*Instant***Wave**™

11Mbps Wireless Networking

Wireless Ethernet Client

NWH2210/NWH2610
Installation Guide

Rev. A1
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WEC

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FCC WARNING

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 or more 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

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation

FCC RF Radiation Exposure Statement

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

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

Table of Contents

List of Figures

Packing List

The package should contain the following items:

- One InstantWave Wireless Ethernet Client

- RS-232 Cable

- Cross-over Ethernet Cable

- One Floppy Disk

- Installation Guide

Introduction

Congratulations on choosing an InstantWave Wireless Ethernet Client (WEC). This guide gives instructions on installing the WEC and using the configuration program.

The InstantWave WEC is part of a family of easy to use high-performance wireless communication products. The family products also include:

- InstantWave AP (NWH660)
- InstantWave PC Card (NWH610)
- InstantWave PCI Card (NWH630)

The InstantWave WEC provides a wireless connection to the Internet or to shared resources for an Ethernet-enabled device. Once the WEC has been set up, all that is required is a simple cross-over Ethernet cable between the WEC and the device to be connected, e.g. notebook computer. Ad hoc mode allows Ethernet-enabled devices to communicate wirelessly WEC to WEC

System Requirements

System requirements to install and operate the InstantWave WEC are:

- An Ethernet adapter
- A PC running Windows 95/98/Me/NT4.0/2000/XP (only required when configuration of the WEC's network properties is necessary)

Placement Guidelines

A few tips to mention that are particularly significant in a radio wave communications system:

1. Radio waves reflect or refract from buildings, walls, metal furniture, or other objects. This could result in performance degradation due to the fluctuation of the received signal.

2. Microwave ovens use the 2.45 GHz frequency band. InstantWave also functions in the 2.4 ~ 2.5 GHz band, and therefore shares some of the band with microwave ovens. This means that when a nearby microwave oven is in use, it may interfere with InstantWave signals, resulting in performance degradation on the wireless network.

For the best performance, follow the guidelines below in placing the product:

- Place as high as possible, in as open an area as possible

- Avoid placing the WEC (especially the antenna) close to metal objects (e.g. file cabinets, metal cubicles, etc.)
- Keep WECs as far away as possible from microwave ovens (10 meters min. is advisable)

How to Use this Guide

The Installation Guide gives complete instructions for installation of the InstantWave Wireless Ethernet Client (WEC).

Use the WEC COMFig tool , see page 7, to change the default WEC settings. The WEC COMFig tool permits basic WEC offline configuration from a PC via an RS-232 cable/COM port connection.

Terminology Used in this Guide

Domain Name/*SSID*

A "Domain" is most commonly used to refer to a group of computers whose hostnames share a common suffix. The domain is usually defined by the network administrator as a segment/subnet of a large network and may be made up of overlapping wireless cells. Wireless nodes can roam freely within the same domain without disconnecting from the network.

Regulatory Domain

InstantWave products use the unlicensed ISM (Industrial, Scientific, Medical) band to communicate through radio waves. Different countries offer different radio frequencies to be used as the ISM band. There are four frequency bands defined by IEEE 802.11: Japan (2.471GHz – 2.497 GHz), USA, Extended Japan, Canada, and Europe (2.4 GHz – 2.4835 GHz), Spain (2.445 GHz – 2.475 GHz), and France (2.4465 GHz – 2.4835 GHz). To use InstantWave in a country not listed above, check with your government's regulating body to find the correct frequency band to use. All InstantWave products are supplied preset to the country of sale's frequency band.

WEP

WEP stands for Wired Equivalent Privacy. It is an encryption scheme that provides secure wireless data communication. WEP uses a 40-bit or 128-bit key to encrypt data. In order to decode the data transmission, each wireless client on the network must use identical keys.

