping

The *Static MAC/IP Mapping* screen appears.

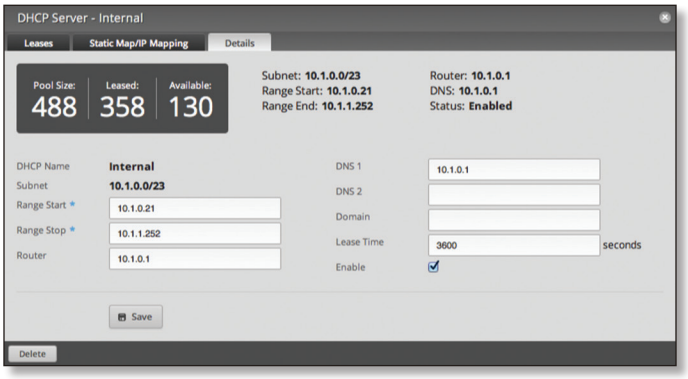


Make changes as needed.

- **ID** The name of this mapping is displayed.
- **MAC Address** Enter the MAC address of the DHCP client.
- **IP Address** Enter the IP address that should be assigned.

Click **Save** to apply your changes.

Details



The top section displays the following status information:

- **Pool Size** The total number of IP addresses is displayed.
- **Leased** The number of used IP addresses is displayed.
- **Available** The number of available IP addresses is displayed.
- **Subnet** The IP address and subnet mask of the DHCP server are displayed in slash notation.
- **Range Start** The starting IP address of the range is displayed.
- **Range End** The last IP address of the range is displayed.
- **Router** The default route of the DHCP clients is displayed. The DHCP clients route all packets to this IP address, which is the EdgeRouter's own IP address in most cases.
- **DNS** The IP address of the DNS server is displayed.
- **Status** The *Enabled*/*Disabled* status of the DHCP server is displayed.

The rest of the *Details* tab displays the following:

- **DHCP Name** The name of the DHCP server is displayed.
- **Subnet** The IP address and subnet mask of the DHCP server are displayed in slash notation.

Make changes as needed to the following options:

- **Range Start** Enter the starting IP address of the range.
- **Range Stop** Enter the last IP address of the range.
- **Router** Enter the default route of the DHCP clients. The DHCP clients route all packets to this IP address, which is the EdgeRouter's own IP address in most cases.
- **DNS 1** Enter the IP address of the primary DNS server. Your ISP may provide this information, or you can use Google's DNS server at *8.8.8.8*.
- **DNS 2** Enter the IP address of the secondary DNS server.
- **Domain** Enter the domain name for DHCP clients.
- **Lease Time** Enter the period of time (in seconds) that a DHCP lease should last.
- **Enable** Check the box to enable this DHCP server.

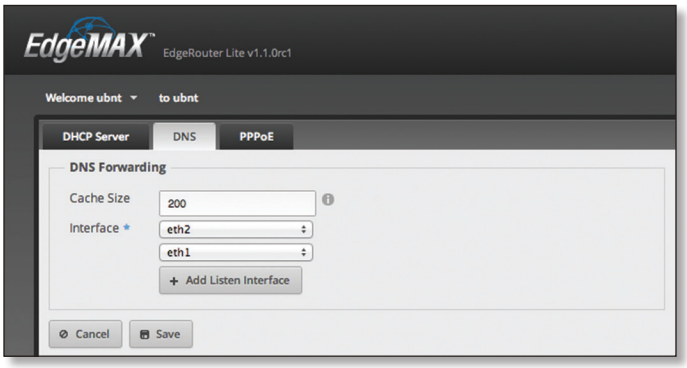
Click **Save** to apply your changes.

At the bottom of the screen, you can click *Delete* to delete the DHCP server and its configuration.

DNS

The EdgeRouter receives all LAN DNS requests and forwards them to the service provider's DNS server. The EdgeRouter receives responses from the DNS server and forwards them to the LAN clients.

DNS Forwarding



Cache Size Completed DNS requests are cached so response time is faster for cached entries, and there is less traffic traveling to the DNS server. Enter the maximum number of DNS queries to cache.

Interface Select the appropriate interface that the EdgeRouter will listen to so it can forward DNS requests.

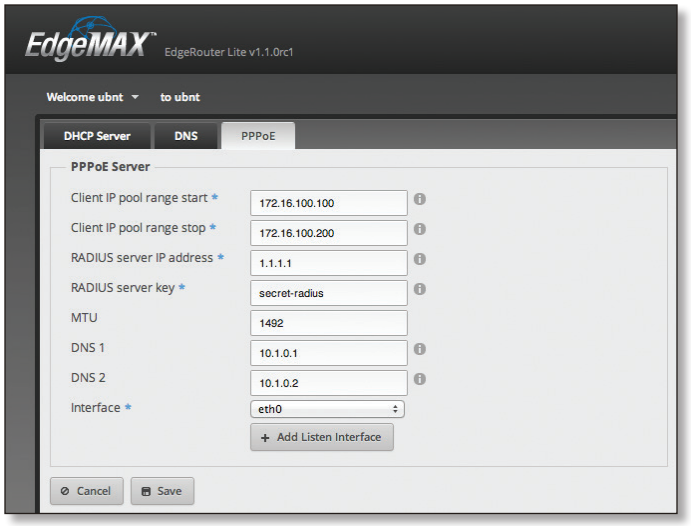
Add Listen Interface You can select multiple interfaces. To add another interface for DNS forwarding, click **Add Listen Interface**. From the new *Interface* drop-down menu, select the appropriate interface.

Click **Save** to apply your changes, or click *Cancel*.

PPPoE

The EdgeRouter can function as a PPPoE (Point-to-Point Protocol over Ethernet) server so a remote PPPoE client can establish a tunnel to the EdgeRouter for network access.

PPPoE Server



Client IP pool range start The client IP pool is the pool of IP addresses that remote PPPoE clients will use. Enter the starting IP address of the range (this address must in a /24 subnet).

Client IP pool range stop Enter the last IP address of the range.

RADIUS server IP address The RADIUS (Remote Access Dial-In User Service) server provides authentication to help secure PPPoE connections. Enter the IP address of the RADIUS server.

RADIUS server key Enter the key shared with the RADIUS server.

MTU Enter the MTU for the PPPoE connection.

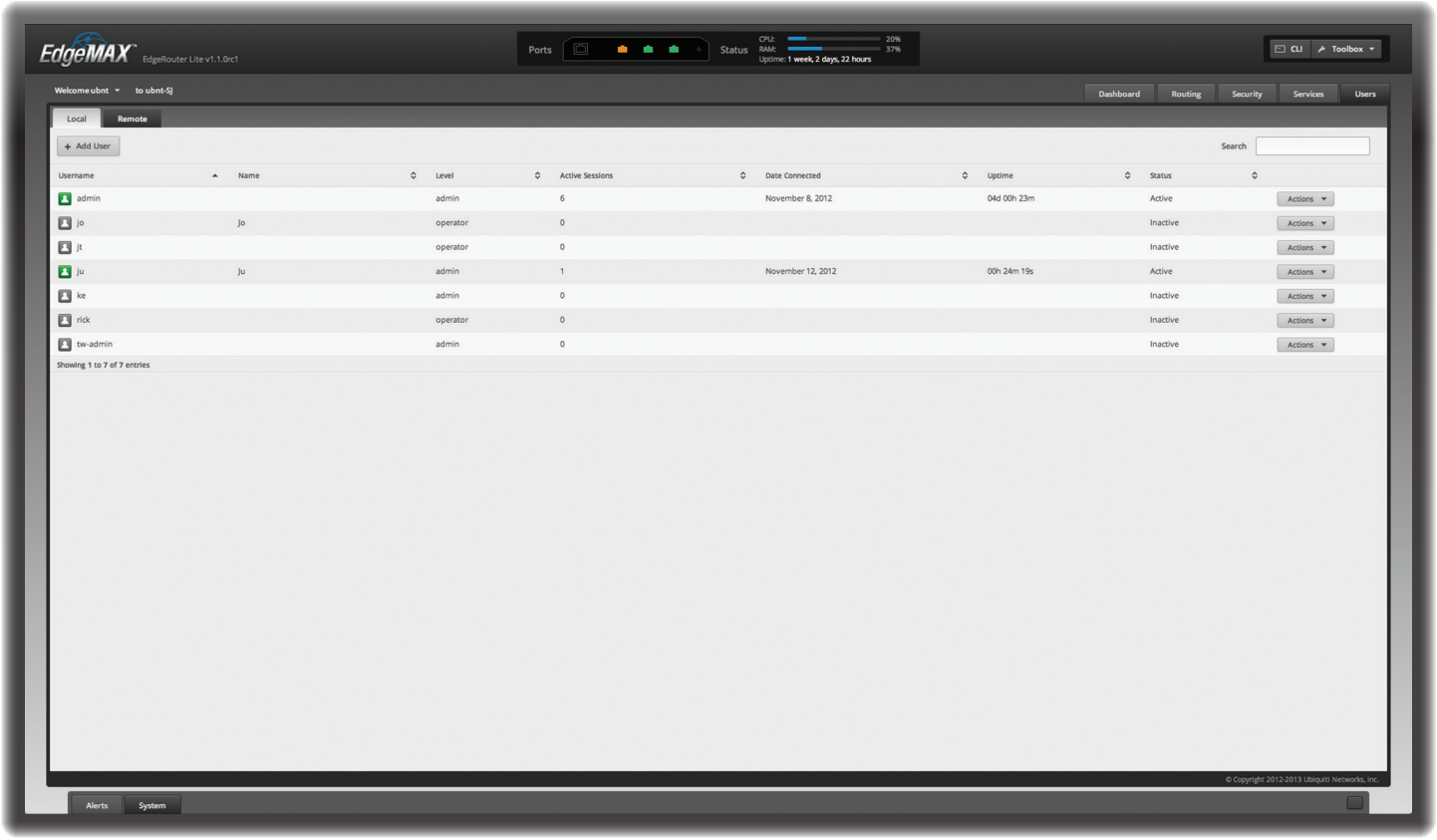
DNS 1 Enter the IP address of the primary remote access DNS server that your PPPoE client will use.

