

802.11 an PCIe Module

**PCE3500AH**

User's Manual

## Federal Communication Commission Interference Statement

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

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

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

## Country Code Statement

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

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.

| Ant. | Brand                           | Model Name   | Antenna Type   | Connector | Gain (dBi) |
|------|---------------------------------|--------------|----------------|-----------|------------|
| 1    | Master Wave Technology CO., LTD | 98618UNXX000 | Dipole Antenna | MMCX      | 7          |
| 2    | Master Wave Technology CO., LTD | 98618UNXX000 | Dipole Antenna | MMCX      | 7          |
| 3    | Master Wave Technology CO., LTD | 98618UNXX000 | Dipole Antenna | MMCX      | 7          |

Note: The EUT has three antennas. (3TX/3RX)

This device is going to be operated in 5.15~5.25GHz frequency range, it is restricted in indoor environment only.

Integration Manual: Antenna Info (list of approved antennas) generally required for modular approved transmitters with external antennas

### IMPORTANT NOTE:

#### FCC Radiation Exposure Statement:

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

**IMPORTANT NOTE:**

This module is intended for OEM integrator. The OEM integrator is still responsible for the FCC compliance requirement of the end product, which integrates this module.

20cm minimum distance has to be able to be maintained between the antenna and the users for the host this module is integrated into. Under such configuration, the FCC radiation exposure limits set forth for an population/uncontrolled environment can be satisfied.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

**USERS MANUAL OF THE END PRODUCT:**

In the users manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of 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.

**LABEL OF THE END PRODUCT:**

The final end product must be labeled in a visible area with the following " Contains TX FCC ID: U2M-PCE3500AH ". If the size of the end product is larger than 8x10cm, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of 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.

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# Chapter 1:

# Introduction

The Dual-band Wireless USB Dongle can access two different networks which could act in any WiFi station or AP combinations. Operating either in the 2.4GHz and 5GHz frequency bands, the Dual-band Wireless USB Dongle effectively increases the available wireless bandwidth and reduces wireless interference. The Dual-band Wireless USB Dongle also supports WiFi Direct feature that can easily build a WiFi P2P PAN network.

The Dual-band Wireless USB Dongle supports 802.11e for multimedia applications, 802.11i and WAPI(Wireless Authentication Privacy Infrastructure) for security, and 802.11n for enhanced MAC protocol efficiency.

The Dual-band Wireless USB Dongle is the most versatile wireless tool on the market. Just plug it into your computer's USB port and enjoy incredible high-speed wireless network access.

## Features

- 3T3R Mode with 450Mbps PHY Rate
- Complies with 802.11a/n standards
- Supports WEP 64/128, WPA, WPA2
- Supports USB 2.0 interface
- Compatible with Microsoft Windows Vista, XP/WIN7
- WiFi Direct supports wireless peer to peer applications

## Physical Details

|                   |  |
|-------------------|--|
| <b>WPS button</b> | To press the physical WPS button on the Wireless USB Dongle once, then the LED will start to flash. Please make a connection with another WPS supported device within <b>2</b> minutes.  |
| <b>LED</b>        | <b>Off</b> – Power off<br><b>Solid Green</b> – When associate with the Access Point or Ad-Hoc wireless workstation the LED will show solid green.<br><b>Blinking Green</b> – Indicate the device is transmitting data through the Access Point or Ad-Hoc wireless workstation. Also when the PBC button is pressed, the LED will blink to indicate WPS status that the LED will blink 2 seconds and off 2 seconds. |

# Chapter 2: Installation

## Install Software

**Note:**

**Do not insert the Wireless USB Adapter into the computer until the InstallShield Wizard finished installing.**

1. Exit all Windows programs. Insert the included Installation CD into the computer. The CD-ROM will run automatically. Please click **Next** to process the installation.
2. When the following screen appears, click **Finish** to restart the computer to complete the software installation.