Application Scenarios

Infrastructure Network

An Infrastructure network is formed by several stations and one or more Access Points (APs), with the stations within a set distance from the AP. Figure 1 depicts a typical Infrastructure network topology.
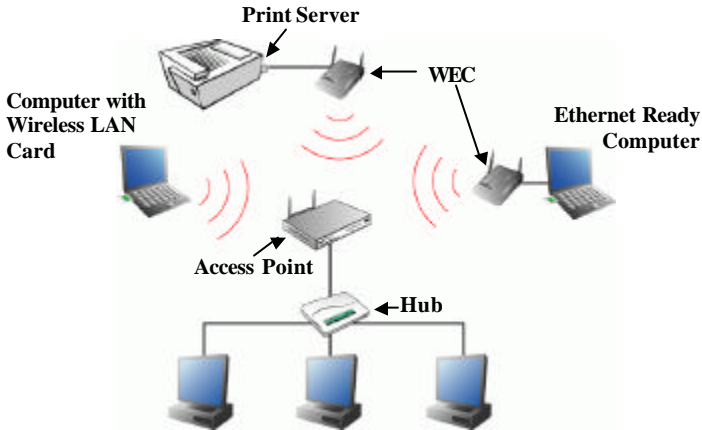

Figure 1.   Infrastructure Network

Ad Hoc Network

An Ad hoc network is formed by a number of wireless stations (without an Access Point) communicating via radio waves. For the users, the shared resources on the wireless network appear exactly as they would on a regular wired network. The wireless operation of the network is totally transparent. Figure 2 depicts a typical Ad hoc network scenario.
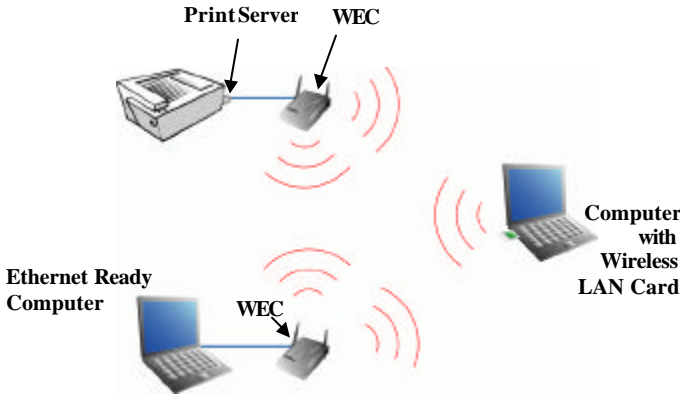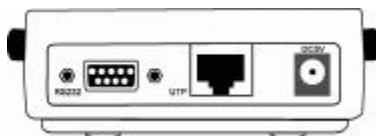

Figure 2.   Ad Hoc Network

Hardware Description

The WEC rear panel contains the cable connectors. One RS-232 port for connecting the configuration cable from a computer COM port, one UTP port for connecting a cross-over Ethernet cable from an Ethernet device, and the DC5V power-in port for connecting the power adapter.

Note: Use only the supplied power adapter.

Figure 3.   Rear Panel
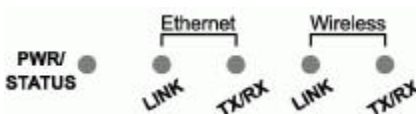
Figure 4.   Front Panel

LED Indicators

The WEC LEDs on the front panel (**Figure 4**) show the status of the connections.

PWR/STATUS	Unlit: Power is off
	Blinking Green: Diagnostic test
	Steady Green: Healthy condition
	Steady Red: Sick condition
	Blinking Green: The WEC COMFig Tool is being used to configure the WEC
Ethernet LINK	Unlit: No link
	Steady Green: Ethernet link
Ethernet TX/RX	Unlit: No activity
	Blinking Orange: TX/RX activity
Wireless LINK	Unlit: No link
	Steady Green: Radio link
	Blinking Green: The WEC COMFig Tool is being used to configure the WEC
Wireless TX/RX	Unlit: No activity
	Blinking Orange: TX/RX activity

WEC Configuration Tool Installation

Before adding a WEC into an existing network, you may need to set basic parameters, e.g. domain name (SSID), security setting (WEP), etc. in order to make it compatible with the existing network.

