USER GUIDE

Mobile WiMAX USB Adapter
US330

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IEEE 802.16e-2005 Mobile WiMAX USB Adapter, with 3.8 GHz Frequency Band Model

COMPLIANCES

FEDERAL COMMUNICATION COMMISSION INTERFERENCE STATEMENT

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

◆ Reorient or relocate the receiving antenna

◆ Increase the separation between the equipment and receiver

◆ Connect the equipment into an outlet on a circuit different from that to which the receiver is connected

◆ Consult the dealer or an experienced radio/TV technician for help

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

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

IMPORTANT NOTE:
FCC RADIATION EXPOSURE STATEMENT

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. To maintain compliance with FCC RF exposure compliance requirements, please follow operation instruction as documented in this manual.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination. The firmware setting is not accessible by the end user.

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

SAR (SPECIFIC ABSORPTION RATE) COMPLIANCES STATEMENT

SAR compliance has been established in typical laptop computer (s) with a USB slot, and the product can be used in typical laptop computers with USB slots. Other applications, such as handheld PCs or similar devices have not been verified and may not be in compliance with related RF exposure rules and such use shall be prohibited.

EC CONFORMANCE DECLARATION $C \epsilon 0560$ ⓘ

Marking by the above symbol indicates compliance with the Essential Requirements of the R&TTE Directive of the European Union (1999/5/EC).

This device is intended for use in the following European Community countries.

ABOUT THIS GUIDE

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

AUDIENCE This guide is for PC users with a working knowledge of computers. You should be familiar with Windows operating system concepts.

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

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

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

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

RELATED PUBLICATIONS The following publication gives basic information on how to install and use the WiMAX USB Adapter.

Quick Installation Guide

Also, as part of the card's configuration software, there is online help that describes all management features.

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

AUGUST 2012 REVISION
This is the third revision of this guide. This guide is valid for software version 1.0.2.0

NOVEMBER 2011 REVISION
This is the second revision of this guide. This guide is valid for software version 1.0.1.5.

JANUARY 2011 REVISION

This is the first revision of this guide. This guide is valid for software version 1.0.1.3.

CONTENTS

1 INTRODUCTION

The WiMAX USB Adapter is a network adapter that enables a notebook PC to connect to a service provider's 3.8 GHz mobile WiMAX network.

The USB adapter plugs directly into a PC's compatible USB port and includes its own driver and configuration software for Windows XP, Windows Vista, and Windows 7.

Figure 1: WiMAX USB Adapter

LINK/ACTIVITY LED Indicator

POWER LED Indicator

USB Connector
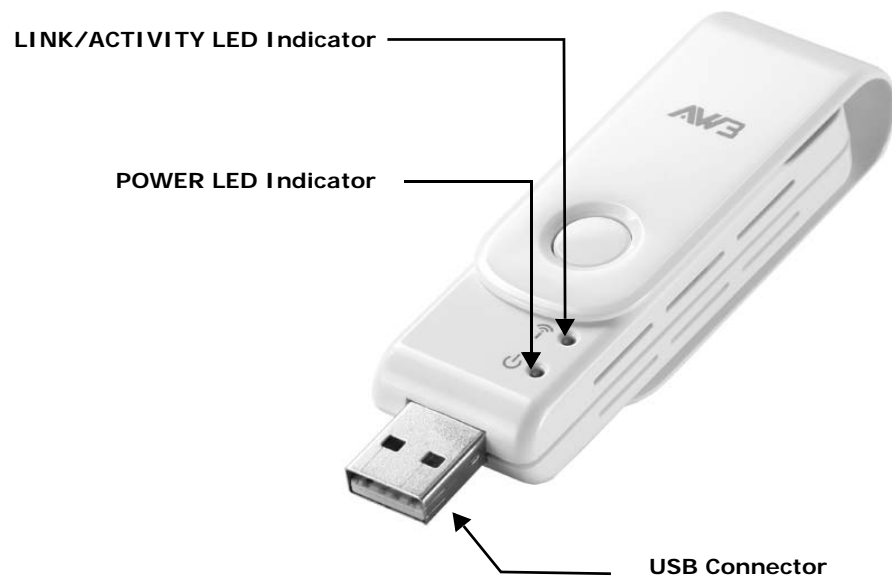
FEATURES

The WiMAX USB Adapter supports the following features:

◆ Mobile WiMAX IEEE 802.16e-2005 Wave 2 compliant

◆ Full Non-Line-of-Sight (NLOS) operation

◆ Two LED indicators for power and link status

◆ Easy installation with a user-friendly interface for configuration.