## Install Hardware

**Note:**

**Insert the Wireless USB Adapter when finished software installation.**

Insert the Wireless USB Adapter into the USB Port of the computer. The system will automatically detect the new hardware.

## Verification

To verify the device is active in the computer. Go to **Start > Control Panel > System > Hardware > Device Manager**. Expand the **Network adapters** category. If the **802.11a/n Mini Wireless LAN USB2.0 Adapter MAC0/MAC1** is listed here, it means that the device is properly installed and enabled.

# Chapter 3:

# Network Connection

## How to Make a Connection

To make a connection with an access point, please follow below steps. Here takes Windows XP OS for example.

**Step 1:** After set up the Wireless USB Adapter successfully, please launch the Configuration Utility. There are two ways to launch the utility by:

- (1) Double clicking the Intelligent Wireless LAN Utility icon on the desktop.
- (2) Or go to **Start → All Programs → Intelligent Wireless LAN Utility → Intelligent Wireless LAN Utility.**

**Step 2:** Please go to the **Available Network** tab, the system will automatically scan access points nearby, or click **Refresh** button to site survey again.

**Step 3:** Then, double click preferred access point or click **Add to Profile** button to make a connection (if the access point has been set up security, please enter passwords and then click **OK.**)

## How to Add a Profile

After launched Wireless LAN Utility and selected preferred access point, please click **Add to Profile** button to enter **Wireless Network Properties** windows. If the access point has been set up security, please enter passwords, and then click **OK** to save profile settings.

After finished above settings, please go to **Profile** tab to check the profile listed (Available Profile(s)).

# Chapter 4:

# Utility Configuration

## Station Mode

- **Show Tray Icon:** Check to show the wireless adapter icon at the tray.
- **Disable Adapter:** Check this to disable the wireless adapter.
- **Radio off:** Check this to turn OFF radio function.
- **Windows Zero Config:** Click to use windows built-in wireless utility.
- **Close:** Click to leave the Intelligent Wireless LAN Utility.

### General

The General page displays the detail information of current connection.

| General Tab            |  |
|------------------------|--|
| <b>Status</b>          | Shows the current connected status. If there is no connection, it will show Not Associated. If been connected, the system will show Associated. When connecting, the system will show checking Status. |
| <b>Speed</b>           | Shows the current transmitting rate and receiving rate.  |
| <b>Type</b>            | Network type in use, Infrastructure or Ad-Hoc.   |
| <b>Encryption</b>      | Shows the encryption type currently in use. Valid value includes WEP, TKIP, AES, and Not Use.  |
| <b>SSID</b>            | Shows the connected access point network name.   |
| <b>Signal Strength</b> | Shows the receiving signal strength.   |
| <b>Link Quality</b>    | Shows the connection quality based on signal strength.   |
| <b>MAC Address</b>     | The physical address of the Wireless USB Adapter.  |
| <b>IP Address</b>      | Shows the IP address information.  |
| <b>Subnet Mask</b>     | Shows the Subnet Mask information.   |
| <b>Gateway</b>         | Shows the default gateway IP address.  |
| <b>Renew IP</b>        | Click the <b>Renew IP</b> button to obtain IP address form the connected gateway.  |

### Profile

Profile can let users book keeping the favorite wireless setting among home, office, and other public hot-spot. Users may save multiple profiles, and activate the correct one at preference. The Profile manager enables users to **Add, Remove, Edit, Duplicate** and **Set Default** profiles.



