

# MAX-207HW2

*WiMAX MIMO Indoor Simple CPE (2.5 GHz)*

中文名稱：WiMAX 802.16e 2.5GHz 無線寬頻路由器

## User's Guide



### Default Login Details

IP Address	http://192.168.1.1
Admin Name and Password	@dmin 284wj/6
User Name and Password	User user

Firmware Version 1.0  
Edition 1, 6/2009

[www.zyxel.com](http://www.zyxel.com)

# ZyXEL

# About This User's Guide

## Intended Audience

This manual is intended for people who want to configure the ZyXEL WiMAX Modem using the web configurator. You should have at least a basic knowledge of TCP/IP networking concepts and topology.

## Related Documentation

- Quick Start Guide

The Quick Start Guide is designed to help you get up and running right away. It contains information on setting up your network and configuring for Internet access.

- Web Configurator Online Help

Embedded web help for descriptions of individual screens and supplementary information.

- Command Reference Guide

The Command Reference Guide explains how to use the Command-Line Interface (CLI) and CLI commands to configure the WiMAX Modem.

**Note:** It is recommended you use the web configurator to configure the WiMAX Modem.

- Support Disc

Refer to the included CD for support documents.

- ZyXEL Web Site

Please refer to [www.zyxel.com](http://www.zyxel.com) for additional support documentation and product certifications.

## Documentation Feedback

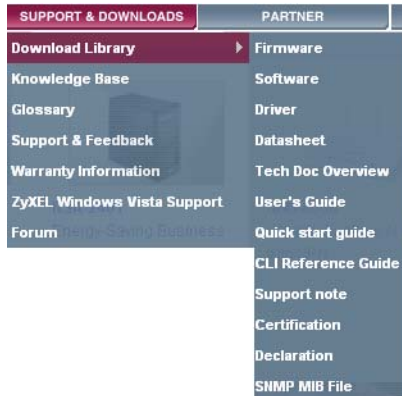
Send your comments, questions or suggestions to: [techwriters@zyxel.com.tw](mailto:techwriters@zyxel.com.tw)

Thank you!

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## Need More Help?

More help is available at [www.zyxel.com](http://www.zyxel.com).



- **Download Library**  
Search for the latest product updates and documentation from this link. Read the Tech Doc Overview to find out how to efficiently use the User Guide, Quick Start Guide and Command Line Interface Reference Guide in order to better understand how to use your product.
- **Knowledge Base**  
If you have a specific question about your product, the answer may be here. This is a collection of answers to previously asked questions about ZyXEL products.
- **Forum**  
This contains discussions on ZyXEL products. Learn from others who use ZyXEL products and share your experiences as well.

## Customer Support

Should problems arise that cannot be solved by the methods listed above, you should contact your vendor. If you cannot contact your vendor, then contact a ZyXEL office for the region in which you bought the device.

See [http://www.zyxel.com/web/contact\\_us.php](http://www.zyxel.com/web/contact_us.php) for contact information. Please have the following information ready when you contact an office.

- Product model and serial number.
- Warranty Information.
- Date that you received your device.
- Brief description of the problem and the steps you took to solve it.

---

# Document Conventions

## Warnings and Notes

These are how warnings and notes are shown in this User's Guide.

**Warnings tell you about things that could harm you or your WiMAX Modem.**

Note: Notes tell you other important information (for example, other things you may need to configure or helpful tips) or recommendations.





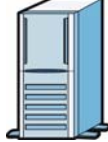







## Syntax Conventions

- The MAX-207HW2 may be referred to as the "WiMAX Modem", the "device", the "system" or the "product" in this User's Guide.
- Product labels, screen names, field labels and field choices are all in **bold** font.
- A key stroke is denoted by square brackets and uppercase text, for example, [ENTER] means the "enter" or "return" key on your keyboard.
- "Enter" means for you to type one or more characters and then press the [ENTER] key. "Select" or "choose" means for you to use one of the predefined choices.
- A right angle bracket ( > ) within a screen name denotes a mouse click. For example, **TOOLS > Logs > Log Settings** means you first click **Tools** in the navigation panel, then the **Logs** sub menu and finally the **Log Settings** tab to get to that screen.
- Units of measurement may denote the "metric" value or the "scientific" value. For example, "k" for kilo may denote "1000" or "1024", "M" for mega may denote "1000000" or "1048576" and so on.
- "e.g.," is a shorthand for "for instance", and "i.e.," means "that is" or "in other words".

## Icons Used in Figures

Figures in this User's Guide may use the following generic icons. The WiMAX Modem icon is not an exact representation of your WiMAX Modem.

**Table 1** Common Icons

<p>WiMAX Device</p> 	<p>WiMAX Access Point</p> 	<p>Computer</p> 
<p>Notebook</p> 	<p>Server</p> 	<p>WiMAX Base Station</p> 
<p>Telephone</p> 	<p>Switch</p> 	<p>Router</p> 
<p>Internet Cloud</p> 	<p>Internet/WiMAX Cloud</p> 	<p>Wireless Signal</p> 

# Safety Warnings

- Do NOT use this product near water, for example, in a wet basement or near a swimming pool.
- Do NOT expose your device to dampness, dust or corrosive liquids.
- Do NOT store things on the device.
- Do NOT install, use, or service this device during a thunderstorm. There is a remote risk of electric shock from lightning.
- Connect ONLY suitable accessories to the device.
- Do NOT open the device or unit. Opening or removing covers can expose you to dangerous high voltage points or other risks. ONLY qualified service personnel should service or disassemble this device. Please contact your vendor for further information.
- Make sure to connect the cables to the correct ports.
- Place connecting cables carefully so that no one will step on them or stumble over them.
- Always disconnect all cables from this device before servicing or disassembling.
- Use ONLY an appropriate power adaptor or cord for your device. Connect it to the right supply voltage (for example, 110V AC in North America or 230V AC in Europe).
- Do NOT remove the plug and connect it to a power outlet by itself; always attach the plug to the power adaptor first before connecting it to a power outlet.
- Do NOT allow anything to rest on the power adaptor or cord and do NOT place the product where anyone can walk on the power adaptor or cord.
- Do NOT use the device if the power adaptor or cord is damaged as it might cause electrocution.
- If the power adaptor or cord is damaged, remove it from the device and the power source.
- Do NOT attempt to repair the power adaptor or cord. Contact your local vendor to order a new one. Do not use the device outside, and make sure all the connections are indoors. There is a remote risk of electric shock from lightning.
- Do NOT obstruct the device ventilation slots, as insufficient airflow may harm your device. Use only No. 26 AWG (American Wire Gauge) or larger telecommunication line cord.
- Antenna Warning! This device meets ETSI and FCC certification requirements when using the included antenna(s). Only use the included antenna(s).
- If you wall mount your device, make sure that no electrical lines, gas or water pipes will be damaged.
- Make sure that the cable system is grounded so as to provide some protection against voltage surges.

Your product is marked with this symbol, which is known as the WEEE mark.

WEEE stands for Waste Electronics and Electrical Equipment. It means that used electrical and electronic products should not be mixed with general waste. Used electrical and electronic equipment should be treated separately.





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# PART I

## Introduction and Wizards

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Getting Started (19)

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# Getting Started

## 1.1 About Your WiMAX Modem

The WiMAX Modem has a built-in switch and one phone port. It allows you to access the Internet by connecting to a WiMAX wireless network.

You can use a traditional analog telephone to make Internet calls using the WiMAX Modem's Voice over IP (VoIP) communication capabilities.

You can configure firewall and content filtering as well as a host of other features.

The web browser-based Graphical User Interface (GUI), also known as the web configurator, provides easy management.

See [Chapter 18 on page 177](#) for a complete list of features for your model.

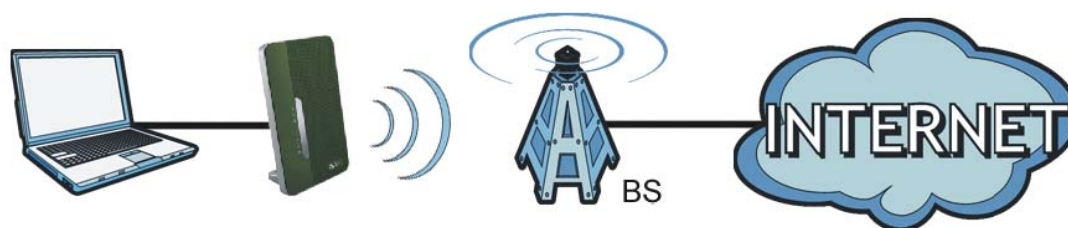
### 1.1.1 WiMAX Internet Access

Connect your computer or network to the WiMAX Modem for WiMAX Internet access. See the Quick Start Guide for instructions on hardware connection.

In a wireless metropolitan area network (MAN), the WiMAX Modem connects to a WiMAX base station (BS) for Internet access.

The following diagram shows a notebook computer equipped with the WiMAX Modem connecting to the Internet through a WiMAX base station (marked **BS**).

**Figure 1** Mobile Station and Base Station



When the firewall is on, all incoming traffic from the Internet to your network is blocked unless it is initiated from your network.

Use content filtering to block access to web sites with URLs containing keywords that you specify. You can define time periods and days during which content filtering is enabled and include or exclude particular computers on your network from content filtering. For example, you could block access to certain web sites for the kids.

## 1.1.2 Make Calls via Internet Telephony Service Provider

In a home or small office environment, you can use the WiMAX Modem to make and receive the following types of VoIP telephone calls:

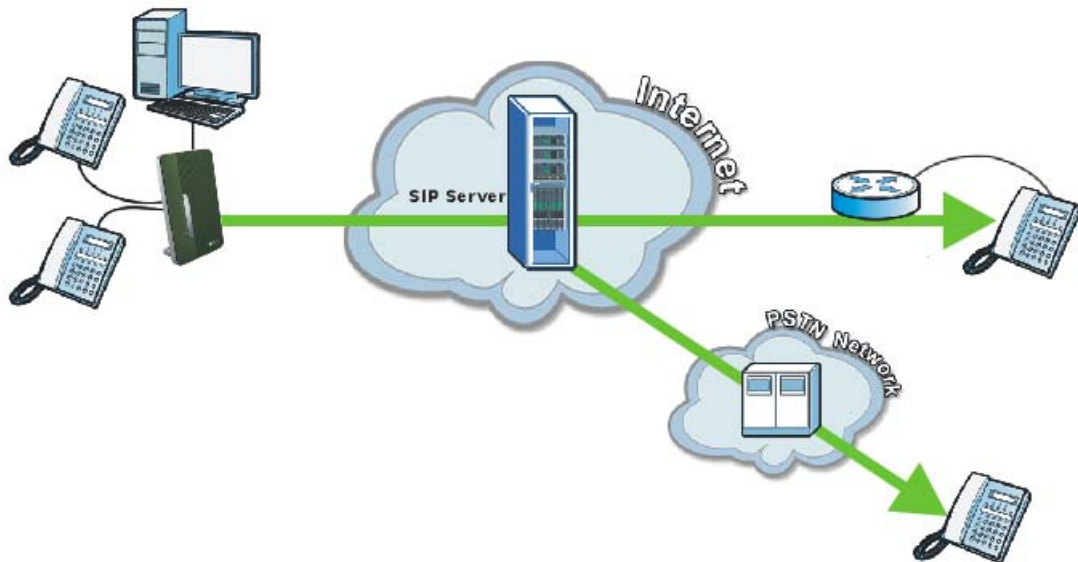
- Peer-to-Peer calls - Use the WiMAX Modem to make a call directly to the recipient's IP address without using a SIP proxy server.

**Figure 2** WiMAX Modem's VoIP Features - Peer-to-Peer Calls



- Calls via a VoIP service provider - The WiMAX Modem sends your call to a VoIP service provider's SIP server which forwards your calls to either VoIP or PSTN phones.

**Figure 3** WiMAX Modem's VoIP Features - Calls via VoIP Service Provider



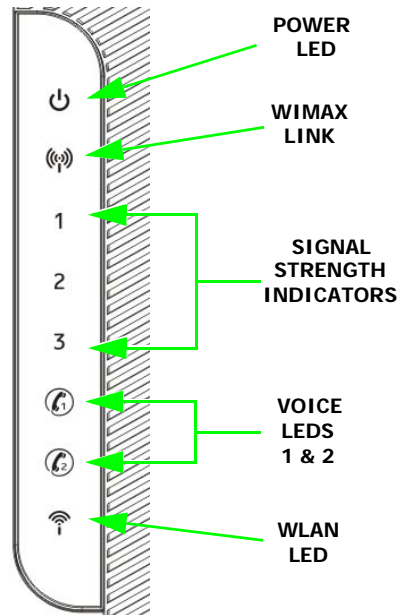
## 1.2 WiMAX Modem Hardware

Follow the instructions in the Quick Start Guide to make hardware connections.

### 1.2.1 LEDs

The following figure shows the LEDs (lights) on the WiMAX Modem.

**Figure 4** The WiMAX Modem's LEDs



The following table describes your WiMAX Modem's LEDs (from right to left).

**Table 2** The WiMAX Modem

LED	STATE	DESCRIPTION
Power	Off	The WiMAX Modem is not receiving power.
	Red	The WiMAX Modem is receiving power but has been unable to start up correctly or is not receiving enough power. See the Troubleshooting section for more information.
	Green	The WiMAX Modem is receiving power and functioning correctly.
WiMAX Link	Off	The WiMAX Modem is not connected to a wireless (WiMAX) network.
	Green	The WiMAX Modem is successfully connected to a wireless (WiMAX) network.
	Green (Blinking Slowly)	The WiMAX Modem is searching for a wireless (WiMAX) network.
	Green (Blinking Quickly)	The WiMAX Modem has found a wireless (WiMAX) network and is connecting.

**Table 2** The WiMAX Modem

LED	STATE	DESCRIPTION
Signal Strength Indicator	The Strength Indicator LEDs display the Interference-plus-Noise Ratio (CINR) of the wireless (WiMAX) connection.	
	Signal 1 On	The signal strength is in the range between 5 and 15.
	Signal 2 On	The signal strength is in the range between 16 and 24.
	Signal 3 On	The signal strength is greater than or equal to 25 dBm
Voice	Off	No SIP account is registered, or the WiMAX Modem is not receiving power.
	Green	A SIP account is registered.
	Green (Blinking)	A SIP account is registered, and the phone attached to the LINE port is in use (off the hook).
	Yellow	A SIP account is registered and has a voice message on the SIP server.
	Yellow (Blinking)	A SIP account is registered and has a voice message on the SIP server, and the phone attached to the LINE port is in use (off the hook).
WLAN	Off	The Wi-Fi network is not operational.
	Green	The Wi-Fi network is operational.
	Blinking Green	The WiMAX Device is sending and receiving data across the Wi-Fi network.

## 1.3 Good Habits for Managing the WiMAX Modem

Do the following things regularly to make the WiMAX Modem more secure and to manage the WiMAX Modem more effectively.

- Change the password. Use a password that's not easy to guess and that consists of different types of characters, such as numbers and letters.
- Write down the password and put it in a safe place.
- Back up the configuration (and make sure you know how to restore it). Restoring an earlier working configuration may be useful if the WiMAX Modem becomes unstable or even crashes. If you forget your password, you will have to reset the WiMAX Modem to its factory default settings. If you backed up an earlier configuration file, you would not have to totally re-configure the WiMAX Modem. You could simply restore your last configuration.

# Introducing the Web Configurator

## 2.1 Overview

The web configurator is an HTML-based management interface that allows easy device set up and management via any web browser that supports: HTML 4.0, CSS 2.0, and JavaScript 1.5, and higher. The recommended screen resolution for using the web configurator is 1024 by 768 pixels and 16-bit color, or higher.

In order to use the web configurator you need to allow:

- Web browser pop-up windows from your device. Web pop-up blocking is enabled by default in many operating systems and web browsers.
- JavaScript (enabled by default in most web browsers).
- Java permissions (enabled by default in most web browsers).

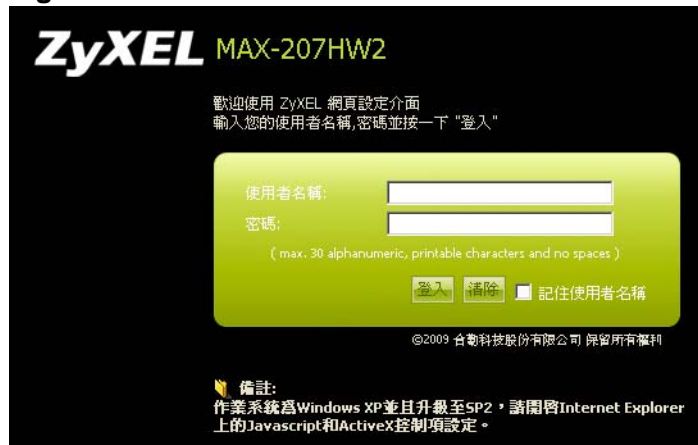
See the [Appendix C on page 219](#) for more information on configuring your web browser.

### 2.1.1 Accessing the Web Configurator

- 1 Make sure your WiMAX Modem hardware is properly connected (refer to the Quick Start Guide for more information).
- 2 Launch your web browser.
- 3 Enter "192.168.1.1" as the URL.

- 4 A login screen displays. Enter the default **User Name** (使用者名稱) (@dmin) and **Password** (密碼) (284wj/6), and then click **Login** (登入).

**Figure 5** Password Screen



- 5 The following screen displays if you have not yet changed your password. It is highly recommended you change the default password. Enter a new password, retype it to confirm and click **Apply** (套用); alternatively click **Ignore** (忽略) to proceed to the main menu if you do not want to change the password now.

**Figure 6** Change Password Screen



## 2.1.2 The Reset Button

If you forget your password or cannot access the web configurator, you will need to use the **Reset** button to reload the factory-default configuration file. This means that you will lose all configurations that you had previously and the password will be reset to "284wj/6".

### 2.1.2.1 Using The Reset Button

- 1 Make sure the **Power** light is on (not blinking).
- 2 To set the device back to the factory default settings, press the **Reset** button for ten seconds or until the **Power** light begins to blink and then release it. When the **Power** light begins to blink, the defaults have been restored and the device restarts.
- 3 Reconfigure the WiMAX Modem following the steps in your Quick Start Guide.

## 2.2 The Main Screen

When you first log into the web configurator and by-pass the wizard, the Main screen appears. Here you can view a concise summary of your WiMAX Modem connection status. This is also the default “home” page for the ZyXEL web configurator and it contains conveniently-placed shortcuts to all of the other screens.




Note: Some features in the web configurator may not be available depending on your firmware version and/or configuration.

**Figure 7** Main Screen ( 首頁 )







The following table describes the icons in this screen.

**Table 3** Main ( 首頁 ) > Icons

ICON	DESCRIPTION
	MAIN ( 首頁 ) Click to return to the Main screen.
	SETUP ( 設定 ) Click to go the Setup screen, where you can configure LAN, DHCP and WAN settings.
	ADVANCED ( 進階 ) Click to go to the Advanced screen, where you can configure features like Port Forwarding and Triggering, SNTP and so on.



**Table 3** Main ( 首頁 ) > Icons (continued)

ICON	DESCRIPTION
	<p>VOICE</p> <p>Click to go to the Voice screen, where you can configure your voice service and phone settings.</p>
	<p>TOOLS ( 工具 )</p> <p>Click to go the Tools screen, where you can configure your firewall, QoS, and content filter, among other things.</p>
	<p>STATUS ( 狀態 )</p> <p>Click to go to the Status screen, where you can view status and statistical information for all connections and interfaces.</p>
	<p>Strength Indicator</p> <p>Displays a visual representation of the quality of your WiMAX connection.</p> <ul style="list-style-type: none"> <li>• Disconnected - Zero bars</li> <li>• <b>Poor</b> reception - One bar</li> <li>• <b>Good</b> reception - Two bars</li> <li>• <b>Excellent</b> reception - Three bars</li> </ul>

The following table describes the labels in this screen.

**Table 4** Main

LABEL	DESCRIPTION
Logout ( 登出 )	<p>Click to log out of the web configurator.</p> <p>Note: This does not log you off the WiMAX network, it simply logs you out of the WiMAX Modem's browser-based configuration interface.</p>
WiMAX Connection Status ( WiMAX 連線狀態 )	<p>This field indicates the current status of your WiMAX connection.</p> <p>Status messages are as follows:</p> <ul style="list-style-type: none"> <li>• <b>Connected</b> - Indicates that the WiMAX Modem is connected to the WiMAX network. Use the <b>Strength Indicator</b> icon to determine the quality of your network connection.</li> <li>• <b>Disconnected</b> - Indicates that the WiMAX Modem is not connected to the WiMAX network.</li> <li>• <b>DL_SYN</b> - Indicates a download synchronization is in progress. This means the firmware is checking with the server for any updates or settings alterations.</li> </ul>
Software Version ( 軟體版本 )	<p>This field indicates the version number of the WiMAX Modem's firmware. The version number takes the form of: <i>Version(Build),release status (candidate)   Version Release Date.</i></p> <p>For example: V3.60(BCC.0)c4   07/08/2008 indicates that the firmware is 3.60, build BCC.0, candidate4, released on July 08, 2008.</p>

**Table 4** Main (continued)

LABEL	DESCRIPTION
WiMAX Firmware Version (WiMAX 韌體版本)	This field displays the version number of the chip firmware used in this WiMAX Modem.
Version Date (版本日期)	This field indicates the exact date and time the current firmware was compiled.
System Uptime (系統開機時間)	This field indicates how long the WiMAX Modem has been on. This resets every time you shut the device down or restart it.

Note: For security reasons, the WiMAX Modem automatically logs you out if you do not use the web configurator for five minutes. If this happens, simply log in again.



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# PART II

## Basic Screens

---

The Main Screen (25)

The Setup Screens (31)



# The Setup Screens

## 3.1 Overview

Use these screens to configure or view LAN, DHCP Client and WAN settings.

### 3.1.1 What You Can Do in This Chapter

- The **Set IP Address (LAN 設定)** screen ([Section 3.2 on page 32](#)) lets you configure the WiMAX Modem's IP address and subnet mask.
- The **DHCP Client (DHCP 用戶端)** screen ([Section 3.3 on page 33](#)) lets you view all DHCP client information.
- The **Time Setting (時間設定)** screen ([Section 3.4 on page 35](#)) lets you configure your WiMAX Modem's time and date keeping settings.

### 3.1.2 What You Need to Know

The following terms and concepts may help as you read through this chapter.

#### LAN

A Local Area Network, or a shared communication system to which many computers are attached. A LAN, as its name implies, is limited to a local area such as a home or office environment. LANs have different topologies, the most common being the linear bus and the star configuration.

#### IP Address

IP addresses identify individual devices on a network. Every networking device (including computers, servers, routers, printers, etc.) needs an IP address to communicate across the network. These networking devices are also known as hosts.

#### Subnet Mask

The subnet mask specifies the network number portion of an IP address. Your device will compute the subnet mask automatically based on the IP Address that

you entered. You do not need to change the computer subnet mask unless you are instructed to do so.

## **DHCP**

Your WiMAX Modem can act as a DHCP (Dynamic Host Configuration Protocol) server that can assign your LAN computers an IP address, subnet mask, DNS and other routing information when its LAN DHCP feature is turned on.

## **Daytime**

A network protocol used by devices for debugging and time measurement. A computer can use this protocol to set its internal clock but only if it knows in which order the year, month, and day are returned by the server. Not all servers use the same format.

## **Time**

A network protocol for retrieving the current time from a server. The computer issuing the command compares the time on its clock to the information returned by the server, adjusts itself automatically for time zone differences, then calculates the difference and corrects itself if there has been any temporal drift.

## **NTP**

NTP stands for Network Time Protocol. It is employed by devices connected to the Internet in order to obtain a precise time setting from an official time server. These time servers are accurate to within 200 microseconds.

### **3.1.3 Before You Begin**

- Make sure that you have made all the appropriate hardware connections to the WiMAX Modem, as described in the Quick Start Guide.
- Make sure that you have logged in to the web configurator at least one time and changed your password from the default, as described in the Quick Start Guide.

## **3.2 Set IP Address (LAN 設定)**

Click the **SETUP (設定)** icon in the navigation bar to set up the WiMAX Modem's IP address and subnet mask. This screen displays this screen by default. If you are in

any other sub-screen you can simply choose **Set IP Address (LAN設定)** from the navigation menu on the left to open it again.

**Figure 8** SETUP ( 設定 ) > Set IP Address (LAN 設定 )

The screenshot shows a web interface titled "LAN Configuration". It contains two input fields: "IP 位址:" with the value "192.168.1.1" and "IP 子網路遮罩:" with the value "255.255.255.0". At the bottom right, there are two buttons: "套用" (Apply) and "重設" (Reset).

The following table describes the labels in this screen.

**Table 5** SETUP ( 設定 ) > Set IP Address (LAN 設定 )

LABEL	DESCRIPTION
IP Address (IP 位址)	Enter the IP address of the WiMAX Modem on the LAN.  Note: This field is the IP address you use to access the WiMAX Modem on the LAN. If the web configurator is running on a computer on the LAN, you lose access to it as soon as you change this field and click <b>Apply ( 套用 )</b> . You can access the web configurator again by typing the new IP address in the browser.
IP Subnet Mask (IP子網路遮罩)	Enter the subnet mask of the LAN.
Apply ( 套用 )	Click to save your changes.
Reset ( 重設 )	Click to restore your previously saved settings.

### 3.3 DHCP Client (DHCP 用戶端 )

Click **SETUP ( 設定 ) > DHCP Client (DHCP 用戶端)** to display the IP addresses, Host Names and MAC addresses of the devices currently connected to the WiMAX



Modem. These settings can be configured in the **ADVANCED (進階) > LAN Configuration (LAN 設定) > DHCP Setup** screen.

**Figure 9** SETUP (設定) > DHCP Client (DHCP 用戶端)

#	IP 位址	主機名稱	MAC 位址	保留
1	192.168.1.35	TW	00:02:e3:57:ea:10	<input type="checkbox"/>

The following table describes the labels in this screen.

**Table 6** SETUP(設定) > DHCP Client(DHCP 用戶端)

LABEL	DESCRIPTION
#	The number of the item in this list.
IP Address (IP 位址)	This field displays the IP address the WiMAX Modem assigned to a computer in the network.
Host Name (主機名稱)	This field displays the system name of the computer to which the WiMAX Modem assigned the IP address.
MAC Address (MAC位址)	This field displays the MAC address of the computer to which the WiMAX Modem assigned the IP address.
Reserve (保留) Apply (套用)	Select <b>Reserve (保留)</b> and click <b>Apply (套用)</b> to have the WiMAX Modem always map the currently assigned IP address to the device with this MAC address.  Clear <b>Remain (保留)</b> and click <b>Apply (套用)</b> to allow the WiMAX Modem to assign a new IP address to this device with this MAC address when next time the device sends a new DHCP request.
Refresh (重新整理)	Click this button to update the table data.

## 3.4 Time Setting (時間設定)

Click **SETUP (設定) > Time Setting (時間設定)** to set the date, time, and time zone for the WiMAX Modem.

**Figure 10** SETUP (設定) > Time Setting (時間設定)

The following table describes the labels in this screen.

**Table 7** SETUP (設定) > Time Setting (時間設定)

LABEL	DESCRIPTION
Current Time and Date (現在的時間與日期)	
Current Time (現在時間)	Displays the current time according to the WiMAX Modem.
Current Date (現在日期)	Displays the current time according to the WiMAX Modem.
Time and Date Setup (時間和日期設定)	
Manual (手動)	Select this if you want to specify the current date and time in the fields below.
New Time (新的時間)	Enter the new time in this field, and click <b>Apply (套用)</b> .
New Date (新的日期)	Enter the new date in this field, and click <b>Apply (套用)</b> .

**Table 7** SETUP ( 設定 ) > Time Setting ( 時間設定 )

LABEL	DESCRIPTION
Get from Time Server ( 從時間伺服器取得 )	Select this if you want to use a time server to update the current date and time in the WiMAX Modem.
Time Protocol ( 時間通訊協定 )	Select the time service protocol that your time server uses. Check with your ISP or network administrator, or use trial-and-error to find a protocol that works.  <b>Daytime (RFC 867)</b> - This format is day/month/year/time zone.  <b>Time (RFC 868)</b> - This format displays a 4-byte integer giving the total number of seconds since 1970/1/1 at 0:0:0.  <b>NTP (RFC 1305)</b> - This format is similar to Time (RFC 868).
Time Server Address ( 時間伺服器位址 )	Enter the IP address or URL of your time server. Check with your ISP or network administrator if you are unsure of this information.
Time Zone Setup ( 時區設定 )	
Time Zone ( 時區 )	Select the time zone at your location.
Daylight Savings ( 日光節約 )	Select this if your location uses daylight savings time. Daylight savings is a period from late spring to early fall when many places set their clocks ahead of normal local time by one hour to give more daytime light in the evening.
Start Date ( 開始時間 )	Enter which hour on which day of which week of which month daylight-savings time starts.
End Date ( 結束時間 )	Enter which hour on the which day of which week of which month daylight-savings time ends.
Apply ( 套用 )	Click to save your changes.
Reset ( 重設 )	Click to restore your previously saved settings.

