300Mbps Wireless 802.11b/g/n PCI-Express Adapter

EW-7612PIn
User Manual

Version 1.0 / 4, 2010
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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 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:

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

FCC Caution

This device and its antenna 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.

Any changes or modifications not expressly approved by the party responsible for compliance could void the authority to operate equipment.
Federal Communication Commission (FCC) Radiation Exposure Statement

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.

The equipment version marketed in US is restricted to usage of the channels 1-11 only.
R&TTE Compliance Statement

This equipment complies with all the requirements of DIRECTIVE 1999/5/EC OF THE EUROPEAN PARLIAMENT AND THE COUNCIL of March 9, 1999 on radio equipment and telecommunication terminal Equipment and the mutual recognition of their conformity (R&TTE).

Safety

This equipment is designed with the utmost care for the safety of those who install and use it. However, special attention must be paid to the dangers of electric shock and static electricity when working with electrical equipment. All guidelines of this and of the computer manufacture must therefore be allowed at all times to ensure the safe use of the equipment.

EU Countries Intended for Use

The ETSI version of this device is intended for home and office use in Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom.

The ETSI version of this device is also authorized for use in EFTA member states: Iceland, Liechtenstein, Norway, and Switzerland.

EU Countries Not intended for use

None.
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1 Introduction

EW-7612PIn is a wireless PCI Express adapter that provides a simple and easy way to add or upgrade wireless connectivity to your desktop. This PCI Express adapter supports higher data rates up to 300Mbps when connected to a 300Mbps wireless 802.11n device. You can also connect to any public wireless hotspot for Internet access to retrieve email, surf web sites or use instant messaging. EW-7612PIn gives you the freedom to join the network.

1.1 Features

- Work with 802.11b/g/n wireless network devices.
- High-speed transfer data rate - up to 300 Mbps.
- High throughput supports multi-media data bandwidth requirement.
- Support 64/128-bit WEP Data Encryption, WPA, WPA2.
- Automatic fallback increases data security and reliability.
- Supports the most popular operating system: Windows XP/Vista/7 and Linux.
- Supports PCI-Express interface.

1.2 Specifications

- Standard: IEEE 802.11b/g/n
- Interface: PCI-Express
- Frequency Band: 2.4000 ~ 2.4835GHz (Industrial Scientific Medical Band)
- Data Rate:
  - 11b: 1/2/5.5/11Mbps
  - 11g: 6/9/12/24/36/48/54Mbps
  - 11n (20MHz): MCS0-7 (up to 72/144Mbps)
  - 11n (40MHz): MCS0-7 (up to 150/300Mbps)
- Security: 64/128-bit WEP Data Encryption, WPA, WPA2
- Antenna: Integrated with 3dBi Antennas
- Drivers: Windows XP/Vista/7 and Linux
- Temperature: Operating 32~104°F (0 ~40°C), Storage -13~149°F (-25~65°C)
- Humidity: Max. 95% (NonCondensing)
- Certification: FCC, CE
1. Antennas
3dBi detachable antenna is enclosed with the PCI card. Please secure the antenna to Reverse SMA connector of the card.

2. Link and Tx/Rx LED Definitions

<table>
<thead>
<tr>
<th>LED Name</th>
<th>Light Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link</td>
<td>On</td>
<td>Link to a wireless access point</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>Radio is switched to off.</td>
</tr>
<tr>
<td>Tx/Rx</td>
<td>Blinking</td>
<td>Transferring / receiving data</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td>No wireless activity</td>
</tr>
</tbody>
</table>

1.3 Package Contents
Before you begin the installation, please check the items of your package. The package should include the following items:

- One EW-7612PIn Adapter
- 3dBi Antennas
- One CD (Driver/Utility/User’s Manual)
- One Quick Guide

*If any of the above items is missing, contact your supplier as soon as possible.*
2 Installation Procedure

Before you proceed with the installation, please notice following descriptions.

**Note1:** The following installation was operated under Windows XP. (Procedures are similar for Windows Vista and Windows 7.)

**Note2:** If you have installed the Wireless PC Adapter driver & utility before, please uninstall the old version first.

