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# USER GUIDE

## **WiMAX 802.16E INDOOR CPE** RG211-2.3/2.5/3.5/3.8G

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## **RG211-2.3/2.5/3.5/3.8G**

*WiMAX IEEE 802.16e Indoor CPE*

# COMPLIANCES

## FEDERAL COMMUNICATION COMMISSION INTERFERENCE STATEMENT

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

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

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

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

## IMPORTANT NOTE: FCC RADIATION EXPOSURE STATEMENT

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

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Due to the essential high output power natural of WiMAX device, use of this device with other transmitter at the same time may exceed the FCC RF exposure limit and such usage must be prohibited (unless such co-transmission has been approved by FCC in the future).

**EC CONFORMANCE DECLARATION** Marking by the above symbol indicates compliance with the Essential Requirements of the R&TTE Directive of the European Union (1999/5/EC). This equipment meets the following conformance standards:

EN 60950-1 (IEC 60950-1) - Product Safety

EN 301 489-1, EN 301 489-4 - EMC requirements for radio equipment

EN 302 326-1-2-3

EN 50385 - Country specific SAR requirements

This device is intended for use in all European Community countries.

# ABOUT THIS GUIDE

**PURPOSE** This guide gives specific information on how to install the WiMAX Indoor CPE (Consumer Premise Equipment, from herein CPE) and its physical and performance related characteristics. It also gives information on how to operate and use the management functions of the CPE.

**AUDIENCE** This guide is intended for use by network administrators who are responsible for installing, operating, and maintaining network equipment; consequently, it assumes a basic working knowledge of LANs (Local Area Networks), the Internet Protocol (IP), and Simple Network Management Protocol (SNMP).

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



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

---



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

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

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**RELATED PUBLICATIONS** As part of the CPE's software, there is an online web-based help that describes all management related features.

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

**SEPTEMBER 2009 REVISION**

This is the first revision of this guide. It is valid for software version 0.06.01.

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# SECTION I

## GETTING STARTED

This section provides an overview of the WiMAX CPE, and introduces some basic concepts about wireless networking. It also describes the basic settings required to access the management interface.

This section includes these chapters:

- ◆ [“Introduction” on page 13](#)
- ◆ [“Installing the RG211” on page 22](#)
- ◆ [“Initial Configuration” on page 26](#)

The RG211 CPE is an indoor WiMAX IEEE 802.16e CPE, that is either 2.3 GHz, 2.5 GHz, 3.5 GHz, or 3.8 GHz, high capacity gateways and WiMAX Wireless Broadband Access subscriber stations, for a home or small office. Which CPE you use depends on the frequency band of your service provider's WiMAX service. Each system provides network connections that are always on, supporting immediate access to the Internet and other IP services at high data rates. The unit provides a gateway function between a WiMAX service provider and a local Ethernet LAN. The device enables a service provider to deliver last mile broadband wireless access as an alternative to wired DSL or cable modems.

Part of an extended and field-proven product portfolio, RG211 CPE is an integral part of the RG211 family, the latest most technologically advanced wireless solution for broadband deployment. With capacity of up to 20 Mbps download and 5 Mbps upload speed per unit, the RG211 CPE solution enables the delivery of powerful wireless broadband services to the subscriber. RG211 CPE is an out-of-the-box solution with immediate available local stock enabling virtually instant network expansion and simplified deployment. RG211 CPE provides a wireless solution for the subscriber to connect to the internet.

With a range of up to 5 Km and lower equipment and deployment costs, RG211 CPE enables service providers to wirelessly extend their services to customers in areas where the cost of cabling is prohibitive to deployment. Remote residential areas can now benefit from high-speed wireless Internet access, Web browsing and e-mail, and advanced applications such as multi-media services.

The RG211 is a plug-and-play device that provides a network interface through an RJ-45 Ethernet switch port, as well as two RJ-11 Voice over IP (VoIP) phone ports for telecommunications.

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## KEY HARDWARE FEATURES

The following table describes the main hardware features of the CPEs.

**Table 1: Key Hardware Features**

| Frequency Band | Model Number         | Description   |
|----------------|----------------------|---|
| 2.3            | RG211-2.3            | TBC   |
| 2.5            | RG211-2.5G-4D2V-2T2R | Four 10/100-BASE-TX RJ-45 LAN ports, and two RJ-11 phone ports. |

**Table 1: Key Hardware Features (Continued)**

| Frequency Band | Model Number    | Description   |
|----------------|-----------------|---|
| 3.5            | RG211-3.5G-1D1V | One 10/100-BASE-TX RJ45 LAN port, and one RJ-11 phone port. |
| 3.8            | RG211-3.8       | TBC   |

The RG211 CPE offers a user-friendly web-based management interface for the configuration of all the unit's features. Any PC directly attached to the unit can access the management interface using a web browser, such as Internet Explorer (version 6.0 or above) or Firefox (version 1.5 or above).

The initial configuration steps can be made through the web browser interface using the Setup Wizard. It is recommended to make the initial changes by connecting a PC directly to one of the RG211's LAN ports.

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## PACKAGE CONTENTS

The RG211 package includes:

- ◆ WiMAX RG211 unit with integrated antennas
- ◆ RJ-45 cable
- ◆ AC power adapter
- ◆ Four rubber feet
- ◆ User Guide CD

Inform your dealer if there are any incorrect, missing or damaged parts. If possible, retain the carton, including the original packing materials. Use them again to repack the product in case there is a need to return it.

**HARDWARE DESCRIPTION**

**Figure 1: Top Panel**

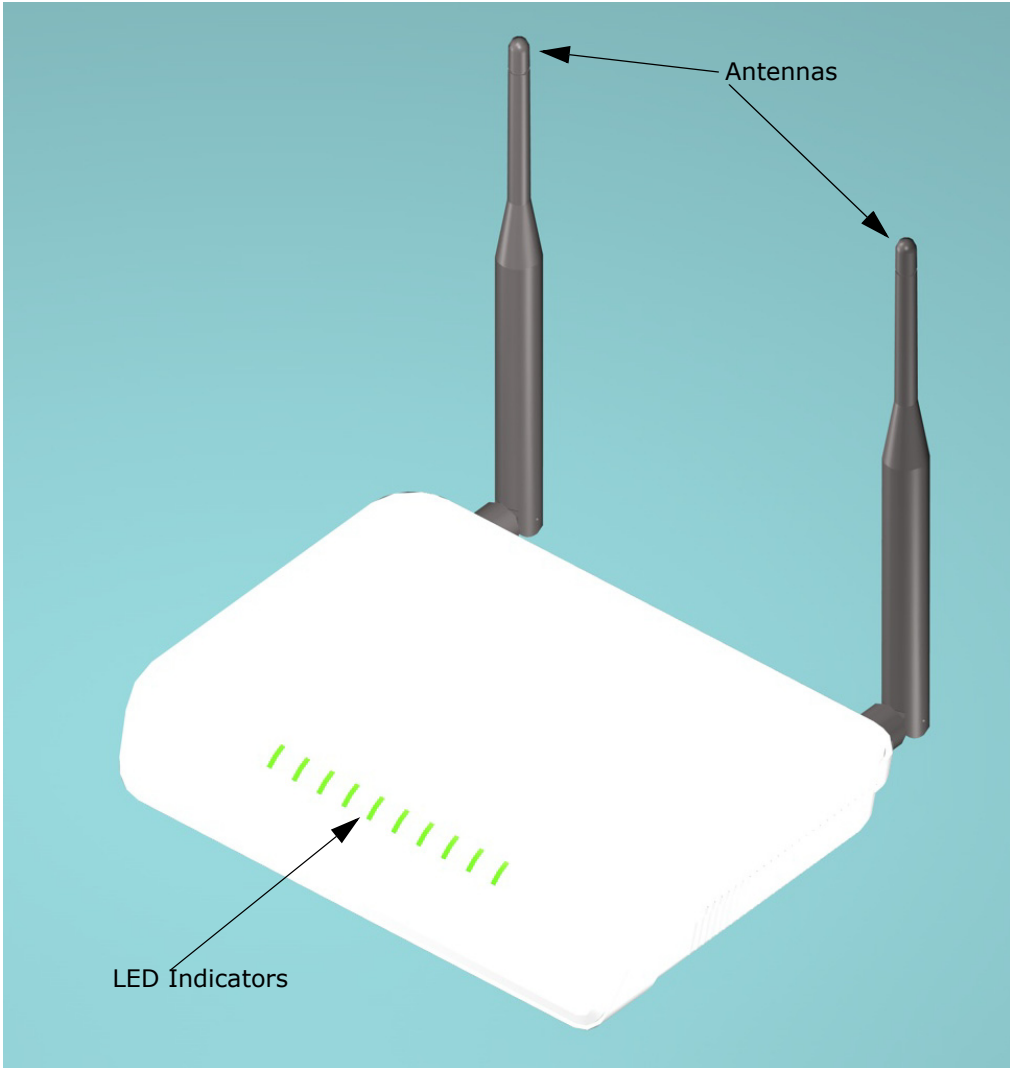
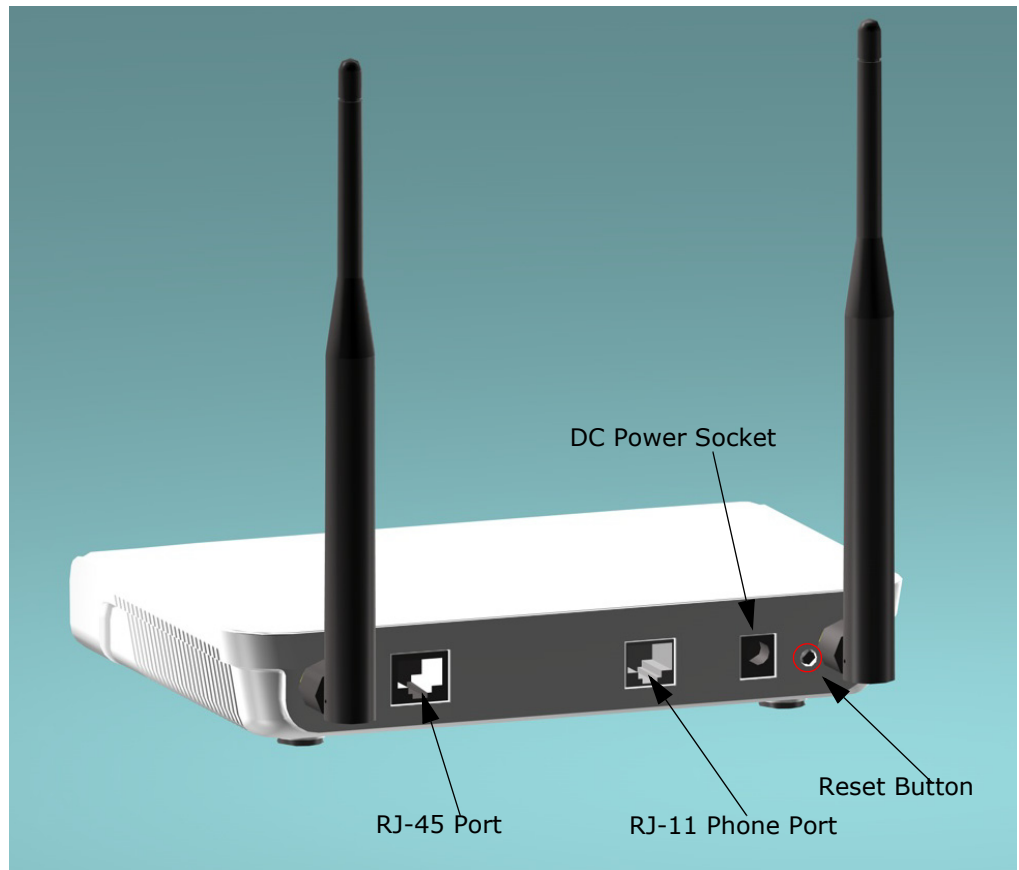
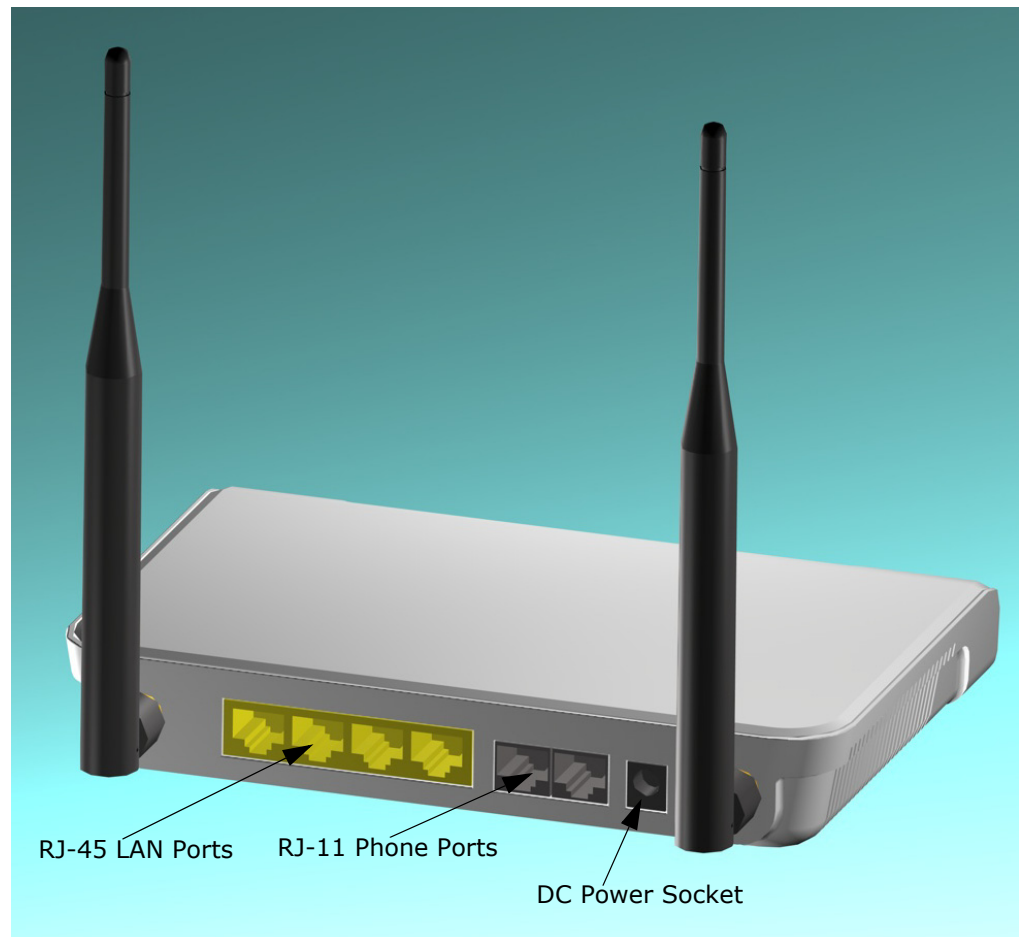