◆ Driver support for Windows XP with Service Pack 2 (SP2), Windows Vista, and Windows 7

SYSTEM REQUIREMENTS

Before you install the WiMAX USB Adapter, check your system meets the following requirements:

◆ A notebook or desktop computer with a USB port

◆ Microsoft Windows XP, Windows Vista or Windows 7

◆ A 1 GHz Pentium CPU or higher with a minimum of 256 MB of RAM

PACKAGE CHECKLIST

The WiMAX USB Adapter package includes these items:

◆ WiMAX USB Adapter (US330)

◆ Quick Installation Guide

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

HARDWARE DESCRIPTION

The US330 WiMAX USB Adapter enables notebook PC users to connect to a WiMAX Internet access service provider.

USB CONNECTOR The USB adapter can be installed in any notebook PC with a USB port. The notebook PC must be running Windows XP with Service Pack 2, Windows Vista, or Windows 7.

LED INDICATORS The WiMAX USB Adapter includes two status LED indicators, as described in the following figure and table.
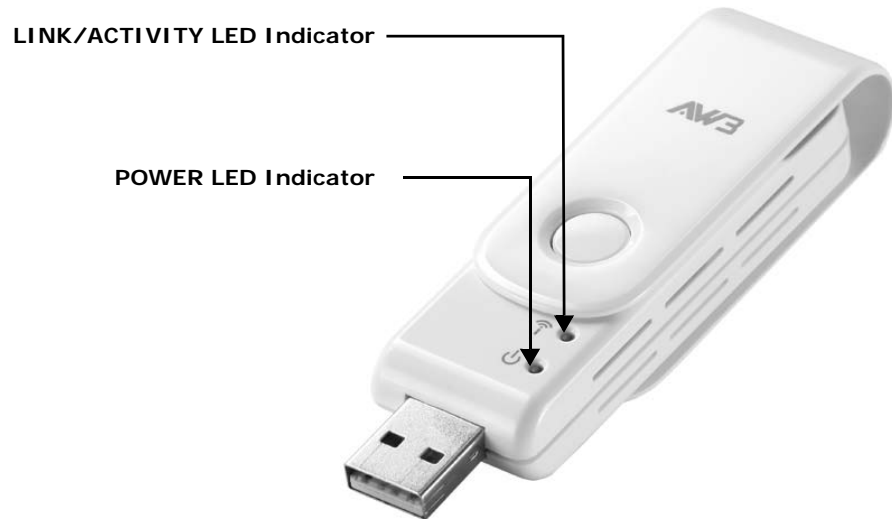
Figure 2: LED Indicators

LINK/ACTIVITY LED Indicator

POWER LED Indicator

Table 1: LED Indicators

LED	Status	Description
Power	On Orange	The USB adapter is correctly installed in a USB port and is receiving power.
	Blinking	The adapter is trying to connect to a base station.
Link/Activity	On Green	The USB adapter is searching for a WiMAX base station.
	Blinking	The USB adapter has an established link with a base station and is transmitting or receiving data.

2 INSTALLATION

To install the WiMAX USB Adapter driver and software utility for Windows XP or WIndows Vista, follow these steps:

NOTE: Only the installation interface for Windows XP is shown in this guide. However, the utility installation screens are similar for all Microsoft Windows systems.

1. Turn on your notebook and wait until the Windows system has completely started.

2. Insert the adapter into an available USB port. When the USB adapter is inserted correctly, its blue LED turns on (see page 10).

3. The setup wizard program should start automatically. If the install program does not start automatically, use Windows Explorer to find the USB adapter, which appears as an external USB drive. Open the folder and find the file "Setup.exe" to start the install program.

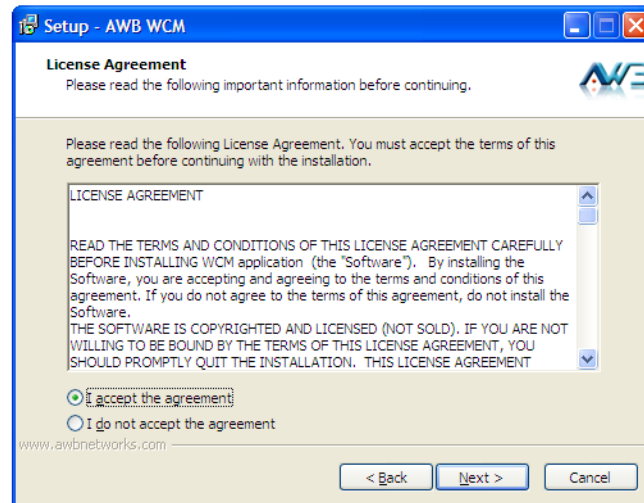**NOTE:** If you encounter problems installing the USB adapter, see "Troubleshooting" on page 24.