| <b>Profile Tab</b>  |  |
|---------------------|--|
| <b>Profile Name</b> | Here shows a distinctive name of profile in this column.   |
| <b>SSID</b>         | The <b>SSID</b> is the unique name shared among all wireless access points in the wireless network.  |
| <b>Add</b>          | <p>Click <b>Add</b> button to add a profile from the drop-down screen.</p> <p><b>Profile Name:</b> Users can enter profile name at will.</p> <p><b>Network Name (SSID):</b> The SSID is the unique network name (case-sensitive) shared among all wireless access points in the wireless network. The name must be identical for all devices and wireless access points attempting to connect to the same network.</p> <p><b>This is a computer-to-computer (ad hoc) network; wireless access points are not used:</b> This function is selected to enable the ad hoc network type that computers should be setup at the same channel to communicate to each other directly without access point, users can share files and printers between each PC and laptop. User can select channels form the pull-down menu.</p> <p style="background-color: #e6f2ff;"><b>Wireless network security</b></p> <p><b>Network Authentication:</b> There are several types of authentication modes including Open System, Shared Key, WPA-PSK, WPA2-PSK, WPA 802.1X, WPA2 802.1X, WEP 802.1X.</p> <p><b>Data encryption:</b> For Open System, Shared Key and WEP 802.1X authentication mode, the selection of encryption type is WEP. For WPA-PSK, WPA2-PSK, WPA 802.1X and WPA2 802.1X authentication mode, the encryption type supports both TKIP and AES.</p> <p style="background-color: #e0e0e0;"><b>When encryption is set to WEP...</b></p> <p><b>ASCII:</b> Only valid when using WEP encryption algorithm. When key length is set to 64 bits user can enter <a href="#">5 ASCII characters</a> (case sensitive), and 128 bits for 13 <a href="#">ASCII characters</a> (case sensitive).</p> <p><b>PASS PHRASE:</b> Only valid when using WEP encryption algorithm. When key length is set to 64 bits user can enter <a href="#">10 Hexadecimal characters</a> (0~9, a~f) and 128 bits for 26 <a href="#">Hexadecimal characters</a> (0~9, a~f).</p> <p><b>Key index (advanced):</b> Select 1~4 key index form the pull-down menu, must match with the connected AP's key index.</p> <p style="background-color: #e0e0e0;"><b>When encryption is set to WPA-PSK/ WPA2-PSK...</b></p> <p><b>Network key:</b> Enter network key at least 8 to 64 characters.</p> <p><b>Confirm network key:</b> Enter network key again to confirm.</p> <p style="background-color: #e0e0e0;"><b>When encryption is set to WPA 802.1X/ WPA2 802.1X/ WEP 802.1X...</b></p> <p>When users use radius server to authenticate client certificate for WPA authentication mode (WPA authentication do not support EAP Method-MD5-Challenge).</p> <p><b>EAP TYPE:</b></p> <ul style="list-style-type: none"> <li>• <b>TLS:</b> Transport Layer Security. Provides for certificate-based and</li> </ul> |

|                    |   |
|--------------------|---|
|                    | <p>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 WEP keys to secure subsequent communications between the WLAN client and the access point.</p> <ul style="list-style-type: none"> <li>• <b>LEAP:</b> Light Extensible Authentication Protocol. It is an EAP authentication type used primarily in Cisco Aironet WLANs. It encrypts data transmissions using dynamically generated WEP keys, and supports mutual authentication.</li> <li>• <b>TTLS:</b> Tunnelled Transport Layer Security. 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.</li> <li>• <b>PEAP:</b> Protect Extensible Authentication Protocol. PEAP transport securely authentication data by using tunnelling between PEAP clients and an authentication server. PEAP can authenticate wireless LAN clients using only server-side certificates, thus simplifying the implementation and administration of a secure wireless LAN. <ul style="list-style-type: none"> <li>○ <b>MD5:</b> Message Digest Challenge. Challenge is an EAP authentication type that provides base-level EAP support. It provides for only one-way authentication - there is no mutual authentication of wireless client and the network.</li> </ul> </li> </ul> <p><b>Tunnel:</b> This is enabled under TTLS and PEAP type. For TTLS, the selections of tunnel are CHAP, MSCHAP, MSCHAP-V2, PAP. For PEAP, the selections of tunnel are MD5, GTC, TLS and MSCHAP-V2.</p> <p><b>Username:</b> Enter the username for server.</p> <p><b>Identity:</b> Enter the identity for server.</p> <p><b>Domain:</b> Enter the domain of the network.</p> <p><b>Password:</b> Enter the password for server.</p> <p><b>Certificate:</b> Choose server that issuer of certificates.</p> |
| <b>Remove</b>      | Click <b>Remove</b> button to delete selected profile.  |
| <b>Edit</b>        | Click <b>Edit</b> button to edit selected profile.  |
| <b>Duplicate</b>   | Click <b>Duplicate</b> button to copy selected profile.   |
| <b>Set Default</b> | Click <b>Set Default</b> button to set selected profile to be connected first.  |