Figure 2: Rear Panel - RG211 3G





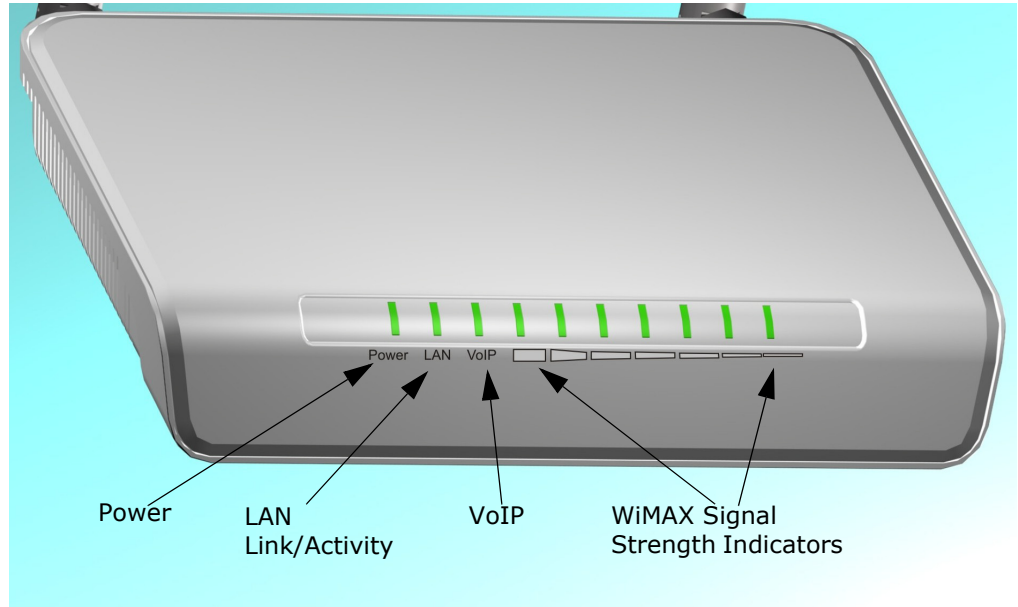
**Figure 3: Rear Panel - RG211 2.5G**



**ANTENNAS** Two omnidirectional antennas are included with the RG211 for WiMAX communications. The omnidirectional antennas transmit and receive signals in all directions equally.

**LED INDICATORS** The RG211 includes an array of status LED indicators, as described in the following figure and table.

**Figure 4: LEDs**



**Table 2: LED Behavior**

| LED                         | Status               | Description  |
|-----------------------------|----------------------|--|
| Power                       | Off                  | The AP has no power.   |
|                             | Yellow               | The AP is receiving power.   |
| LAN                         | Off                  | Ethernet RJ-45 has no valid link.  |
|                             | Blue                 | Ethernet RJ-45 has a 1000 Mbps link. Blinking indicates network activity.      |
|                             | Green                | Ethernet RJ-45 has a 100 Mbps link. Blinking indicates network activity.       |
| VoIP                        | Amber                | Ethernet RJ-45 has a 10 Mbps link. Blinking indicates network activity.        |
|                             | Off                  | The VoIP function is disabled.   |
| WiMAX Signal Strength (1~7) | Green                | The VoIP function is enabled.  |
|                             | All Illuminated      | The unit is receiving a full WiMAX signal from a transmitting base station.    |
|                             | Partial Illumination | The unit is receiving a reduced WiMAX signal from a transmitting base station. |
|                             | Single Illumination  | The unit is receiving a low WiMAX signal from a transmitting base station.     |

**ETHERNET PORTS** The unit has one to four 10/100-BASE-TX RJ-45 ports (depending on model) that can be attached directly to 10BASE-T/100BASE-TX LAN segment.

This port supports automatic MDI/MDI-X operation, so you can use straight-through cables for all network connections to PCs, switches, or hubs.

The unit appears as an Ethernet node and performs a bridging function by moving packets from the wired LAN to remote workstations on the wireless infrastructure.

**VOIP PHONE PORTS** The RG211 provides a maximum of two RJ-11 telephone ports that connect directly to a standard (analog) telephone set. This allows a regular telephone to be used for making VoIP calls over the Internet.

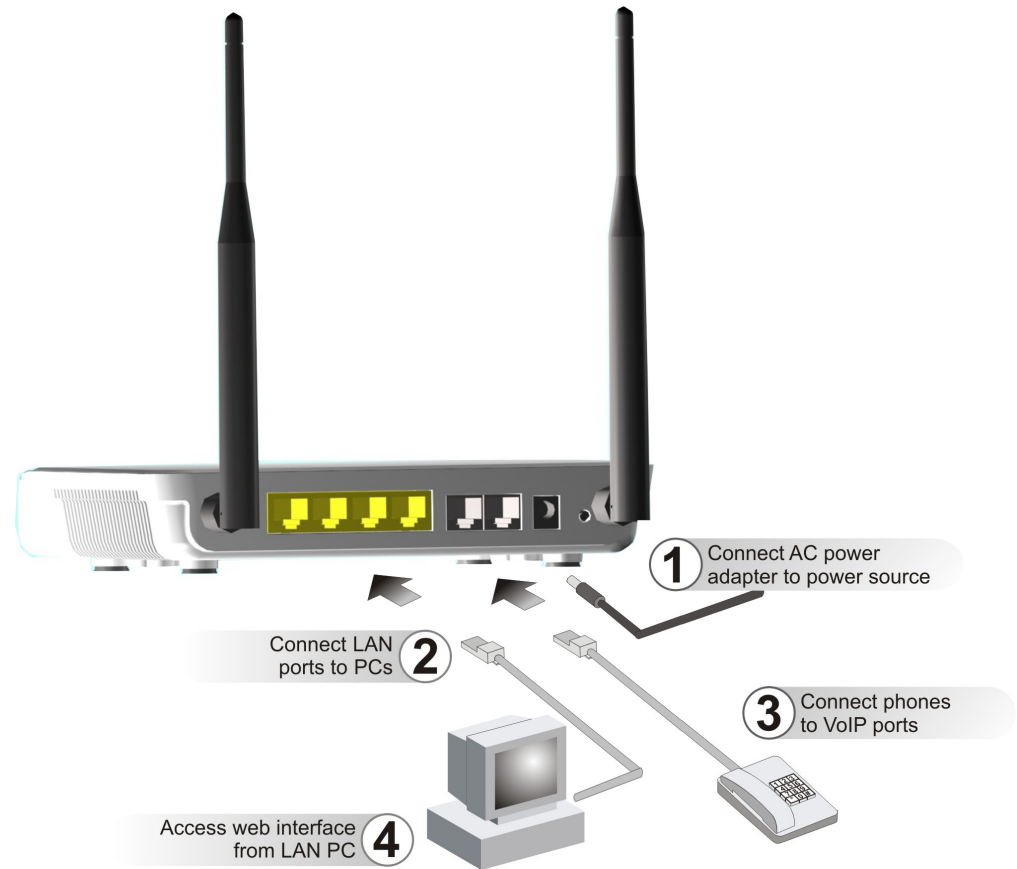
**POWER CONNECTOR** The unit does not have a power switch. It is powered on when connected to the AC power adapter, and the power adapter is connected to a power source. The power adapter automatically adjusts to any voltage between 100~240 volts at 50 or 60 Hz, and supplies 12 volts DC power to the unit. No voltage range settings are required.

**RESET BUTTON** This button can be used to restart the RG211.

**CABLE CONNECTIONS** The RG211 is a plug-and-play device, so once it has been connected to your PC and powered up, it is fully operable.

Functioning as a gateway, the unit routes traffic between a WiMAX network and PCs or notebooks in the local network.

Figure 5: Connecting the RG211



### TO CONNECT THE RG211:

1. Power on the RG211 by connecting the AC power adapter and plugging it into an AC power source.



**CAUTION:** Use ONLY the power adapter supplied with the RG211. Otherwise, the product may be damaged.

2. Observe the Indicator LEDs. When you power on the BreezeMAX Si, verify that the Power LED turns on and that the other LED indicators start functioning as described under "[LED Indicators](#)" on page 18.
3. Connect Category 5 or better Ethernet cables from the RG211's LAN ports to the network ports of your PCs. Alternatively, you can connect the LAN ports to an Ethernet switch or other devices. Make sure the length of each cable does not exceed 100 meters (328 ft).
4. If your PCs are powered on, the RJ-45 LAN port LED on the RG211 should turn on to indicate valid links.

5. Connect one or two standard (analog) telephone sets to the BreezeMAX Si's VoIP ports using standard telephone cable with RJ-11 plugs. The RG211 enables VoIP calls to be made through the unit using a standard (analog) telephone set connected to a VoIP port, or from PCs or other network devices connected to the LAN ports. Standard Session Initiation Protocol (SIP) technology is used to make VoIP calls. You must access the web interface and configure settings for your SIP service provider before you can make VoIP calls.
6. Use your PC's web browser to access the unit's management interface and run the Setup Wizard to make any configuration changes.

This chapter describes how to install the RG211.

---

## LOCATION SELECTION

Choose a proper place for the RG211. In general, the best location is at the center of your wireless coverage area, within line of sight of all wireless devices. Try to place the RG211 in a position that can best cover its service area. For optimum performance, consider these guidelines:

- ◆ Mount the RG211 as high as possible above any obstructions in the coverage area.
- ◆ Avoid mounting next to or near building support columns or other obstructions that may cause reduced signal or null zones in parts of the coverage area.
- ◆ Mount away from any signal absorbing or reflecting structures (such as those containing metal).

The RG211 can be mounted on any horizontal surface, or a wall.

### MOUNTING ON A HORIZONTAL SURFACE

To keep the RG211 from sliding on the surface, the unit is provided with four attached rubber feet.

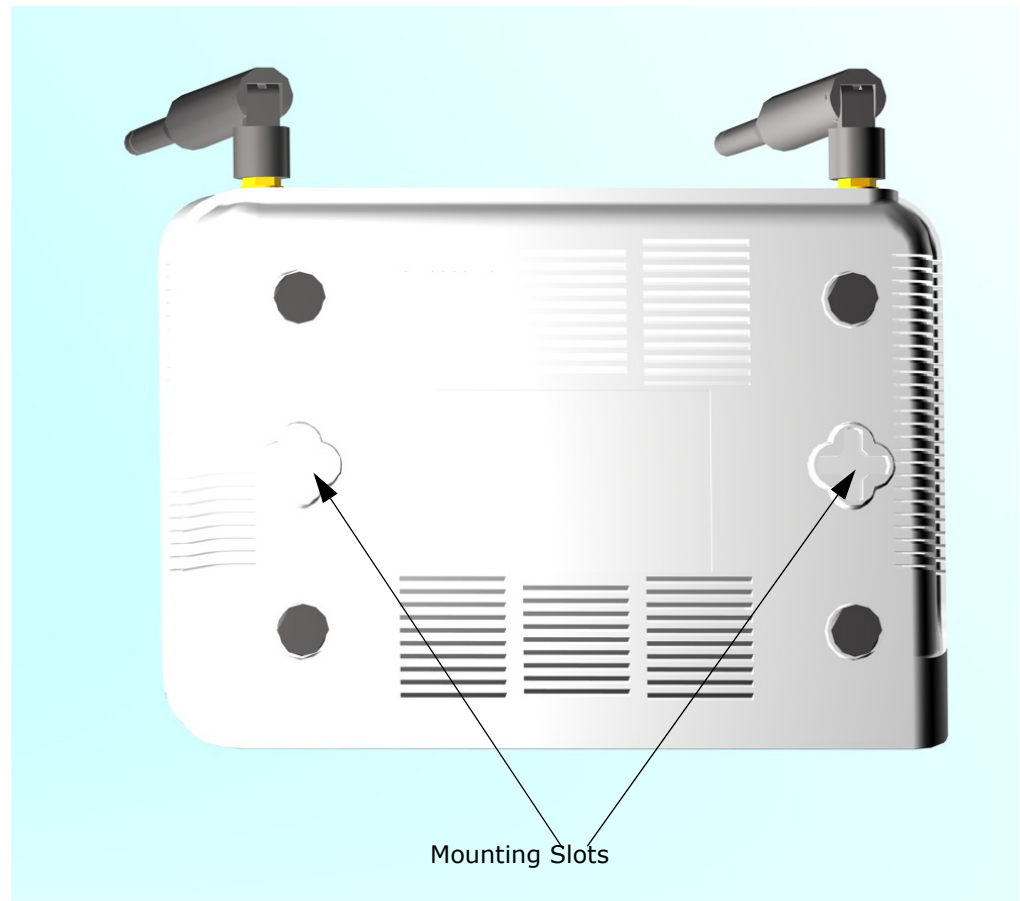
**Figure 6: Anti-slip Feet**



## MOUNTING ON A WALL

To mount on a wall follow the instructions below.