Follow the steps below to connect the WEC to a PC for configuration:

step1. Connect the supplied RS-232 cable to the COM port on the WEC and connect the other end to a serial port (COM port) on the PC

step2. Connect the power block to the electricity outlet and then to the WEC DC5V port

step3. Insert the InstantWave WEC floppy disk into the floppy disk drive and click *Start/Run*. Type *a:/setup.exe*

step4. Follow the on-screen instructions to complete the WEC COMFig Tool installation

Using the WEC COMFig Tool

The WEC COMFig Tool is a Windows based utility used to configure the WEC via a COM port connection between the WEC and a PC.

It provides the following functions:

- Sets WEC parameters (e.g., Network Mode, Domain Name (SSID), Security, etc.)

- Diagnoses the WEC hardware and shows the diagnostic results

- Upgrades the WEC firmware

- Resets the WEC Configuration

To start the WEC COMFIG Tool, click *Start/Programs/Wec/WEC COMFig Tool*.

Connect

The program opens with the WEC *COMFig Tool/Connect* card (**Figure 5**). Once a valid COM port is selected, the WEC COMFig tool will remember this port number and use it as the default port when the program is next run. The program will show *Connected* when a connection is made.
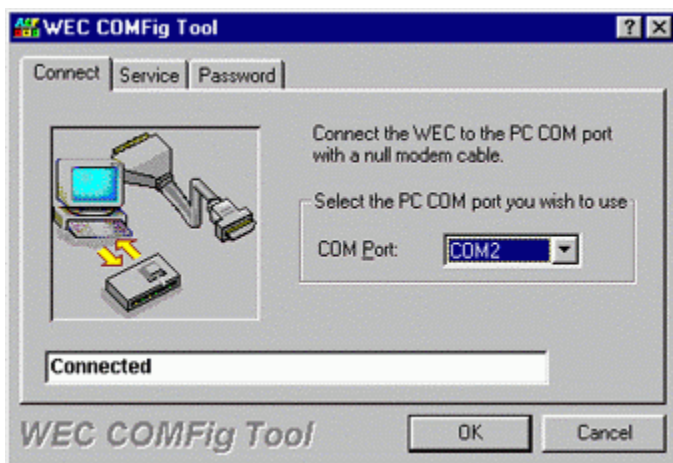

Figure 5.   Connect

Password

After connecting with the WEC, click on the *Password* tab to open the *Password* card (**Figure 6**). Setting a password prevents unauthorized changes to the WEC configuration settings.

The password is blank by default. A password of up to 30 characters may be set.

Figure 6.   Password

Service

Click on the *Service* tab to open the *Service* card (**Figure 7**). The *Service* card provides access to the management features.
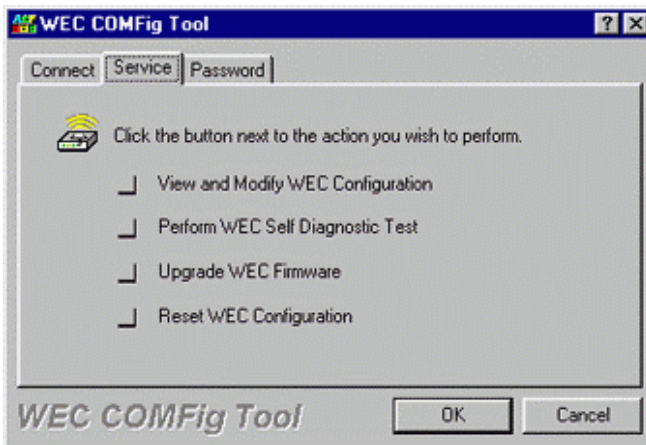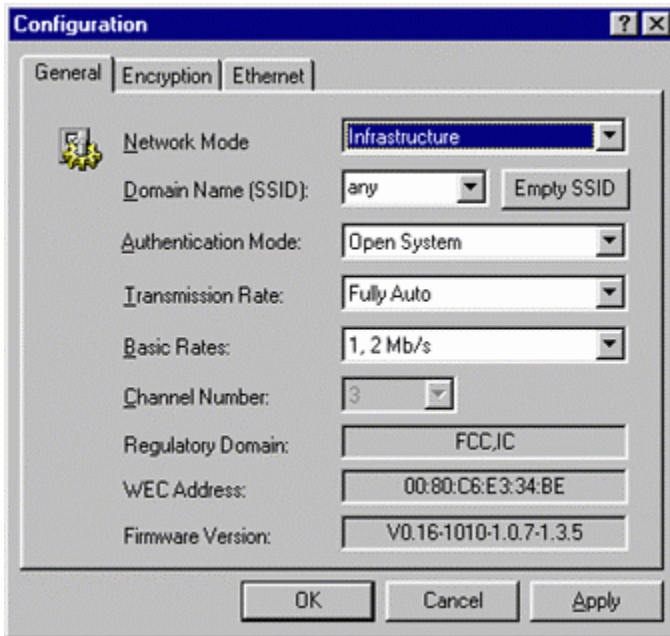

