

WLAN 802.11 a/b/g/n CardBus

DNBA-81

User Manual

Version: 1.0

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Copyright Statement

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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: To assure continued compliance, (example - use only shielded interface cables when connecting to computer or peripheral devices) any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this 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.

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

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

IMPORTANT NOTE:

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

This EUT is compliance with SAR for general population/uncontrolled exposure limits in ANSI/IEEE C95.1-1999 and had been tested in accordance with the measurement methods and procedures specified in OET Bulletin 65 Supplement C. This equipment should be installed and operated with minimum distance 2.5 cm between the radiator & your body.

"This device supports FCC Part 15, subpart E dynamic frequency selection (DFS)."

"For the band 5150 – 5350 MHz this equipment must be used indoors only to reduce potential for harmful interference to co-channel mobile satellite systems."

“This device has been designed to operate with the antennas listed below, and having a maximum gain of 4.52 dB. Antennas not included in this list or having a gain greater than 4.52 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.”

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B conforme à la norme NMB-003 du Canada

“Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.”

The device could automatically discontinue transmission in case of absence of information to transmit, or operational failure. Note that this is not intended to prohibit transmission of control or signaling information or the use of repetitive codes where required by the technology.

The device for the band 5150-5350 MHz is only for indoor usage to reduce potential for harmful interference to co-channel mobile satellite systems; The maximum antenna gain 4.52 permitted (for devices in the bands 5250-5350 MHz and 5470-5725 MHz) to comply with the e.i.r.p. limit; and The maximum antenna gain 4.52 permitted (for devices in the band 5725-5825 MHz) to comply with the e.i.r.p. limits specified for point-to-point and non point-to-point operation as appropriate, as stated in section A9.2(3).

High-power radars are allocated as primary users (meaning they have priority) of the bands 5250-5350 MHz and 5650-5850 MHz and these radars could cause interference and/or damage to LE-LAN devices.

For product available in the USA/Canada market, only channel 1~11 can be operated.

Selection of other channels is not possible.

This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p) is not more than that permitted for successful communication.

The information is as follows:

-the maximum antenna gain 4.52 permitted (for devices in the 5250-5350 MHz and 5470-5725 MHz bands) to comply with the e.i.r.p. limit.

- the maximum antenna gain 4.52 permitted (for devices in the 5725-5825 MHz band) to comply with the e.i.r.p. limits specified for point-to-point and non point-to-point operation as appropriate, as stated in section A9.2(3)

- users should also be cautioned to take note that high power radars are allocated as primary users (meaning they have priority) of 5250-5350 MHz and 5650-5850 MHz and these radars could cause interference and/or damage to LE-LAN devices.

CE Statement

Hereby, AirMagnet, declares that this device is in compliance with the essential requirement and other relevant provisions of the R&TTE Directive 1999/5/EC.

This device will be sold in the following EEA countries : Austria, Italy, Belgium, Liechtenstein, Denmark, Luxembourg, Finland, Netherlands, France, Norway, Germany, Portugal, Greece, Spain, Iceland, Sweden, Ireland, United Kingdom, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Slovakia, Poland, Slovenia Bulgaria, Romania.

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1. Introduction

Thank you for purchasing the 802.11a/b/g/n Wireless PC Card that provides the easiest way to wireless networking. This User Manual contains detailed instructions in the operation of this product. Please keep this manual for future reference.

System Requirements

- A laptop PC contains:
 - 32 MB memory or greater
 - 300 MHz processor or higher
- Microsoft® Win™ 2000/ME/98 Second Edition/XP