**Figure 7: Wall Mounting**



The RG211 should be mounted only to a wall or wood surface that is at least 1/2-inch plywood or its equivalent. To mount the RG211 on a wall, always use its wall-mounting bracket. The RG211 must be mounted with the RJ-45 cable connector oriented upwards to ensure proper operation.

1. Mark the position of the three screw holes on the wall. For concrete or brick walls, you will need to drill holes and insert wall plugs for the screws.
2. Insert the included 20-mm M4 tap screws into the holes, leaving about 2-3 mm clearance from the wall.
3. Line up the three mounting points on the AP with the screws in the wall, then slide the AP down onto the screws until it is in a secured position.



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## CONNECTING AND POWERING ON

Connect the power adapter to the RG211, and the power cord to an AC power outlet.



**CAUTION:** Use ONLY the power adapter supplied with this RG211. Otherwise, the product may be damaged.

---

- 1. Observe the Self Test** – When you power on the RG211, verify that the Power indicator turns on, and that the other indicators start functioning as described under [“LED Indicators” on page 18](#).
- 2. Connect the Ethernet Cable** – The RG211 can be connected to a 10/100 Mbps Ethernet through a network device such as a hub or a switch. Connect your network to the RJ-45 port on the back panel with Category 5E or better UTP Ethernet cable. When the RG211 and the connected device are powered on, the Ethernet Link LED should turn on indicating a valid network connection.



**NOTE:** The RJ-45 ports on the RG211 supports automatic MDI/MDI-X operation, so you can use straight-through cables for all network connections to PCs, switches, or hubs.

---

- 3. Position the Antennas** – Each antenna emits a radiation pattern that is toroidal (doughnut shaped), with the coverage extending most in the direction perpendicular to the antenna. Therefore, the antennas should be oriented so that the radio coverage pattern fills the intended horizontal space. Also, the antennas should both be positioned along the same axes, providing the same coverage area. For example, if the RG211 is mounted on a horizontal surface, all antennas should be positioned pointing vertically up to provide optimum coverage.

# 3

## INITIAL CONFIGURATION

The RG211 offers a user-friendly web-based management interface for the configuration of all the unit's features. Any PC directly attached to the unit can access the management interface using a web browser, such as Internet Explorer (version 6.0 or above) or Firefox (version 2.0 or above).

---

### CONNECTING TO THE LOGIN PAGE

It is recommended to make initial configuration changes by connecting a PC directly to the RG211's LAN port. The RG211 has a default IP address of 192.168.254.251 and a subnet mask of 255.255.255.0. You must set your PC IP address to be on the same subnet as the RG211 (that is, the PC and RG211 addresses must both start 192.168.254.x).

To access the CPE management interface, follow these steps:

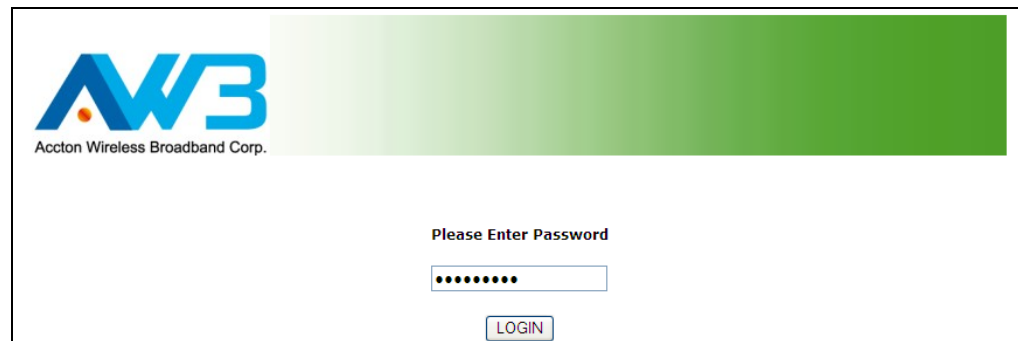
1. Use your web browser to connect to the management interface using the default IP address of 192.168.254.251.
2. Log into the interface by entering the default password "installer," then click Login.



**NOTE:** It is strongly recommended to change the default user name and password the first time you access the web interface. For information on changing user names and passwords, See ["System Settings" on page 29](#).

---

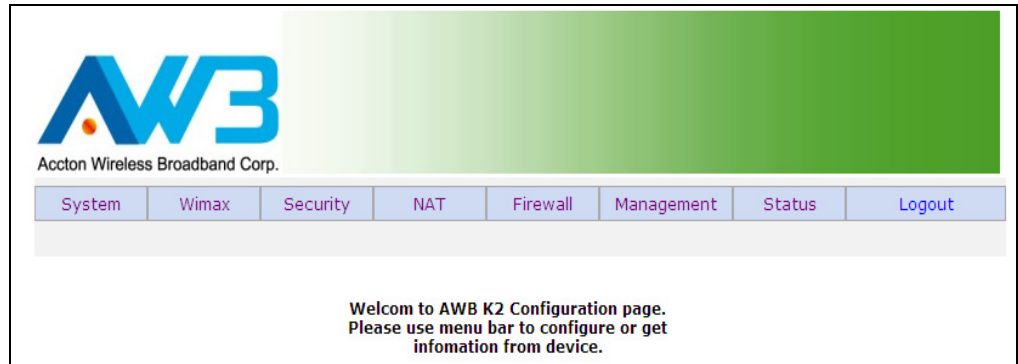
**Figure 8: Login Page**



## HOME PAGE AND MAIN MENU

After logging in to the web interface, the Home page displays. The Home page shows some basic settings for the AP, including Country Code and the management access password.

**Figure 9: Home Page**



The web interface Main Menu menu provides access to all the configuration settings available for the CPE.

# SECTION II

## WEB CONFIGURATION

This section provides details on configuring the CPE using the web browser interface.

This section includes these chapters:

- ◆ ["System Settings" on page 29](#)
- ◆ ["WiMAX Settings" on page 34](#)
- ◆ ["Security Settings" on page 44](#)
- ◆ ["NAT Settings" on page 46](#)
- ◆ ["Firewall Settings" on page 50](#)
- ◆ ["Management Settings" on page 52](#)
- ◆ ["Status" on page 60](#)
- ◆ ["Logout" on page 66](#)

This chapter describes basic system settings on the CPE. It includes the following sections:

- ◆ “System Settings” on page 29
  - “WAN Settings” on page 29
  - “LAN Settings” on page 31
  - “SNTP” on page 32
  - “Ethernet Mode” on page 33

---

## SYSTEM SETTINGS

The System page configures some basic settings for the CPE, such as the WAN, LAN SNTP and Ethernet Mode settings.

**WAN SETTINGS** Configuring the CPE with an IP address expands your ability to manage the CPE. A number of CPE features depend on IP addressing to operate.

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

By default, the CPE will not be automatically configured with IP settings from a Dynamic Host Configuration Protocol (DHCP) server. The default IP address is 192.168.0.102, subnet mask 255.255.255.0 and a default gateway of 192.168.0.254.

**Figure 10: WAN Settings - Dynamic**

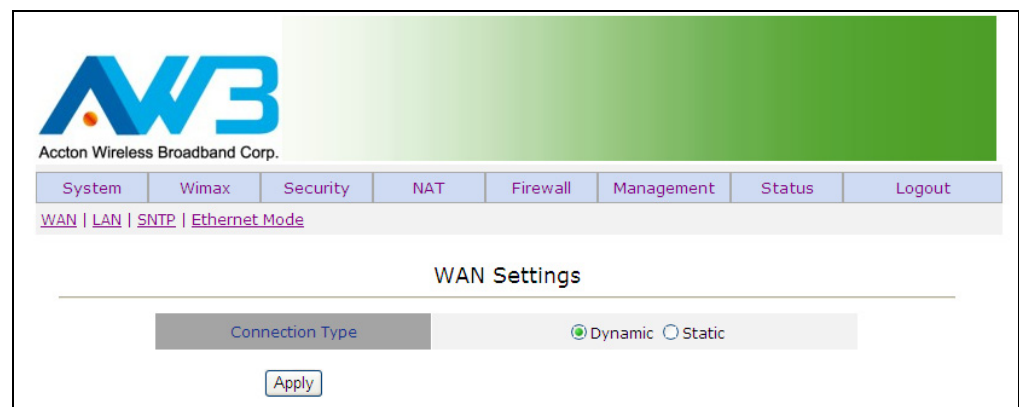
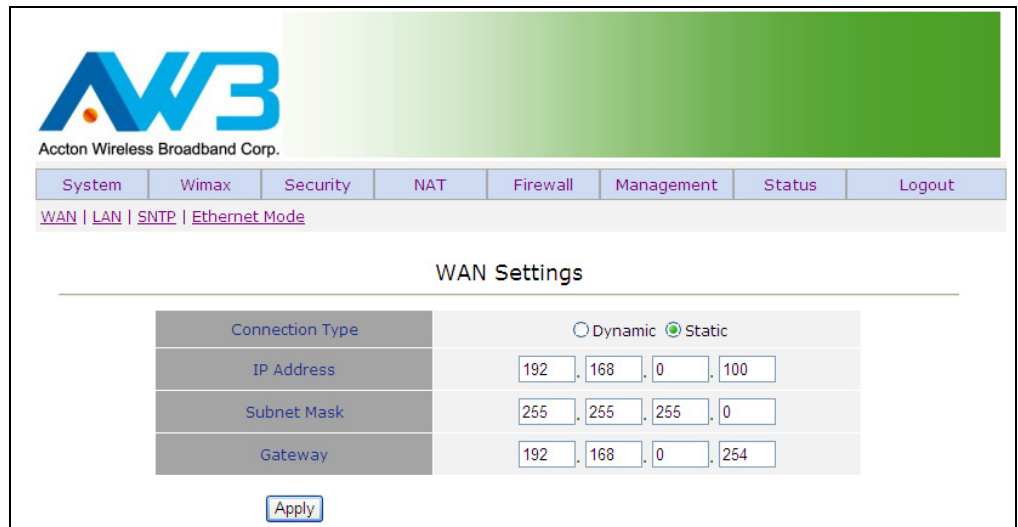


Figure 11: WAN Settings - Static



The following items are displayed on these pages:

- ◆ **Connection Type** — Specifies dynamic or static connection to the wireless WAN port.
- ◆ **IP Address** — Specifies an IP address for wireless management of the CPE. Valid IP addresses consist of four decimal numbers, 0 to 255, separated by periods. (Default: 192.168.0.102.)
- ◆ **Subnet Mask** — Indicates the local subnet mask. (Default: 255.255.255.0)
- ◆ **Gateway** — The default gateway is the IP address of the router for the CPE, which is used if the requested destination address is not on the local subnet. (Default: 192.168.0.254)

**LAN SETTINGS** Configuring the CPE with a LAN IP address range enables you to connect various network devices to the routing capabilities of the RG211.

**Figure 12: LAN Settings**

The screenshot shows the LAN Settings page. At the top left is the AWB logo and the text 'Accton Wireless Broadband Corp.'. Below this is a navigation menu with tabs for System, Wimax, Security, NAT, Firewall, Management, Status, and Logout. Underneath the tabs are links for WAN, LAN, SNTP, and Ethernet Mode. The main heading is 'LAN Settings'. Below the heading is a table of settings:

|                          |  |
|--------------------------|--|
| IP Address               | 192 . 168 . 254 . 251                      |
| Subnet Mask              | 255.255.255.0                              |
| DHCP Server              | <input checked="" type="checkbox"/> Enable |
| IP Pool Starting Address | 192.168.254.100                            |
| IP Pool Ending Address   | 192.168.254.199                            |
| Lease Time               | One day                                    |

At the bottom of the form is an 'Apply' button.

The following items are displayed on this page:

- ◆ **IP Address** — Specifies an IP address for connection to the CPE. Valid IP addresses consist of four decimal numbers, 0 to 255, separated by periods. (Default: 192.168.254.251.)
- ◆ **Subnet Mask** — Indicates the local subnet mask. (Default: 255.255.255.0)
- ◆ **DHCP Server** — Enables the DHCP server function.
- ◆ **IP Pool Starting Address** — Specifies the starting IP address of the LAN port/s pool.
- ◆ **IP Pool Ending Address** — Specifies the ending IP address of the LAN port/s pool.
- ◆ **Lease Time** — Specifies a lease time for usage of the specified DHCP Server settings. (Default: One day; Range: Half hour, One hour, Two hours, Half day, One day, Two days, One week, Two weeks)

**SNTP** Simple Network Time Protocol (SNTP) allows the CPE to set its internal clock based on periodic updates from a time server (SNTP or NTP). Maintaining an accurate time on the CPE enables the system log to record meaningful dates and times for event entries. If the clock is not set, the CPE will only record the time from the factory default set at the last bootup.

The CPE acts as an SNTP client, periodically sending time synchronization requests to specific time servers. You can configure up to two time server IP addresses. The CPE will attempt to poll each server in the configured sequence.