DNS 2 Enter the IP address of the secondary remote access DNS server.

Interface Select the appropriate interface that the EdgeRouter will listen to so it can forward PPPoE requests.

Add Listen Interface You can select multiple interfaces. To add another interface for PPPoE connections, click **Add Listen Interface**. From the new *Interface* drop-down menu, select the appropriate interface.

Click **Save** to apply your changes, or click *Cancel*.



Chapter 8: Users Tab

The *Users* tab displays account information about users. You can also configure these user accounts. Any setting marked with a blue asterisk * is required.

You have two sub-tabs:

Local Displays configurable user accounts.

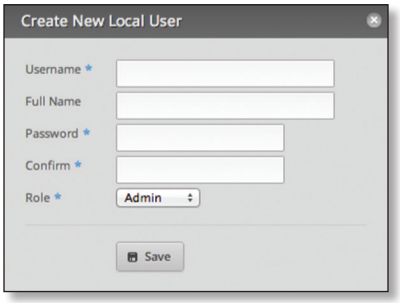
Remote Displays statistics about the users who remotely access the EdgeRouter.

Local

Configure user accounts with unique logins.

Add User To create a new user, click **Add User**.

The *Create New Local User* screen appears.



Complete the following:

- **Username** Enter a unique account name for the user.
- **Full Name** Enter the actual name of the user.
- **Password** Enter the password.
- **Confirm** Enter the password again.
- **Role** Select the appropriate permission level:
  - **Admin** The user can make changes to the EdgeRouter configuration.
  - **Operator** The user can view the EdgeRouter configuration but cannot make changes.

Click **Save** to apply your changes.

Search Allows you to search for specific text. Begin typing; there is no need to press *enter*. The results are filtered in real time as soon as you type two or more characters.

A table displays the following information about each user. Click a column heading to sort by that heading.

Username The account name of the user is displayed.

Name The actual name of the user is displayed.

Level The permission level of the user is displayed.

Active Sessions The number of times the user has accessed the EdgeRouter is displayed.

Date Connected The date of the user's most recent access is displayed.

Uptime The duration of the user's access is displayed.

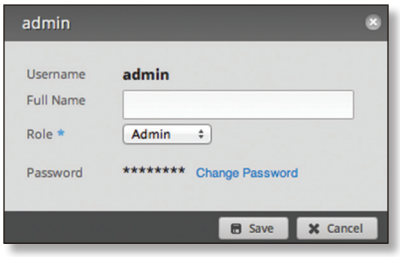
Status The status of the user is displayed.

Actions Click the **Actions** button to access the following options:

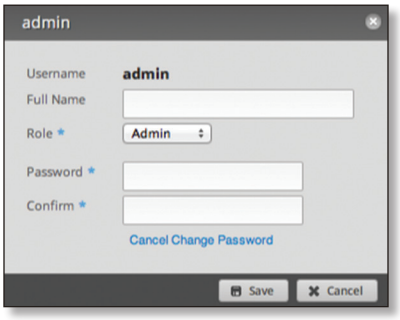
- **Config** To configure the user, click **Config**. Go to the *Configure the User* section below.
- **Delete** Delete the user account; its configuration will be removed.

Configure the User

After you click *Config*, the *Username* screen appears. Make changes as needed.



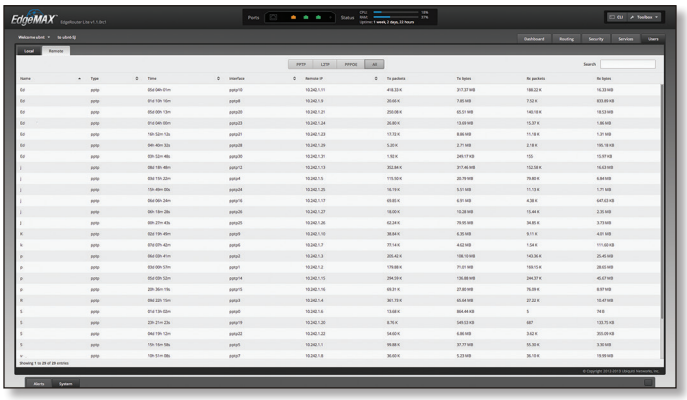
- **Username** The unique account name is displayed.
- **Full Name** Enter the actual name of the user.
- **Role** Select the appropriate permission level:
  - **Admin** The user can make changes to the EdgeRouter configuration.
  - **Operator** The user can view the EdgeRouter configuration but cannot make changes.
- **Password** Click **Change Password** to make a change.
  - **Password** Enter the new password.
  - **Confirm** Enter the new password again.
  - **Cancel Change Password** Click this option to cancel.



Click **Save** to apply your changes, or click *Cancel*.

Remote

Remote access of the EdgeRouter is logged on this tab.



Search Allows you to search for specific text. Begin typing; there is no need to press *enter*. The results are filtered in real time as soon as you type two or more characters.

PPTP/L2TP/PPPOE/All Click the appropriate tab to filter the remote users as needed.

- **PPTP** All users who use PPTP (Point-to-Point Tunneling Protocol) connections are displayed.
- **L2TP** All users who use L2TP (Layer 2 Tunneling Protocol) connections are displayed.
- **PPPOE** All users who use PPPOE (Point-to-Point over Ethernet) connections are displayed.
- **All** All remote users are displayed by default.

A table displays the following information about each remote user. Click a column heading to sort by that heading.

Name The actual name of the user is displayed.

Type The type of connection used by the user is displayed.

Time The duration of the user's access is displayed.

Interface The specific interface used by the user is displayed.

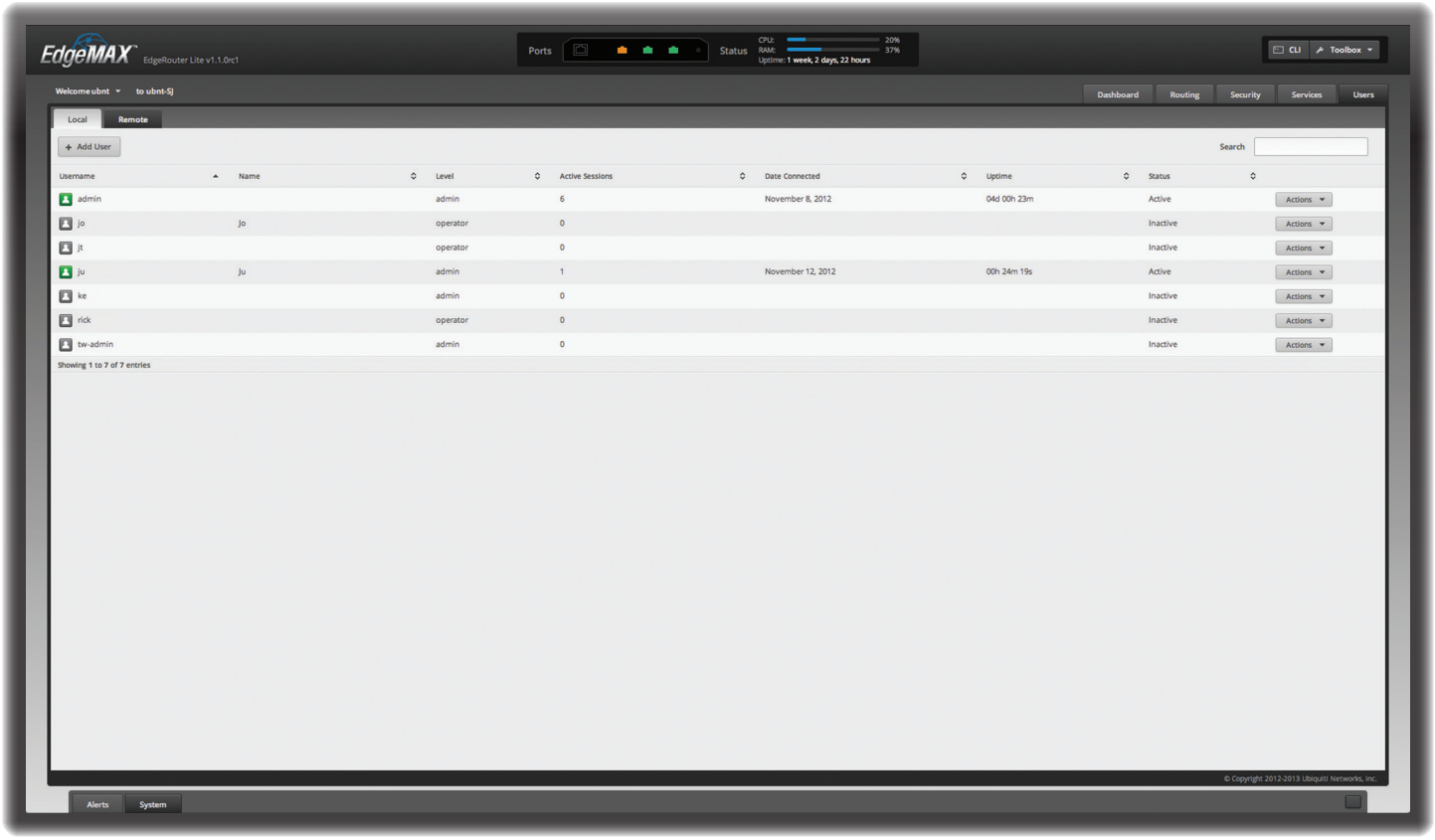
Remote IP The remote IP address of the user is displayed.