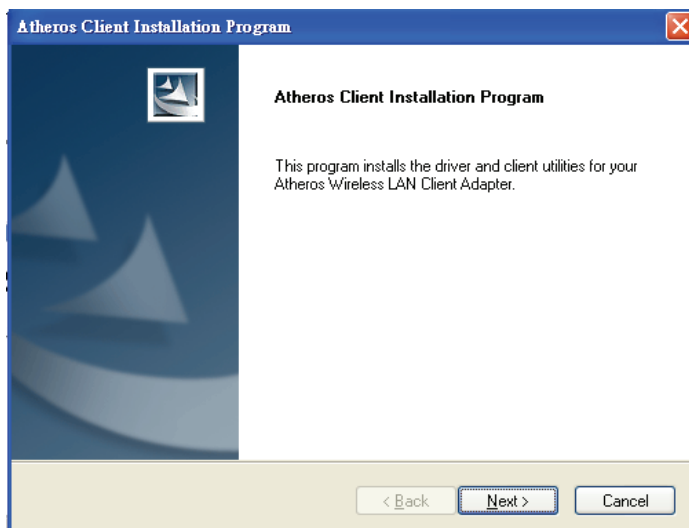
2. Driver/Utility Installation

2.1 Installation

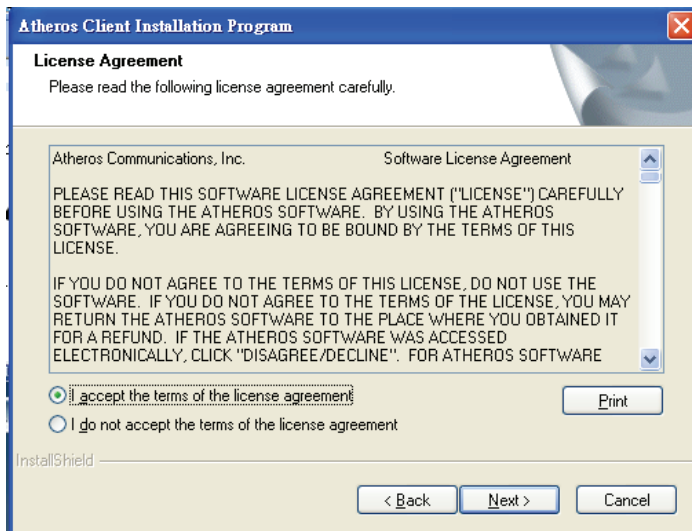
Note! The Installation Section in this User Manual describes the first-time installation for Windows. To re-install the driver, please first uninstall the previously installed driver. See Chapter 2.3 “Uninstallation” in this User Manual.

Follow the steps below to complete the driver/utility installation:

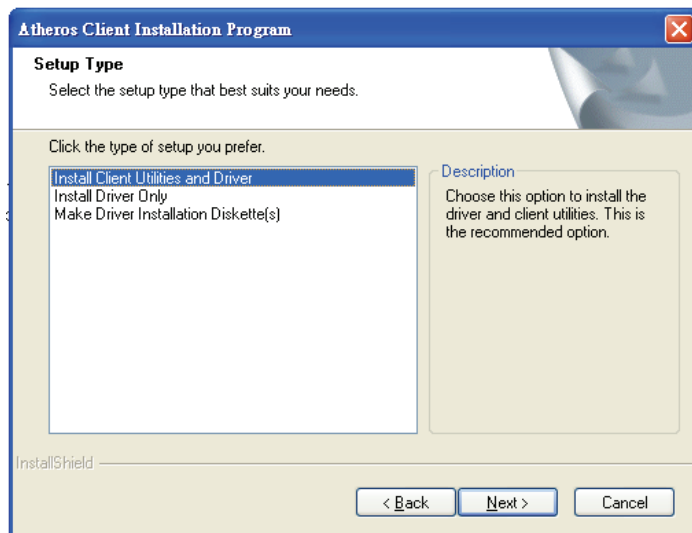
1. Insert the **Installation Software CD** into the CD-Rom Drive.
2. Choose the installation language
3. Click “**Next**”.



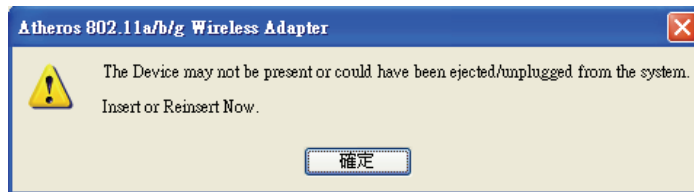
4. Read the **License Agreement**, choose “**I accept the terms of license agreement**” and click “**Next**”



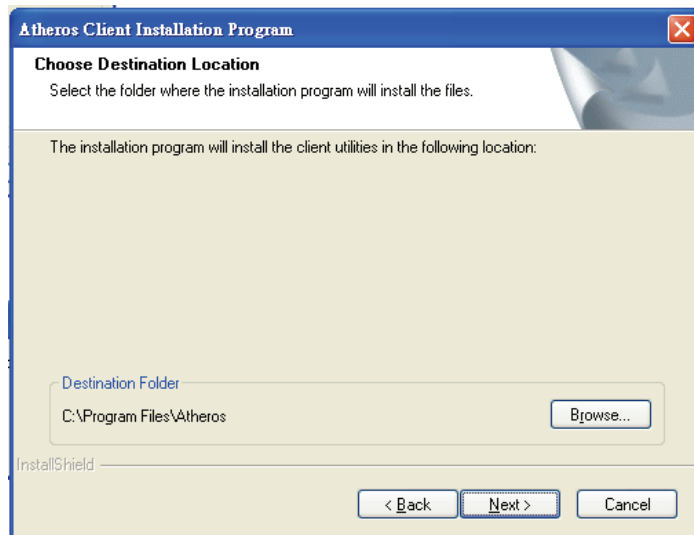
3.5. Click "Next"