Figure 7.   Service

Click the *View and Modify WEC Configuration* button. The *Configuration* screen will open (**Figure 8**).

General

The *General* card (**Figure 8**) is the first card in the *Configuration* section.

Figure 8.   Configuration/General

On this card, you can set and view general WEC settings:

Network Mode	The WEC allows for two types of networking operation, Infrastructure or Ad-hoc.
Domain Name (SSID)	Identifies the wireless LAN domain that this WEC is in. Only WECs and Access Points with the same SSID can associate with each other. Each SSID may contain up to 31 characters.
Empty SSID	Click this button to clear the SSID history and reset the SSID to 'any'. This allows the WEC to associate with the Access Point with the best signal quality, regardless of the SSID setting.
Authentication Mode	The Authentication Mode parameter controls the validation of the WEP Key. *Open System* On association with an Access Point, only the SSID setting is checked. The Wired Equivalent Privacy (WEP) key will be checked only when a data link is made. *Shared Key* Both the SSID and the WEP key will be checked during WLAN association. Shared Key selection is not available when the WEC encryption method is set to disabled (see Encryption, page 11). In such cases the WEC will automatically use the open system authentication mode. *Auto Switch* When using auto switch mode, the WEC will try shared key authentication mode first. If shared mode fails, the WEC attempts to use the open system authentication mode.
Transmission Rate	Sets the transmission rate at which the data packets are transmitted by the WEC.
Basic Rates	This value determines the basic rates used and reported for this BSS by the WEC. The highest rate specified will be the rate that the WEC will use when transmitting broadcast/multicast and management frames. Available options are:

| | | 1 and 2Mbps |
		All (1, 2, 5.5, and 11Mbps)
Channel Number		802.11b WLAN operates on multiple radio channels. The allowed channels depend on the country you are in.
		When the WEC is running in Infrastructure mode, the channel number is auto set to the same channel as the Access Point to which it is associated.
		In Ad hoc mode, the channel must match the channel used by the other wireless stations you wish to communicate with. Select the channel you want to use.
		Refer to the Appendix, page 22, for channels supported in each regulatory domain.
Regulatory Domain		Identifies the country where the WEC is used. Each country has defined its available channel numbers and transmission power (see Appendix, page 22).
WEC Address		This is the MAC ID of the WEC.
Firmware Version		The current WEC firmware version.

Important:
In a multiple cell network topology, overlapping and/or adjacent cells using different channels can operate simultaneously without interference if the frequency distance between the center frequencies is at least 30MHz. For example channels 1, 7, and 13 are non-overlapping frequency channels.

After making any changes, click the *Apply* button to make the changes effective immediately, without closing the dialog box, or click *OK* to accept the changes and close the box.