TX packets The number of packets transmitted is displayed.

TX bytes The number of bytes transmitted is displayed.

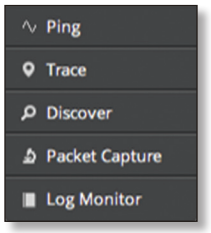
RX packets The number of packets received is displayed.

RX bytes The number of bytes received is displayed.



Chapter 9: Toolbox

Each tab of the EdgeOS interface contains network administration and monitoring tools. At the top right of the screen, click the **Toolbox** Toolbox button. The *Toolbox* drop-down menu appears.

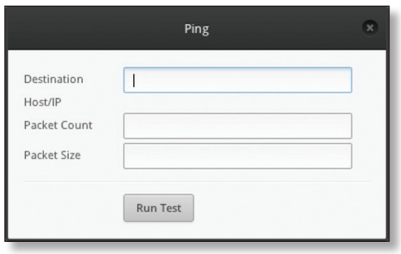


The following tools are available:

- Ping
- Trace
- Discover
- Packet Capture
- Log Monitor

Ping

You can ping other devices on the network directly from the EdgeRouter. The *Ping* tool uses ICMP packets to check the preliminary link quality and packet latency estimation between two network devices.



Destination Host/IP Enter the IP address.

Packet Count Enter the number of packets to send for the ping test.

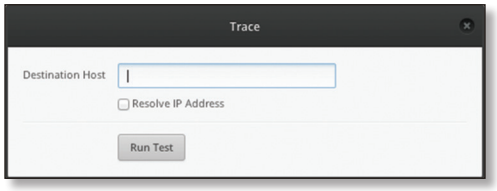
Packet Size Specify the size of the packet.

Run Test Click this button to start the test.

Packet loss statistics and latency time evaluation are displayed after the test is completed.

Trace

The *Trace* tool traces the hops from the EdgeRouter to a specified outgoing IP address. Use this tool to find the route taken by ICMP packets across the network to the destination host.



Destination Host Enter the IP address of the destination host.

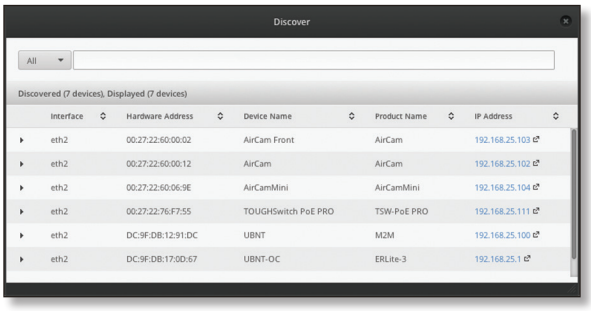
Resolve IP Address Select this option to resolve the IP addresses symbolically (as names) instead of numerically.

Run Test Click this button to start the test.

Responses are displayed after the test is completed.

Discover

The *Discover* tool searches for all Ubiquiti devices on your network. The *Search* field automatically filters devices containing specified names or numbers as you enter them.



All/eth_ Select which interface to search, or select **All**.

The tool reports the number of *Discovered* and *Displayed* Ubiquiti devices. A table displays the following information about each Ubiquiti device. Click a column heading to sort by that heading.

Interface The EdgeRouter interface used by the device is displayed.

Hardware Address The MAC address of the device is displayed.

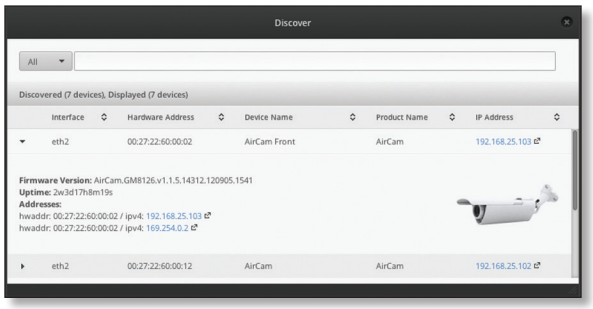
Device Name The name assigned to the device is displayed.

Product Name The Ubiquiti name of the device is displayed.

IP Address The IP address of the device is displayed. You can click it to access the device's configuration through its web management interface.

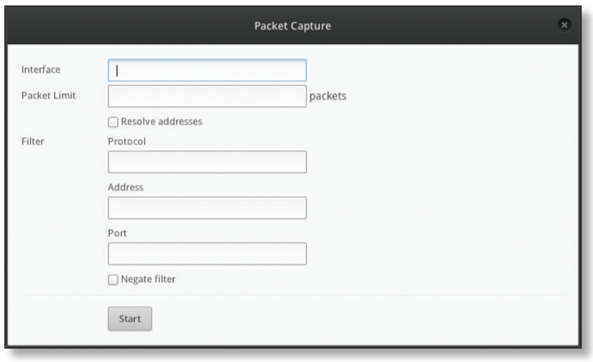
For more information, click the ▸ arrow to view the following:

- **Firmware Version** The version number of the device's firmware is displayed.
- **Uptime** The duration of the device's activity is displayed.
- **Addresses** The addresses of the device's interface are displayed. If the device has more than one interface, addresses for each interface are displayed.
  - **hwaddr** The MAC address of the device's interface is displayed.
  - **ipv4** The IP address of the device's interface is displayed.



Packet Capture

Capture packets traveling through the specified interface for analysis. You can set up filters to capture the specific types of packets you are seeking.



Interface Enter the name of the interface.

Packet Limit Enter the number of packets to capture. The maximum number is 300.

Resolve addresses Select this option to resolve the IP addresses symbolically (as names) instead of numerically.

Filter

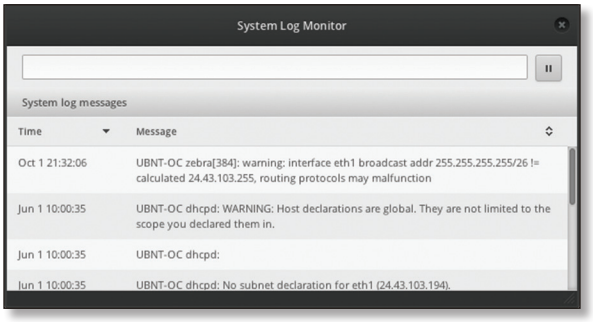
- **Protocol** Enter the protocol to filter.
- **Address** Enter the address to filter.
- **Port** Enter the port number to filter.
- **Negate filter** Check this box to capture all packets except for the ones matching the selected filter(s).

Start Click this button to start the capture. (If a *Packet Limit* is not specified, then this button becomes a *Stop* button during the capture.)

Capture results are displayed with *Time* and *Packet* descriptions.

Log Monitor

The *Log Monitor* is a log displaying live updates.



Click the *pause* button to stop the live updates. Click the *play* button to resume the live updates.

The *System log messages* table displays the following information about each log. Click a column heading to sort by that heading.

Time The system time is displayed next to every log entry that registers a system event.

Message A description of the system event is displayed.

Appendix A: Command Line Interface

Overview

The Command Line Interface (CLI) is available if you need to configure and monitor advanced features on the EdgeRouter or prefer configuration by command line. The CLI provides direct access to standard Linux tools and shell commands. This chapter explains how to access the CLI and describes a basic set of frequently used commands.

Access the CLI

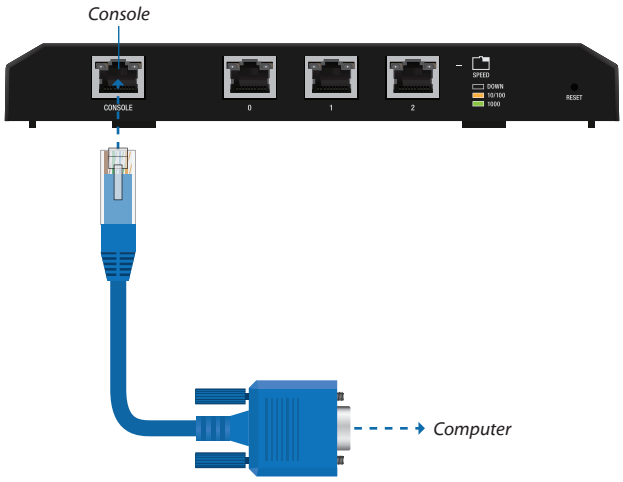
There are four methods you can use to access the CLI:

- **terminal emulator** Go to the following section, *Connect to the Console Port*.
- **SSH** If you are using the console port, go to the following section, *Connect to the Console Port*; otherwise, go to **"Access Using SSH" on page 39**.
- **Telnet** If you are using the console port, go to the following section, *Connect to the Console Port*; otherwise, go to **"Access Using Telnet" on page 39**.
- **EdgeOS Configuration Interface** Go to **"Access Using the EdgeOS Configuration Interface" on page 40**.

Connect to the Console Port

Instructions may vary slightly, depending on your specific terminal emulator.

1. Use a RJ45 to DB9, serial console cable, also known as a rollover cable, to connect the *Console* port of the EdgeRouter to your computer. (If your computer does not have a DB9 port, then you will also need a DB9 adapter.)