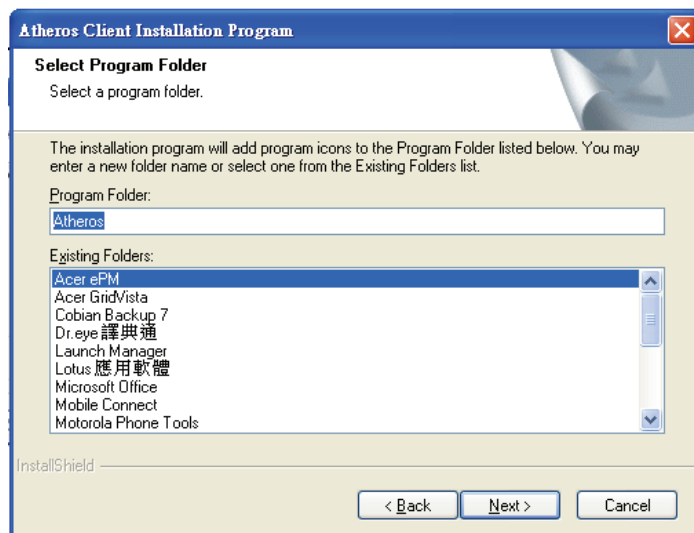
4.6. If the device is not plugged, insert now.



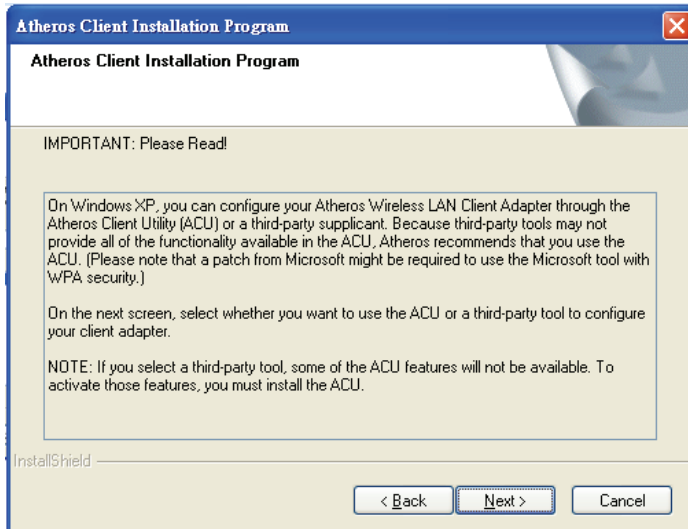
7. Click “Next” to continue or click “Browse” to choose a destination folder.



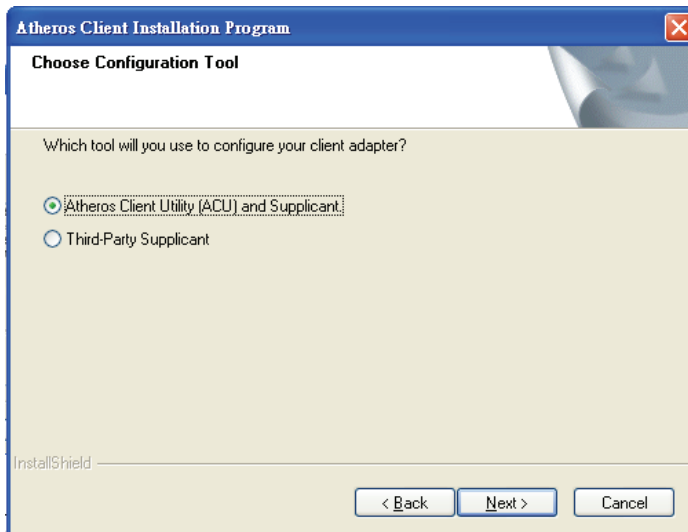
5.8. Click “Next”.



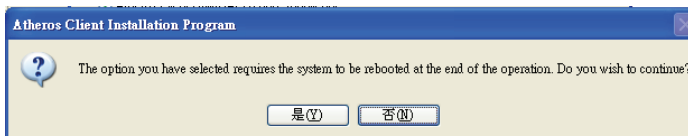
9. Click “Next”.



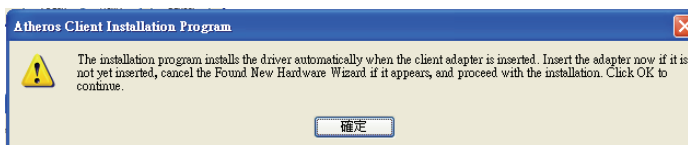
10. Click “Next”.



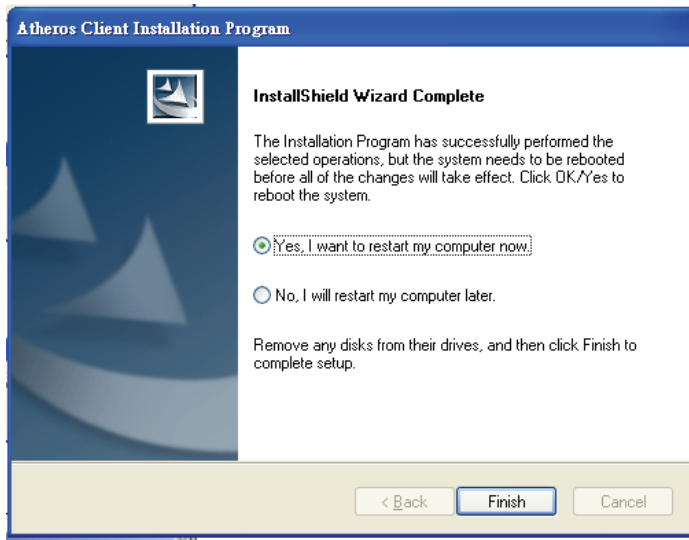
11. Click “Yes”



