Accton Wireless Broadband Corp.

OD200-ODU
Outdoor WiMAX Residential Gateway

Operator Guide

Operator Guide

OD200-ODU

Outdoor IEEE 802.16e-2005 Mobile WiMAX Unit,
with 2.3/2.5/3.5 GHz Frequency Band Support and Integrated Antenna,

OD200-ODU
E122008-CS-R01
1*************

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

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

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

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 20 cm between the radiator and your body.

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

EC Conformance Declaration CE0682(!)

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, EN 302 326-2 (V1.2.2), EN 302 326-3 (V1.2.2) - EMC requirements for radio equipment

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

NCC

減少電磁波影響，請妥適使用。

About This Guide

Purpose

This guide details the hardware features of the WiMAX Residential Gateway including its physical and performance-related characteristics, and how to install the device and use its configuration software.

Audience

The guide is intended for use by network administrators who are responsible for operating and maintaining network equipment; consequently, it assumes a working knowledge of general networking concepts, 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.

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

Related Publications

The following publication gives basic information on how to install and use the WiMAX Residential Gateway.

Quick Installation Guide

As part of the WiMAX Residential Gateway's software, there is online help that describes all configuration related features.

Revision History

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

December 2008 Revision

This is the first revision of this guide. This guide is valid for software release v0.2.0.1.

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Tables

Figures

Chapter 1: Introduction

The OD200 WiMAX Residential Gateway is a WiMAX subscriber station designed to provide Internet access for a home or small office. 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.

The OD200 is a combination of an indoor unit (IDU) and an outdoor unit (ODU). There are different ODU units for each of the 2.3, 2.5, and 3.5 GHz WiMAX frequency bands. Which ODU unit you use depends on the frequency band of your service provider's WiMAX service.

The OD200 IDU includes four RJ-45 Ethernet switch ports for LAN connections and two RJ-11 Voice over IP (VoIP) phone ports. An 802.11b/g Wi-Fi module is included that provides a local Wi-Fi access point service. The IDU also includes a dedicated Power-over-Ethernet (PoE) RJ-45 port that connects to the ODU.

The following table lists the available OD200 models.

Table 1-1 OD200 Models

Model Number	Description
OD200-2.3-ODU	2.3 GHz ODU with integrated antenna
OD200-2.5-ODU	2.5 GHz ODU with integrated antenna
OD200-3.5-ODU	3.5 GHz ODU with integrated antenna
OD200-IDU-1D	IDU with 1 LAN port
OD200-IDU-4D	IDU with 4 LAN ports
OD200-IDU-1D2V	IDU with 1 LAN port and 2 VoIP ports
OD200-IDU-4D2V	IDU with 4 LAN ports and 2 VoIP ports
OD200-IDU-4D1W	IDU with 4 LAN ports and Wi-Fi
OD200-IDU-4D2V1W	IDU with 4 LAN ports and 2 VoIP ports and Wi-Fi

The OD200 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 IDU's LAN ports.

ODU Hardware Description

The ODU is an outdoor, pole-mounted, weatherproof unit that includes a built-in antenna for WiMAX communications. The unit includes an RJ-45 Ethernet port for a connection to the IDU.

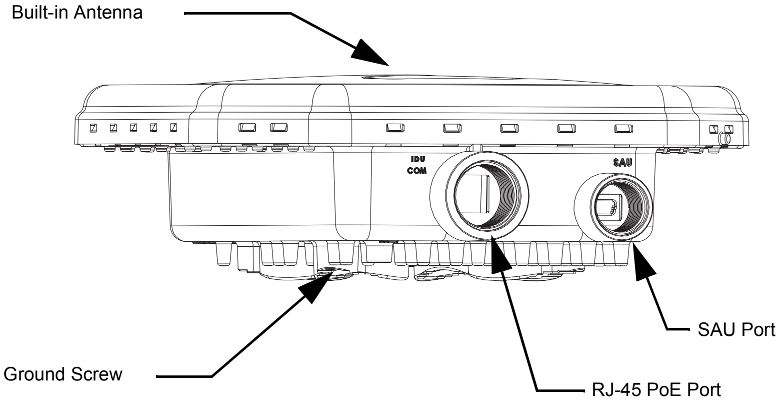


Figure 1-1 ODU Components

Built-in WiMAX Antenna

One high-gain internal antenna is built into the ODU for WiMAX communications. The antenna must be aligned towards the direction of the WiMAX service provider’s base station.

RJ-45 PoE Port

The ODU has one 10BASE-T/100BASE-TX RJ-45 port that connects to the IDU using Ethernet cable. The Ethernet port supports a Power over Ethernet (PoE) connection to the IDU, delivering power from the IDU as well as a data link.

SAU Port

A Subscriber Unit Alignment Unit (SAU) port is included for connecting an optional SAU device that provides indicator status LEDs for antenna alignment.

Weatherproof Port Covers

The ODU includes weatherproof port covers for the RJ-45 and SAU ports. The RJ-45 port cover allows the Ethernet cable to be fed through and conneted to the RJ-45 port. The SAU port cover protects the SAU port when it is not in use.

Ground Screw

The ODU includes its own built-in lightning protection, however it is also important that the unit is properly connected to ground. A grounding screw is provided for attaching a ground wire to the unit.

Pole-Mounting Bracket Kit

The ODU includes a bracket kit that is used to mount the unit to a pole, radio mast, or part of a tower structure.

SAU (Optional)

The SAU device can be connected to the ODU during installation to assist with antenna alignment and testing.

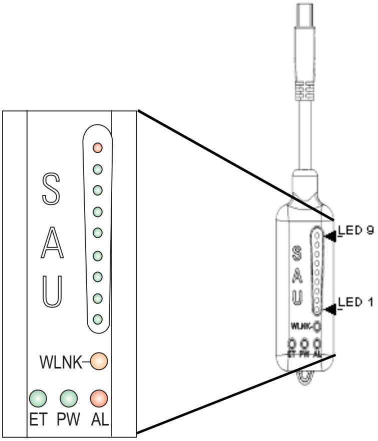


Figure 1-2 SAU LED Indicators

When connected to the ODU, the SAU provides status LED indications as described in the following table.

Table 1-2 SAU LED Indicators

LED	Status	Description
AL (Alarm)	Off	The diagnostic test has passed and the ODU is operating normally.
	On Red	An ODU failure has been detected.
PW (Power)	Off	The ODU is not receiving power or there is an internal 3.3 VDC failure.
	On Green	The SAU is receiving power from the ODU.

Table 1-2 SAU LED Indicators (Continued)

LED	Status	Description
ET (Ethernet)	Off	There is no valid Ethernet link between the ODU and the IDU.
	On Green	There is a valid Ethernet link between the ODU and the IDU.
WLNK (Wireless link)	Off	The ODU is not connected to a base station.
	On Orange	The ODU is connected to and receives services from a base station (Network Entry completed). Link quality is indicated by LEDs 1-9, as described below.
	Blinking Orange	Authentication has failed due to one of the following reasons (indicated by the WiMAX Link LEDs): • If LEDs 6, 7 and 8 are on: Authentication has been rejected by the RADIUS server. • If LEDS 7 and 8 are on: Authentication has been rejected by the base station (due to a duplicate subscriber unit name in its database). • If LED 8 is on: Authentication has failed due to a timeout, or there was a re-authentication failure (connection to the RADIUS server was lost or a mismatched shared secret).
1	On Green	5dB ≤SNR < 10dB
1-2	On Green	10dB ≤SNR < 15dB
1-3	On Green	15dB ≤SNR < 20dB
1-4	On Green	20dB ≤SNR < 24dB
1-5	On Green	SNR ≥ 24dB and RSSI < -75dBm
1-6	On Green	SNR ≥ 24dB and RSSI ≥ -75dBm
1-7	On Green	SNR ≥ 24dB and RSSI ≥ -70dBm
1-8	On Green	SNR ≥ 24dB and RSSI ≥ -60dBm
1-9	1-8 On Green 9 On Red	RSSI ≥ -20dBm (saturation)
1-8 in sequence	Cycle On/Off Green	Indicates a full frequency scan in progress.
5, 4&6, 3&7, 2&8, 1 in sequence	Cycle On/Off Green	Selecting a detected base station with the strongest signal, or a short scan.

Chapter 2: Installing the OD200

This section describes how to install and connect the OD200 WiMAX Residential Gateway.

Package Checklist

The OD200-ODU package includes:

- ODU outdoor WiMAX unit
  (OD200-2.3-ODU, OD200-2.5-ODU, or OD200-3.5-ODU)
- ODU pole-mount bracket kit

Installation Overview

Before installing the OD200, verify that you have all the items listed in the package checklist above. If any of the items are missing or damaged, contact your local dealer. Also, be sure you have all the necessary tools and cabling before installing the OD200.

Hardware installation of the OD200 involves these steps:

1. Mount the ODU on a pole, mast, or tower using the mounting bracket.
2. Install the IDU indoors.
3. Connect the ODU-IDU Ethernet cable and a grounding wire to the ODU.
4. Align the ODU antenna with the base station.

ODU Installation

The ODU includes its own bracket kit for mounting the unit to a 1 to 4 inch diameter steel pole or tube. The pole-mounting bracket allows the unit to be mounted to part of a radio mast or tower structure.

Caution: The planning and installation of the ODU requires professional personnel that are trained in the installation of radio transmitting equipment. The user is responsible for compliance with local regulations concerning items such as building safety codes, use of lightning arrestors, and grounding. Therefore, you must consult a professional contractor knowledgeable in local regulations prior to equipment installation.

ODU Location

The ODU should be installed outdoors, mounted to a pole using the included mounting bracket. When selecting an suitable location for the unit, consider these guidelines:

- The ODU should be installed where it can provide a direct, or near line of sight with the WiMAX base station. Normally, the higher the unit placement, the better the link quality.
- Make sure there are no other radio antennas within 2 m (6 ft) of the ODU.
- Place the ODU away from power and telephone lines.
- Avoid placing the ODU too close to any metallic, refective surfaces, such as roof-installed air-conditioning equipment, wire fences, or water pipes.

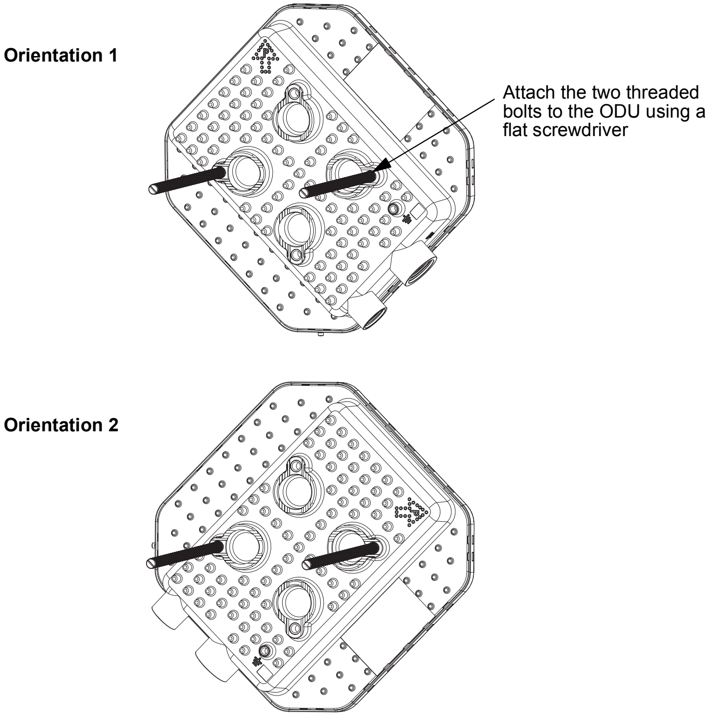
Mount the Unit

The ODU’s pole-mounting bracket attaches directly to the ODU using two long threaded bolts. The bracket has V-shaped edges on one side that clamp the unit to a pole. The bracket allows the ODU to be mounted to a pole in one of two orientations.

Perform the following steps to mount the unit to a 1 to 4 inch diameter steel pole or tube using the mounting bracket:

1. Attach the two threaded bolts to the back of the ODU using a flat screwdriver. Make sure you use the correct threaded holes for the required orientation.

Note: The ODU contains dual polarization antennas so it can be mounted in either orientation. Note that the ODU connectors always face downward.



Orientation 1

Attach the two threaded bolts to the ODU using a flat screwdriver

Orientation 2

Figure 2-1 ODU Orientations

2. Place the ODU against one side of the pole and then fit the bracket onto the threaded bolts. The bracket’s V-shaped edges should be against the pole.

3. Use the included nuts and washers to secure the ODU to the pole. The securing nuts should be just tight enough to hold the ODU to the pole. (The bracket may need to be rotated around the pole during the antenna alignment process.)

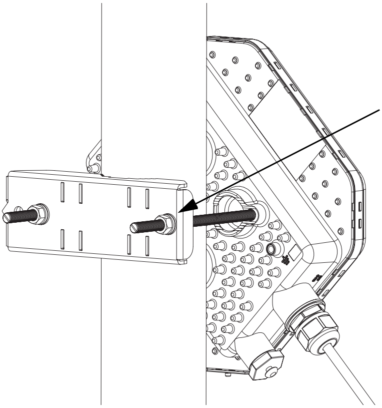


Figure 2-2 Securing the ODU to the Pole

ODU Cable Connections

The ODU needs to be connected to the IDU using Ethernet cable, and the ODU must be grounded by connecting a grounding wire.

ODU-IDU Ethernet Cable Connection

Use outdoor-rated Category 5E or better Ethernet cable with RJ-45 connectors on each end. Before connecting the cable, first plan a cable route from the ODU outdoors to the IDU indoors. Consider these guidelines:

- Make sure the cable length does not exceed 100 meters (328 ft).
- Determine a building entry point for the cable.
- Determine if conduits, bracing, or other structures are required for safety or protection of the cable.
- Be sure to ground the outdoor-rated Ethernet cable immediately before it enters the building. See “Grounding the ODU-IDU Ethernet Cable” on page 2-5.
- For additional lightning protection, it is recommended to use a lightning arrestor immediately before the Ethernet cable enters the building.

Caution: DC VOLTAGE! Do not connect the ODU port to a computer’s RJ-45 port.

To connect the ODU-IDU Ethernet cable, follow these steps:

1. Remove the cover from the IDU COM port on the ODU.
2. Cut the Ethernet cable to the required length and feed it through the port cover. Then use a crimp tool to attach an RJ-45 connector to the Ethernet cable.

Make sure the Ethernet twisted-pair wires are attached to the RJ-45 connector following standard pin assignments. See “Twisted-Pair Cable Assignments” on page C-1.

3. Connect the Ethernet cable to the IDU COM RJ-45 connector.
4. Screw the port cover back into the unit and tighten it to ensure protection against moisture.
5. Seal the IDU COM connector using tar seal or weatherproof tape to protect against rain and moisture.
6. Route the Ethernet cable from the ODU to the IDU following your cable plan and connect it to the ODU port on the IDU. The RJ-45 port LED on the IDU should turn on to indicate a valid link.

Note: Connecting the Ethernet cable to the IDU powers on the ODU.

Grounding the ODU-IDU Ethernet Cable

To comply with safety regulations, the shield of the ODU-IDU outdoor-rated Ethernet cable must be connected to protective ground (earth). The grounding point can be either inside the building, or immediately at the entry point to the building, depending on where a protective ground is available.

Caution: Grounding the ODU-IDU Ethernet cable must be performed by a professional installer in conformance with local safety regulations.

This document proposes one method for grounding the outdoor-rated Category 5E Ethernet cable through its drain wire. The actual connection method employed is left to the professional installer.

To ground the ODU-IDU Ethernet cable, follow these steps:

1. Strip back about a one inch (2.4 cm) section of the Ethernet cable jacket to expose the drain wire.

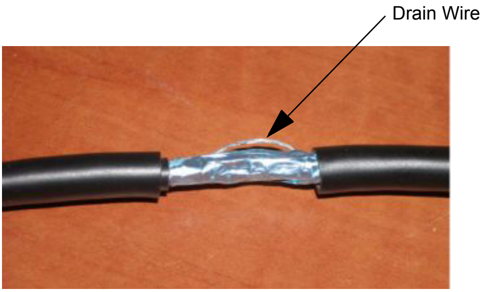


Figure 2-3 ODU-IDU Ethernet Cable Drain Wire

2. Attach a grounding cable to the drain wire and then connect it to protective earth.

3. Use weatherproof tape to cover and seal the attachment area on the Ethernet cable.

Ground Wire Connection

When connecting a ground wire to the ODU, use the grounding screw located on the base of the unit. Be sure to use #14 AWG or larger copper core ground wire.

Caution: Be sure that grounding is available and that it meets local and national electrical codes. Grounding the ODU must be performed by a professional installer.

The ground wire can be connected to a point on the bracket, pole, metal grounding plate, or directly to an earth termination. Make sure that there is a good electrical connection between the ground wire and the grounding point (no paint or isolating surface treatment).

To connect a grounding wire to the ODU, follow these steps:

1. Crimp a ring lug onto the end of the ground wire before connecting it to the unit.
2. Place the ground wire lug on the grounding point and firmly tighten the screw.

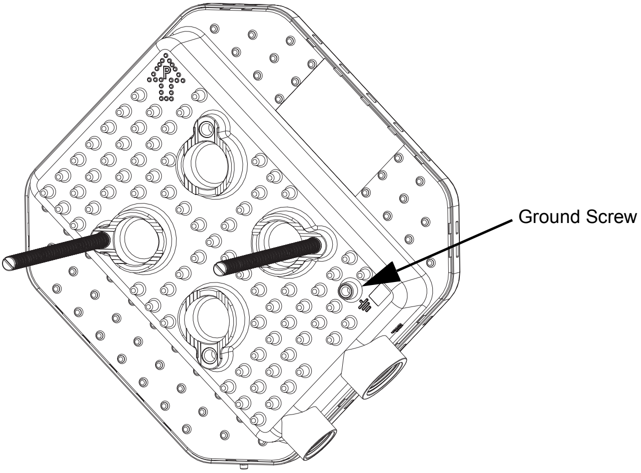


Figure 2-4 ODU Grounding Screw

3. Connect the other end of the grounding wire to a good ground (earth) connection.

Note: Use cable strips to secure all cables to the pole.

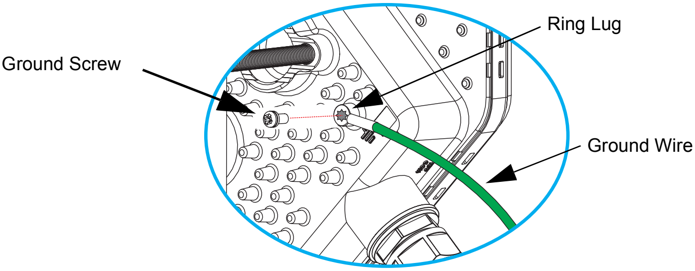


Figure 2-5 Ground Wire Connection

ODU Antenna Alignment

The ODU will provide the best link quality when its antenna is aligned in the direction of the WiMAX base station. The optional SAU can be connected to the ODU to provide status LED indications and assist with antenna alignment.

To align the ODU antenna using the SAU, follow these steps:

1. Remove the cover from the SAU port on the ODU.
2. Connect the SAU device to the SAU port. The PW (power) LED should turn on to indicate that it is properly connected.
3. Point the ODU antenna in the general direction of the base station, then pan the ODU back and forth while watching the link quality LEDs (see Table 1-2).

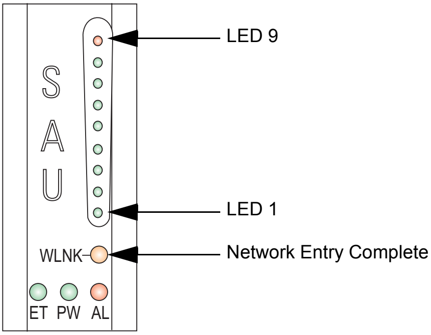


Figure 2-6 SAU LED Indicators

4. Find the point where the link quality is best and secure the ODU in that position. Verify that the SAU's WLNK LED is on, indicating that the unit is synchronized with the base station.

Note: If all the SAU link quality LEDs are on, including LED 9 (red), the received signal strength is too high. Move the ODU's position so that only LEDs 1 to 8 are on.

5. Remove the SAU connection and replace the cover on the port.
6. Seal the SAU connector using tar seal or weatherproof tape to protect against rain and moisture.