2. Follow the appropriate set of instructions:
   - **terminal emulator** Go to the following section, *Access Using a Terminal Emulator*.
   - **SSH** Go to **"Access Using SSH" on page 39**.
   - **Telnet** Go to **"Access Using Telnet" on page 39**.

Access Using a Terminal Emulator

Instructions may vary slightly, depending on your specific terminal emulator.

1. Open the terminal emulator on your computer, and configure it with the following serial port settings:
   - **Baud rate** 115200
   - **Stop bits** 8
   - **Parity** 1
   - **Flow control** NONE
2. Select **Serial** as the connection type.
3. Click **Open** to connect to the EdgeRouter.
4. At the *ubnt login* prompt, enter the username (the default is *ubnt*).

```
Welcome to EdgeOS

By logging in, accessing, or using the Ubiquiti product, you
acknowledge that you have read and understood the Ubiquiti
License Agreement (available in the Web UI at, by default,
http://192.168.1.1) and agree to be bound by its terms.

UBNT-OC login: ubnt
```

5. At the *Password* prompt, enter the password (the default is *ubnt*).

```
Welcome to EdgeOS

By logging in, accessing, or using the Ubiquiti product, you
acknowledge that you have read and understood the Ubiquiti
License Agreement (available in the Web UI at, by default,
http://192.168.1.1) and agree to be bound by its terms.

UBNT-OC login: ubnt
Password:
```

6. For help with commands, you can either press the **?** key or enter **show** and press the **?** key.

```
Welcome to EdgeOS

By logging in, accessing, or using the Ubiquiti product, you
acknowledge that you have read and understood the Ubiquiti
License Agreement (available in the Web UI at, by default,
http://192.168.1.1) and agree to be bound by its terms.

UBNT-OC login: ubnt
Password:
Linux ubnt 2.6.32.13-UBNT #1 SMP Wed Oct 24 01:08:06 PDT 2012 mips64
Welcome to EdgeOS
ubnt@UBNT-OC:~$
```

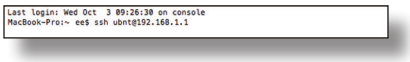
Note: To enhance security, we recommend that you change the default login using at least one of the following options:

- Set up a new user account (preferred option). For details, go to **"Remove the Default User Account" on page 42**.
- Change the default password of the *ubnt* login. Use the *set* command as detailed in **"Remove the Default User Account" on page 42**.

Access Using SSH

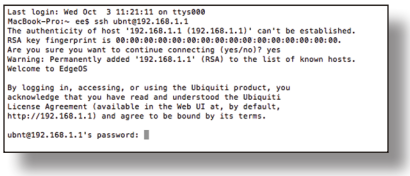
SSH is enabled by default.

1. Open the SSH client on your computer.
2. At the *login* prompt, enter:
   ssh <*username*>**@<***hostname*>
   The defaults are *ubnt* for the username and *192.168.1.1* for the hostname. You can also enter a domain name instead of an IP address for the hostname.

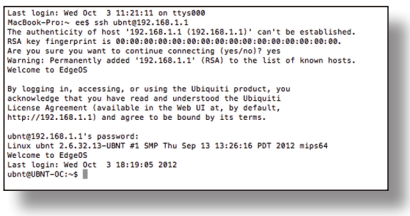


Note: Upon initial login, a host key will be displayed. You will be asked to confirm that you want to save the host key to the local database. Click **Yes** to bypass this message in the future.

3. At the *Password* prompt, enter the password (the default is *ubnt*).



4. For help with commands, you can either press the **?** key or enter **show** and press the **?** key.



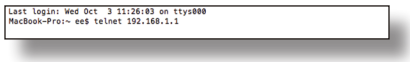
Note: To enhance security, we recommend that you change the default login using at least one of the following options:

- Set up a new user account (preferred option). For details, go to **"Remove the Default User Account" on page 42**.
- Change the default password of the *ubnt* login. Use the *set* command as detailed in **"Remove the Default User Account" on page 42**.

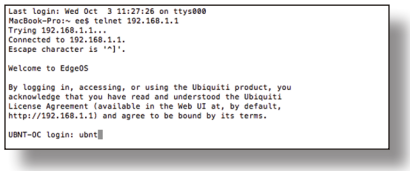
Access Using Telnet

Telnet is disabled by default. To use Telnet, enable it on the *System* tab (see **"Telnet Server" on page 8**).

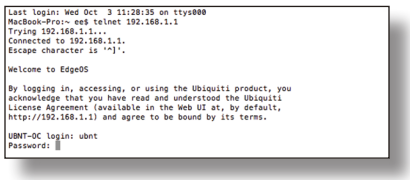
1. Open the telnet client on your computer.
2. At the prompt, enter:
   telnet <*hostname*>
   The default is *192.168.1.1* for the hostname. You can also enter a domain name instead of an IP address for the hostname.



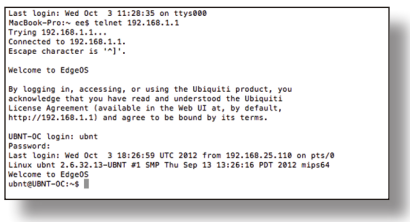
3. At the *login* prompt, enter the username (the default is *ubnt*).



4. At the *Password* prompt, enter the password (the default is *ubnt*).



5. For help with commands, you can either press the **?** key or enter **show** and press the **?** key.



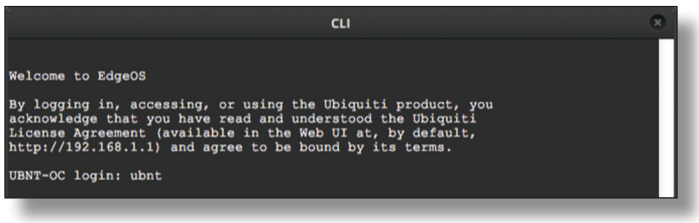
Note: To enhance security, we recommend that you change the default login using at least one of the following options:

- Set up a new user account (preferred option). For details, go to **"Remove the Default User Account" on page 42**.
- Change the default password of the *ubnt* login. Use the *set* command as detailed in **"Remove the Default User Account" on page 42**.

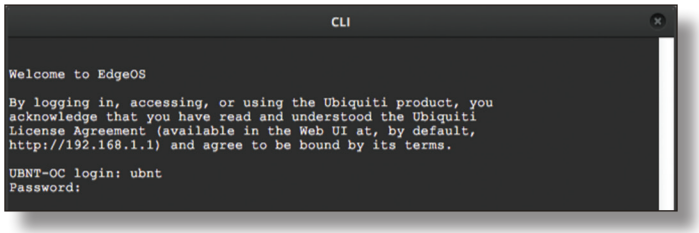
Access Using the EdgeOS Configuration Interface

Each tab of the EdgeOS interface contains CLI access.

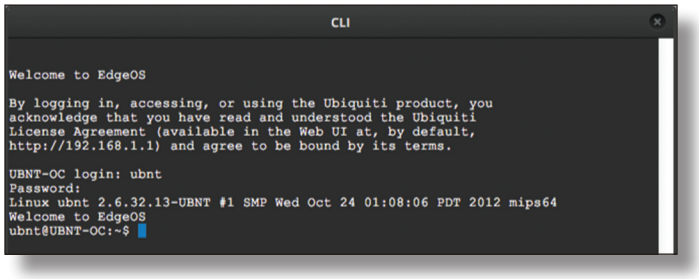
1. At the top right of the screen, click the **CLI** button.
2. The *CLI* window appears. At the *login* prompt, enter the username (the default is *ubnt*).



3. At the *Password* prompt, enter the password (the default is *ubnt*).



4. For help with commands, you can either press the **?** key or enter **show** and press the **?** key.



Note: To enhance security, we recommend that you change the default login using at least one of the following options:

- Set up a new user account (preferred option). For details, go to **"Remove the Default User Account" on page 42**.
- Change the default password of the *ubnt* login. Use the *set* command as detailed in **"Remove the Default User Account" on page 42**.

CLI Modes

Operational Mode

When you first log in, the CLI is in operational mode. Press the **?** key to view the available commands.

```
ubnt@ubnt:~$
```

Note: The question mark does not display onscreen.

```
add          delete          ping6     reset     terminal
clear        disconnect      reboot    restart   traceroute
configure    generate        release   set       traceroute6
connect      initial-setup   remove    show      undebug
copy         no              rename    shutdown
debug        ping            renew     telnet
```

Enter **show** and press the **?** key to view the settings that you have configured.

```
ubnt@ubnt:~$ show
```

```
arp             flow-accounting  nat           tech-support
bridge          hardware         ntp           ubnt
configuration   history          openvpn       users
date            host             pppoe-server  version
debugging       incoming         queueing      vpn
dhcp            interfaces       reboot        vrrp
dhcpv6          ip               route-map     webproxy
disk            ipv6             shutdown      zebra
dns             lldp             snmp
file            log              system
firewall        login            table
```

For example, type **show interfaces** to display the interfaces and their status information.

```
ubnt@ubnt:~$ show interfaces
Codes: S - State, L - Link, u - Up, D - Down,
A - Admin Down
Interface      IP Address          S/L      Description
---------      ----------          ---      -----------
eth0           -                   u/u
eth1           -                   u/D
eth2           -                   u/D
lo             127.0.0.1/8         u/u
```

To properly shut down the EdgeRouter, use the **shutdown** command.

```
ubnt@ubnt:~$ shutdown
```

WARNING: Use the **shutdown** command to properly shut down the EdgeRouter. An improper shutdown, such as disconnecting the EdgeRouter from its power supply, runs the risk of data corruption!