**Figure 13: SNTP Settings**

| System Time           |   |
|-----------------------|---|
| NTP                   | <input checked="" type="checkbox"/> Enable      |
| NTP Server IP Address | <input type="text" value="0.0.0.0"/>            |
| Update Period         | <input type="text" value="0"/> Hour(s)          |
| Time Zone             | (GMT-08:00) Pacific Time (US & Canada); Tijuana |

Apply

The following items are displayed on this page:

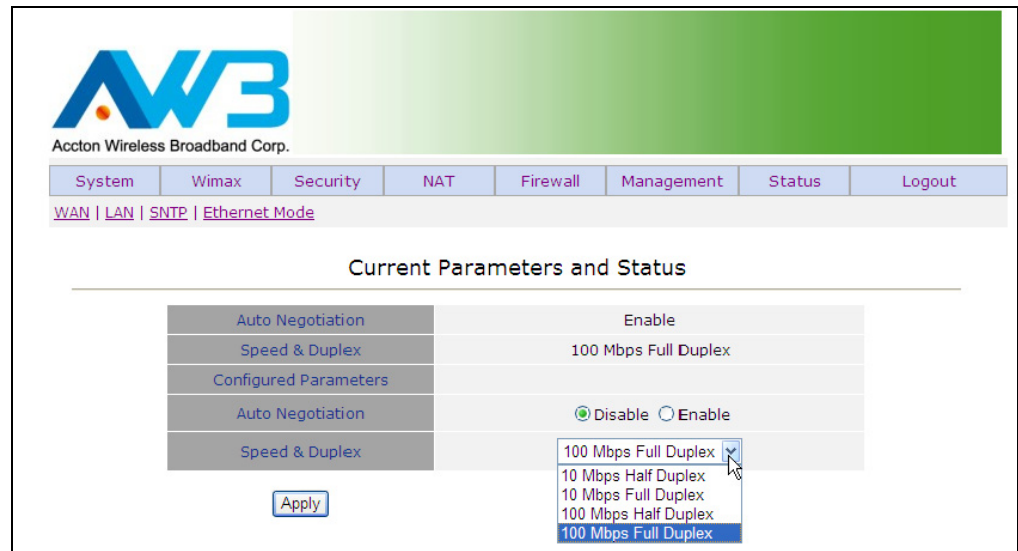
- ◆ **NTP** — Configures the CPE to operate as an SNTP client. (Default: Enabled)
- ◆ **NTP Server IP Address** — The IP address of an SNTP or NTP time server that the CPE attempts to poll for a time update.
- ◆ **Update Period** — The interval at which the client sends a time update request to the SNTP or NTP server.
- ◆ **Time Zone** — SNTP uses Greenwich Mean Time, or GMT (sometimes referred to as Coordinated Universal Time, or UTC) based on the time at the Earth's prime meridian, zero degrees longitude. To display a time corresponding to your local time, you must indicate the number of hours your time zone is located before (east) or after (west) GMT.

Select from the scroll down list the locale you are situated most close to, for example for New York, select '(GMT-05) Eastern Time (US & Canada)'.



**ETHERNET MODE** The Ethernet Mode settings displays and configures the mode of the Ethernet port/s.

**Figure 14: Ethernet Mode**



The following items are displayed on this page:

- ◆ **Auto Negotiation** — Displays the auto-negotiation status of the LAN port/s.
- ◆ **Speed & Duplex** — Displays the speed and duplex of the LAN port/s.
- ◆ **Configured Parameters** — this feature is not currently implemented.
- ◆ **Auto Negotiation** — Enables/disables auto-negotiation. (Default: Disable)
- ◆ **Speed & Duplex** — Select from the drop down menu the speed and duplex of the port/s. (Range: 10 Mbbps Half Duplex, 10 Mbps Full Duplex, 100 Mbps Half Duplex, 100 Mbps Full Duplex)

This chapter describes WiMAX management settings on the CPE. It includes the following sections:

- ◆ “Best BST/AU” on page 34
- ◆ “Frequency Scanning” on page 37
- ◆ “Link Quality Counters” on page 39
- ◆ “Ethernet On-Line Counters” on page 40
- ◆ “Integration Time” on page 42

---

## BEST BST/AU

The BS AU scanning page allows the user to scan for a nearby base station, specify a frequency, a preferred bandwidth, and frame duration.

The table will display all base stations that match the criteria entered.



**NOTE:** The access unit will search for the preferred base station first, but the displayed best base station might not be the preferred base station if it is unavailable.

---

Figure 15: Best BST/AU

The screenshot displays the 'Best BST/AU Parameters and Best BST/AU Table' section. It includes a table with the following data:

|                           |             |
|---------------------------|-------------|
| Configured Best BS ID     | 0.0.0.0.0.0 |
| Current Best BS ID        | 0.0.0.0.0.0 |
| Current Best BS RSSI(dBm) | 0           |
| Current Best BS SNR(dB)   | 0           |
| Current Bandwidth         | 0           |

Below this is the 'Selected BST/AU Parameters' section with another table:

|                       |             |
|-----------------------|-------------|
| Selected BST/AU ID    | 0.0.0.0.0.0 |
| Selected Rx Frequency | 0           |
| Rx RSSI(dBm)          | 0           |
| Rx SNR(dB)            | 0           |
| Selected BW           | 0           |

Next is the 'Best BST/AU Table' header, followed by a table with columns: BS ID, Rx Frequency(KHz), SNR(dB), RSSI(dBm), and Bandwidth.

The 'BST/AU and Preferred BST/AU Parameters' section contains a form with the following fields:

|                          |   |
|--------------------------|---|
| BST/AU ID                | 0 . 0 . 0 . 0 . 0 . 0   |
| BST/AU ID Mask           | 0 . 0 . 0 . 0 . 0 . 0   |
| Preferred BST/AU ID      | 0 . 0 . 0 . 0 . 0 . 0   |
| Preferred BST/AU ID Mask | 0 . 0 . 0 . 0 . 0 . 0   |
| Mobility Mode            | <input checked="" type="radio"/> Nomadic <input type="radio"/> Mobile |

An 'Apply' button is located at the bottom of the form.

**BEST BS/AU** — The Best BS/AU menu displays information on the base station identity (BSID), as well as signal strength indication, noise ratio and bandwidth of the WiMAX connection.

The following items are displayed on Best BST/AU page:

- ◆ **Configured Best BS ID** — Describes the configured base station identity, in the form xx.xx.xx.xx.xx.xx.
- ◆ **Current Best BS ID** — Describes the identity of the best base station, in the form xx.xx.xx.xx.xx.xx.
- ◆ **Current Best BS RSSI (dBm)** — Describes the receive signal strength indicator of the optimal WiMAX link, in decibels per milliwatt.
- ◆ **Current Best BS SNR (dB)** — Describes the signal to noise ratio of the optimal WiMAX link, in decibels.

- ◆ **Current Bandwidth** — Describes the bandwidth of the optimal WiMAX link.

**SELECTED BST/AU PARAMETERS** — The Selected BST/AU Parameters menu describes the BSID, frequency, signal strength, noise ratio and identity of the selected base station.

- ◆ **Selected BST/AU ID** — Describes the configured base station identity, in the form xx.xx.xx.xx.xx.xx.
- ◆ **Frequency** — Describes the selected receive signal frequency.
- ◆ **Rx RSSI (dBm)** — Describes the receive signal strength indicator of the WiMAX link, in decibels per milliwatt.
- ◆ **Rx SNR (dB)** — Describes the signal to noise ratio of the WiMAX link, in decibels.
- ◆ **Selected Bandwidth** — Describes the bandwidth of the WiMAX link.

**BEST BST/AU TABLE** — The Best BST/AU Table describes the optimal base station identity, frequency, signal to noise ratio and bandwidth of the selected base station.

- ◆ **BS ID** — Describes the optimal base station identity (BSID).
- ◆ **Rx Frequency (MHz)** — Describes the optimal base station receive frequency for the WiMAX link, in megahertz.
- ◆ **SNR(dB)** — Describes the optimal signal to noise ratio of the WiMAX link, in decibels.
- ◆ **Bandwidth** — Describes the optimal bandwidth of the WiMAX link.

**BEST BST/AU TABLE** – The BST/AU and Preferred BST/AU Parameters menu describes the user configured base station identity, mask, preferred base station identity and mask, as well as the mobility mode.

- ◆ **BST/AU ID** — Allows the user to configure the base station identity.
- ◆ **BEST/AU ID MASK** — Allows the user to configure the base station mask.
- ◆ **Preferred BST/AU ID** — Allows the user to configure the preferred base station identity.
- ◆ **Preferred BST/AU ID Mask** — Allows the user to configure the preferred base station mask.
- ◆ **Mobility Mode** — Selects the mobility mode of the WiMAX radio. (Options: nomadic and mobile)
- ◆ **Apply** — Applies the specified changes.

## FREQUENCY SCANNING

Frequency Scanning allows the user to enter frequencies with which to scan for nearby base stations.

**FREQUENCY SCANNING PARAMETERS** The Frequency Scanning Parameters menu specifies the frequency, scanning steps and bandwidth for purposes of scanning for nearby base stations.

**Figure 16: Frequency Scanning Parameters**

| Frequency Scanning Parameters  |   |
|--|---|
| Start Rx Frequency(KHz)  | 2500000   |
| End Rx Frequency(KHz)  | 2700000   |
| Scanning Main Step(MHz)  | 2.5   |
| Scanning Intermediate Steps (KHz)  | <input checked="" type="checkbox"/> B0 Start freq scan <input type="checkbox"/> B1 125KHz<br><input type="checkbox"/> B2 250KHz <input type="checkbox"/> B3 375KHz<br><input type="checkbox"/> B4 500KHz <input type="checkbox"/> B5 625KHz<br><input type="checkbox"/> B6 750KHz <input type="checkbox"/> B7 1250KHz   |
| Bandwidth(MHz)   | Auto  |
| Discrete Frequencies   | <input type="checkbox"/> <input type="text"/> <input type="checkbox"/> <input type="text"/><br><input type="checkbox"/> <input type="text"/> <input type="checkbox"/> <input type="text"/><br><input type="checkbox"/> <input type="text"/> <input type="checkbox"/> <input type="text"/><br><input type="checkbox"/> <input type="text"/> <input type="checkbox"/> <input type="text"/><br><input type="checkbox"/> <input type="text"/> <input type="checkbox"/> <input type="text"/> |
| <input type="button" value="select all"/> <input type="button" value="clear all"/><br><input type="button" value="Apply"/> |   |

The following items are displayed on the Frequency Scanning Parameters page:

- ◆ **Start Rx Frequency(MHz)** — Specifies the frequency at which to start scanning, in megahertz.
- ◆ **End Rx Frequency(MHz)** — Specifies the frequency at which to stop scanning, in megahertz.
- ◆ **Scanning Main Step(KHz)** — Specifies the main step in the frequency scanning process using the formula  $F(N) = \text{Start Frequency} + N * \text{Main Step}$ , for  $N = 0, 1, 2, ..$
- ◆ **Scanning Intermediate Steps(KHz)** — Specifies the intermediate step in the scanning process using the formula  $F(N) = \text{Start Frequency} + N * (\text{Main Step})$ ,  $\text{Start Frequency} + N * (\text{Main Step} + \text{Intermediate Step})$ , for  $N = 0, 1, 2, ..$
- ◆ **Bandwidth(MHz)** — Specifies the bandwidth for the scanning process.

- ◆ **Apply** — Saves the specified bandwidth.
- ◆ **Discrete Frequencies** — Delete a selected discrete frequency.
- ◆ **Delete All Discrete Frequencies** — Deletes all discrete frequencies.

**SCANNING TABLE SCANNING TABLE** – The Scanning Table displays all frequencies and bandwidths scanned by the Extreme CPE.

**Figure 17: Scanning Table**

| Scanning Table                                       |                   |             |           |           |
|--|-------------------|-------------|-----------|-----------|
| Full Scanning table list                             |                   |             |           |           |
| Rx Frequency(KHz)                                    |                   | Bandwidth   |           |           |
| 2500000  |                   | 5MHz (Auto) |           |           |
| 2502500  |                   | 5MHz (Auto) |           |           |
| 2505000  |                   | 5MHz (Auto) |           |           |
| 2507500  |                   | 5MHz (Auto) |           |           |
| 2510000  |                   | 5MHz (Auto) |           |           |
| 2512500  |                   | 5MHz (Auto) |           |           |
| 2515000  |                   | 5MHz (Auto) |           |           |
| 2517500  |                   | 5MHz (Auto) |           |           |
| 2697500  |                   | 5MHz (Auto) |           |           |
| 2700000  |                   | 5MHz (Auto) |           |           |
| Best BS Scanning table list                          |                   |             |           |           |
| BS ID  | Rx Frequency(KHz) | SNR(dB)     | RSSI(dBm) | Bandwidth |
| <input type="button" value="Update Scanning Table"/> |                   |             |           |           |
| <input type="button" value="Clear Best AU Table"/>   |                   |             |           |           |
| <input type="button" value="Force Full Scanning"/>   |                   |             |           |           |

The following items are displayed on the Scanning Table page:

- ◆ **Rx Frequency(MHz)** — Describes the receive frequency scanned.
  - ◆ **Bandwidth** — Describes the receive bandwidth scanned.
- BEST BS SCANNING TABLE LIST** — The Scanning Table List allows the user to update the scanning table, clear the best AU table and force full scanning.
- ◆ **BS ID** — Describes the number used to uniquely identify the base station identity.
  - ◆ **Rx Frequency(MHz)** — Describes the received signal frequency band.
  - ◆ **SNR(dB)** — Describes the signal-to-noise ratio of the received signal.

- ◆ **Bandwidth** — Describes the bandwidth of the received signal.
- ◆ **Update Scanning Table** — Updates the scanning table.
- ◆ **Clear Best AU Table** — Clears the table.
- ◆ **Force Full Scanning** — Forces scanning on all frequencies.

## LINK QUALITY COUNTERS

The Link Quality On-Line Display page displays the SNR (signal to noise ratio), RSSI (receive signal strength indication), and Tx/Rx data levels.

**Figure 18: Link Quality Counters**

|                      |             |
|----------------------|-------------|
| Current Fec Code     | qpsk-cc-1/2 |
| CINR (dB)            | 0.79        |
| CINRStd (dB)         | -6.64       |
| CINR Reuse 1 (dB)    | -4.41       |
| CINRStd Reuse 1 (dB) | -3.72       |
| CINR Reuse 3 (dB)    | -1.77       |
| CINRStd Reuse 3 (dB) | -10.14      |
| RSSI (dBm)           | -98.73      |
| RSSIStd (dB)         | -108.29     |
| Last Tx power (dBm)  | 0.00        |
| UL fec code          | qpsk-cc-1/2 |

**ONLINE LINK QUALITY** — The Link Quality On-Line Display table displays read-only information related to the quality of the link between the CPE and the base station.