### 3.4.1 Pre-Defined NTP Time Servers List

The WiMAX Modem uses a pre-defined list of NTP time servers if you do not specify a time server or it cannot synchronize with the time server you specified. It can use this list regardless of the time protocol you select.

When the WiMAX Modem uses the list, it randomly selects one server and tries to synchronize with it. If the synchronization fails, then it goes through the rest of the list in order until either it is successful or all the pre-defined NTP time servers have been tried.

**Table 8** Pre-defined NTP Time Servers

ntp1.cs.wisc.edu
ntp1.gbg.netnod.se
ntp2.cs.wisc.edu
tock.usno.navy.mil
ntp3.cs.wisc.edu

**Table 8** Pre-defined NTP Time Servers (continued)

ntp.cs.strath.ac.uk
ntp1.sp.se
time1.stupi.se
tick.stdtime.gov.tw
tock.stdtime.gov.tw
time.stdtime.gov.tw

### 3.4.2 Resetting the Time

The WiMAX Modem automatically resets the time in the following circumstances:

- When the device starts up, such as when you press the **Power** button.
- When you click **Apply (套用)** in the **SETUP (設定) > Time Setting (時間設定)** screen.
- Once every 24-hours after starting up.



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# PART III

## Advanced Screens

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The Status Screen (41)

The LAN Configuration Screens (45)

The WIFI Configuration Screen (59)

The WAN Configuration Screens (77)

The NAT Configuration Screens (89)

The System Configuration Screens (99)



# The Status Screen

## 4.1 Overview

Use this screen to view a complete summary of your WiMAX Modem connection status.

## 4.2 Status ( 状態 ) Screen

Click **Advanced ( 進階 )** > **STATUS ( 状態 )** in the navigation bar to go to this screen, where you can view the current status of the device, system resources, interfaces (LAN and WAN), and SIP accounts. You can also register and un-register SIP accounts as well as view detailed information from DHCP and statistics from WiMAX, VoIP, bandwidth management, and traffic.

**Figure 11** Advanced ( 進階 ) > Status ( 状態 )

Device Information		Interface Status	
System Name:	MAX-207HW2	Interface	Status
Firmware Version:	forteset	WAN	Down
WAN Information:		LAN	Up
IP Address:			
IP Subnet Mask:			
DHCP:	Client		
LAN Information:			
IP Address:	192.168.1.1		
IP Subnet Mask:	255.255.255.0		
DHCP:	Server		
WiMAX Information			
CINR Mean:	0 dB		
CINR Deviation:	0 dB		
RSSI:	0 dBm		

The following tables describe the labels in this screen.

**Table 9** Advanced ( 進階 ) > Status ( 状態 )

LABEL	DESCRIPTION
Refresh Interval	Select how often you want the WiMAX Modem to update this screen.
Refresh Now	Click this to update this screen immediately.



**Table 9** Advanced (進階) > Status (狀態) (continued)

LABEL	DESCRIPTION
Device Information	
System Name	This field displays the WiMAX Modem system name. It is used for identification.
Firmware Version	This field displays the current version of the firmware inside the device. It also shows the date the firmware version was created.  You can change the firmware version by uploading new firmware in <b>ADVANCED (進階) &gt; System Configuration (系統組態) &gt; Firmware.</b>
WAN Information	
IP Address	This field displays the current IP address of the WiMAX Modem in the WAN.
IP Subnet Mask	This field displays the current subnet mask on the WAN.
DHCP	This field displays what DHCP services the WiMAX Modem is using in the WAN. Choices are:  <b>Client</b> - The WiMAX Modem is a DHCP client in the WAN. Its IP address comes from a DHCP server on the WAN. <b>None</b> - The WiMAX Modem is not using any DHCP services in the WAN. It has a static IP address.
LAN Information	
IP Address	This field displays the current IP address of the WiMAX Modem in the LAN.
IP Subnet Mask	This field displays the current subnet mask in the LAN.
DHCP	This field displays what DHCP services the WiMAX Modem is providing to the LAN. Choices are:  <b>Server</b> - The WiMAX Modem is a DHCP server in the LAN. It assigns IP addresses to other computers in the LAN. <b>Relay</b> - The WiMAX Modem is routing DHCP requests to one or more DHCP servers. The DHCP server(s) may be on another network. <b>None</b> - The WiMAX Modem is not providing any DHCP services to the LAN.  You can change this in <b>ADVANCED (進階) &gt; LAN Configuration (LAN 設定) &gt; DHCP Setup.</b>
WiMAX Information	
CINR mean	This field shows the average Carrier to Interference plus Noise Ratio of the current connection. This value is an indication of overall radio signal quality. A higher value indicates a higher signal quality, and a lower value indicates a lower signal quality.
CINR deviation	This field shows the amount of change in the CINR level. This value is an indication of radio signal stability. A lower number indicates a more stable signal, and a higher number indicates a less stable signal.
RSSI	This field shows the Received Signal Strength Indication. This value is a measurement of overall radio signal strength. A higher RSSI level indicates a stronger signal, and a lower RSSI level indicates a weaker signal.  A strong signal does not necessarily indicate a good signal: a strong signal may have a low signal-to-noise ratio (SNR).
Interface Status	

**Table 9** Advanced ( 進階 ) > Status ( 狀態 ) (continued)

LABEL	DESCRIPTION
Interface	This column displays each interface of the WiMAX Modem.
Status	<p>This field indicates whether or not the WiMAX Modem is using the interface.</p> <p>For the WAN interface, this field displays <b>Up</b> when the WiMAX Modem is connected to a WiMAX network, and <b>Down</b> when the WiMAX Modem is not connected to a WiMAX network.</p> <p>For the LAN interface, this field displays <b>Up</b> when the WiMAX Modem is using the interface and <b>Down</b> when the WiMAX Modem is not using the interface.</p>



# The LAN Configuration Screens

## 5.1 Overview

Use the **ADVANCED > LAN Configuration** screens to set up the WiMAX Modem on the LAN. You can configure its IP address and subnet mask, DHCP services, and other subnets. You can also control how the WiMAX Modem sends routing information using RIP.

A Local Area Network (LAN) is a shared communication system to which many computers are attached. A LAN is usually a computer network limited to the immediate area, such as the same building or floor of a building.

### 5.1.1 What You Can Do in This Chapter

- The **DHCP Setup** screen ([Section 5.2 on page 46](#)) lets you enable, disable, and configure the DHCP server in the WiMAX Modem.
- The **Static DHCP** screen ([Section 5.3 on page 47](#)) lets you assign specific IP addresses to specific computers on the LAN.
- The **IP Alias** screen ([Section 5.4 on page 49](#)) lets you add subnets on the LAN port. You can also control what routing information is sent and received by each subnet.
- The **IP Static Route** screen ([Section 5.5 on page 51](#)) lets you examine the static routes configured in the WiMAX Modem.
- The **Other Settings** screen ([Section 5.6 on page 53](#)) lets you control the routing information that is sent and received by each subnet assign specific IP addresses to specific computers on the LAN.

### 5.1.2 What You Need to Know

The following terms and concepts may help as you read through this chapter.

#### IP Address

IP addresses identify individual devices on a network. Every networking device (including computers, servers, routers, printers, etc.) needs an IP address to

communicate across the network. These networking devices are also known as hosts.

### Subnet Masks

Subnet masks determine the maximum number of possible hosts on a network. You can also use subnet masks to divide one network into multiple sub-networks.

### DNS

DNS (Domain Name System) is for mapping a domain name to its corresponding IP address and vice versa. The DNS server is extremely important because without it, you must know the IP address of a networking device before you can access it.

### DHCP

A DHCP (Dynamic Host Configuration Protocol) server can assign your WiMAX Modem an IP address, subnet mask, DNS and other routing information when it's turned on.

## 5.2 DHCP Setup

Click **ADVANCED > LAN Configuration > DHCP Setup** to enable, disable, and configure the DHCP server in the WiMAX Modem.

**Figure 12** ADVANCED > LAN Configuration > DHCP Setup

DHCP Setup	
<input checked="" type="checkbox"/> Enable DHCP Server	
IP Pool Starting Address:	192.168.100.33
Pool Size:	32
DNS Server	
DNS Servers Assigned by DHCP Server	
First DNS Server:	From ISP 0.0.0.0
Second DNS Server:	From ISP 0.0.0.0
Third DNS Server:	From ISP 0.0.0.0
Apply Reset	

The following table describes the labels in this screen.

**Table 10** ADVANCED > LAN Configuration > DHCP Setup

LABEL	DESCRIPTION
DHCP Setup	
Enable DHCP Server	Select this if you want the WiMAX Modem to be the DHCP server on the LAN. As a DHCP server, the WiMAX Modem assigns IP addresses to DHCP clients on the LAN and provides the subnet mask and DNS server information.
IP Pool Starting Address	Enter the IP address from which the WiMAX Modem begins allocating IP addresses, if you have not specified an IP address for this computer in <b>ADVANCED &gt; LAN Configuration &gt; Static DHCP</b> .
Pool Size	Enter the number of IP addresses to allocate. This number must be at least one and is limited by a subnet mask of 255.255.255.0 (regardless of the subnet the WiMAX Modem is in). For example, if the <b>IP Pool Start Address</b> is 10.10.10.10, the WiMAX Modem can allocate up to 10.10.10.254, or 245 IP addresses.
DNS Server	
First, Second and Third DNS Server	Specify the IP addresses of a maximum of three DNS servers that the network can use. The WiMAX Modem provides these IP addresses to DHCP clients. You can specify these IP addresses two ways.  <b>From ISP</b> - provide the DNS servers provided by the ISP on the WAN port.  <b>User Defined</b> - enter a static IP address.  <b>DNS Relay</b> - this setting will relay DNS information from the DNS server obtained by the WiMAX Modem.  <b>None</b> - no DNS service will be provided by the WiMAX Modem.
Apply	Click to save your changes.
Reset	Click to restore your previously saved settings.

## 5.3 Static DHCP

Click **ADVANCED > LAN Configuration > Static DHCP** to assign specific IP addresses to specific computers on the LAN.

Note: This screen has no effect if the DHCP server is not enabled. You can enable it in **ADVANCED > LAN Configuration > DHCP Setup**.

**Figure 13** ADVANCED > LAN Configuration > Static DHCP

#	MAC Address	IP Address
1	<input type="text"/>	<input type="text" value="0.0.0.0"/>
2	<input type="text"/>	<input type="text" value="0.0.0.0"/>
3	<input type="text"/>	<input type="text" value="0.0.0.0"/>
4	<input type="text"/>	<input type="text" value="0.0.0.0"/>
5	<input type="text"/>	<input type="text" value="0.0.0.0"/>
6	<input type="text"/>	<input type="text" value="0.0.0.0"/>
7	<input type="text"/>	<input type="text" value="0.0.0.0"/>
8	<input type="text"/>	<input type="text" value="0.0.0.0"/>

The following table describes the labels in this screen.

**Table 11** ADVANCED > LAN Configuration > Static DHCP

LABEL	DESCRIPTION
#	The number of the item in this list.
MAC Address	Enter the MAC address of the computer to which you want the WiMAX Modem to assign the same IP address.
IP Address	Enter the IP address you want the WiMAX Modem to assign to the computer.
Apply	Click to save your changes.
Reset	Click to restore your previously saved settings.

## 5.4 IP Alias

Click **ADVANCED > LAN Configuration > IP Alias** to add subnets on the LAN port. You can also control what routing information is sent and received by each subnet.

**Figure 14** ADVANCED > LAN Configuration > IP Alias

The screenshot shows the 'IP Alias' configuration screen. It is divided into two sections, 'IP Alias 1' and 'IP Alias 2'. Each section has a checkbox to enable the alias, followed by four fields: 'IP Address', 'IP Subnet Mask', 'RIP Direction', and 'RIP Version'. In both sections, the IP Address and IP Subnet Mask are set to '0.0.0.0', 'RIP Direction' is set to 'None', and 'RIP Version' is set to 'RIP-1'. At the bottom right of the screen are 'Apply' and 'Reset' buttons.

The following table describes the labels in this screen.

**Table 12** ADVANCED > LAN Configuration > IP Alias

LABEL	DESCRIPTION
IP Alias 1	Select this to add the specified subnet to the LAN port.
IP Address	Enter the IP address of the WiMAX Modem on the subnet.
IP Subnet Mask	Enter the subnet mask of the subnet.
RIP Direction	Use this field to control how much routing information the WiMAX Modem sends and receives on the subnet. <ul style="list-style-type: none"> <li>• <b>None</b> - The WiMAX Modem does not send or receive routing information on the subnet.</li> <li>• <b>Both</b> - The WiMAX Modem sends and receives routing information on the subnet.</li> <li>• <b>In Only</b> - The WiMAX Modem only receives routing information on the subnet.</li> <li>• <b>Out Only</b> - The WiMAX Modem only sends routing information on the subnet.</li> </ul>



**Table 12** ADVANCED > LAN Configuration > IP Alias (continued)













LABEL	DESCRIPTION
RIP Version	Select which version of RIP the WiMAX Modem uses when it sends or receives information on the subnet. <ul style="list-style-type: none"> <li>• <b>RIP-1</b> - The WiMAX Modem uses RIPv1 to exchange routing information.</li> <li>• <b>RIP-2B</b> - The WiMAX Modem broadcasts RIPv2 to exchange routing information.</li> <li>• <b>RIP-2M</b> - The WiMAX Modem multicasts RIPv2 to exchange routing information.</li> </ul>
IP Alias 2	Select this to add the specified subnet to the LAN port.
IP Address	Enter the IP address of the WiMAX Modem on the subnet.
IP Subnet Mask	Enter the subnet mask of the subnet.
RIP Direction	Use this field to control how much routing information the WiMAX Modem sends and receives on the subnet. <ul style="list-style-type: none"> <li>• <b>None</b> - The WiMAX Modem does not send or receive routing information on the subnet.</li> <li>• <b>Both</b> - The WiMAX Modem sends and receives routing information on the subnet.</li> <li>• <b>In Only</b> - The WiMAX Modem only receives routing information on the subnet.</li> <li>• <b>Out Only</b> - The WiMAX Modem only sends routing information on the subnet.</li> </ul>
RIP Version	Select which version of RIP the WiMAX Modem uses when it sends or receives information on the subnet. <ul style="list-style-type: none"> <li>• <b>RIP-1</b> - The WiMAX Modem uses RIPv1 to exchange routing information.</li> <li>• <b>RIP-2B</b> - The WiMAX Modem broadcasts RIPv2 to exchange routing information.</li> <li>• <b>RIP-2M</b> - The WiMAX Modem multicasts RIPv2 to exchange routing information.</li> </ul>
Apply	Click to save your changes.
Reset	Click to restore your previously saved settings.

## 5.5 IP Static Route

Click **ADVANCED > LAN Configuration > IP Static Route** to look at the static routes configured in the WiMAX Modem.



Note: The first static route is the default route and cannot be modified or deleted.

**Figure 15** Advanced> LAN Configuration > IP Static Route

#	Name	Active	Destination	Gateway	Action
1	-	-	...	...	 
2	-	-	...	...	 
3	-	-	...	...	 
4	-	-	...	...	 
5	-	-	...	...	 
6	-	-	...	...	 

The following table describes the icons in this screen.

**Table 13** Advanced> LAN Configuration > IP Static Route

ICON	DESCRIPTION
	Edit Click to edit this item.
	Delete Click to delete this item.

The following table describes the labels in this screen.

**Table 14** Advanced> LAN Configuration > IP Static Route

LABEL	DESCRIPTION
#	The number of the item in this list.
Name	This field displays the name that describes the static route.
Active	This field shows whether this static route is active ( <b>Yes</b> ) or not ( <b>No</b> ).
Destination	This field displays the destination IP address(es) that this static route affects.
Gateway	This field displays the IP address of the gateway to which the WiMAX Modem should send packets for the specified <b>Destination</b> . The gateway is a router or a switch on the same network segment as the device's LAN or WAN port. The gateway helps forward packets to their destinations.
Apply	Click to save your changes.
Reset	Click to restore your previously saved settings.

## 5.5.1 IP Static Route Setup

Click an **Edit** icon in **ADVANCED > LAN Configuration > IP Static Route** to edit a static route in the WiMAX Modem.

**Figure 16** Advanced> LAN Configuration > IP Static Route Setup

The screenshot shows a configuration window titled "Static Route Setup". It contains the following fields and controls:

- Route Name:** An empty text input field.
- Active:** An unchecked checkbox.
- Private:** An unchecked checkbox.
- Destination IP Address:** A text input field containing "0.0.0.0".
- IP Subnet Mask:** A text input field containing "0.0.0.0".
- Gateway IP Address:** A text input field containing "0.0.0.0".
- Metric:** A text input field containing "2".
- Buttons:** "Apply" and "Cancel" buttons at the bottom right.

The following table describes the labels in this screen.

**Table 15** Management > Static Route > IP Static Route > Edit

LABEL	DESCRIPTION
Route Name	Enter the name of the static route.
Active	Select this if you want the static route to be used. Clear this if you do not want the static route to be used.
Private	Select this if you do not want the WiMAX Modem to tell other routers about this static route. For example, you might select this if the static route is in your LAN. Clear this if you want the WiMAX Modem to tell other routers about this static route.
Destination IP Address	Enter one of the destination IP addresses that this static route affects.
IP Subnet Mask	Enter the subnet mask that defines the range of destination IP addresses that this static route affects. If this static route affects only one IP address, enter 255.255.255.255.
Gateway IP Address	Enter the IP address of the gateway to which the WiMAX Modem should send packets for the specified <b>Destination</b> . The gateway is a router or a switch on the same network segment as the device's LAN or WAN port. The gateway helps forward packets to their destinations.
Metric	Usually, you should keep the default value. This field is related to RIP.  The metric represents the "cost of transmission". A router determines the best route for transmission by choosing a path with the lowest "cost". The smaller the metric, the lower the "cost". RIP uses hop count as the measurement of cost, where 1 is for a directly-connected network. The metric must be 1-15; if you use a value higher than 15, the routers assume the link is down.

**Table 15** Management > Static Route > IP Static Route > Edit (continued)

LABEL	DESCRIPTION
Apply	Click to save your changes.
Cancel	Click to return to the previous screen without saving your changes.

## 5.6 Other Settings

Click **ADVANCED > LAN Configuration > Other Settings** to set the RIP and Multicast options.

**Figure 17** ADVANCED > LAN Configuration > Advanced

RIP & Multicast Setup

RIP Direction: Both

RIP Version: RIP-1

Multicast: None

Apply Reset

The following table describes the labels in this screen.

**Table 16** ADVANCED > LAN Configuration > Other Settings

LABEL	DESCRIPTION
RIP & Multicast Setup	
RIP Direction	<p>Use this field to control how much routing information the WiMAX Modem sends and receives on the subnet.</p> <ul style="list-style-type: none"> <li>• <b>None</b> - The WiMAX Modem does not send or receive routing information on the subnet.</li> <li>• <b>Both</b> - The WiMAX Modem sends and receives routing information on the subnet.</li> <li>• <b>In Only</b> - The WiMAX Modem only receives routing information on the subnet.</li> <li>• <b>Out Only</b> - The WiMAX Modem only sends routing information on the subnet.</li> </ul>
RIP Version	<p>Select which version of RIP the WiMAX Modem uses when it sends or receives information on the subnet.</p> <ul style="list-style-type: none"> <li>• <b>RIP-1</b> - The WiMAX Modem uses RIPv1 to exchange routing information.</li> <li>• <b>RIP-2B</b> - The WiMAX Modem broadcasts RIPv2 to exchange routing information.</li> <li>• <b>RIP-2M</b> - The WiMAX Modem multicasts RIPv2 to exchange routing information.</li> </ul>

**Table 16** ADVANCED > LAN Configuration > Other Settings (continued)

LABEL	DESCRIPTION
Multicast	<p>You do not have to enable multicasting to use <b>RIP-2M</b>. (See <b>RIP Version</b>.)</p> <p>Select which version of IGMP the WiMAX Modem uses to support multicasting on the LAN. Multicasting sends packets to some computers on the LAN and is an alternative to unicasting (sending packets to one computer) and broadcasting (sending packets to every computer).</p> <ul style="list-style-type: none"> <li>• <b>None</b> - The WiMAX Modem does not support multicasting.</li> <li>• <b>IGMP-v1</b> - The WiMAX Modem supports IGMP version 1.</li> <li>• <b>IGMP-v2</b> - The WiMAX Modem supports IGMP version 2.</li> </ul> <p>Multicasting can improve overall network performance. However, it requires extra processing and generates more network traffic. In addition, other computers on the LAN have to support the same version of IGMP.</p>
Apply	Click to save your changes.
Reset	Click to restore your previously saved settings.

## 5.7 Technical Reference

The following section contains additional technical information about the WiMAX Modem features described in this chapter.

### 5.7.1 IP Address and Subnet Mask

Similar to the way houses on a street share a common street name, computers on a LAN share one common network number.

Where you obtain your network number depends on your particular situation. If the ISP or your network administrator assigns you a block of registered IP addresses, follow their instructions in selecting the IP addresses and the subnet mask.

If the ISP did not explicitly give you an IP network number, then most likely you have a single user account and the ISP will assign you a dynamic IP address when the connection is established. If this is the case, it is recommended that you select a network number from 192.168.0.0 to 192.168.255.0 and you must enable the Network Address Translation (NAT) feature of the WiMAX Modem. The Internet Assigned Number Authority (IANA) reserved this block of addresses specifically for private use; please do not use any other number unless you are told otherwise. Let's say you select 192.168.1.0 as the network number; which covers 254 individual addresses, from 192.168.100.1 to 192.168.1.254 (zero and 255 are reserved). In other words, the first three numbers specify the network number while the last number identifies an individual computer on that network.

Once you have decided on the network number, pick an IP address that is easy to remember, for instance, 192.168.100.1, for your WiMAX Modem, but make sure that no other device on your network is using that IP address.

The subnet mask specifies the network number portion of an IP address. Your WiMAX Modem will compute the subnet mask automatically based on the IP address that you entered. You don't need to change the subnet mask computed by the WiMAX Modem unless you are instructed to do otherwise.

## 5.7.2 DHCP Setup

DHCP (Dynamic Host Configuration Protocol, RFC 2131 and RFC 2132) allows individual clients to obtain TCP/IP configuration at start-up from a server. You can configure the WiMAX Modem as a DHCP server or disable it. When configured as a server, the WiMAX Modem provides the TCP/IP configuration for the clients. If DHCP service is disabled, you must have another DHCP server on your LAN, or else each computer must be manually configured.

The WiMAX Modem is pre-configured with a pool of IP addresses for the DHCP clients (DHCP Pool). See the product specifications in the appendices. Do not assign static IP addresses from the DHCP pool to your LAN computers.

These parameters should work for the majority of installations. If your ISP gives you explicit DNS server address(es), see [Section 5.3 on page 47](#).

## 5.7.3 LAN TCP/IP

The WiMAX Modem has built-in DHCP server capability that assigns IP addresses and DNS servers to systems that support DHCP client capability.

The LAN parameters of the WiMAX Modem are preset in the factory with the following values:

- IP address of 192.168.100.1 with subnet mask of 255.255.255.0 (24 bits)
- DHCP server enabled with 32 client IP addresses starting from 192.168.1.33.

These parameters should work for the majority of installations. If your ISP gives you explicit DNS server address(es), see [Section 5.3 on page 47](#).

## 5.7.4 DNS Server Address

DNS (Domain Name System) is for mapping a domain name to its corresponding IP address and vice versa. The DNS server is extremely important because without it, you must know the IP address of a machine before you can access it.

The DNS server addresses that you enter in the DHCP setup are passed to the client machines along with the assigned IP address and subnet mask.

There are two ways that an ISP disseminates the DNS server addresses. The first is for an ISP to tell a customer the DNS server addresses, usually in the form of an information sheet, when s/he signs up. If your ISP gives you the DNS server addresses, enter them in the **DNS Server** fields in **DHCP Setup**, otherwise, leave them blank.

Some ISPs choose to pass the DNS servers using the DNS server extensions of PPP IPCP (IP Control Protocol) after the connection is up. If your ISP did not give you explicit DNS servers, chances are the DNS servers are conveyed through IPCP negotiation. The WiMAX Modem supports the IPCP DNS server extensions through the DNS proxy feature.

If the **Primary** and **Secondary DNS Server** fields in the **LAN Setup** screen are not specified, for instance, left as 0.0.0.0, the WiMAX Modem tells the DHCP clients that it itself is the DNS server. When a computer sends a DNS query to the WiMAX Modem, the WiMAX Modem forwards the query to the real DNS server learned through IPCP and relays the response back to the computer.

Please note that DNS proxy works only when the ISP uses the IPCP DNS server extensions. It does not mean you can leave the DNS servers out of the DHCP setup under all circumstances. If your ISP gives you explicit DNS servers, make sure that you enter their IP addresses in the **LAN Setup** screen. This way, the WiMAX Modem can pass the DNS servers to the computers and the computers can query the DNS server directly without the WiMAX Modem's intervention.

## 5.7.5 RIP Setup

RIP (Routing Information Protocol) allows a router to exchange routing information with other routers. The **RIP Direction** field controls the sending and receiving of RIP packets. When set to:

- **Both** - the WiMAX Modem will broadcast its routing table periodically and incorporate the RIP information that it receives.
- **In Only** - the WiMAX Modem will not send any RIP packets but will accept all RIP packets received.
- **Out Only** - the WiMAX Modem will send out RIP packets but will not accept any RIP packets received.
- **None** - the WiMAX Modem will not send any RIP packets and will ignore any RIP packets received.

The **Version** field controls the format and the broadcasting method of the RIP packets that the WiMAX Modem sends (it recognizes both formats when receiving). **RIP-1** is universally supported; but RIP-2 carries more information.

RIP-1 is probably adequate for most networks, unless you have an unusual network topology.

Both **RIP-2B** and **RIP-2M** sends the routing data in RIP-2 format; the difference being that **RIP-2B** uses subnet broadcasting while **RIP-2M** uses multicasting.

## 5.7.6 Multicast

Traditionally, IP packets are transmitted in one of either two ways - Unicast (1 sender - 1 recipient) or Broadcast (1 sender - everybody on the network). Multicast delivers IP packets to a group of hosts on the network - not everybody and not just 1.

IGMP (Internet Group Multicast Protocol) is a network-layer protocol used to establish membership in a Multicast group - it is not used to carry user data. IGMP version 2 (RFC 2236) is an improvement over version 1 (RFC 1112) but IGMP version 1 is still in wide use. If you would like to read more detailed information about interoperability between IGMP version 2 and version 1, please see sections 4 and 5 of RFC 2236. The class D IP address is used to identify host groups and can be in the range 224.0.0.0 to 239.255.255.255. The address 224.0.0.0 is not assigned to any group and is used by IP multicast computers. The address 224.0.0.1 is used for query messages and is assigned to the permanent group of all IP hosts (including gateways). All hosts must join the 224.0.0.1 group in order to participate in IGMP. The address 224.0.0.2 is assigned to the multicast routers group.

The WiMAX Modem supports both IGMP version 1 (**IGMP-v1**) and IGMP version 2 (**IGMP-v2**). At start up, the WiMAX Modem queries all directly connected networks to gather group membership. After that, the WiMAX Modem periodically updates this information. IP multicasting can be enabled/disabled on the WiMAX Modem LAN and/or WAN interfaces in the web configurator (**LAN**; **WAN**). Select **None** to disable IP multicasting on these interfaces.



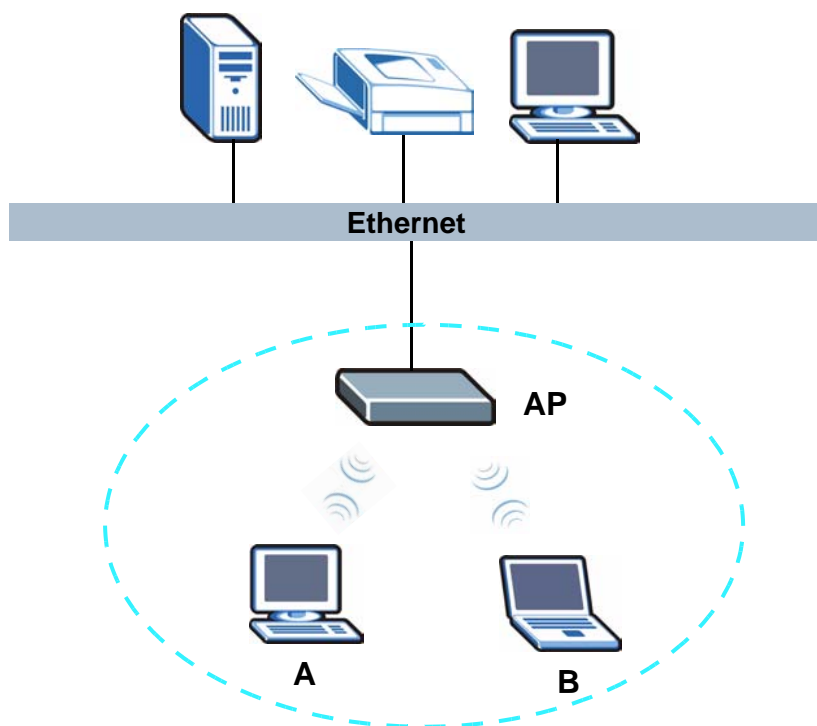


# The WIFI Configuration Screen

## 6.1 Overview

Wi-Fi is a wireless networking technology and it is a synonym for wireless LAN. The blue circle marks a wireless LAN in the following figure. Wireless clients (A and B) connect to an access point (AP) to access other devices (such as the printer) or the Internet. Your WiMAX Modem works as an AP when you install a compatible WLAN card.