Configuration Mode

To switch to configuration mode, use the **configure** command.

```
ubnt@ubnt:~$ configure
[edit]
ubnt@ubnt#
```

For the *show*, *set*, and *delete* commands, you can press the **?** key for help.

- **set ?** View the available commands.
- **show ?** View the settings that you have configured. (Because configurations vary, the list you see will differ from the sample list displayed below.)
- **delete ?** View the settings that you can delete.

Enter **show** and press the **?** key.

```
ubnt@ubnt# show

firewall    interfaces    protocol    service    system
[edit]
```

To display the available command completions, press the **tab** key.

Note: The tab does not display onscreen.

```
ubnt@ubnt# show
Possible completions:

firewall                Firewall
interfaces              Network interfaces
protocols               Routing protocol parameters
service                 Services
system                  System parameters
```

The EdgeRouter uses three configurations:

- **Working** When you make changes to the working configuration, they are not applied until you commit the changes to the active configuration.
- **Active** When you commit changes to the active configuration, they are applied; however, the changes do not become part of the boot configuration until you save the changes to the boot configuration.
- **Boot** When the EdgeRouter reboots, it loads the boot configuration for use.

The following scenarios cover some of the most commonly used commands:

- Configure an Interface (see below)
- **"Remove the Default User Account" on page 42**
- **"Create a Firewall Rule" on page 42**
- **"Manage the Configuration File" on page 45**

Configure an Interface

To configure an interface, do the following:

- Assign an IP address and subnet mask
- Enter a description

Use the **set**, **compare**, **commit**, and **save** commands.

To configure an interface, use the **set** command.

```
ubnt@ubnt:~$ configure
[edit]
```

To view the possible completions for the eth0 address, enter **set interfaces ethernet eth0 address** and press the **?** key.

```
ubnt@ubnt# set interfaces ethernet eth0 address
Possible completions:

<x.x.x.x/x>          IP address and prefix length
<h:h:h:h:h:h:h:h/x>  IPv6 address and prefix length
dhcp                 Dynamic Host Configuration Protocol
dhcpv6               Dynamic Host Configuration Protocol
                     for IPv6
[edit]
ubnt@ubnt# set interfaces ethernet eth0 address
10.1.1.80/23
[edit]
ubnt@ubnt# set interfaces ethernet eth0 description
"production LAN"
```

These changes affect the working configuration, not the active configuration. To see what changes have been made to the working configuration, use the **compare** command:

```
ubnt@ubnt# compare
[edit interfaces ethernet eth0]
+address 10.1.1.2/24
+description "production LAN"
[edit]
```

To make the changes active, use the **commit** command:

```
ubnt@ubnt# commit
[edit]
```

If you reboot the EdgeRouter, the changes will be lost. To save these changes, use the **save** command to save the active configuration to the boot configuration.

```
ubnt@ubnt# save
Saving configuration to '/config/config.boot'...
Done
[edit]
ubnt@ubnt# exit
exit
ubnt@ubnt:~$
ubnt@ubnt:~$ show interfaces
Codes: S - State, L - Link, u - Up, D - Down,
A - Admin Down

Interface     IP Address          S/L    Description
---------     ----------          ---    -----------
eth0          10.1.1.80/23        u/u    production LAN
eth1          -                   u/D
eth2          -                   u/D
lo            127.0.0.1/8         u/u
              ::1/128
ubnt@ubnt:$ ping 10.1.0.1
PING 10.1.0.1 (10.1.0.1) 56(84) bytes of data.
64 bytes from 10.1.0.1: icmp_req=1 ttl=64 time=0.460 ms
64 bytes from 10.1.0.1: icmp_req=2 ttl=64 time=0.407 ms
^C
--- 10.1.0.1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time
999 ms
rtt min/avg/max/mdev = 0.407/0.433/0.460/0.033 ms
```

Remove the Default User Account

To remove the default user account, do the following:

- Create a new user
- Log out of the default user account
- Log in with the new user account
- Delete the default user account

Use the **set**, **commit**, **save**, **exit**, and **delete** commands.

```
ubnt@ubnt:~$ configure
[edit]
ubnt@ubnt:# set system login user admin1 authentication
plaintext-password admin1pass
[edit]
ubnt@ubnt:# commit
[edit]
ubnt@ubnt:# save
Saving configuration to '/config/config.boot'...
Done
[edit]
ubnt@ubnt:# exit
exit
ubnt@ubnt:~$ exit
logout

Welcome to Edge OS ubnt ttyS0

ubnt login: admin1
Password:
Linux ubnt 2.6.32.13-UBNT #1 SMP Fri Jun 8 09:48:31 PDT
2012 mips64
Welcome to EdgeOS
admin1@ubnt:~$ configure
[edit]
admin1@ubnt# delete system login user ubnt
[edit]
admin1@ubnt# commit
[edit]
admin1@ubnt# save
Saving configuration to '/config/config.boot'...
Done
[edit]
admin@ubnt# exit
exit
admin1@ubnt:~$
```

The plaintext password that you entered is converted to an encrypted password.

```
admin1@ubnt:~$ configure
[edit]
admin1@ubnt# show system login
user admin1 {
        authentication {
                encrypted-password
                $1$mv8ERQ1T$7xq/eUDwy/5And7nV.9r6.
                plaintext-password
                ""
        }
}
[edit]
admin1@ubnt# exit
exit
admin1@ubnt:~$
```

Create a Firewall Rule

To create a firewall rule, use the **set** or **edit** commands (both methods are described below). In addition, use the **compare**, **discard**, **up**, **top**, **copy**, and **rename** commands.

Create a firewall rule using the full syntax:

```
ubnt@ubnt:~$ configure
[edit]
ubnt@ubnt# set firewall name TEST default-action drop
[edit]
ubnt@ubnt# set firewall name TEST enable-default-log
[edit]
ubnt@ubnt# set firewall name TEST rule 10 description
"allow icmp"
[edit]
ubnt@ubnt# set firewall name TEST rule 10 action accept
[edit]
ubnt@ubnt# set firewall name TEST rule 10 protocol icmp
[edit]
```

To display uncommitted changes, use the **compare** command:

```
ubnt@ubnt# compare
[edit firewall]
+name TEST {
+       default-action drop
+       enable-default-log
+       rule 10 {
+               action accept
+               description "allow icmp"
+               protocol icmp
+       }
+}
[edit]
```

To undo uncommitted changes, use the **discard** command:

```
ubnt@ubnt# discard
Changes have been discarded
[edit]
ubnt@ubnt# compare
No changes between working and active configurations
[edit]
```

To create the same firewall rule while reducing the amount of repetition in the full syntax, use the **edit** command:

```
ubnt@ubnt# edit firewall name TEST
[edit firewall name TEST]
ubnt@ubnt#set default-action drop
[edit firewall name TEST]
ubnt@ubnt# set enable-default-log
[edit firewall name TEST]
ubnt@ubnt#edit rule 10
[edit firewall name TEST rule 10]
```

Press the **?** or **tab** key to display options for the specified edit level.

```
ubnt@ubnt# set
```

```
action        disable    ipsec   p2p        source   time
description   fragment   limit   protocol   state
destination   icmp       log     recent     tcp
[edit firewall name TEST rule 10]
ubnt@ubnt# set description “allow icmp”
[edit firewall name TEST rule 10]
ubnt@ubnt# set action accept
[edit firewall name TEST rule 10]
ubnt@ubnt# set protocol icmp
[edit firewall name TEST rule 10]
```

To show changes within the edit level, use the **compare** command:

```
ubnt@ubnt# compare
[edit firewall name TEST rule 10]
+action accept
+description “allow icmp”
+protocol icmp
[edit firewall name TEST rule 10]
```

To move up an edit level, use the **up** command:

```
ubnt@ubnt#up
[edit firewall name TEST]
ubnt@ubnt# compare
[edit firewall name TEST]
+default-action drop
+enable-default-log
+rule 10 {
+       action accept
+       description “allow icmp”
+       protocol icmp
+}
[edit firewall name TEST]
ubnt@ubnt# up
[edit firewall]
ubnt@ubnt# compare
[edit firewall]
+name TEST {
+       default-action drop
+       enable-default-log
+       rule 10 {
+               action accept
+               description “allow icmp”
+               protocol icmp
+       }
+}
[edit firewall]
```

To return to the top edit level, use the **top** command:

```
ubnt@ubnt# top
[edit]
ubnt@ubnt# compare
[edit firewall]
+name TEST{
+       default-action drop
+       enable-default-log
+       rule 10 {
+               action accept
+               description “allow icmp”
+               protocol icmp
+       }
+}
[edit]
```

To display the existing firewall rule, use the **show firewall** command:

```
ubnt@ubnt# show firewall
name WAN1_LOCAL {
        default-action drop
        rule 10 {
                action accept
                state {
                        established enable
                        related enable
                }
        }
        rule 20 {
                action drop
                state {
                        invalid enable
                }
        }
        rule 30 {
                action accept
                destination {
                        port 22
                }
                protocol tcp
        }
}
[edit]
```