You can install the Wireless Adapter by EZMAX Setup Wizard in the CD-ROM including in the package. The wizard is an easy and quick configuration tool for internet connection with series process. When you start EZMAX Setup Wizard, you will get the following welcome screen. Please choose the language to start the configuration. The wizard will guide you to finish your network connection. We will not provide any instruction for the EZMAX Setup Wizard here.

If you lose the CD ROM or you prefer the traditional setup procedure, please follow the instruction as following step in this quick installation guide.
I. Install the Driver and Utility

A. Insert the Installation CD to your CD-ROM Drive. Execute the “Setup.exe” program.

B. Select Setup Language and click “OK” to proceed.

C. Click “Next” to go to the next step.
D. Now you’ll see the following message, please click ‘Install’ to begin the installation.

E. The system starts to install the driver and utility.
F. Click “Finish” to complete the driver and utility installation.

II. Connect to Wireless Access Point

After you finish installation the Configuration Utility appears as an icon on the system tray and desktop of Windows. You can open it by double-click on the icon.

A. To start configuring the adapter, double click the icon in the system tray or right click the icon and select open configuration utility.
B. The utility of the adapter is displayed. Click “Available Network” and double-click on the wireless access point you want to connect to.
C. Input the security setting and click “OK” to start network connection.
*Use Windows Zero Configuration on Windows Vista:*

A. For Windows Vista user, you can use Windows Zero Configuration to connect to wireless access point.

Click ‘Start’ button, then click ‘Control Panel. Click ‘Network and Internet’ in Control Panel.

B. Click ‘Connect to a network’ under ‘Network and Sharing Center’
C. Click the access point you want to use if it’s shown, then click ‘Connect’.

D. If it’s an unnamed access point (i.e. the SSID of this wireless access point is hidden), you’ll be prompted to input it’s name, and the name must be identical to the SSID setting of the wireless access point you’re connecting to.
E. If the access point is protected by encryption method, you have to input its security or passphrase here. It must match the encryption setting on the access point.

![Connect to a network](image)

F. If you can see this image, the connection between your computer and wireless access point is successfully established. Click ‘Close’ to start network connection.

![Successfully connected to VarioxNET](image)
3 Configuration Utility

The Configuration Utility is a powerful application that helps you configure the Wireless LAN PCI Express Adapter and monitor the link status and the statistics during the communication process.

The Configuration Utility appears as an icon on the system tray and desktop of Windows. You can open it by double-click on the icon.

Right click the icon in the system tray there are some items for you to operate the configuration utility.

- **Open Config Utility**
  Select “Open Config Utility” to open the configuration utility.
- **About**
  Select “About” to show the utility information.
- **Hide**
- **Select “Hide” to hide the utility in the system tray.**
- **Quit**
  Select “Quit” to quit the utility in the system tray.
3.1 Utility Overview

There are several parts in the utility screen. Please refer to the following table for the description.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refresh</td>
<td>Refresh adapter list in the “B” block.</td>
</tr>
<tr>
<td>Mode</td>
<td>There are two modes: Station and Access Point. If “Station” is selected, the adapter works as a wireless adapter. If “Access Point” is selected, the adapter will works as a wireless AP.</td>
</tr>
<tr>
<td>View</td>
<td>Enable “Status Bar” and the “D” block in the utility will display the current status of the utility.</td>
</tr>
<tr>
<td>About</td>
<td>To check the version of the utility, select this item.</td>
</tr>
<tr>
<td>Show Tray Icon</td>
<td>To show the icon in the system tray, select the item.</td>
</tr>
<tr>
<td>Disable Adapter</td>
<td>This function is for you to disable or enable the adapter.</td>
</tr>
<tr>
<td>Windows Zero Config</td>
<td>To configure the adapter from Windows XP Zero Configuration, check the item.</td>
</tr>
<tr>
<td>Radio Off</td>
<td>This function is for you to turn off or turn on the radio of the adapter. If the radio is turned off, the adapter will not work.</td>
</tr>
</tbody>
</table>

This is a list for you to configure several adapters in your PC from the utility.
It is the status bar that displays the current status of the utility. To close it, please disable the “Status Bar” in the “View” item.