**Figure 18** Example of a Wireless Network



### 6.1.1 What You Can Do in the WIFI Screens

This chapter describes the WiMAX Modem's **Advanced (進階) > WIFI Configuration (WIFI 設定)** screens. Use these screens to set up your WiMAX Modem's wireless connection.

- Use the **General** screen (see [Section 6.2 on page 63](#)) to turn the wireless connection on or off, set up wireless security, configure the MAC filter, set up Quality of Service and make other basic configuration changes.
- Use the **MAC Filter** screen (see [Section 6.3 on page 69](#)) to configure a MAC (Media Access Control) address filter to restrict access to the wireless network.

You don't necessarily need to use all these screens to set up your wireless connection. For example, you may just want to set up a network name, a wireless radio channel and some security in the **AP** screen.

## 6.1.2 What You Need to Know About WIFI

### Wireless Basics

- Every device in the same wireless network must use the same Service Set IDentity (SSID).

The SSID is the name of the wireless network.

- If two wireless networks overlap, they should use different channels.

Like radio stations or television channels, each wireless network uses a specific channel, or frequency, to send and receive information.

### Wireless Network Construction

Wireless networks consist of wireless clients, access points and bridges.

- A wireless client is a radio connected to a user's computer.
- An access point is a radio with a wired connection to a network, which can connect with numerous wireless clients and let them access the network.
- A bridge is a radio that relays communications between access points and wireless clients, extending a network's range.

Traditionally, a wireless network operates in one of two ways.

- An "infrastructure" type of network has one or more access points and one or more wireless clients. The wireless clients connect to the access points.
- An "ad-hoc" type of network is one in which there is no access point. Wireless clients connect to one another in order to exchange information.

### Wired Equivalent Privacy (WEP)

WEP (Wired Equivalent Privacy) encrypts data transmitted between wired and wireless networks to keep the transmission private. Although one of the original wireless encryption protocols, WEP is also the weakest. Many people use it strictly to deter unintentional usage of their wireless network by outsiders.

### Authentication Type

The IEEE 802.11b/g standard describes a simple authentication method between the wireless stations and AP. Three authentication types are defined: **Auto**, **Open** and **Shared**. The WiMAX Modem supports the **WEP (Open)** and **WEP (Shared)** authentication types.

- **Open** mode is implemented for ease-of-use and when security is not an issue. The wireless station and the AP or peer computer do not share a secret key. Thus the wireless stations can associate with any AP or peer computer and listen to any transmitted data that is not encrypted.
- **Shared** mode involves a shared secret key to authenticate the wireless station to the AP or peer computer. This requires you to enable the wireless LAN security and use same settings on both the wireless station and the AP or peer computer.

### **Wi-Fi Protected Access (WPA)**

WPA encrypts data transmitted between wired and wireless networks to keep the transmission private. It affords vastly stronger security than its lower-tier counterpart, WEP (Wired Equivalent Privacy). It comes in two different flavors: WPA and WPA2. Always try to use WPA2 as it implements the full version of the security standard while WPA does not.

### **WPA2**

WPA2 (IEEE 802.11i) is a wireless security standard that defines stronger encryption, authentication and key management than WPA. It includes two data encryption algorithms, Temporal Key Integrity Protocol (TKIP) and Advanced Encryption Standard (AES) in the Counter mode with Cipher block chaining Message authentication Code Protocol (CCMP). WPA2 reduces the number of key exchange messages from six to four (CCMP 4-way handshake) and shortens the time required to connect to a network. Other WPA2 authentication features that are different from WPA include key caching and pre-authentication. These two features are optional and may not be implemented in all wireless devices. See also WPA.


### **Pre-Shared Key (PSK)**

A pre-shared key is a password shared between the server and the client that unlocks the algorithm used to encrypt the data traffic between them. Without the proper password, the client and the server cannot communicate.

## Security

Security stops unauthorized devices from using the wireless network. It can also protect the information that is sent in the wireless network. Use the strongest security that every wireless client in the wireless network supports.

**Table 17** Wireless Security Levels

SECURITY LEVEL	SECURITY TYPE
Weakest    Strongest	No Security
	MAC Address Filtering
	WEP Encryption
	IEEE 802.1x EAP with RADIUS Server Authentication
	WPA-PSK (Wi-Fi Protected Access Pre-Shared Key)
	WPA (Wi-Fi Protected Access)
	WPA-PSK2
	WPA2

Note: WPA2 or WPA2-PSK security is recommended.

- WPA2-PSK and WPA-PSK do not employ user authentication and are known as the personal version of WPA.
- WEP is better than no security, but it is still possible for unauthorized devices to figure out the original information pretty quickly.

## AES

Advanced Encryption Standard is method of data encryption that uses a secret key. AES may use a 128-bit, 192-bit or 256-bit key. AES is faster than 3DES.

## TKIP

Temporal Key Integrity Protocol (TKIP) is an encryption protocol that uses 128-bit keys that are dynamically generated and distributed by the authentication server. TKIP regularly changes and rotates the encryption keys so that the same encryption key is never used twice.

## MAC Address Filter

Every Ethernet device has a unique MAC (Media Access Control) address. The MAC address consists of twelve hexadecimal characters (0-9, and A to F), and it is usually written in the following format: "0A:A0:00:BB:CC:DD".

The MAC address filter controls access to the wireless network. You can use the MAC address of each wireless client to allow or deny access to the wireless network.

### Finding Out More

- See [Chapter 3 on page 31](#) for a tutorial showing how to set up your wireless connection in an example scenario.
- See [Section 6.4 on page 70](#) for advanced technical information on wireless networks.

## 6.1.3 Before You Start

Before you start using these screens, ask yourself the following questions. See [Section 6.1.2 on page 60](#) if some of the terms used here do not make sense to you.

- What wireless standards do the other wireless devices support (IEEE 802.11g, for example)? What is the most appropriate standard to use?
- What security options do the other wireless devices support (WPA-PSK, for example)? What is the best one to use?
- Do the other wireless devices support WPS (Wi-Fi Protected Setup)? If so, you can set up a well-secured network very easily.

Even if some of your devices support WPS and some do not, you can use WPS to set up your network and then add the non-WPS devices manually, although this is somewhat more complicated to do.

- What advanced options do you want to configure, if any? If you want to configure advanced options such as Quality of Service, ensure that you know precisely what you want to do. If you do not want to configure advanced options, leave them alone.

## 6.2 General Screen

Note: If you are configuring the WiMAX Modem from a computer connected to the wireless LAN and you change the WiMAX Modem's SSID or security settings, you will lose your wireless connection when you press **Apply (套用)** to confirm. You must then change the wireless settings of your computer to match the WiMAX Modem's new settings.

Click **Advanced (進階) > WIFI Configuration (WIFI 設定)** to open the **General** screen.

**Figure 19** Advanced (進階) > WIFI Configuration (WIFI 設定) > General

The following table describes the labels in this screen.

**Table 18** Advanced (進階) > WIFI Configuration (WIFI 設定) > General

LABEL	DESCRIPTION
Active Wireless LAN (啟用無線區域網路)	Click the check box to activate wireless LAN.
Network Name (SSID) (名稱)	The SSID (Service Set Identity) identifies the service set with which a wireless device is associated. Wireless devices associating to the access point (AP) must have the same SSID. Enter a descriptive name (up to 32 printable 7-bit ASCII characters) for the wireless LAN.  Note: If you are configuring the WiMAX Modem from a computer connected to the wireless LAN and you change the WiMAX Modem's SSID or WEP settings, you will lose your wireless connection when you press <b>Apply (套用)</b> to confirm. You must then change the wireless settings of your computer to match the WiMAX Modem's new settings.
Hide SSID (隱藏 SSID)	Select this check box to hide the SSID in the outgoing beacon frame so a station cannot obtain the SSID through scanning using a site survey tool.
Channel Selection (頻道選擇)	Select this option and set the operating frequency/channel depending on your particular region. Select a channel from the drop-down list box.
Security Mode (安全模式)	See the following sections for more details about this field.
Apply (套用)	Click <b>Apply (套用)</b> to save your changes back to the WiMAX Modem.

**Table 18** Advanced (進階) > WIFI Configuration (WIFI設定) > General (continued)

LABEL	DESCRIPTION
Cancel (取消)	Click <b>Cancel (取消)</b> to reload the previous configuration for this screen.
Advanced Setup (進階模式)	Click <b>Advanced Setup (進階模式)</b> to display the <b>Wireless Advanced Setup</b> screen and edit more details of your WLAN setup.

## 6.2.1 No Security

Select **No Security** in the **Security Mode (安全模式)** field to allow wireless devices to communicate with the access points without any data encryption.

Note: If you do not enable any wireless security on your WiMAX Modem, your network is accessible to any wireless networking device that is within range.

**Figure 20** Advanced (進階) > WIFI Configuration (WIFI設定) > General: No Security

The screenshot shows the 'General' tab of the 'WIFI Configuration' screen. The 'Security Mode' is set to 'No Security'. The 'Wireless Setup' section includes options for 'Enable Wireless LAN', 'SSID Name', 'Hide SSID' (checked), and 'Channel Selection' (Channel-01 2412MHz). The 'Security' section shows 'Security Mode' set to 'No Security'. At the bottom, there are buttons for 'Apply', 'Reset', and 'Advanced Mode'.



## 6.2.2 WEP Encryption

In order to configure and enable WEP encryption; click **Advanced (進階) > WIFI Configuration (WIFI 設定) > General** to display the **General** screen. Select **WEP (OPEN)** or **WEP (SHARED)** from the **Security Mode (安全模式)** list.

**Figure 21** Advanced (進階) > WIFI Configuration (WIFI 設定) > General: WEP (OPEN) / WEP (SHARED)

The screenshot shows a configuration interface with two tabs: 'General' and 'MAC Filter'. Under '無線設定' (Wireless Settings), there is a checkbox for '啟用無線區域網路' (Enable wireless LAN), a text field for '名稱 (SSID)', a checked checkbox for '隱藏 SSID', and a dropdown for '頻道選擇' (Channel selection) set to 'Channel-01 2412MHZ'. Under '安全性' (Security), the '安全模式' (Security mode) dropdown is set to 'WEP (OPEN)', and there is a text field for 'WEP Key'. A 'NOTE' section states: 'The different WEP lengths configure different strength security, 40/64-bit or 128-bit respectively. Your wireless client must match the security strength set on the router. --Please type exactly 5 or 13 characters.' At the bottom are buttons for '套用' (Apply), '重設' (Reset), and '進階模式' (Advanced mode).

The following table describes the wireless LAN security labels in this screen.

**Table 19** Advanced (進階) > WIFI Configuration (WIFI 設定) > General: WEP (OPEN) / WEP (SHARED)

LABEL	DESCRIPTION
Security Mode (安全模式)	Choose <b>WEP (OPEN)</b> or <b>WEP (SHARED)</b> from the drop-down list box.
WEP Key	The WEP key is used to encrypt data. Both the WiMAX Modem and the wireless stations must use the same WEP key for data transmission.  If you want to manually set the WEP key, enter any 5 or 13 characters (ASCII string) or 10 or 26 hexadecimal characters ("0-9", "A-F") for a 64-bit or 128-bit WEP key respectively.

## 6.2.3 WPA(2)-PSK

In order to configure and enable WPA(2)-PSK authentication; click **Advanced (進階) > WIFI Configuration (WIFI 設定)** to display the **General** screen. Select

**WPA-PSK (AES), WPA2-PSK (AES), WPA-PSK (TKIP), or WPA2-PSK (TKIP)** from the **Security Mode (安全模式)** list.

**Figure 22** Advanced (進階) > WIFI Configuration (WIFI設定) > General: WPA(2)-PSK (AES/TKIP)

The screenshot shows the 'General' tab of the WIFI Configuration screen. It includes sections for '無線設定' (Wireless Settings) and '安全性' (Security). In the '無線設定' section, there are checkboxes for '啟用無線區域網路' (Enable Wireless LAN) and '隱藏 SSID' (Hide SSID), a text field for '名稱 (SSID)', and a dropdown for '頻道選擇' (Channel Selection) set to 'Channel-01 2412MHz'. In the '安全性' section, the '安全模式' (Security Mode) dropdown is set to 'WPA-PSK (AES)', and there is a text field for 'Pre-Shared Key'. A note at the bottom states: 'NOTE: --The length of Pre-Shared Key is between 8~63 characters.' At the bottom right, there are buttons for '套用' (Apply), '重設' (Reset), and '進階模式' (Advanced Mode).

The following table describes the wireless LAN security labels in this screen.

**Table 20** Advanced (進階) > WIFI Configuration (WIFI設定) > General: WPA(2)-PSK (AES/TKIP)

LABEL	DESCRIPTION
Security Mode (安全模式)	Choose <b>WPA-PSK (AES)</b> , <b>WPA2-PSK (AES)</b> , <b>WPA-PSK (TKIP)</b> , or <b>WPA2-PSK (TKIP)</b> from the drop-down list box.
Pre-Shared Key	The encryption mechanisms used for <b>WPA(2)</b> and <b>WPA(2)-PSK</b> are the same. The only difference between the two is that <b>WPA(2)-PSK</b> uses a simple common password, instead of user-specific credentials.  Type a pre-shared key from 8 to 63 case-sensitive ASCII characters (including spaces and symbols).

## 6.2.4 Wireless LAN Advanced Setup

To configure advanced wireless settings, click the **Advanced Setup (進階模式)** button in the **General** screen. The screen appears as shown.

**Figure 23** Advanced(進階) > WIFI Configuration(WIFI設定) > General > Advanced Setup (進階模式)

The following table describes the labels in this screen.

**Table 21** Advanced(進階) > WIFI Configuration(WIFI設定) > General(一般) > Advanced Setup (進階模式)

LABEL	DESCRIPTION
Wireless Advanced Setup	
RTS/CTS Threshold	Enter a value between 0 and 2432.
Fragmentation Threshold	It is the maximum data fragment size that can be sent. Enter a value between 256 and 2432.
Preamble	Select a preamble type. Choices are <b>Long</b> , <b>Short</b> or <b>Dynamic</b> . The default setting is <b>Long</b> . See the appendix for more information.
802.11 Mode	Select <b>802.11b Only</b> to allow only IEEE 802.11b compliant WLAN devices to associate with the WiMAX Modem.  Select <b>802.11g Only</b> to allow only IEEE 802.11g compliant WLAN devices to associate with the WiMAX Modem.  Select <b>Mixed</b> to allow either IEEE 802.11b or IEEE 802.11g compliant WLAN devices to associate with the WiMAX Modem. The transmission rate of your WiMAX Modem might be reduced.
Apply (套用)	Click <b>Apply (套用)</b> to save your changes back to the WiMAX Modem.
Cancel (重設)	Click <b>Cancel (重設)</b> to reload the previous configuration for this screen.
Back (上一步)	Click this to return to the previous screen without saving changes.

## 6.3 MAC Filter

Use this screen to change your WiMAX Modem's MAC filter settings. Click **Advanced (進階) > WIFI Configuration (WIFI 設定) > MAC Filter**. The screen appears as shown.

**Figure 24** Advanced ( 進階 ) > WIFI Configuration (WIFI 設定) > MAC Filter

General    MAC Filter

啟用 MAC 位址過濾

過濾動作     允許     拒絕

設定	MAC 位址	設定	MAC 位址
1	00:00:00:00:00:00	2	00:00:00:00:00:00
3	00:00:00:00:00:00	4	00:00:00:00:00:00
5	00:00:00:00:00:00	6	00:00:00:00:00:00
7	00:00:00:00:00:00	8	00:00:00:00:00:00
9	00:00:00:00:00:00	10	00:00:00:00:00:00
11	00:00:00:00:00:00	12	00:00:00:00:00:00
13	00:00:00:00:00:00	14	00:00:00:00:00:00
15	00:00:00:00:00:00	16	00:00:00:00:00:00
17	00:00:00:00:00:00	18	00:00:00:00:00:00
19	00:00:00:00:00:00	20	00:00:00:00:00:00
21	00:00:00:00:00:00	22	00:00:00:00:00:00
23	00:00:00:00:00:00	24	00:00:00:00:00:00
25	00:00:00:00:00:00	26	00:00:00:00:00:00
27	00:00:00:00:00:00	28	00:00:00:00:00:00
29	00:00:00:00:00:00	30	00:00:00:00:00:00
31	00:00:00:00:00:00	32	00:00:00:00:00:00

套用    重設

The following table describes the labels in this screen.

**Table 22** Advanced( 進階 ) > WIFI Configuration(WIFI 設定 ) > MAC Filter

LABEL	DESCRIPTION
Active MAC Filter ( 啓用 MAC 位址過濾 )	Select the check box to enable MAC address filtering.
Filter Action ( 過濾動作 )	<p>Define the filter action for the list of MAC addresses in the MAC Address table.</p> <p>Select <b>Allow</b> ( 允許 ) to permit access to the WiMAX Modem, MAC addresses not listed will be denied access to the WiMAX Modem.</p> <p>Select <b>Deny</b> ( 拒絕 ) to block access to the WiMAX Modem, MAC addresses not listed will be allowed to access the WiMAX Modem.</p>
Set ( 設定 )	This is the index number of the MAC address.
MAC Address ( MAC 位址 )	Enter the MAC addresses of the wireless devices that are allowed or denied access to the WiMAX Modem in these address fields. Enter the MAC addresses in a valid MAC address format, that is, six hexadecimal character pairs, for example, 12:34:56:78:9a:bc.
Apply ( 套用 )	Click <b>Apply</b> ( 套用 ) to save your changes back to the WiMAX Modem.
Cancel ( 重設 )	Click <b>Cancel</b> ( 重設 ) to reload the previous configuration for this screen.

## 6.4 Wireless LAN Technical Reference

This section discusses wireless LANs in depth. For more information, see the appendix.

## 6.4.1 Additional Wireless Terms

The following table describes some wireless network terms and acronyms used in the WiMAX Modem's Web Configurator.

**Table 23** Additional Wireless Terms

TERM	DESCRIPTION
RTS/CTS Threshold	<p>In a wireless network which covers a large area, wireless devices are sometimes not aware of each other's presence. This may cause them to send information to the AP at the same time and result in information colliding and not getting through.</p> <p>By setting this value lower than the default value, the wireless devices must sometimes get permission to send information to the WiMAX Modem. The lower the value, the more often the devices must get permission.</p> <p>If this value is greater than the fragmentation threshold value (see below), then wireless devices never have to get permission to send information to the WiMAX Modem.</p>
Preamble	A preamble affects the timing in your wireless network. There are two preamble modes: long and short. If a device uses a different preamble mode than the WiMAX Modem does, it cannot communicate with the WiMAX Modem.
Authentication	The process of verifying whether a wireless device is allowed to use the wireless network.
Fragmentation Threshold	A small fragmentation threshold is recommended for busy networks, while a larger threshold provides faster performance if the network is not very busy.

## 6.4.2 Wireless Security Overview

The following sections introduce different types of wireless security you can set up in the wireless network.

### 6.4.2.1 SSID

Normally, the WiMAX Modem acts like a beacon and regularly broadcasts the SSID in the area. You can hide the SSID instead, in which case the WiMAX Modem does not broadcast the SSID. In addition, you should change the default SSID to something that is difficult to guess.

This type of security is fairly weak, however, because there are ways for unauthorized wireless devices to get the SSID. In addition, unauthorized wireless devices can still see the information that is sent in the wireless network.

### 6.4.2.2 MAC Address Filter

Every device that can use a wireless network has a unique identification number, called a MAC address.<sup>1</sup> A MAC address is usually written using twelve hexadecimal

characters<sup>2</sup>; for example, 00A0C5000002 or 00:A0:C5:00:00:02. To get the MAC address for each device in the wireless network, see the device's User's Guide or other documentation.

You can use the MAC address filter to tell the WiMAX Modem which devices are allowed or not allowed to use the wireless network. If a device is allowed to use the wireless network, it still has to have the correct information (SSID, channel, and security). If a device is not allowed to use the wireless network, it does not matter if it has the correct information.

This type of security does not protect the information that is sent in the wireless network. Furthermore, there are ways for unauthorized wireless devices to get the MAC address of an authorized device. Then, they can use that MAC address to use the wireless network.

### 6.4.2.3 User Authentication

Authentication is the process of verifying whether a wireless device is allowed to use the wireless network. You can make every user log in to the wireless network before they can use it. However, every device in the wireless network has to support IEEE 802.1x to do this.

For wireless networks, you can store the user names and passwords for each user in a RADIUS server. This is a server used in businesses more than in homes. If you do not have a RADIUS server, you cannot set up user names and passwords for your users.

Unauthorized wireless devices can still see the information that is sent in the wireless network, even if they cannot use the wireless network. Furthermore, there are ways for unauthorized wireless users to get a valid user name and password. Then, they can use that user name and password to use the wireless network.

### 6.4.2.4 Encryption

Wireless networks can use encryption to protect the information that is sent in the wireless network. Encryption is like a secret code. If you do not know the secret code, you cannot understand the message.

- 
1. Some wireless devices, such as scanners, can detect wireless networks but cannot use wireless networks. These kinds of wireless devices might not have MAC addresses.
  2. Hexadecimal characters are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, and F.

The types of encryption you can choose depend on the type of authentication. (See [Section 6.4.2.3 on page 72](#) for information about this.)

**Table 24** Types of Encryption for Each Type of Authentication

	NO AUTHENTICATION	RADIUS SERVER
<b>Weakest</b> ↑ ↓	No Security	WPA
	Static WEP	
	WPA-PSK	
<b>Strongest</b>	WPA2-PSK	WPA2

For example, if the wireless network has a RADIUS server, you can choose **WPA** or **WPA2**. If users do not log in to the wireless network, you can choose no encryption, **Static WEP**, **WPA-PSK**, or **WPA2-PSK**.

Usually, you should set up the strongest encryption that every device in the wireless network supports. For example, suppose you have a wireless network with the WiMAX Modem and you do not have a RADIUS server. Therefore, there is no authentication. Suppose the wireless network has two devices. Device A only supports WEP, and device B supports WEP and WPA. Therefore, you should set up **Static WEP** in the wireless network.

Note: It is recommended that wireless networks use **WPA-PSK**, **WPA**, or stronger encryption. The other types of encryption are better than none at all, but it is still possible for unauthorized wireless devices to figure out the original information pretty quickly.

When you select **WPA2** or **WPA2-PSK** in your WiMAX Modem, you can also select an option (**WPA compatible**) to support WPA as well. In this case, if some of the devices support WPA and some support WPA2, you should set up **WPA2-PSK** or **WPA2** (depending on the type of wireless network login) and select the **WPA compatible** option in the WiMAX Modem.

Many types of encryption use a key to protect the information in the wireless network. The longer the key, the stronger the encryption. Every device in the wireless network must have the same key.

### 6.4.3 MBSSID

Traditionally, you needed to use different APs to configure different Basic Service Sets (BSSs). As well as the cost of buying extra APs, there was also the possibility of channel interference. The WiMAX Modem's MBSSID (Multiple Basic Service Set Identifier) function allows you to use one access point to provide several BSSs simultaneously. You can then assign varying QoS priorities and/or security modes to different SSIDs.



Wireless devices can use different BSSIDs to associate with the same AP.

### 6.4.3.1 Notes on Multiple BSSs

- A maximum of eight BSSs are allowed on one AP simultaneously.
- You must use different keys for different BSSs. If two wireless devices have different BSSIDs (they are in different BSSs), but have the same keys, they may hear each other's communications (but not communicate with each other).
- MBSSID should not replace but rather be used in conjunction with 802.1x security.

## 6.4.4 Wireless Distribution System (WDS)

The WiMAX Modem can act as a wireless network bridge and establish WDS (Wireless Distribution System) links with other APs. You need to know the MAC addresses of the APs you want to link to. Once the security settings of peer sides match one another, the connection between devices is made.

At the time of writing, WDS security is compatible with other ZyXEL access points only. Refer to your other access point's documentation for details.

The following example illustrates how WDS link works between APs. Notebook computer **A** is a wireless client connecting to access point **AP 1**. **AP 1** has no wired Internet connection, but can establish a WDS link with access point **AP 2**, which does. When **AP 1** has a WDS link with **AP 2**, the notebook computer can access the Internet through **AP 2**.

**Figure 25** WDS Link Example



## 6.4.5 WiFi Protected Setup

Your WiMAX Modem supports WiFi Protected Setup (WPS), which is an easy way to set up a secure wireless network. WPS is an industry standard specification, defined by the WiFi Alliance.

WPS allows you to quickly set up a wireless network with strong security, without having to configure security settings manually. Each WPS connection works between two devices. Both devices must support WPS (check each device's documentation to make sure).

Depending on the devices you have, you can either press a button (on the device itself, or in its configuration utility) or enter a PIN (a unique Personal Identification Number that allows one device to authenticate the other) in each of the two devices. When WPS is activated on a device, it has two minutes to find another device that also has WPS activated. Then, the two devices connect and set up a secure network by themselves.

### 6.4.5.1 Push Button Configuration

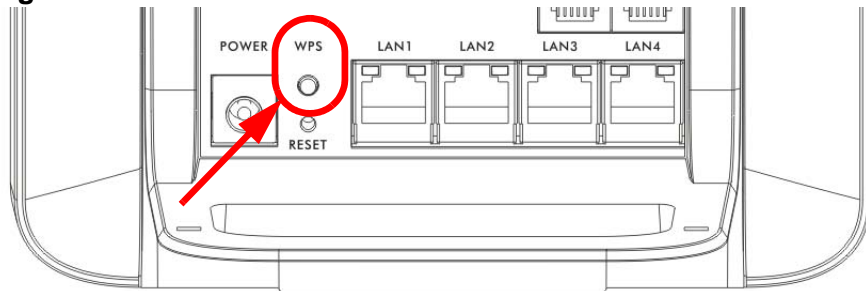
WPS Push Button Configuration (PBC) is initiated by pressing a button on each WPS-enabled device, and allowing them to connect automatically. You do not need to enter any information.

Not every WPS-enabled device has a physical WPS button. Some may have a WPS PBC button in their configuration utilities instead of or in addition to the physical button.

Take the following steps to set up WPS using the button.

- 1 Ensure that the two devices you want to set up are within wireless range of one another.
- 2 Look for a WPS button on each device. If the device does not have one, log into its configuration utility and locate the button (see the device's User's Guide for how to do this). The WiMAX Modem's **WPS** button is in the rear panel as shown next.

**Figure 26** The WPS Button on the WiMAX Modem



- 3 Press the button on one of the devices (it doesn't matter which). For the WiMAX Modem you must press the WPS button for more than three seconds.
- 4 Within two minutes, press the button on the other device. The registrar sends the network name (SSID) and security key through an secure connection to the enrollee.

If you need to make sure that WPS worked, check the list of associated wireless clients in the AP's configuration utility. If you see the wireless client in the list, WPS was successful.



# The WAN Configuration Screens

## 7.1 Overview

Use the **ADVANCED > WAN Configuration** screens to set up your WiMAX Modem's Wide Area Network (WAN) or Internet features.

A Wide Area Network (or WAN) links geographically dispersed locations to other networks or the Internet. A WAN configuration can include switched and permanent telephone circuits, terrestrial radio systems and satellite systems.

### 7.1.1 What You Can Do in This Chapter

- The **Internet Connection** screen ([Section 7.2 on page 79](#)) lets you set up your WiMAX Modem's Internet settings.
- The **WiMAX Configuration** screen ([Section 7.3 on page 82](#)) lets set up the frequencies used by your WiMAX Modem.

### 7.1.2 What You Need to Know

The following terms and concepts may help as you read through this chapter.

#### WiMAX

WiMAX (Worldwide Interoperability for Microwave Access) is the IEEE 802.16 wireless networking standard, which provides high-bandwidth, wide-range wireless service across wireless Metropolitan Area Networks (MANs). ZyXEL is a member of the WiMAX Forum, the industry group dedicated to promoting and certifying interoperability of wireless broadband products.

In a wireless MAN, a wireless-equipped computer is known either as a mobile station (MS) or a subscriber station (SS). Mobile stations use the IEEE 802.16 standard and are able to maintain connectivity while switching their connection from one base station to another base station (handover) while subscriber stations use other standards that do not have this capability (IEEE 802.16-2004, for

example). The following figure shows an MS-equipped notebook computer **MS1** moving from base station **BS1**'s coverage area and connecting to **BS2**.

**Figure 27** WiMax: Mobile Station



WiMAX technology uses radio signals (around 2 to 10 GHz) to connect subscriber stations and mobile stations to local base stations. Numerous subscriber stations and mobile stations connect to the network through a single base station (BS), as in the following figure.

**Figure 28** WiMAX: Multiple Mobile Stations



A base station's coverage area can extend over many hundreds of meters, even under poor conditions. A base station provides network access to subscriber stations and mobile stations, and communicates with other base stations.