Encryption

Data encryption provides more secure wireless data communications. Click the *Encryption* tab to setup/change the security settings (**Figure 9**). The default is *Disabled* and initially the keys section will be blank.
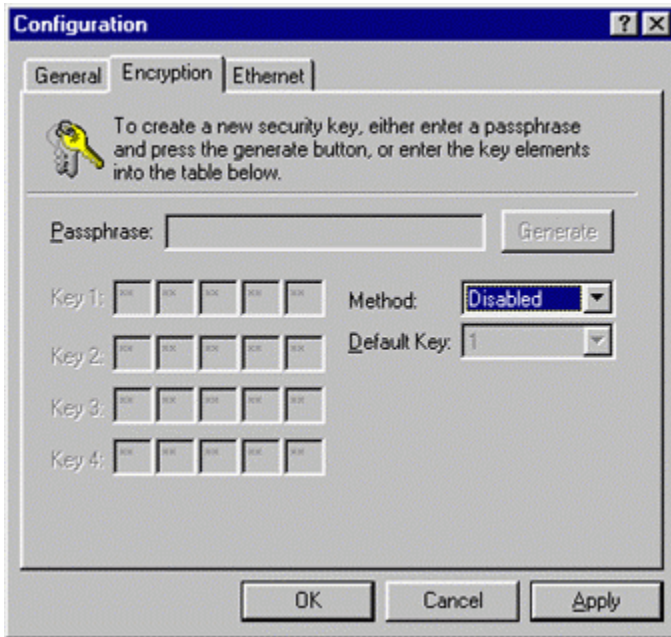
Figure 9.   Configuration/Encryption

The dropdown *Method* box lists three options:

1.   Disabled (default) - Disables data encryption
2.   40-bit WEP - Enables 40-bit WEP encryption
3.   128-bit WEP - Enables 128-bit WEP encryption

*Key Generation* - There are two ways to generate a security key.

The first is by entering any text in the *Passphrase* field. The passphrase should contain multiple words and may include spaces, numbers, and punctuation characters; the passphrase is case sensitive. Click the *Generate* button. For 40-bit WEP, it will generate four keys, Key 1, Key 2, Key 3, and Key 4. Select a key number from the dropdown list of the *Default Key* box. If you do not manually select a key, key 1 will be selected. For 128-bit WEP, only one key will be generated. Click *Apply*.

Another WEP key generation method is to insert the key values directly from the keyboard. The key value must be valid hexadecimal characters (0-9, and A-F). Enter your own key into one of the *Key 1~4* fields. Select that field number in the *Default Key* box. Click *OK*.

Ethernet

This card is used to set the WEC's Ethernet port settings.
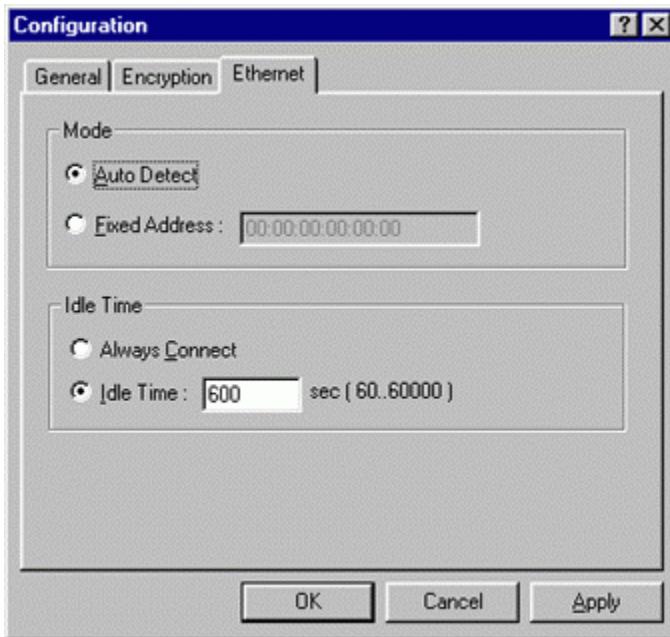
Figure 10. Configuration/Ethernet

Auto Detect	If *Auto Detect* is selected, the WEC will use the MAC address of the connecting Ethernet device as its MAC address.
Fixed Address	This option allows you to specify a specific Ethernet device MAC address that is allowed to pass traffic through the WEC.
Always Connect	Selecting this option keeps the WEC always associated with an Access Point, regardless of whether an Ethernet device is connected to the WEC.
Idle Time	The *Idle Time* option determines the amount of time the WEC may be idle (no packets received from or transmitted to it) before it disconnects from the associated Access Point. Specify a time from 60 to 60,000 seconds for this option.