12. Click “Yes”



7.13. Click “**Finish**” to restart your system.



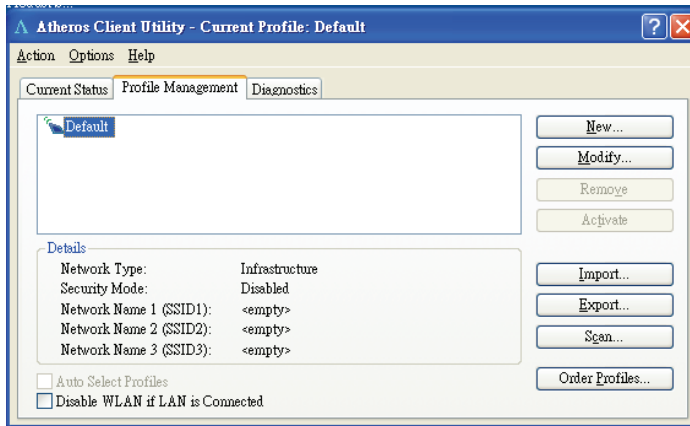
2.2 Additional Setup Processes

During software installation procedure, each operating system may prompt different specific options:

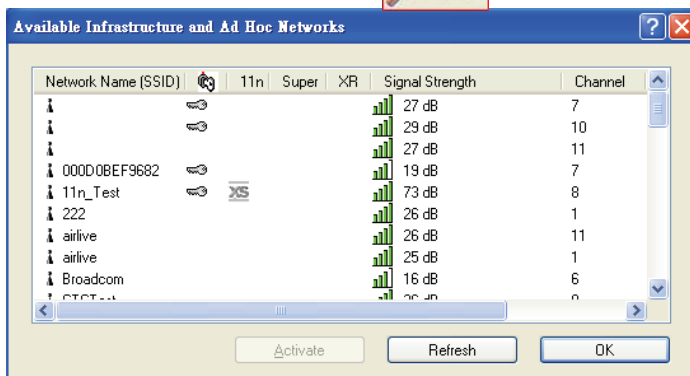
1. **Windows 98SE:** The system will request the original Windows CD during the installation process. When the installation is finished, you'll have to restart your computer.
2. **Windows Me:** Please restart your computer when the installation is finished.
3. **Windows 2000/XP:** Select "Install the software automatically" when the window with this option appears, and then click "Next" to continue installation.

3. Connecting to an Existing Network

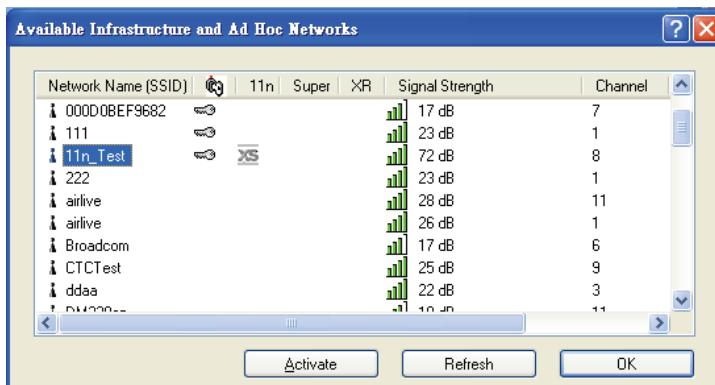
1. Double click the shortcut icon of Atheros Client Utility on the desktop, and the Configuration window appears.



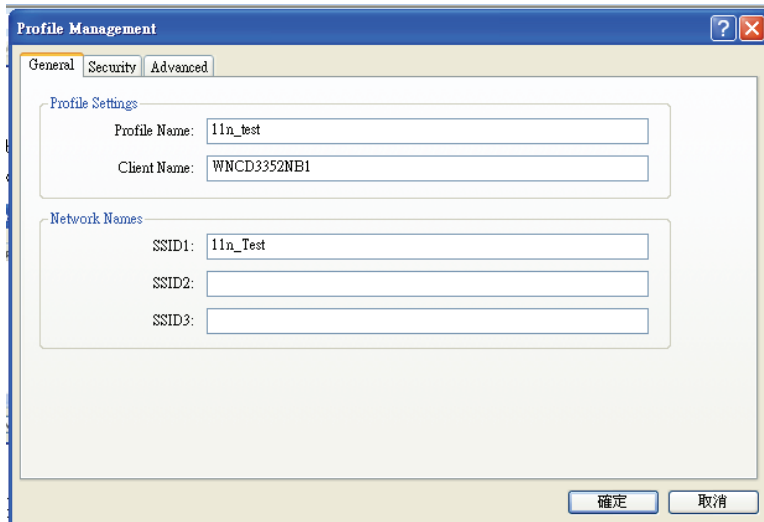
2. Click on the **Scan** button to list available networks.