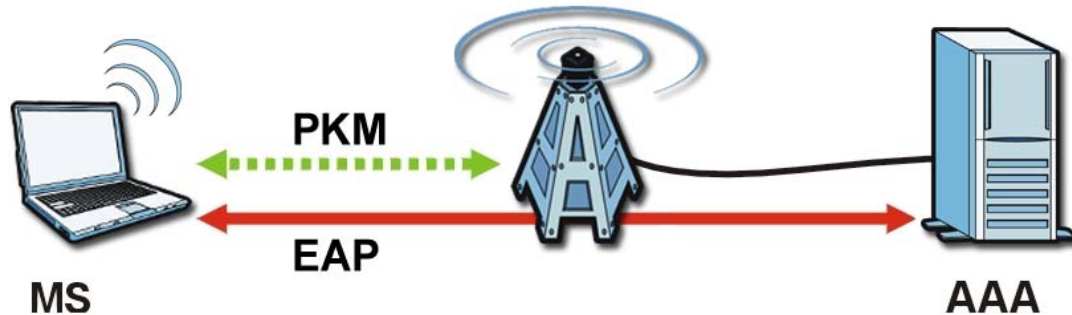
The radio frequency and bandwidth of the link between the WiMAX Modem and the base station are controlled by the base station. The WiMAX Modem follows the base station's configuration.

### Authentication

When authenticating a user, the base station uses a third-party RADIUS or Diameter server known as an AAA (Authentication, Authorization and Accounting) server to authenticate the mobile or subscriber stations.

The following figure shows a base station using an **AAA** server to authenticate mobile station **MS**, allowing it to access the Internet.

**Figure 29** Using an AAA Server



In this figure, the dashed arrow shows the PKM (Privacy Key Management) secured connection between the mobile station and the base station, and the solid arrow shows the EAP secured connection between the mobile station, the base station and the AAA server. See the WiMAX security appendix for more details.

## 7.2 Internet Connection

Click **ADVANCED (進階) > WAN Configuration (WAN 設定)** to set up your WiMAX Modem's Internet settings.

Note: Not all WiMAX Modem models have all the fields shown here.

**Figure 30** ADVANCED ( 進階 ) > WAN Configuration (WAN 設定 ) > Internet Connection

The following table describes the labels in this screen.

**Table 25** ADVANCED ( 進階 ) > WAN Configuration (WAN 設定 ) > Internet Connection > ISP Parameters for Internet Access ( )

LABEL	DESCRIPTION
ISP Parameters for Internet Access ( 存取網際網路的 ISP 參數 )	
User (使用者名稱)	Use this field to enter the username associated with your Internet access account. You can enter up to 61 printable ASCII characters.
Password (密碼)	Use this field to enter the password associated with your Internet access account. You can enter up to 47 printable ASCII characters.
Anonymous Identity (匿名身份)	Enter the anonymous identity provided by your Internet Service Provider. Anonymous identity (also known as outer identity) is used with EAP-TTLS encryption. The anonymous identity is used to route your authentication request to the correct authentication server, and does not reveal your real user name. Your real user name and password are encrypted in the TLS tunnel, and only the anonymous identity can be seen.  Leave this field blank if your ISP did not give you an anonymous identity to use.
PKM	This field displays the Privacy Key Management version number. PKM provides security between the WiMAX Modem and the base station. At the time of writing, the WiMAX Modem supports PKMv2 only. See the WiMAX security appendix for more information.

**Table 25** ADVANCED ( 進階 ) > WAN Configuration (WAN 設定 ) > Internet Connection > ISP Parameters for Internet Access ( ) (continued)

LABEL	DESCRIPTION
Authentication ( 認證 )	<p>This field displays the user authentication method. Authentication is the process of confirming the identity of a mobile station (by means of a username and password, for example).</p> <p>Check with your service provider if you are unsure of the correct setting for your account.</p> <p>Choose from the following user authentication methods:</p> <ul style="list-style-type: none"> <li>• <b>TTLS</b> (Tunnelled Transport Layer Security)</li> <li>• <b>TLS</b> (Transport Layer Security)</li> </ul> <p><b>Note: Not all WiMAX Modems support TLS authentication. Check with your service provider for details.</b></p>
TTLS Inner EAP	<p>This field displays the type of secondary authentication method. Once a secure EAP-TTLS connection is established, the inner EAP is the protocol used to exchange security information between the mobile station, the base station and the AAA server to authenticate the mobile station. See the WiMAX security appendix for more details.</p> <p>This field is available only when <b>TTLS</b> is selected in the <b>Authentication</b> field.</p> <p>The WiMAX Modem supports the following inner authentication types:</p> <ul style="list-style-type: none"> <li>• <b>CHAP</b> (Challenge Handshake Authentication Protocol)</li> <li>• <b>MSCHAP</b> (Microsoft CHAP)</li> <li>• <b>MSCHAPV2</b> (Microsoft CHAP version 2)</li> <li>• <b>PAP</b> (Password Authentication Protocol)</li> </ul>
Auth Mode ( 認證 模式 )	<p>Select the authentication mode from the drop-down list box.</p> <p>This field is not available in all WiMAX Modems. Check with your service provider for details.</p> <p>The WiMAX Modem supports the following authentication modes:</p> <ul style="list-style-type: none"> <li>• User Only</li> <li>• Device Only with Cert</li> <li>• Certs and User Authentication</li> </ul>
Certificate ( 憑證 )	<p>This is the security certificate the WiMAX Modem uses to authenticate the AAA server. Use the <b>TOOLS ( 工具 ) &gt; Certificate ( 憑證 ) &gt; Trusted CAs</b> screen to import certificates to the WiMAX Modem.</p>
WAN IP Address Assignment ( 指定 WAN IP 位址 )	
Get automatically from ISP (Default) ( 自動從 ISP 取得 ( 預設 ) )	<p>Select this if you have a dynamic IP address. A dynamic IP address is not fixed; the ISP assigns you a different one each time you connect to the Internet.</p>



**Table 25** ADVANCED ( 進階 ) > WAN Configuration (WAN 設定 ) > Internet Connection > ISP Parameters for Internet Access ( ) (continued)

LABEL	DESCRIPTION
Use Fixed IP Address ( 使用固定 IP 位址 )	A static IP address is a fixed IP that your ISP gives you. Type your ISP assigned IP address in the <b>IP Address (IP 位址)</b> field below.
IP Subnet Mask (IP 子網路遮罩)	Enter a subnet mask in dotted decimal notation.  Refer to the appendices to calculate a subnet mask If you are implementing subnetting.
Gateway IP Address ( 閘道 IP 位址 )	Specify a gateway IP address (supplied by your ISP).
Apply ( 套用 )	Click to save your changes.
Reset ( 重設 )	Click to restore your previously saved settings.

## 7.3 WiMAX Configuration

Click **ADVANCED ( 進階 ) > WAN Configuration (WAN 設定 ) > WiMAX Configuration** to set up the frequencies used by your WiMAX Modem.

In a WiMAX network, a mobile or subscriber station must use a radio frequency supported by the base station to communicate. When the WiMAX Modem looks for a connection to a base station, it can search a range of frequencies.

Radio frequency is measured in Hertz (Hz).

**Table 26** Radio Frequency Conversion

1 kHz = 1000 Hz
1 MHz = 1000 kHz (1000000 Hz)
1 GHz = 1000 MHz (1000000 kHz)

**Figure 31** ADVANCED ( 進階 ) > WAN Configuration (WAN 設定) > WiMAX Configuration (WiMAX 設定)

Internet Connection
WiMAX Configuration

**頻寬 & 頻率**

頻寬:  kHz

頻率 [1]:  kHz

頻率 [2]:  kHz

頻率 [3]:  kHz

頻率 [4]:  kHz

頻率 [5]:  kHz

頻率 [6]:  kHz

頻率 [7]:  kHz

頻率 [8]:  kHz

頻率 [9]:  kHz

**網路存取提供者 ID**

提供者 ID [1]:  (16 進位輸入) <= 主要的

提供者 ID [2]:  (16 進位輸入)

提供者 ID [3]:  (16 進位輸入)

提供者 ID [4]:  (16 進位輸入)

提供者 ID [5]:  (16 進位輸入)

提供者 ID [6]:  (16 進位輸入)

**基地台**

ALU

NEC

**功能啟用**

HARQ

ARQ

MIMO

Idle\_Mode

The following table describes the labels in this screen.

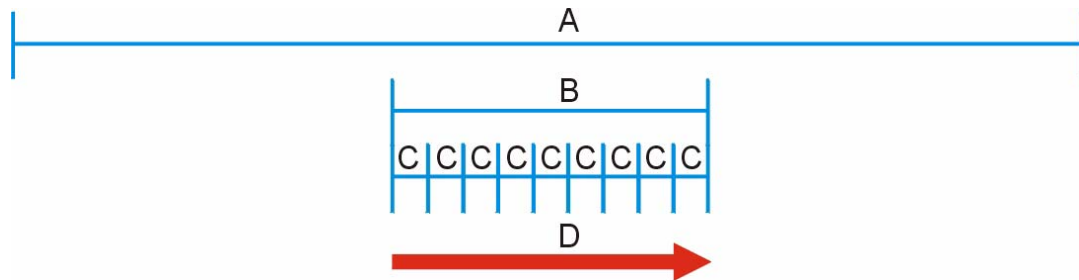
**Table 27** ADVANCED ( 進階 ) > WAN Configuration (WAN 設定 ) > WiMAX Configuration (WiMAX 設定 )

LABEL	DESCRIPTION
Bandwidth & Frequency ( 頻寬 & 頻率 )	<p>These fields show the downlink frequency settings in kilohertz (kHz).</p> <p>Enter the width of a frequency band (only support 5MHz &amp; 10MHz) the WiMAX Modem can use for transmitting and receiving data.</p> <p>Enter values in the <b>Frequency ( 頻率 )</b> fields to have the WiMAX Modem scan these frequencies for available channels in ascending numerical order.</p> <p>Contact your service provider for the bandwidth value and the supported frequencies.</p>
Network Access Provider ID ( 網路接取提供者 ID )	<p>Enter the <b>primary ( 主要的 )</b> network access provider ID for the WAN connection. You can also enter the substitute access provider IDs for the connection backup when the primary one is down.</p>
Base Station ( 基地台 )	<p>Select <b>ALU</b> to connect this WiMAX Modem to an Alcatel-Lucent WiMAX base station.</p> <p>Select <b>NEC</b> to connect this WiMAX Modem to a NEC WiMAX base station.</p>
Enabling Functions ( 功能啓用 )	<p>Select one or multiple check box(es) to enable the function(s). Configure this according to what you were given by your service provider.</p> <ul style="list-style-type: none"> <li>• <b>HARQ</b>: Select this to enable the Hybrid Automatic Repeat-Request feature on the WiMAX Modem. HARQ works in the physical (PHY) layer and provides radio link error detection and correction.</li> <li>• <b>ARQ</b>: Select this to enable the Automatic Repeat-Request feature on the WiMAX Modem. ARQ works in the MAC layer and provides error correction by scheduling re-transmission.</li> </ul> <p>Both HARQ and ARQ are designed to provide reliable transmission over a wireless connection. When a receiver detects errors, it will notify the sender to retransmit the data within a certain period.</p> <ul style="list-style-type: none"> <li>• <b>MIMO</b>: Select this to enable the Multiple Input Multiple Output (MIMO) feature on the WiMAX Modem.</li> <li>• <b>Idle_Mode</b>: Select this to have the WiMAX Modem enter the idle mode after it has no traffic passing through for a pre-defined period. Make sure your base station also supports this before selecting this.</li> </ul>
Apply ( 套用 )	<p>Click to save your changes.</p>
Reset ( 重設 )	<p>Click to restore your previously saved settings.</p>

## 7.3.1 Frequency Ranges

The following figure shows the WiMAX Modem searching a range of frequencies to find a connection to a base station.

**Figure 32** Frequency Ranges



In this figure, **A** is the WiMAX frequency range. “WiMAX frequency range” refers to the entire range of frequencies the WiMAX Modem is capable of using to transmit and receive (see the Product Specifications appendix for details).

In the figure, **B** shows the operator frequency range. This is the range of frequencies within the WiMAX frequency range supported by your operator (service provider).

The operator range is subdivided into bandwidth steps. In the figure, each **C** is a bandwidth step.

The arrow **D** shows the WiMAX Modem searching for a connection.

Have the WiMAX Modem search only certain frequencies by configuring the downlink frequencies. Your operator can give you information on the supported frequencies.

The downlink frequencies are points of the frequency range your WiMAX Modem searches for an available connection. Use the **Site Survey** screen to set these bands. You can set the downlink frequencies anywhere within the WiMAX frequency range. In this example, the downlink frequencies have been set to search all of the operator range for a connection.

## 7.3.2 Configuring Frequency Settings

You need to set the WiMAX Modem to scan one or more specific radio frequencies to find an available connection to a WiMAX base station.

Use the **WiMAX Configuration (WiMAX 設定)** screen to define the radio frequencies to be searched for available wireless connections. See [Section 7.3.3 on page 86](#) for an example of using the **WiMAX Configuration (WiMAX 設定)** screen.

Note: It may take several minutes for the WiMAX Modem to find a connection.

- The WiMAX Modem searches the **DL Frequency (頻率)** settings in ascending numerical order, from **[1]** to **[9]**.
- If you enter a 0 in a **DL Frequency (頻率)** field, the WiMAX Modem immediately moves on to the next **DL Frequency (頻率)** field.
- When the WiMAX Modem connects to a base station, the values in this screen are automatically set to the base station's frequency. The next time the WiMAX Modem searches for a connection, it searches only this frequency. If you want the WiMAX Modem to search other frequencies, enter them in the **DL Frequency (頻率)** fields.

The following table describes some examples of **DL Frequency (頻率)** settings.

**Table 28** DL Frequency Example Settings

	EXAMPLE 1	EXAMPLE 2
<b>DL Frequency [1]</b> (頻率 [1]):	2500000	2500000
<b>DL Frequency [2]</b> (頻率 [2]):	2550000	2550000
<b>DL Frequency [3]</b> (頻率 [3]):	0	2600000
<b>DL Frequency [4]</b> (頻率 [4]):	0	0
	The WiMAX Modem searches at 2500000 kHz, and then searches at 2550000 kHz if it has not found a connection.	<i>The WiMAX Modem searches at 2500000 kHz and then at 2550000 kHz if it has not found an available connection. If it still does not find an available connection, it searches at 2600000 kHz.</i>

### 7.3.3 Using the WiMAX Frequency Screen

In this example, your Internet service provider has given you a list of supported frequencies: 2.51, 2.525, 2.6, and 2.625.

- 1 In the **DL Frequency [1]** (頻率 [1]) field, enter **2510000** (2510000 kilohertz (kHz) is equal to 2.51 gigahertz).
- 2 In the **DL Frequency [2]** (頻率 [2]) field, enter **2525000**.
- 3 In the **DL Frequency [3]** (頻率 [3]) field, enter **2600000**.
- 4 In the **DL Frequency [4]** (頻率 [4]) field, enter **2625000**.

Leave the rest of the **DL Frequency (頻率)** fields at zero.

- 5 Enter the ID of your service provider you were given in the **Service Provider ID [1]** (提供者 ID[1]) field.
- 6 Configure the **Base Station (基地台)** (ALU in this example) and **Function Enabling (功能啓動)** (All of the four options are selected in this example) fields.

The screen appears as follows.

**Figure 33** Completing the WiMAX Frequency Screen

The screenshot shows the 'WiMAX Configuration' window with the following sections:

- 頻寬 & 頻率 (Bandwidth & Frequency):**
  - 頻寬: 3500 kHz
  - 頻率 [1]: 2510000 kHz
  - 頻率 [2]: 2525000 kHz
  - 頻率 [3]: 2600000 kHz
  - 頻率 [4]: 2625000 kHz
  - 頻率 [5]: 0 kHz
  - 頻率 [6]: 0 kHz
  - 頻率 [7]: 0 kHz
  - 頻率 [8]: 0 kHz
  - 頻率 [9]: 0 kHz
- 網路接取提供者 ID (Network Access Provider ID):**
  - 提供者 ID [1]: F74844 (16 進位輸入) <= 主要的
  - 提供者 ID [2]: (16 進位輸入)
  - 提供者 ID [3]: (16 進位輸入)
  - 提供者 ID [4]: (16 進位輸入)
  - 提供者 ID [5]: (16 進位輸入)
  - 提供者 ID [6]: (16 進位輸入)
- 基地台 (Base Station):**
  - ALU
  - NEC
- 功能啓用 (Function Enabling):**
  - HARQ
  - ARQ
  - MIMO
  - Idle\_Mode

Buttons at the bottom: 套用 (Apply) and 重設 (Reset).

- 7 Click **Apply (套用)**. The WiMAX Modem stores your settings.

When the WiMAX Modem searches for available frequencies, it scans all frequencies from **DL Frequency [1]** (頻率[1]) to **DL Frequency [4]** (頻率[4]). When it finds an available connection, the fields in this screen will be automatically set to use that frequency.



# The NAT Configuration Screens

## 8.1 Overview

Use these screens to configure port forwarding and trigger ports for the WiMAX Modem. You can also enable and disable SIP, FTP, and H.323 ALG.

Network Address Translation (NAT) maps a host's IP address within one network to a different IP address in another network. For example, you can use a NAT router to map one IP address from your ISP to multiple private IP addresses for the devices in your home network.

### 8.1.1 What You Can Do in This Chapter

- The **General** screen ([Section 8.2 on page 90](#)) lets you enable or disable NAT and to allocate memory for NAT and firewall rules.
- The **Port Forwarding** screen ([Section 8.3 on page 91](#)) lets you look at the current port-forwarding rules in the WiMAX Modem, and to enable, disable, activate, and deactivate each one.
- The **Trigger Port** screen ([Section 8.4 on page 94](#)) lets you maintain trigger port forwarding rules for the WiMAX Modem.



## 8.2 General

Click **ADVANCED (進階) > NAT Configuration (NAT設定) > General** to enable or disable NAT and to allocate memory for NAT and firewall rules.

**Figure 34** ADVANCED (進階) > NAT Configuration (NAT設定) > General

The following table describes the labels in this screen.

**Table 29** ADVANCED (進階) > NAT Configuration (NAT設定) > General

LABEL	DESCRIPTION
Enable Network Address Translation (啟用網路位址轉譯)	Select this if you want to use port forwarding, trigger ports, or any of the ALG.
Max NAT/Firewall Session Per User (每一使用者的 NAT/防火牆 最大連線數)	<p>When computers use peer to peer applications, such as file sharing applications, they may use a large number of NAT sessions. If you do not limit the number of NAT sessions a single client can establish, this can result in all of the available NAT sessions being used. In this case, no additional NAT sessions can be established, and users may not be able to access the Internet.</p> <p>Each NAT session establishes a corresponding firewall session. Use this field to limit the number of NAT/firewall sessions each client computer can establish through the WiMAX Modem.</p> <p>If your network has a small number of clients using peer to peer applications, you can raise this number to ensure that their performance is not degraded by the number of NAT sessions they can establish. If your network has a large number of users using peer to peer applications, you can lower this number to ensure no single client is using all of the available NAT sessions.</p>
Apply (套用)	Click to save your changes.
Cancel (重設)	Click to return to the previous screen without saving your changes.

## 8.3 Port Forwarding

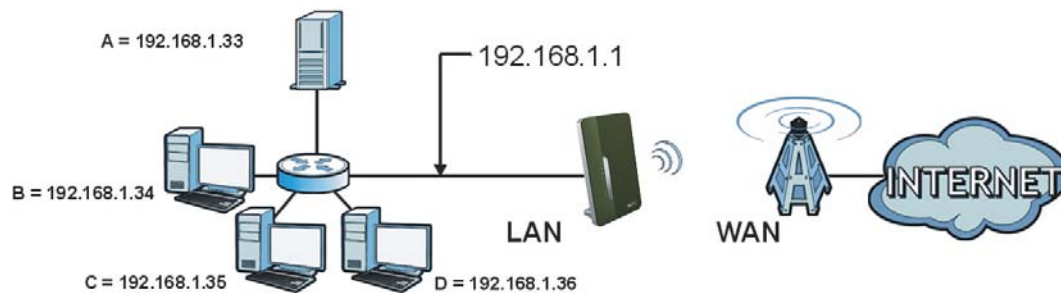
A NAT server set is a list of inside (behind NAT on the LAN) servers, for example, web or FTP, that you can make accessible to the outside world even though NAT makes your whole inside network appear as a single machine to the outside world.

Use the **ADVANCED (進階) > NAT Configuration (NAT 設定) > Port Forwarding** screen to forward incoming service requests to the server(s) on your local network. You may enter a single port number or a range of port numbers to be forwarded, and the local IP address of the desired server. The port number identifies a service; for example, web service is on port 80 and FTP on port 21. In some cases, such as for unknown services or where one server can support more than one service (for example both FTP and web service), it might be better to specify a range of port numbers.

In addition to the servers for specified services, NAT supports a default server. A service request that does not have a server explicitly designated for it is forwarded to the default server. If the default is not defined, the service request is simply discarded.

For example, let's say you want to assign ports 21-25 to one FTP, Telnet and SMTP server (A in the example), port 80 to another (B in the example) and assign a default server IP address of 192.168.1.35 to a third (C in the example). You assign the LAN IP addresses and the ISP assigns the WAN IP address. The NAT network appears as a single host on the Internet.

**Figure 35** Multiple Servers Behind NAT Example



### 8.3.1 Port Forwarding Options



Click **ADVANCED (進階) > NAT Configuration (NAT 設定) > Port Forwarding** to look at the current port-forwarding rules in the WiMAX Modem, and to enable,

disable, activate, and deactivate each one. You can also set up a default server to handle ports not covered by rules.

**Figure 36** ADVANCED ( 進階 ) > NAT Configuration ( NAT 設定 ) > Port Forwarding

The following table describes the icons in this screen.

**Table 30** ADVANCED ( 進階 ) > NAT Configuration ( NAT 設定 ) > Port Forwarding

ICON	DESCRIPTION
	Edit Click to edit this item.
	Delete Click to delete this item.

The following table describes the labels in this screen.

**Table 31** ADVANCED ( 進階 ) > NAT Configuration ( NAT 設定 ) > Port Forwarding

LABEL	DESCRIPTION
Default Server Setup ( 預設伺服器設定 )	
Default Server ( 預設伺服器 )	Enter the IP address of the server to which the WiMAX Modem should forward packets for ports that are not specified in the <b>Port Forwarding</b> section below or in the <b>TOOLS &gt; Remote MGMT</b> screens. Enter 0.0.0.0 if you want the WiMAX Modem to discard these packets instead.
Port Forwarding ( 連接埠轉遞 )	
#	The number of the item in this list.
Active ( 啟動 )	Select this to enable this rule. Clear this to disable this rule.
Name ( 名稱 )	This field displays the name of the rule. It does not have to be unique.
Start Port ( 起始埠 )	This field displays the beginning of the range of port numbers forwarded by this rule.

**Table 31** ADVANCED (進階) > NAT Configuration (NAT 設定) > Port Forwarding

LABEL	DESCRIPTION
End Port (結束埠)	This field displays the end of the range of port numbers forwarded by this rule. If it is the same as the <b>Start Port</b> , only one port number is forwarded.
Server IP Address (伺服器)	This field displays the IP address of the server to which packet for the selected port(s) are forwarded.
Action (啓動)	Click the <b>Edit</b> icon to set up a port forwarding rule or alter the configuration of an existing port forwarding rule.  Click the <b>Delete</b> icon to remove an existing port forwarding rule.
Apply (套用)	Click to save your changes.
Reset (重設)	Click to restore your previously saved settings.

### 8.3.2 Port Forwarding Rule Setup

Click a port forwarding rule's **Edit** icon in the **ADVANCED (進階) > NAT Configuration (NAT 設定) > Port Forwarding** screen to activate, deactivate, or edit it.

**Figure 37** ADVANCED (進階) > NAT Configuration (NAT 設定) > Port Forwarding >

Rule Setup

The following table describes the labels in this screen.

**Table 32** ADVANCED (進階) > NAT Configuration (NAT 設定) > Port Forwarding > Rule Setup

LABEL	DESCRIPTION
Active	Select this to enable this rule. Clear this to disable this rule.
Service Name	Enter a name to identify this rule. You can use 1 - 31 printable ASCII characters, or you can leave this field blank. It does not have to be a unique name.

**Table 32** ADVANCED (進階) > NAT Configuration (NAT 設定) > Port Forwarding > Rule Setup (continued)

LABEL	DESCRIPTION
Start Port End Port	Enter the port number or range of port numbers you want to forward to the specified server.  To forward one port number, enter the port number in the <b>Start Port</b> and <b>End Port</b> fields.  To forward a range of ports, <ul style="list-style-type: none"> <li>• enter the port number at the beginning of the range in the <b>Start Port</b> field</li> <li>• enter the port number at the end of the range in the <b>End Port</b> field.</li> </ul>
Server IP Address	Enter the IP address of the server to which to forward packets for the selected port number(s). This server is usually on the LAN.
Apply (套用)	Click to save your changes.
Cancel (取消)	Click to return to the previous screen without saving your changes.

## 8.4 Trigger Port

Some services use a dedicated range of ports on the client side and a dedicated range of ports on the server side. With regular port forwarding you set a forwarding port in NAT to forward a service (coming in from the server on the WAN) to the IP address of a computer on the client side (LAN). The problem is that port forwarding only forwards a service to a single LAN IP address. In order to use the same service on a different LAN computer, you have to manually replace the LAN computer's IP address in the forwarding port with another LAN computer's IP address,

Trigger port forwarding solves this problem by allowing computers on the LAN to dynamically take turns using the service. The WiMAX Modem records the IP address of a LAN computer that sends traffic to the WAN to request a service with a specific port number and protocol (a "trigger" port). When the WiMAX Modem's WAN port receives a response with a specific port number and protocol ("incoming" port), the WiMAX Modem forwards the traffic to the LAN IP address of the computer that sent the request. After that computer's connection for that service closes, another computer on the LAN can use the service in the same manner. This way you do not need to configure a new IP address each time you want a different LAN computer to use the application.

Click **ADVANCED (進階) > NAT Configuration (NAT 設定) > Trigger Port** to maintain trigger port forwarding rules for the WiMAX Modem.

**Figure 38** ADVANCED (進階) > NAT Configuration (NAT 設定) > Trigger Port

#	名稱	內送埠		觸發埠	
		起始埠	結束埠	起始埠	結束埠
1	<input type="text"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
2	<input type="text"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
3	<input type="text"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>
4	<input type="text"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>

The following table describes the labels in this screen.

**Table 33** ADVANCED (進階) > NAT Configuration (NAT 設定) > Trigger Port

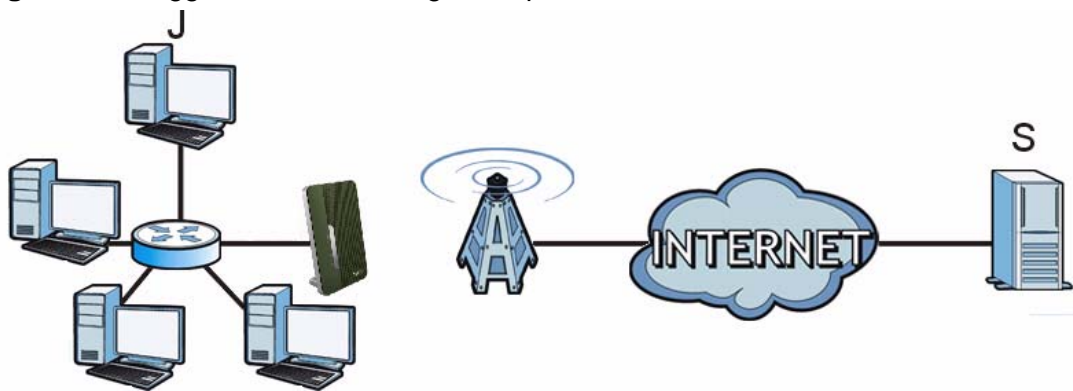
LABEL	DESCRIPTION
#	The number of the item in this list.
Name (名稱)	Enter a name to identify this rule. You can use 1 - 15 printable ASCII characters, or you can leave this field blank. It does not have to be a unique name.
Incoming (內送埠)	
Start Port (起始埠) End Port (結束埠)	<p>Enter the incoming port number or range of port numbers you want to forward to the IP address the WiMAX Modem records.</p> <p>To forward one port number, enter the port number in the <b>Start Port (起始埠)</b> and <b>End Port (結束埠)</b> fields.</p> <p>To forward a range of ports,</p> <ul style="list-style-type: none"> <li>enter the port number at the beginning of the range in the <b>Start Port (起始埠)</b> field</li> <li>enter the port number at the end of the range in the <b>End Port (結束埠)</b> field.</li> </ul> <p>If you want to delete this rule, enter zero in the <b>Start Port (起始埠)</b> and <b>End Port (結束埠)</b> fields.</p>
Trigger (觸發埠)	

**Table 33** ADVANCED (進階) > NAT Configuration (NAT 設定) > Trigger Port

LABEL	DESCRIPTION
Start Port (起始埠) End Port (結束埠)	<p>Enter the outgoing port number or range of port numbers that makes the WiMAX Modem record the source IP address and assign it to the selected incoming port number(s).</p> <p>To select one port number, enter the port number in the <b>Start Port</b> and <b>End Port</b> fields.</p> <p>To select a range of ports,</p> <ul style="list-style-type: none"> <li>enter the port number at the beginning of the range in the <b>Start Port</b> field</li> <li>enter the port number at the end of the range in the <b>End Port</b> field.</li> </ul> <p>If you want to delete this rule, enter zero in the <b>Start Port</b> and <b>End Port</b> fields.</p>
Apply (套用)	Click to save your changes.
Cancel (重設)	Click to return to the previous screen without saving your changes.