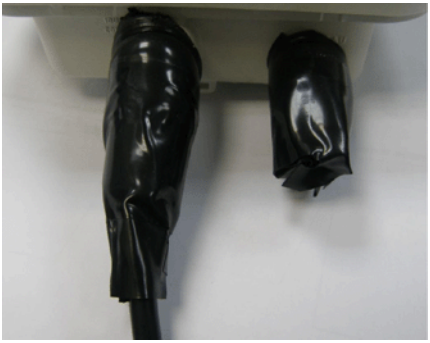


Figure 2-7 Sealed ODU Connectors

Chapter 3: Initial Configuration

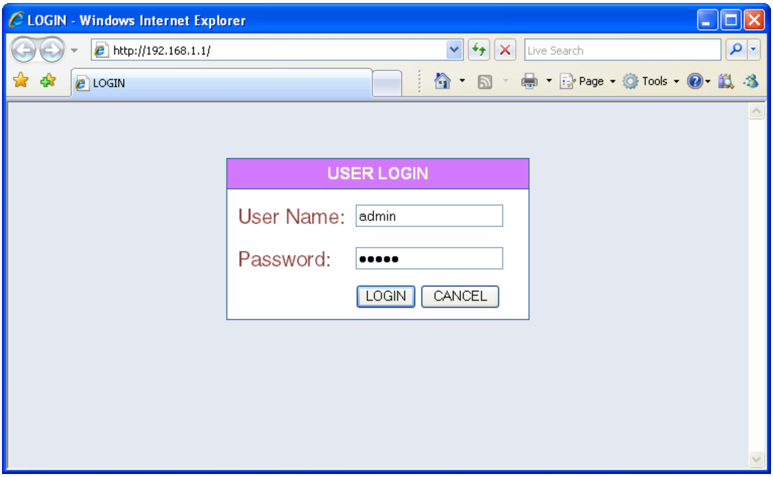
The OD200 can be configured through its web management interface. The web interface provides a simple Basic Setup or Advanced Setup options.

Accessing the Web Management Interface

The OD200 has a default IP address of 192.168.1.1 and a subnet mask of 255.255.255.0. If your PC is set to have an IP address assigned by DHCP (Dynamic Host Configuration Protocol), you can connect immediately to the web management interface. Otherwise, you must first check if your PC's IP address is set on the same subnet as the OD200 (that is, the PC's IP address starts 192.168.1.x).

In the web browser's address bar, type the default IP address: http://192.168.1.1.

The web browser displays the OD200's login page.

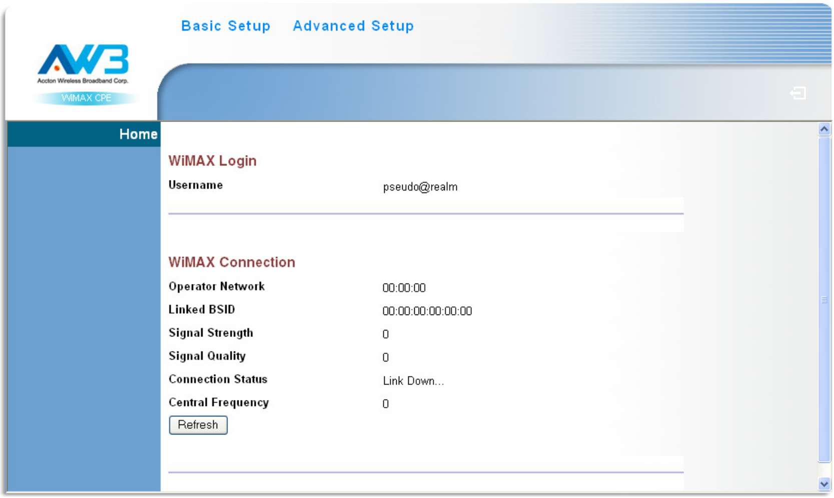


User Name: admin

Password: •••••

Figure 3-1 Login Page

Logging In – Type the default User Name "admin" and Password "admin," then click Login. The home page displays.



WiMAX Login

Username	pseudo@realm

WiMAX Connection

Operator Network	00:00:00
Linked BSID	00:00:00:00:00:00
Signal Strength	0
Signal Quality	0
Connection Status	Link Down...
Central Frequency	0

Refresh

Figure 3-2 Home Page

To configure basic settings for the current operating mode, click Basic Setup. For more information, see “Initial Configuration” on page 3-1.

Alternatively, to configure more detailed settings, click Advanced Setup. For more information, see “The Advanced Setup Menu” on page 3-5.

Note: It is recommended that you configure a user password as the first step under “Administrator Settings” on page 4-3 to control management access to the unit.

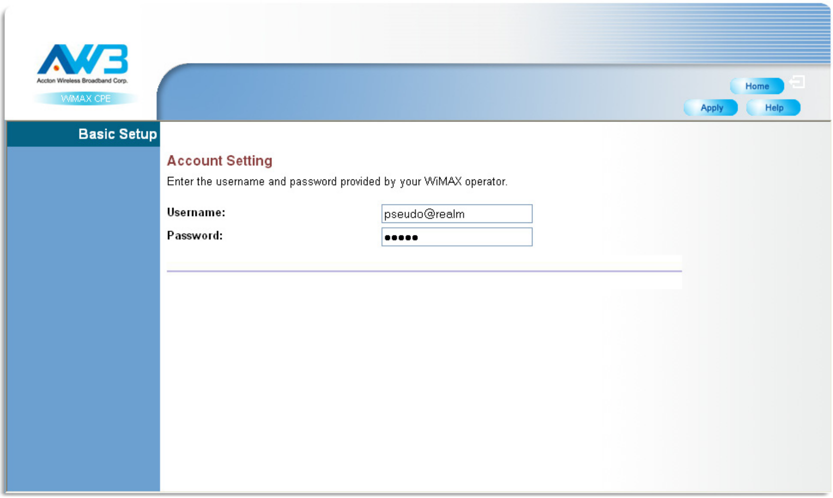
Using the Basic Setup

The Basic Setup takes you through the basic configuration steps for the OD200.

Launching the Basic Setup – To perform basic configuration, click Basic Setup on the home page.

When configuring the unit through the Basic Setup you will need to proceed through the following steps:

1. **WiMAX Login** – Configures user authentication settings for connection to the WiMAX network.



Account Setting

Enter the username and password provided by your WiMAX operator.

Username: pseudo@realm

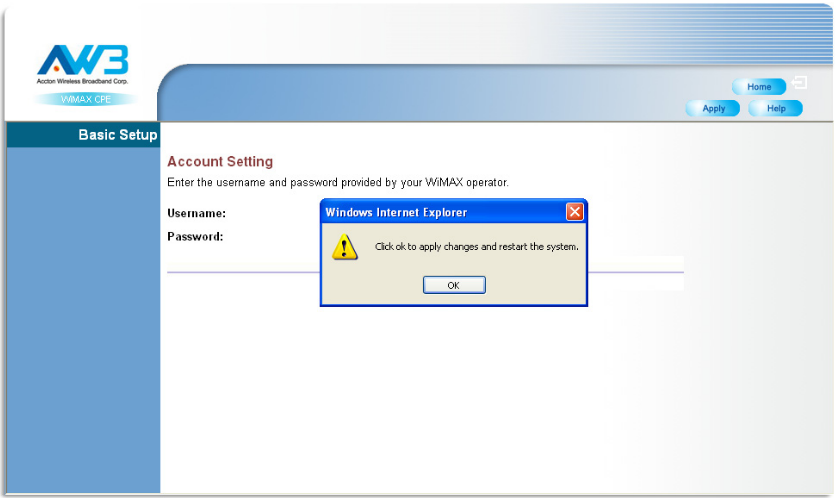
Password: •••••

Figure 3-3 WiMAX Login

User Name – The user name required for authentication as provided by the WiMAX operator. (Default: pseudo@realm)

Password – The user password required for authentication as provided by the WiMAX operator. (Default: hello)

2. **Apply Settings** – Click “Apply” to confirm the basic settings.



Account Setting

Enter the username and password provided by your WiMAX operator.

Username:

Password:

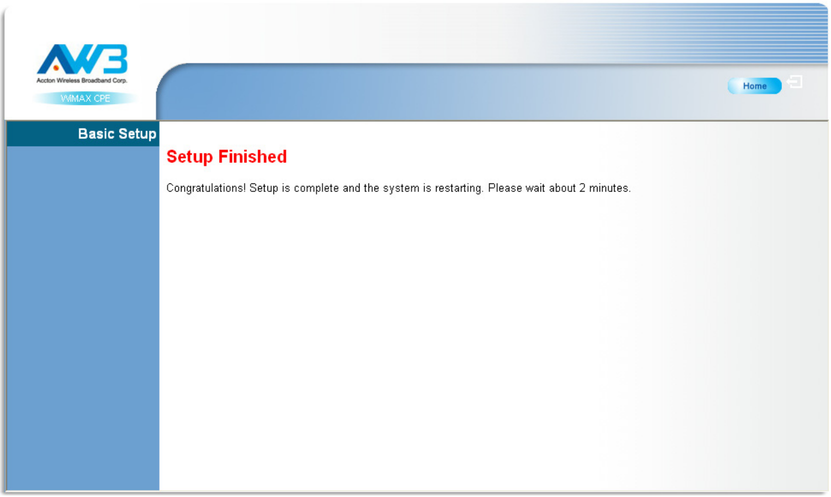
Windows Internet Explorer

Click ok to apply changes and restart the system.

OK

Figure 3-4 Apply Settings

3. **Basic Setup Finished** – When the Basic Setup steps are completed the unit reboots and attempts to connect to the specified WiMAX network. Click on the Home button to return to the Home page.



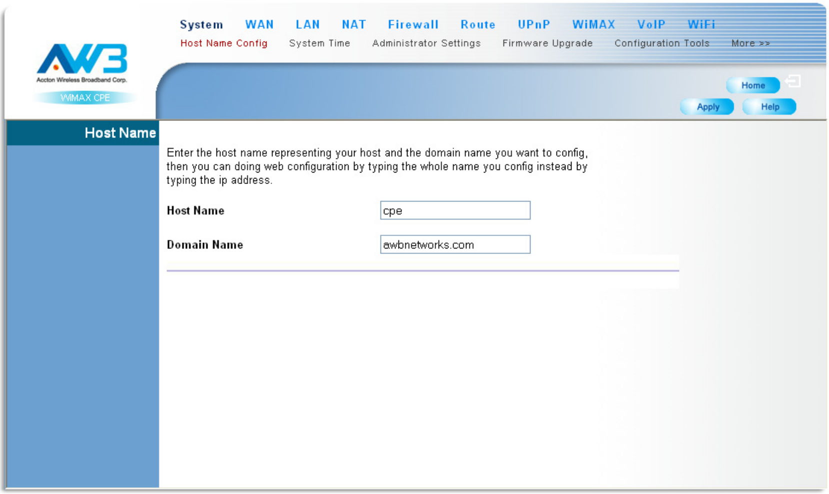
Setup Finished

Congratulations! Setup is complete and the system is restarting. Please wait about 2 minutes.

Figure 3-5 Basic Setup Finished

The Advanced Setup Menu

The Advanced Setup menu provides access to all the configuration settings available for the OD200.


System WAN LAN NAT Firewall Route UPnP WiMAX VoIP WiFi
Host Name Config System Time Administrator Settings Firmware Upgrade Configuration Tools More >>
AW3
Accton Wireless Broadband Corp.
WiMAX CPE
Home
Apply
Help
Host Name

Enter the host name representing your host and the domain name you want to config, then you can doing web configuration by typing the whole name you config instead by typing the ip address.

Host Name	cpe
Domain Name	awbnetworks.com

Figure 3-6 Advanced Setup

Each primary menu item is sumarized below with links to the relevant section in this guide where configuration parameters are described in detail:

• **System** – Configures general device settings.	see page 4-1
• **WAN** – Configures WAN settings.	see page 5-2
• **LAN** – Configures LAN settings.	see page 5-8
• **NAT** – Configures Network Address Translation settings.	see page 5-9
• **Firewall** – Configures firewall settings.	see page 5-12
• **Route** – Configures static routing settings.	see page 5-16
• **UPnP** – Enables UPnP.	see page 5-17
• **WiMAX** – Views the wireless connection status.	see page 6-1
• **VoIP** – Configures VoIP SIP settings.	see page 7-1
• **WiFi** – Configures 802.11 access point settings.	see page 8-1

Chapter 4: System Settings

The gateway's System menu allows you to perform general management functions for the unit, including setting the system time, configuring an access password, and upgrading the system software.

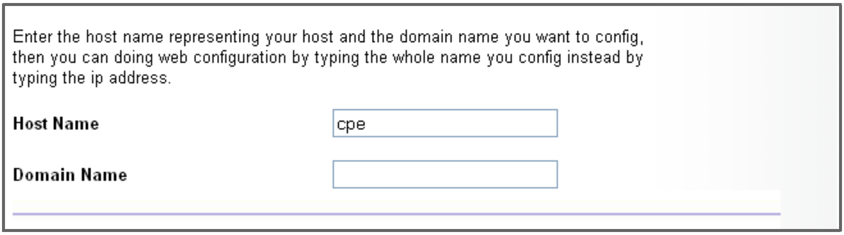
The System pages include the following options.

Table 4-1 System Settings

Menu	Description	Page
Host Name Config	Configures a host name and domain name	4-1
System Status	Displays WAN and LAN interface information and other system details	4-2
Administrator Settings	Configures user password for management access	4-3
Firmware Upgrade	Updates the current firmware	4-4
Configuration Tools	Restores the factory default settings, or save the unit's current settings	4-4
System Time	Configures the system time settings for updates from a time server	4-6
System Log	Displays event log entries	4-7
Reset	Resets the device	4-8

Host Name

The gateway allows you to define a name that identifies your unit and the domain name used by the local network. Setting a host name enables the web interface to be accessed using an easy-to-remember name instead of its IP address.



Enter the host name representing your host and the domain name you want to config, then you can doing web configuration by typing the whole name you config instead by typing the ip address.

Host Name cpe

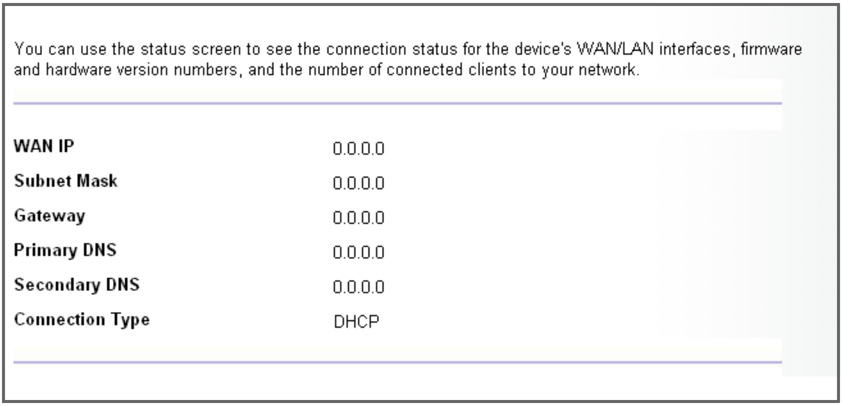
Domain Name

Figure 4-1 System Host Name

- **Host Name** – Enter the name chosen for the unit. (Default: cpe)
- **Domain Name** – Enter the domain to which the unit is connected.

System Status

The system status page displays connectivity status information for the unit's WiMAX (WAN) and LAN interfaces, firmware and hardware version numbers, and the number of clients connected to your network.



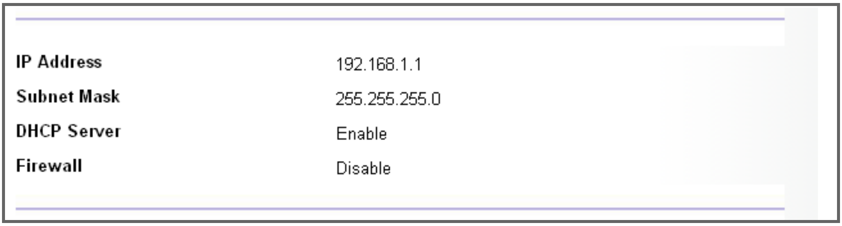
You can use the status screen to see the connection status for the device's WAN/LAN interfaces, firmware and hardware version numbers, and the number of connected clients to your network.

WAN IP	0.0.0.0
Subnet Mask	0.0.0.0
Gateway	0.0.0.0
Primary DNS	0.0.0.0
Secondary DNS	0.0.0.0
Connection Type	DHCP

Figure 4-2 System Status – Internet

INTERNET – Displays WAN (WiMAX) connection status:

- **WAN IP** – Displays the IP address assigned by the service provider.
- **Subnet Mask** – Displays the WAN subnet mask assigned by the service provider.
- **Gateway** – Displays the WAN gateway address assigned by the service provider.
- **Primary DNS** – Displays the WAN primary Domain Name System server address.
- **Secondary DNS** – Displays the WAN secondary Domain Name System server address.
- **Connection Type** – Displays the connection type for the WAN. Either FIXED for a static IP setting, or DHCPC for dynamic IP assignment.



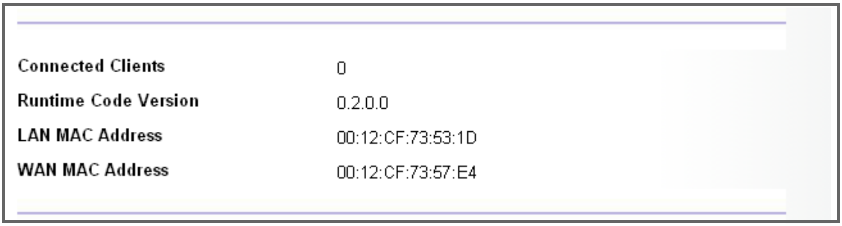
IP Address	192.168.1.1
Subnet Mask	255.255.255.0
DHCP Server	Enable
Firewall	Disable

Figure 4-3 System Status – Gateway

GATEWAY – Display system IP settings, as well as DHCP, NAT and firewall status:

- **IP Address** – Displays the unit's IP address.
- **Subnet Mask** – Displays the subnet mask.

- **DHCP Server** – Displays the DHCP server status.
- **Firewall** – Displays the firewall status.



Connected Clients	0
Runtime Code Version	0.2.0.0
LAN MAC Address	00:12:CF:73:53:1D
WAN MAC Address	00:12:CF:73:57:E4

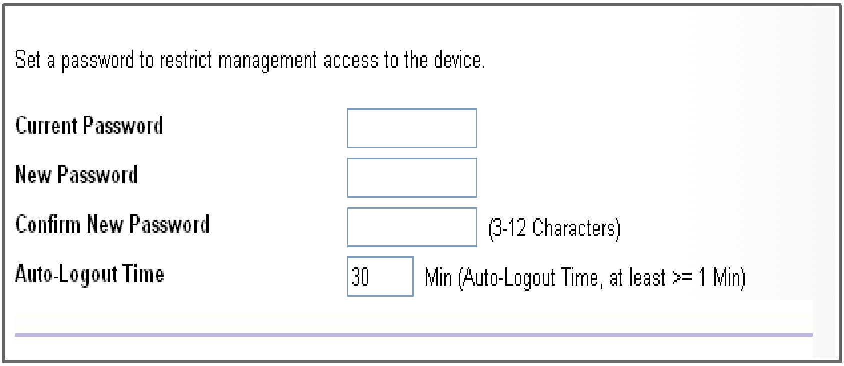
Figure 4-4 System Status – Information

INFORMATION – Displays the number of connected clients, as well as the unit's LAN and WAN MAC addresses:

- **Connected Clients** – Displays the number of connected clients, if any.
- **Runtime Code Version** – Displays the runtime code version.
- **LAN MAC Address** – Displays the LAN MAC address.
- **WAN MAC Address** – Displays WAN MAC address.

Administrator Settings

The Administrator Settings page enables you to change the default password for management access to the gateway.



Set a password to restrict management access to the device.

Current Password

New Password

Confirm New Password (3-12 Characters)

Auto-Logout Time 30 Min (Auto-Logout Time, at least >= 1 Min)

Figure 4-5 Setting a Password

Current Password – You need to first enter your current administrator password to be able to configure a new one. (Default: admin)

New Password – Enter a new administrator password. (Range: 3~12 characters)

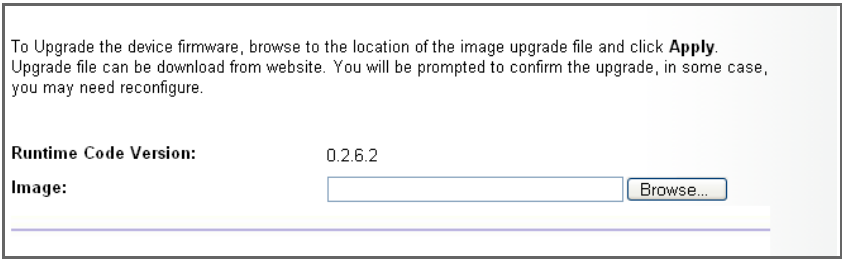
Confirm New Password – Enter the new password again for verification. (Range: 3~12 characters)

Auto-Logout Time – The time of inactivity after which the unit terminates a web management session. (Default: 30 minutes; Range: 1~99 minutes)

NMS IP Address – The IP address of a network management station on the operator's network. The unit will send SNMP trap messages to a management station when the operator's DHCP server does not return an IP address to the gateway.

Firmware Update

The Firmware Update page enables you to download new software to the unit.