Perform WEC Self Diagnostic Test

On the *Service* card (Figure 7, page 8), click *Perform WEC Self Diagnostic Test*.
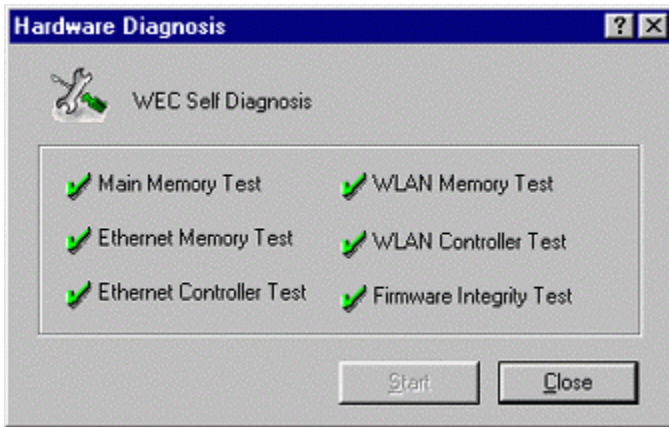The *Hardware Diagnosis* screen will open (**Figure 11**).

Figure 11. Hardware Diagnosis

Click *Start* and the tests will commence. As each item is tested, a yellow arrow
will appear alongside it. If the test is successful, the arrow will change to a green
tick. If a failure occurs, an "X" will appear. You can click *Cancel* at any time to
stop the tests. When the tests have completed, the *Cancel* button changes to a
Close button. Click *Close* to return to the *Service* card.

Upgrade WEC Firmware

From time to time updated firmware is released and may be downloaded from our
website at http://www.ndc.com.tw/support/support.htm

The updated firmware may be installed via a COM port using the WEC COMFig
tool. Click on **Upgrade WEC Firmware** (Figure 7, page 8). The *Upgrade
Firmware* dialog box will open (**Figure 12**).
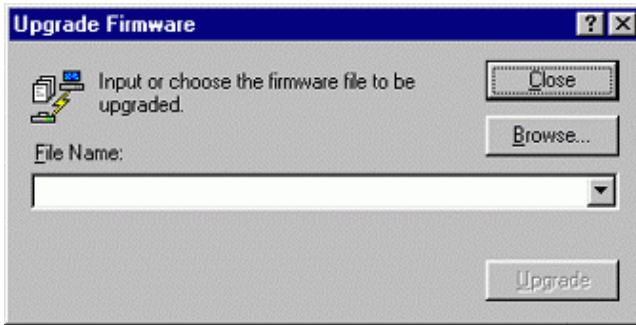
Figure 12. Upgrade Firmware

Use the *Browse* button to choose the file to be uploaded to the WEC, or type the file location and name in the *File Name* field. The *Upgrade* button will then become enabled. Click *Upgrade*. The new firmware will be loaded into the WEC's flash memory area. When the firmware upgrade is complete, click *Close* to return to the *Service* card.