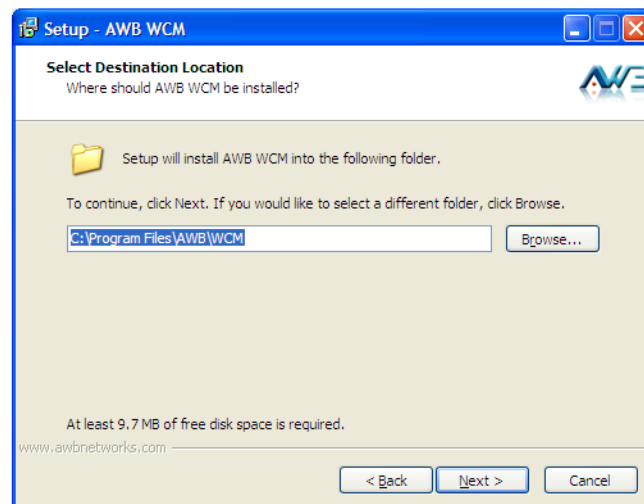4. Click Next to continue the installation.

Figure 3: Setup Wizard Start
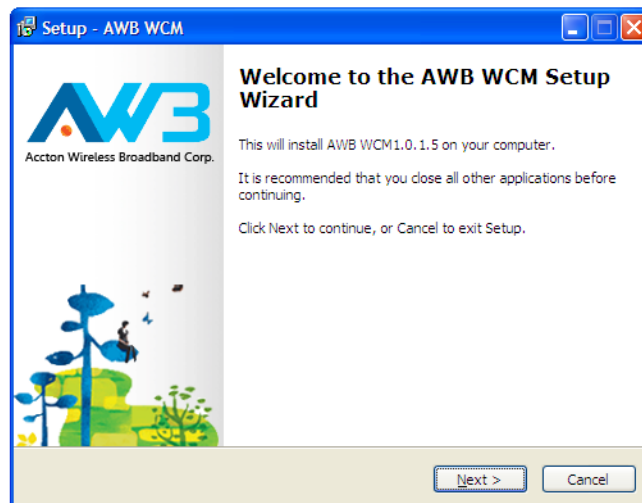
5. Select to accept the license agreement terms, then click Next.

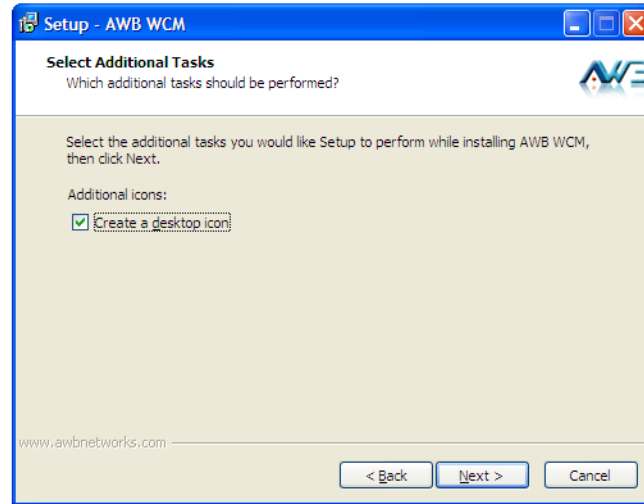**Figure 4: Accept License Agreement Terms**

6. Confirm or change the location of the installation files on the PC before clicking Next.
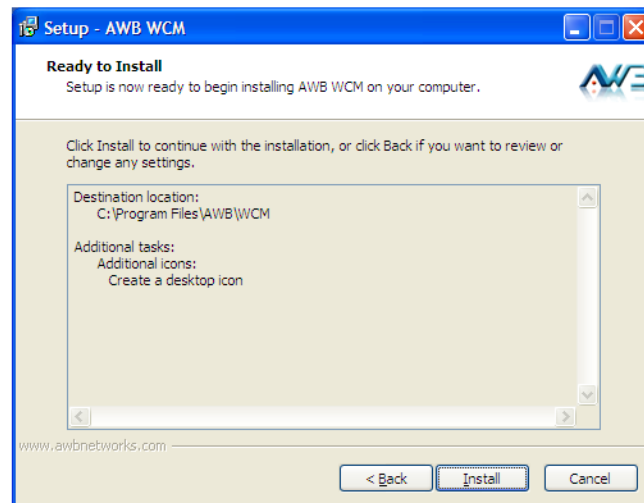
Figure 5: Confirm Installation Location