To Upgrade the device firmware, browse to the location of the image upgrade file and click **Apply**. Upgrade file can be download from website. You will be prompted to confirm the upgrade, in some case, you may need reconfigure.

Runtime Code Version: 0.2.6.2

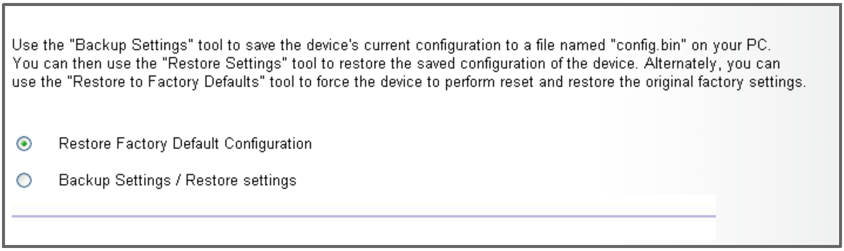
Image:

Figure 4-6 Firmware Update

Firmware Update – Downloads an operation code file from the web management station to the gateway using HTTP. Use the Browse button to locate the code file locally on the management station and click Apply to proceed.

Configuration Tools

The Configurations Tools page allows you to restore factory default settings, or save and restore the unit's configuration settings to or from a file on the management station.



Use the "Backup Settings" tool to save the device's current configuration to a file named "config.bin" on your PC. You can then use the "Restore Settings" tool to restore the saved configuration of the device. Alternately, you can use the "Restore to Factory Defaults" tool to force the device to perform reset and restore the original factory settings.

● Restore Factory Default Configuration

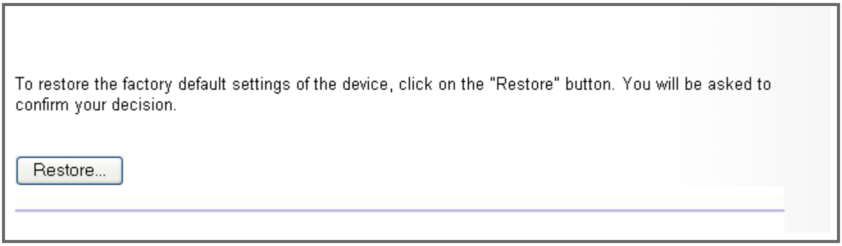
○ Backup Settings / Restore settings

Figure 4-7 Configuration Tools

Restore Factory Default Configuration – Resets the unit to its factory default settings.

Backup Settings/Restore Settings – When selected, prompts either to backup the current configuration to a file, or select a previously backed up file to restore to the unit.

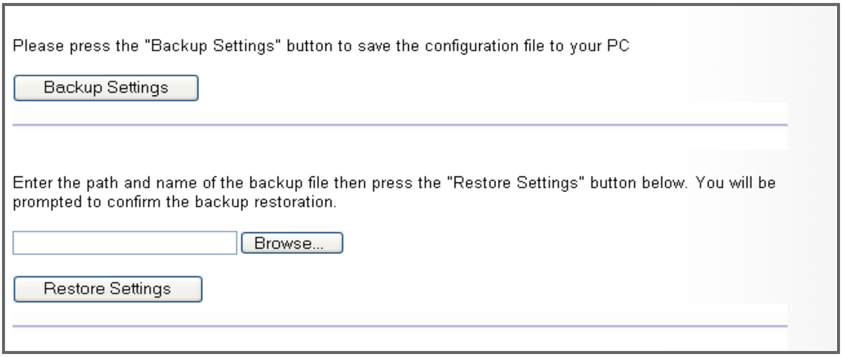
When you select “Restore Factory Default Configuration” and click Apply, a confirmation page displays. Click the Restore button to continue.



To restore the factory default settings of the device, click on the "Restore" button. You will be asked to confirm your decision.

Figure 4-8 Restore Factory Default Configuration

When you select “Backup Settings/Restore Settings” and click Apply, The following page displays.



Please press the "Backup Settings" button to save the configuration file to your PC

Enter the path and name of the backup file then press the "Restore Settings" button below. You will be prompted to confirm the backup restoration.

Figure 4-9 Backup/Restore Settings

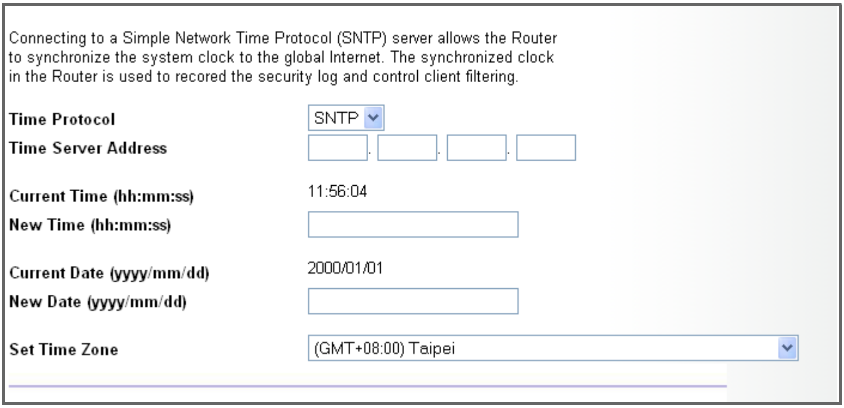
Backup Settings – Saves the current configuration settings to a file named “config.bin” on the web management station.

Restore Settings – Restores a saved configuration file to the unit. You can use the Browse button to locate the file on the web management station.

System Time

The gateway uses the Simple Network Time Protocol (SNTP) to set its internal clock based on periodic updates from a time server. Maintaining an accurate time on the device enables the system log to record meaningful dates and times for event entries.

SNTP uses Coordinated Universal Time (or UTC, formerly Greenwich Mean Time, or GMT) based on the time at the Earth's prime meridian, zero degrees longitude. To display a time corresponding to your local time, you must select your time zone.



Connecting to a Simple Network Time Protocol (SNTP) server allows the Router to synchronize the system clock to the global Internet. The synchronized clock in the Router is used to recored the security log and control client filtering.

Time Protocol	SNTP
Time Server Address	. . .
Current Time (hh:mm:ss)	11:56:04
New Time (hh:mm:ss)	
Current Date (yyyy/mm/dd)	2000/01/01
New Date (yyyy/mm/dd)	
Set Time Zone	(GMT+08:00) Taipei

Figure 4-10 System Time

Time Protocol – Select SNTP to enable the unit to set its internal clock based on periodic updates from a time server. The unit acts as an SNTP client, periodically sending time synchronization requests to a specified time server. Alternatively, you can select "None" and set the time and date manually. (Default: SNTP)

Time Server Address – The IP address of a time server that the unit attempts to poll for a time update. (Default: 192.43.244.18)

Current Time (hh:mm:ss) – Displays the current time of the system clock.

New TIme (hh:mm:ss) – Sets the system clock to the time specified.

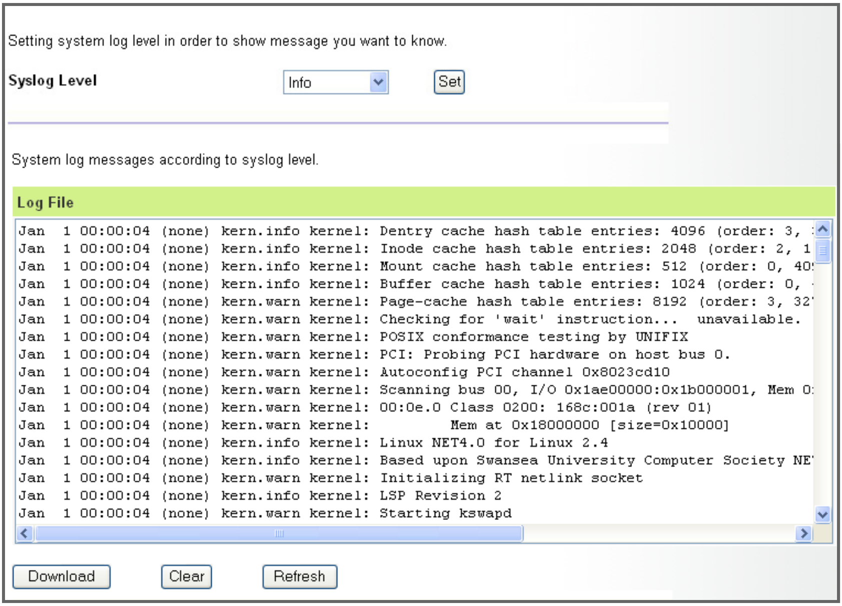
Current Date (yyyy:mm:dd) – Displays the current date of the system clock.

New Date (yyyy:mm:dd) – Sets the system clock to the date specified.

Set Time Zone – SNTP uses Coordinated Universal Time (or UTC, formerly Greenwich Mean Time, or GMT) based on the time at the Earth's prime meridian, zero degrees longitude. To display a time corresponding to your local time, you must select your time zone from the pull-down list. (Default: (GMT+08:00) Taipei)

System Log

The System Log page allows you to display system event messages. The logged messages can serve as a valuable tool for isolating device and network problems, and also indicate if any unauthorized attempts have been made to gain access to your network.



Setting system log level in order to show message you want to know.

Syslog Level: Info

System log messages according to syslog level.

Log File

```
Jan  1 00:00:04 (none) kern.info kernel: Dentry cache hash table entries: 4096 (order: 3,
Jan  1 00:00:04 (none) kern.info kernel: Inode cache hash table entries: 2048 (order: 2, 1
Jan  1 00:00:04 (none) kern.info kernel: Mount cache hash table entries: 512 (order: 0, 40
Jan  1 00:00:04 (none) kern.info kernel: Buffer cache hash table entries: 1024 (order: 0,
Jan  1 00:00:04 (none) kern.warn kernel: Page-cache hash table entries: 8192 (order: 3, 32
Jan  1 00:00:04 (none) kern.warn kernel: Checking for 'wait' instruction...  unavailable.
Jan  1 00:00:04 (none) kern.warn kernel: POSIX conformance testing by UNIFIX
Jan  1 00:00:04 (none) kern.warn kernel: PCI: Probing PCI hardware on host bus 0.
Jan  1 00:00:04 (none) kern.warn kernel: Autoconfig PCI channel 0x8023cd10
Jan  1 00:00:04 (none) kern.warn kernel: Scanning bus 00, I/O 0x1ae00000:0x1b000001, Mem 0
Jan  1 00:00:04 (none) kern.warn kernel: 00:0e.0 Class 0200: 168c:001a (rev 01)
Jan  1 00:00:04 (none) kern.warn kernel:         Mem at 0x18000000 [size=0x10000]
Jan  1 00:00:04 (none) kern.info kernel: Linux NET4.0 for Linux 2.4
Jan  1 00:00:04 (none) kern.info kernel: Based upon Swansea University Computer Society NE
Jan  1 00:00:04 (none) kern.warn kernel: Initializing RT netlink socket
Jan  1 00:00:04 (none) kern.info kernel: LSP Revision 2
Jan  1 00:00:04 (none) kern.warn kernel: Starting kswapd
```

Figure 4-11 System Log

Syslog Level – Sets the minimum severity level for event logging. The system allows you to limit the messages that are logged by specifying a minimum severity level. Error message levels range from the most severe (Emergency) to least severe (Debug). The message levels that are logged include the specified minimum level up to the Emergency level. (Default: Info)

Download – Downloads the current log file to the web management station.

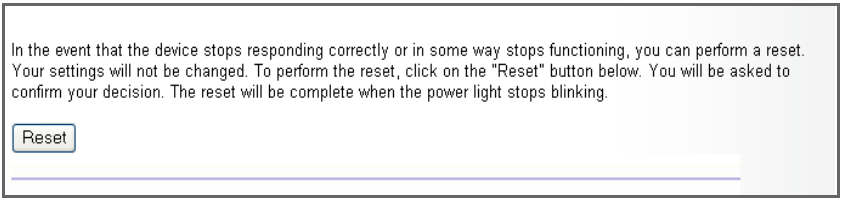
Clear – Deletes all entries in the current log file.

Refresh – Updates the displayed log entries on the web page.

Note: Log messages saved in the unit's memory are erased when the device is rebooted.

Reset

The Reset page allows you to restart the device's software. If the unit stops responding correctly or in some way stops functioning, performing a reset can clear the condition.



In the event that the device stops responding correctly or in some way stops functioning, you can perform a reset. Your settings will not be changed. To perform the reset, click on the "Reset" button below. You will be asked to confirm your decision. The reset will be complete when the power light stops blinking.

Figure 4-12 Reset Unit

Reset – Resets the unit. All current settings are retained.

Chapter 5: Gateway Configuration

The information in this chapter covers the configuration options for the OD200's Internet gateway functions.

The OD200 provides comprehensive firewall features and NAT isolation for Internet traffic passing from the WiMAX service provider to the local network connected to the LAN ports. The DHCP server feature can assign IP addresses for up to 32 local network PCs and wireless clients.

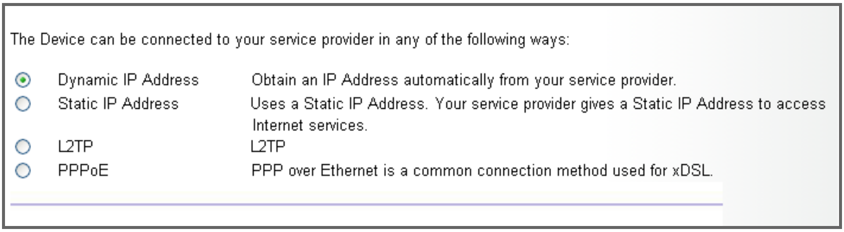
The Advanced Setup menu includes the following items for Internet gateway configuration.

Table 5-1 Gateway Configuration

Menu	Description	Page
WAN		5-2
WAN Settings	Sets the connection method of your Internet service provider	5-2
DNS	Specifies DNS servers that you want to access	5-6
SNMP IP Setting	Sets SNMP management IP filters	5-7
LAN		5-8
LAN Settings	Sets the unit's IP address and configures the DHCP server for the local network	5-8
DHCP Client List	Displays connected DHCP clients that have been assigned IP addresses by the DHCP server	5-9
NAT		5-9
Virtual Server	Allows the unit to be configured as a virtual server	5-9
Port Mapping	Enables IP port mapping for special applications	5-11
DMZ	Allows clients to connect to the unit directly bypassing the firewall	5-12
Firewall		5-12
Firewall Setting	Controls access to and from the local network	5-12
Firewall Options	Blocks scans of the network services from an outside hacker	5-12
Client Filtering	Blocks Internet access based on IP addresses	5-14
MAC Control	Blocks internet access based on MAC addresses	5-15
Route		5-16
Routing Table List	Displays the routing table	5-16
UPnP		5-17
Settings	Provides support for Universal Plug and Play devices	5-17

WAN Settings

Select the WAN connection type used by your service provider and specify DNS (Domain Name System) servers.



The Device can be connected to your service provider in any of the following ways:

●	Dynamic IP Address	Obtain an IP Address automatically from your service provider.
○	Static IP Address	Uses a Static IP Address. Your service provider gives a Static IP Address to access Internet services.
○	L2TP	L2TP
○	PPPoE	PPP over Ethernet is a common connection method used for xDSL.

Figure 5-1 WAN Settings

The unit can be connected to your ISP in one of the following ways:

Dynamic IP Address – Selects configuration for an Internet connection using DHCP for IP address assignment. This is the default setting.

Static IP Address – Selects configuration for an Internet connection using a fixed IP assignment.

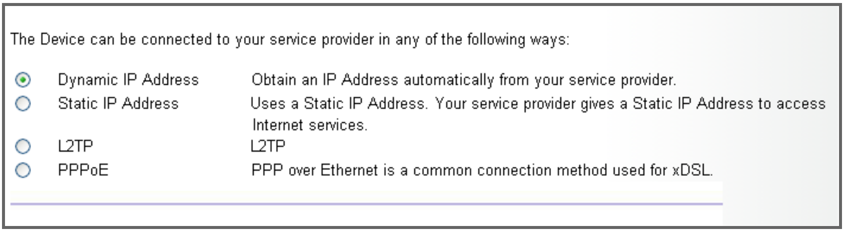
L2TP – Selects configuration for an Internet connection using the Layer 2 Tunneling Protocol, an access protocol often used for virtual private networks.

PPPoE – Selects configuration for an Internet connection using the Point-to-Point Protocol over Ethernet (PPPoE), a common connection method used for DSL access.

Note: For the Dynamic IP Address (DHCP) option, the unit requires no further configuration. Selecting other WAN types displays the parameters that are required for configuring the connection.

Dynamic IP Address

For dynamic IP assignment from the service provider, the unit functions as a Dynamic Host Configuration Protocol (DHCP) client. When enabled, no other settings are required.



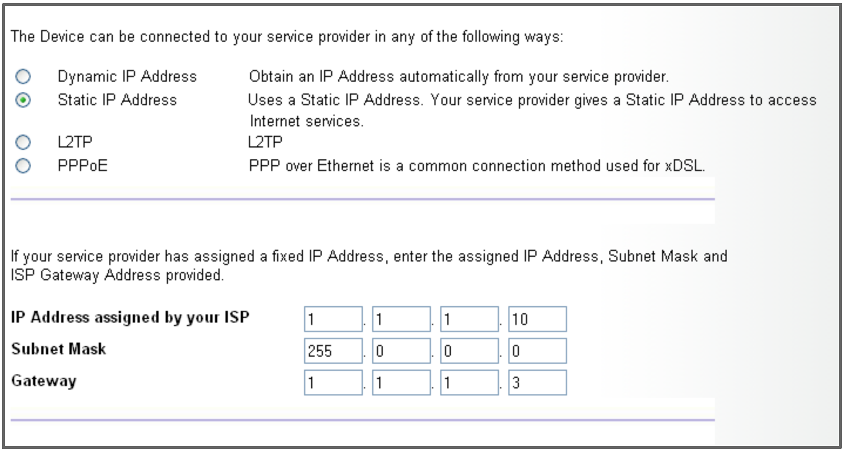
The Device can be connected to your service provider in any of the following ways:

● Dynamic IP Address — Obtain an IP Address automatically from your service provider.
○ Static IP Address — Uses a Static IP Address. Your service provider gives a Static IP Address to access Internet services.
○ L2TP — L2TP
○ PPPoE — PPP over Ethernet is a common connection method used for xDSL.

Figure 5-2 Dynamic IP Address

Static IP Settings

Selecting Static IP Address for the WAN type enables you to enter static IP settings as assigned by the service provider.



The Device can be connected to your service provider in any of the following ways:

○ Dynamic IP Address — Obtain an IP Address automatically from your service provider.
● Static IP Address — Uses a Static IP Address. Your service provider gives a Static IP Address to access Internet services.
○ L2TP — L2TP
○ PPPoE — PPP over Ethernet is a common connection method used for xDSL.

If your service provider has assigned a fixed IP Address, enter the assigned IP Address, Subnet Mask and ISP Gateway Address provided.

IP Address assigned by your ISP 1 . 1 . 1 . 10
Subnet Mask 255 . 0 . 0 . 0
Gateway 1 . 1 . 1 . 3

Figure 5-3 Static IP Settings

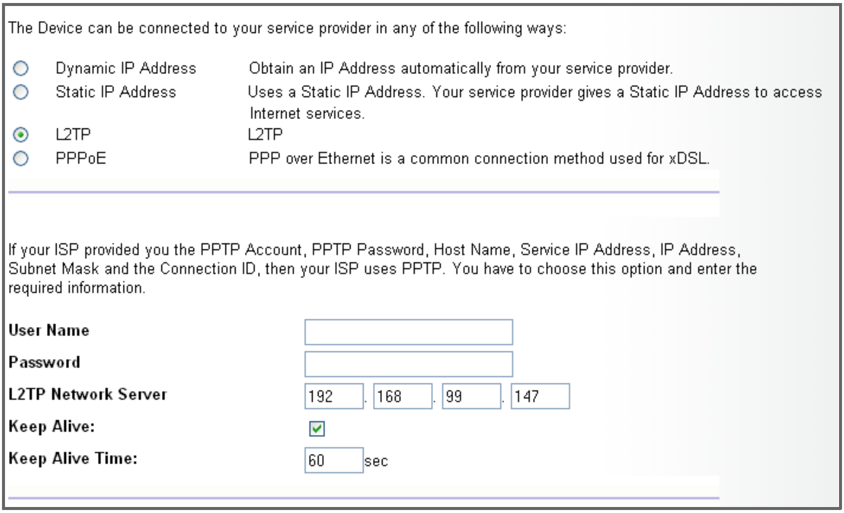
IP Address assigned by your ISP – The IP address provided by your service provider. Valid IP addresses consist of four decimal numbers, 0 to 255, separated by periods.

Subnet Mask – Indicates the subnet mask, such as 255.255.255.0.

Gateway – The gateway IP address provided by your service provider.

L2TP Settings

If your service provider supports Layer 2 Tunneling Protocol (L2TP) for your Internet connection, configure the settings described below.