Reset WEC Configuration

Click *Reset WEC Configuration* (Figure 7, page 8) to open the screen shown in Figure 13, and click *Reset* to restore the factory default configuration to the WEC.
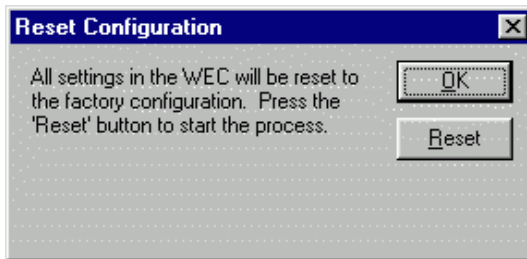
Figure 13. Reset Configuration

Connect An Ethernet Device

Follow the steps below to connect the WEC to a PC or to another Ethernet device.

step1. Connect one end of the supplied cross-over Ethernet cable to the port on the rear of the WEC

step2. Connect the other end of the cable to the Ethernet adapter of a PC or other Ethernet device

Technical Support

If you have any problems that you cannot resolve with the information in troubleshooting, or the FAQs at
http://www.ndc.com.tw/support/tech/iw_faq.htm
please note the following information and contact our technical support team:

- What you were doing when the error occurred
- What error messages you saw
- Whether the problem can be reproduced
- The serial number of the product
- The firmware version and the debug information

NDC Technical Support is available via e-mail: techsupt@ndc.com.tw

For other information about NDC, please visit us at: www.ndc.com.tw

NDC Limited Warranty

Hardware

NDC warrants its products to be free of defects in workmanship and materials, under normal use and service, for a period of 12 months from the date of purchase from NDC or its Authorized Reseller, and for the period of time specified in the documentation supplied with each product.

Should a product fail to be in good working order during the applicable warranty period, NDC will, at its option and expense, repair or replace it, or deliver to the purchaser an equivalent product or part at no additional charge except as set forth below. Repair parts and replacement products are furnished on an exchange basis and will be either reconditioned or new. All replaced products and parts will become the property of NDC. Any replaced or repaired product or part has a ninety (90) day warranty or the remainder of the initial warranty period, whichever is longer.

NDC shall not be liable under this warranty if its testing and examination disclose that the alleged defect in the product does not exist or was caused by the purchaser's, or any third party's misuse, neglect, improper installation or testing, unauthorized attempt to repair or modify, or any other cause beyond the range of the intended use, or by accident, fire, lightning, or other hazard.

Software

Software and documentation materials are supplied "as is" without warranty as to their performance, merchantability, or fitness for any particular purpose. However, the media containing the software is covered by a 90-day warranty that protects the purchaser against failure within that period.

Limited Warranty Service Procedures

Any product (1) received in error, (2) in a defective or non-functioning condition, or (3) exhibiting a defect under normal working conditions, can be returned to NDC by following these steps:

You must prepare:
- Dated proof of purchase
- Product model number & quantity
- Product serial number
- Precise reason for return
- Your name/address/email address/telephone/fax

1. Inform the distributor or retailer.

2. Ship the product back to the distributor/retailer with prepaid freight. The purchaser must pay the shipping fee from the distributor/retailer to NDC. Any package sent C.O.D. (Cash On Delivery) will be refused.

3. Charges: Usually RMA (Returned Material Authorization) items will be returned to the purchaser via airmail, prepaid by NDC. If returned by another carrier, the purchaser will pay the difference. A return freight and handling fee will be charged to the purchaser if NDC determines that there was 'No Problem Found' or that the damage was caused by the user.

Warning

NDC is not responsible for the integrity of any data on storage equipment (hard drives, tape drives, floppy diskettes, etc.). We strongly recommend that our customers back their data up before sending such equipment in for diagnosis or repair.

Services after Warranty Period

After the warranty period expires, all products can be repaired for a reasonable service charge. The shipping charges to and from the NDC facility will be borne by the purchaser.

Return for Credit

In the case of a DOA (Dead on Arrival) or a shipping error, a return for credit will automatically be applied to the purchaser's account, unless otherwise requested.

Limitation of Liability

All expressed and implied warranties of a product's merchantability, or of its fitness for a particular purpose, are limited in duration to the applicable period as set forth in this limited warranty, and no warranty will be considered valid after its expiration date.

If this product does not function as warranted, your sole remedy shall be repair or replacement as provided for above. In no case shall NDC be liable for any incidental, consequential, special, or indirect damages resulting from loss of data, loss of profits, or loss of use, even if NDC or an authorized NDC distributor/dealer has been advised of the possibility of such damages, or for any claim by any other party.