7. Confirm to create a desktop icon before clicking Next.

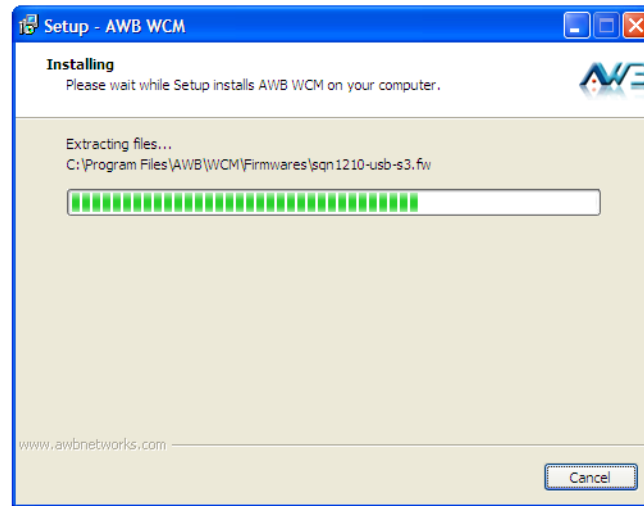**Figure 6: Create Desktop Icon**

8. Check selected options before clicking Install.

Figure 7: Ready to Install Files

9. Wait for the software installation procedure to complete.

Figure 8: Installation in Progress

NOTE: If a message concerning Windows Logo testing is displayed, click the "Continue Anyway" button.

NOTE: If you are prompted to install the Microsoft Visual C++ 2005 Redistributable Package on your system click "Yes" and follow the instructions.

10. When the "Setup Wizard Complete" message displays, click Finish.

Figure 9: Setup Wizard Complete

> **CAUTION:** Safely remove the USB adapter by double-clicking the Safely Remove Hardware icon in the notification area. Click the device and then click Stop.

3 CONFIGURATION

The WiMAX Connection Manager (WCM) software provides all the tools to manage and monitor your WiMAX connection. After initial installation, the software starts automatically every time you insert the WiMAX USB Adapter.

ACCESSING THE WCM UTILITY

Once the utility installation is complete, there are several methods of starting the WCM software other than by inserting the WiMAX USB Adapter. The utility screens are similar for all Microsoft Windows systems. The interface for Windows XP is described in this user guide.
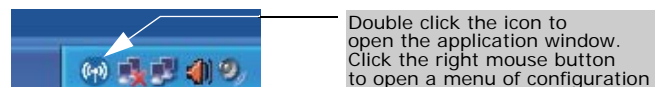
From the WCM shortcut icon on the Windows XP or Windows Vista desktop:

Figure 10: WCM Desktop Icon

Double click the icon to start the utility

From the WCM icon on the Windows System Tray:

Figure 11: WCM System Tray Icon

Double click the icon to open the application window. Click the right mouse button to open a menu of configuration

The System Tray icon also indicates the WiMAX connection status.

 No connection to a WiMAX network.

 Connected to network with an assigned IP address. The yellow color bars indicate the receive signal level.

CONNECTION MANAGEMENT

The WCM login screen displays information about the wireless link to the service provider network.

Figure 12: Login Screen - Auto login

Auto login — Enter the "*Account*" and "*Password*" provided for your log in to the WiMAX service, then click the Connect button. Next time the WCM utility launches, it automatically logs in using the account details previously entered.

Remember my login data — If selected, the WCM utility saves the account name only when the Connect button is clicked. Next time the WCM utility is launched, the Account field retains the previous log-in information.

Remember my password — If selected, the WCM utility saves the account name and password when the Connect button is clicked. You will not need to sign in the next time the WCM utility is launched.

Once connected to a WiMAX network, the WCM screen displays information about the wireless link to the service provider network.

Figure 13: Connection Status

The displayed items on this screen can be described as follows:

Provider — The service provider name to which the adapter is connected.

IP Address — The IP address assigned to the adapter.

Subnet Mask — Indicates the local subnet mask, such as 255.255.255.0.

Default Gateway — The gateway address provided by the WiMAX service provider.

DNS Server — Address of the DNS server, specified in the form of 0.0.0.0.

ADAPTER SETTINGS

The Setting screen enables specific adapter and WCM utility features to be configured.