The Device can be connected to your service provider in any of the following ways:

○	Dynamic IP Address	Obtain an IP Address automatically from your service provider.
○	Static IP Address	Uses a Static IP Address. Your service provider gives a Static IP Address to access Internet services.
●	L2TP	L2TP
○	PPPoE	PPP over Ethernet is a common connection method used for xDSL.

If your ISP provided you the PPTP Account, PPTP Password, Host Name, Service IP Address, IP Address, Subnet Mask and the Connection ID, then your ISP uses PPTP. You have to choose this option and enter the required information.

User Name	
Password	
L2TP Network Server	192 . 168 . 99 . 147
Keep Alive:	☑
Keep Alive Time:	60 sec

Figure 5-4 L2TP Settings

User Name – Enter your user name for connecting to the L2TP service, as supplied by the service provider. (Range: 1-32 characters)

Password – Specify the password for your connection, as supplied by the service provider. (Default: No password)

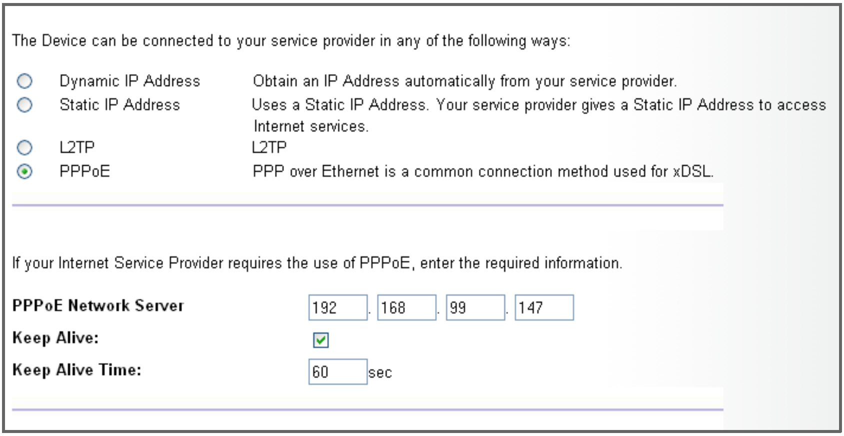
L2TP Network Server – The IP address of the L2TP server, as specified by the service provider.

Keep Alive – This option enables the unit to check periodically that the L2TP connection is still operating. If the connection is found to be lost, the unit automatically attempts to reconnect to the service provider. (Default: Enabled)

Keep Alive Time – The time period the unit waits before checking that the L2TP connection is still operating. This parameter only applies when Keep Alive is enabled. (Default: 60 seconds; Range: 10-180 seconds)

PPPoE Settings

If your service provider supports Point-to-Point Protocol over Ethernet (PPPoE) for your Internet connection, configure the settings described below.



The Device can be connected to your service provider in any of the following ways:

○	Dynamic IP Address	Obtain an IP Address automatically from your service provider.
○	Static IP Address	Uses a Static IP Address. Your service provider gives a Static IP Address to access Internet services.
○	L2TP	L2TP
●	PPPoE	PPP over Ethernet is a common connection method used for xDSL.

If your Internet Service Provider requires the use of PPPoE, enter the required information.

PPPoE Network Server 192 . 168 . 99 . 147

Keep Alive: ☑

Keep Alive Time: 60 sec

Figure 5-5 PPPoE Settings

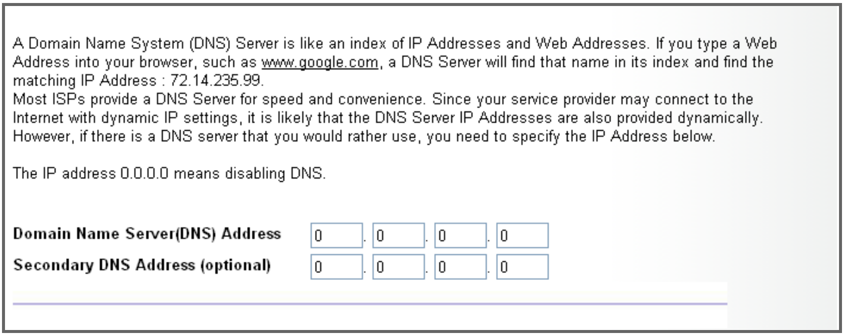
PPPoE Network Server – The IP address of the PPPoE server, as specified by the service provider.

Keep Alive – This option enables the unit to check periodically that the PPPoE connection is still operating. If the connection is found to be lost, the unit automatically attempts to reconnect to the service provider. (Default: Enabled)

Keep Alive Time – The time period the unit waits before checking that the PPPoE connection is still operating. This parameter only applies when Keep Alive is enabled. (Default: 60 seconds; Range: 10-180 seconds)

DNS

DNS (Domain Name System) server addresses are usually provided by service providers, however if you want to specify certain servers, the DNS page enables you to enter primary and secodary DNS addresses.



A Domain Name System (DNS) Server is like an index of IP Addresses and Web Addresses. If you type a Web Address into your browser, such as www.google.com, a DNS Server will find that name in its index and find the matching IP Address : 72.14.235.99.
Most ISPs provide a DNS Server for speed and convenience. Since your service provider may connect to the Internet with dynamic IP settings, it is likely that the DNS Server IP Addresses are also provided dynamically. However, if there is a DNS server that you would rather use, you need to specify the IP Address below.

The IP address 0.0.0.0 means disabling DNS.

Domain Name Server(DNS) Address 0 . 0 . 0 . 0
Secondary DNS Address (optional) 0 . 0 . 0 . 0

Figure 5-6 DNS Settings

Domain Name Server (DNS) Address – Address of the primary DNS server, specified in the form of 0.0.0.0. (The default address 0.0.0.0 disables the manual DNS setting.)

Secondary DNS Address (optional) – Optional address of a secondary DNS server, specified in the form of 0.0.0.0.

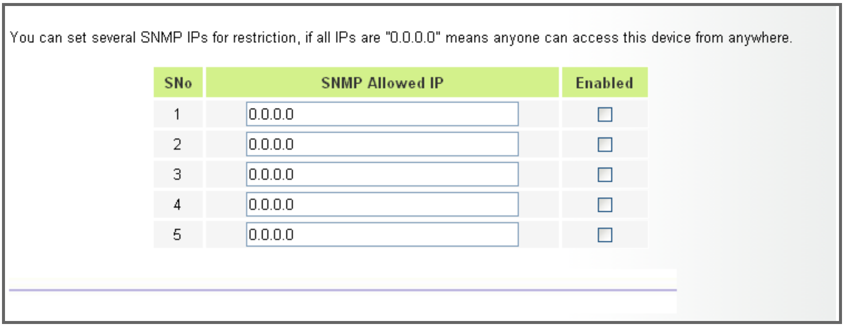
SNMP IP Setting

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

The gateway includes an agent that supports SNMP version 1 and 2c access. A network management station can access the gateway using SNMP management software. To implement SNMP management, the gateway must first have an assigned IP address and subnet mask.

Access to the gateway using SNMP v1 and v2c is controlled by community strings. To communicate with the gateway, the management station must first submit a valid community string for authentication. In addition, the SNMP management station IP must be configured on the gateway to permit SNMP access.

The default community strings for the gateway are “public” for read-only access, and “private” for read/write access. The default community strings can be changed only through SNMP management software.



You can set several SNMP IPs for restriction, if all IPs are "0.0.0.0" means anyone can access this device from anywhere.

SNo	SNMP Allowed IP	Enabled
1	0.0.0.0	□
2	0.0.0.0	□
3	0.0.0.0	□
4	0.0.0.0	□
5	0.0.0.0	□

Figure 5-7 SNMP IP Setting

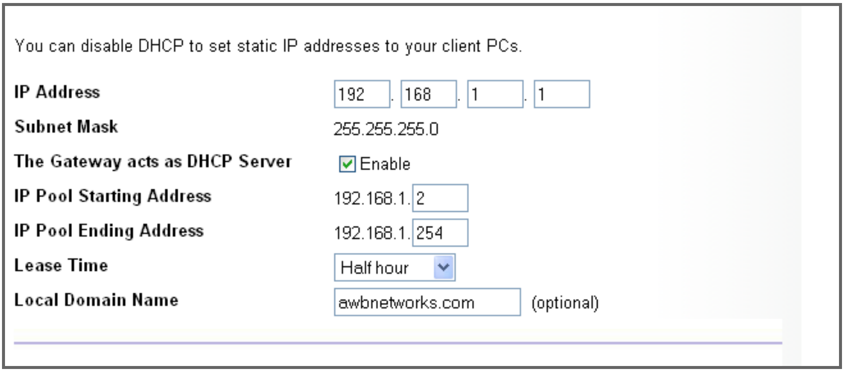
SNMP Allowed IP – The list of management station IPs that are permitted SNMP access to the gateway. Up to five IP addresses can be configured for management access. Check the Enabled checkbox to enable a configured IP address.

LAN

The OD200 must have a valid IP address for management using a web browser and to support other features. The unit has a default IP address of 192.168.1.1. You can use this IP address or assign another address that is compatible with your existing local network. The unit can also be enabled as a Dynamic Host Configuration Protocol (DHCP) server to allocate IP addresses to local PCs.

LAN Settings

The OD200 includes a DHCP server that can assign temporary IP addresses to any attached host requesting the service. Addresses are assigned to clients from a common address pool configured on the unit. Configure an address pool by specifying start and end IP addresses. Be sure not to include the unit's IP address in the address pool range.



You can disable DHCP to set static IP addresses to your client PCs.

IP Address	192 . 168 . 1 . 1
Subnet Mask	255.255.255.0
The Gateway acts as DHCP Server	☑ Enable
IP Pool Starting Address	192.168.1. 2
IP Pool Ending Address	192.168.1. 254
Lease Time	Half hour
Local Domain Name	awbnetworks.com (optional)

Figure 5-8 LAN Settings

IP Address – The IP address of the unit. Valid IP addresses consist of four decimal numbers, 0 to 255, separated by periods.The default setting is 192.168.1.1.

Subnet Mask – Indicates the local subnet mask is fixed as 255.255.255.0.

The Gateway acts as DHCP Server – Check this box to enable the DHCP server.

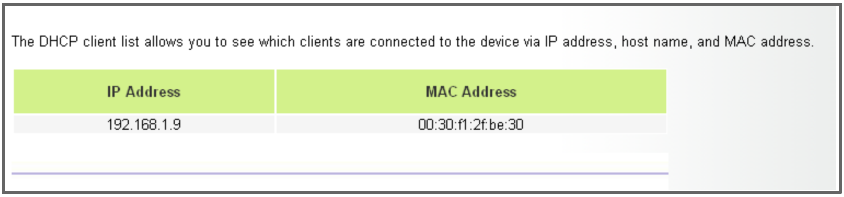
IP Pool Starting/Ending Address – Specifies the start and end IP address of a range that the DHCP server can allocate to DHCP clients. You can specify a single address or an address range. Note that the address pool range is always in the same subnet as the unit’s IP setting. (Default: 192.168.1.2 to 192.168.1.254)

Lease Time – Selects a time limit for the use of an IP address form the IP pool. When the time limit expires, the client has to request a new IP address. (Default: Half hour; Options: Half hour, one hour, two hours, half day, one day, two days, one week, two weeks)

Local Domain Name – This optional parameter specifies the name of the domain the unit is attached to.

DHCP Client List

The DHCP Client List page enables you to see the MAC address of devices that are currently connected to the unit and have been assigned an IP address by the DHCP server.



The DHCP client list allows you to see which clients are connected to the device via IP address, host name, and MAC address.

IP Address	MAC Address
192.168.1.9	00:30:f1:2f:be:30

Figure 5-9 DHCP Client List

NAT

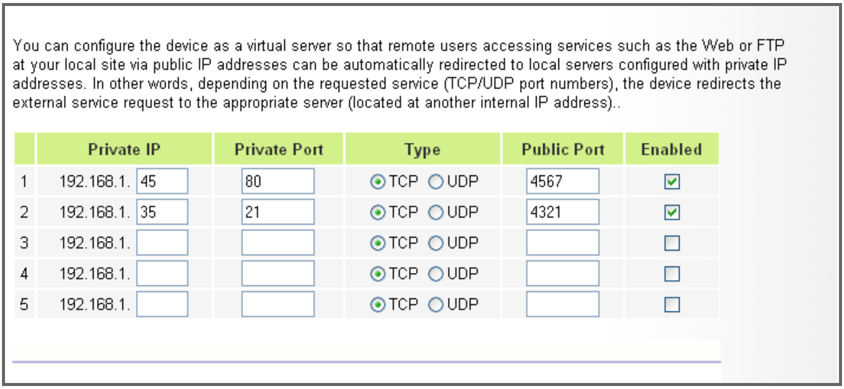
Network Address Translation (NAT) is a standard method of mapping multiple "internal" IP addresses to one "external" IP address on devices at the edge of a network. For the OD200, the internal (local) IP addresses are the IP addresses assigned to local PCs by the DHCP server, and the external IP address is the IP address assigned to the WiMAX interface.

Virtual Server

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

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

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



You can configure the device as a virtual server so that remote users accessing services such as the Web or FTP at your local site via public IP addresses can be automatically redirected to local servers configured with private IP addresses. In other words, depending on the requested service (TCP/UDP port numbers), the device redirects the external service request to the appropriate server (located at another internal IP address)..

	Private IP	Private Port	Type	Public Port	Enabled
1	192.168.1. 45	80	● TCP ○ UDP	4567	☑
2	192.168.1. 35	21	● TCP ○ UDP	4321	☑
3	192.168.1.		● TCP ○ UDP		□
4	192.168.1.		● TCP ○ UDP		□
5	192.168.1.		● TCP ○ UDP		□

Figure 5-10 Virtual Server

Private IP – The IP address of the server on the local Ethernet network. The specified address must be in the same subnet as the OD200 and its DHCP server address pool. (Range: 192.168.1.1 to 192.168.1.254)

Private Port – Specifies the TCP/UDP port number used on the local server for the service. (Range: 0-65535)

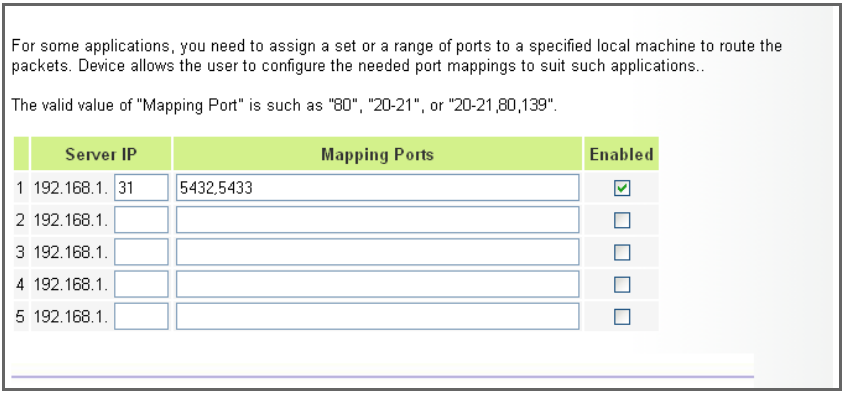
Type – Specifies the port type. (Options: TCP or UDP; Default: TCP)

Public Port – Specifies the public TCP/UDP port used for the service on the WAN interface. (Range: 0-65535)

Enabled – Enables the virtual server mapping on the specified ports. (Default: Disabled)

Port Mapping

Some applications, such as Internet gaming, videoconferencing, Internet telephony and others, require multiple connections. These applications cannot work with Network Address Translation (NAT) enabled. If you need to run applications that require multiple connections, use port mapping to specify the additional public ports to be opened for each application.



For some applications, you need to assign a set or a range of ports to a specified local machine to route the packets. Device allows the user to configure the needed port mappings to suit such applications..

The valid value of "Mapping Port" is such as "80", "20-21", or "20-21,80,139".

	Server IP		Mapping Ports	Enabled
1	192.168.1.	31	5432,5433	☑
2	192.168.1.			□
3	192.168.1.			□
4	192.168.1.			□
5	192.168.1.			□

Figure 5-11 Port Mapping

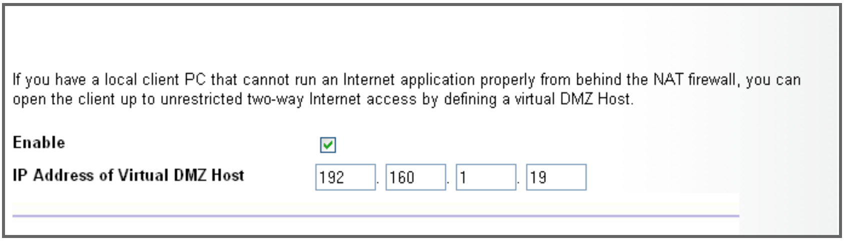
Server IP – The IP address of the local server. (Range: 192.168.1.1 to 192.168.1.254)

Mapping Ports – Specifies the TCP/UDP ports that the application requires. The ports may be specified individually, in a range, or a combination of both. For example, 7, 11, 57, 72-96. (Range: 0-65535)

Enabled – Enables port mapping for the specified IP address. (Default: Disabled)

DMZ

If you have a client PC that cannot run an Internet application properly from behind the NAT firewall, you can open the client up to unrestricted two-way internet access by defining a virtual-DMZ (virtual-demilitarized-zone) host.



If you have a local client PC that cannot run an Internet application properly from behind the NAT firewall, you can open the client up to unrestricted two-way Internet access by defining a virtual DMZ Host.

Enable ☑

IP Address of Virtual DMZ Host 192 . 160 . 1 . 19

Figure 5-12 DMZ Settings

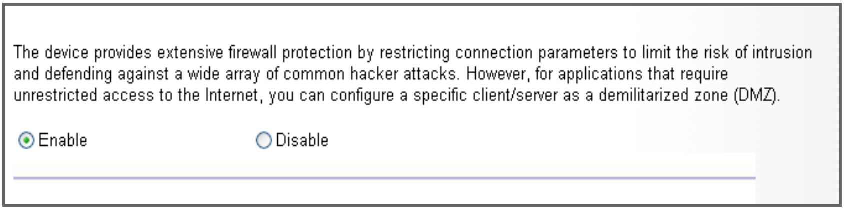
Enable – Enables the feature. (Default: Disabled)

IP Address of Virtual DMZ Host – Specifies the IP address of the virtual DMZ host. (Range: 192.168.1.1 to 192.168.1.254; Default: 0.0.0.0)

Note: Adding a host to the DMZ may expose your local network to a variety of security risks, so only use this option as a last resort.

Firewall

The OD200 provides extensive firewall protection by restricting connection parameters to limit the risk of intrusion and defending against a wide array of common hacker attacks. You can also block access to the Internet from clients on the local network based on IP addresses and TCP/UDP port numbers, or specific MAC addresses.



The device provides extensive firewall protection by restricting connection parameters to limit the risk of intrusion and defending against a wide array of common hacker attacks. However, for applications that require unrestricted access to the Internet, you can configure a specific client/server as a demilitarized zone (DMZ).

● Enable ○ Disable

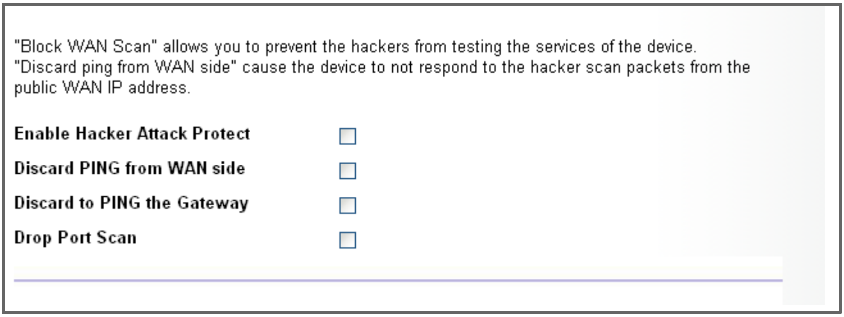
Figure 5-13 Firewall Setting

Enable – Enables the feature.

Disable – Disables the feature. (This is the default.)

Firewall Options

The OD200's firewall enables access control of client PCs, blocks common hacker attacks, including IP Spoofing, Land Attack, Ping of Death, Smurf Attack, TCP null scan, ICMP defect, and TCP SYN flooding. The firewall does not significantly affect system performance and it is best to leave it enabled to protect your network.



"Block WAN Scan" allows you to prevent the hackers from testing the services of the device.
"Discard ping from WAN side" cause the device to not respond to the hacker scan packets from the public WAN IP address.

Enable Hacker Attack Protect □

Discard PING from WAN side □

Discard to PING the Gateway □

Drop Port Scan □

Figure 5-14 Firewall Options

Enable Hacker Attack Protect – Network attacks that deny access to a network device are called DoS attacks. DoS attacks are aimed at devices and networks with a connection to the Internet. Their goal is not to steal information, but to disable a device or network so users no longer have access to network resources. The Router protects against the following DoS attacks: IP Spoofing, Land Attack, Ping of Death, Smurf Attack, TCP null scan, ICMP defect, and TCP SYN flooding.