## 8.4.1 Trigger Port Forwarding Example

The following is an example of trigger port forwarding. In this example, **J** is Jane's computer and **S** is the Real Audio server.

**Figure 39** Trigger Port Forwarding Example

- Jane requests a file from the Real Audio server (port 7070).
- Port 7070 is a "trigger" port and causes the WiMAX Modem to record Jane's computer IP address. The WiMAX Modem associates Jane's computer IP address with the "incoming" port range of 6970-7170.
- The Real Audio server responds using a port number ranging between 6970-7170.
- The WiMAX Modem forwards the traffic to Jane's computer IP address.

- 5 Only Jane can connect to the Real Audio server until the connection is closed or times out. The WiMAX Modem times out in three minutes with UDP (User Datagram Protocol), or two hours with TCP/IP (Transfer Control Protocol/Internet Protocol).

Two points to remember about trigger ports:

- 1 Trigger events only happen on data that is coming from inside the WiMAX Modem and going to the outside.
- 2 If an application needs a continuous data stream, that port (range) will be tied up so that another computer on the LAN can't trigger it.





# The System Configuration Screens

## 9.1 Overview

Click **ADVANCED (進階) > System Configuration (系統組態)** to set up general system settings, change the system mode, change the password, configure the DDNS server settings, and set the current date and time.

### 9.1.1 What You Can Do in This Chapter

- The **Dynamic DNS** screen ([Section 9.2 on page 100](#)) lets you set up the WiMAX Modem as a dynamic DNS client.
- The **Firmware** screen ([Section 9.3 on page 102](#)) lets you upload new firmware to the WiMAX Modem.
- The **Configuration** screen ([Section 9.4 on page 104](#)) lets you back up or restore the configuration of the WiMAX Modem.
- The **Restart** screen ([Section 9.5 on page 105](#)) lets you restart your WiMAX Modem from within the web configurator.

### 9.1.2 What You Need to Know

The following terms and concepts may help as you read through this chapter.

#### System Name

The **System Name** is often used for identification purposes. Because some ISPs check this name you should enter your computer's "Computer Name".

- In Windows 2000: Click **Start > Settings > Control Panel** and then double-click the **System** icon. Select the **Network Identification** tab and then click the **Properties** button. Note the entry for the **Computer Name** field and enter it as the **System Name**.
- In Windows XP: Click **Start > My Computer > View system information** and then click the **Computer Name** tab. Note the entry in the **Full computer name** field and enter it as the WiMAX Modem **System Name**.

## Domain Name

The **Domain Name** entry is what is propagated to the DHCP clients on the LAN. If you leave this blank, the domain name obtained by DHCP from the ISP is used. While you must enter the host name (System Name) on each individual computer, the domain name can be assigned from the WiMAX Modem via DHCP.

## DNS Server Address Assignment

Use DNS (Domain Name System) to map a domain name to its corresponding IP address and vice versa, for instance, the IP address of [www.zyxel.com](http://www.zyxel.com) is 204.217.0.2. The DNS server is extremely important because without it, you must know the IP address of a computer before you can access it.

The WiMAX Modem can get the DNS server addresses in the following ways:

- 1 The ISP tells you the DNS server addresses, usually in the form of an information sheet, when you sign up. If your ISP gives you DNS server addresses, enter them in the **DNS Server** fields in the **SYSTEM General** screen.
- 2 If the ISP did not give you DNS server information, leave the **DNS Server** fields in the **SYSTEM General** screen set to 0.0.0.0 for the ISP to dynamically assign the DNS server IP addresses.

## 9.2 Dynamic DNS

Dynamic DNS allows you to update your current dynamic IP address with one or many dynamic DNS services so that anyone can contact you (in NetMeeting, CU-SeeMe, etc.). You can also access your FTP server or Web site on your own computer using a domain name (for instance [myhost.dns.org](http://myhost.dns.org), where [myhost](http://myhost) is a name of your choice) that will never change instead of using an IP address that changes each time you reconnect. Your friends or relatives will always be able to call you even if they don't know your IP address.

First of all, you need to have registered a dynamic DNS account with [www.dyndns.org](http://www.dyndns.org). This is for people with a dynamic IP from their ISP or DHCP server that would still like to have a domain name. The Dynamic DNS service provider will give you a password or key.

Enabling the wildcard feature for your host causes [\\*.yourhost.dyndns.org](http://*.yourhost.dyndns.org) to be aliased to the same IP address as [yourhost.dyndns.org](http://yourhost.dyndns.org). This feature is useful if you want to be able to use, for example, [www.yourhost.dyndns.org](http://www.yourhost.dyndns.org) and still reach your hostname.

Note: If you have a private WAN IP address, then you cannot use Dynamic DNS.

Click **ADVANCED (進階) > System Configuration (系統組態) > Dynamic DNS** to set up the WiMAX Modem as a dynamic DNS client.

**Figure 40** ADVANCED (進階) > System Configuration (系統組態) > Dynamic DNS

The following table describes the labels in this screen.

**Table 34** ADVANCED (進階) > System Configuration (系統組態) > Dynamic DNS

LABEL	DESCRIPTION
Dynamic DNS Setup (動態 DNS 設定)	
Enable Dynamic DNS (啟用動態 DNS)	Select this to use dynamic DNS.
Service Provider (服務供應商)	Select the name of your Dynamic DNS service provider.
Dynamic DNS Type (動態 DNS 類型)	Select the type of service that you are registered for from your Dynamic DNS service provider.
Host Name (主機名稱)	Enter the host name. You can specify up to two host names, separated by a comma (",").
User Name (使用者名稱)	Enter your user name.
Password (密碼)	Enter the password assigned to you.
Enable Wildcard Option (啟用萬用字元選項)	Select this to enable the DynDNS Wildcard feature.
Enable offline option (啟用離線選項) (只限於自訂 DNS)	This field is available when <b>CustomDNS (自訂 DNS)</b> is selected in the <b>DDNS Type (動態 DNS 類型)</b> field. Select this if your Dynamic DNS service provider redirects traffic to a URL that you can specify while you are off line. Check with your Dynamic DNS service provider.

**Table 34** ADVANCED (進階) > System Configuration (系統組態) > Dynamic DNS

LABEL	DESCRIPTION
IP Address Update Policy (IP 位址更新原則)	
Use WAN IP Address (使用 WAN IP 位址)	Select this if you want the WiMAX Modem to update the domain name with the WAN port's IP address.
Dynamic DNS server auto detect IP address (動態 DNS 伺服器自動偵測 IP 位址)	Select this if you want the DDNS server to update the IP address of the host name(s) automatically. Select this option when there are one or more NAT routers between the WiMAX Modem and the DDNS server.  <b>Note:</b> The DDNS server may not be able to detect the proper IP address if there is an HTTP proxy server between the WiMAX Modem and the DDNS server.
Use specified IP address (使用指定的 IP 位址)	Select this if you want to use the specified IP address with the host name(s). Then, specify the IP address. Use this option if you have a static IP address.
Apply (套用)	Click to save your changes.
Reset (重設)	Click to restore your previously saved settings.

## 9.3 Firmware

Click **ADVANCED (進階) > System Configuration (系統組態) > Firmware** to upload new firmware to the WiMAX Modem. Firmware files usually use the system model name with a ".bin" extension, such as "WiMAX Modem.bin". The upload process uses HTTP (Hypertext Transfer Protocol) and may take up to two minutes. After a successful upload, the system will reboot.

Contact your service provider for information on available firmware upgrades.

Note: Only use firmware for your WiMAX Modem's specific model.

**Figure 41** ADVANCED (進階) > System Configuration (系統組態) > Firmware

The screenshot shows a web interface with four tabs: Dynamic DNS, Firmware (selected), Configuration, and Restart. Below the tabs is a text box containing instructions in Chinese: "要升級內部裝置韌體，請瀏覽到二進位 (.BIN) 升級檔案的位置，然後按一下上載。升級檔案可以從網站上下載。如果升級檔案經過壓縮 (.ZIP 檔)，您必需先解壓縮成二進位 (.BIN) 檔。在某些情形中，您可能需要重新設定。" Below the text is a label "檔案路徑:" followed by an empty text input field, a "Browse..." button, and an "Upload" button.

The following table describes the labels in this screen.

**Table 35** ADVANCED ( 進階 ) > System Configuration ( 系統組態 ) > Firmware

LABEL	DESCRIPTION
File Path ( 檔案路徑 )	Enter the location of the *.bin file you want to upload, or click <b>Browse...</b> to find it. You must decompress compressed (.zip) files before you can upload them.
Browse...	Click this to find the *.bin file you want to upload.
Upload	Click this to begin uploading the selected file. This may take up to two minutes.  Note: Do not turn off the device while firmware upload is in progress!

### 9.3.1 The Firmware Upload Process

When the WiMAX Modem uploads new firmware, the process usually takes about two minutes. The device also automatically restarts in this time. This causes a temporary network disconnect.

Note: Do not turn off the device while firmware upload is in progress!

After two minutes, log in again, and check your new firmware version in the **Status** screen. You might have to open a new browser window to log in.

If the upload is not successful, you will be notified by error message.

Click **Return** to go back to the **Firmware** screen.

## 9.4 Configuration

Click **ADVANCED (進階) > System Configuration (系統組態) > Configuration** to back up or restore the configuration of the WiMAX Modem. You can also use this screen to reset the WiMAX Modem to the factory default settings.

**Figure 42** ADVANCED (進階) > System Configuration (系統組態) > Configuration

The following table describes the labels in this screen.

**Table 36** ADVANCED (進階) > System Configuration (系統組態) > Configuration

LABEL	DESCRIPTION
Backup Configuration (備份設定檔)	
Backup	Click this to save the WiMAX Modem's current configuration to a file on your computer. Once your device is configured and functioning properly, it is highly recommended that you back up your configuration file before making configuration changes. The backup configuration file is useful if you need to return to your previous settings.
Restore Configuration (回復設定)	
File Path ()	Enter the location of the file you want to upload, or click <b>Browse...</b> to find it.
Browse	Click this to find the file you want to upload.
Upload	Click this to restore the selected configuration file.  Note: Do not turn off the device while configuration file upload is in progress.
Back to Factory Defaults (回復原廠設定值)	
Reset	Click this to clear all user-entered configuration information and return the WiMAX Modem to its factory defaults. There is no warning screen.

## 9.4.1 The Restore Configuration Process

When the WiMAX Modem restores a configuration file, the device automatically restarts. This causes a temporary network disconnect.

Note: Do not turn off the device while configuration file upload is in progress.

If the WiMAX Modem's IP address is different in the configuration file you selected, you may need to change the IP address of your computer to be in the same subnet as that of the default management IP address (192.168.5.1). See the Quick Start Guide or the appendices for details on how to set up your computer's IP address.

You might have to open a new browser to log in again.

If the upload was not successful, you are notified by **Configuration Upload Error** message:

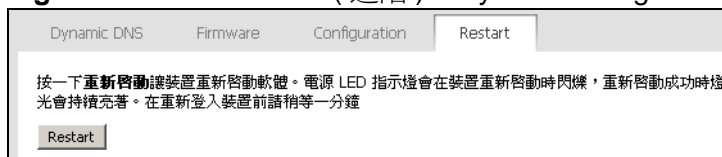
Click **Return** to go back to the **Configuration** screen.

## 9.5 Restart

Click **ADVANCED (進階) > System Configuration (系統組態) > Restart** to reboot the WiMAX Modem without turning the power off.

Note: Restarting the WiMAX Modem does not affect its configuration.

**Figure 43** ADVANCED (進階) > System Configuration (系統組態) > Restart



The following table describes the labels in this screen.

**Table 37** ADVANCED (進階) > System Configuration (系統組態) > Firmware

LABEL	DESCRIPTION
Restart	<p>Click this button to have the device perform a software restart. The <b>Power</b> LED blinks as it restarts and the shines steadily if the restart is successful.</p> <p>Note: Wait one minute before logging back into the WiMAX Modem after a restart.</p>



## 9.5.1 The Restart Process

When you click **Restart**, the the process usually takes about two minutes. Once the restart is complete you can log in again.

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# PART IV

## Voice Screens

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The Service Configuration Screens (109)

The Phone Screens (127)

The Phone Book Screens (137)



# The Service Configuration Screens

## 10.1 Overview

The **VOICE > Service Configuration** screens allow you to set up your voice accounts and configure your QoS settings.

VoIP (Voice over IP) is the sending of voice signals over the Internet Protocol. This allows you to make phone calls and send faxes over the Internet at a fraction of the cost of using the traditional circuit-switched telephone network. You can also use servers to run telephone service applications like PBX services and voice mail. Internet Telephony Service Provider (ITSP) companies provide VoIP service. A company could alternatively set up an IP-PBX and provide its own VoIP service.

Circuit-switched telephone networks require 64 kilobits per second (kbps) in each direction to handle a telephone call. VoIP can use advanced voice coding techniques with compression to reduce the required bandwidth.

### 10.1.1 What You Can Do in This Chapter

- The **SIP Setting** screen ([Section 10.2 on page 111](#)) lets you setup and maintain your SIP account(s) in the WiMAX Modem.
- The **Advanced SIP Settings** screen ([Section 10.2.1 on page 112](#)) lets you set up and maintain advanced settings for each SIP account
- The **QoS** screen ([Section 10.3 on page 119](#)) lets you set up and maintain ToS and VLAN settings for the WiMAX Modem.

### 10.1.2 What You Need to Know

The following terms and concepts may help as you read through this chapter.

#### SIP

The Session Initiation Protocol (SIP) is an application-layer control (signaling) protocol that handles the setting up, altering and tearing down of voice and

multimedia sessions over the Internet. SIP signaling is separate from the media for which it handles sessions. The media that is exchanged during the session can use a different path from that of the signaling. SIP handles telephone calls and can interface with traditional circuit-switched telephone networks.

## **SIP Identities**

A SIP account uses an identity (sometimes referred to as a SIP address). A complete SIP identity is called a SIP URI (Uniform Resource Identifier). A SIP account's URI identifies the SIP account in a way similar to the way an e-mail address identifies an e-mail account. The format of a SIP identity is SIP-Number@SIP-Service-Domain.

## **SIP Number**

The SIP number is the part of the SIP URI that comes before the “@” symbol. A SIP number can use letters like in an e-mail address (johndoe@your-ITSP.com for example) or numbers like a telephone number (1122334455@VoIP-provider.com for example).

## **SIP Service Domain**

The SIP service domain of the VoIP service provider (the company that lets you make phone calls over the Internet) is the domain name in a SIP URI. For example, if the SIP address is [1122334455@VoIP-provider.com](mailto:1122334455@VoIP-provider.com), then “VoIP-provider.com” is the SIP service domain.

## **SIP Register Server**

A SIP register server maintains a database of SIP identity-to-IP address (or domain name) mapping. The register server checks your user name and password when you register.

## **RTP**

When you make a VoIP call using SIP, the RTP (Real time Transport Protocol) is used to handle voice data transfer. See RFC 1889 for details on RTP.

## **Use NAT**

If you know the NAT router's public IP address and SIP port number, you can use the Use NAT feature to manually configure the WiMAX Modem to use a them in the SIP messages. This eliminates the need for STUN or a SIP ALG. You must also configure the NAT router to forward traffic with this port number to the WiMAX Modem.

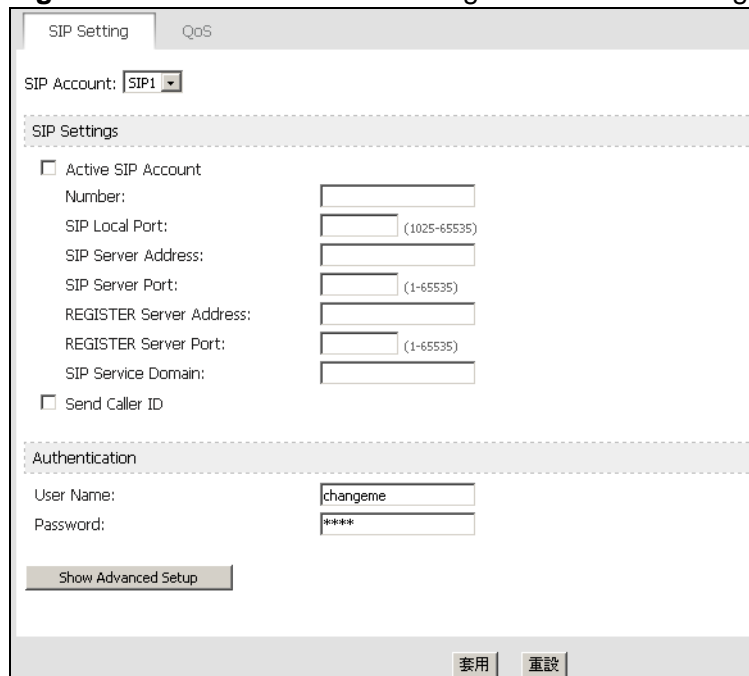
### 10.1.3 Before you Begin

- Ensure that you have all of your voice account information on hand. If not, contact your voice account service provider to find out which settings in this chapter you should configure in order to use your telephone with the WiMAX Modem.
- Connect your WiMAX Modem to the Internet, as described in the Quick Start Guide. If you have not already done so, then you will not be able to test your VoIP settings.

## 10.2 SIP Settings

Click **VOICE > Service Configuration > SIP Setting** to setup and maintain your SIP account(s) in the WiMAX Modem. Your VoIP or Internet service provider should provide you with your account information. You can also enable and disable each SIP account.

**Figure 44** VOICE > Service Configuration > SIP Setting



The following table describes the labels in this screen.

**Table 38** VOICE > Service Configuration > SIP Setting

LABEL	DESCRIPTION
SIP Account	Select the SIP account you want to see in this screen. If you change this field, the screen automatically refreshes.
SIP Settings	

**Table 38** VOICE > Service Configuration > SIP Setting (continued)

LABEL	DESCRIPTION
Active SIP Account	Select this if you want the WiMAX Modem to use this account. Clear it if you do not want the WiMAX Modem to use this account.
Number	Enter your SIP number. In the full SIP URI, this is the part before the @ symbol. You can use up to 127 printable ASCII characters.
SIP Local Port	Enter the WiMAX Modem's listening port number, if your VoIP service provider gave you one. Otherwise, keep the default value.
SIP Server Address	Enter the IP address or domain name of the SIP server provided by your VoIP service provider. You can use up to 95 printable ASCII characters. It does not matter whether the SIP server is a proxy, redirect or register server.
SIP Server Port	Enter the SIP server's listening port number, if your VoIP service provider gave you one. Otherwise, keep the default value.
REGISTER Server Address	Enter the IP address or domain name of the SIP register server, if your VoIP service provider gave you one. Otherwise, enter the same address you entered in the <b>SIP Server Address</b> field. You can use up to 95 printable ASCII characters.
REGISTER Server Port	Enter the SIP register server's listening port number, if your VoIP service provider gave you one. Otherwise, enter the same port number you entered in the <b>SIP Server Port</b> field.
SIP Service Domain	Enter the SIP service domain name. In the full SIP URI, this is the part after the @ symbol. You can use up to 127 printable ASCII Extended set characters.
Send Caller ID	Select this if you want to send identification when you make VoIP phone calls. Clear this if you do not want to send identification.
Authentication	
User Name	Enter the user name for registering this SIP account, exactly as it was given to you. You can use up to 95 printable ASCII characters.
Password	Enter the user name for registering this SIP account, exactly as it was given to you. You can use up to 95 printable ASCII Extended set characters.
Show Advanced Setup	Click this to display the advanced settings for this SIP account in this screen for editing.
Apply ( 套用 )	Click to save your changes.
Reset ( 重設 )	Click to restore your previously saved settings.

## 10.2.1 Advanced SIP Settings

This section describes the features of the Advanced SIP settings screen.

### 10.2.1.1 STUN

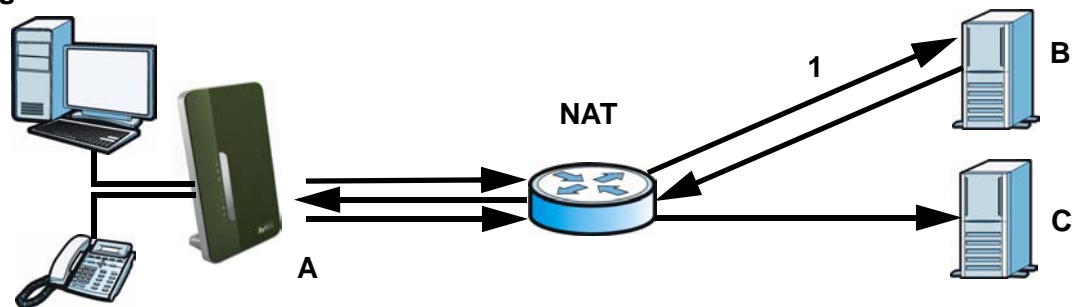
STUN (Simple Traversal of User Datagram Protocol (UDP) through Network Address Translators) allows the WiMAX Modem to find the presence and types of NAT routers and/or firewalls between it and the public Internet. STUN also allows the WiMAX Modem to find the public IP address that NAT assigned, so the WiMAX

Modem can embed it in the SIP data stream. STUN does not work with symmetric NAT routers or firewalls. See RFC 3489 for details on STUN.

The following figure shows how STUN works.

- 1 The WiMAX Modem (A) sends SIP packets to the STUN server (B).
- 2 The STUN server (B) finds the public IP address and port number that the NAT router used on the WiMAX Modem's SIP packets and sends them to the WiMAX Modem.
- 3 The WiMAX Modem uses the public IP address and port number in the SIP packets that it sends to the SIP server (C).

**Figure 45** STUN



### 10.2.1.2 Outbound Proxy

Your VoIP service provider may host a SIP outbound proxy server to handle all of the WiMAX Modem's VoIP traffic. This allows the WiMAX Modem to work with any type of NAT router and eliminates the need for STUN or a SIP ALG. Turn off a SIP ALG on a NAT router in front of the WiMAX Modem to keep it from re-translating the IP address (since this is already handled by the outbound proxy server).

### 10.2.1.3 Voice Coding

A codec (coder/decoder) codes analog voice signals into digital signals and decodes the digital signals back into voice signals. The WiMAX Modem supports the following codecs.

- **G.711** is a Pulse Code Modulation (PCM) waveform codec. PCM measures analog signal amplitudes at regular time intervals (sampling) and converts them into digital bits (quantization). Quantization "reads" the analog signal and then "writes" it to the nearest digital value. For this reason, a digital sample is usually slightly different from its analog original (this difference is known as "quantization noise"). G.711 provides excellent sound quality but requires 64kbps of bandwidth.



- **G.723** is an Adaptive Differential Pulse Code Modulation (ADPCM) waveform codec. Differential (or Delta) PCM is similar to PCM, but encodes the audio signal based on the difference between one sample and a prediction based on previous samples, rather than encoding the sample's actual quantized value. Many thousands of samples are taken each second, and the differences between consecutive samples are usually quite small, so this saves space and reduces the bandwidth necessary.

However, DPCM produces a high quality signal (high signal-to-noise ratio or SNR) for high difference signals (where the actual signal is very different from what was predicted) but a poor quality signal (low SNR) for low difference signals (where the actual signal is very similar to what was predicted). This is because the level of quantization noise is the same at all signal levels. Adaptive DPCM solves this problem by adapting the difference signal's level of quantization according to the audio signal's strength. A low difference signal is given a higher quantization level, increasing its signal-to-noise ratio. This provides a similar sound quality at all signal levels. G.723 provides high quality sound and requires 20 or 40 kbps.

- **G.729** is an Analysis-by-Synthesis (AbS) hybrid waveform codec. It uses a filter based on information about how the human vocal tract produces sounds. The codec analyzes the incoming voice signal and attempts to synthesize it using its list of voice elements. It tests the synthesized signal against the original and, if it is acceptable, transmits details of the voice elements it used to make the synthesis. Because the codec at the receiving end has the same list, it can exactly recreate the synthesized audio signal. G.729 provides good sound quality and reduces the required bandwidth to 8kbps.

#### 10.2.1.4 MWI (Message Waiting Indication)

Enable Message Waiting Indication (MWI) enables your phone to give you a message-waiting (beeping) dial tone when you have one or more voice messages. Your VoIP service provider must have a messaging system that sends message-waiting-status SIP packets as defined in RFC 3842.

### 10.2.1.5 Advanced SIP Settings Options

Click **Show Advanced Setup** in **VOICE > Service Configuration > SIP Settings** to set up and maintain advanced settings for each SIP account.

**Figure 46** VOICE > Service Configuration > SIP Settings > Show Advanced Setup

<p><b>SIP Server Settings</b></p> <p>URL Type: <input type="text" value="SIP"/> (dropdown)</p> <p>Expiration Duration: <input type="text" value="3600"/> (20-65535) sec</p> <p>Register Re-send timer: <input type="text" value="180"/> (1-65535) sec</p> <p>Session Expires: <input type="text" value="180"/> (30-3600) sec</p> <p>Min-SE: <input type="text" value="30"/> (20-1800) sec</p> <hr/> <p><b>RTP Port Range</b></p> <p>Start Port: <input type="text" value="4000"/> (1025-65535)</p> <p>End Port: <input type="text" value="65535"/> (1025-65535)</p> <hr/> <p><b>Voice Compression</b></p> <p>Primary Compression Type: <input type="text" value="G.711A"/> (dropdown)</p> <p>Secondary Compression Type: <input type="text" value="G.729"/> (dropdown)</p> <p>Third Compression Type: <input type="text" value="G.711u"/> (dropdown)</p> <p>DTMF Mode: <input type="text" value="RFC 2883"/> (dropdown)</p> <hr/> <p><b>STUN</b></p> <p><input type="checkbox"/> Active</p> <p>Server Address: <input type="text"/></p> <p>Server Port: <input type="text" value="3478"/> (1025-65535)</p> <hr/> <p><b>Use NAT</b></p> <p><input type="checkbox"/> Active</p> <p>Server Address: <input type="text"/></p> <p>Server Port: <input type="text" value="5060"/> (1025-65535)</p> <hr/> <p><b>Outbound Proxy</b></p> <p><input type="checkbox"/> Active</p> <p>Server Address: <input type="text"/></p> <p>Server Port: <input type="text" value="3478"/> (1025-65535)</p>	<p><b>NAT Keep Alive</b></p> <p><input type="checkbox"/> Active</p> <p><input type="radio"/> Keep Alive With SIP Proxy</p> <p><input type="radio"/> Keep Alive With Outbound Proxy</p> <p>Keep Alive Interval: <input type="text" value="120"/> (30-65535) sec</p> <hr/> <p><b>MWI (Message Waiting Indication)</b></p> <p><input type="checkbox"/> Enable</p> <p>Expiration Time: <input type="text" value="1800"/> (1-65535) sec</p> <hr/> <p><b>Fax Option</b></p> <p><input checked="" type="radio"/> G.711 Fax Passthrough</p> <p><input type="radio"/> T.38 Fax Relay</p> <hr/> <p><b>Call Forward</b></p> <p>Call Forward Table: <input type="text" value="Table1"/> (dropdown)</p> <hr/> <p><b>Caller Ringing</b></p> <p><input type="checkbox"/> Enable</p> <p>Caller Ringing Tone: <input type="text" value="Default"/> (dropdown)</p> <hr/> <p><b>On Hold</b></p> <p><input type="checkbox"/> Enable</p> <p>On Hold Tone: <input type="text" value="Default"/> (dropdown)</p> <p><input type="button" value="Hide Advanced Setup"/></p>
---	--

The following table describes the labels in this screen.