There are several tabs in the block for you to setup the function of the adapter. Please refer to the description in the following sections.

3.2 Available Network

When you open the Configuration Utility, the system will scan all the channels to find all the access points/stations within the accessible range of your adapter and automatically connect to the wireless network with the highest signal strength. From the “Available Network” tab, all the networks nearby will be listed. You can change the connection to another network.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available Network(s)</td>
<td>This list shows all information of the available wireless networks within the range of your adapter. The information includes SSID, Channel, Encryption, Network Authentication, Signal and etc. If you want to connect to any network on the list, double-click the selected network.</td>
</tr>
<tr>
<td>Refresh</td>
<td>Click “Refresh” to update the available networks list. It is</td>
</tr>
</tbody>
</table>
recommended that refresh the list while you have changed the connection network.

Add to Profile  
A profile stores the setting of a network, so that you can connect to the network quickly. To add the selected network to a profile, click this button.

### 3.3 General

To check the connection status of the adapter, select “General”. This screen shows the information of Link Speed, Network Type, Encryption Method, SSID, Signal Strength, Link Quality and Network Address of the adapter.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>It will show the connection status of the adapter.</td>
</tr>
<tr>
<td>Speed</td>
<td>It shows the current speed</td>
</tr>
<tr>
<td>Type</td>
<td><strong>Infrastructure</strong> – This operation mode requires the presence of an 802.11 Access Point. All communication is done via the Access</td>
</tr>
</tbody>
</table>
Point or Router. **IBSS** — Select this mode if you want to connect to another wireless stations in the Wireless LAN network without through an Access Point or Router.

**IBSS** — Select this mode if you want to connect to another wireless stations in the Wireless LAN network without through an Access Point or Router.

<table>
<thead>
<tr>
<th><strong>Encryption</strong></th>
<th>It displays the encryption setting of the current connection including None, WEP, TKIP or AES.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SSID</strong></td>
<td>The SSID (up to 32 printable ASCII characters) is the unique name identified in a WLAN. The ID prevents the unintentional merging of two co-located WLANs.</td>
</tr>
<tr>
<td><strong>Signal Strength</strong></td>
<td>It indicates the wireless signal strength.</td>
</tr>
<tr>
<td><strong>Link Quality</strong></td>
<td>It indicates the wireless link quality.</td>
</tr>
<tr>
<td><strong>Network Address</strong></td>
<td>It shows the MAC, IP address and other information of the adapter.</td>
</tr>
</tbody>
</table>
3.4 Profile

The “Profiles List” is for you to manage the networks you connect to frequently. You are able to Add/Remove/Edit/Duplicate/Set Default to manage a profile.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available Profile(s)</td>
<td>This list shows the preferred networks for the wireless connection. You can add, remove, edit, duplicate the preferred networks or set one of the networks as the default connection.</td>
</tr>
<tr>
<td>Add/ Remove/ Edit Button</td>
<td>Click these buttons to add/ delete/ edit the selected profiles.</td>
</tr>
<tr>
<td>Duplicate</td>
<td>If you like to build up the new profile with the same settings as the current profile, then you can select this feature.</td>
</tr>
<tr>
<td>Set Default</td>
<td>To designate a profile as the default network for the connection from the available profiles list, click the button.</td>
</tr>
</tbody>
</table>
3.4.1 Configure the Profile

### Parameter Description

**Profile Name**
Define a recognizable profile name for you to identify the different networks.

**Network Name (SSID)**
The SSID (up to 32 printable ASCII characters) is the unique name identified in a WLAN. The ID prevents the unintentional merging of two co-located WLANs.

You may specify a SSID for the adapter and then only the device with the same SSID can interconnect to the adapter.

**This is a computer-to-computer (ad hoc) network; wireless access points are not used.**
There are two kinds of network type described as follows.

- **Infrastructure** – This operation mode requires the presence of an 802.11 Access Point. All communication is done via the Access Point or Router.

- **Ad Hoc** – Connect to another wireless adapter in the Wireless LAN network without through an Access Point or Router.

  If this item is selected, the adapter will work in Ad Hoc mode.