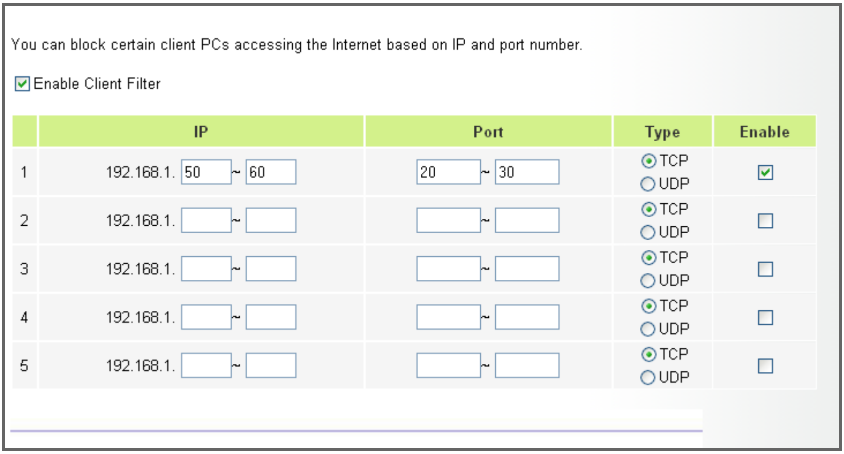
Discard PING from WAN side – Prevents pings on the unit's WiMAX interface from being routed to the network.

Discard to PING the Gateway – Prevents any response to a ping to the unit's IP address.

Drop Port Scan – Prevents outside hackers form testing the TCP/UDP port numbers on the unit for any services.

Client Filtering

You can block access to the Internet from clients on the local network by specifying IP addresses and TCP/UDP port numbers. You can configure up to five IP filters on the unit.



You can block certain client PCs accessing the Internet based on IP and port number.

☑ Enable Client Filter

	IP	Port	Type	Enable
1	192.168.1. 50 ~ 60	20 ~ 30	● TCP ○ UDP	☑
2	192.168.1. ~	~	● TCP ○ UDP	□
3	192.168.1. ~	~	● TCP ○ UDP	□
4	192.168.1. ~	~	● TCP ○ UDP	□
5	192.168.1. ~	~	● TCP ○ UDP	□

Figure 5-15 Client Filtering Settings

Enable Client Filter – Enables client filtering for entries in the table. (Default: Disabled)

IP – Specifies an IP address or range on the local network. (Range: 192.168.1.1 to 192.168.1.254)

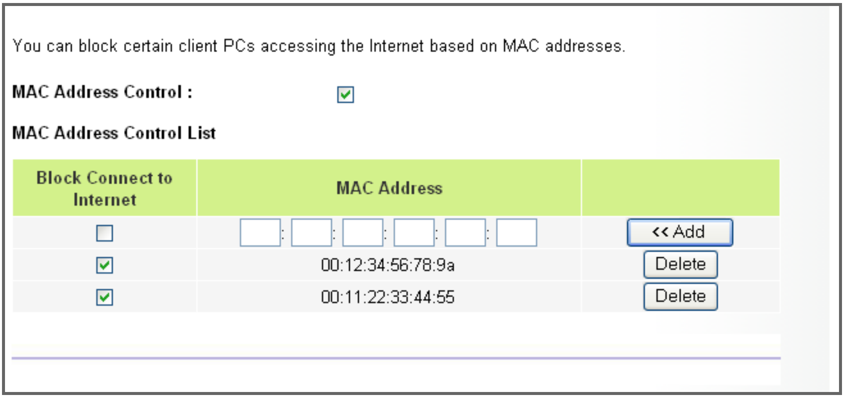
Port – Specifies a TCP/UDP port number range to filter. (Range: 0-65535)

Type – Specifies the the port type. (Options: TCP or UDP; Default: TCP)

Enable – Enables filtering for the table entry. (Default: Disabled)

MAC Control

You can block access to the Internet from clients on the local network by MAC addresses. You can configure up to 32 MAC address filters on the unit.



You can block certain client PCs accessing the Internet based on MAC addresses.

MAC Address Control : ☑

MAC Address Control List

Block Connect to Internet	MAC Address	
□	__ : __ : __ : __ : __ : __	<< Add
☑	00:12:34:56:78:9a	Delete
☑	00:11:22:33:44:55	Delete

Figure 5-16 MAC Control

MAC Address Control – Enables the feature. (Default: Enabled)

Block Connect to Internet – Blocks Internet access for the scpecified MAC address. (Default: Enabled)

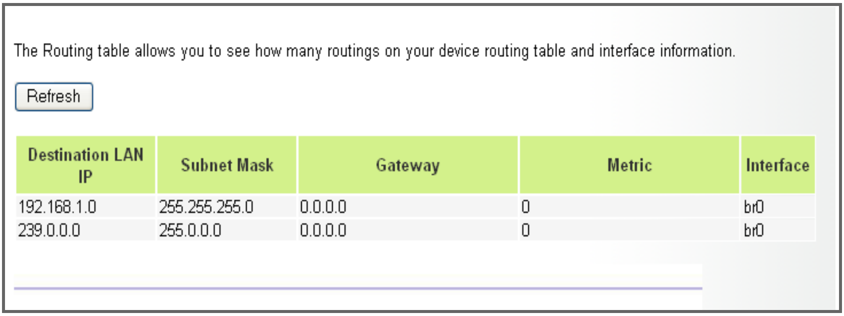
MAC Address – Specifies a local PC MAC address.

Add – Adds a new MAC address to the filter table.

Delete – Removes a MAC address from the filter table.

Route

The Routing Table displays the list of static routes on the unit.



The Routing table allows you to see how many routings on your device routing table and interface information.

Destination LAN IP	Subnet Mask	Gateway	Metric	Interface
192.168.1.0	255.255.255.0	0.0.0.0	0	br0
239.0.0.0	255.0.0.0	0.0.0.0	0	br0

Figure 5-17 Routing Table

Destination LAN IP – The IP address that identifies the IP subnet of the remote network.

Subnet Mask – The mask that identifies the IP subnet of the remote network.

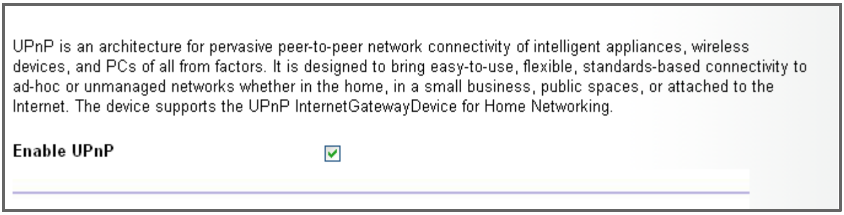
Gateway – The IP address of the router within the local IP subnet that forwards traffic to the remote IP subnet.

Metric – Cost for the local interface. This cost is only used when routes are imported by a dynamic routing protocol.

Interface – Indicates the local network interface on the unit.

UPnP

UPnP (Universal Plug and Play Forum) provides inter-connectivity between devices supported by the same standard.



UPnP is an architecture for pervasive peer-to-peer network connectivity of intelligent appliances, wireless devices, and PCs of all from factors. It is designed to bring easy-to-use, flexible, standards-based connectivity to ad-hoc or unmanaged networks whether in the home, in a small business, public spaces, or attached to the Internet. The device supports the UPnP InternetGatewayDevice for Home Networking.

Enable UPnP ☑

Figure 5-18 UPnP Setting

UPnP – Enables UpnP support on the unit. (Default: Enabled)

Chapter 6: WiMAX Settings

The OD200’s WiMAX menu enables you to configure WiMAX connection profiles, view subscriber station information, and select an operating antenna.

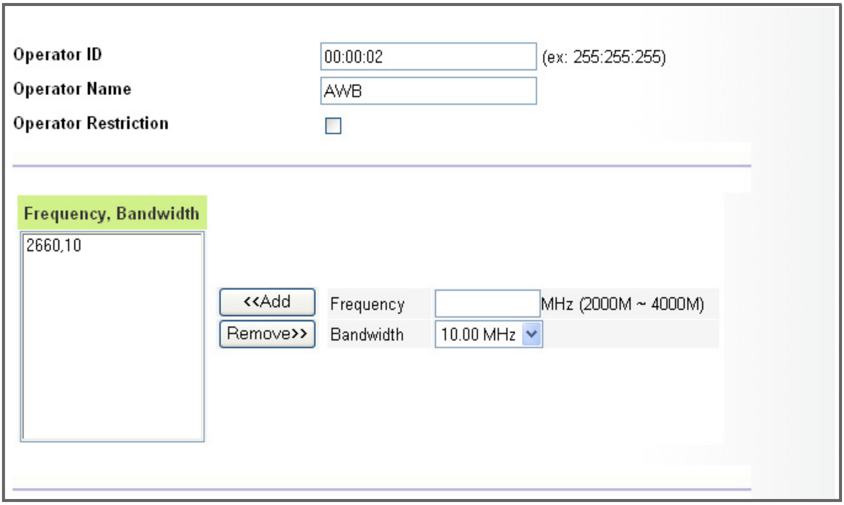
The WiMAX pages include the following options.

Table 6-1 WiMAX Settings

Menu	Description	Page
Profile	Configures WiMAX connection profiles	6-1
SSinfo	Displays subscriber station information for the unit	6-4
Antenna Setting	Configures use of internal or external antennas	6-5
Advance Configure	Configures extended WiMAX features	6-6

Profile Configuration

A profile allows a user to set specific details for connecting to various WiMAX service providers. The OD200 must have at least one profile configured to be able to connect to a WiMAX service.



Operator ID	00:00:02	(ex: 255:255:255)
Operator Name	AWB	
Operator Restriction	□	

Frequency, Bandwidth

2660,10

Frequency MHz (2000M ~ 4000M)

Bandwidth 10.00 MHz

Figure 6-1 WiMAX Profile Configuration

Operator ID – The ID number that identifies the WiMAX operator for this profile. (Default: 00:00:02)

Operator name – The WiMAX operator name. (Default: AWB)

Operator Restriction – When enabled, the user can only connect to the service provider specified in the profile. The user cannot roam to other networks. When disabled, the operator specified in the profile will be used when base stations are detected, otherwise the user can roam to other networks. (Default: Disabled)

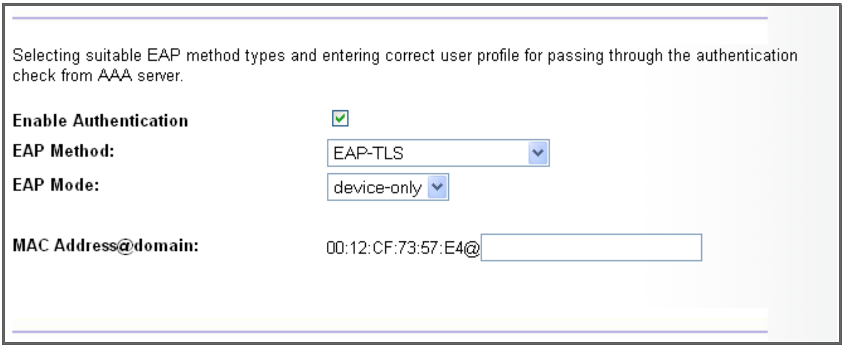
Scan Frequency – Specifies a center frequency to scan. (Range: 2000-4000 MHz)

Scan Bandwidth – Specifies the bandwidth of the scan channel. (Options: 5.00, 7.00, 8.75, 10.00 MHz; Default: 10.00 MHz)

Add/Remove – Use the Add button to add a new center frequency and channel bandwidth to scan. Use the Remove button to delete a frequency from the scan list.

Authentication

Set user authentication for the WiMAX connection profile, as specified by the service provider. Selecting EAP-TLS, EAP-TTLS-CHAP, or EAP-TTLS-MSCHAPV2 displays the parameters that are required for configuring the authentication method.



Selecting suitable EAP method types and entering correct user profile for passing through the authentication check from AAA server.

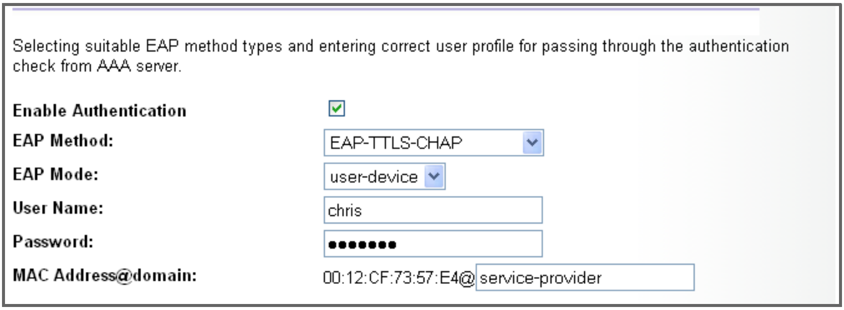
Enable Authentication ☑

EAP Method: EAP-TLS

EAP Mode: device-only

MAC Address@domain: 00:12:CF:73:57:E4@

Figure 6-2 WiMAX Profile Authentication - EAP-TLS



Selecting suitable EAP method types and entering correct user profile for passing through the authentication check from AAA server.

Enable Authentication ☑

EAP Method: EAP-TTLS-CHAP

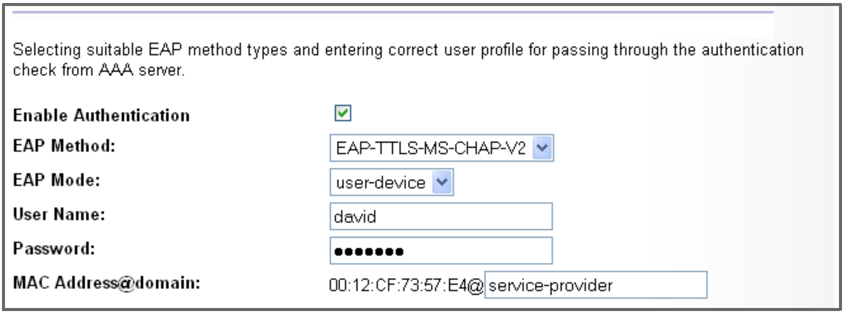
EAP Mode: user-device

User Name: chris

Password: ●●●●●●●

MAC Address@domain: 00:12:CF:73:57:E4@ service-provider

Figure 6-3 WiMAX Profile Authentication - EAP-TTLS-CHAP



Selecting suitable EAP method types and entering correct user profile for passing through the authentication check from AAA server.

Enable Authentication	☑
EAP Method:	EAP-TTLS-MS-CHAP-V2
EAP Mode:	user-device
User Name:	david
Password:	•••••••
MAC Address@domain:	00:12:CF:73:57:E4@ service-provider

Figure 6-4 WiMAX Profile Authentication - EAP-TTLS-MSCHAPV2

Enable Authentication – Enables user authentication for connection to the network. (Default: Disabled)

EAP Method – Selects the Extensible Authentication Protocol (EAP) method to use for authentication. (Default: EAP-TTLS-MSCHAPV2)

- **EAP-TLS** – Transport Layer Security. Provides for certificate-based and mutual authentication of the client and the network. It relies on client-side and server-side certificates to perform authentication and can be used to dynamically generate user-based and session-based encryption keys to secure subsequent communications between the user and the network. A unique X.509 authentication certificate is included with the gateway firmware.
- **EAP-TTLS-CHAP** – Tunneled Transport Layer Security with Challenge-Handshake Authentication Protocol (CHAP). This security method provides for certificate-based, mutual authentication of the client and network through an encrypted channel. Unlike EAP-TLS, EAP-TTLS requires only server-side certificates.
- **EAP-TTLS-MSCHAPV2** – Tunneled Transport Layer Security with Microsoft's version 2 of CHAP.

EAP Mode – Selects if only a specific user is to be authenticated (user-only), the subscriber device itself (device-only), or both a user and the device (user-device). Select the option instructed by the WiMAX service operator.

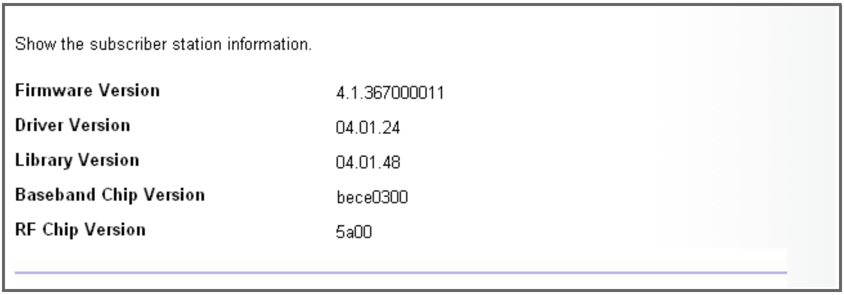
User Name – The user name required for EAP-TTLS authentication. (Default: pseudo@realm)

Password – The user password required for EAP-TTLS authentication. (Default: hello)

MAC Address@domain – A text string that is used to identify the authentication realm for device authentication. This identity is used to proxy an authentication request to another remote server. The authentication is then performed using the unique X.509 authentication certificate included with the device firmware. The identitiy string consists of either the device MAC address (for EAP-TLS) or a random generated number (for EAP-TTLS), together with an operator-specified domain name. For example; 1f:20:30:10:4d:50@service-telecom.

Subscriber Station Information

The SSInfo page displays information about the software versions on the OD200 unit.



Show the subscriber station information.

Firmware Version	4.1.367000011
Driver Version	04.01.24
Library Version	04.01.48
Baseband Chip Version	bece0300
RF Chip Version	5a00

Figure 6-5 Subscriber Station Information

Firmware Version – The version of software code running on the unit.

Driver Version – The version of the WiMAX chip driver software.

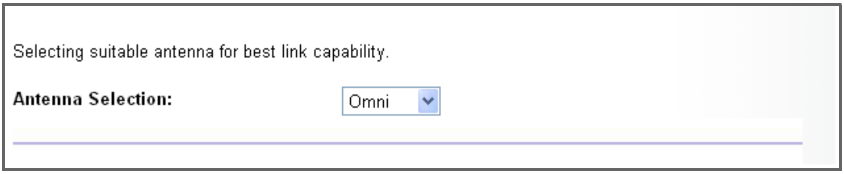
Library Version – The version of WiMAX library software.

Baseband Chip Version – The version of the WiMAX baseband chip.

RF Chip Version – The version of the WiMAX radio chip.

Antenna Setting

The OD200 does not have the option of using an external antenna instead of the integrated antennas supplied with the unit. Be sure to always set the Antenna Selection setting to “Omni.”



Selecting suitable antenna for best link capability.

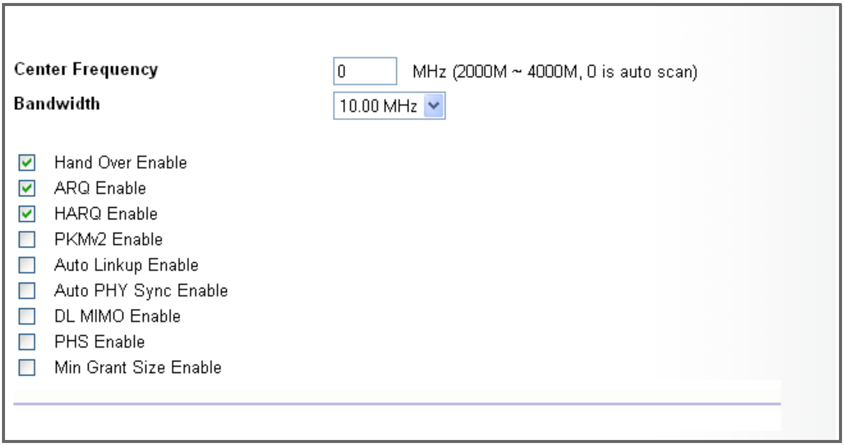
Antenna Selection: Omni

Figure 6-6 WiMAX Antenna Setting

Antenna Selection – Set to use the integrated (Omni) antennas for WiMAX communications. (Default: Omni)

Advance Configure

The Advanced Configuration screen allows you to configure extended features for the WiMAX connection.



Center Frequency 0 MHz (2000M ~ 4000M, 0 is auto scan)

Bandwidth 10.00 MHz

☑ Hand Over Enable
☑ ARQ Enable
☑ HARQ Enable
□ PKMv2 Enable
□ Auto Linkup Enable
□ Auto PHY Sync Enable
□ DL MIMO Enable
□ PHS Enable
□ Min Grant Size Enable

Figure 6-7 WiMAX Advance Configure

Center Frequency – Configures the centre frequency used by the WiMAX service.

Bandwidth – Configures the channel bandwidth used by the WiMAX service.

Hand Over Enable – Enable handoffs when moving between base stations.

ARQ Enable – The Automatic Repeat reQuest (ARQ) mechanism is an optional part of the WiMAX MAC layer and a protocol for error control in data transmission. When a packet error is detected, the transmitter is automatically requested to resend the packet.