## Available Network

This page displays the information of surrounding APs from last scan result. The tab lists the information including SSID, Channel, Encryption, Network Authentication, Signal, Type, BSSID, Supported Rate (s), and Mode.

| <b>Network Tab</b> |  |
|--------------------|--|
| <b>SSID</b>        | Shows the network name of the access points. |

|                               |  |
|-------------------------------|--|
| <b>Channel</b>                | Shows the currently channel in use.  |
| <b>Encryption</b>             | Shows the encryption type currently in use. Valid value includes WEP, TKIP, AES, None and TKIP/AES.                  |
| <b>Network Authentication</b> | Show the device network authentication.  |
| <b>Signal</b>                 | Shows transmit power, the amount of power used by a radio transceiver to send the signal out.                        |
| <b>Type</b>                   | Network type in use, Infrastructure or Ad-Hoc mode.  |
| <b>BSSID</b>                  | Shows Wireless MAC address.  |
| <b>Supported Rate(s)</b>      | Shows the transmitting data rate.  |
| <b>Mode</b>                   | Supported wireless mode. It may support 802.11b, 802.11g and 802.11n wireless mode.                                  |
| <b>Refresh</b>                | Click Refresh button to search and rescan the available network.   |
| <b>Add to Profile</b>         | Select an available network (SSID) on the list and then click Add to Profile button to add it into the profile list. |
| <b>Note</b>                   | Double click on item to join/create profile.   |

## **Status**

This tab listed the information about the wireless USB adapter and connected access point.

## **Statistics**

The Statistics screen displays the statistics on the current network settings.

| <b>Statistics</b>      |   |
|------------------------|---|
| <b>Tx OK</b>           | Shows information of packets successfully sent.                         |
| <b>Tx Error</b>        | Shows information of packets failed transmit after hitting retry limit. |
| <b>Rx OK</b>           | Shows information of packets received successfully.                     |
| <b>Rx Packet Count</b> | Shows information of packets received successfully.                     |
| <b>Rx Retry</b>        | Shows information of packets failed transmit after hitting retry limit. |
| <b>Rx ICV Error</b>    | Shows information of packets received with ICV error.                   |
| <b>Reset</b>           | Click to reset counters to zero.  |

## WPS

The primary goal of Wi-Fi Protected Setup (Wi-Fi Simple Configuration) is to simplify the security setup and management of Wi-Fi networks. The STA as an Enrollee or external Registrar supports the configuration setup using PIN (Personal Identification Number) configuration method or PBC (Push Button Configuration) method through an internal or external Registrar.

| <b>WPS Tab</b>                  |  |
|---------------------------------|--|
| <b>PIN Code</b>                 | 8-digit numbers. It is required to enter PIN Code into Registrar when using PIN method. When STA is Enrollee, users can use " <b>Renew</b> " button to re-generate new PIN Code. |
| <b>Pin Input Config (PIN)</b>   | Click the <b>Pin Input Config (PIN)</b> button to select specific AP to process PIN Config.  |
| <b>Push Button Config (PBC)</b> | Click this button to connect with AP that supported WPS function within two minutes. Meanwhile, the AP should also click the PBC button simultaneously.                          |

## About

This page displays the information of the Wireless USB Adapter Version.