Specifications

General

Regulatory Compliance	FCC Part 15 Class B. ETS 300 328 and ETS 300 826, CE Mark. ARIB STD-T66
Standards	Wireless LAN: IEEE 802.11b, Wi-Fi Compliant Ethernet: IEEE 802.3
Data Rate	11Mbps/5.5Mbps/2 Mbps/1Mbps auto fallback
Communication Method	Half-Duplex
Security	40-bit/128-bit WEP Data Encryption
LED Indicators	Power/Status, Ethernet Link, Ethernet TX/RX, Wireless Link, Wireless TX/RX
Interfaces/Connectors	10Base-T: RJ-45 RS-232C: V.24 compliance. D-SUB 9 pin (female, DCE definition) Max. Data Speed: 38.4Kbps Max. Cable Length: 10 meters (32.81 feet)
Power	Power Voltage: DC 5.1Volt ± 5 % AC Adapter: AC 100V~240V Power Consumption: 5.1Volt, 1.0 A (Typical)
Dimensions	135 x 115 x 35mm (including antenna) (5.31 x 4.52 x 1.38in.)

Wireless

Emission Type	Direct Sequence Spread Spectrum
RF Frequency Range	2471MHz ~ 2497MHz – Japan Band 2400MHz ~ 2483.5MHz – North America, Europe, and Extended Japan Band 2445MHz ~ 2475MHz – Spain 2446.5MHz ~ 2483.5MHz – France
Transmitter	RF Output Power: 20 dBm (For North America and Extended Japan Band). 18 dBm (Europe)

	Frequency Stability: Within ± 25ppm Data Modulation Type: BPSK (1Mbps)/QPSK (2/5.5/11Mbps) Data Modulation Speed: 11Mbps/5.5Mbps/2Mbps/1Mbps with Auto Fallback
Receiver	Sensitivity: (Less than 8% of FER packet size is 1024 bytes)- 80 dBm (11Mbps @25°C±5°C)
Antenna Type	Dual Dipole Diversity Antenna

Software

Configuration	WEC COMFIG program via COM port
Security	Data encryption Configuration settings password
Firmware Upgrade	Via COM port

Environment

Temperature	Operating: 0° ~ 50°C (32° ~ 122°F) (Except RF output power and sensitivity) Storage: -30° ~ +70°C (-22° ~ 158°F)
Humidity	85% at 40°C (104°F)

EC DECLARATION OF CONFORMITY

The following equipment:

Product Name : **InstantWave Wireless Ethernet Client**

Model Number : **WEC**

is hereby confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Laws of the Member States relating to R&TTE Directive(99/ 5/ EC). For the evaluation regarding the electromagnetic compatibility, the following standards were applied.

The product meets or exceeds the following EMC standards:

EN 300 328 (November 1996/A1 (July 1997))

EN 300 826 (November 1997)

EN 60950:1992 + A1:1993 + A2:1993 + A3:1995 + A4:1996 + A11:1997

The manufacturer/importer is responsible for this declaration:

Company Name : **NDC Europe**

Company Address : **1 Earlsfort Centre**

   Hatch Street

   Dublin 2, Ireland

Person authorized to make this declaration:

Name : **Changhua Chiang**

Position/Title : **President & CEO**

November 15, 2001
_____
Date

_____
Legal Signature

Appendix

This appendix lists the channels supported by the world's regulatory domains. The channel numbers, channel center frequencies, and regulatory domains are shown in the table.

Channel Number	Center Frequency (MHz)	FCC/ Canada	ETSI	Spain	France	Japan
1	2412	O	O			O
2	2417	O	O			O
3	2422	O	O			O
4	2427	O	O			O
5	2432	O	O			O
6	2437	O	O			O
7	2442	O	O			O
8	2447	O	O			O
9	2452	O	O			O
10	2457	O	O	O	O	O
11	2462	O	O	O	O	O
12	2467		O		O	O
13	2472		O		O	O
14	2484					O

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