To create a new firewall rule from an existing firewall rule, use the **copy** command.

```
ubnt@ubnt# edit firewall
[edit firewall]
ubnt@ubnt# copy name WAN1_LOCAL to name WAN2_LOCAL
[edit firewall]
ubnt@ubnt# commit
[edit firewall]
ubnt@ubnt#top
[edit]
ubnt@ubnt#show firewall
name WAN1_LOCAL {
        default-action drop
        rule 10 {
                action accept
                state {
                        established enable
                        related enable
                }
        }
        rule 20 {
                action drop
                state {
                        invalid enable
                }
        }
        rule 30 {
                action accept
                destination {
                        port 22
                }
                protocol tcp
        }
}
name WAN2_LOCAL {
        default-action drop
        rule 10 {
                action accept
                state {
                        established enable
                        related enable
                }
        }
        rule 20 {
                action drop
                state {
                        invalid enable
                }
        }
        rule 30 {
                action accept
                destination {
                        port 22
                }
                protocol tcp
        }
}
[edit]
```

To change the name of the new firewall rule, use the **rename** command.

```
ubnt@ubnt# edit firewall
[edit firewall]
ubnt@ubnt# rename name W[TAB]
WAN1_LOCAL      WAN2_LOCAL
[edit firewall]
ubnt@ubnt# rename name WAN2_LOCAL to name WAN2_IN
[edit firewall]
ubnt@ubnt# commit
[edit firewall]
ubnt@ubnt#top
[edit]
ubnt@ubnt# show firewall name
name WAN1_LOCAL {
        default-action drop
        rule 10 {
                action accept
                state {
                        established enable
                        related enable
                }
        }
        rule 20 {
                action drop
                state {
                        invalid enable
                }
        }
        rule 30 {
                action accept
                destination {
                        port 22
                }
                protocol tcp
        }
}
name WAN2_IN {
        default-action drop
        rule 10 {
                action accept
                state {
                        established enable
                        related enable
                }
        }
        rule 20 {
                action drop
                state {
                        invalid enable
                }
        }
        rule 30 {
                action accept
                destination {
                        port 22
                }
                protocol tcp
        }
}
[edit]
ubnt@ubnt#
```

Manage the Configuration File

Typically, you use the *save* command to save the active configuration to disk (*'config/config.boot'*); however, you can also save the active configuration to a different file or remote server.

Enter **save** and press the **?** key.

```
ubnt@RTR# save
Possible completions:
<Enter>                                  Save to system
                                         config file
<file>                                   Save to file on
                                         local machine
scp://<user>:<passwd>@<host>/<file>      Save to file on
                                         remote machine
ftp://<user>:<passwd>@<host>/<file>      Save to file on
                                         remote machine
tftp://<host>/<file>                     Save to file on
                                         remote machine
[edit]
ubnt@RTR# save tftp://10.1.0.15/rtr-config.boot
Saving configuration to
'tftp://10.1.0.15rtr-config.boot'...
############################################## 100.0%
Done
[edit]
```

Scenario: In the midst of the administrator changing an IPsec tunnel into an OpenVPN tunnel, the administrator had to revert the EdgeRouter to its previous configuration with the IPsec tunnel.

1. Before making changes, the administrator saved a backup configuration file with a working IPsec tunnel configuration:

```
ubnt@RTR# save config.boot-ipsec
Saving configuration to '/config/config.boot-ipsec'...
Done
[edit]
```

Note: This is a backup; if the EdgeRouter were rebooted, it would still boot from the default file: '*/config/config.boot*'

2. After the administrator deleted the IPsec configuration and was configuring of the OpenVPN tunnel, circumstances changed so that the IPsec tunnel was required again. Consequently, the administrator reverted the EdgeRouter to its previous configuration with the IPsec tunnel.

```
ubnt@RTR# load config.boot-ipsec
Loading configuration from
'/config/config.boot-ipsec'...

Load complete. Use 'commit' to make changes active.
[edit]
ubnt@RTR# commit
[edit]
ubnt@RTR# save; exit
Saving configuration to '/config/config.boot'...
Done
exit
ubnt@RTR:~$
```

To automatically make a remote backup after every commit, use the **commit-archive** configuration option, enter **location**, and press the **?** key.

```
ubnt@RTR# set system config-management commit-archive
location
Possible completions:
<url>    Uniform Resource Identifier
Detailed information:
        "scp://<user>:<passwd>@<host>/<dir>"
        "ftp://<user>:<passwd>@<host>/<dir>"
        "tftp://<host>/<dir>"
ubnt@RTR# set system config-management commit-archive
location tftp://10.1.0.15/RTR
[edit]
ubnt@RTR# commit
Archiving config...
        tftp://10.1.0.15/RTR    OK
[edit]
```

On the remote tftp server, a copy with the hostname and date is saved for each commit.

```
admin2@server://tftpboot/RTR$ ls -l
total   8
-rw------- 1 nobody nogroup 908 Aug 17 17:19
        config.boot-RTR.20120817_171932
-rw------- 1 nobody nogroup 874 Aug 17 17:20
        config.boot-RTR.20120818_002046
```

You can also keep a specified number of revisions of the configuration file on the local disk. Use the **commit-revisions** configuration option.

```
ubnt@RTR# set system config-management commit-revisions
50
[edit]
ubnt@RTR# commit
[edit]
```

Here is an example that uses the *commit-revisions* command:

```
ubnt@RTR# set system login user joe authentication
plaintext-password secret
[edit]
ubnt@RTR# commit
[edit]
ubnt@RTR# save; exit
Saving configuration to '/config/config.boot'...
Done
exit

ubnt@RTR:~$ show system commit

0        2012-08-17 18:32:13 by ubnt via cli commit
1        2012-08-17 18:31:52 by ubnt via cli commit
2        2012-08-17 18:31:51 by root via init commit
```

Note: The following commands require that the configuration option, *commit-revisions*, be set first.

```
show system commit diff      commit-confirm
show system commit file      confirm
show system commit           rollback
commit comment
```

For details on the *commit-revisions* option, go to **"Manage the Configuration File" on page 45**.

To display the changes in revision 0, use the **show system commit diff** command.

```
ubnt@RTR:~$ show system commit diff 0
[edit system login]
+user joe       {
+       authentication {
+               encrypted-password
                $1$CWVzYggs$NyJXxC3S572rfm6pY8ZMO.
+               plaintext-password ""
+       }
+       level admin
+}
```

To display the entire configuration file for revision 0, use the **show system commit file** command.

```
ubnt@RTR:~$ show system commit file 0
```

To add a comment to the commit, use the **comment** command.

```
ubnt@RTR# set system login user joe level operator
[edit]
ubnt@RTR# commit comment "change joe from admin to op"
[edit]
ubnt@RTR# save; exit
Saving configuration to '/config/config.boot'...
Done
exit
```

Now you will see the comment when you use the **show system commit** command.

```
ubnt@RTR:~$ show system commit

0       2012-08-17 18:44:41 by ubnt via cli change joe
        from admin to op
1       2012-08-17 18:34:01 by ubnt via cli commit
2       2012-08-17 18:32:13 by ubnt via cli commit
3       2012-08-17 18:31:52 by ubnt via cli commit
4       2012-08-17 18:31:51 by root via init commit
```

When you work on a remote router, certain changes, such as a firewall or NAT rule, can cut off access to the remote router, so you then have to visit the remote router and reboot it. To avoid such issues when you make risky changes, use the **commit-confirm** command first. Then use the **confirm** command to save your changes.

```
ubnt@RTR:~$ configure
[edit]
ubnt@RTR# set firewall name WAN_IN rule 50 action drop
[edit]
ubnt@RTR# set firewall name WAN_IN rule 50 destination
address 172.16.0.0/16
[edit]
ubnt@RTR# commit-confirm
commit confirm will be automatically reboot in
10 minutes unless confirmed
Proceed? [confirm][y]
[edit]
```

After you verify that the changes should be saved, use the **confirm** command.

```
ubnt@RTR# confirm
[edit]
```

You can also specify the number of minutes to wait, but you must remember to also use the **confirm** command. Otherwise, if you forget, then you can be surprised by the EdgeRouter's reboot to its previous configuration.

```
ubnt@RTR# commit-confirm 1
commit confirm will be automatically reboot in 1 minutes
unless confirmed
Proceed? [confirm][y]
[edit]
ubnt@RTR#
Broadcast message from root@RTR (Mon Aug 20 14:00:06
2012):

The system is going down for reboot NOW!
INIT: Switching to runlevel: 6
INIT: Stopping routing services...zebra...done.
Removing all Quagga Routes.
[SNIP]
```

To roll back to an earlier commit, use the **show system commit** and **rollback** commands.

```
ubnt@RTR:~$ show system commit

0       2012-08-21 14:46:41 by admin_5 via cli
        fix bgp policy maps
1       2012-08-21 14:45:59 by admin_5 via cli
        commit
2       2012-08-21 14:45:33 by admin_5 via cli
        fix port forwarding
3       2012-08-21 14:45:15 by admin_5 via cli
        fix firewall
4       2012-08-21 14:44:29 by ubnt via cli
        commit
5       2012-08-21 14:21:15 by ubnt via cli
        add port forward for port 2222 to build-server
6       2012-08-21 14:20:24 by ubnt via cli
        add dmz interface to eth2
7       2012-08-21 14:19:53 by ubnt via cli
        add ipsec tunnel to office_exchange
8       2012-08-21 14:07:18 by ubnt via cli
        add firewall for WAN_IN
9       2012-08-21 14:06:37 by ubnt via cli
        add user first_last
10      2012-08-21 14:04:47 by ubnt via cli
        commit
11      2012-08-21 14:04:46 by root via init
        commit
```

After viewing the history of system commits, you decide to discard the last four commits by *admin_5*. Roll back the system configuration file to commit 4:

```
ubnt@RTR# rollback 4
Proceed with reboot? [confirm] [y]

Broadcast message from root@RTR (ttyS0) (Mon Aug 21
15:09:12 2012):

The system is going down for reboot NOW!
```