## Switch to AP Mode

To access the soft AP mode, please double click the **802.11 a/n Mini Wireless LAN USB2.0 Adapter WiFi Soft AP** to enter the soft AP mode setting.

## Soft AP mode

| <b>General</b>           |   |
|--------------------------|---|
| <b>SSID</b>              | Shows the network name of the AP.   |
| <b>BSSID</b>             | Shows the MAC address of the AP.  |
| <b>Network Address</b>   | Shows the IP address and subnet Mask of the soft AP.  |
| <b>Association Table</b> | This table shows the connected client here.   |
| <b>Config</b>            | Click the Config button to set up the Wireless Network Properties.<br><b>Network Name (SSID):</b> User can change the network name of this access |

|  |   |
|--|---|
|  | <p>point.</p> <p><b>Channel:</b> User can select the channel form the pull-down list.</p> <p><b>Wireless network security</b></p> <p><b>Network Authentication:</b> There are several types of authentication modes including Open System, Shared Key, WPA-PSK and WPA2-PSK.</p> <p><b>Data encryption:</b> For Open System and Shared Key authentication mode, the selection of encryption type is WEP. For WPA-PSK, WPA2-PSK, authentication mode, the encryption type supports both TKIP and AES.</p> <p><b>When encryption is set to WEP...</b></p> <p><b>ASCII:</b> Only valid when using WEP encryption algorithm. When key length is set to 64 bits user can enter <u>5 ASCII characters</u> (case sensitive), and 128 bits for 13 <u>ASCII characters</u> (case sensitive).</p> <p><b>PASS PHRASE:</b> Only valid when using WEP encryption algorithm. When key length is set to 64 bits user can enter <u>10 Hexadecimal characters</u> (0~9, a~f) and 128 bits for 26 <u>Hexadecimal characters</u> (0~9, a~f).</p> <p><b>Key index (advanced):</b> Select 1~4 key index form the pull-down menu, must match with the connected AP's key index.</p> <p><b>When encryption is set to WPA-PSK/ WPA2-PSK...</b></p> <p><b>Network key:</b> Enter network key at least 8 to 64 characters.</p> <p><b>Confirm network key:</b> Enter network key again to confirm.</p> |
|--|---|

## Advanced

| Advanced               |  |
|------------------------|--|
| <b>Beacon Interval</b> | The time between two beacons. (The system default is 100 ms.)  |
| <b>DTIM Period</b>     | The delivery traffic indication message (DTIM) is an element included in some beacon frames. User can specify a value from 1 to 255 beacons. |
| <b>Preamble Mode</b>   | Select from the pull-down menu to change the Preamble type into <b>Short</b> or <b>Long</b> .  |
| <b>Set Defaults</b>    | Click to use the system default value.   |
| <b>Apply</b>           | Click to apply the above settings.   |

| Statistics             |   |
|------------------------|---|
| <b>Tx OK</b>           | Shows information of packets successfully sent.                         |
| <b>Tx Error</b>        | Shows information of packets failed transmit after hitting retry limit. |
| <b>Rx OK</b>           | Shows information of packets received successfully.                     |
| <b>Rx Packet Count</b> | Shows information of packets received successfully.                     |

|                     |   |
|---------------------|---|
| <b>Rx Retry</b>     | Shows information of packets failed transmit after hitting retry limit. |
| <b>Rx ICV Error</b> | Shows information of packets received with ICV error.                   |
| <b>Reset</b>        | Click to reset counters to zero.  |

## ICS

This page displays setting Internet connection sharing (ICS). Select a sharing public network and click Apply button to make a connection.

# Chapter 5: Remove

To remove the utility and driver, please refer to below steps. (When removing the utility, the driver will be removed as well.)

1. Go to **Start → All Programs → Intelligent Wireless LAN Utility → Uninstall**.
2. Click **Yes** to completely remove the selected application and all of its features.
3. Then click **Finish** to complete removing.