**Channel**
This setting is only available for Ad Hoc mode. Select the number
of the radio channel used for the networking. The channel setting should be the same with the network you are connecting to.

Network Authentication

This setting has to be consistent with the wireless networks that the adapter intends to connect.

**Open System** – No authentication is needed among the wireless network.

**Shared Key** – Only wireless stations using a shared key (WEP Key identified) are allowed to connecting each other.

**WPA-PSK** – It is a special mode designed for home and small business users who do not have access to network authentication servers. In this mode, known as Pre-Shared Key, the user manually enters the starting password in their access point or gateway, as well as in each wireless stations in the network. WPA-PSK takes over automatically from that point, keeping unauthorized users that don’t have the matching password from joining the network, while encrypting the data traveling between authorized devices.

**WPA2-PSK** – WPA2-PSK is also for home and small business. The difference between WPA-PSK and WPA2-PSK is that WPA2-PSK provides data encryption via the AES. In contrast, WPA-PSK uses Temporal Key Integrity Protocol (TKIP).

**WPA 802.1X** – WPA provides a scheme of mutual authentication using either IEEE 802.1x/Extensible Authentication Protocol (EAP) authentication or pre-shared key (PSK) technology. It provides a high level of assurance to enterprises, small businesses and home users that data will remain protected and that only authorized users may access their networks. For enterprises that have already deployed IEEE 802.1x authentication, WPA offers the advantage of leveraging existing authentication databases and infrastructure.

**WPA2 802.1X** – Like WPA, WPA2 supports IEEE 802.1x/EAP authentication or PSK technology. It also includes a new advanced encryption mechanism using the Advanced Encryption Standard (AES). AES is required to the corporate user or government users. The difference between WPA and WPA2 is that WPA2 provides data encryption via the AES. In contrast, WPA uses Temporal Key Integrity Protocol (TKIP).

**WEP 802.1X** – It’s a special mode for using IEEE 802.1x/EAP technology for authentication and WEP keys for data encryption.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Encryption</td>
<td><strong>Disabled</strong> – Disable the WEP Data Encryption. <strong>WEP</strong> – Enable the WEP Data Encryption. When the item is selected, you have to continue setting the WEP Encryption keys. <strong>TKIP</strong> – TKIP (Temporal Key Integrity Protocol) changes the temporal key every 10,000 packets (a packet is a kind of message transmitted over a network.) This insures much greater security than the standard WEP security. <strong>AES</strong> – AES has been developed to ensure the highest degree of security and authenticity for digital information and it is the most advanced solution defined by IEEE 802.11i for the security in the wireless network. Note: All devices in the network should use the same encryption method to ensure the communication.</td>
</tr>
<tr>
<td>ASCII</td>
<td>WEP Key can be ASCII format. Alphanumeric values or signs are allowed to be the WEP key. It is more recognizable for user.</td>
</tr>
<tr>
<td>PASSPHRASE</td>
<td>It is a text string with a maximum of 32 alphanumeric characters, for example: “Test”. The WEP Key is based upon the Passphrase determined by you. This passphrase may not work with other vendors’ products due to possible incompatibility with other vendors’ passphrase generators. You must use the same passphrase or WEP key settings for all wireless computers within the network.</td>
</tr>
<tr>
<td>Key Length</td>
<td>When you select the “WEP” and “PASSPHRASE” and this function will display in the current status of the utility. The keys are used to encrypt data transmitted in the wireless network. Fill the text box by following the rules below. <strong>64-bit</strong> – Input 10-digit Hex values as the encryption keys. For example: “0123456aeef”. <strong>128-bit</strong> – Input 26-digit Hex values as the encryption keys. For example: “01234567890123456789abcdef”.</td>
</tr>
<tr>
<td>Key Index (advanced)</td>
<td>Select one of the four keys to be the data encryption key.</td>
</tr>
<tr>
<td>Network Key</td>
<td>Please enter network security key here to make sure the password is correct.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Confirm Network Key</td>
<td>Please enter network security key here again.</td>
</tr>
<tr>
<td>EAP Type</td>
<td><strong>GTC</strong> – GTC is an authentication protocol which allows the exchange of clear text authentication credentials across the network.</td>
</tr>
<tr>
<td></td>
<td><strong>TLS</strong> – TLS is the most secure of the EAP protocols but not easy to use. It requires that digital certificates be exchanged in the authentication phase. The server presents a certificate to the client. After validating the server’s certificate, the client presents a client certificate to the server for validation.</td>
</tr>
<tr>
<td></td>
<td><strong>LEAP</strong> – LEAP is a pre-EAP, Cisco-proprietary protocol, with many of the features of EAP protocols. Cisco controls the ability of other vendors to implement this protocol, so it should be selected for use only when limited vendor choice for client, access-point, and server products is not a concern. When you have set up LEAP authentication, you have to enter the user name and password of your computer.</td>
</tr>
<tr>
<td></td>
<td><strong>PEAP &amp; TTLS</strong> – PEAP and TTLS are similar and easier than TLS in that they specify a stand-alone authentication protocol be used within an encrypted tunnel. TTLS supports any protocol within its tunnel, including CHAP, MSCHAP, MSCHAPv2 and PAP. PEAP specifies that an EAP-compliant authentication protocol must be used; this adaptor supports MD5, TLS, GTC (Generic Token Card) and MSCHAPv2. The client certificate is optional required for the authentication.</td>
</tr>
<tr>
<td>Tunnel</td>
<td>Includes MD5, GTC, TLS, MSCHAP-v2.</td>
</tr>
<tr>
<td>Username</td>
<td>The certificate username in the RADIUS server.</td>
</tr>
<tr>
<td>Identity</td>
<td>User’s identity in the RADIUS server.</td>
</tr>
<tr>
<td>Password</td>
<td>User’s password in the RADIUS server.</td>
</tr>
<tr>
<td>Certificate</td>
<td>Select the certificate for RADIUS server authentication</td>
</tr>
</tbody>
</table>
3.5 Status