3. From the list of "Available Networks", choose one network by double clicking the **Network Name**. Click "**Activate**" to continue.



4. Type the preferred profile name.



5. If the chosen network has security enabled, the **Security** tab displays. Select the security option used by the network. Contact the network administrator for the correct settings.

Additional Note for Windows XP

In Windows XP, it is recommended that you use the Atheros Client Utility.

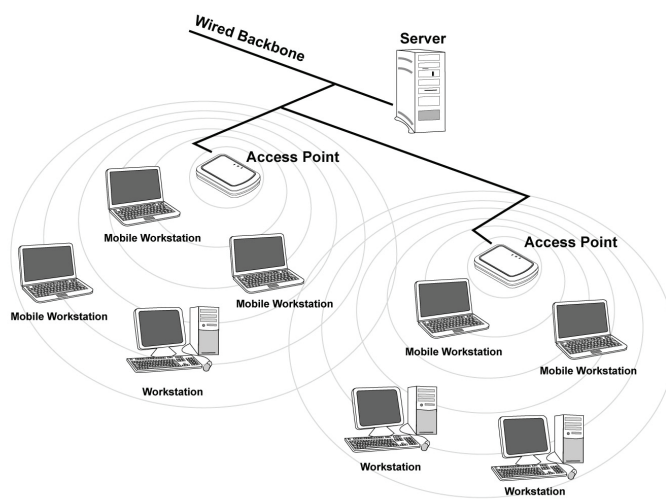
5. Modifying a Wireless Network

5.1 Infrastructure Mode

Only **Infrastructure mode** is supported with this 802.11a/b/g/n Wireless PC Card.

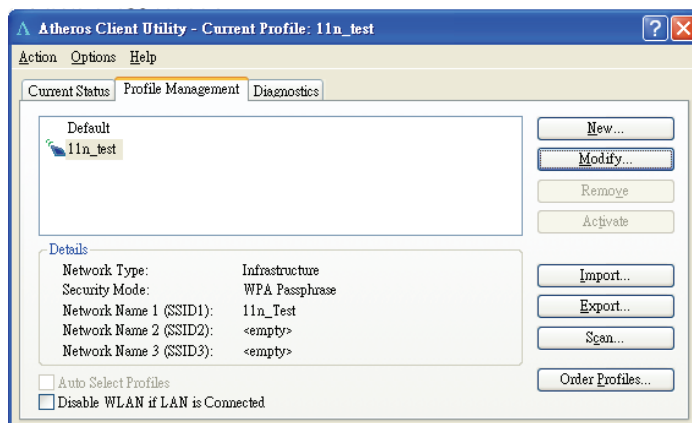
Infrastructure Mode

In infrastructure mode, devices communicate with each other by first going through an Access Point (AP). Wireless devices can communicate with each other or can communicate with a wired network. When one AP is connected to wired network and a set of wireless stations, it is referred to as a BSS (Basic Service Set).



5.2 Modifying a Wireless Network

1. Open “Atheros Client Utility” by double clicking the shortcut icon on the desktop.
2. From the Profile List, select one Profile and click **Modify** button



Appendix A: FAQ about WLAN

1. Can I run an application from a remote computer over the wireless network?

This will depend on whether or not the application is designed to be used over a network. Consult the application's user guide to determine whether it supports operation over a network.

2. Can I play computer games with other members of the wireless network?

Yes, as long as the game supports multiple players over a LAN (local area network). Refer to the game's user guide for more information.

3. What is Spread Spectrum?

Spread Spectrum technology is a wideband radio frequency technique developed by the military for use in reliable, secure, mission-critical communications systems. It is designed to trade off bandwidth efficiency for reliability, integrity, and security. In other words, more bandwidth is consumed than in the case of narrowband transmission, but the trade-off produces a signal that is, in effect, louder and thus easier to detect, provided that the receiver knows the parameters of the spread-spectrum signal being broadcast. If a receiver is not tuned to the right frequency, a spread-spectrum signal looks like background noise. There are two main alternatives, Direct Sequence Spread Spectrum (DSSS) and Frequency Hopping Spread Spectrum (FHSS).

4. What is DSSS? What is FHSS? And what are their differences?

Frequency-Hopping Spread-Spectrum (FHSS) uses a narrowband carrier that changes frequency in a pattern that is known to both transmitter and receiver. Properly synchronized, the net effect is to maintain a single logical channel. To an unintended receiver, FHSS appears to be short-duration impulse noise. Direct-Sequence Spread-Spectrum (DSSS) generates a redundant bit pattern for each bit to be transmitted. This bit pattern is called a chip (or chipping code). The longer the chip, the greater the probability that the original data can be recovered. Even if one or more bits in the chip are damaged during transmission, statistical techniques embedded in the radio can recover the original data without the need for retransmission. To an unintended receiver, DSSS appears as low power wideband noise and is rejected (ignored) by most narrowband receivers.