Appendix B: Specifications

EdgeRouter Lite	
Dimensions	197.52 x 91 x 28 mm
Weight	289.2 g
Power Input	12VDC, 1A Power Adapter (Included) 9 to 24V (Supported Voltage Range)
Button	Reset
Processor	Dual-Core 500 MHz, MIPS64 with Hardware Acceleration for Packet Processing
System Memory	512 MB DDR2 RAM
Onboard Flash Storage	2 GB
Certifications	CE, FCC, IC
Wall-Mount	Yes
Operating Temperature	-10 to 45°C
Operating Humidity	90% Non-Condensing
Layer 3 Forwarding Performance	
Packet Size: 64 Bytes	1,000,000 pps
Packet Size: 512 Bytes or Larger	3 Gbps (Line Rate)
LEDs Per Port	
Serial Console Port	Power
Data Ports	Speed/Link/Activity
Networking Interfaces	
Serial Console Port	(1) RJ45 Serial Port
Data Ports	(3) 10/100/1000 Ethernet Ports

EdgeOS	
Interface/Encapsulation	Ethernet 802.1q VLAN PPPoE GRE IP in IP Bridging Bonding (802.3ad)
Addressing	Static IPv4/IPv6 Addressing DHCP/DHCPv6
Routing	Static Routes OSPF/OSPFv3 RIP/RIPng BGP (with IPv6 Support) IGMP Proxy
Security	ACL-Based Firewall Zone-Based Firewall NAT
VPN	IPSec Site-to-Site and Remote Access OpenVPN Site-to-Site and Remote Access PPTP Remote Access L2TP Remote Access PPTP Client
Services	DHCP/DHCPv6 Server DHCP/DHCPv6 Relay Dynamic DNS DNS Forwarding VRRP RADIUS Client Web Caching PPPoE Server
QoS	FIFO Stochastic Fairness Queueing Random Early Detection Token Bucket Filter Deficit Round Robin Hierarchical Token Bucket Ingress Policing
Management	Web UI CLI (Console, SSH, Telnet) SNMP NetFlow LLDP NTP UBNT Discovery Protocol Logging

Appendix C: Safety Notices

1. Read, follow, and keep these instructions.
2. Heed all warnings.
3. Only use attachments/accessories specified by the manufacturer.

WARNING: Do not use this product in location that can be submerged by water.

WARNING: Avoid using this product during an electrical storm. There may be a remote risk of electric shock from lightning.

Electrical Safety Information

1. Compliance is required with respect to voltage, frequency, and current requirements indicated on the manufacturer's label. Connection to a different power source than those specified may result in improper operation, damage to the equipment or pose a fire hazard if the limitations are not followed.
2. There are no operator serviceable parts inside this equipment. Service should be provided only by a qualified service technician.
3. This equipment is provided with a detachable power cord which has an integral safety ground wire intended for connection to a grounded safety outlet.
   a. Do not substitute the power cord with one that is not the provided approved type. Never use an adapter plug to connect to a 2-wire outlet as this will defeat the continuity of the grounding wire.
   b. The equipment requires the use of the ground wire as a part of the safety certification, modification or misuse can provide a shock hazard that can result in serious injury or death.
   c. Contact a qualified electrician or the manufacturer if there are questions about the installation prior to connecting the equipment.
   d. Protective earthing is provided by Listed AC adapter. Building installation shall provide appropriate short-circuit backup protection.
   e. Protective bonding must be installed in accordance with local national wiring rules and regulations.

Appendix D: Warranty

Limited Warranty

UBIQUITI NETWORKS, Inc ("UBIQUITI NETWORKS") warrants that the product(s) furnished hereunder (the "Product(s)") shall be free from defects in material and workmanship for a period of one (1) year from the date of shipment by UBIQUITI NETWORKS under normal use and operation. UBIQUITI NETWORKS' sole and exclusive obligation and liability under the foregoing warranty shall be for UBIQUITI NETWORKS, at its discretion, to repair or replace any Product that fails to conform to the above warranty during the above warranty period. The expense of removal and reinstallation of any Product is not included in this warranty. The warranty period of any repaired or replaced Product shall not extend beyond its original term.

Warranty Conditions

The above warranty does not apply if the Product:

(I) has been modified and/or altered, or an addition made thereto, except by Ubiquiti Networks, or Ubiquiti Networks' authorized representatives, or as approved by Ubiquiti Networks in writing;

(II) has been painted, rebranded or physically modified in any way;

(III) has been damaged due to errors or defects in cabling;

(IV) has been subjected to misuse, abuse, negligence, abnormal physical, electromagnetic or electrical stress, including lightning strikes, or accident;

(V) has been damaged or impaired as a result of using third party firmware; or

(VI) has no original Ubiquiti MAC label, or is missing any other original Ubiquiti label(s).

In addition, the above warranty shall apply only if: the product has been properly installed and used at all times in accordance, and in all material respects, with the applicable Product documentation; all Ethernet cabling runs use CAT5 (or above), and for outdoor installations, shielded Ethernet cabling is used, and for indoor installations, indoor cabling requirements are followed.

Returns

No Products will be accepted for replacement or repair without obtaining a Return Materials Authorization (RMA) number from UBIQUITI NETWORKS during the warranty period, and the Products being received at UBIQUITI NETWORKS' facility freight prepaid in accordance with the RMA process of UBIQUITI NETWORKS. Products returned without an RMA number will not be processed and will be returned freight collect or subject to disposal. Information on the RMA process and obtaining an RMA number can be found at: **www.ubnt.com/support/warranty**.

Disclaimer

EXCEPT FOR ANY EXPRESS WARRANTIES PROVIDED HEREIN, UBIQUITI NETWORKS, ITS AFFILIATES, AND ITS AND THEIR THIRD PARTY DATA, SERVICE, SOFTWARE AND HARDWARE PROVIDERS HEREBY DISCLAIM AND MAKE NO OTHER REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS, IMPLIED OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, REPRESENTATIONS, GUARANTEES, OR WARRANTIES OF MERCHANTABILITY, ACCURACY, QUALITY OF SERVICE OR RESULTS, AVAILABILITY, SATISFACTORY QUALITY, LACK OF VIRUSES, QUIET ENJOYMENT, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT AND ANY WARRANTIES ARISING FROM ANY COURSE OF DEALING, USAGE OR TRADE PRACTICE IN CONNECTION WITH SUCH PRODUCTS AND SERVICES. BUYER ACKNOWLEDGES THAT NEITHER UBIQUITI NETWORKS NOR ITS THIRD PARTY PROVIDERS CONTROL BUYER'S EQUIPMENT OR THE TRANSFER OF DATA OVER COMMUNICATIONS FACILITIES, INCLUDING THE INTERNET, AND THAT THE PRODUCTS AND SERVICES MAY BE SUBJECT TO LIMITATIONS, INTERRUPTIONS, DELAYS, CANCELLATIONS AND OTHER PROBLEMS INHERENT IN THE USE OF COMMUNICATIONS FACILITIES. UBIQUITI NETWORKS, ITS AFFILIATES AND ITS AND THEIR THIRD PARTY PROVIDERS ARE NOT RESPONSIBLE FOR ANY INTERRUPTIONS, DELAYS, CANCELLATIONS, DELIVERY FAILURES, DATA LOSS, CONTENT CORRUPTION, PACKET LOSS, OR OTHER DAMAGE RESULTING FROM ANY OF THE FOREGOING. In addition, UBIQUITI NETWORKS does not warrant that the operation of the Products will be error-free or that operation will be uninterrupted. In no event shall UBIQUITI NETWORKS be responsible for damages or claims of any nature or description relating to system performance, including coverage, buyer's selection of products (including the Products) for buyer's application and/or failure of products (including the Products) to meet government or regulatory requirements.

Limitation of Liability

EXCEPT TO THE EXTENT PROHIBITED BY LOCAL LAW, IN NO EVENT WILL UBIQUITI OR ITS SUBSIDIARIES, AFFILIATES OR SUPPLIERS BE LIABLE FOR DIRECT, SPECIAL, INCIDENTAL, CONSEQUENTIAL OR OTHER DAMAGES (INCLUDING LOST PROFIT, LOST DATA, OR DOWNTIME COSTS), ARISING OUT OF THE USE, INABILITY TO USE, OR THE RESULTS OF USE OF THE PRODUCT, WHETHER BASED IN WARRANTY, CONTRACT, TORT OR OTHER LEGAL THEORY, AND WHETHER OR NOT ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Note

Some countries, states and provinces do not allow exclusions of implied warranties or conditions, so the above exclusion may not apply to you. You may have other rights that vary from country to country, state to state, or province to province. Some countries, states and provinces do not allow the exclusion or limitation of liability for incidental or consequential damages, so the above limitation may not apply to you. EXCEPT TO THE EXTENT ALLOWED BY LOCAL LAW, THESE WARRANTY TERMS DO NOT EXCLUDE, RESTRICT OR MODIFY, AND ARE IN ADDITION TO, THE MANDATORY STATUTORY RIGHTS APPLICABLE TO THE LICENSE OF ANY SOFTWARE (EMBEDDED IN THE PRODUCT) TO YOU. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to any transactions regarding the sale of the Products.

Appendix E: Compliance Information

FCC

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the 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.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operations of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Industry Canada

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est confrome à la norme NMB-003 Canada.

Australia and New Zealand

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

Japan VCCI-A

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

CE Marking

CE marking on this product represents the product is in compliance with all directives that are applicable to it.