HARQ Enable – Hybrid ARQ (HARQ) is a variation of the ARQ error control method. In standard ARQ, error-detection information (ED) bits are added to data to be transmitted (such as cyclic redundancy check, CRC). In Hybrid ARQ, forward error correction (FEC) bits are also added to the existing Error Detection (ED) bits (such as Reed-Solomon code or Turbo code).

PKMv2 Enable – PKMv2 (Privacy Key Management version 2) is the standard security solution for WiMAX networks. The security protocol provides mutual authentication of the subscriber station and base station, as well as distributing traffic encryption keys. It is also used to transport EAP (Extensible Authentication Protocol) messages.

Auto Linkup Enable – Enables automatic synchronization with the base station signal.

Auto PHY Sync Enable – Enable automatic synchronization with the base station PHY MAC address.

DL MIMO Enable – Enables the use of downlink multiple-input and multiple-output (DL MIMO) antennas.

PHS Enable – Enables payloader header suppression (PHS) a feature that conserves link layer bandwidth by suppressing unnecessary packet headers on upstream and downstream traffic flows.

Min Grant Size Enable – Enables the WiMAX service to obtain performance information and reports back that it can schedule the session using its Unsolicited Grant Service, UGS, with a link delay of 5 msecs, or on its Real-Time Polling Service with a link delay of 18 msecs.

Chapter 7: VoIP Settings

Voice over Internet Protocol (VoIP) technology is a way of using the Internet to make phone calls. Phone calls can be tranmitted over the Internet by encoding a voice call into data packets at one end and then decoding it back into voice calls at the other end. This encoding and decoding is from a analog signal (your voice) into a digital signal (data packets) and then back into an analog signal.

The OD200 uses Session Initiation Protocol (SIP) as the control mechanism that sets up, initiates, and terminates calls between a caller and a called party. The SIP messaging makes use of “Proxy,” “Redirect,” and “Registration” servers to process call requests and find the location of called parties across the Internet. When SIP has set up a call between two parties, the actual voice communication is a direct peer-to-peer connection using the standard Real-Time Protocol (RTP), which streams the encoded voice data across the network.

You can make VoIP calls by connecting a regular phone to one of the OD200’s RJ-11 Phone ports. You can also make VoIP calls from your computer using a VoIP application with a simple microphone and computer speakers. Using either method, VoIP provides an experience identical to normal telephoning.

Before using the VoIP Phone ports on the OD200, you must have an account with a SIP service provider and configure the required parameters through the web interface. The OD200 allows the two RJ-11 Phone ports to be configured separately with different settings.

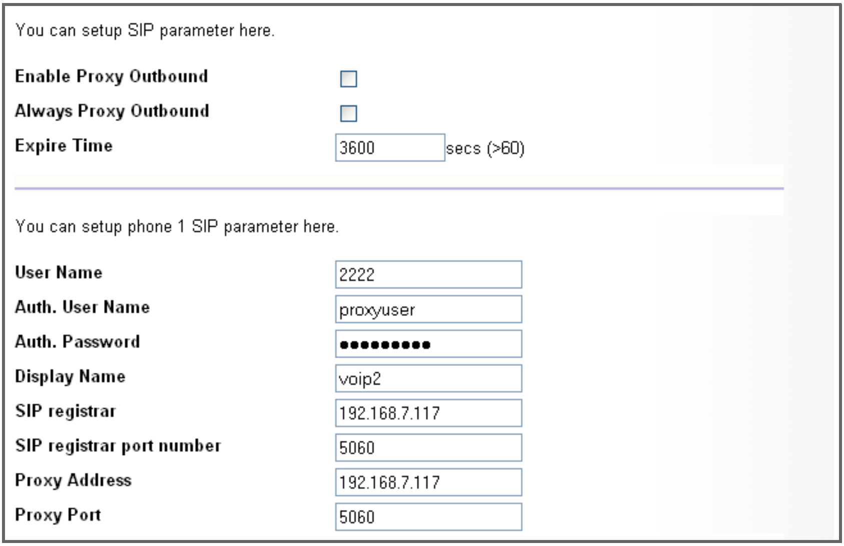
The VoIP configuration pages include the following options.

Table 7-1. VoIP Settings

Menu	Description	Page
SIP Account	Sets up basic SIP account details for Phone 1 and Phone 2	7-2
SIP Setting	Configures SIP connection parameters	7-3
Dial Plan	Sets control strings for dialed phone numbers	7-4
Call Feature	Configures call forwarding options	7-6
Codecs	Select coder/decoders (codecs) to use for phone traffic	7-8
Call Block Setting	Set incoming and outgoing numbers to block	7-9
Phone Setting	Sets phone timeout parameters	7-10

SIP Account

From the VoIP SIP Account page, you can configure the basic SIP service parameters for Phone 1 and Phone 2.



You can setup SIP parameter here.

Enable Proxy Outbound	□
Always Proxy Outbound	□
Expire Time	3600 secs (>60)

You can setup phone 1 SIP parameter here.

User Name	2222
Auth. User Name	proxyuser
Auth. Password	●●●●●●●●●●
Display Name	voip2
SIP registrar	192.168.7.117
SIP registrar port number	5060
Proxy Address	192.168.7.117
Proxy Port	5060

Figure 7-1 SIP Account Settings

Enable Proxy Outbound – Enables the use of proxy servers in the local network to forward SIP requests. (Default: Disabled)

Always Proxy Outbound – Forces all SIP requests to be forwarded through local proxy servers. (Default: Disabled)

Expire Time – The time the OD200 waits for a response from a proxy server before a VoIP call fails. (Range: 61-65535 seconds; Default: 3600 seconds)

User Name – The SIP account user name.

Auth. User Name – An alphanumeric string that uniquely identifies the user to the SIP server.

Auth. Password – An alphanumeric string that uniquely identifies the SIP user’s permission rights.

Display Name – The name that is displayed to the other party during a call.

SIP Register – The IP address of the SIP registrar server. A registrar is a server that accepts SIP register requests and places the information it receives in those requests into the location service for the domain it handles.

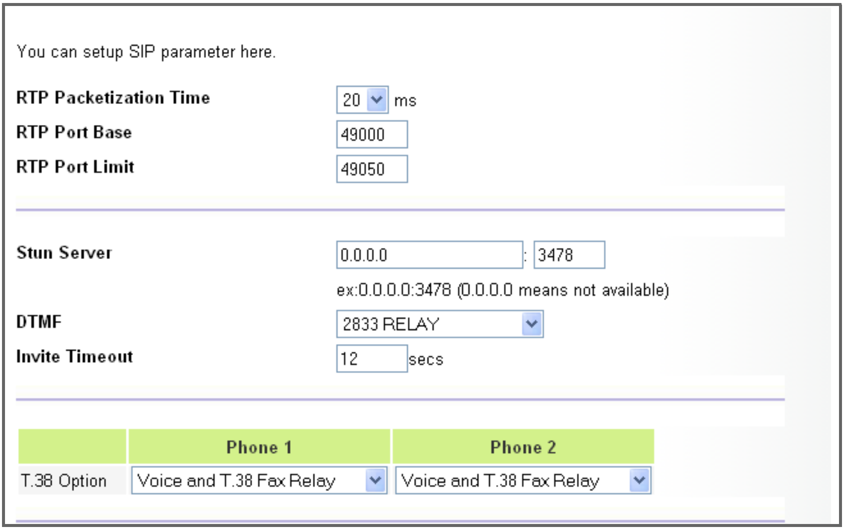
SIP Register Port Number – The TCP port number used by the VoIP service provider’s register server. (Range: 0-65535; Default: 5060)

Proxy Address – Address of the VoIP service provider SIP proxy server.

Proxy Port – The TCP port number used by the VoIP service provider’s SIP proxy server. (Range: 0-65535; Default: 5060)

SIP Setting

From the VoIP SIP Setting page you can configure SIP parameter details.



You can setup SIP parameter here.

RTP Packetization Time: 20 ms
RTP Port Base: 49000
RTP Port Limit: 49050

Stun Server: 0.0.0.0 : 3478
ex:0.0.0.0:3478 (0.0.0.0 means not available)
DTMF: 2833 RELAY
Invite Timeout: 12 secs

	Phone 1	Phone 2
T.38 Option	Voice and T.38 Fax Relay	Voice and T.38 Fax Relay

Figure 7-2 SIP Setting

RTP Packetization Time – Specifies a maximum amount of time for transmission of a RTP data packet. (Options: 10, 20, 30 ms; Default: 20 ms)

RTP Port Base/Limit – The Real-time Transport Protocol (RTP) and Real-time Control Protocol (RTCP) do not use specified port numbers. You can specify a port range that the RTP and RTCP traffic can use. Enter the port Base and Limit to define the range. (Range: 1024-65535)

Stun Server – STUN (Simple Traversal of UDP through NAT (Network Address Translation)) is a protocol that assists devices behind a NAT firewall or router with packet routing. The problem of NAT firewalls can also be solved using a proxy server to control SIP traffic. Specify the IP address and TCP port used by the STUN server. (Default: 0.0.0.0:3478, “0.0.0.0” means not available; Port Range: 0-65535)

DTMF – Enables the sending of dual-tone multi-frequency (touch tone) phone signals over the VoIP connection. There are several methods to choose from:

- **No DTMF:** The DTMF signals are not sent over the VoIP connection.
- **In-band Mode:** The DTMF signals are sent over the RTP voice stream. In the case when low-bandwidth codecs are used, the DTMF signals may be distorted.
- **2833 Relay:** Uses the RFC 2833 method to relay the DTMF signals over the RTP voice stream without any distortion. (This is the default.)
- **Both In-band and 2833:** Uses the best method depending on the codecs selected.

Invite Timeout – The time that the unit waits for a response to a SIP Invite message before a call fails. If network connections are slow and many SIP calls fail, you may need to increase this timeout value. (Range: 1-300 seconds; Default: 12 seconds)

T.38 Option – Selects the method to use when sending fax messages over the VoIP network from a fax machine connected to one of the RJ-11 Phone ports on the OD200. (Default: Voice and T.38 Fax Relay)

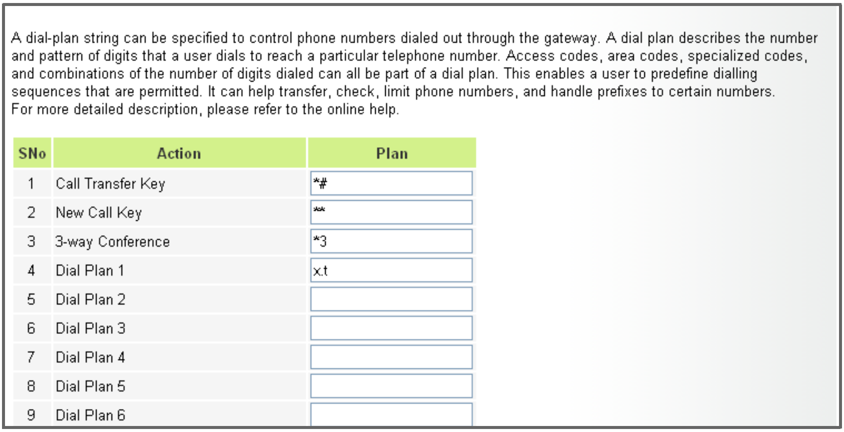
- **T.38 Fax Relay:** The SIP protocol sets up the VoIP call, then the T.38 Fax Relay protocol sends the fax data over the network.
- **Voice and T.38 Fax Relay:** Enables voice calls and faxes to be sent from the Phone port connection. When a fax tone signal is detected on the port, the T.38 Fax Relay standard is used instead of the voice codec.
- **Voice and Fax Pass Through:** Enables voice calls and faxes to be sent from the Phone port connection. For this option, fax signals are sent over the VoIP network using the voice codec, just as if it were a voice call.

Dial Plan

A dial-plan string can be specified to control phone numbers dialed out through the OD200. A dial plan describes the number and pattern of digits that a user dials to reach a particular telephone number. Access codes, area codes, specialized codes, and combinations of the number of digits dialed can all be part of a dial plan. This enables a user to predefine dialling sequences that are permitted. It can help transfer, check, limit phone numbers, and handle prefixes to certain numbers.

The dial-plan string consists of a single digit rule. A typical example of a dial-plan string is: [0123]xxxxxx.t

Three standard dial plans are defined; Call Transfer Key, New Call Key, and 3-way Conference. Up to 10 other dial plans can be defined by the user.



A dial-plan string can be specified to control phone numbers dialed out through the gateway. A dial plan describes the number and pattern of digits that a user dials to reach a particular telephone number. Access codes, area codes, specialized codes, and combinations of the number of digits dialed can all be part of a dial plan. This enables a user to predefine dialling sequences that are permitted. It can help transfer, check, limit phone numbers, and handle prefixes to certain numbers.
For more detailed description, please refer to the online help.

SNo	Action	Plan
1	Call Transfer Key	*#
2	New Call Key	**
3	3-way Conference	*3
4	Dial Plan 1	x.t
5	Dial Plan 2	
6	Dial Plan 3	
7	Dial Plan 4	
8	Dial Plan 5	
9	Dial Plan 6	

Figure 7-3 Dial Plan Settings

The function of elements allowed in a dial plan are described in the table below:

Table 7-1. Dial Plan Elements

Element	Example	Description
x	xxxx	Represents a digit of any value (0 to 9) that can be dialed on a phone. This example has a rule with four digits of any number.
.	xx.	Indicates zero or more occurrences of the previous symbol. The example acts like a wildcard, meaning any dialed phone number of two or more digits is allowed.
0-9	01xx	Indicates dialed digits that must be matched. This example only allows four-digit numbers starting “01.”
[ ]	[125-8]	Limits a dialed digit to specified values or a range of values. The example specifies that only digits 1, 2, 5, 6, 7, and 8 are permitted.
t	xx.t	The timeout indicator that can placed after dialed digits or at the end of the dial-plan string.

When a user dials a series of digits, the dial-plan rule is tested for a possible match. If a match is made, the dialed sequence is transmitted. If no match is made, the dialed number is blocked and the user will hear an error tone.

A dial-plan string cannot include spaces between elements. Dialed sequences that are longer than specified in a dial-plan rule are truncated after the number of specified digits. For example, if the dial-plan rule is “011x” and “0115678” is dialed, only the digit sequence “0115” is transmitted.

Call Feature

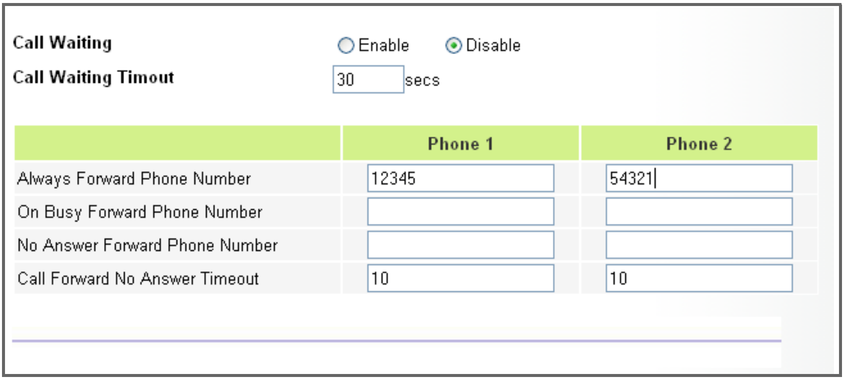
The OD200 allows you to configure several call features, such as call waiting and call-forwarding. Other call features can be implemented by pressing specific phone buttons or entering dial patterns.

The table below describes the various call features available.

Note: Some call features may be dependent on support at the SIP server. Check with the SIP service provider.

Table 7-1. VoIP Call Features

Call Feature	Description	Activation
Call Hold	Places an active call on hold for an unlimited period of time.	Press the “Flash,” “Flash Hook,” or “Hold” button on the phone.
Call Waiting	If during a call there is another incoming call, an alert tone is heard.	This feature must first be enabled using the web interface. You can place the active call on hold and switch to the incoming call. You can switch between the two calls by placing the active call on hold.
Call Switching	Calls two numbers, then switches between them.	Dial the first number, then place it on hold. Dial the key sequence “**” and wait until you hear the dial tone, then dial the second number. Placing the active call on hold switches to the other call. If the active call is hung up, the phone rings again to activate the other call.
Call Transfer	Transfers any received call to another number you specify.	First place the received call on hold, then dial the transfer key sequence “*#”. When you hear a dial tone, enter the transfer phone number, then hang up.
Call Forward	Forwards an incoming call to another number.	This feature can be configured using the web interface. You can specify forwarding numbers for all calls, when busy, or for no answer.
3-Way Conference	Calls two numbers, then allows all to talk together.	Dial the first number, then place it on hold. Dial the key sequence “**” and wait until you hear the dial tone, then dial the second number. When the second call is active, dial “*3” to establish the three-way conference.



Call Waiting ○ Enable ● Disable

Call Waiting Timout 30 secs

	Phone 1	Phone 2
Always Forward Phone Number	12345	54321
On Busy Forward Phone Number		
No Answer Forward Phone Number		
Call Forward No Answer Timeout	10	10

Figure 7-4 Call Features

Call Waiting – Enables a call waiting alert. If during a call there is another incoming call, an alert tone is heard. You can place the active call on hold (press the “Flash,” “Flash Hook,” or “Hold” button on the phone) and switch to the incoming call. (Default: Disabled)

Call Waiting Timeout – The time a second incoming call waits before a “no answer” message is sent. (Range: 1-300 seconds; Default: 30 seconds)

Always Forward Phone Number – Another phone number to which all incoming calls are forwarded.

On Busy Forward Phone Number – Another phone number to which incoming calls are forwarded when the phone is busy.

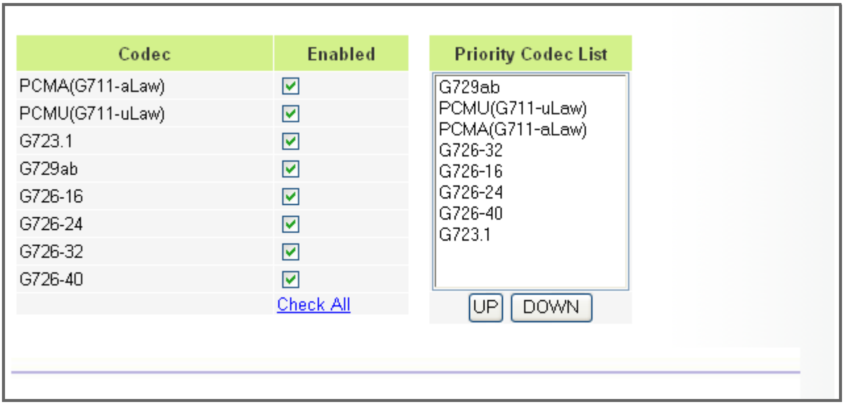
No Answer Forward Phone Number – Another phone number to which incoming calls are forwarded when there is no answer.

Call Forward No Answer Timeout – The time a call waits for an answer before being forwarded to the No Answer Forward Phone Number. (Range: 1-300 seconds; Default: 10 seconds)

Codecs

A codec (coder/decoder) is the way a voice analog signal is converted into a digital bitstream to send over the network, and how it is converted back into an analog signal at the receiving end. Codecs differ in the type of data compression that is used to save network bandwidth and in the time delay caused in the signal. This results in different voice quality experienced by the user.

The voice codecs in common use today have been standardized by the International Telecommunication Union Telecommunication Standardization Sector (ITU-T) and are identified by a standard number, such as G.711 or G.726. The same codec must be supported at each end of a VoIP call to be able to encode and decode the signal. Since devices in other networks may want to use different codecs, the OD200 provides support for several common standards.



Codec	Enabled
PCMA(G711-aLaw)	☑
PCMU(G711-uLaw)	☑
G723.1	☑
G729ab	☑
G726-16	☑
G726-24	☑
G726-32	☑
G726-40	☑
	Check All

Priority Codec List

G729ab
PCMU(G711-uLaw)
PCMA(G711-aLaw)
G726-32
G726-16
G726-24
G726-40
G723.1

Figure 7-5 Codecs

Codec – Lists the codecs supported by the OD200. You can enable specific codecs to use, or enable all. Alternatively, you may want to disable certain codecs, such as high-bandwidth codecs, to preserve network bandwidth.