5. Would the information be intercepted while transmitting on air?

WLAN features two-fold protection in security. On the hardware side, as with Direct Sequence Spread Spectrum technology, it has the inherent security feature of scrambling. On the software side, WLAN offers the encryption function (WEP) to enhance security and access control.

6. What is WEP?

WEP is Wired Equivalent Privacy, a data privacy mechanism based on a 64-bit or 128-bit shared key algorithm, as described in the IEEE 802.11 standard.

7. What is infrastructure mode?

When a wireless network is set to infrastructure mode, the wireless network is configured to communicate with a wired network through a wireless access point.

8. What is roaming?

Roaming is the ability of a portable computer user to communicate continuously while moving freely throughout an area greater than that covered by a single access point. Before using the roaming function, the workstation must make sure that it is the same channel number with the access point of dedicated coverage area.

To achieve true seamless connectivity, the wireless LAN must incorporate a number of different functions. Each node and access point, for example, must always acknowledge receipt of each message. Each node must maintain contact with the wireless network even when not actually transmitting data. Achieving these functions simultaneously requires a dynamic RF networking technology that links access points and nodes. In such a system, the user's end node undertakes a search for the best possible access to the system. First, it evaluates such factors as signal strength and quality, as well as the message load currently being carried by each access point and the distance of each access point to the wired backbone. Based on that information, the node next selects the right access point and registers its address. Communications between end node and host computer can then be transmitted up and down the backbone. As the user moves on, the end node's RF transmitter regularly checks the system to determine whether it is in touch with the original access point or whether it should seek a new one. When a node no longer receives acknowledgment from its original access point, it undertakes a new search. Upon finding a new access point, it then re-registers, and the communication process continues.

<p>@25° C & Win2K environment</p>	<table border="0"> <thead> <tr> <th></th> <th>Avg/Max (mA)</th> <th>Avg/Max</th> <th>Avg/Max</th> <th>Avg/Max (mA)</th> </tr> </thead> <tbody> <tr> <td colspan="5">Avg/Max (mA)</td> </tr> <tr> <td>➤ Continue Tx</td> <td>615/716</td> <td>614/720</td> <td>547/639</td> <td></td> </tr> <tr> <td></td> <td>584/685</td> <td>632/732</td> <td></td> <td></td> </tr> <tr> <td>➤ FTP Tx</td> <td>384/600</td> <td>487/640</td> <td>351/480</td> <td></td> </tr> <tr> <td></td> <td>486/669</td> <td>572/698</td> <td></td> <td></td> </tr> <tr> <td>➤ FTP Rx</td> <td>433/524</td> <td>379/611</td> <td>386/499</td> <td></td> </tr> <tr> <td></td> <td>406/653</td> <td>474/676</td> <td></td> <td></td> </tr> <tr> <td>➤ Standby mode</td> <td>437/502</td> <td>393/485</td> <td>391/468</td> <td>383/456</td> </tr> <tr> <td></td> <td>393/490</td> <td></td> <td></td> <td></td> </tr> <tr> <td>➤ Power saving</td> <td>38/487</td> <td>41/447</td> <td>42/454</td> <td></td> </tr> <tr> <td></td> <td>42/417</td> <td>101/426</td> <td></td> <td></td> </tr> <tr> <td colspan="5">***The maximum current consumption would be impacted by radiation environment and the driver mechanism.</td> </tr> </tbody> </table>		Avg/Max (mA)	Avg/Max	Avg/Max	Avg/Max (mA)	Avg/Max (mA)					➤ Continue Tx	615/716	614/720	547/639			584/685	632/732			➤ FTP Tx	384/600	487/640	351/480			486/669	572/698			➤ FTP Rx	433/524	379/611	386/499			406/653	474/676			➤ Standby mode	437/502	393/485	391/468	383/456		393/490				➤ Power saving	38/487	41/447	42/454			42/417	101/426			***The maximum current consumption would be impacted by radiation environment and the driver mechanism.																																																						
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5190	15.5	15.5		15.5		15	15
	15	12		11			
5230	15.5	15.5		15.5		15	15
	15	12		11			
5260	15.5	15.5		15.5		15	15
	15	12		11			
5320	15.5	15.5		15.5		15	15
	15	12		11			
5500	17	17		17		15	
	15	15		12		11	
5600	17	17		17		15	
	15	15		12		11	
5700	17	17		17		15	
	15	15		12		11	
5825	17	17		17		15	
	15	15		12		11	
Freq. Range: 2.4GHz/HT20: @800GI(400GI)							
Test Freq	MCS 0/8	MCS 1/9	MCS 2/10	MCS 3/11	MCS 4/12	MCS 5/13	MCS 6/14
	MCS 7/15						
2412	18	18		18		17	
16	15	14		13			
2437	18	18		18		17	
16	15	14		13			
2472	18	18		18		17	
	16	15		14		13	
Freq. Range: 2.4GHz/HT40: @800GI(400GI)							
Test Freq	MCS 0/8	MCS 1/9	MCS 2/10	MCS 3/11	MCS 4/12	MCS 5/13	MCS 6/14