**Table 39** VOICE > Service Configuration > SIP Settings > Show Advanced Setup

LABEL	DESCRIPTION
SIP Server Settings	
URL Type	Select whether or not to include the SIP service domain name when the WiMAX Modem sends the SIP number. <ul style="list-style-type: none"> <li>• <b>SIP</b> - include the SIP service domain name</li> <li>• <b>TEL</b> - do not include the SIP service domain name</li> </ul>

**Table 39** VOICE > Service Configuration > SIP Settings > Show Advanced Setup

LABEL	DESCRIPTION
Expiration Duration	Enter the number of seconds your SIP account is registered with the SIP register server before it is deleted. The WiMAX Modem automatically tries to re-register your SIP account when one-half of this time has passed. (The SIP register server might have a different expiration.)
Register Re-send timer	Enter the number of seconds the WiMAX Modem waits before it tries again to register the SIP account, if the first try failed or if there is no response.
Session Expires	Enter the number of seconds the conversation can last before the call is automatically disconnected. Usually, when one-half of this time has passed, the WiMAX Modem or the other party updates this timer to prevent this from happening.
Min-SE	Enter the minimum number of seconds the WiMAX Modem accepts for a session expiration time when it receives a request to start a SIP session. If the request has a shorter time, the WiMAX Modem rejects it.
RTP Port Range	
Start Port End Port	<p>Enter the listening port number(s) for RTP traffic, if your VoIP service provider gave you this information. Otherwise, keep the default values.</p> <p>To enter one port number, enter the port number in the <b>Start Port</b> and <b>End Port</b> fields.</p> <p>To enter a range of ports:</p> <ul style="list-style-type: none"> <li>Type the port number at the beginning of the range in the <b>Start Port</b> field</li> <li>Type the port number at the end of the range in the <b>End Port</b> field.</li> </ul>
Voice Compression	
Primary, Secondary, and Third Compression	<p>Select the type of voice coder/decoder (codec) that you want the WiMAX Modem to use.</p> <p>G.711 provides high voice quality but requires more bandwidth (64 kbps).</p> <ul style="list-style-type: none"> <li><b>G.711A</b> is typically used in Europe.</li> <li><b>G.711u</b> is typically used in North America and Japan.</li> <li><b>G.723</b> provides good voice quality, and requires 20 or 40 kbps.</li> <li><b>G.729</b> requires only 8 kbps.</li> </ul> <p>The WiMAX Modem must use the same codec as the peer. When two SIP devices start a SIP session, they must agree on a codec.</p> <p>For more on voice compression, see <a href="#">Voice Coding on page 113</a></p>
DTMF Mode	<p>Control how the WiMAX Modem handles the tones that your telephone makes when you push its buttons. You should use the same mode your VoIP service provider uses.</p> <ul style="list-style-type: none"> <li><b>RFC 2833</b> - send the DTMF tones in RTP packets</li> <li><b>PCM</b> - send the DTMF tones in the voice data stream. This method works best when you are using a codec that does not use compression (like G.711). Codecs that use compression (like G.729) can distort the tones.</li> <li><b>SIP INFO</b> - send the DTMF tones in SIP messages</li> </ul>

**Table 39** VOICE > Service Configuration > SIP Settings > Show Advanced Setup

LABEL	DESCRIPTION
STUN	
Active	Select this if all of the following conditions are satisfied. <ul style="list-style-type: none"> <li>• There is a NAT router between the WiMAX Modem and the SIP server.</li> <li>• The NAT router is not a SIP ALG.</li> <li>• Your VoIP service provider gave you an IP address or domain name for a STUN server.</li> <li>• Otherwise, clear this field.</li> </ul>
Server Address	Enter the IP address or domain name of the STUN server provided by your VoIP service provider.
Server Port	Enter the STUN server's listening port, if your VoIP service provider gave you one. Otherwise, keep the default value.
Use NAT	
Active	Select this if you want the WiMAX Modem to send SIP traffic to a specific NAT router. You must also configure the NAT router to forward traffic with the specified port to the WiMAX Modem. This eliminates the need for STUN or a SIP ALG.
Server Address	Enter the public IP address or domain name of the NAT router.
Server Port	Enter the port number that your SIP sessions use with the public IP address of the NAT router.
Outbound Proxy	
Active	Select this if your VoIP service provider has a SIP outbound server to handle voice calls. This allows the WiMAX Modem to work with any type of NAT router and eliminates the need for STUN or a SIP ALG. Turn off any SIP ALG on a NAT router in front of the WiMAX Modem to keep it from re-translating the IP address (since this is already handled by the outbound proxy server).
Server Address	Enter the IP address or domain name of the SIP outbound proxy server.
Server Port	Enter the SIP outbound proxy server's listening port, if your VoIP service provider gave you one. Otherwise, keep the default value.
NAT Keep Alive	
Active	Select this to stop NAT routers between the WiMAX Modem and SIP server (a SIP proxy server or outbound proxy server) from dropping the SIP session. The WiMAX Modem does this by sending SIP notify messages to the SIP server based on the specified interval.
Keep Alive with SIP Proxy	Select this if the SIP server is a SIP proxy server.
Keep Alive with Outbound Proxy	Select this if the SIP server is an outbound proxy server. You must enable <b>Outbound Proxy</b> to use this.
Keep Alive Interval	Enter how often (in seconds) the WiMAX Modem should send SIP notify messages to the SIP server.
MWI (Message Waiting Indication)	
Enable	Select this if you want to hear a waiting (beeping) dial tone on your phone when you have at least one voice message. Your VoIP service provider must support this feature.

**Table 39** VOICE > Service Configuration > SIP Settings > Show Advanced Setup

LABEL	DESCRIPTION
Expiration Time	Keep the default value, unless your VoIP service provider tells you to change it. Enter the number of seconds the SIP server should provide the message waiting service each time the WiMAX Modem subscribes to the service. Before this time passes, the WiMAX Modem automatically subscribes again.
Fax Option	
G.711 Fax Passthrough	Select this if the WiMAX Modem should use G.711 to send fax messages. The peer devices must also use G.711.
T.38 Fax Relay	Select this if the WiMAX Modem should send fax messages as UDP or TCP/IP packets through IP networks. This provides better quality, but it may have inter-operability problems. The peer devices must also use T.38.
Call Forward	
Call Forward Table	Select which call forwarding table you want the WiMAX Modem to use for incoming calls. You set up these tables in <b>VOICE &gt; Phone Book &gt; Incoming Call Policy</b> .
Caller Ringing	
Enable	Check this box if you want people to hear a customized recording when they call you.
Caller Ringing Tone	Select the tone you want people to hear when they call you. See <a href="#">Custom Tones (IVR)</a> on <a href="#">page 118</a> for information on how to record these tones.
On Hold	
Enable	Check this box if you want people to hear a customized recording when you put them on hold.
On Hold Tone	Select the tone you want people to hear when you put them on hold. See <a href="#">Custom Tones (IVR)</a> on <a href="#">page 118</a> for information on how to record these tones.
Hide Advanced Setup	Click this to not display these advanced settings in this screen.

### 10.2.1.6 Custom Tones (IVR)

IVR (Interactive Voice Response) is a feature that allows you to use your telephone to interact with the WiMAX Modem. The WiMAX Modem allows you to record custom tones for the **Caller Ringing Tone** and **On Hold Tone** functions. The same recordings apply to both the caller ringing and on hold tones.

**Table 40** Custom Tones Details

LABEL	DESCRIPTION
Total Time for All Tones	128 seconds for all custom tones combined
Maximum Time per Individual Tone	20 seconds
Total Number of Tones Recordable	8 You can record up to eight different custom tones but the total time must be 128 seconds or less.

Use the following steps if you would like to create new tones or change your tones:

- 1 Pick up the phone and press \*\*\*\* on your phone's keypad and wait for the message that says you are in the configuration menu.
- 2 Press a number from 1101~1108 on your phone followed by the # key.
- 3 Play your desired music or voice recording into the receiver's mouthpiece. Press the # key.
- 4 You can continue to add, listen to, or delete tones, or you can hang up the receiver when you are done.

Do the following to listen to a custom tone:

- 1 Pick up the phone and press \*\*\*\* on your phone's keypad and wait for the message that says you are in the configuration menu.
- 2 Press a number from 1201~1208 followed by the # key to listen to the tone.
- 3 You can continue to add, listen to, or delete tones, or you can hang up the receiver when you are done.

Do the following to delete a custom tone:

- 1 Pick up the phone and press \*\*\*\* on your phone's keypad and wait for the message that says you are in the configuration menu.
- 2 Press a number from 1301~1308 followed by the # key to delete the tone of your choice. Press 14 followed by the # key if you wish to clear all your custom tones.
- 3 You can continue to add, listen to, or delete tones, or you can hang up the receiver when you are done.

## 10.3 QoS

Network traffic can be classified by setting the ToS (Type Of Service) values at the data source (for example, at the WiMAX Modem) so a server can decide the best method of delivery, that is the least cost, fastest route and so on.

Virtual Local Area Network (VLAN) allows a physical network to be partitioned into multiple logical networks. Only stations within the same group can communicate with each other.

Your WiMAX Modem can add IEEE 802.1Q VLAN ID tags to voice frames that it sends to the network. This allows the WiMAX Modem to communicate with a SIP server that is a member of the same VLAN group. Some ISPs use the VLAN tag to identify voice traffic and give it priority over other traffic.

Click **VOICE > Service Configuration > QoS** to set up and maintain ToS and VLAN settings for the WiMAX Modem. QoS (Quality of Service) refers to both a network's ability to deliver data with minimum delay and the networking methods used to provide bandwidth for real-time multimedia applications.

**Figure 47** VOICE > Service Configuration > QoS

The following table describes the labels in this screen.

**Table 41** VOICE > Service Configuration > QoS

LABEL	DESCRIPTION
TDS	
SIP TOS Priority Setting	Enter the priority for SIP voice transmissions. The WiMAX Modem creates Type of Service priority tags with this priority to voice traffic that it transmits.
RTP TOS Priority Setting	Enter the priority for RTP voice transmissions. The WiMAX Modem creates Type of Service priority tags with this priority to RTP traffic that it transmits.
VLAN Tagging	
Voice VLAN ID	Select this if the WiMAX Modem has to be a member of a VLAN to communicate with the SIP server. Ask your network administrator, if you are not sure. Enter the VLAN ID provided by your network administrator in the field on the right. Your LAN and gateway must be configured to use VLAN tags.  Otherwise, clear this field.
Apply ( 套用 )	Click to save your changes.
Reset ( 重設 )	Click to restore your previously saved settings.

## 10.4 Technical Reference

The following section contains additional technical information about the WiMAX Modem features described in this chapter.

### 10.4.1 SIP Call Progression

The following figure displays the basic steps in the setup and tear down of a SIP call. A calls B.

**Table 42** SIP Call Progression

A		B
1. INVITE		
		2. Ringing
		3. OK
4. ACK		
	5. Dialogue (voice traffic)	
6. BYE		
		7. OK

- 1 A sends a SIP INVITE request to B. This message is an invitation for B to participate in a SIP telephone call.
- 2 B sends a response indicating that the telephone is ringing.
- 3 B sends an OK response after the call is answered.
- 4 A then sends an ACK message to acknowledge that B has answered the call.
- 5 Now A and B exchange voice media (talk).
- 6 After talking, A hangs up and sends a BYE request.
- 7 B replies with an OK response confirming receipt of the BYE request and the call is terminated.



## 10.4.2 SIP Client Server

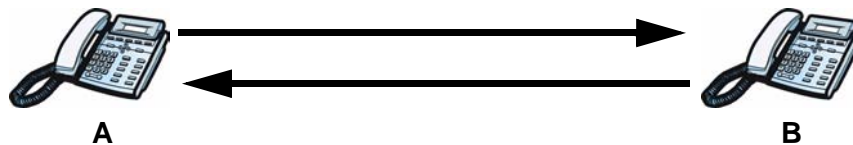
SIP is a client-server protocol. A SIP client is an application program or device that sends SIP requests. A SIP server responds to the SIP requests.

When you use SIP to make a VoIP call, it originates at a client and terminates at a server. A SIP client could be a computer or a SIP phone. One device can act as both a SIP client and a SIP server.

## 10.4.3 SIP User Agent

A SIP user agent can make and receive VoIP telephone calls. This means that SIP can be used for peer-to-peer communications even though it is a client-server protocol. In the following figure, either A or B can act as a SIP user agent client to initiate a call. A and B can also both act as a SIP user agent to receive the call.

**Figure 48** SIP User Agent



## 10.4.4 SIP Proxy Server

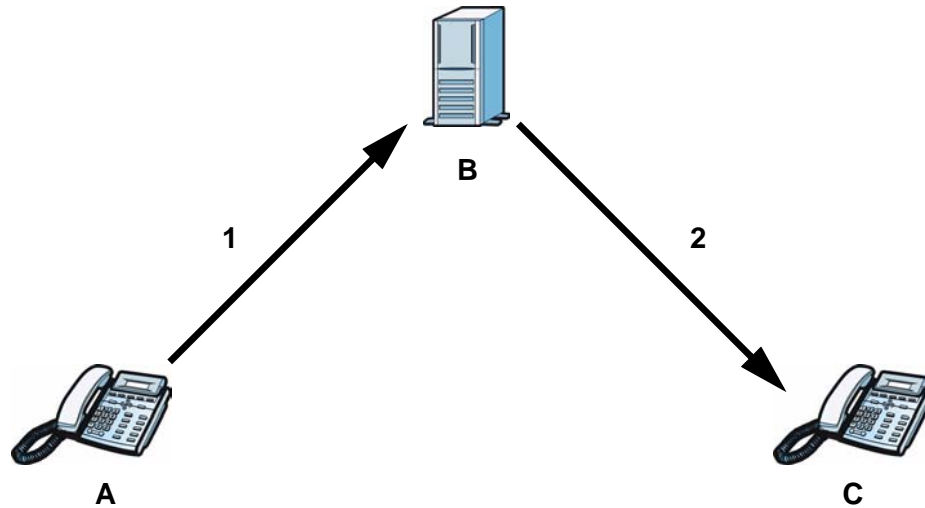
A SIP proxy server receives requests from clients and forwards them to another server.

In the following example, you want to use client device A to call someone who is using client device C.

- 1 The client device (A in the figure) sends a call invitation to the SIP proxy server (B).

- 2 The SIP proxy server forwards the call invitation to C.

**Figure 49** SIP Proxy Server



### 10.4.5 SIP Redirect Server

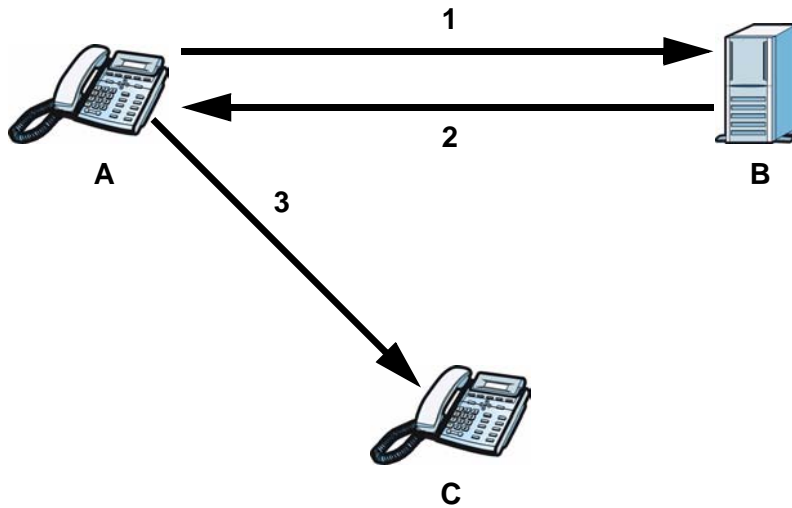
A SIP redirect server accepts SIP requests, translates the destination address to an IP address and sends the translated IP address back to the device that sent the request. Then the client device that originally sent the request can send requests to the IP address that it received back from the redirect server. Redirect servers do not initiate SIP requests.

In the following example, you want to use client device A to call someone who is using client device C.

- 1 Client device A sends a call invitation for C to the SIP redirect server (B).
- 2 The SIP redirect server sends the invitation back to A with C's IP address (or domain name).

- 3 Client device A then sends the call invitation to client device C.

**Figure 50** SIP Redirect Server



## 10.4.6 NAT and SIP

The WiMAX Modem must register its public IP address with a SIP register server. If there is a NAT router between the WiMAX Modem and the SIP register server, the WiMAX Modem probably has a private IP address. The WiMAX Modem lists its IP address in the SIP message that it sends to the SIP register server. NAT does not translate this IP address in the SIP message. The SIP register server gets the WiMAX Modem's IP address from inside the SIP message and maps it to your SIP identity. If the WiMAX Modem has a private IP address listed in the SIP message, the SIP server cannot map it to your SIP identity. See [Chapter 8 The NAT Configuration Screens](#) for more information.

Use a SIP ALG (Application Layer Gateway), Use NAT, STUN, or outbound proxy to allow the WiMAX Modem to list its public IP address in the SIP messages.

## 10.4.7 DiffServ

DiffServ is a class of service (CoS) model that marks packets so that they receive specific per-hop treatment at DiffServ-compliant network devices along the route based on the application types and traffic flow. Packets are marked with DiffServ Code Points (DSCPs) indicating the level of service desired. This allows the intermediary DiffServ-compliant network devices to handle the packets differently depending on the code points without the need to negotiate paths or remember state information for every flow. In addition, applications do not have to request a particular service or give advanced notice of where the traffic is going.

## 10.4.8 DSCP and Per-Hop Behavior

DiffServ defines a new DS (Differentiated Services) field to replace the Type of Service (TOS) field in the IP header. The DS field contains a 2-bit unused field and a 6-bit DSCP field which can define up to 64 service levels. The following figure illustrates the DS field.

**Figure 51** DiffServ: Differentiated Service Field

DSCP (6-bit)	Unused (2-bit)
-----------------	-------------------

DSCP is backward compatible with the three precedence bits in the ToS octet so that non-DiffServ compliant, ToS-enabled network device will not conflict with the DSCP mapping.

The DSCP value determines the forwarding behavior, the PHB (Per-Hop Behavior), that each packet gets across the DiffServ network. Based on the marking rule, different kinds of traffic can be marked for different priorities of forwarding. Resources can then be allocated according to the DSCP values and the configured policies.



# The Phone Screens

## 11.1 Overview

Use the **VOICE > Phone** screens to configure the volume, echo cancellation, VAD settings and custom tones for the phone port on the WiMAX Modem. You can also select which SIP account to use for making outgoing calls.

### 11.1.1 What You Can Do in This Chapter

- The **Analog Phone** screen ([Section 11.2 on page 128](#)) lets you control which SIP accounts each phone uses.
- The **Common** screen ([Section 11.3 on page 130](#)) lets you activate and deactivate immediate dialing.
- The **Region** screen ([Section 11.4 on page 131](#)) lets you maintain settings that often depend on the region of the world in which the WiMAX Modem is located.

### 11.1.2 What You Need to Know

The following terms and concepts may help as you read through this chapter.

#### **Voice Activity Detection/Silence Suppression/Comfort Noise**

Voice Activity Detection (VAD) detects whether or not speech is present. This lets the WiMAX Modem reduce the bandwidth that a call uses by not transmitting “silent packets” when you are not speaking.

When using VAD, the WiMAX Modem generates comfort noise when the other party is not speaking. The comfort noise lets you know that the line is still connected as total silence could easily be mistaken for a lost connection.

#### **Echo Cancellation**

G.168 is an ITU-T standard for eliminating the echo caused by the sound of your voice reverberating in the telephone receiver while you talk.

## Supplementary Phone Services Overview

Supplementary services such as call hold, call waiting, call transfer, etc. are generally available from your VoIP service provider. The WiMAX Modem supports the following services:

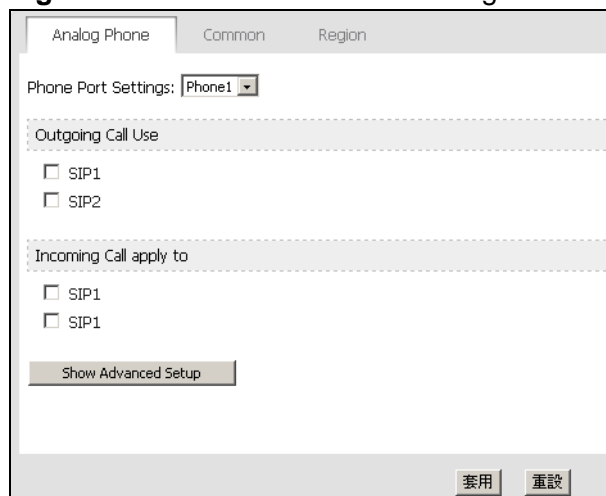
- Call Hold
- Call Waiting
- Making a Second Call
- Call Transfer
- Call Forwarding
- Three-Way Conference
- Internal Calls
- Caller ID
- CLIP (Calling Line Identification Presentation)
- CLIR (Calling Line Identification Restriction)

Note: To take full advantage of the supplementary phone services available through the WiMAX Modem's phone port, you may need to subscribe to the services from your VoIP service provider.

## 11.2 Analog Phone

Click **VOICE > Phone > Analog Phone** to control which SIP accounts each phone uses.

**Figure 52** VOICE > Phone > Analog Phone



The screenshot shows a web interface for configuring an analog phone. At the top, there are three tabs: "Analog Phone" (selected), "Common", and "Region". Below the tabs, the "Phone Port Settings" section shows a dropdown menu with "Phone1" selected. The "Outgoing Call Use" section has two checkboxes: "SIP1" and "SIP2", both of which are unchecked. The "Incoming Call apply to" section has two checkboxes: "SIP1" and "SIP1", both of which are unchecked. A "Show Advanced Setup" button is located below these sections. At the bottom right of the page, there are two buttons: "套用" (Apply) and "重設" (Reset).

The following table describes the labels in this screen.

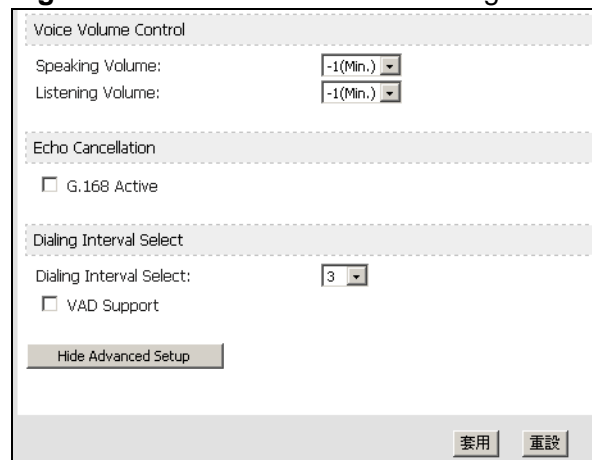
**Table 43** VOICE > Phone > Analog Phone

LABEL	DESCRIPTION
Phone Port Settings	Select the number of a phone port for the configuration in this screen.
Outgoing Call Use	
SIP1	Select this if you want this phone port to use the SIP1 account when it makes calls. If you select both SIP accounts, the WiMAX Modem tries to use SIP2 first.
SIP2	Select this if you want this phone port to use the SIP2 account when it makes calls. If you select both SIP accounts, the WiMAX Modem tries to use SIP2 first.
Incoming Call apply to	
SIP1	Select this if you want to receive phone calls for the SIP1 account on this phone port. If you select more than one source for incoming calls, there is no way to distinguish between them when you receive phone calls.
SIP2	Select this if you want to receive phone calls for the SIP2 account on this phone port. If you select more than one source for incoming calls, there is no way to distinguish between them when you receive phone calls.
Show Advanced Setup	Click this to edit the advanced settings for this phone port. The advanced settings appear.
Apply	Click to save your changes.
Reset	Click to restore your previously saved settings.

## 11.2.1 Advanced Analog Phone Setup

Click the **Show Advanced Setup** button in **VOICE > Phone > Analog Phone** to edit advanced settings for the selected phone port.

**Figure 53** VOICE > Phone > Analog Phone > Show Advanced Setup



Voice Volume Control

Speaking Volume: -1(Min.)

Listening Volume: -1(Min.)

Echo Cancellation

G.168 Active

Dialing Interval Select

Dialing Interval Select: 3

VAD Support

Hide Advanced Setup

套用 重設



The following table describes the labels in this screen.

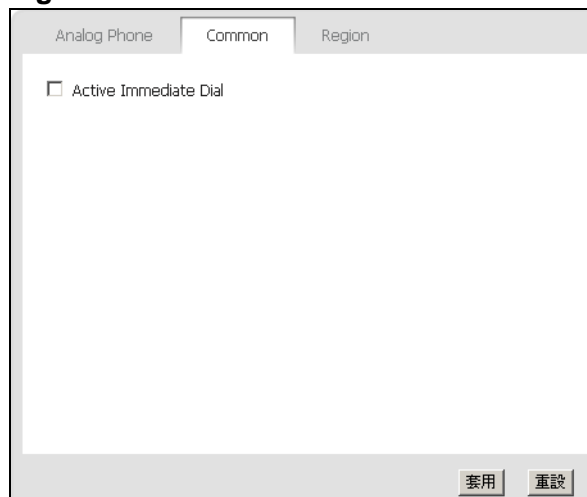
**Table 44** VOICE > Phone > Analog Phone > Show Advanced Setup

LABEL	DESCRIPTION
Voice Volume Control	
Speaking Volume	Enter the loudness that the WiMAX Modem uses for speech that it sends to the peer device. -1 is the quietest, and 1 is the loudest.
Listening Volume	Enter the loudness that the WiMAX Modem uses for speech that it receives from the peer device. -1 is the quietest, and 1 is the loudest.
Echo Cancellation	
G.168 Active	Select this if you want to eliminate the echo caused by the sound of your voice reverberating in the telephone receiver while you talk.
Dialing Interval Select	
Dialing Interval Select	Enter the number of seconds the WiMAX Modem should wait after you stop dialing numbers before it makes the phone call. The value depends on how quickly you dial phone numbers.  If you select <b>Active Immediate Dial</b> in <b>VOICE &gt; Phone &gt; Common</b> , you can press the pound key (#) to tell the WiMAX Modem to make the phone call immediately, regardless of this setting.
VAD Support	Select this if the WiMAX Modem should stop transmitting when you are not speaking. This reduces the bandwidth the WiMAX Modem uses.
Hide Advanced Setup	Click this to not display these advanced settings in this screen.
Apply	Click to save your changes.
Reset	Click to restore your previously saved settings.

## 11.3 Common

Click **VOICE > Phone > Common** to activate and deactivate immediate dialing.

**Figure 54** VOICE > Phone > Common



The following table describes the labels in this screen.


**Table 45** VOICE > Phone > Common

LABEL	DESCRIPTION
Active Immediate Dial	Select this if you want to use the pound key (#) to tell the WiMAX Modem to make the phone call immediately, instead of waiting the number of seconds you selected in the <b>Dialing Interval Select</b> in <b>VOICE &gt; Phone &gt; Analog Phone</b> .  If you select this, dial the phone number, and then press the pound key if you do not want to wait. The WiMAX Modem makes the call immediately.
Apply ( 套用 )	Click to save your changes.
Reset ( 重設 )	Click to restore your previously saved settings.

## 11.4 Region

Click **VOICE > Phone > Region** to maintain settings that often depend on the region of the world in which the WiMAX Modem is located.

**Figure 55** VOICE > Phone > Region



The screenshot shows a settings window with three tabs: 'Analog Phone', 'Common', and 'Region'. The 'Region' tab is active. It contains two dropdown menus: 'Region Settings' is set to 'United States' and 'Call Service Mode' is set to 'USA Type'. At the bottom right, there are two buttons: '套用' (Apply) and '重設' (Reset).

The following table describes the labels in this screen.

**Table 46** VOICE > Phone > Region

LABEL	DESCRIPTION
Region Settings	Select the place in which the WiMAX Modem is located. Do not select <b>Default</b> .
Call Service Mode	Select the mode for supplementary phone services (call hold, call waiting, call transfer and three-way conference calls) that your VoIP service provider supports. <ul style="list-style-type: none"><li>• <b>Europe Type</b> - use supplementary phone services in European mode</li><li>• <b>USA Type</b> - use supplementary phone services American mode</li></ul> You might have to subscribe to these services to use them. Contact your VoIP service provider.
Apply ( 套用 )	Click to save your changes.
Reset ( 重設 )	Click to restore your previously saved settings.

## 11.5 Technical Reference

The following section contains additional technical information about the WiMAX Modem features described in this chapter.

### 11.5.1 The Flash Key

Flashing means to press the hook for a short period of time (a few hundred milliseconds) before releasing it. On newer telephones, there should be a "flash" key (button) that generates the signal electronically. If the flash key is not available, you can tap (press and immediately release) the hook by hand to achieve the same effect. However, using the flash key is preferred since the timing is much more precise. The WiMAX Modem may interpret manual tapping as hanging up if the duration is too long

You can invoke all the supplementary services by using the flash key.

## 11.5.2 Europe Type Supplementary Phone Services

This section describes how to use supplementary phone services with the **Europe Type Call Service Mode**. Commands for supplementary services are listed in the table below.

After pressing the flash key, if you do not issue the sub-command before the default sub-command timeout (2 seconds) expires or issue an invalid sub-command, the current operation will be aborted.

**Table 47** European Type Flash Key Commands

COMMAND	SUB-COMMAND	DESCRIPTION
Flash		Put a current call on hold to place a second call. Switch back to the call (if there is no second call).
Flash	0	Drop the call presently on hold or reject an incoming call which is waiting for answer.
Flash	1	Disconnect the current phone connection and answer the incoming call or resume with caller presently on hold.
Flash	2	1. Switch back and forth between two calls. 2. Put a current call on hold to answer an incoming call. 3. Separate the current three-way conference call into two individual calls (one is on-line, the other is on hold).
Flash	3	Create three-way conference connection.
Flash	*98#	Transfer the call to another phone.

European Call Hold allows you to put a call (A) on hold by pressing the flash key.