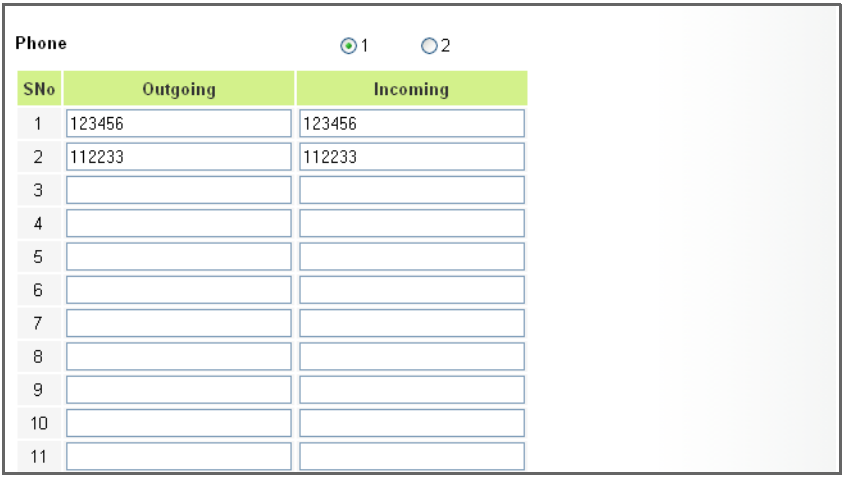
- **PCMA (G711.aLaw):** The ITU-T G.711 with A-law standard codec that uses Pulse Code Modulation (PCM) to produce a 64 Kbps high-quality voice data stream. This standard is used in Europe and most other countries around the world.
- **PCMU (G711.uLaw):** The ITU-T G.711 with mu-law standard codec that uses Pulse Code Modulation (PCM) to produce a 64 Kbps high-quality voice data stream. This standard is used in North America and Japan.
- **G723.1:** The ITU-T G.723.1 standard low bitrate codec that uses Multi-Pulse Maximum Likelihood Quantization (MP-MLQ) and Algebraic Code Excited Linear Prediction (ACELP) speech coding to produce data streams of 6300 and 5300 bps.

- **G729ab:** The ITU-T G.729ab standard codec that uses Conjugate Structure Algebraic-Code Excited Linear Prediction (CS-ACELP) with silence suppression to produce a low-bandwidth data stream of 8 Kbps. Note that DTMF and fax tones do not transport reliably with this codec, it is better to use G.711 for these signals.
- **G726-16/24/32/40:** The ITU-T G.726 standard codecs that use Adaptive Differential Pulse Code Modulation (ADPCM) to produce good-quality, low-bandwidth data streams of either 16, 24, 32, or 40 Kbps.

Priority Codec List – The OD200 automatically negotiates the codec to use for each called party. You can specify a priority for the codecs that you prefer to use. For example, you may want to use a low-bandwidth codec such as G729ab instead of a high-bandwidth G711 codec. Select a codec in the list, then use the UP and DOWN buttons to set the priority. The OD200 attempts to use the codec highest in the list before trying the next lower one.

Call Block Setting

The OD200 can block certain incoming and outgoing phone numbers from making calls through the unit. You can specify up to 15 incoming and 15 outgoing numbers to block.



Phone ● 1 ○ 2

SNo	Outgoing	Incoming
1	123456	123456
2	112233	112233
3		
4		
5		
6		
7		
8		
9		
10		
11		

Figure 7-6 Call Block Setting

Phone – Selects either VoIP port PHONE1 or PHONE2.

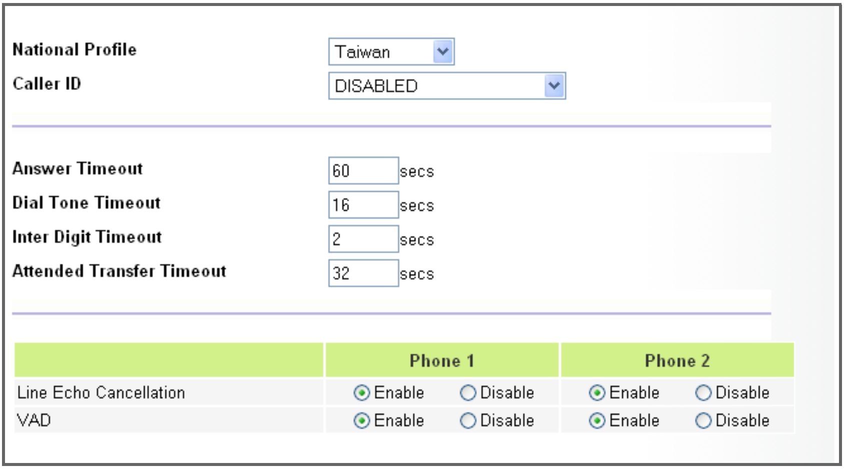
Outgoing – Blocks outgoing calls from the listed numbers. (Valid characters 0-9)

Incoming – Blocks incoming calls from the listed numbers. (Valid characters 0-9)

Phone Setting

The OD200 allows the timings for certain events on the VoIP phone ports to be precisely configured. For example, you can specify how long a phone will ring and how long a dial tone is heard on a phone.

The OD200 also enables the line delay to be specified for each phone so that the caller’s voice echo is cancelled.



National Profile	Taiwan
Caller ID	DISABLED

Answer Timeout	60	secs
Dial Tone Timeout	16	secs
Inter Digit Timeout	2	secs
Attended Transfer Timeout	32	secs

	Phone 1		Phone 2	
Line Echo Cancellation	● Enable	○ Disable	● Enable	○ Disable
VAD	● Enable	○ Disable	● Enable	○ Disable

Figure 7-7 Phone Setting

National Profile – Choose the country of operation for phone setting compatibility. Currently only France, Israel, Japan, Korea, Spain, Taiwan, UK, and the United States are supported.

Caller ID – The compatible telecommunications caller ID standard that is supported for the country of operation. (Default: Disabled)

Answer Timeout – The time after which a no answer message is sent to the caller. (Range: 1-300 seconds; Default: 60 seconds)

Dial Tone Timeout – The length of time a dial tone is heard on a connected phone. (Range: 1-300 seconds; Default: 16 seconds)

Inter Digit Timeout – The maximum time delay allowed between each dialed digit. When the time is exceeded, a call is made using the dialed digits.
(Range: 1-300 seconds; Default: 2 seconds)

Attended Transfer Timeout – The time after which a held call that is being transferred is terminated. (Range: 5-300 seconds; Default: 32 seconds)

Note: You can hold a call by pressing the “Flash,” “Flash Hook,” or “Hold” button on the phone, then dial a transfer number.

Line Echo Cancellation – Enables a time delay for voice echo cancellation. A voice echo can be created on some two-wire phone loops, which becomes increasingly louder and annoying when there is a long delay. If voice echo is a problem during a call, you can enable this parameter to try and reduce or remove it. (Default: Enabled)

VAD – Voice Activity Detection. Enables the detection of periods of silence in the audio stream so that it is not transmitted over the network. (Default: Disabled)

Chapter 8: Wi-Fi Settings

The OD200 model for the 3.5 GHz WiMAX band includes an IEEE 802.11g radio interface for local Wi-Fi communications. The Wi-Fi set up pages include configuration options for the radio signal characteristics and Wi-Fi security.

The Wi-Fi configuration pages include the following options.

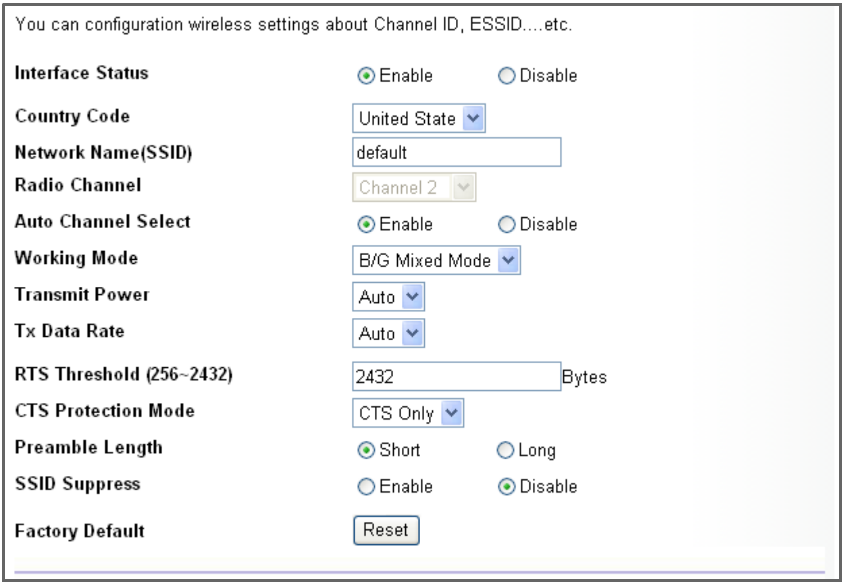
Table 8-1 Wi-Fi Settings

Menu	Description	Page
Settings	Allows you configure basic radio parameters.	8-1
Security	Configures Wi-Fi security features.	8-5
MAC Authentication	Configures a client MAC address control list.	8-9

Wireless Settings

From the Wireless menu, click on Settings to configure the unit’s Wi-Fi radio interface. The unit’s radio can operate in three modes, IEEE, 802.11b & g, 802.11g only, and 802.11b only.

The IEEE 802.11g standard operates within the 2.4 GHz band at up to 54 Mbps. Note that because the IEEE 802.11g standard is an extension of the IEEE 802.11b standard, it allows clients with 802.11b wireless network cards to associate to an 802.11g access point.



You can configuration wireless settings about Channel ID, ESSID....etc.

Interface Status ● Enable ○ Disable

Country Code United State

Network Name(SSID) default

Radio Channel Channel 2

Auto Channel Select ● Enable ○ Disable

Working Mode B/G Mixed Mode

Transmit Power Auto

Tx Data Rate Auto

RTS Threshold (256~2432) 2432 Bytes

CTS Protection Mode CTS Only

Preamble Length ● Short ○ Long

SSID Suppress ○ Enable ● Disable

Factory Default Reset

Figure 8-1. Wireless Settings

Interface Status – Enables the Wi-Fi radio.

Country Code – The country code restricts operation of the Wi-Fi radio to the channels and transmit power levels permitted for Wi-Fi networks in the specified region. You must set the correct Country Code to be sure the radio conforms to local regulations. (Options: United States, Japan, Europe; Default: United States)

Note to US Model Owner: To comply with US FCC regulation, the country selection function has been completely removed from all US models. The above function is for non-US models only.

The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination. The firmware setting is not accessible by the end user.

Network Name (SSID) – The Service Set ID (SSID) that identifies the Wi-Fi network. The SSID is case sensitive and can consist of up to 32 alphanumeric characters. (Default: default)

Radio Channel – The radio channel used by the unit and its clients to communicate with each other. This channel must be the same on the unit and all of its wireless clients. The available channel settings are limited by local regulations. (Default: 1; Range: 1-11)

Note: If you experience poor performance, you may be encountering interference from another wireless device. Try changing the channel, as this may eliminate interference and increase performance. Channels 1, 6, and 11, as the three non-overlapping channels in the 2.4 GHz band, are preferred.

Auto Channel Select – Enables the unit to automatically select an available radio channel. (Default: Enabled)

Working Mode – Selects the operating mode for the 802.11g radio. (Default: B/G Mixed Mode)

- **B/G Mixed Mode:** Both 802.11b and 802.11g clients can communicate with the unit (up to 54 Mbps).
- **G Only Mode:** Only 802.11g clients can communicate with the unit (up to 54 Mbps).
- **B Only Mode:** Both 802.11b and 802.11g clients can communicate with the unit, but 802.11g clients can only transfer data at 802.11b standard rates (up to 11 Mbps).

Transmit Power – Adjusts the power of the radio signals transmitted from the unit. The higher the transmission power, the farther the transmission range. Power selection is not just a trade off between coverage area and maximum supported clients. You also have to ensure that high-power signals do not interfere with the operation of other radio devices in the service area. (Options: Auto, Full, Min; Default: Auto)

Tx Data Rate – The maximum data rate at which the unit transmits unicast packets on the Wi-Fi interface. The maximum transmission distance is affected by the data rate. The lower the data rate, the longer the transmission distance. (Default: Auto)

RTS Threshold (256~2432) – Sets the packet size threshold at which a Request to Send (RTS) signal must be sent to a receiving station prior to the sending the data frame. The unit sends RTS frames to a receiving station to negotiate the sending of a data frame. After receiving an RTS frame, the station sends a CTS (clear to send) frame to notify the unit that it can start sending data. If a packet size equals or exceeds the RTS threshold, the RTS/CTS (Request to Send / Clear to Send) mechanism will be enabled. Units contending for the medium may not be aware of each other, and the RTS/CTS mechanism can solve this “Hidden Node Problem.” (Range: 256-2432 bytes: Default: 2432 bytes)

Preamble Length – All IEEE 802.11 frames begin with an alternating pattern of 1s and 0s called the preamble, which tells receiving stations that a frame is arriving. This provides time for the receiving station to synchronize to the incoming data stream. This parameter sets the length of the signal preamble that is used at the start of a data transmission. Using a short preamble (96 microseconds) instead of a long preamble (192 microseconds) can increase data throughput on the unit, but requires that all clients can support a short preamble. (Default: Short)

- **Short:** Sets the preamble to short for increased throughput.

- **Long:** Sets the preamble to long. Using a long preamble ensures the unit can support all 802.11b and 802.11g clients.

SSID Suppress – When enabled, the OD200 stops broadcasting the configured SSID in its beacon signal. The unit is configured by default as an “open system,” which broadcasts a beacon signal including the configured SSID. Wireless clients with a configured SSID of “ANY” can read the SSID from the beacon, and automatically set their SSID for immediate connection to the OD200. When enabled, the unit does not include its SSID in beacon messages. This provides a basic level of security, since wireless clients must be configured with the SSID to connect to the OD200.

Frame Burst – Enables data transmission bursting to boost throughput. (Default: Disabled)

CTS Protection Mode – When 802.11g and 802.11b clients operate together in the same Wi-Fi network, there needs to be a mechanism that prevents 802.11b clients interferring with 802.11g transmissions. This is achieved by sending 802.11b-compatible CTS (Clear to Send) or RTS/CTS (Request to Send / Clear to Send) frames before each transmission. This mechanism decreases the performance of 802.11g clients, but ensures that 802.11b clients can communicate with the OD200. (Default:CTS Only)

- **Disable:** If there are no 802.11b clients in the network, the protection mode can be disabled.
- **CTS Only:** The transmitting client sends only a CTS frame to prevent others from accessing the medium. This mechanism is effective for most neworks with mixed 802.11g and 802.11b clients.
- **RTS/CTS:** Both RTS and CTS frames must be exchanged before a client can send data. There may be 802.11b clients in some networks that do not detect the CTS frames from other stations. The full RTS/CTS exchange should solve most connection problems, but it also has the greatest impact on network performance.

Factory Default – Click the Reset button to set all the Wi-Fi settings to their factory default values.

Wireless Security

The OD200’s Wi-Fi interface is configured by default as an “open system,” which broadcasts a beacon signal including the configured SSID. Wireless clients with a configured SSID of “ANY” can read the SSID from the beacon, and automatically set their SSID to allow immediate connection to the wireless network.

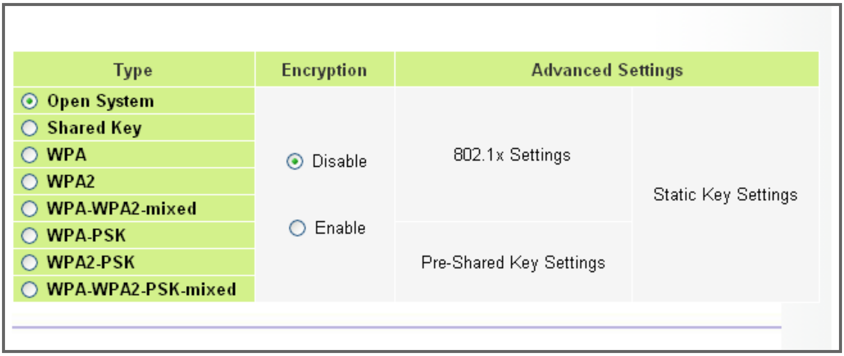
To implement wireless network security, you have to employ two main functions:

- Authentication – It must be verified that clients attempting to connect to the network are authorized users.

- Traffic Encryption – Data passing between the unit and clients must be protected from interception and evesdropping.

For a more secure network, the OD200 can implement one of several security mechanisms. The security mechanism employed depends on the level of security required, the network and management resources available, and the software support provided on wireless clients.

To configure wireless security click on Security.



Type	Encryption	Advanced Settings	
● Open System	● Disable	802.1x Settings	Static Key Settings
○ Shared Key			
○ WPA			
○ WPA2			
○ WPA-WPA2-mixed			
○ WPA-PSK	○ Enable	Pre-Shared Key Settings	
○ WPA2-PSK			
○ WPA-WPA2-PSK-mixed			

Figure 8-2. Wireless Security

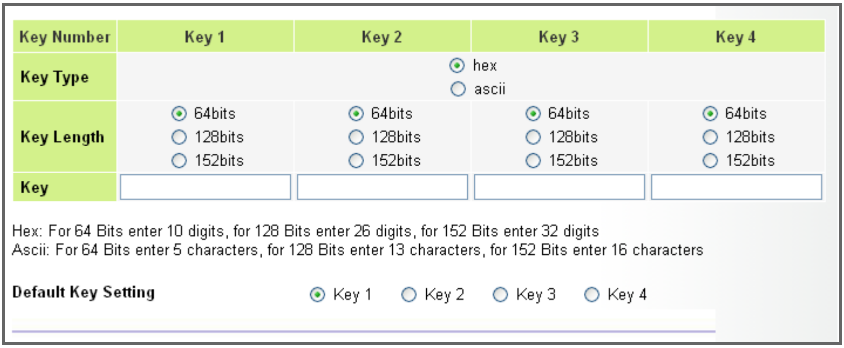
There are eight security options available. When you select the security type in the table, the required settings are displayed. The option “Open System” together with encryption disabled is equivalent to no security, all clients will be able to immediately connect to the Wi-Fi network.

The following sections describe the security options available for the OD200 Wi-Fi network.

WEP Shared Key Security

Wired Equivalent Privacy (WEP) provides a basic level of security, preventing unauthorized access to the network and encrypting data transmitted between wireless clients and the OD200. WEP uses static shared keys (fixed-length hexadecimal or alphanumeric strings) that are manually distributed to all clients that want to use the network.

When enabled, you must configure at least one WEP key for the Wi-Fi interface and all its clients.



Key Number	Key 1	Key 2	Key 3	Key 4
Key Type	● hex ○ ascii			
Key Length	● 64bits ○ 128bits ○ 152bits	● 64bits ○ 128bits ○ 152bits	● 64bits ○ 128bits ○ 152bits	● 64bits ○ 128bits ○ 152bits
Key				

Hex: For 64 Bits enter 10 digits, for 128 Bits enter 26 digits, for 152 Bits enter 32 digits
Ascii: For 64 Bits enter 5 characters, for 128 Bits enter 13 characters, for 152 Bits enter 16 characters

Default Key Setting ● Key 1 ○ Key 2 ○ Key 3 ○ Key 4

Figure 8-3. WEP Shared Key Security

Key 1 ~ Key 4 – Sets WEP key values. The user must first choose between ASCII or Hexadecimal keys. At least one key must be specified. Each WEP key has an index number. The selected key is used for authentication and encryption on the Wi-Fi interface. Enter key values that match the key type and length settings. (Default: Hex, 64 bits, no preset value)

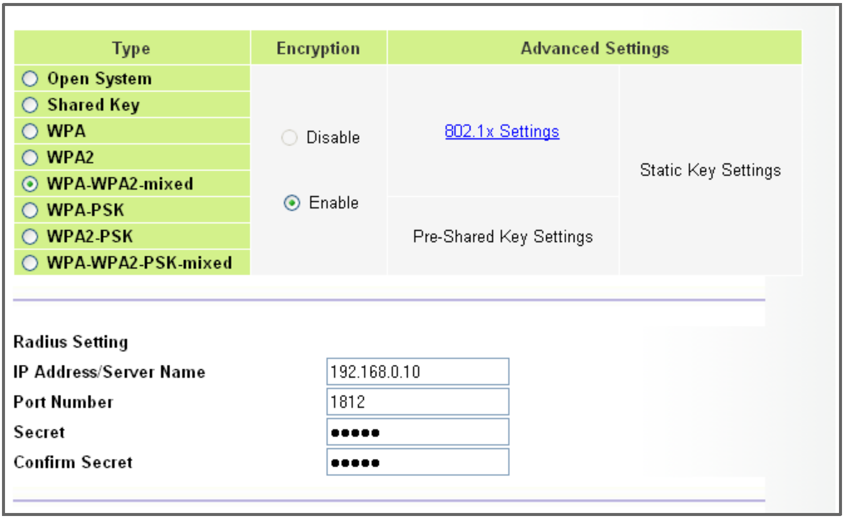
- **Key Type:** Specifies keys as either ASCII or Hexadecimal values.
- **Key Length:** WEP keys can be set as 64, 128, or 152 bits in length.
- **Key:** Specify keys as either 5, 13, or 16 alphanumeric characters, or 10, 26, or 32 hexadecimal digits, depending on the selected key length.

Default Key Setting – Sets the WEP key used for authentication and encryption. (Range: 1-4; Default: 1)

WPA/WPA2 Security

The WPA and WPA2 modes use IEEE 802.1X as their basic framework for user authentication and dynamic key management. IEEE 802.1X access security uses Extensible Authentication Protocol (EAP) and requires a configured Remote Authentication Dial-in User Service (RADIUS) authentication server to be accessible in the enterprise network. If you select WPA or WPA2 mode, be sure to configure the RADIUS settings displayed on the page.