Figure 14: Settings Screen

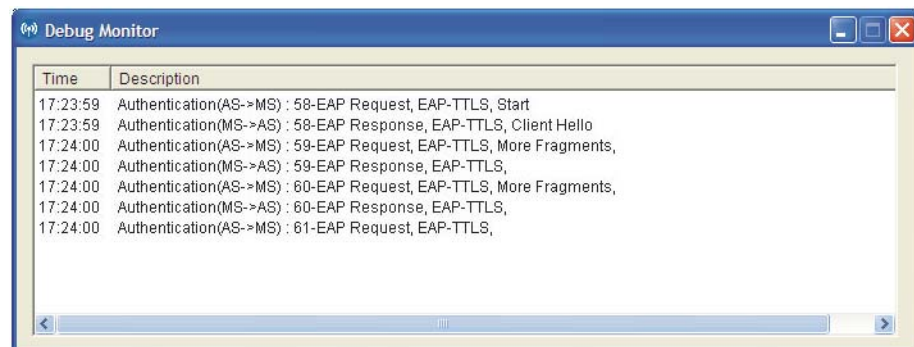The displayed items on this screen can be described as follows:

Auto-run WiMAX Connection Manager — Automatically starts the WCM utility when the adapter is inserted into a PC slot.

Run WiMAX Connection Manager as minimum size — When set to automatically start WCM, the utility starts in its Windows minimized form.

Automatically update — Automatically check for available WCM software updates.

Enable Debug Monitor — Enables logging of messages to the WCM debug monitor. The debug monitor window is displayed when the WCM utility restarts.

Figure 15: Debug Monitor Window

WiMAX CONNECTION STATISTICS

The Statistics screen allows you to view information on the WiMAX connection.

Figure 16: Statistics Information

The displayed items on this screen can be described as follows:

BSID — The current base station ID to which the mobile station is currently connected.

Online Duration — The time the unit has had a link with the base station for the current session.

DL Data Volume — The downloaded data volume in Mbytes for the current online session.

UL Data Volume — The uploaded data volume in Mbytes for the current online session.

DL Data Rate — The current download data rate in Kbps.

UL Data Rate — The current upload data rate in Kbps.

CINR — The current carrier-to-interference-plus-noise ratio of the received WiMAX radio signal.

RSSI — The current receive signal strength indicator value of the received WiMAX radio signal.

Transmit Power — The current transmit power of the WiMAX radio signal.

ABOUT WIMAX CONNECTION MANAGER

The About page displays information about the software version the WCM utility.

Figure 17: About WCM Information

4 ADMINISTRATOR MODE

The WiMAX USB Adapter has an Administrator Mode for configuring profiles and accessing the Advanced Configuration settings.
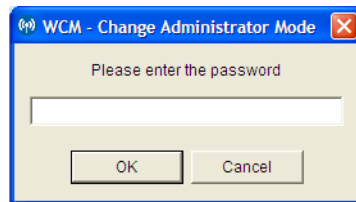
Administrator Mode is intended for qualified service personnel only.

ACCESSING ADMINISTRATOR MODE

Administrator Mode is accessed through the key sequence "Alt + t," which prompts for a password.

The password for Administrator Mode is "wimax123" (case sensitive).

Figure 18: WCM Change Mode

Once in Administrator Mode, the user can create, edit, and delete profiles, configure authentication settings, and access the Advance Configuration screen.

Using the key sequence "Alt + t" a second time exits Administrator Mode.

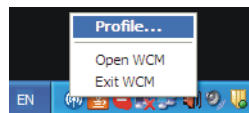**Figure 19: Administrator mode - Auto login**

EDITING A PROFILE

Double-click the system tray icon to open the application window. Then right-click on the icon to open the configuration menu.
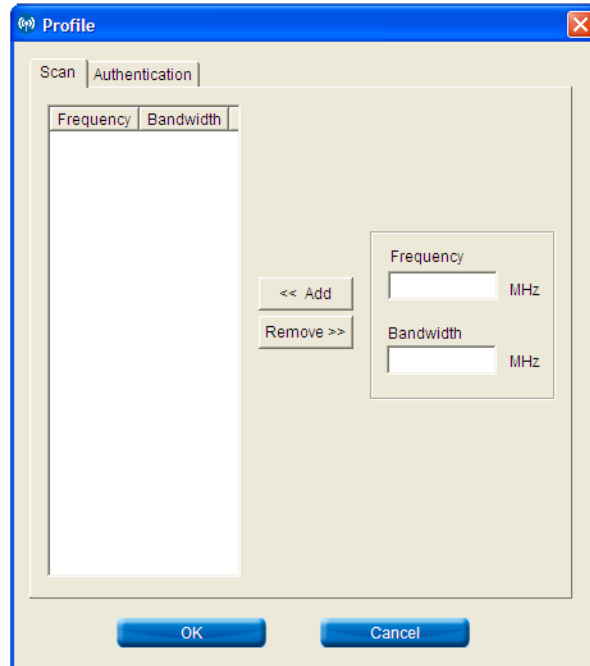
From the configuration menu, select "Profile."