The following items are displayed on the Link Quality On-line Display page:

- ◆ **Current Fec Code** — Displays the current FEC code.
- ◆ **CINR (dB)** — Displays the median level of the downlink (DL) Carrier-to-Interference and Signal-to-Noise (SNR) ratio, measured over a duration of two seconds. The figure will refresh every two seconds.
- ◆ **CINRStd (dB)** — Displays the median level of the downlink (DL) Carrier-to-Interference and Signal-to-Noise (SNR) ratio, measured over the duration of the link.
- ◆ **CINR Reuse 1 (dB)** —
- ◆ **CINRStd Reuse 1 (dB)** —
- ◆ **CINR Reuse 3 (dB)** —

- ◆ **CINRStd Reuse 3 (dB)** —
- ◆ **RSSI (dBm)** — Displays the median level of the downlink Receive Signal Strength Indicator (RSSI), measured over a duration of two seconds. The figure will refresh every two seconds.
- ◆ **RSSISTd (dB)** —
- ◆ **Last Tx Power (dBm)** — Displays the most recent transmit data rate of the CPE in Megabits per second, measured over the last two seconds. The figure will refresh every two seconds.
- ◆ **UL FEC Code** — Displays the uplink FEC code.

## ETHERNET ON-LINE COUNTERS

The Ethernet On-Line Counters page displays RX and Tx levels for the Ethernet connection.

**Figure 19: Ethernet Counters**

| Ethernet On-Line Counters |               |
|---------------------------|---------------|
| Rx LAN Port Bit Rate      | 69760.000000  |
| Rx LAN Packet Rate        | 55.000000     |
| Tx LAN Port Bit Rate      | 152000.000000 |
| Tx LAN Packet Rate        | 55.000000     |
| Rx LAN Port Total Bytes   | 17440         |
| Rx LAN Port Total Packets | 110           |
| Tx LAN Port Total Bytes   | 38000         |
| Tx LAN Port Total Packets | 110           |
| Rx WAN Port Bit Rate      | 0.000000      |
| Rx WAN Packet Rate        | 0.000000      |
| Tx WAN Port Bit Rate      | 0.000000      |
| Tx WAN Packet Rate        | 0.000000      |
| Rx WAN Port Total Bytes   | 0             |
| Rx WAN Port Total Packets | 0             |
| Tx WAN Port Total Bytes   | 0             |
| Tx WAN Port Total Packets | 0             |

**ETHERNET ON-LINE COUNTERS** — The Ethernet On-Line Counters table describes read-only incremental statistical values of the LAN and WAN ports.

The following items are displayed on the Ethernet On-Line Counters page:

- ◆ **Rx LAN Port Bit Rate** — Displays the received bit rate of the Ethernet LAN port. The figure will refresh every two seconds.



- ◆ **Rx LAN Packet Rate** — Displays the received packet rate of the Ethernet LAN port. The figure will refresh every two seconds.
- ◆ **Tx LAN Port Bit Rate** — Displays the transmitted bit rate of the Ethernet LAN port. The figure will refresh every two seconds.
- ◆ **Tx LAN Packet Rate** — Displays the transmitted packet rate of the Ethernet LAN port. The figure will refresh every two seconds.
- ◆ **Rx LAN Port Total Bytes** — Displays the received byte rate of the Ethernet LAN port. The figure will refresh every two seconds.
- ◆ **Rx LAN Port Total Packets** — Displays the total received packets of the Ethernet LAN port. The figure will refresh every two seconds.
- ◆ **Tx LAN Port Total Bytes** — Displays the transmitted byte rate of the Ethernet LAN port. The figure will refresh every two seconds.
- ◆ **Tx LAN Port Total Packets** — Displays the total number of packets transmitted by the Ethernet LAN port. The figure will refresh every two seconds.
- ◆ **Rx WAN Port Bit Rate** — Displays the received bit rate of the WiMAX WAN port. The figure will refresh every two seconds.
- ◆ **Rx WAN Packet Rate** — Displays the received packet rate of the WiMAX WAN port. The figure will refresh every two seconds.
- ◆ **Tx WAN Port Bit Rate** — Displays the transmitted bit rate of the WiMAX WAN port. The figure will refresh every two seconds.
- ◆ **Tx WAN Packet Rate** — Displays the transmitted packet rate of the WiMAX WAN port. The figure will refresh every two seconds.
- ◆ **Rx WAN Port Total Bytes** — Displays the total bytes received on the WiMAX WAN port. The figure will refresh every two seconds.
- ◆ **Rx WAN Port Total Packets** — Displays the total packets received on the WiMAX WAN port. The figure will refresh every two seconds.
- ◆ **Tx WAN Port Total Bytes** — Displays the total bytes transmitted by the WiMAX WAN port. The figure will refresh every two seconds.
- ◆ **Tx WAN Port Total Packets** — Displays the total number of packets transmitted by the WiMAX WAN port. The figure will refresh every two seconds.

## INTEGRATION TIME

The Integration Time page allows you to set the frequency with which the CPE will monitor traffic statistics on both the WiMAX link and Ethernet link.

**Figure 20: Integration Time**

The screenshot displays two sections: 'Link Quality Historical' and 'Ethernet Historical'. Each section has a label 'Integration times :', two radio button options: '1 Min Counters' and '15 Min Counters', and an 'Apply' button. In the 'Link Quality Historical' section, the '15 Min Counters' option is selected. In the 'Ethernet Historical' section, the '15 Min Counters' option is also selected.

The following items are displayed on the Integration Time page:

**LINK QUALITY HISTORICAL** — The Link Quality Historical menu allows the user to define a time period for monitoring the WiMAX WAN port link.

- ◆ **1 Min Counters** — Sets the counter to a duration of one minute.
- ◆ **15 Min Counters** — Sets the counter to a duration of fifteen minutes.
- ◆ **Apply** — Applies the chosen setting.

**ETHERNET HISTORICAL** — The Ethernet Historical menu allows the user to define a time period for monitoring the Ethernet LAN port link.

- ◆ **1 Min Counters** — Sets the counter to a duration of one minute.
- ◆ **15 Min Counters** — Sets the counter to a duration of fifteen minutes.
- ◆ **Apply** — Applies the chosen setting.



The Security menu enables the user to enter station information about for the CPE, such as user name, password, country of operation and organisation. It also enables the user to select the authentication method used to authenticate the CPE with the base station. It contains the following sections:

- “User Registration” on page 44
- “CA File” on page 45

**USER REGISTRATION** The User Registration page allows the user to define registration parameters such as configured user name, password, organisation and the country of operation of the CPE. It also allows the user to select the authentication method.

**Figure 21: User Registration**

| User Registration                    |   |
|--------------------------------------|---|
| User Name                            | CPEMACaddress@WiMa  |
| Password                             | <input type="text"/>  |
| Password Confirm                     | <input type="text"/>  |
| Organization                         | <input type="text"/>  |
| Address                              | <input type="text"/>  |
| Country                              | <input type="text"/>  |
| Outer Identity type                  | <input type="radio"/> MAC <input checked="" type="radio"/> Random <input type="radio"/> Customize               |
| Outer Identity                       | <input type="text"/> @wimax.com   |
| Authentication                       | <input type="radio"/> Not Authenticated <input checked="" type="radio"/> EAP TTLS <input type="radio"/> EAP TLS |
| CA File                              | cacert.pem  |
| <input type="button" value="Apply"/> |   |

**USER REISTRATION** — The User Registration menu allows the user to enter information on the authentication parameters required to support provisioning on the unit.

The following items are displayed on the User Registration page:

- ◆ **User Name** — Allows the user to enter a user name for the unit, in the form someone@WiMAX.com.

- ◆ **Password** — Allows the user to set a password for registration purposes.
- ◆ **Password Confirm** — Prompts the user to re-enter the password.
- ◆ **Organization** — Enter the WiMAX subscriber name.
- ◆ **Address** — Enter the contact information for the WiMAX subscriber.
- ◆ **Country** — Enter the country of operation.
- ◆ **Authentication** — Allows the user to describe the method of authentication being used to secure the WiMAX connection. (Options: none; EAP TTLS; EAP TLS)

**CA FILE** The CA File is the root file used in certificate-based authentication. This file is used by the CPE to identify the ACS. Note that because this authentication process uses SSL/TLS, the ACS URL attribute on this page must be specified as an HTTPS URL.

**Figure 22: CA File**

| CA File                              |  |
|--------------------------------------|--|
| Action                               | <input checked="" type="radio"/> Upload <input type="radio"/> Delete                 |
| File Name                            | <input type="text"/> <input type="button" value="Browse..."/> (Max file size is 4KB) |
| <input type="button" value="Apply"/> |  |

The following items are displayed on the CA File page:

- ◆ **Action** — Specifies to upload or delete the current CA file.
- ◆ **File Name** — Click browse to locate the CA file on the local PC.

This chapter describes NAT settings on the CPE. It includes the following sections:

- ◆ “Network Address Translation” on page 46
- ◆ “Virtual Server” on page 47
- ◆ “Demilitarized Zone (DMZ)” on page 48

## NETWORK ADDRESS TRANSLATION

Network Address Translation (NAT) is a method of mapping between a single global address on the WAN interface to multiple local addresses on the LAN interface. For the Gateway, the internal (local) IP addresses are those assigned to PCs or other network devices by the DHCP server, and the external IP address is the single address assigned to the WAN port.

**Figure 23: Network Address Translation**

| NAT                                  |  |
|--------------------------------------|--|
| Active                               | <input checked="" type="checkbox"/>        |
| ALG Setup                            |  |
| FTP ALG                              | <input checked="" type="checkbox"/> Enable |
| H.323 ALG                            | <input checked="" type="checkbox"/> Enable |
| PPTP ALG                             | <input checked="" type="checkbox"/> Enable |
| IPSec ALG                            | <input checked="" type="checkbox"/> Enable |
| <input type="button" value="Apply"/> |  |

The following items are displayed on the NAT page:

- ◆ **Active** — Activates NAT.

**ALG Setup** — This page is used to enable or disable customized Application Layer Gateway (ALG) traversal filters for SIP, H323, IRC, PPTP, SNMP, and TFTP applications.

- ◆ **FTP ALG** — File Transfer Protocol.
- ◆ **H.323 ALG** — ITU-T standard that defines protocols used to provide audio-visual communication sessions on any packet-based network. It

is widely deployed by service providers to support both voice and video services over IP networks.

- ◆ **PPTP ALG** — Point-to-Point Tunneling Protocol is a method for implementing virtual private networks.
- ◆ **IPSec ALG** — Internet Protocol Security is a protocol suite for securing Internet Protocol (IP) communications by authenticating and encrypting each IP packet of a data stream.

## VIRTUAL SERVER

If you configure the CPE as a virtual server, remote users accessing services such as web sites or FTP servers on your local network through public IP addresses can be automatically redirected to local servers configured with private IP addresses. In other words, depending on the requested service (designated by the TCP/UDP port number), the CPE redirects the external service request to the appropriate server (located at an internal IP address). This secures your network from direct attack by hackers, and provides more flexible management by allowing you to change internal IP addresses without affecting outside access to local network services.

For example, if you set Type/Public Port to TCP/80 (HTTP or web) and the Private IP/Port to 192.168.2.2/80, then all HTTP requests from outside users will be transferred to 192.168.2.2 on port 80. Therefore, by just entering the IP address provided by the ISP, Internet users can access the service they need at the local address to which you redirect them.

The more common TCP service port numbers include: HTTP: 80, FTP: 21, Telnet: 23, and POP3: 110.

**Figure 24: Virtual Server**

| Virtual Server |                             |                                     |          |                      |                      |                          |
|----------------|-----------------------------|-------------------------------------|----------|----------------------|----------------------|--------------------------|
| Active         |                             | <input checked="" type="checkbox"/> |          |                      |                      |                          |
| Rules          |                             |                                     |          |                      |                      |                          |
| NO             | Rule Name                   | Private IP Address                  | Protocol | Private Port         | Public Port          | Enable                   |
| 1              | <input type="text"/><br>DNS | 192.168.254. <input type="text"/>   | BOTH     | <input type="text"/> | <input type="text"/> | <input type="checkbox"/> |
| 2              | <input type="text"/><br>DNS | 192.168.254. <input type="text"/>   | BOTH     | <input type="text"/> | <input type="text"/> | <input type="checkbox"/> |
| 3              | <input type="text"/><br>DNS | 192.168.254. <input type="text"/>   | BOTH     | <input type="text"/> | <input type="text"/> | <input type="checkbox"/> |
| 4              | <input type="text"/><br>DNS | 192.168.254. <input type="text"/>   | BOTH     | <input type="text"/> | <input type="text"/> | <input type="checkbox"/> |
| 5              | <input type="text"/><br>DNS | 192.168.254. <input type="text"/>   | BOTH     | <input type="text"/> | <input type="text"/> | <input type="checkbox"/> |

The following items are displayed on the Virtual Server page:

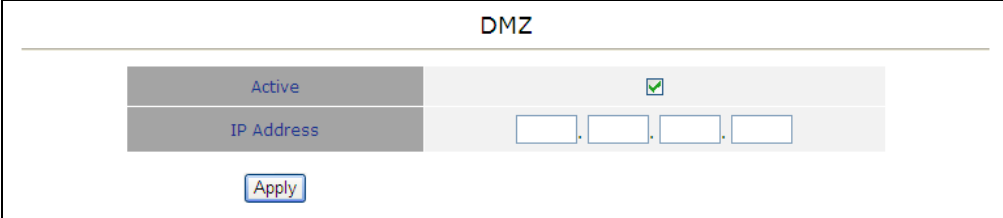
- ◆ **Active** — Activates the virtual server.
- ◆ **Rule Name** — From the drop down menu select the protocol to use.
- ◆ **Private IP Address** — The IP address of a server on the local network. The specified address must be in the same subnet as the CPE and its DHCP server address pool.
- ◆ **Protocol** — Specifies the port type, TCP or UDP. (Default: TCP)
- ◆ **Private Port** — Specifies the local LAN TCP/UDP port number. (Range: 1-65535)
- ◆ **Public Port** — Specifies the WAN port number.
- ◆ **Enable** — Enables the rule.