The WPA-WPA2-Mixed mode is a transitional mode of operation for networks moving from WPA security to WPA2. WPA-WPA2-Mixed mode allows both WPA and WPA2 clients to associate to a common Wi-Fi interface.



Type	Encryption	Advanced Settings	
○ Open System ○ Shared Key ○ WPA ○ WPA2 ● WPA-WPA2-mixed ○ WPA-PSK ○ WPA2-PSK ○ WPA-WPA2-PSK-mixed	○ Disable ● Enable	802.1x Settings Pre-Shared Key Settings	Static Key Settings

Radius Setting

IP Address/Server Name	192.168.0.10
Port Number	1812
Secret	●●●●●
Confirm Secret	●●●●●

Figure 8-4. WPA/WPA2 Security

RADIUS Setting – Configures RADIUS server settings for WPA, WPA2, or WPA-WPA2-Mixed security modes.

- **IP Address/Server Name** – Specifies the IP address or domain name of the RADIUS server.
- **Port Number** – The User Datagram Protocol (UDP) port number used by the RADIUS server for authentication messages. (Range: 1024-65535; Default: 1812)
- **Secret** – A shared text string used to encrypt messages between the unit and the RADIUS server. Be sure that the same text string is specified on the RADIUS server. Do not use blank spaces in the string. (Maximum length: 20 characters)

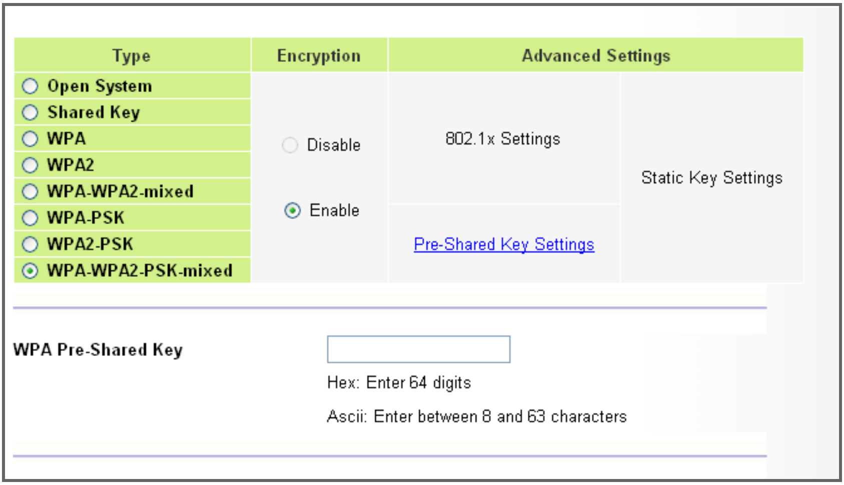
Note: This guide assumes that you have already configured a RADIUS server in the attached wired network to support the unit. Configuration of RADIUS server software is beyond the scope of this guide, refer to documentation provided with the RADIUS server software.

WPA/WPA2 PSK Security

The WPA-PSK, WPA2-PSK, and WPA-WPA2-Mixed-PSK modes use a common password phrase, called a Pre-Shared Key (PSK), that must be manually distributed to all clients that want to connect to the network. The Pre-shared Key modes of WPA/WPA2 remove the need for RADIUS server support in the attached network.

You can specify a key as an easy-to-remember form of letters and numbers. The WPA Pre-shared Key can be input as ASCII string (8-63 characters) or Hexadecimal format (length is 64). All wireless clients must be configured with the same key to communicate with the VAP interface.

The WPA-WPA2-Mixed-PSK mode is a transitional mode of operation for networks moving from WPA security to WPA2. WPA-WPA2-Mixed-PSK mode allows both WPA and WPA2 clients to associate to a common Wi-Fi interface.



Type	Encryption	Advanced Settings	
○ Open System	○ Disable	802.1x Settings	Static Key Settings
○ Shared Key	● Enable	Pre-Shared Key Settings	
○ WPA			
○ WPA2			
○ WPA-WPA2-mixed			
○ WPA-PSK			
○ WPA2-PSK			
● WPA-WPA2-PSK-mixed			

WPA Pre-Shared Key

Hex: Enter 64 digits

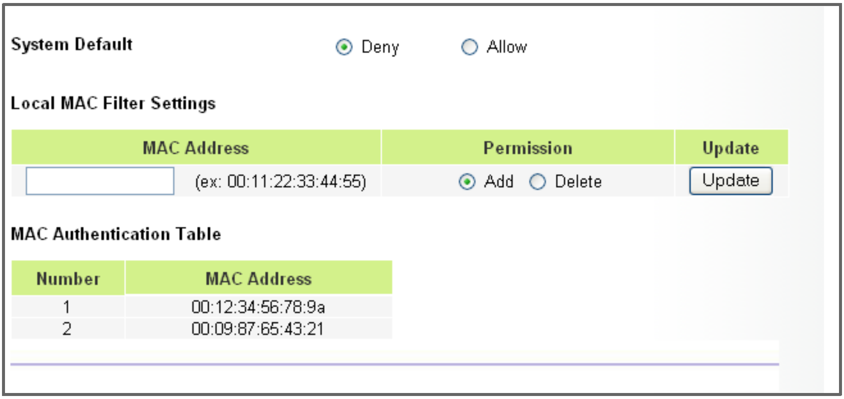
Ascii: Enter between 8 and 63 characters

Figure 8-5. WPA/WPA2 PSK Security

WPA Pre-Shared Key – The key required for WPA-PSK, WPA2-PSK, and WPA-WPA2-Mixed-PSK modes. There are.two methods for key entry: An ASCII string of 8~63 characters in length (0~9, A~F, including spaces), or 64 hexadecimal digits.

MAC Authentication

Wireless clients can be authenticated for network access by checking their MAC address against a local database configured on the OD200. You can configure a list of up to 32 wireless client MAC addresses in the filter list to either allow or deny network access.



System Default ● Deny ○ Allow

Local MAC Filter Settings

MAC Address	Permission	Update
(ex: 00:11:22:33:44:55)	● Add ○ Delete	Update

MAC Authentication Table

Number	MAC Address
1	00:12:34:56:78:9a
2	00:09:87:65:43:21

Figure 8-6. MAC Authentication

System Default – Specifies the action for MAC addresses listed in the local MAC Authentication Table.

- **Deny:** Blocks access for all MAC addresses listed in the MAC Authentication Table. Clients with MAC addresses not listed in the table are permitted access.
- **Allow:** Permits access for all MAC addresses listed in the MAC Authentication Table. Clients with MAC addresses not listed in the table are denied access.

Local MAC Filter Settings – Adds new MAC addresses to the MAC Authentication Table, or removes addresses currently listed in the table.

- **MAC Address:** Physical address of a client. Enter six pairs of hexadecimal digits separated by colons; for example, 00:90:D1:12:AB:89.
- **Permission:** Select Add to list a new specified MAC address in the MAC Authentication Table. Select Delete to remove the specified MAC address from the table.
- **Update:** Performs the Add or Delete action on the specified MAC address.

MAC Authentication Table – Displays current entries in the MAC filter database.

Appendix A: Troubleshooting

Diagnosing LED Indicators

Table A-1 Troubleshooting Chart

Symptom	Action
SAU WiMAX Signal LEDs are all on Green and LED 9 is on Red	• The receive signal strength is too high. Adjust the direction the ODU is pointing so that only LEDs 1 to 8 are on.

Cannot Connect to the Internet

If you cannot access the Internet from the PC, check the following:

- If you cannot access the Internet, be sure your WIndows system is correctly configured for TCP/IP. The IP settings should be set to "obtain an IP address automatically."
- The WAN Type settings for the service provider may not be configured correctly. Use the web interface to check that the WAN settings match those provided by the service provider.
- You may be out of the service area of the WiMAX network. Check with the WiMAX service provider for service coverage information.
- If you cannot resolve the problem, check the System Status page of the web interface and contact your WiMAX service provider.

Cannot Access Web Management

If the management interface cannot be accessed using a web browser:

- Be sure the management station is correctly configured for TCP/IP. The IP settings should be set to "obtain an IP address automatically."
- Try a Ping command from the management station to the unit's IP address to verify that the entire network path between the two devices is functioning correctly.
- Check that the management station has a valid network connection and that the Ethernet port that you are using has not been disabled.
- Check the network cabling between the management station and the unit. If the problem is not resolved, try using a different port or a different cable.

Forgot or Lost the Password

Set the unit to its default configuration by pressing the reset button on the back panel for 5 seconds or more. Then use the default password "admin" to access the management interface.

Resetting the Unit

If all other recovery measures fail and the unit is still not functioning properly, take either of these steps:

- Reset the unit using the web interface, or through a power reset.
- Reset the unit to its factory default configuration by pressing the reset button on the back panel for 5 seconds or more. Then use the default password “admin” to access the management interface.

Appendix B: Specifications

ODU Specifications

Physical Specifications

Ports
1 LAN port, 10/100BASE-TX with auto-negotiation, RJ-45 connector

Network Interface
RJ-45 connector, auto MDI/X:
  10BASE-T: RJ-45 (100-ohm, UTP cable; Category 3 or better)
  100BASE-TX: RJ-45 (100-ohm, UTP cable; Category 5 or better)

Physical Size
229.8 x 219.55 x 71.3 mm (9.05 x 8.64 x 2.81 in)

Weight
1.36 kg (2.99 lbs)

Temperature
Operating: -40 to 55 °C (-40 to 131 °F)
Storage: -40 to 75 °C (-40 to 167 °F)

Humidity
5% to 95% (non-condensing)

WiMAX Specifications

Antennas
Embedded dual polarization antennas
Transmit: Single antenna
Receive: Two antennas using Maximal-Ratio Combining (MRC)
Gain: 12 dBi at 2.3/2.5 GHz, 15 dBi at 3.5 GHz
Impedance: 50 Ohm

Operating Frequency
ETSI: 3.4–3.6 GHz
FCC-2.3: 2305-2320 MHz, 2345-2360 MHz
FCC-2.5: 2496-2690 MHz
Taiwan NCC: 2500-2690 MHz
Support for Full Scan and Partial Scan

Channel Bandwidth

5, 7, 8.75, or 10 MHz depending on model (software configurable)
2.3 GHz Model: 5, 8.75, and 10 MHz
2.5 GHz Model: 5 and 10 MHz
3.5 GHz Model: 5, 7, and 10 MHz

Modulation Scheme

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

Modulation and Coding Types

Down Link: QPSK, 16 QAM, 64 QAM
Up Link: QPSK, 16 QAM

Maximum Throughput

Up link: 7 Mbps maximum
Down link: 20 Mbps maximum

Transmit Power Level

+24 dBm maximum (at antenna connector)

Receive Sensitivity

-94 dBm maximum (at antenna connector)

Compliances

Emissions

FCC CFR 47 Part 15 Class B
EN 301 489-1/-4

WiMAX Radio Signal Certification

US: 2.3 GHz - FCC CFR 47 Part 27D; 2.5 GHz - CFR 47 Part 27M
Europe (3.5 GHz): EN 302 326-2 (V1.2.2), EN 302 326-3 (V1.2.2)

Waterproof

IP67 (IEC 60529)

Safety

cTUVus
CB report

Standards

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

SAU Specifications

Ports

1 Mini USB

Temperature

Operating: -40 to 55 °C (-40 to 131 °F)
Storage: -25 to 85 °C (-13 to 185 °F)

Humidity

5% to 95% (non-condensing)

Safety

EN-60950-1 and UL 60950-1

Appendix C: Cables and Pinouts

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.

Caution: Each wire pair must be attached to the RJ-45 connectors in a specific orientation. (See “Straight-Through Wiring” on page C-2 and “Crossover Wiring” on page C-2 for an explanation.)

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

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

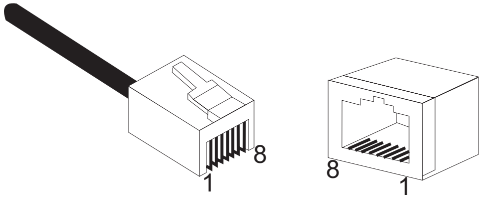


Figure C-1 RJ-45 Connector

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, or 100-ohm Category 5 or better cable for 100 Mbps connections. Also be sure that the length of any twisted-pair connection does not exceed 100 meters (328 feet).

The RJ-45 ports on the unit 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 C-1. 10/100BASE-TX MDI and MDI-X Port Pinouts

Pin	MDI-X Signal Name	MDI Signal Name
1	Receive Data plus (RD+)	Transmit Data plus (TD+)
2	Receive Data minus (RD-)	Transmit Data minus (TD-)
3	Transmit Data plus (TD+)	Receive Data plus (RD+)
4	Positive V_{port}	Positive V_{port}
5	Positive V_{port}	Positive V_{port}
6	Transmit Data minus (TD-)	Receive Data minus (RD-)
7	Negative V_{port}	Negative V_{port}
8	Negative V_{port}	Negative V_{port}

Note: 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.

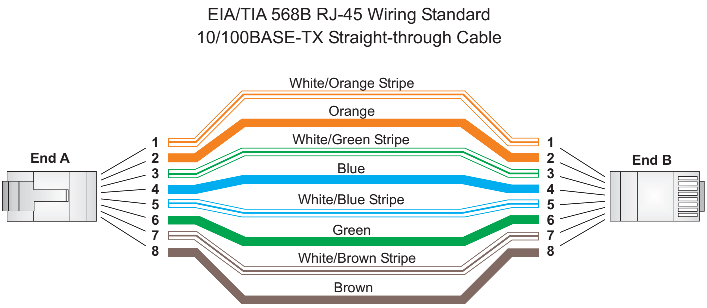


Figure C-2 Straight-Through Wiring

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.

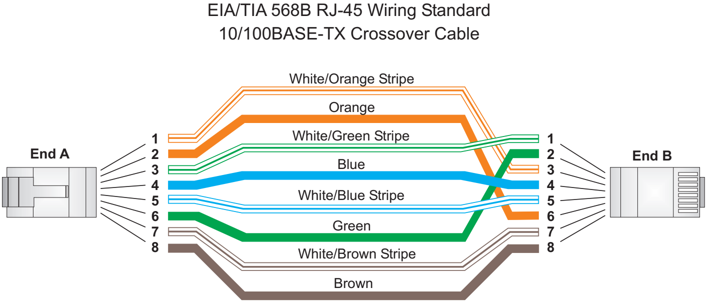


Figure C-3 Crossover Wiring

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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.

Access Point

An Wi-Fi internetworking device that seamlessly connects wired and wireless networks.

Authentication

The process to verify the identity of a client requesting network access.

Auto-Negotiation

Signalling method allowing each node to select its optimum operational mode (speed and duplex mode) based on the capabilities of the node to which it is connected.

Base Station

A WIMAX service provider’s equipment that is installed at a fixed location to provide network connectivity for subscriber stations within a defined service area.

Beacon

A signal periodically transmitted from a Wi-Fi access point that is used to identify the network and maintain contact with wireless clients.

Carrier-to-Interference-Plus-Noise Ratio (CINR)

A measurement of the channel quality in a WiMAX link. Subscriber stations measure the received CINR and send the information back to the base station. The base station can then adjust modulation and coding for the link to optimize throughput.

Center Frequency

The radio frequency at the center of a WiMAX channel. WiMAX channels can be of different widths (the channel bandwidth) and the transmitted radio signal is spread across the full width of the channel.

Channel Bandwidth

The range of frequencies occupied by a WiMAX radio signal. The amount of information that can be transmitted in a radio signal is related to the channel bandwidth, which is measured in Megahertz (MHz). WiMAX supports a range of channel bandwidths that can be defined by the service operator depending on performance requirements, operating preferences, and regulatory constraints.

CPE (Customer-Premises Equipment)

Terminal equipment provided by a service provider that is located at a subscriber's premises and supports a communication channel between a customer and the service provider.

Domain Name System (DNS)

A system used for translating host names for network nodes into IP addresses.

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 a base station and subscribers uses encryption to protect from interception and evesdropping.

Ethernet

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

Extensible Authentication Protocol (EAP)

An authentication protocol used to authenticate subscribers. EAP is used with TLS or TTLS authentication to provide "mutual authentication" between a subscriber and a WiMAX network.

Hypertext Transfer Protocol (HTTP)

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

IEEE 802.11b

The Wi-Fi wireless standard that supports communications in the 2.4 GHz band using Direct Sequence Spread Spectrum (DSSS). The standard provides for data rates of 1, 2, 5.5, and 11 Mbps.

IEEE 802.11g

The Wi-Fi wireless standard that supports communications in the 2.4 GHz band using using Orthogonal Frequency Division Multiplexing (OFDM). The standard provides for data rates of 6, 9, 11, 12, 18, 24, 36, 48, 54 Mbps. IEEE 802.11g is also backward compatible with IEEE 802.11b.

IEEE 802.16e

The WiMAX standard that provides mobile broadband wireless access using Scalable Orthogonal Frequency Division Multiple Access (SOFDMA).

IEEE 802.1X

Port Authentication controls access to the switch ports by requiring users to first enter a user ID and password for authentication.

Internet Service Provider

A company that offers an access service that connects customers to the Internet.

IP Address

The Internet Protocol (IP) address is a numerical identification assigned to a device that communicates in a network using the Internet Protocol.

LED

Light emitting diode, used for indicating a device or network condition.

Local Area Network (LAN)

A group of interconnected computer and support devices.

MAC Address

The physical layer address used to uniquely identify network nodes.

MS-CHAPV2

Microsoft’s version 2 of the Challenge-Handshake Authentication Protocol. Introduced by Microsoft with Windows 2000, MS-CHAPV2 (defined in RFC 2759) provides mutual authentication between peers using user names and passwords.

Orthogonal Frequency Division Multiplexing (ODFM)

The air interface defined for IEEE 802.11g Wi-Fi. OFDM allows multiple users to transmit in an allocated band by dividing the bandwidth into many narrow bandwidth carriers.

RADIUS

Remote Authentication Dial-in User Service. A logon authentication protocol that uses software running on a central server to control access to a network.

RJ-45 Connector

A connector for twisted-pair wiring.

Receive Signal Strength Indicator (RSSI)

A measurement of the strength of a received wireless signal. The higher the RSSI value, the stronger the received signal from the antenna.

Roaming

The process where a WiMAX subscriber can move onto another operator's network while maintaining a continuous connection.

SAU (Subscriber Unit Alignment Unit)

An optional device that can be connected to the SAU port on the ODU to provide status LED indications during antenna alignment.

Scalable Orthogonal Frequency Division Multiple Access (SOFDMA)

The air interface defined for mobile WiMAX. SOFDMA is a multiple access method that allows simultaneous transmissions to and from several users, employing a subchannel structure that scales with bandwidth.

Service Provider

See *Internet Service Provider*.

Service Set Identifier (SSID)

A name that is sent in packets over a Wi-Fi network, which functions as a password for clients connecting to the network. The SSID differentiates one Wi-Fi network from another.

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.

Subscriber Identity Module (SIM)

A standard for a small removable integrated circuit card that securely stores information used to identify a mobile wireless subscriber.

Subscriber Station

A general term for a customer's WIMAX terminal equipment that provides connectivity with a base station.

Transmission Control Protocol/Internet Protocol (TCP/IP)

Protocol suite that includes TCP as the primary transport protocol, and IP as the network layer protocol.

Transport Layer Security (TLS)

An standard defined in RFC 5216, EAP-TLS is an authentication protocol that provides strong security through the use of client-side certificates.

Tunneled Transport Layer Security (TTLS)

EAP-TTLS is a protocol extension of EAP-TLS. The authentication server is authenticated to the client using its Certification Authority certificate, this establishes a secure “tunnel” through which the client is then authenticated.

URL (Uniform Resource Locator)

An easy-to-read character string that is used to represent a resource available on the Internet. For example, “http://www.url-example.com/.”

UTP

Unshielded twisted-pair cable.

Wi-Fi Protected Access

WPA employs IEEE 802.1X as its basic framework for user authentication and dynamic key management to provide an enhanced security solution for 802.11 Wi-Fi networks.

Wired Equivalent Privacy (WEP)

WEP is the Wi-Fi security based on the use of RC4 encryption keys. Wi-Fi devices without a valid WEP key are excluded from the network.

WPA Pre-shared Key (PSK)

PSK security can be used for small Wi-Fi networks that may not have the resources to configure and maintain a RADIUS server. WPA provides a simple operating mode that uses just a pre-shared password for network access.

WiMAX

The IEEE 802.16 standard for Worldwide Interoperability for Microwave Access. The IEEE 802.16-2004 standard, known as “fixed WiMAX,” supports only point-to-point links and has no support for mobility. The IEEE 802.16e-2005 standard, known as “mobile WiMAX,” is an amendment to IEEE 802.16-2004 and supports mobility. Note that mobile WiMAX standard is not backward compatible with the fixed WiMAX standard.

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