RoHS/WEEE Compliance Statement

English

European Directive 2002/96/EC requires that the equipment bearing this symbol on the product and/or its packaging must not be disposed of with unsorted municipal waste. The symbol indicates that this product should be disposed of separately from regular household waste streams. It is your responsibility to dispose of this and other electric and electronic equipment via designated collection facilities appointed by the government or local authorities. Correct disposal and recycling will help prevent potential negative consequences to the environment and human health. For more detailed information about the disposal of your old equipment, please contact your local authorities, waste disposal service, or the shop where you purchased the product.

Deutsch

Die Europäische Richtlinie 2002/96/EC verlangt, dass technische Ausrüstung, die direkt am Gerät und/oder an der Verpackung mit diesem Symbol versehen ist , nicht zusammen mit unsortiertem Gemeindeabfall entsorgt werden darf. Das Symbol weist darauf hin, dass das Produkt von regulärem Haushaltmüll getrennt entsorgt werden sollte. Es liegt in Ihrer Verantwortung, dieses Gerät und andere elektrische und elektronische Geräte über die dafür zuständigen und von der Regierung oder örtlichen Behörden dazu bestimmten Sammelstellen zu entsorgen. Ordnungsgemäßes Entsorgen und Recyceln trägt dazu bei, potentielle negative Folgen für Umwelt und die menschliche Gesundheit zu vermeiden. Wenn Sie weitere Informationen zur Entsorgung Ihrer Altgeräte benötigen, wenden Sie sich bitte an die örtlichen Behörden oder städtischen Entsorgungsdienste oder an den Händler, bei dem Sie das Produkt erworben haben.

Español

La Directiva 2002/96/CE de la UE exige que los equipos que lleven este símbolo en el propio aparato y/o en su embalaje no deben eliminarse junto con otros residuos urbanos no seleccionados. El símbolo indica que el producto en cuestión debe separarse de los residuos domésticos convencionales con vistas a su eliminación. Es responsabilidad suya desechar este y cualesquiera otros aparatos eléctricos y electrónicos a través de los puntos de recogida que ponen a su disposición el gobierno y las autoridades locales. Al desechar y reciclar correctamente estos aparatos estará contribuyendo a evitar posibles consecuencias negativas para el medio ambiente y la salud de las personas. Si desea obtener información más detallada sobre la eliminación segura de su aparato usado, consulte a las autoridades locales, al servicio de recogida y eliminación de residuos de su zona o pregunte en la tienda donde adquirió el producto.

Français

La directive européenne 2002/96/CE exige que l'équipement sur lequel est apposé ce symbole sur le produit et/ou son emballage ne soit pas jeté avec les autres ordures ménagères. Ce symbole indique que le produit doit être éliminé dans un circuit distinct de celui pour les déchets des ménages. Il est de votre responsabilité de jeter ce matériel ainsi que tout autre matériel électrique ou électronique par les moyens de collecte indiqués par le gouvernement et les pouvoirs publics des collectivités territoriales. L'élimination et le recyclage en bonne et due forme ont pour but de lutter contre l'impact néfaste potentiel de ce type de produits sur l'environnement et la santé publique. Pour plus d'informations sur le mode d'élimination de votre ancien équipement, veuillez prendre contact avec les pouvoirs publics locaux, le service de traitement des déchets, ou l'endroit où vous avez acheté le produit.

Italiano

La direttiva europea 2002/96/EC richiede che le apparecchiature contrassegnate con questo simbolo sul prodotto e/o sull'imballaggio non siano smaltite insieme ai rifiuti urbani non differenziati. Il simbolo indica che questo prodotto non deve essere smaltito insieme ai normali rifiuti domestici. È responsabilità del proprietario smaltire sia questi prodotti sia le altre apparecchiature elettriche ed elettroniche mediante le specifiche strutture di raccolta indicate dal governo o dagli enti pubblici locali. Il corretto smaltimento ed il riciclaggio aiuteranno a prevenire conseguenze potenzialmente negative per l'ambiente e per la salute dell'essere umano. Per ricevere informazioni più dettagliate circa lo smaltimento delle vecchie apparecchiature in Vostro possesso, Vi invitiamo a contattare gli enti pubblici di competenza, il servizio di smaltimento rifiuti o il negozio nel quale avete acquistato il prodotto.

Appendix F: Declaration of Conformity

Česky [Czech]	UBIQUITI NETWORKS tímto prohla uje, e tento UBIQUITI NETWORKS device, je ve shod se základními po adavky a dal ími p íslu n mi ustanoveními sm rnice 1999/5/ES.
Dansk [Danish]	Undertegnede UBIQUITI NETWORKS erklærer herved, at følgende udstyr UBIQUITI NETWORKS device, overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.
Nederlands [Dutch]	Hierbij verklaart UBIQUITI NETWORKS dat het toestel UBIQUITI NETWORKS device, in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG. Bij deze verklaart UBIQUITI NETWORKS dat deze UBIQUITI NETWORKS device, voldoet aan de essentiële eisen en aan de overige relevante bepalingen van Richtlijn 1999/5/EC.
English	Hereby, UBIQUITI NETWORKS, declares that this UBIQUITI NETWORKS device, is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.
Eesti [Estonian]	Käesolevaga kinnitab UBIQUITI NETWORKS seadme UBIQUITI NETWORKS device, vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.
Suomi [Finnish]	UBIQUITI NETWORKS vakuuttaa täten että UBIQUITI NETWORKS device, tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
Français [French]	Par la présente UBIQUITI NETWORKS déclare que l'appareil UBIQUITI NETWORKS, device est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE. Par la présente, UBIQUITI NETWORKS déclare que ce UBIQUITI NETWORKS device, est conforme aux exigences essentielles et aux autres dispositions de la directive 1999/5/CE qui lui sont applicables.
Deutsch [German]	Hiermit erklärt UBIQUITI NETWORKS, dass sich diese UBIQUITI NETWORKS device, in Übereinstimmung mit den grundlegenden Anforderungen und den anderen relevanten Vorschriften der Richtlinie 1999/5/EG befindet". (BMWi) Hiermit erklärt UBIQUITI NETWORKS die Übereinstimmung des Gerätes UBIQUITI NETWORKS device, mit den grundlegenden Anforderungen und den anderen relevanten Festlegungen der Richtlinie 1999/5/EG. (Wien)
Ελληνική [Greek]	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ UBIQUITI NETWORKS ΔΗΛΩΝΕΙ ΟΤΙ UBIQUITI NETWORKS device, ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1995/5/ΕΚ.
Magyar [Hungarian]	Alulírott, UBIQUITI NETWORKS nyilatkozom, hogy a UBIQUITI NETWORKS device, megfelel a vonatkozó alapvetõ követelményeknek és az 1999/5/EC irányelv egyéb elõírásainak.
Íslenska [Icelandic]	Hér me l sir UBIQUITI NETWORKS yfir ví a UBIQUITI NETWORKS device, er í samræmi vi grunnkröfur og a rar kröfur, sem ger ar eru í tilskipun 1999/5/EC.
Italiano [Italian]	Con la presente UBIQUITI NETWORKS dichiara che questo UBIQUITI NETWORKS device, è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.
Latviski [Latvian]	Ar o UBIQUITI NETWORKS deklar , ka UBIQUITI NETWORKS device, atbilst Direkt vas 1999/5/EK b tiskaj m pras b m un citiem ar to saist tajiem noteikumiem.
Lietuviškai [Lithuanian]	UBIQUITI NETWORKS deklaruoja, kad šis UBIQUITI NETWORKS įrenginys atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.
Malti [Maltese]	Hawnhekk, UBIQUITI NETWORKS, jiddikjara li dan UBIQUITI NETWORKS device, jikkonforma mal- ti ijiet essenzjali u ma provvedimenti o rajn relevanti li hemm fid-Dirrettiva 1999/5/EC.
Norsk [Norwegian]	UBIQUITI NETWORKS erklærer herved at utstyret UBIQUITI NETWORKS device, er i samsvar med de grunnleggende krav og øvrige relevante krav i direktiv 1999/5/EF.
Slovensky [Slovak]	UBIQUITI NETWORKS t mto vyhlasuje, e UBIQUITI NETWORKS device, sp a základné po iadavky a v etky príslu né ustanovenia Smernice 1999/5/ES.
Svenska [Swedish]	Härmed intygar UBIQUITI NETWORKS att denna UBIQUITI NETWORKS device, står I överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.
Español [Spanish]	Por medio de la presente UBIQUITI NETWORKS declara que el UBIQUITI NETWORKS device, cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.
Polski [Polish]	Niniejszym, firma UBIQUITI NETWORKS o wiadcza, e produkt serii UBIQUITI NETWORKS device, spełnia zasadnicze wymagania i inne istotne postanowienia Dyrektywy 1999/5/EC.
Português [Portuguese]	UBIQUITI NETWORKS declara que este UBIQUITI NETWORKS device, está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.
Română [Romanian]	Prin prezenta, UBIQUITI NETWORKS declară că acest dispozitiv UBIQUITI NETWORKS este în conformitate cu cerinţele esenţiale şi alte prevederi relevante ale Directivei 1999/5/CE.

Appendix G: Contact Information

Ubiquiti Networks Support

Ubiquiti Support Engineers are located around the world and are dedicated to helping customers resolve software, hardware compatibility, or field issues as quickly as possible. We strive to respond to support inquiries within a 24-hour period.

Online Resources

Support: **support.ubnt.com**

Wiki Page: **wiki.ubnt.com**

Support Forum: **forum.ubnt.com**

Downloads: **downloads.ubnt.com**

2580 Orchard Parkway
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