Figure 20: Profile Icon

Clicking the Scan tab on the Profile screen displays the profile frequency and bandwidth settings.
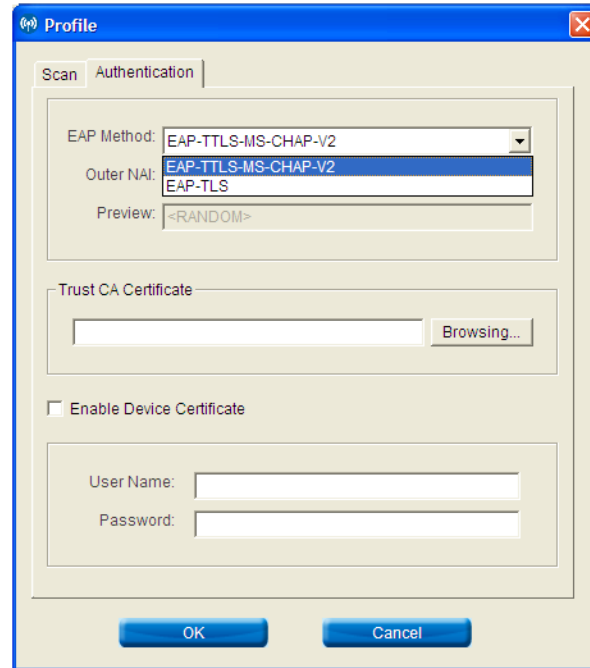
Figure 21: Profile Screen - Scan Tab

The Scan tab on the Edit Profile screen displays the following items:

◆ **Frequency** — Specifies a center frequency to scan.

◆ **Bandwidth** — Specifies the bandwidth of the channel; 5 or 10 MHz.

Clicking the Authentication tab on the Profile screen displays the user authentication settings.

Figure 22: Profile Screen - Authentication

EAP Method — Selects the Extensible Authentication Protocol (EAP) method to use for authentication. When EAP-TTLS or EAP-TLS is selected, the appropriate parameters need to be configured.

◆ **EAP-TTLS-MS-CHAP-V2** — Tunneled Transport Layer Security with Microsoft's version 2 of CHAP (Challenge-Handshake Authentication Protocol). This security method provides for certificate-based, mutual authentication of the client and network through an encrypted channel. Unlike EAP-TLS, EAP-TTLS requires only server-side certificates. The MS-CHAP protocol requires a user name and password to be configured. The user name and password can be up to 50 characters. (The following characters are not permitted; /\|"?@#$%^&*():;<>,.)

◆ **EAP-TLS** — Transport Layer Security. Provides for certificate-based and mutual authentication of the client and the network. It relies on client-side and server-side certificates to perform authentication and can be used to dynamically generate user-based and session-based encryption keys to secure subsequent communications between the user and the network.

Outer NAI —The Network Access Identifier (NAI) text string that is used to identify the home authentication realm for device authentication during roaming. The NAI string (defined in RFC 4282) is used to proxy an authentication request to another remote server. The authentication is then performed using the unique X.509 authentication certificate included with the device. The string can be defined by three methods:

◆ **MAC:** Uses the device MAC address as part of the identity.

◆ **RANDOM:** Uses a generated random number of 26 hexadecimal digits.

◆ **CUSTOMIZE:** Allows the whole string to be defined as required.

Trust CA Certificate — The security certificate issued by a recognized certification authority (CA) that is used for mutual authentication with the authentication server when EAP-TLS is used. The browse button can be used to locate the file on the host PC.

User name — A text string used by EAP-TTLS-MS-CHAP-V2 to identify the user to the authentication server.

Password — The password used by EAP-TTLS-MS-CHAP-V2 to confirm the identity of the user to the authentication server.