If you have another call, press the flash key and then "2" to switch back and forth between caller **A** and **B** by putting either one on hold.

Press the flash key and then "0" to disconnect the call presently on hold and keep the current call on line.

Press the flash key and then "1" to disconnect the current call and resume the call on hold.

If you hang up the phone but a caller is still on hold, there will be a remind ring.

European Call Waiting allows you to place a call on hold while you answer another incoming call on the same telephone (directory) number.

If there is a second call to a telephone number, you will hear a call waiting tone. Take one of the following actions.

- Reject the second call.  
Press the flash key and then press "0".
- Disconnect the first call and answer the second call.  
Either press the flash key and press "1", or just hang up the phone and then answer the phone after it rings.
- Put the first call on hold and answer the second call.  
Press the flash key and then "2".

European Call Transfer allows you to transfer an incoming call (that you have answered) to another phone. To do so:

- 1 Press the flash key to put the caller on hold.
- 2 When you hear the dial tone, dial "\*98#" followed by the number to which you want to transfer the call. to operate the Intercom.
- 3 After you hear the ring signal or the second party answers it, hang up the phone.

European Three-Way Conference allows you to make three-way conference calls. To do so:

- 1 When you are on the phone talking to someone, place the flash key to put the caller on hold and get a dial tone.
- 2 Dial a phone number directly to make another call.
- 3 When the second call is answered, press the flash key and press "3" to create a three-way conversation.
- 4 Hang up the phone to drop the connection.
- 5 If you want to separate the activated three-way conference into two individual connections (one is on-line, the other is on hold), press the flash key and press "2".

### 11.5.3 USA Type Supplementary Services

This section describes how to use supplementary phone services with the **USA Type Call Service Mode**. Commands for supplementary services are listed in the table below.

After pressing the flash key, if you do not issue the sub-command before the default sub-command timeout (2 seconds) expires or issue an invalid sub-command, the current operation will be aborted.

**Table 48** USA Type Flash Key Commands

COMMAND	SUB-COMMAND	DESCRIPTION
Flash		Put a current call on hold to place a second call. After the second call is successful, press the flash key again to have a three-way conference call. Put a current call on hold to answer an incoming call.
Flash	*98#	Transfer the call to another phone.

**USA Call Hold** allows you to put a call (**A**) on hold by pressing the flash key.

If you have another call, press the flash key to switch back and forth between caller **A** and **B** by putting either one on hold.

If you hang up the phone but a caller is still on hold, there will be a remind ring.

**USA Call Waiting** allows you to place a call on hold while you answer another incoming call on the same telephone (directory) number.

If there is a second call to your telephone number, you will hear a call waiting tone.

Press the flash key to put the first call on hold and answer the second call.

**USA Call Transfer** allows you to transfer an incoming call (that you have answered) to another phone. To do so:

- 1 Press the flash key to put the caller on hold.
- 2 When you hear the dial tone, dial `**98#` followed by the number to which you want to transfer the call. to operate the Intercom.
- 3 After you hear the ring signal or the second party answers it, hang up the phone.

**USA Three-Way Conference** allows you to make three-way conference calls. To do so:

- 1 When you are making a call, press the flash key to put the call on hold and get a dial tone.
- 2 Dial a phone number to make a second call.

- 3 When the second call is answered, press the flash key to create a three-way conversation.
- 4 If you want to separate the three-way conference into two individual calls (one call is online, the other is on hold), press the flash key. The first call is online and the second call is on hold. Pressing the flash key again will recreate the three-way conversation. The next time you press the flash key, the second call is online and the first call is on hold.
- 5 Hang up the phone to drop the connection.

# The Phone Book Screens

## 12.1 Overview

The **VOICE > Phone Book** screens allow you to configure the WiMAX Modem's phone book for making VoIP calls.

### 12.1.1 What You Can Do in This Chapter

- The **Incoming Call Policy** screen ([Section 12.2 on page 138](#)) lets you maintain rules for handling incoming calls. You can block, redirect, or accept them.
- The **Speed Dial** screen ([Section 12.3 on page 140](#)) lets you add, edit, or remove speed-dial entries.

### 12.1.2 What You Need to Know

The following terms and concepts may help as you read through this chapter.

#### **Speed Dial and Peer-to-Peer Calling**

Speed dial provides shortcuts for dialing frequently used (VoIP) phone numbers. It is also required if you want to make peer-to-peer calls.

In peer-to-peer calls, you call another VoIP device directly without going through a SIP server. In the WiMAX Modem, you must set up a speed dial entry in the phone book in order to do this. Select **Non-Proxy (Use IP or URL)** in the **Type** column and enter the callee's IP address or domain name. The WiMAX Modem sends SIP INVITE requests to the peer VoIP device when you use the speed dial entry.

You do not need to configure a SIP account in order to make a peer-to-peer VoIP call.



## 12.2 Incoming Call Policy

Click **VOICE > Phone Book > Incoming Call Policy** to maintain rules for handling incoming calls. You can block, redirect, or accept them.

**Figure 56** VOICE > Phone Book > Incoming Call Policy

The following table describes the labels in this screen.

**Table 49** VOICE > Phone Book > Incoming Call Policy

LABEL	DESCRIPTION
Table Number	Select the call-forwarding table you want to see in this screen. If you change this field, the screen automatically refreshes.
Forward to Number Setup	
Unconditional Forward to Number	Select this if you want the WiMAX Modem to forward all incoming calls to the specified phone number, regardless of other rules in the <b>Forward to Number</b> section. Specify the phone number in the field on the right.
Busy Forward to Number	Select this if you want the WiMAX Modem to forward incoming calls to the specified phone number if the phone port is busy. Specify the phone number in the field on the right. If you have call waiting, the incoming call is forwarded to the specified phone number if you reject or ignore the second incoming call.
No Answer Forward to Number	Select this if you want the WiMAX Modem to forward incoming calls to the specified phone number if the call is unanswered. (See <b>No Answer Waiting Time</b> .) Specify the phone number in the field on the right.
No Answer Waiting Time	This field is used by the <b>No Answer Forward to Number</b> feature and <b>No Answer</b> conditions below.  Enter the number of seconds the WiMAX Modem should wait for you to answer an incoming call before it considers the call is unanswered.
Advanced Setup	

**Table 49** VOICE > Phone Book > Incoming Call Policy

LABEL	DESCRIPTION
#	The number of the item in this list.
Activate	Select this to enable this rule. Clear this to disable this rule.
Incoming Call Number	Enter the phone number to which this rule applies.
Forward to Number	Enter the phone number to which you want to forward incoming calls from the <b>Incoming Call Number</b> . You may leave this field blank, depending on the <b>Condition</b> .
Condition	<p>Select the situations in which you want to forward incoming calls from the <b>Incoming Call Number</b>, or select an alternative action.</p> <ul style="list-style-type: none"> <li>• <b>Unconditional</b> - The WiMAX Modem immediately forwards any calls from the <b>Incoming Call Number</b> to the <b>Forward to Number</b>.</li> <li>• <b>Busy</b> - The WiMAX Modem forwards any calls from the <b>Incoming Call Number</b> to the <b>Forward to Number</b> when your SIP account already has a call connected.</li> <li>• <b>No Answer</b> - The WiMAX Modem forwards any calls from the <b>Incoming Call Number</b> to the <b>Forward to Number</b> when the call is unanswered. (See <b>No Answer Waiting Time</b>.)</li> <li>• <b>Block</b> - The WiMAX Modem rejects calls from the <b>Incoming Call Number</b>.</li> <li>• <b>Accept</b> - The WiMAX Modem allows calls from the <b>Incoming Call Number</b>. You might create a rule with this condition if you do not want incoming calls from someone to be forwarded by rules in the <b>Forward to Number</b> section.</li> </ul>
Apply	Click to save your changes.
Reset	Click to restore your previously saved settings.

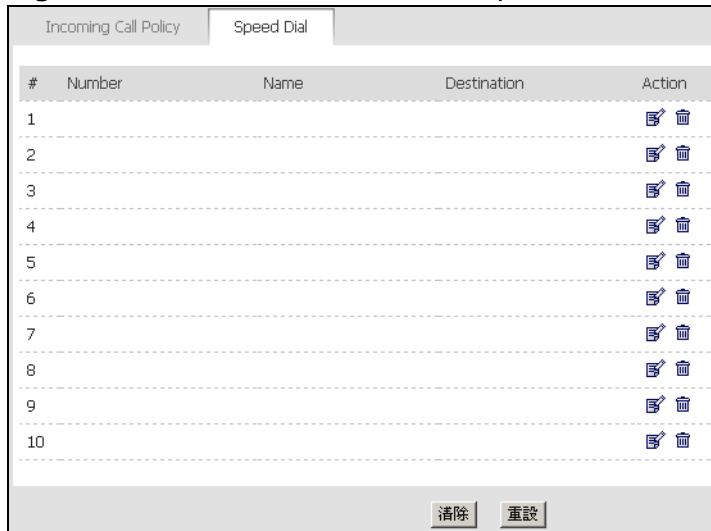
Note: The WiMAX Modem checks the Advanced rules first before checking the Forward to Number rules. All rules are checked in order from top to bottom.

## 12.3 Speed Dial

Click **VOICE > Phone Book > Speed Dial** to add, edit, or remove speed-dial entries.



You must create speed-dial entries if you want to make peer-to-peer calls or call SIP numbers that use letters. You can also create speed-dial entries for frequently-used SIP phone numbers.

**Figure 57** VOICE > Phone Book > Speed Dial



The following table describes the icons in this screen.

**Table 50** VOICE > Phone Book > Speed Dial

ICON	DESCRIPTION
	Edit Click to edit this item.
	Delete Click to delete this item.

The following table describes the labels in this screen.

**Table 51** VOICE > Phone Book > Speed Dial

LABEL	DESCRIPTION
#	This is a list of speed dial numbers.
Number	This is the SIP number the WiMAX Modem calls when you use this speed dial number.
Name	This is the name of the party associated with this speed-dial number.
Destination	This indicates if the speed-dial entry uses one of your SIP accounts or uses the IP address or domain name of the SIP server.
Action	Click the <b>Delete</b> icon to erase this speed-dial entry.

**Table 51** VOICE > Phone Book > Speed Dial

LABEL	DESCRIPTION
Clear (清除)	Click to clear all fields on the screen and begin anew.
Reset (重設)	Click to restore your previously saved settings.

## 12.3.1 Speed Dial Setup

Click the **Edit** icon of an entry in the **VOICE > Phone Book > Speed Dial** screen to open the following screen. Use this screen to configure a speed dial entry.

**Figure 58** VOICE > Phone Book > Speed Dial > Edit

The following table describes the labels in this screen.

**Table 52** VOICE > Phone Book > Speed Dial > Edit

LABEL	DESCRIPTION
Speed Dial	Select the speed-dial number you want to use for this phone number.
Number	Enter the SIP number you want the WiMAX Modem to call when you dial the speed-dial number.
Name	Enter a name to identify the party you call when you dial the speed-dial number. You can use up to 127 printable ASCII characters.
Type	Select <b>Use Proxy</b> if you want to use one of your SIP accounts to call this phone number.  Select <b>Non-Proxy (Use IP or URL)</b> if you want to use a different SIP server or if you want to make a peer-to-peer call. In this case, enter the IP address or domain name of the SIP server or the other party in the field below.
Apply (套用)	Click to save your changes.
Cancel (取消)	Click to return to the previous screen without saving your changes.



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# PART V

## Tools & Status Screens

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The Certificates Screens (145)

The Remote Management Screens (149)

The Password Setup Screen (161)

The Status Screen (163)



# The Certificates Screens

## 13.1 Overview

Use the **TOOLS (工具) > Certificates (憑證)** screens to import public key certificates on the WiMAX Modem.

The WiMAX Modem can use public key certificates (also sometimes called “digital IDs”) to authenticate users. Certificates are based on public-private key pairs. A certificate contains the certificate owner’s identity and public key. Certificates provide a way to exchange public keys for use in authentication.

Public key certificates are used by web browsers to ensure that a secure web site is legitimate. When a certificate authority such as VeriSign, Comodo, or Network Solutions (to name a few) receives a certificate request from a website operator, they confirm that the web domain and contact information in the request match those on public record with a domain name registrar. If they match, then the certificate is issued to the website operator, who then places it on his site to be issued to all visiting web browsers to let them know that the site is legitimate.

### 13.1.1 What You Can Do in This Chapter

- The **My Certificates** screen ([Section 13.2 on page 146](#)) lets you import the WiMAX Modem’s CA-signed certificates.
- The **Trusted CAs** screen ([Section 13.3 on page 146](#)) lets you import trusted CA-signed certificates.

### 13.1.2 What You Need to Know

The following terms and concepts may help as you read through this chapter.

#### **Certificate Authorities**

A Certification Authority (CA) issues certificates and guarantees the identity of each certificate owner. There are commercial certification authorities like CyberTrust or VeriSign and government certification authorities.



## 13.2 My Certificates

Click **TOOLS (工具) > Certificates (憑證) > My Certificates** to import a certificate that matches a corresponding certification request that was generated by the WiMAX Modem. You must remove any spaces from the certificate's filename before you can import it.

**Figure 59** TOOLS (工具) > Certificates (憑證) > My Certificates

The following table describes the labels in this screen.

**Table 53** TOOLS (工具) > Certificates (憑證) > My Certificates

LABEL	DESCRIPTION
File Path (檔案路徑)	Type in the location of the file you want to upload in this field or click <b>Browse</b> to find it.  You cannot import a certificate with the same name as a certificate that is already in the WiMAX Modem.
Browse	Click to find the certificate file you want to upload.
Apply (套用)	Click to save your changes.
Cancel (取消)	Click to return to the previous screen without saving your changes.

## 13.3 Trusted CAs

Click **TOOLS (工具) > Certificates (憑證) > Trusted CAs** to open the following screen. Follow the instructions in this screen to save a trusted certification authority's certificate from a computer to the WiMAX Modem. The WiMAX Modem trusts any valid certificate signed by any of the imported trusted CA certificates.

Note: You must remove any spaces from the certificate's filename before you can import the certificate.

**Figure 60** TOOLS ( 工具 ) > Certificates ( 憑證 ) > Trusted CAs

The following table describes the labels in this screen.

**Table 54** TOOLS ( 工具 ) > Certificates ( 憑證 ) > Trusted CAs Import

LABEL	DESCRIPTION
File Path ( 檔案路徑 )	Type in the location of the file you want to upload in this field or click <b>Browse</b> to find it.
Browse...	Click to find the certificate file you want to upload.
Apply ( 套用 )	Click to save your changes.
Cancel ( 重設 )	Click to return to the previous screen without saving your changes.



# The Remote Management Screens

## 14.1 Overview

Use the **TOOLS (工具) > Remote MGMT** screens to control which computers can use which services to access the WiMAX Modem on each interface.

Remote management allows you to determine which services/protocols can access which WiMAX Modem interface (if any) from which computers.

You may manage your WiMAX Modem from a remote location via:

**Table 55** Remote Management

- Internet (WAN only)
- ALL (LAN and WAN)
- LAN only
- Neither (Disable).

To disable remote management of a service, select **Disable** in the corresponding **Server Access** field.

You may only have one remote management session running at a time. The WiMAX Modem automatically disconnects a remote management session of lower priority when another remote management session of higher priority starts. The priorities for the different types of remote management sessions are as follows.

- 1 Telnet
- 2 HTTP

### 14.1.1 What You Can Do in This Chapter

- The **WWW** screen ([Section 14.2 on page 151](#)) lets you control HTTP access to your WiMAX Modem.
- The **Telnet** screen ([Section 14.3 on page 152](#)) lets you control Telnet access to your WiMAX Modem.
- The **FTP** screen ([Section 14.4 on page 153](#)) lets you control FTP access to your WiMAX Modem.

- The **SNMP** screen ([Section 14.5 on page 154](#)) lets you control SNMP access to your WiMAX Modem.
- The **DNS** screen ([Section 14.6 on page 157](#)) lets you control DNS access to your WiMAX Modem.
- The **Security** screen ([Section 14.7 on page 158](#)) lets you control how your WiMAX Modem responds to other types of requests.

## 14.1.2 What You Need to Know

The following terms and concepts may help as you read through this chapter.

### Remote Management Limitations

Remote management over LAN or WAN will not work when:

- 1 A filter in SMT menu 3.1 (LAN) or in menu 11.5 (WAN) is applied to block a Telnet, FTP or Web service.
- 2 You have disabled that service in one of the remote management screens.
- 3 The IP address in the **Secured Client IP** field does not match the client IP address. If it does not match, the WiMAX Modem will disconnect the session immediately.
- 4 There is already another remote management session with an equal or higher priority running. You may only have one remote management session running at one time.

### Remote Management and NAT

When NAT is enabled:

- Use the WiMAX Modem's WAN IP address when configuring from the WAN.
- Use the WiMAX Modem's LAN IP address when configuring from the LAN.

### System Timeout

There is a default system management idle timeout of five minutes (three hundred seconds). The WiMAX Modem automatically logs you out if the management session remains idle for longer than this timeout period. The management session does not time out when a statistics screen is polling.

### SNMP

Simple Network Management Protocol (SNMP) is a protocol used for exchanging management information between network devices. SNMP is a member of the

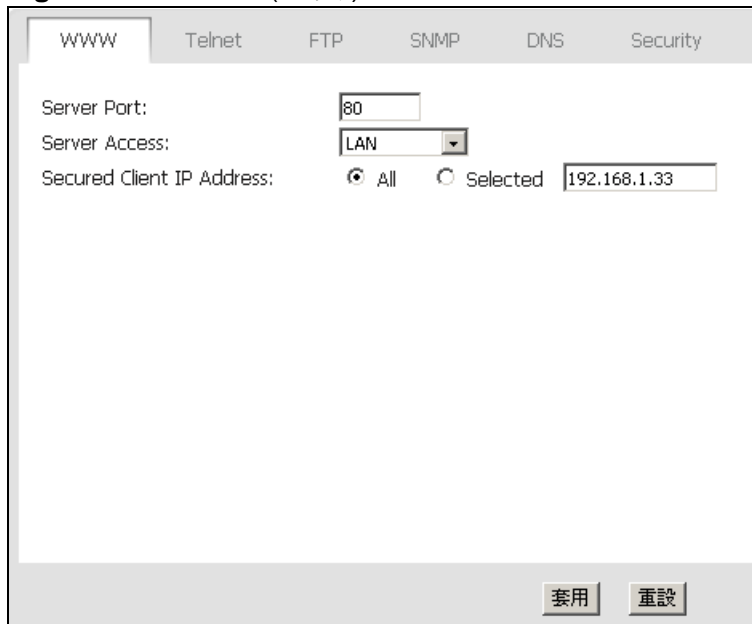
TCP/IP protocol suite. Your WiMAX Modem supports SNMP agent functionality, which allows a manager station to manage and monitor the WiMAX Modem through the network. The WiMAX Modem supports SNMP version one (SNMPv1) and version two (SNMPv2). The next figure illustrates an SNMP management operation.

Note: SNMP is only available if TCP/IP is configured.

## 14.2 WWW

Click **TOOLS (工具) > Remote MGMT > WWW** to control HTTP access to your WiMAX Modem.

**Figure 61** TOOLS (工具) > Remote MGMT > WWW



The following table describes the labels in this screen.

**Table 56** TOOLS (工具) > Remote MGMT > WWW

LABEL	DESCRIPTION
Server Port	Enter the port number this service can use to access the WiMAX Modem. The computer must use the same port number.
Server Access	Select the interface(s) through which a computer may access the WiMAX Modem using this service.
Secured Client IP Address	Select <b>All</b> to allow any computer to access the WiMAX Modem using this service.  Select <b>Selected</b> to only allow the computer with the IP address that you specify to access the WiMAX Modem using this service.

**Table 56** TOOLS ( 工具 ) > Remote MGMT > WWW (continued)

LABEL	DESCRIPTION
Apply ( 套用 )	Click to save your changes.
Reset ( 重設 )	Click to restore your previously saved settings.

## 14.3 Telnet

Click **TOOLS ( 工具 ) > Remote MGMT > Telnet** to control Telnet access to your WiMAX Modem.

**Figure 62** TOOLS ( 工具 ) > Remote MGMT > Telnet


The following table describes the labels in this screen.

**Table 57** TOOLS ( 工具 ) > Remote MGMT > Telnet

LABEL	DESCRIPTION
Server Port	Enter the port number this service can use to access the WiMAX Modem. The computer must use the same port number.
Server Access	Select the interface(s) through which a computer may access the WiMAX Modem using this service.
Secured Client IP Address	Select <b>All</b> to allow any computer to access the WiMAX Modem using this service. Select <b>Selected</b> to only allow the computer with the IP address that you specify to access the WiMAX Modem using this service.
Apply ( 套用 )	Click to save your changes.
Reset ( 重設 )	Click to restore your previously saved settings.

## 14.4 FTP

Click **TOOLS (工具) > Remote MGMT > FTP** to control FTP access to your WiMAX Modem.

**Figure 63** TOOLS (工具) > Remote MGMT > FTP

The following table describes the labels in this screen.

**Table 58** TOOLS (工具) > Remote MGMT > FTP

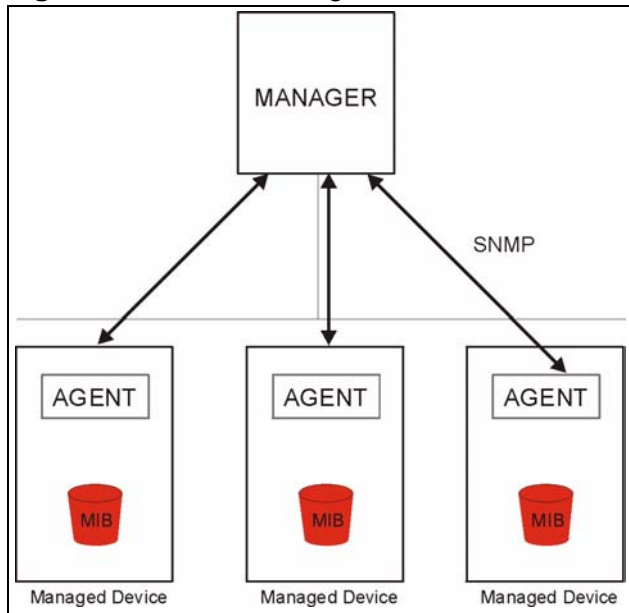
LABEL	DESCRIPTION
Server Port	Enter the port number this service can use to access the WiMAX Modem. The computer must use the same port number.
Server Access	Select the interface(s) through which a computer may access the WiMAX Modem using this service.
Secured Client IP Address	Select <b>All</b> to allow any computer to access the WiMAX Modem using this service. Select <b>Selected</b> to only allow the computer with the IP address that you specify to access the WiMAX Modem using this service.
Apply (套用)	Click to save your changes.
Reset (重設)	Click to restore your previously saved settings.



## 14.5 SNMP

An SNMP managed network consists of two main types of component: agents and a manager.

**Figure 64** SNMP Management Model



An agent is a management software module that resides in a managed device (the WiMAX Modem). An agent translates the local management information from the managed device into a form compatible with SNMP. The manager is the console through which network administrators perform network management functions. It executes applications that control and monitor managed devices.

The managed devices contain object variables/managed objects that define each piece of information to be collected about a device. Examples of variables include such as number of packets received, node port status etc. A Management Information Base (MIB) is a collection of managed objects. SNMP allows a manager and agents to communicate for the purpose of accessing these objects. The WiMAX Modem supports MIB II that is defined in RFC-1213 and RFC-1215. The focus of the MIBs is to let administrators collect statistical data and monitor status and performance.

SNMP itself is a simple request/response protocol based on the manager/agent model. The manager issues a request and the agent returns responses using the following protocol operations:

- Get - Allows the manager to retrieve an object variable from the agent.

- GetNext - Allows the manager to retrieve the next object variable from a table or list within an agent. In SNMPv1, when a manager wants to retrieve all elements of a table from an agent, it initiates a Get operation, followed by a series of GetNext operations.
- Set - Allows the manager to set values for object variables within an agent.
- Trap - Used by the agent to inform the manager of some events.

## 14.5.1 SNMP Traps

The WiMAX Modem sends traps to the SNMP manager when any of the following events occurs:

**Table 59** SNMP Traps

TRAP #	TRAP NAME	DESCRIPTION
0	coldStart (defined in <i>RFC-1215</i> )	A trap is sent after booting (power on).
1	warmStart (defined in <i>RFC-1215</i> )	A trap is sent after booting (software reboot).
4	authenticationFailure (defined in <i>RFC-1215</i> )	A trap is sent to the manager when receiving any SNMP get or set requirements with the wrong community (password).
6	whyReboot (defined in ZYXEL-MIB)	A trap is sent with the reason of restart before rebooting when the system is going to restart (warm start).
6a	For intentional reboot:	A trap is sent with the message "System reboot by user!" if reboot is done intentionally, (for example, download new files, CI command "sys reboot", etc.).
6b	For fatal error:	A trap is sent with the message of the fatal code if the system reboots because of fatal errors.

## 14.5.2 SNMP Options

Click **TOOLS (工具) > Remote MGMT > SNMP** to control SNMP access to your WiMAX Modem.

**Figure 65** TOOLS (工具) > Remote MGMT > SNMP

The following table describes the labels in this screen.

**Table 60** TOOLS (工具) > Remote MGMT > SNMP

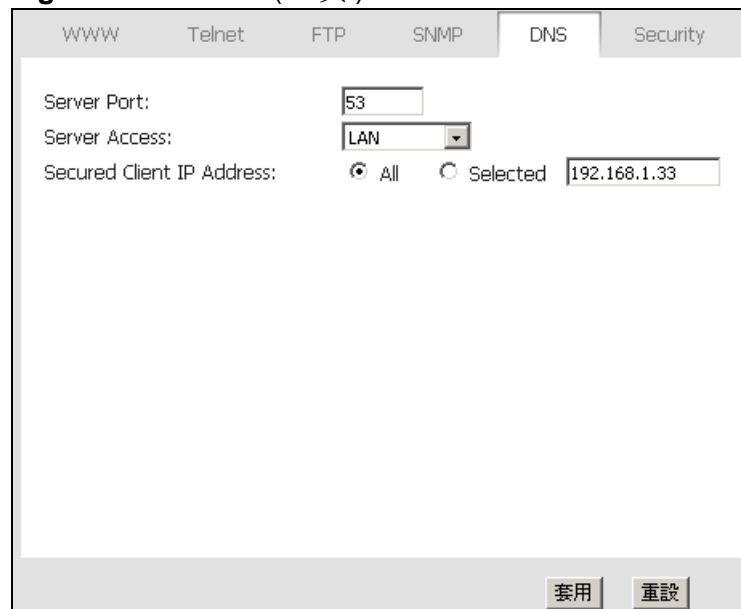
LABEL	DESCRIPTION
SNMP Configuration	
Get Community	Enter the <b>Get Community</b> , which is the password for the incoming Get and GetNext requests from the management station. The default is public and allows all requests.
Set Community	Enter the <b>Set community</b> , which is the password for incoming Set requests from the management station. The default is public and allows all requests.
Trap Community	Enter the trap community, which is the password sent with each trap to the SNMP manager. The default is public and allows all requests.
Trap Destination	Enter the IP address of the station to send your SNMP traps to.
SNMP	
Port	You may change the server port number for a service if needed, however you must use the same port number in order to use that service for remote management.
Access Status	Select the interface(s) through which a computer may access the WiMAX Modem using this service.

**Table 60** TOOLS ( 工具 ) > Remote MGMT > SNMP (continued)

LABEL	DESCRIPTION
Secured Client IP	A secured client is a “trusted” computer that is allowed to communicate with the WiMAX Modem using this service.  Select <b>All</b> to allow any computer to access the WiMAX Modem using this service.  Choose <b>Selected</b> to just allow the computer with the IP address that you specify to access the WiMAX Modem using this service.
Apply ( 套用 )	Click to save your changes.
Reset ( 重設 )	Click to restore your previously saved settings.

## 14.6 DNS

Click **TOOLS ( 工具 ) > Remote MGMT > DNS** to control DNS access to your WiMAX Modem.

**Figure 66** TOOLS ( 工具 ) > Remote MGMT > DNS


WWW    Telnet    FTP    SNMP    **DNS**    Security

Server Port:

Server Access:

Secured Client IP Address:  All     Selected   

The following table describes the labels in this screen.

**Table 61** TOOLS ( 工具 ) > Remote MGMT > DNS

LABEL	DESCRIPTION
Server Port	This field is read-only. This field displays the port number this service uses to access the WiMAX Modem. The computer must use the same port number.
Server Access	Select the interface(s) through which a computer may access the WiMAX Modem using this service.

**Table 61** TOOLS ( 工具 ) > Remote MGMT > DNS (continued)

LABEL	DESCRIPTION
Secured Client IP Address	Select <b>All</b> to allow any computer to access the WiMAX Modem using this service.  Select <b>Selected</b> to only allow the computer with the IP address that you specify to access the WiMAX Modem using this service.
Apply ( 套用 )	Click to save your changes.
Reset ( 重設 )	Click to restore your previously saved settings.

## 14.7 Security

Click **TOOLS ( 工具 ) > Remote MGMT > Security** to control how your WiMAX Modem responds to other types of requests.