---

## DEMILITARIZED ZONE (DMZ)

This page is used to allow a specified host on the local network to access the Internet without any firewall protection. Some Internet applications, such as interactive games or videoconferencing, may not function properly behind the CPE's firewall. By specifying a Demilitarized Zone (DMZ) host, the PC's TCP ports are completely exposed to the Internet, allowing unrestricted two-way communications. The host PC should be assigned a static IP address and this address configured as the DMZ host IP.

**Figure 25: DMZ**



The screenshot shows a configuration page titled "DMZ". It features a table with two rows. The first row has a grey header cell labeled "Active" and a white cell containing a checked checkbox. The second row has a grey header cell labeled "IP Address" and a white cell containing four input boxes for IP address digits, separated by dots. Below the table is an "Apply" button.

| DMZ        |   |
|------------|---|
| Active     | <input checked="" type="checkbox"/>   |
| IP Address | <input type="text"/> . <input type="text"/> . <input type="text"/> . <input type="text"/> |

Apply

The following items are displayed on the DMZ page:

- ◆ **Active** — Activates the DMZ service.
- ◆ **IP Address** — Specify an IP address to allow access to.





This chapter describes firewall settings on the CPE. It includes the following section:

- ◆ “Firewall Settings” on page 50

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## FIREWALL SETTINGS

The CPE provides extensive firewall protection by restricting connection parameters to limit the risk of intrusion and defending against a wide array of common hacker attacks.

**Figure 26: Firewall Settings**

The screenshot shows the 'Firewall Settings' page. It has a title bar 'Firewall Settings' and a horizontal line below it. The 'Mode' section contains a single row with 'Mode' on the left and a checked checkbox followed by 'Enable' on the right. Below this is another horizontal line, followed by the 'Options' section. This section contains three rows: 'Enable Web Server', 'Enable Telnet', and 'Enable Ping'. Each row has its respective label on the left and a checked checkbox followed by 'Enable' on the right. At the bottom of the page is an 'Apply' button.

| Firewall Settings                    |  |
|--------------------------------------|--|
| Mode                                 | <input checked="" type="checkbox"/> Enable |
| Options                              |  |
| Enable Web Server                    | <input checked="" type="checkbox"/> Enable |
| Enable Telnet                        | <input checked="" type="checkbox"/> Enable |
| Enable Ping                          | <input checked="" type="checkbox"/> Enable |
| <input type="button" value="Apply"/> |  |

The following items are displayed on the Firewall page:

- ◆ **Mode** — Enables firewall protection. (Default: Enabled)
- ◆ **Enable Web Server** — Enables web server protection. (Default: Enabled)
- ◆ **Enable Telenet** — Enables Telnet protect. (Default: Enabled)
- ◆ **Enable Ping** — Enables ping protection. (Default: Enabled)



This chapter describes Management settings on the CPE. It includes the following section:

- ◆ “Resetting the Unit” on page 52
- ◆ “Changing the Access Password” on page 53
- ◆ “Software Versions Control” on page 54
- ◆ “Configuration Control” on page 55
- ◆ “TM and PM Upload Control” on page 56
- ◆ “TR Parameters” on page 57

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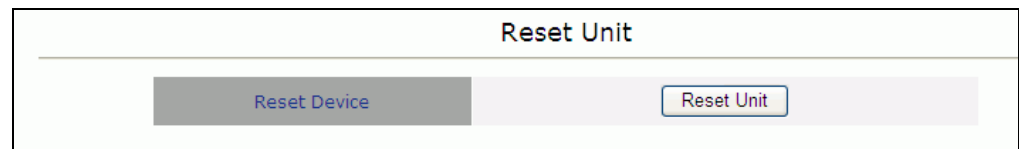
## RESETTING THE UNIT

The Reset page allows you to reset the CPE for configuration changes to take effect.



**NOTE:** Resetting the unit does not restore factory defaults.

**Figure 27: Reset Unit**



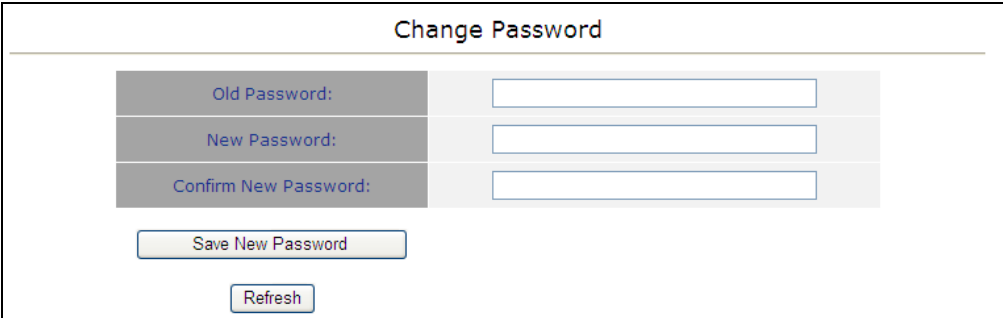
The following items are displayed on the Reset Unit page:

- ◆ **Reset Unit** — Click 'Reset Unit' to reboot the CPE.

## CHANGING THE ACCESS PASSWORD

The Change Password page enables you to create a new password for access to the CPE. It is advisable to change the factory default password upon receipt of your CPE device.

**Figure 28: Change Password**



The screenshot shows a web form titled "Change Password". It contains three input fields stacked vertically, each with a label to its left: "Old Password:", "New Password:", and "Confirm New Password:". Below these fields are two buttons: "Save New Password" and "Refresh".

The following items are displayed on the Change Password page:

- ◆ **Old Password** — Prompts you to enter your current password.
- ◆ **New Password** — Prompts you to enter a new password. (Length: 1-20 characters, cannot include the characters '<>?:;,.'"{}]/\|,' and is case sensitive).
- ◆ **Confirm New Password** — Prompts you to re-enter the new password.
- ◆ **Save New Password** — Clicking 'Save New Password' saves the new password and deletes the old password.
- ◆ **Refresh** — Clicking 'Refresh' clears all information boxes.

## SOFTWARE VERSIONS CONTROL

The Software Version Control page allows you to download new runtime software for the CPE, run a backup runtime image (or shadow), reset the device and select the current running configuration file.

**Figure 29: SW Version Control**

The screenshot shows a web interface titled "SW Versions Control". It contains a table with the following fields and values:

|                               |                       |
|-------------------------------|-----------------------|
| SW File Name                  | K2_0_06_01.app        |
| SW Version                    | 0.06.01               |
| Local TFTP Server IP Address  | 192 . 168 . 254 . 250 |
| Remote TFTP Server IP Address | 192.168.254.250       |
| SW File Name                  | K2_OD210_Firmware.bz  |

Below the table is a button labeled "SW Download".

The following items are displayed on the SW Versions Control page:

**SW VERSIONS CONTROL** — Enables uploading and setting of main software versions.

- ◆ **SW File Name** — Describes the file name of the currently loaded software.
- ◆ **SW Version** — Describes the version of software currently in use.
- ◆ **Local TFTP Server IP Address** — Allows the user to enter the IP address of the TFTP server from which to download code to the unit.
- ◆ **Remote TFTP Server IP Address** — Non-configurable preset remote TFTP server address.
- ◆ **SW File Name** — Allows the user to enter the file name of the software file to be downloaded to the unit.
- ◆ **SW Download** — Click 'SW Download' to download user specified software to the unit from the TFTP IP address. The image downloaded will overwrite the current shadow image.

## CONFIGURATION CONTROL

The Configuration Control page allows you to specify an IP address from which to upload or download a running configuration file. It also allows you to restore the factory default TFTP server address.

**Figure 30: Configuration Control**

The screenshot shows the 'Configuration Control' page with the following fields and controls:

|                                  |  |
|----------------------------------|--|
| Configuration Upload File Name   | SU_UPLOAD_CFG  |
| Configuration Download File Name | SU_DOWNLOAD_CFG  |
| Local TFTP Server IP Address     | 192 . 168 . 254 . 250  |
| Remote TFTP Server IP Address    | 192.168.254.250  |
| Choose upload/download Action    | <input checked="" type="radio"/> Upload <input type="radio"/> Download |

Below the table are three buttons: 'Perform Action', 'Refresh', and 'Set Factory Defaults'.

The following items are displayed on the Configuration Control page:

**CONFIGURATION CONTROL** — Use the configuration control page to transfer running configuration files.

- ◆ **Configuration Upload File Name** — Allows the user to specify the configuration upload file name for copying to the TFTP server.
- ◆ **Configuration Download File Name** — Allows the user to specify the configuration download file name for downloading from the TFTP server.
- ◆ **Local TFTP Server IP Address** — Specifies a TFTP server IP address for upload/download.
- ◆ **Chose upload/download** — Selects to either upload to, or download from the specified TFTP server.
- ◆ **Perform Action** — Performs the selected upload or download procedure.
- ◆ **Refresh** — Reloads the page and the parameters associated with it.
- ◆ **Set Factory Defaults** — Resets the factory default configuration file path settings from the TFTP server to the Extreme CPE.



**NOTE:** Selecting this option does not perform a factory reset. It simply makes available the TFTP IP path of the default factory configuration file settings to the unit. Selecting 'Action' will implement the file settings.

## TM AND PM UPLOAD CONTROL

The TM (Traffic Monitoring) & PM (Performance Monitoring) File Upload Control page enables the user to define parameters related to uploading the TM & PM files where link quality data is stored, to the TFTP server directory and to initiate the upload operation.

**Figure 31: TM & PM File Upload Control**

The screenshot shows a web interface titled "TM & PM File Upload Control". It contains a table with three rows and two columns. The first row has a header "TM & PM files" and a dropdown menu showing "N/A". The second row has a header "Local TFTP Server IP Address" and four input fields containing "192", "168", "254", and "250". The third row has a header "Remote TFTP Server IP Address" and a single input field containing "192.168.254.250". Below the table is a button labeled "Perform Action".

| TM & PM files                 | N/A                   |
|-------------------------------|-----------------------|
| Local TFTP Server IP Address  | 192 . 168 . 254 . 250 |
| Remote TFTP Server IP Address | 192.168.254.250       |

Perform Action

The following items are displayed on the TM & PM File Upload Control page:

**TM & PM FILE UPLOAD CONTROL** — Traffic and performance monitoring allow for a variety of statistical data to be collected about the Extreme CPE and its WiMAX link.

- ◆ **TM & PM Files** — Specifies the available TM and PM files from the drop down menu for uploading to the TFTP server.
- ◆ **Local TFTP Server IP Address** — Specifies a local TFTP server IP address from which to upload the TM and PM files.
- ◆ **Perform Action** — Clicking 'Perform Action' initiates the upload procedure.



## TR PARAMETERS

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

The CPE's TR-069 parameters need to be defined to allow communication with the remote ACS.

**Figure 32: TR Parameters**

| TR Parameters                        |   |
|--------------------------------------|---|
| Enable periodic report               | <input checked="" type="radio"/> Enable <input type="radio"/> Disable |
| Periodic report interval             | <input type="text" value="86400"/>                                    |
| Username                             | <input type="text" value="tr069"/>                                    |
| Password                             | <input type="text" value="tr069"/>                                    |
| Connection Request Username          | <input type="text" value="admin"/>                                    |
| Connection Request Password          | <input type="text" value="1234"/>                                     |
| ACS URL                              | <input type="text" value="http://AlvarionWiMAX-CPE"/>                 |
| Default ACS URL                      | <input type="text" value="http://"/>                                  |
| Enable STUN                          | <input type="radio"/> Enable <input checked="" type="radio"/> Disable |
| STUN Server Address                  | <input type="text" value="0.0.0.0"/>                                  |
| STUN Server Port                     | <input type="text" value="3478"/>                                     |
| <input type="button" value="Apply"/> |   |

The following items are displayed on the TR Parameters page:

- ◆ **TR069** — Enables/disables TR-069 support. (Default: Enabled)
- ◆ **Periodic Inform Interval** — Time interval in seconds to send Inform RPC.
- ◆ **Username** — Enter the user name that the CPE should use when connecting to the ACS.
- ◆ **Password** — Enter the password that the ADSL Router should use when connecting to the ACS.
- ◆ **Connection Request Username** — The user name the remote ACS should use when connecting to this device.
- ◆ **Connection Request Password** — The password the remote ACS should use when connecting to this device.

- ◆ **ACS URL** — Specifies the URL required for the CPE to connect to the ACS.
- ◆ **Default ACS URL** — The default URL used for the CPE to connect to the ACS.
- ◆ **Enable STUN** — Enables the STUN facility. (Default: Disabled)
- ◆ **STUN Server Address** — Specify the STUN server IP address.
- ◆ **STUN Server Port** — Specify the port to be used for communication between the CPE and the STUN server.



This chapter describes Status settings on the CPE. It includes the following section:

- ◆ “System Status” on page 60

## SYSTEM STATUS

The Status page is a display-only menu of non-configurable parameters for Unit Control, Registration, Base Station Identification (BSID), Radio, Multi rate, Adaptive Transmission Power Control (ATPC) and Service. To configure the parameters associated with each show menu item refer to the sections listed in the main menu.

**SHOW ALL** The Show All parameters, Unit Control menu provides information on the default system configuration and radio type.