A TROUBLESHOOTING

DIAGNOSING LED INDICATORS

Table 2: LED Indicators

LED Status	Probable Cause	Action
Orange LED is Off	The USB adapter is not receiving power	◆ Remove the USB adapter and reinsert it in the slot. Be sure the card is securely seated in the port. ◆ Try the USB adapter in another USB port. If this also fails, test your PC with another USB adapter that is known to operate correctly. ◆ Check the USB adapter and port connectors for any physical damage. ◆ Try the USB adapter in another PC's port that is known to operate correctly. ◆ If you cannot resolve the problem, contact your local dealer for assistance.
Green LED is Off	The USB adapter cannot detect a WiMAX base station	◆ Verify the area covered by your WiMAX service provider. ◆ Move to another location within the WiMAX service area.

NETWORK CONNECTION PROBLEMS

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

◆ Make sure the WCM software and driver is correctly installed on your system. If necessary, try uninstalling and reinstalling the software.

◆ If you cannot access the Internet, be sure your Windows system is correctly configured for TCP/IP. The IP settings should be set to "obtain an IP address automatically."

◆ You may have moved out of the service area of the WiMAX network. The WCM main screen should indicate that there is no connection. Call the service provider for service coverage information.

◆ The service provider's profile may not be configured correctly. Check that the Authentication Mode settings are correct.

◆ If you cannot resolve the problem, check the error logs from the WCM Status screen and contact your service provider.
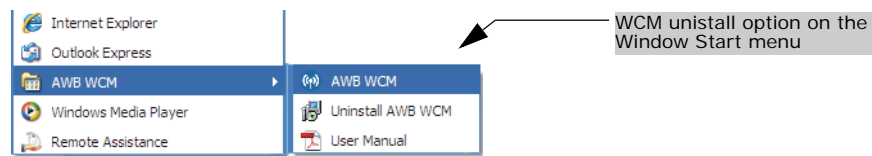
UNINSTALLING THE WCM SOFTWARE

If you are having problems with the WiMAX USB Adapter or the WCM software, you may need to uninstall the USB adapter driver and software from the Windows system.
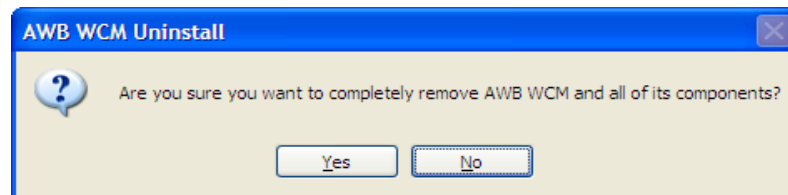
Follow these steps:

1. From the Windows Start menu, go to the WCM software entry.

2. Click the Uninstall WCM option on the menu.
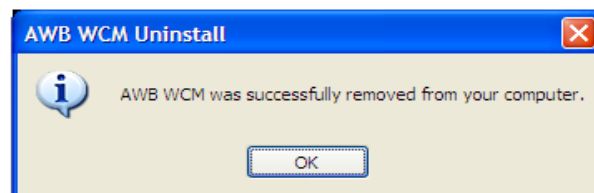
Figure 23: Uninstall WCM

3. Click the Yes button to confirm the uninstall process.

Figure 24: Confirm Uninstall

4. When the uninstall is complete, click OK to exit.

Figure 25: Uninstall Complete

B SPECIFICATIONS

HOST INTERFACE   USB 2.0 specification

STANDARD COMPLIANT   IEEE 802.16e-2005 Wave 2

AIR INTERFACE   Scaleable OFDMA

DUPLEX MODE   TDD/5ms frame

ANTENNA   Printed antenna
Transmit: Two antennas
Receive: Two antennas
Gain: 2 dBi
Pattern: Omnidirectional
Impedance: 50 ohms

POWER CONSUMPTION   2.4 W maximum

PHYSICAL SIZE   25 x 89 x 16 mm (0.98 x 3.50 x 0.62 in.)

WEIGHT   23 g (0.81 oz)

OPERATING FREQUENCY

Frequency Band	CE	FCC
3.8G	3300-3800	3650-3675

BANDWIDTH ALLOCATION

	3.8G
Bandwidth Allocation	5 MHz 10 MHz

MODULATION SCHEME PRBS subcarrier randomization
Contains pilot, preamble, and ranging modulation

MODULATION AND CODING TYPES Down Link
QPSK 1/2 CTC
QPSK 3/4 CTC
16 QAM 1/2 CTC
16 QAM 3/4 CTC
64 QAM 1/2 CTC
64 QAM 2/3 CTC
64 QAM 3/4 CTC
64 QAM 5/6 CTC
Up Link
QPSK 1/2 CTC
QPSK 3/4 CTC
16 QAM 1/2 CTC
16 QAM 3/4 CTC