	MCS 7/15				
	2412	18	18	18	16
16	15	13	12		
	2437	18	18	18	16
16	15	13	12		
	2472	18	18	18	16
		16	15	13	12
	➤ 802.11a				
	Modulation	Code Rate	Relative constellation error (dB)		Relative constellation error (dB)
			IEEE Spec (1Tx dB)		Typical/Maximum
			(2Tx dB)		
EVM	BPSK	1/2	-5		
			-20/-15		
	BPSK	3/4	-8		
			-20/-15		
	QPSK	1/2	-10		
			-20/-15		
	QPSK	3/4	-13		
			-21/-17		
	16-QAM	1/2	-16		
			-21/-17		
	16-QAM	3/4	-19		
			-25/-21		
	64-QAM	2/3	-22		
			-26/-23		
	64-QAM	3/4	-25		
			-28/-25		
	➤ 802.11b				
	Modulation	Code Rate	Relative constellation error (dB)		Relative constellation error (dB)
			IEEE Spec (1Tx dB)		Typical/Maximum
			(2Tx dB)		
	DBPSK		-10		
			-18/-15		
	DQPSK		-10		
			-18/-15		

	CCK			-10
	-18/-15			
	➤ 802.11g			
	Modulation	Code Rate	Relative constellation error (dB)	Relative constellation error (dB)
			IEEE Spec (1Tx dB)	Typical/Maximum
	(2Tx dB)			
	BPSK	1/2		-5
	-21/-15			
	BPSK	3/4		-8
	-21/-15			
	QPSK	1/2		-10
	-21/-15			
	QPSK	3/4		-13
	-23/-20			
	16-QAM	1/2		-16
	-25/-20			
	16-QAM	3/4		-19
	-27/-22			
	64-QAM	2/3		-22
	-28/-25			
	64-QAM	3/4		-25
	-30/-27			
	➤ 802.11ng			
	Modulation	Code Rate	Relative constellation error (dB)	Relative constellation error (dB)
			IEEE Spec (1Tx dB)	Typical/Maximum
	(2Tx dB)			
	○ HT20			
	BPSK	1/2		-5
	-20/-15			
	QPSK	1/2		-10
	-20/-16			
	QPSK	3/4		-13
	-20/-16			
	16-QAM	1/2		-16

	-25/-20			
	16-QAM	3/4		-19
	-29/-22			
	64-QAM	2/3		-22
	-29/-24			
	64-QAM	3/4		-25
	-30/-26			
	64-QAM	5/6		-28
	-31/-28			
	○ HT40			
	BPSK	1/2		-5
	-21/-15			
	QPSK	1/2		-10
	-21/-15			
	QPSK	3/4		-13
	-21/-15			
	16-QAM	1/2		-16
	-25/-20			
	16-QAM	3/4		-19
	-28/-22			
	64-QAM	2/3		-22
	-30/-24			
	64-QAM	3/4		-25
	-31/-26			
	64-QAM	5/6		-28
	-32/-28			
	➤ 802.11na			
	Modulation	Code Rate	Relative constellation error (dB)	Relative constellation error (dB)
			IEEE Spec (1Tx dB)	Typical/Maximum
				(2Tx dB)
	○ HT20			
	BPSK	1/2		-5
	-26/-15			
	QPSK	1/2		-10
	-26/-16			

	<p>QPSK 3/4 -13 -26/-16</p> <p>16-QAM 1/2 -16 -28/-20</p> <p>16-QAM 3/4 -19 -29/-22</p> <p>64-QAM 2/3 -22 -30/-24</p> <p>64-QAM 3/4 -25 -30/-26</p> <p>64-QAM 5/6 -28 -30/-28</p> <p>○ HT40</p> <p>BPSK 1/2 -5 -20/-15</p> <p>QPSK 1/2 -10 -20/-15</p> <p>QPSK 3/4 -13 -20/-15</p> <p>16-QAM 1/2 -16 -25/-20</p> <p>16-QAM 3/4 -19 -26/-22</p> <p>64-QAM 2/3 -22 -28/-24</p> <p>64-QAM 3/4 -25 -31/-26</p> <p>64-QAM 5/6 -28 -32/-28</p>																					
Sensitivity	<p>➤ 802.11a</p> <table border="0"> <thead> <tr> <th>Modulation</th> <th>Code Rate</th> <th>IEEE Spec (1Rx dBm)</th> </tr> </thead> <tbody> <tr> <td colspan="3">Typical/Maximum (3Rx dBm)</td> </tr> <tr> <td>BPSK</td> <td>1/2</td> <td>-82</td> </tr> <tr> <td>-94/-90</td> <td></td> <td></td> </tr> <tr> <td>BPSK</td> <td>3/4</td> <td>-81</td> </tr> <tr> <td>-94/-90</td> <td></td> <td></td> </tr> <tr> <td>QPSK</td> <td>1/2</td> <td>-79</td> </tr> </tbody> </table>	Modulation	Code Rate	IEEE Spec (1Rx dBm)	Typical/Maximum (3Rx dBm)			BPSK	1/2	-82	-94/-90			BPSK	3/4	-81	-94/-90			QPSK	1/2	-79
Modulation	Code Rate	IEEE Spec (1Rx dBm)																				
Typical/Maximum (3Rx dBm)																						
BPSK	1/2	-82																				
-94/-90																						
BPSK	3/4	-81																				
-94/-90																						
QPSK	1/2	-79																				