**Figure 33: Show All**

| Show All parameters, Unit Control |                            |
|-----------------------------------|----------------------------|
| SU Type                           | CPE Si SQ                  |
| CPE Family                        | SEQUANS                    |
| Serial Number                     | RF_SN                      |
| LAN MAC Address                   | 00:12:CF:DA:FD:8C          |
| WAN MAC Address                   | 00:12:CF:DA:FD:8D          |
| LAN IP Address                    | 192.168.254.251            |
| LAN Subnet Mask                   | 255.255.255.0              |
| WAN IP Address                    | N/A                        |
| WAN Subnet Mask                   | N/A                        |
| WAN Gateway                       | N/A                        |
| Radio Band                        | 2.xGHz                     |
| Hardware Version                  | R0A                        |
| Hardware Configuration            | RG211                      |
| RF Version                        | SQN1145                    |
| Interface Type                    | 1D                         |
| Radio Type                        | 1 Rx , 1 Tx                |
| Ethernet Port Auto Negotiation    | Enable                     |
| Ethernet Port Speed & Duplex      | 100 Mbps Full Duplex       |
| Operation Mode                    | NONE                       |
| Unit Status                       | Searching for Base Station |
| SW Boot Version                   | 0.06.01                    |
| SW File Name                      | K2_0_06_01.app             |
| SW Version                        | 0.06.01                    |

The following items are displayed on the Show All page:

- ◆ **SU Type** — Describes the service unit (SU) type.
- ◆ **CPE Family** — Describes the primary chipset of the CPE.
- ◆ **Serial Number** — Describes the serial number of the CPE unit. This number can be used to determine the identity of the subscriber unit by the base station operator.
- ◆ **LAN MAC Address** — Describes the physical layer address of the LAN port.
- ◆ **WAN MAC Address** — The WAN port MAC address can be determined by adding "1" to the LAN port MAC address.
- ◆ **LAN IP Address** — The IP address of the LAN port.
- ◆ **LAN Subnet Mask** — The LAN port subnet mask.
- ◆ **WAN IP Address** — The IP address of the wireless WAN port.
- ◆ **WAN Subnet Mask** — The subnet mask of the wireless WAN port.
- ◆ **WAN Gateway** — The gateway address of the wireless WAN port.
- ◆ **Radio Band** — Describes the radio band in use. The radio bands for the CPE are 2.3, 2.5, 3.5 and 5 GHz.
- ◆ **Hardware version** — Describes the revision of hardware in use.
- ◆ **Hardware configuration** — Describes the identity of the current hardware configuration by serial number.
- ◆ **RF version** — Describes the radio frequency (RF) or rate of oscillation of the electrical circuit.
- ◆ **SU Interface Type** — Describes the number of ports available on the interface. "D" refers to data ports, "V" refers to VoIP ports, with a prefix number in use as a quantifier.
- ◆ **Radio Type** — Describes the receive (Rx) and transmit (Tx) capacity of the radio.
- ◆ **Ethernet Port Auto Negotiation** — Describes the Ethernet port auto negotiation enable/disable state.
- ◆ **Ethernet Port Speed & Duplex** — Describes the speed and duplex capabilities to which the Ethernet port has been set to.
- ◆ **Operation Mode** — Describes the operation mode of the Extreme CPE, either IPCS or ETHCS, where IPCS refers to transparent delivery of IPv4 packets and ETHCS refers to transparent delivery of tagged 802.3 packets over Ethernet.

- ◆ **Unit Status** — Describes the connectivity status of the Extreme CPE to the base station.
- ◆ **SW Boot Version** — Describes the current software boot version file.
- ◆ **SW File Name** — Describes the name of the current firmware.
- ◆ **SW Version** — Describes the version of the current firmware.

**LICENCE TYPE** Describes the availability of VoIP ports, operator preset maximum information rates (MIR), Ethernet status, virtual private networks (VPN) status and switching antenna status.

**Figure 34: License Type**

| License type |               |           |               |               |               |                |                   |
|--------------|---------------|-----------|---------------|---------------|---------------|----------------|-------------------|
| POTS 1       | POTS 2        | MIR=2Mbps | MIR=6Mbps     | Unlimited MIR | Ethernet CS   | VPN over IP CS | Switching Antenna |
| Available    | Not Available | Available | Not Available | Not Available | Not Available | Not Available  | Not Available     |

The following items are displayed on the License Type page:

- ◆ **POTS1/2** — Describes the availability status of the VoIP plain old telephone service (POTS) ports. 'Available' indicates that the specified VoIP port is open for use.
- ◆ **MIR=2Mbps** — Describes the operator preset maximum information rate (MIR) state per subscriber at 2Mbps upload/download.
- ◆ **MIR=6Mbps** — Describes the operator preset maximum information rate (MIR) state per subscriber at 6Mbps upload/download.
- ◆ **Unlimited MIR** — Describes if the operator preset maximum information rate (MIR) is unlimited in upload/download bandwidth, or unavailable to the subscriber.
- ◆ **Ethernet CS** — Describes the Ethernet convergence sublayer (CS) status.
- ◆ **VPN over IP CS** — Describes the status of the virtual private network (VPN) over internet protocol (IP) convergence sublayer.
- ◆ **Switching Antenna** — Describes the status of the switching antenna.

**SHOW BEST BS ID** Displays information on the base station identity (BSID), as well as signal strength indication, noise ratio and bandwidth of the WiMAX connection.

**Figure 35: Show Best BS ID**

| Show All parameters, Best BS ID |             |
|---------------------------------|-------------|
| Configured Best BS ID           | 0.0.0.0.0.0 |
| Current Best BS ID              | 0.0.0.0.0.0 |
| Current Best BS RSSI(dBm)       | 0           |
| Current Best BS SNR(dB)         | 0           |
| Current Bandwidth               | 0           |

The following items are displayed on the Show All parameters, Best BS ID page:

- ◆ **Configured Best BS ID** — Describes the configured base station identity, in the form xx.xx.xx.xx.xx.xx.
- ◆ **Current Best BS ID** — Describes the identity of the best base station, in the form xx.xx.xx.xx.xx.xx.
- ◆ **Current Best BS RSSI (dBm)** — Describes the receive signal strength indicator of the WiMAX link, in decibels per milliwatt.
- ◆ **Current Best BS SNR (dB)** — Describes the signal to noise ratio of the WiMAX link, in decibels.
- ◆ **Current Bandwidth** — Describes the bandwidth of the WiMAX link.

**SHOW RADIO PARAMETERS** Radio Parameters display information on the bandwidth and antenna selection of the CPE.

**Figure 36: Show Radio Parameters**

| Show All parameters, Radio parameters |             |
|---------------------------------------|-------------|
| Configured Bandwidth                  | 5MHz (Auto) |
| Configured TX Antenna Selection       | N/A         |
| Configured RX Antenna Selection       | N/A         |
| Configured Rx Attenuator parameters   | N/A         |
| Current Bandwidth                     | 0           |
| Current TX Antenna Selection          | N/A         |
| Current RX Antenna Selection          | N/A         |
| Current Rx Attenuator parameters      | N/A         |

The following items are displayed on the Show All parameters, Radio Parameters page:

- ◆ **Configured Bandwidth** — Describes the configured bandwidth in megahertz.
- ◆ **Configured Tx Antenna Selection** — Describes the configured transmission antenna selection.
- ◆ **Configured Rx Antenna Selection** — Describes the configured receive antenna selection.
- ◆ **Configured Rx Attenuator Parameters** — Describes the configured receive signal after attenuation.
- ◆ **Current Bandwidth** — Describes the current bandwidth of the WiMAX link.
- ◆ **Current Tx Antenna Selection** — Describes the current transmission antenna selection.
- ◆ **Current Rx Antenna Selection** — Describes the current receive antenna selection.
- ◆ **Current Rx Attenuator Parameters** — Describes the current receive attenuator parameters.

**SHOW REGISTRATION** Registration parameters displays information on the authentication parameters required to support provisioning on the unit.

**Figure 37: Show Registration**

| Show All parameters, Registration parameters |                         |
|--|-------------------------|
| Configure User Name                          | CPEMACaddress@WiMax.com |
| Actual User Name                             | CPEMACaddress@WiMax.com |
| Organization                                 |                         |
| Address                                      |                         |
| Country                                      |                         |
| Outer Identity                               | (RANDON)@wimax.com      |
| Authentication                               | EAP TTLS                |
| Selected CA file                             | cacert.pem              |

The following items are displayed on the Show All parameters, Registration Parameters page:

- ◆ **Configure User Name** — Describes the configured user name for the unit.
- ◆ **Actual User Name** — Describes the current name being used to identify the user of the unit.
- ◆ **Organization** — Describes the WiMAX subscriber name.



- ◆ **Address** — Describes the contact information for the WiMAX subscriber.
- ◆ **Country** — Describes the country of operation.
- ◆ **Authentication** — Describes the method of authentication being used to secure the WiMAX connection.
- ◆ **Selected CA file** — Describes the CA file in use for authentication.

This chapter describes how to log out of the CPE. It includes the following section:

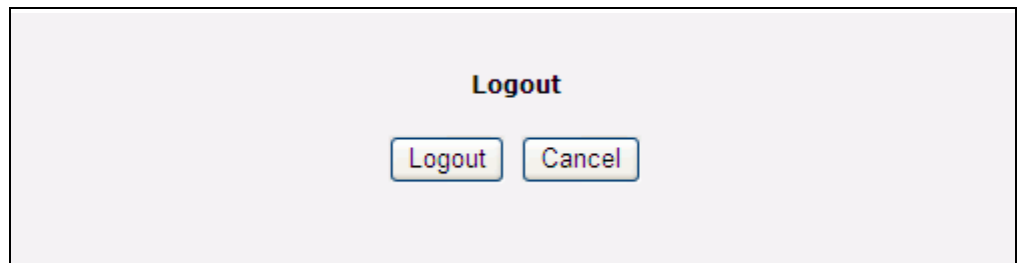
- ◆ “Logging Out” on page 66

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## LOGGING OUT

The Logout page enables you to log out of the web interface and terminate your session. Logging out is preceded by a prompt to log in again.

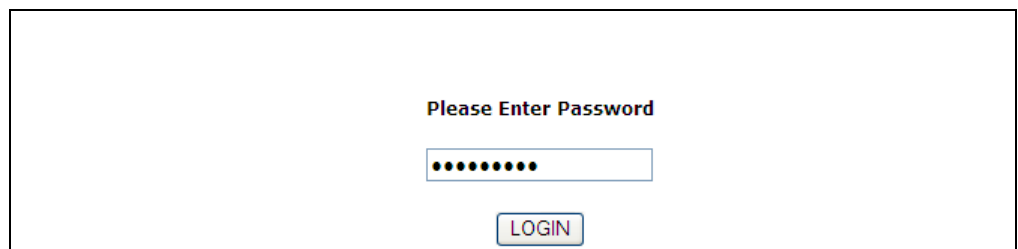
**Figure 38: Logout**



The following items are displayed on the Logout page:

- ◆ **Logout** — Logs you out of the current session.

**Figure 39: Login**



- ◆ **Login** — Logs you into the system. The default password is “installer”.



# SECTION III

## APPENDICES

This section provides additional information and includes these items:

- ◆ "Troubleshooting" on page 69
- ◆ "Hardware Specifications" on page 71
- ◆ "Cables and Pinouts" on page 75
- ◆ "Glossary" on page 78
- ◆ "Index" on page 81

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## DIAGNOSING LED INDICATORS

**Table 3: LED Indicators**

| Symptom                              | Action   |
|--------------------------------------|--|
| Power LED is off                     | ◆ The AC power adapter may be disconnected. Check connections between the unit, the power adapter, and the wall outlet.  |
| LAN LED is off (when port connected) | ◆ Verify that the unit and attached device are powered on.<br>◆ Be sure the cable is plugged into both the unit and corresponding device.<br>◆ Verify that the proper cable type is used and its length does not exceed specified limits.<br>◆ Check the cable connections for possible defects. Replace the defective cable if necessary. |
| WiMAX Signal Strength LEDs are off   | ◆ There is no detected signal from a WiMAX base station. Check the radio settings in the management interface.   |

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## BEFORE CONTACTING TECHNICAL SUPPORT

Check the following items before you contact local Technical Support.

1. If wireless clients cannot access the network, check the following:
  - If authentication or encryption are enabled, ensure that the wireless clients are properly configured with the appropriate authentication or encryption keys.
2. If the CPE cannot be configured using a web browser:
  - Be sure to have configured the CPE with a valid IP address, subnet mask and default gateway.
  - Check that you have a valid network connection to the CPE and that the Ethernet port or the wireless interface that you are using has not been disabled.
  - If you are connecting to the CPE through the wired Ethernet interface, check the network cabling between the management station and the CPE. If you are connecting to CPE from a wireless client, ensure that you have a valid connection to the CPE.

3. If you forgot or lost the password, contact technical support for assistance.
4. If all other recovery measure fail, and the CPE is still not functioning properly, take any of these steps:
  - Reset the CPE's hardware using the reset button, through the web interface, or through a power reset. Then use the default password "installer" to access the management interface.