**Figure 67** TOOLS ( 工具 ) > Remote MGMT > Security


WWW    Telnet    FTP    SNMP    DNS    Security

Respond to Ping on:    LAN & WAN

套用    重設

The following table describes the labels in this screen.

**Table 62** TOOLS ( 工具 ) > Remote MGMT > Security

LABEL	DESCRIPTION
Respond to Ping on	<p>Select the interface(s) on which the WiMAX Modem should respond to incoming ping requests.</p> <ul style="list-style-type: none"> <li>• <b>Disable</b> - the WiMAX Modem does not respond to any ping requests.</li> <li>• <b>LAN</b> - the WiMAX Modem only responds to ping requests received from the LAN.</li> <li>• <b>WAN</b> - the WiMAX Modem only responds to ping requests received from the WAN.</li> <li>• <b>LAN &amp; WAN</b> - the WiMAX Modem responds to ping requests received from the LAN or the WAN.</li> </ul>
Do not respond to requests for unauthorized services	<p>Select this to prevent outsiders from discovering your WiMAX Modem by sending requests to unsupported port numbers. If an outside user attempts to probe an unsupported port on your WiMAX Modem, an ICMP response packet is automatically returned. This allows the outside user to know the WiMAX Modem exists. Your WiMAX Modem supports anti-probing, which prevents the ICMP response packet from being sent. This keeps outsiders from discovering your WiMAX Modem when unsupported ports are probed.</p> <p>If you clear this, your WiMAX Modem replies with an ICMP Port Unreachable packet for a port probe on unused UDP ports and with a TCP Reset packet for a port probe on unused TCP ports.</p>
Apply ( 套用 )	Click to save your changes.
Reset ( 重設 )	Click to restore your previously saved settings.



# The Password Setup Screen

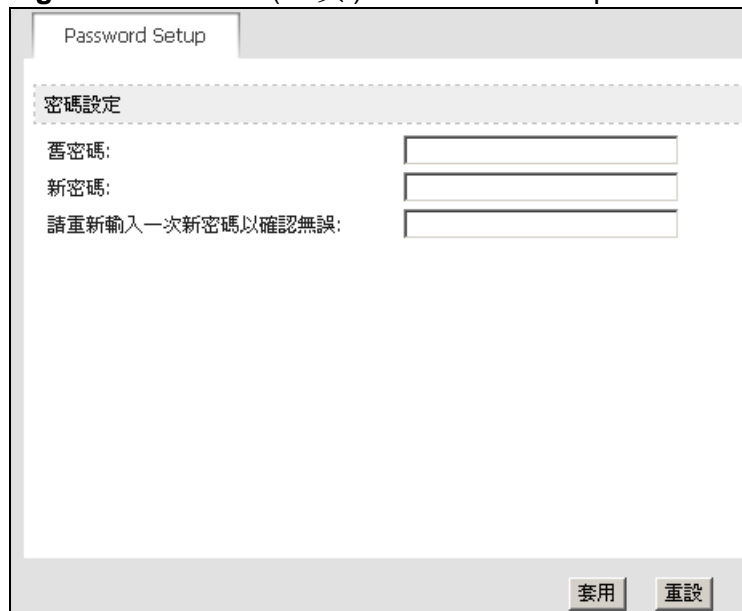
## 15.1 Overview

The default administrator password is 284wj/6. Use this screen to change it.

## 15.2 Password Setup

Click **TOOLS (工具) > Password Setup** to change the administrator password.

**Figure 68** TOOLS (工具) > Password Setup



The screenshot shows a web interface for password setup. At the top, there is a tab labeled "Password Setup". Below the tab, the section is titled "密碼設定" (Password Setup). There are three input fields: "舊密碼:" (Current Password), "新密碼:" (New Password), and "請重新輸入一次新密碼以確認無誤:" (Please re-enter the new password once to confirm it is correct). At the bottom right, there are two buttons: "套用" (Apply) and "重設" (Reset).



The following table describes the labels in this screen.

**Table 63** TOOLS ( 工具 ) > Password Setup

LABEL	DESCRIPTION
Old Password ( 舊密碼 )	Enter the current password you use to access the WiMAX Modem.
New Password ( 新密碼 )	Enter the new password for the WiMAX Modem. You can use up to 30 characters. As you type the password, the screen displays an asterisk (*) for each character you type.
Retype to Confirm ( 請重新輸入一次新密碼以確認無誤 )	Enter the new password again.
Apply ( 套用 )	Click to save your changes.
Reset ( 重設 )	Click to restore your previously saved settings.

# The Status Screen

## 16.1 Overview

Use this screen to view a complete summary of your WiMAX Modem connection status.

## 16.2 Status Screen

Click the **STATUS (狀態)** icon in the navigation bar to go to this screen, where you can view the current status of the device, system resources, and interfaces (LAN and WAN).

**Figure 69** Status ( 狀態 )

System Status	
<b>裝置資訊</b>	
系統名稱:	MAX-207HW2
軟體版本:	1.00(BQI.0)b2
硬體版本:	ACB
系統開機時間:	10:46:41 up 1 day
記憶體使用:	6%
<b>介面狀態</b>	
<b>LAN 資訊</b>	
狀態:	Connected
速率:	100 Mbps
IP 位址:	192.168.1.1
IP 子網路遮罩:	255.255.255.0
<b>WAN 資訊</b>	
狀態:	OPERATIONAL
IP 位址:	10.0.1.154
IP 子網路遮罩:	255.255.255.0
BSID:	10:10:10:10:33:44
Preamble Index:	2
頻率:	2510000
UL 傳輸量:	29435668
DL 傳輸量:	25130995
RSSI:	-64
發射功率:	19
CINR:	23
MAC 位址:	00:50:C2:74:D1:B8

The following tables describe the labels in this screen.

**Table 64** Status (狀態)

LABEL	DESCRIPTION
Device Information ()	
System Name ()	This field displays the WiMAX Modem system name. It is used for identification.  You can change this in the <b>ADVANCED (進階) &gt; System Configuration (系統組態) &gt; General</b> screen's <b>System Name (系統名稱)</b> field.
Firmware Version ()	This field displays the current version of the firmware inside the device. It also shows the date the firmware version was created.  You can change the firmware version by uploading new firmware in <b>ADVANCED (進階) &gt; System Configuration (系統組態) &gt; Firmware</b> .
Hardware Version (硬體版本)	This field displays the version of the physical device hardware.
System Uptime(系統開機時間)	This field displays how long the WiMAX Modem has been running since it last started up. The WiMAX Modem starts up when you plug it in, when you restart it ( <b>ADVANCED (進階) &gt; System Configuration (系統組態) &gt; Restart</b> ), or when you reset it.
Memory Usage(記憶體使用)	This field displays what percentage of the WiMAX Modem's memory is currently used. The higher the memory usage, the more likely the WiMAX Modem is to slow down. Some memory is required just to start the WiMAX Modem and to run the web configurator. You can reduce the memory usage by disabling some services (see <b>CPU Usage</b> ); by reducing the amount of memory allocated to NAT and firewall rules (you may have to reduce the number of NAT rules or firewall rules to do so); or by deleting rules in functions such as incoming call policies, speed dial entries, and static routes.
Interface Information (介面狀態)	
LAN Information (LAN 資訊)	
Status (狀態)	This field indicates whether or not the WiMAX Modem is using the LAN interface.  This field displays <b>Connected</b> when the WiMAX Modem is using the LAN interface. Otherwise, it displays <b>DISCONNECTED</b> .
Speed (速率)	This field displays the LAN connection speed (in Mbps).
IP Address (IP 位址)	This field displays the current IP address of the WiMAX Modem in the LAN.
IP Subnet Mask (IP子網路遮罩)	This field displays the current subnet mask on the LAN.
WAN Information (WAN )	
Status (狀態)	This field indicates whether or not the WiMAX Modem is using the WAN interface.  This field displays <b>OPERATIONAL</b> when the WiMAX Modem is using the WAN interface. Otherwise, it displays <b>DISCONNECTED</b> .

**Table 64** Status ( 狀態 ) (continued)

LABEL	DESCRIPTION
IP Address (IP 位址)	This field displays the current IP address of the WiMAX Modem in the LAN.
IP Subnet Mask (IP子網路遮罩)	This field displays the current subnet mask in the LAN.
BSID	This field displays the identification number of the wireless base station to which the WiMAX Modem is connected. Every base station transmits a unique BSID, which identifies it across the network.
Preamble Index	The Preamble Index is the number of bytes used for initial synchorinzation at the biginning of a downlink frame. See the IEEE 802.16e standard for more information.
Frequency ( 頻率 )	This field displays the radio frequency of the WiMAX Modem's wireless connection to a base station.
UL Data Amount (UL 傳輸量)	This field shows the number of data packets uploaded from the WiMAX Modem to the base station each second.
DL Data Amount (DL 傳輸量)	This field shows the number of data packets downloaded to the WiMAX Modem from the base station each second.
RSSI	<p>This field shows the Received Signal Strength Indication. This value is a measurement of overall radio signal strength. A higher RSSI level indicates a stronger signal, and a lower RSSI level indicates a weaker signal.</p> <p>A strong signal does not necessarily indicate a good signal: a strong signal may have a low signal-to-noise ratio (SNR).</p>
Tx Power ( 發射功率 )	This field shows the output transmission (Tx) level of the WiMAX Modem.
CINR	This field shows the average Carrier to Interference plus Noise Ratio of the current connection. This value is an indication of overall radio signal quality. A higher value indicates a higher signal quality, and a lower value indicates a lower signal quality.
MAC address (MAC 位址)	This field displays the Media Access Control address of the WiMAX Modem. Every network device has a unique MAC address which identifies it across the network.



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# PART VI

## Troubleshooting and Specifications

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Troubleshooting (169)

Product Specifications (177)



# Troubleshooting

This chapter offers some suggestions to solve problems you might encounter. The potential problems are divided into the following categories:

- [Power, Hardware Connections, and LEDs](#)
- [WiMAX Modem Access and Login](#)
- [Internet Access](#)
- [Phone Calls and VoIP](#)
- [Reset the WiMAX Modem to Its Factory Defaults](#)

## 17.1 Power, Hardware Connections, and LEDs

---

The WiMAX Modem does not turn on. None of the LEDs turn on.

---

- 1 Make sure you are using the power adapter or cord included with the WiMAX Modem.
- 2 Make sure the power adapter or cord is connected to the WiMAX Modem and plugged in to an appropriate power source. Make sure the power source is turned on.
- 3 Disconnect and re-connect the power adapter or cord to the WiMAX Modem.
- 4 If the problem continues, contact the vendor.

---

One of the LEDs does not behave as expected.

---

- 1 Make sure you understand the normal behavior of the LED. See [Section 1.2.1 on page 21](#) for more information.



- 2 Check the hardware connections. See the Quick Start Guide.
- 3 Inspect your cables for damage. Contact the vendor to replace any damaged cables.
- 4 Disconnect and re-connect the power adapter to the WiMAX Modem.
- 5 If the problem continues, contact the vendor.

## 17.2 WiMAX Modem Access and Login

---

### I forgot the IP address for the WiMAX Modem.

---

- 1 The default IP address is `http://192.168.1.1`.
- 2 If you changed the IP address and have forgotten it, you might get the IP address of the WiMAX Modem by looking up the IP address of the default gateway for your computer. To do this in most Windows computers, click **Start > Run**, enter **cmd**, and then enter **ipconfig**. The IP address of the **Default Gateway** might be the IP address of the WiMAX Modem (it depends on the network), so enter this IP address in your Internet browser.
- 3 If this does not work, you have to reset the WiMAX Modem to its factory defaults. See [Section 17.1 on page 169](#).

---

### I forgot the password.

---

- 1 The default password is **284wj/6**.
- 2 If this does not work, you have to reset the WiMAX Modem to its factory defaults. See [Section 9.4 on page 104](#).

---

### I cannot see or access the **Login** screen in the web configurator.

---

- 1 Make sure you are using the correct IP address.
  - The default IP address is `http://192.168.1.1`.

- If you changed the IP address ([Section 3.2 on page 32](#)), use the new IP address.
  - If you changed the IP address and have forgotten it, see the troubleshooting suggestions for [I forgot the IP address for the WiMAX Modem](#).
- 2 Check the hardware connections, and make sure the LEDs are behaving as expected. See the Quick Start Guide and [Section 1.2.1 on page 21](#).
  - 3 Make sure your Internet browser does not block pop-up windows and has JavaScript and Java enabled. See [Appendix C on page 219](#).
  - 4 If there is a DHCP server on your network, make sure your computer is using a dynamic IP address. Your WiMAX Modem is a DHCP server by default.  
  
If there is no DHCP server on your network, make sure your computer's IP address is in the same subnet as the WiMAX Modem. See [Appendix D on page 229](#).
  - 5 Reset the WiMAX Modem to its factory defaults, and try to access the WiMAX Modem with the default IP address. See [Section 9.5 on page 105](#).
  - 6 If the problem continues, contact the network administrator or vendor, or try one of the advanced suggestions.

### Advanced Suggestions

- Try to access the WiMAX Modem using another service, such as Telnet. If you can access the WiMAX Modem, check the remote management settings and firewall rules to find out why the WiMAX Modem does not respond to HTTP.
- If your computer is connected wirelessly, use a computer that is connected to a **LAN/ETHERNET** port.

---

### I can see the **Login** screen, but I cannot log in to the WiMAX Modem.

---

- 1 Make sure you have entered the user name and password correctly. The default user name is **@dmin**, and the default password is **284wj/6**. These fields are case-sensitive, so make sure [Caps Lock] is not on.
- 2 You cannot log in to the web configurator while someone is using Telnet to access the WiMAX Modem. Log out of the WiMAX Modem in the other session, or ask the person who is logged in to log out.
- 3 Disconnect and re-connect the power adapter or cord to the WiMAX Modem.
- 4 If this does not work, you have to reset the WiMAX Modem to its factory defaults. See [Section 9.4 on page 104](#).

---

## I cannot Telnet to the WiMAX Modem.

---

See the troubleshooting suggestions for [I cannot see or access the Login screen in the web configurator](#). Ignore the suggestions about your browser.

## 17.3 Internet Access

---

### I cannot access the Internet.

---

- 1 Check the hardware connections, and make sure the LEDs are behaving as expected. See the Quick Start Guide and [Section 1.2.1 on page 21](#).
- 2 Make sure you entered your ISP account information correctly in the wizard. These fields are case-sensitive, so make sure [Caps Lock] is not on.
- 3 Check your security settings. In the web configurator, go to the **Status** screen. Click the **WiMAX Profile** link in the **Summary** box and make sure that you are using the correct security settings for your Internet account.
- 4 Check your WiMAX settings. The WiMAX Modem may have been set to search the wrong frequencies for a wireless connection. In the web configurator, go to the **Status** screen. Click the **WiMAX Site Information** link in the **Summary** box and ensure that the values are correct. If the values are incorrect, enter the correct frequency settings in the **ADVANCED (進階) > WAN Configuration (WAN設定) > WiMAX Configuration** screen. If you are unsure of the correct values, contact your service provider.
- 5 If you are trying to access the Internet wirelessly, make sure the wireless settings in the wireless client are the same as the settings in the AP.
- 6 Disconnect all the cables from your WiMAX Modem, and follow the directions in the Quick Start Guide again.
- 7 If the problem continues, contact your ISP.

---

[I cannot access the Internet any more. I had access to the Internet \(with the WiMAX Modem\), but my Internet connection is not available any more.](#)

---

- 1 Check the hardware connections, and make sure the LEDs are behaving as expected. See the Quick Start Guide and [Section 1.2.1 on page 21](#).
- 2 Disconnect and re-connect the power adapter to the WiMAX Modem.
- 3 If the problem continues, contact your ISP.

---

### The Internet connection is slow or intermittent.

---

- 1 The quality of the WiMAX Modem's wireless connection to the base station may be poor. Poor signal reception may be improved by moving the WiMAX Modem away from thick walls and other obstructions, or to a higher floor in your building.
- 2 There may be radio interference caused by nearby electrical devices such as microwave ovens and radio transmitters. Move the WiMAX Modem away or switch the other devices off. Weather conditions may also affect signal quality.
- 3 As well as having an external antenna connector, the MAX-210HW2 is equipped with an internal directional antenna. If you know the location of the base station, orient the front of the WiMAX Modem (the side with the LEDs) towards the base station. If you do not know the location of the base station, experiment by moving the WiMAX Modem while observing the **Strength Indicator** LEDs for an increase in received signal strength. The MAX-200HW2 and MAX-230HW2 do not have internal antennas.
- 4 There might be a lot of traffic on the network. Look at the LEDs, and check [Section 1.2.1 on page 21](#). If the WiMAX Modem is sending or receiving a lot of information, try closing some programs that use the Internet, especially peer-to-peer applications.
- 5 Disconnect and re-connect the power adapter to the WiMAX Modem.
- 6 If the problem continues, contact the network administrator or vendor, or try one of the advanced suggestions.

---

### The Internet connection disconnects.

---

- 1 Check your WiMAX link and signal strength using the **WiMAX Link** and **Strength Indicator** LEDs on the device.
- 2 Contact your ISP if the problem persists.

## 17.4 Phone Calls and VoIP

---

The telephone port won't work or the telephone lacks a dial tone.

---

- 1 Check the telephone connections and telephone wire.
- 2 Make sure you have the **VOICE > Service Configuration > SIP Settings** screen properly configured (Chapter 10 on page 109).

---

I can access the Internet, but cannot make VoIP calls.

---

- 1 Make sure you have the **VOICE > Service Configuration > SIP Settings** screen properly configured (Chapter 10 on page 109).
- 2 The **VoIP** LED should come on. Make sure that your telephone is connected to the **VoIP** port (see the Quick Start Guide for information on connecting telephone cables to the these ports).
- 3 You can also check the VoIP status in the **Status ( 状態 )** screen.
- 4 If the VoIP settings are correct, use speed dial to make peer-to-peer calls. If you cannot make a call using speed dial, there may be something wrong with the SIP server. Contact your VoIP service provider.

---

Problems With Multiple SIP Accounts

---

You can set up two SIP accounts on your WiMAX Modem. By default your WiMAX Modem uses SIP account 1 for outgoing calls, and it uses SIP accounts 1 and 2 for incoming calls. With this setting, you always use SIP account 1 for your outgoing calls and you cannot distinguish which SIP account the calls are coming in through. If you want to control the use of different dialing plans for accounting purposes or other reasons, you need to configure your phone port in order to control which SIP account you are using when placing or receiving calls.

---

## 17.5 Reset the WiMAX Modem to Its Factory Defaults

If you reset the WiMAX Modem, you lose all of the changes you have made. The WiMAX Modem re-loads its default settings, and the password resets to **1234**. You have to make all of your changes again.

---

You will lose all of your changes when you push the **Reset** button.

---

To reset the WiMAX Modem,

- 1 Make sure the **Power** LED is on and not blinking.
- 2 Press and hold the **Reset** button for five to ten seconds. Release the **Reset** button when the **Power** LED begins to blink. The default settings have been restored.

If the WiMAX Modem restarts automatically, wait for the WiMAX Modem to finish restarting, and log in to the web configurator. The password is "284wj/6".

If the WiMAX Modem does not restart automatically, disconnect and reconnect the WiMAX Modem's power. Then, follow the directions above again.

### 17.5.1 Pop-up Windows, JavaScripts and Java Permissions

Please see [Appendix C on page 219](#).



## Product Specifications

This chapter gives details about your WiMAX Modem's hardware and firmware features.

**Table 65** Environmental and Hardware Specifications

FEATURE	DESCRIPTION
Operating Temperature	0°C to 45°C
Storage Temperature	-25°C to 55°C
Operating Humidity	10% ~ 90% (non-condensing)
Storage Humidity	10% to 95% (non-condensing)
Power Supply	12V DC, 2A
Power consumption	18W
Ethernet Interface	Four auto-negotiating, auto-MDI/MDI-X NWay 10/100 Mbps RJ-45 Ethernet ports
Telephony Interface	Two analog ATA interfaces for standard telephones through RJ-11 FXS (Foreign Exchange Subscriber) analog connector
Antennas	Two internal omnidirectional 5dBi WiMAX antennas
Weight	400 g
Dimensions	165 mm (W) x 25 mm (D) x 260 mm (H)
Certification	EMI and EMS: USA-FCC Part 15B/ FCC Part 27M/ FCC MPE Taiwan-NCC PLMN09/ NCC MPE/ BSMI CNS13438/ BSMI CNS14336

**Table 66** Radio Specifications

FEATURE	DESCRIPTION
Media Access Protocol	IEEE 802.16e
WiMAX Bandwidth	2.5 GHz



**Table 66** Radio Specifications (continued)

Data Rate	<p>Download:</p> <p>Maximum 20 Mbps Average 6 Mbps</p> <p>Upload:</p> <p>Maximum 4 Mbps Average 3 Mbps</p>
Modulation	<p>QPSK (uplink and downlink)</p> <p>16-QAM (uplink and downlink)</p> <p>64-QAM (downlink only)</p>
Output Power	Typically 26 dBm with internal antennas
Duplex mode	Time Division Duplex (TDD)
Security	<p>PKMv2</p> <p>EAP</p> <p>CCMP, 128-bit AES</p>

**Table 67** Firmware Specifications

FEATURE	DESCRIPTION
Web-based Configuration and Management Tool	Also known as “the web configurator”, this is a firmware-based management solution for the WiMAX Modem. You must connect using a compatible web browser in order to use it.
High Speed Wireless Internet Access	<p>The WiMAX Modem is ideal for high-speed wireless Internet browsing.</p> <p>WiMAX (Worldwide Interoperability for Microwave Access) is a wireless networking standard providing high-bandwidth, wide-range secured wireless service. The WiMAX Modem is a WiMAX mobile station (MS) compatible with the IEEE 802.16e standard.</p>
Firewall	The WiMAX Modem is a stateful inspection firewall with DoS (Denial of Service) protection. By default, when the firewall is activated, all incoming traffic from the WAN to the LAN is blocked unless it is initiated from the LAN. The WiMAX Modem’s firewall supports TCP/UDP inspection, DoS detection and prevention, real time alerts, reports and logs.
Content Filtering	The WiMAX Modem can block access to web sites containing specified keywords. You can define time periods and days during which content filtering is enabled and include or exclude a range of users on the LAN from content filtering.
Network Address Translation (NAT)	Network Address Translation (NAT) allows the translation of an Internet protocol address used within one network (for example a private IP address used in a local network) to a different IP address known within another network (for example a public IP address used on the Internet).
Universal Plug and Play (UPnP)	Your device and other UPnP enabled devices can use the standard TCP/IP protocol to dynamically join a network, obtain an IP address and convey their capabilities to each other.

**Table 67** Firmware Specifications (continued)

FEATURE	DESCRIPTION
Dynamic DNS Support	With Dynamic DNS support, you can have a static hostname alias for a dynamic IP address, allowing the host to be more easily accessible from various locations on the Internet. You must register for this service with a Dynamic DNS service provider.
DHCP	DHCP (Dynamic Host Configuration Protocol) allows the individual clients (computers) to obtain the TCP/IP configuration at start-up from a centralized DHCP server. Your device has built-in DHCP server capability enabled by default. It can assign IP addresses, an IP default gateway and DNS servers to DHCP clients. Your device can also act as a surrogate DHCP server (DHCP Relay) where it relays IP address assignment from the actual real DHCP server to the clients.
IP Alias	IP alias allows you to partition a physical network into logical networks over the same Ethernet interface. Your device supports three logical LAN interfaces via its single physical Ethernet interface with the your device itself as the gateway for each LAN network.
Multiple SIP Accounts	You can configure multiple voice (SIP) accounts.
SIP ALG	Your device is a SIP Application Layer Gateway (ALG). It allows VoIP calls to pass through NAT for devices behind it (such as a SIP-based VoIP software application on a computer).
Dynamic Jitter Buffer	The built-in adaptive buffer helps to smooth out the variations in delay (jitter) for voice traffic (up to 60 ms). This helps ensure good voice quality for your conversations.
Voice Activity Detection/ Silence Suppression	Voice Activity Detection (VAD) reduces the bandwidth that a call uses by not transmitting when you are not speaking.
Comfort Noise Generation	Your device generates background noise to fill moments of silence when the other device in a call stops transmitting because the other party is not speaking (as total silence could easily be mistaken for a lost connection).
Echo Cancellation	Your device supports G.168 of at least 24 ms.  This an ITU-T standard for eliminating the echo caused by the sound of your voice reverberating in the telephone receiver while you talk.
Time and Date	Get the current time and date from an external server when you turn on your WiMAX Modem. You can also set the time manually.
Logging	Use the WiMAX Modem's logging feature to view connection history, surveillance logs, and error messages.
Codecs	Enhanced Variable Rate Codec (EVRC), G.711 (PCM $\mu$ -law and a-law), G.729a, and G.723.1
Fax Support	T.38 FAX relay (FAX over UDP).  G.711 fax relay for fax calls and be able to renegotiate codec to G.711 if a fax call is detected.

**Table 67** Firmware Specifications (continued)

FEATURE	DESCRIPTION
Ring Tones	Supports different distinctive ring tones on each line.
Call Prioritization	Prioritize VoIP traffic originating from the RJ-11 ports over any other traffic.

**Table 68** Standards Supported

STANDARD	DESCRIPTION
RFC 768	User Datagram Protocol
RFC 791	Internet Protocol v4
RFC 792	Internet Control Message Protocol
RFC 792	Transmission Control Protocol
RFC 826	Address Resolution Protocol
RFC 854	Telnet Protocol
RFC 1349	Type of Service Protocol
RFC 1706	DNS NSAP Resource Records
RFC 1889	Real-time Transport Protocol (RTP)
RFC 1890	Real-time Transport Control Protocol (RTCP)
RFC 2030	Simple Network Time Protocol
RFC 2104	HMAC: Keyed-Hashing for Message Authentication
RFC 2131	Dynamic Host Configuration Protocol
RFC 2401	Security Architecture for the Internet Protocol
RFC 2409	Internet Key Exchange
RFC 2475	Architecture for Differentiated Services (Diffserv)
RFC 2617	Hypertext Transfer Protocol (HTTP) Authentication: Basic and Digest Access Authentication
RFC 2782	A DNS RR for specifying the location of services (DNS SRV)
RFC 2833	Real-time Transport Protocol Payload for DTMF Digits, Telephony Tones and Telephony Signals
RFC 2976	The SIP INFO Method
RFC 3261	Session Initiation Protocol (SIP version 2)
RFC 3262	Reliability of Provisional Responses in the Session Initiation Protocol (SIP).
RFC 3263	Session Initiation Protocol (SIP): Locating SIP Servers
RFC 3264	An Offer/Answer Model with the Session Description Protocol (SDP)
RFC 3265	Session Initiation Protocol (SIP)-Specific Event Notification
RFC 3323	A Privacy Mechanism for SIP
RFC 3325	Private Extensions to the Session Initiation Protocol (SIP) for Asserted Identity within Trusted Networks
RFC 3550	RTP - A Real Time Protocol for Real-Time Applications
RFC 3581	An Extension to the Session Initiation Protocol (SIP) for Symmetric Response Routing

**Table 68** Standards Supported (continued)

STANDARD	DESCRIPTION
RFC 3611	RTP Control Protocol Extended Reports (RTCP XR)-XR
RFC 3715	IP Sec/NAT Compatibility
RFC 3842	A Message Summary and Message Waiting Indication Event Package for the Session Initiation Protocol (SIP)
IEEE 802.3	10BASE5 10 Mbit/s (1.25 MB/s)
IEEE 802.3u	100BASE-TX, 100BASE-T4, 100BASE-FX Fast Ethernet at 100 Mbit/s (12.5 MB/s) with auto-negotiation

**Table 69** Voice Features

Call Park and Pickup	<p>Call park and pickup lets you put a call on hold (park) and then continue the call (pickup). The caller must still pay while the call is parked.</p> <p>When you park the call, you enter a number of your choice (up to eight digits), which you must enter again when you pick up the call. If you do not enter the correct number, you cannot pickup the call. This means that only someone who knows the number you have chosen can pick up the call.</p> <p>You can have more than one call on hold at the same time, but you must give each call a different number.</p>
Call Return	With call return, you can place a call to the last number that called you (either answered or missed). The last incoming call can be through either SIP or PSTN.
Country Code	Phone standards and settings differ from one country to another, so the settings on your WiMAX Modem must be configured to match those of the country you are in. The country code feature allows you to do this by selecting the country from a list rather than changing each setting manually. Configure the country code feature when you move the WiMAX Modem from one country to another.
Do not Disturb (DnD)	This feature allows you to set your phone not to ring when someone calls you. You can set each phone independently using its keypad, or configure global settings for all phones using the command line interpreter.
Auto Dial	You can set the WiMAX Modem to automatically dial a specified number immediately whenever you lift a phone off the hook. Use the Web Configurator to set the specified number. Use the command line interpreter to have the WiMAX Modem wait a specified length of time before dialing the number.
Phone config	The phone configuration table allows you to customize the phone keypad combinations you use to access certain features on the WiMAX Modem, such as call waiting, call return, call forward, etc. The phone configuration table is configurable in command interpreter mode.