MAXIMUM THROUGHPUT Downlink Peak Rate: > 20 Mbps
Uplink Peak Rate: > 7 Mbps

TRANSMIT POWER Maximum Power class less than +23 dBm

RECEIVE SENSITIVITY QPSK 1/2 CTC: -94 dBm
16-QAM 3/4 CTC: -82 dBm
64-QAM 3/4 CTC: -76 dBm

SECURITY/ENCRYPTION PKMv2 with 128 bit AES/CCM, EAP-TLS, EAP-TTLS

QoS MECHANISM Dynamic Service Flow Creation, Change, Deletion
Scheduling: UGS, RT-VR, NRT-VR, ERT-VR and BE

OPERATING TEMPERATURE Operating: -5 °C to 45 °C (32 to 113 °F)

HUMIDITY Operation: 5% to 95% (non-condensing)
Maximum Storage: 95%

EMMISSIONS/IMMUNITY COMPLIANCE FCC 47 CFR Part 15 Class B
EN 301 489-1/-17

SAFETY EN60950-1

RADIO SIGNAL CERTIFICATION US: 3.8 GHz - CFR 47 Part 90Z
Europe (3.5GHz): EN 302 623

SPECIFIC ABSORPTION RATE (SAR) US: FCC OET Bulletin 65, Supplement C
Europe: EN62311

SOFTWARE DRIVERS Windows XP SP2,Windows Vista and Windows 7
NDIS 5.0 PnP ETH 802.3 device driver specification
WHQL certified

LED	Status	Description
Power	On Orange	The USB adapter is correctly installed in a USB port and is receiving power.
	Blinking	The adapter is trying to connect to a base station.
Link/Activity	On Green	The USB adapter is searching for a WiMAX base station.
	Blinking	The USB adapter has an established link with a base station and is transmitting or receiving data.

GLOSSARY

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

BANDWIDTH   The difference between the highest and lowest frequencies available for network signals. Also synonymous with network speed, the actual speed of data transmission through a medium.

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

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

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

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

CPE   Customer-Premises Equipment: Terminal equipment provided by a service provider that is located at a subscriber's premises and supports a communication channel between a customer and the service provider.

CPU   Central Processing Unit: The CPU, or processor, is the part of a computer where most calculations take place. In most of today's PCs, the CPU is contained on a single chip. The type and speed (in GHz) of a CPU largely defines the processing power of a computer.

DNS Domain Name System: A system used for translating host names for network nodes into IP addresses.

DHCP Dynamic Host Configuration Protocol: Provides a framework for passing configuration information to hosts on a TCP/IP network. DHCP is based on the Bootstrap Protocol (BOOTP), adding the capability of automatic allocation of reusable network addresses and additional configuration options.

ENCRYPTION Data passing between a base station and subscribers uses encryption to protect from interception and evesdropping.

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

IEEE 802.16E The WiMAX standard that provides mobile broadband wireless access using Scalable Orthogonal Frequency Division Multiple Access (SOFDMA).

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

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

LED Light Emitting Diode: Used for indicating a device or network condition.

LAN Local Area Network: A group of interconnected computers and support devices.

MAC ADDRESS The physical layer address used to uniquely identify network nodes.

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

NETWORK ADAPTER A hardware device that enables a computer to communicate over a network. The adapter provides physical access to a particular networking medium.

RAM   Random Access Memory: The memory in a computer where the operating system, application programs, and other data currently in use are stored. RAM is volatile memory where data is lost when the computer is turned off. Having more RAM in a computer reduces the time the processor takes to read data, which increases overall computer performance.

RSSI   Receive Signal Strength Indicator: A measurement of the strength of a received wireless signal. The higher the RSSI value, the stronger the received signal from the antenna.

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

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

SERVICE PROVIDER   See *Internet Service Provider*.

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

SUBSCRIBER STATION   A general term for a customer's terminal equipment that provides connectivity with a WIMAX network.

TCP/IP   Transmission Control Protocol/Internet Protocol: Protocol suite that includes TCP as the primary transport protocol, and IP as the network layer protocol.

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

TTLS   Tunneled Transport Layer Security: EAP-TTLS is a protocol extension of EAP-TLS. The authentication server is authenticated to the client using its Certification Authority certificate, this establishes a secure "tunnel" through which the client is then authenticated.

USIM   Universal Subscriber Identity Module: See *Subscriber Identity Module*.

URL Uniform Resource Locator: An easy-to-read character string that is used to represent a resource available on the Internet. For example, "http://www.url-example.com/."

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

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