## WIMAX RADIO SPECIFICATIONS

**RADIO TYPE** IEEE 802.16e WAVE 1 & WAVE 2

**FREQUENCY BAND RANGE** 2305~2360 MHz, or  
2496~2690 MHz (FCC), 2500~2690 MHz (CE), or  
3300~3600 MHz (CE), or  
3600~3800 MHz

**ANTENNA TYPE** External Omni-dipole antenna with MRC function

**CHANNEL BANDWIDTH** 2.5G: 5.00 and 10.00 MHz  
3.5G: 5.00, 7.00 and 10.00 MHz

**MAXIMUM THROUGHPUT** 5 Mbps Upload, 20 Mbps download

**RADIO TECHNOLOGY** Maximum-Ratio Combining (MRC)

**MODULATION TECHNIQUE** Scaleable OFDMA employing Time-Division Duplex (TDD) mechanism  
PRBS subcarrier randomization  
Contains pilot, preamble, and ranging modulation

**FEC CODING RATES** Down Link: QPSK, 16 QAM, 64 QAM  
Up Link: QPSK, 16 QAM

**ANTENNA GAIN** 2.3 GHz 5 dBi  
 2.5 GHz 5 dBi  
 3.5 GHz 6 dBi  
 3.8 GHz 6 dBi

**TPL (TRANSMIT POWER LEVEL)** +24~26 dBm maximum (+/- 2dBm)

**RECEIVE SENSITIVITY** -94 dBm maximum

**VOIP SPECIFICATIONS**

**VOICE SIGNALLING PROTOCOL** SIP v2 (RFC 3261)

**VOICE CODECS** G.711 (a-law and u-law)  
 G.729ab  
 G.722  
 G.722.1

**VOICE QUALITY** G.726 VAD (Voice Activity Detection)  
 G.723 CNG (Comfortable Noise Generation)  
 Echo cancellation (G.165/G.168)  
 Adaptive jitter buffer, up to 200 milliseconds  
 DTMF tone detection and generation  
 Configurable Cadence Rings

**CALL FEATURES** Call transfer  
 Call waiting/hold/retrieve  
 3-way conference call  
 Call blocking



T.38 fax relay

Dial plan (E.164 dialing plan)

Call forwarding: No Answer/Busy/All

**REN (RING EQUIVALENT NUMBER)** 3 REN total in system

#### **CONFIGURATION AND MANAGEMENT**

**MANAGEMENT OPTIONS** Web-based (HTTP/HTTPS)

**MANAGEMENT ACCESS** From Wired LAN, Wireless Link

**MANAGEMENT ACCESS PROTECTION** Access Password

**ENCRYPTION** PKMv2 with 128bit AES/CCM

**ALLOCATION OF IP PARAMETERS** Configurable or automatic (DHCP client)

**SOFTWARE UPGRADE** HTTP

**CONFIGURATION UPLOAD/DOWNLOAD** HTTP

#### **MECHANICAL**

**DIMENSIONS** TBC

**WEIGHT** TBC

**MOUNTING** Desktop or wall

**CABLING** Category 5 cable connection

## ELECTRICAL

**AC POWER SUPPLY** Input: 100-240 VAC, 50-60 Hz, maximum power consumption 1.0A  
Output: 12 VDC @ 1.5A, maximum power consumption 18A

**MTBF** 5 years  
Bellcore SR332

## ENVIRONMENTAL

**OPERATING TEMPERATURE** -5°C to 45°C

**STORAGE TEMPERATURE** -40 to 75 °C

**HUMIDITY** Maximum 95%, non-condensing

## STANDARDS COMPLIANCE

**EMC** FCC Part 15B Class B  
EN 55022  
EN 55022 + EN 55024 Class B  
EN 301 489-1/4

**SAFETY** EN 60950-1 (2006)

**WiMAX RADIO SIGNAL CERTIFICATION** EN 302 326  
FCC Part 27M

**STANDARDS** IEEE 802.16e-2005 WAVE 1 and WAVE 2  
IEEE 802.3-2005 10BASE-T and 100BASE-TX

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## TWISTED-PAIR CABLE ASSIGNMENTS

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



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

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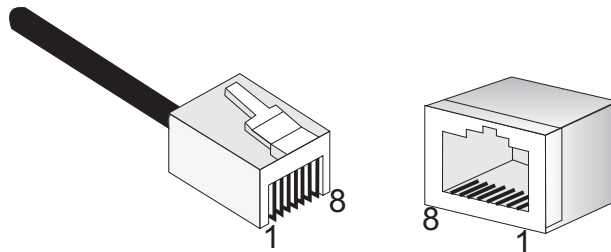


**CAUTION:** DO NOT plug a phone jack connector into the RJ-45 port. Use only twisted-pair cables with RJ-45 connectors that conform with FCC standards.

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

**Figure 40: RJ-45 Connector**



### 10/100BASE-TX PIN ASSIGNMENTS

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

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

**Table 4: 10/100BASE-TX MDI and MDI-X Port Pinouts**

| PIN | MDI Signal Name <sup>a</sup>                                   | MDI-X Signal Name  |
|-----|--|--|
| 1   | Transmit Data plus (TD+)<br>-48V power (Negative $V_{port}$ )  | Receive Data plus (RD+)<br>GND (Positive $V_{port}$ )          |
| 2   | Transmit Data minus (TD-)<br>-48V power (Negative $V_{port}$ ) | Receive Data minus (RD-)<br>GND (Positive $V_{port}$ )         |
| 3   | Receive Data plus (RD+)<br>GND (Positive $V_{port}$ )          | Transmit Data plus (TD+)<br>-48V power (Negative $V_{port}$ )  |
| 4   | -48V power (Negative $V_{port}$ )                              | GND (Positive $V_{port}$ )                                     |
| 5   | -48V power (Negative $V_{port}$ )                              | GND (Positive $V_{port}$ )                                     |
| 6   | Receive Data minus (RD-)<br>GND (Positive $V_{port}$ )         | Transmit Data minus (TD-)<br>-48V power (Negative $V_{port}$ ) |
| 7   | GND (Positive $V_{port}$ )                                     | -48V power (Negative $V_{port}$ )                              |
| 8   | GND (Positive $V_{port}$ )                                     | -48V power (Negative $V_{port}$ )                              |

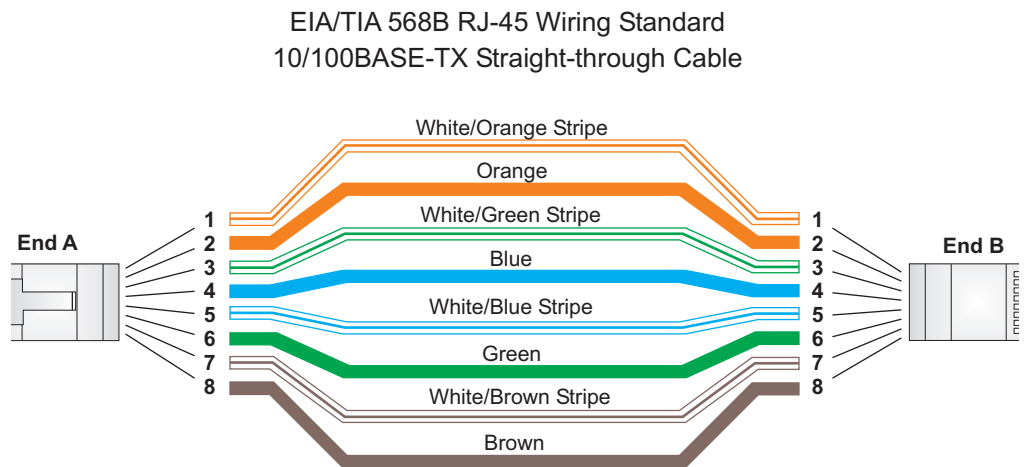
a. The "+" and "-" signs represent the polarity of the wires that make up each wire pair.

**STRAIGHT-THROUGH WIRING**

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

You must connect all four wire pairs as shown in the following diagram to support Gigabit Ethernet connections.

**Figure 41: Straight Through Wiring**

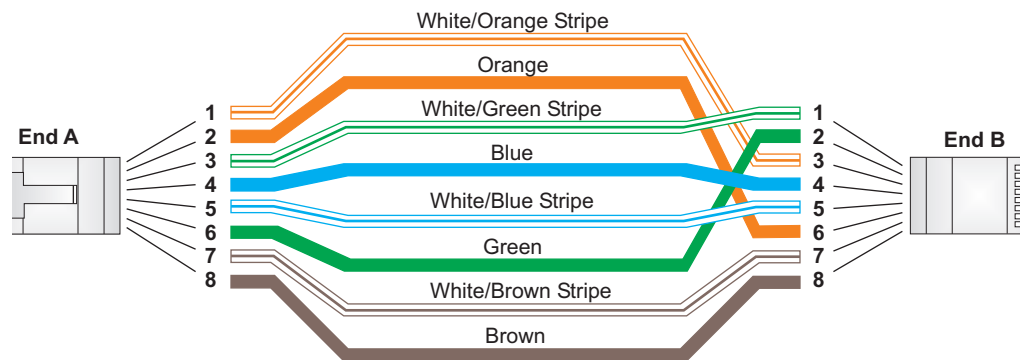


**CROSSOVER WIRING** If the twisted-pair cable is to join two ports and either both ports are labeled with an “X” (MDI-X) or neither port is labeled with an “X” (MDI), a crossover must be implemented in the wiring. (When auto-negotiation is enabled for any RJ-45 port on this switch, you can use either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

You must connect all four wire pairs as shown in the following diagram to support Gigabit Ethernet connections.

**Figure 42: Crossover Wiring**

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



**CABLE TESTING FOR EXISTING CATEGORY 5 CABLE**

Installed Category 5 cabling must pass tests for Attenuation, Near-End Crosstalk (NEXT), and Far-End Crosstalk (FEXT). This cable testing information is specified in the ANSI/TIA/EIA-TSB-67 standard. Additionally, cables must also pass test parameters for Return Loss and Equal-Level Far-End Crosstalk (ELFEXT). These tests are specified in the ANSI/TIA/EIA-TSB-95 Bulletin, “The Additional Transmission Performance Guidelines for 100 Ohm 4-Pair Category 5 Cabling.”

Note that when testing your cable installation, be sure to include all patch cables between switches and end devices.

# GLOSSARY

**10BASE-T** IEEE 802.3-2005 specification for 10 Mbps Ethernet over two pairs of Category 3 or better UTP cable.

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

**ADVANCED ENCRYPTION STANDARD (AES)** An encryption algorithm that implements symmetric key cryptography. AES provides very strong encryption using a completely different ciphering algorithm to TKIP and WEP.

**AUTHENTICATION** The process to verify the identity of a client requesting network access. IEEE 802.11 specifies two forms of authentication: open system and shared key.

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

**BEACON** A signal periodically transmitted from the CPE that is used to identify the service set, and to maintain contact with wireless clients.

**BROADCAST KEY** Broadcast keys are sent to stations using dynamic keying. Dynamic broadcast key rotation is often used to allow the CPE to generate a random group key and periodically update all key-management capable wireless clients.

**DYNAMIC HOST CONFIGURATION PROTOCOL (DHCP)** Provides a framework for passing configuration information to hosts on a TCP/IP network. DHCP is based on the Bootstrap Protocol (BOOTP), adding the capability of automatic allocation of reusable network addresses and additional configuration options.

**ENCRYPTION** Data passing between the CPE and clients can use encryption to protect from interception and eavesdropping.

|  |  |
|--|--|
| <b>ETHERNET</b>  | A popular local area data communications network, which accepts transmission from computers and terminals.   |
| <b>FILE TRANSFER<br/>PROTOCOL (FTP)</b>                          | A TCP/IP protocol used for file transfer.  |
| <b>HYPertext TRANSFER<br/>PROTOCOL (HTTP)</b>                    | HTTP is a standard used to transmit and receive all data over the World Wide Web.  |
| <b>INFRASTRUCTURE</b>  | An integrated wireless and wired LAN is called an infrastructure configuration.  |
| <b>LOCAL AREA NETWORK<br/>(LAN)</b>                              | A group of interconnected computer and support devices.  |
| <b>MAC ADDRESS</b>   | The physical layer address used to uniquely identify network nodes.  |
| <b>NETWORK TIME<br/>PROTOCOL (NTP)</b>                           | NTP provides the mechanisms to synchronize time across the network. The time servers operate in a hierarchical-master-slave configuration in order to synchronize local clocks within the subnet and to national time standards via wire or radio. |
| <b>OPEN SYSTEM</b>   | A security option which broadcasts a beacon signal including the CPE's configured SSID. Wireless clients can read the SSID from the beacon, and automatically reset their SSID to allow immediate connection to the nearest CPE.                   |
| <b>ORTHOGONAL<br/>FREQUENCY DIVISION<br/>MULTIPLEXING (OFDM)</b> | OFDM allows multiple users to transmit in an allocated band by dividing the bandwidth into many narrow bandwidth carriers.   |
| <b>SERVICE SET IDENTIFIER<br/>(SSID)</b>                         | An identifier that is attached to packets sent over the wireless LAN and functions as a password for joining a particular radio cell; i.e., Basic Service Set (BSS).   |
| <b>SESSION KEY</b>   | Session keys are unique to each client, and are used to authenticate a client connection, and correlate traffic passing between a specific client and the CPE.   |

- SHARED KEY** A shared key can be used to authenticate each client attached to a wireless network. Shared Key authentication must be used along with the 802.11 Wireless Equivalent Privacy algorithm.
- SIMPLE NETWORK TIME PROTOCOL (SNTP)** SNTP allows a device to set its internal clock based on periodic updates from a Network Time Protocol (NTP) server. Updates can be requested from a specific NTP server, or can be received via broadcasts sent by NTP servers.
- TEMPORAL KEY INTEGRITY PROTOCOL (TKIP)** A data encryption method designed as a replacement for WEP. TKIP avoids the problems of WEP static keys by dynamically changing data encryption keys.
- TRIVIAL FILE TRANSFER PROTOCOL (TFTP)** A TCP/IP protocol commonly used for software downloads.
- VIRTUAL CPE (VAP)** Virtual AP technology multiplies the number of CPEs present within the RF footprint of a single physical access device. With Virtual AP technology, WLAN users within the device's footprint can associate with what appears to be different CPEs and their associated network services. All the services are delivered using a single radio channel, enabling Virtual AP technology to optimize the use of limited WLAN radio spectrum.
- WI-FI PROTECTED ACCESS** WPA employs 802.1X as its basic framework for user authentication and dynamic key management to provide an enhanced security solution for 802.11 wireless networks.
- WIRED EQUIVALENT PRIVACY (WEP)** WEP is based on the use of security keys and the popular RC4 encryption algorithm. Wireless devices without a valid WEP key will be excluded from network traffic.
- WPA PRE-SHARED KEY (WPA-PSK)** WPA-PSK can be used for small office networks with a limited number of users that may not need a high level of security. WPA-PSK provides a simple security implementation that uses just a pre-shared password for network access.



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