	-94/-89		
	QPSK	3/4	-77
	-93/-88		
	16-QAM	1/2	-74
	-90/-86		
	16-QAM	3/4	-70
	-87/-82		
	64-QAM	2/3	-66
	-83/-79		
	64-QAM	3/4	-65
	-81/-77		
	➤ 802.11b		
	Modulation		IEEE Spec (1Rx dBm)
	Typical/Maximum (3Rx dBm)		
	DBPSK		-82
	-99/-95		
	DQPSK		-80
	-93/-89		
	CCK		-76
	-90/-86		
	➤ 802.11g		
	Modulation	Code Rate	IEEE Spec (1Rx dBm)
	Typical/Maximum (3Rx dBm)		
	BPSK	1/2	-82
	-95/-91		
	BPSK	3/4	-81
	-95/-91		
	QPSK	1/2	-79
	-95/-91		
	QPSK	3/4	-77
	-94/-90		
	16-QAM	1/2	-74
	-91/-87		
	16-QAM	3/4	-70
	-88/-84		
	64-QAM	2/3	-66

	-84/-80		
	64-QAM	3/4	-65
	-82/-77		
➤	802.11ng		
	Modulation	Code Rate	IEEE Spec (1Rx dBm)
	Typical/Maximum (3Rx dBm)		
○	HT20		
	BPSK	1/2	-80
	-95/-91		
	QPSK	1/2	-77
	-94/-90		
	QPSK	3/4	-75
	-91/-87		
	16-QAM	1/2	-72
	-88/-84		
	16-QAM	3/4	-68
	-85/-81		
	64-QAM	2/3	-64
	-81/-77		
	64-QAM	3/4	-63
	-80/-76		
	64-QAM	5/6	-62
	-77/-72		
○	HT40		
	BPSK	1/2	-77
	-91/-86		
	QPSK	1/2	-74
	-90/-86		
	QPSK	3/4	-72
	-88/-83		
	16-QAM	1/2	-69
	-85/-81		
	16-QAM	3/4	-65
	-82/-78		
	64-QAM	2/3	-61
	-78/-74		

	64-QAM	3/4	-60
	-77/-72		
	64-QAM	5/6	-59
	-74/-70		
	➤ 802.11na		
	Modulation	Code Rate	IEEE Spec (1Rx dBm)
	Typical/Maximum (3Rx dBm)		
	○ HT20		
	BPSK	1/2	-80
	-94/-90		
	QPSK	1/2	-77
	-92/-88		
	QPSK	3/4	-75
	-90/-86		
	16-QAM	1/2	-72
	-87/-83		
	16-QAM	3/4	-68
	-84/-81		
	64-QAM	2/3	-64
	-81/-76		
	64-QAM	3/4	-63
	-79/-75		
	64-QAM	5/6	-62
	-76/-72		
	○ HT40		
	BPSK	1/2	-77
	-90/-86		
	QPSK	1/2	-74
	-89/-85		
	QPSK	3/4	-72
	-88/-84		
	16-QAM	1/2	-69
	-85/-80		
	16-QAM	3/4	-65
	-81/-77		
	64-QAM	2/3	-61

	<ul style="list-style-type: none"> ● 40MHz BW <ul style="list-style-type: none"> ▪ 1 Nss: 135(150) Mbps maximal ▪ 2 Nss: 270(300) Mbps maximal
Operation temperature	➤ 0° ~ 55° C
Storage temperature	➤ -20° ~ 80° C
Wi-Fi® Alliance®	➤ WECA Compliant
WHQL	➤ Microsoft® 2K, XP Compliant
FAA	➤ S/W audio On/Off support
EMC certificate	<ul style="list-style-type: none"> ➤ FCC part 15 (USA) ➤ IC RSS210 (Canada) ➤ TELEC (Japan) ➤ ETSI, EN301893, EN60950 (Europe) ➤ VCCI CLASS B
Media access protocol	➤ CSMA/CA with ACK architecture 32-bit MAC
Antenna	➤ Dual Band Metal PIFA Antenna x 2 and Chip Antenna x 1