This screen shows the information of manufacturer, driver version, settings of the wireless network the adapter is connecting to, linking time and link status. If you don’t ensure the status of the adapter and the network you are connecting, please go to the screen for more details.
3.6 Statistics

You can get the real time information about the packet transmission and receiving status during wireless communication from the screen. If you want to recount the statistics value, please click “Reset”.

<table>
<thead>
<tr>
<th>Counter Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tx OK</td>
<td>388</td>
</tr>
<tr>
<td>Tx Error</td>
<td>0</td>
</tr>
<tr>
<td>Rx OK</td>
<td>911</td>
</tr>
<tr>
<td>Rx Packet Count</td>
<td>911</td>
</tr>
<tr>
<td>Rx Retry</td>
<td>120</td>
</tr>
<tr>
<td>Rx ICV Error</td>
<td>0</td>
</tr>
</tbody>
</table>
3.7 Wi-Fi Protect Setup (WPS)

Wi-Fi Protected Setup (WPS) is the latest wireless network technology which makes wireless network setup become very simple. If you have WPS-enabled wireless access point, and you want to establish a secure connection to it, you don’t have to configure the wireless access point and setup data encryption by yourself. All you have to do is to go to the WPS setup page of this wireless card, click the PBC or PIN button, and then press a WPS button or enter a set of 8-digit code on the wireless access point you wish to establish a secure connection.

I. Pin Input Config (PIN)

1. The PIN code of your wireless network card is an eight-digit number located at the upper-right position of configuration utility. Remember it, and input the number to your wireless access point as the WPS PIN code (Please refer to the user manual of your wireless access point for instructions about how to do this).

2. Click ‘Pin Input Config (PIN)’ button now, and the following message will appear on your computer, click ‘Yes’ to select a specific wireless access point or click ‘No’ to start PIN method of WPS.
3. If you click ‘Yes’, and the following message will appear on your computer, please select the SSID of wireless access point that you wish to connect and click ‘Select’.

![Wi-Fi Protected Setup - Select AP](image1.png)

4. Please wait while the install procedure is running and wait for few seconds to two minutes. If a wireless access point with correct PIN code is found, you’ll be connected to that access point.

![Wi-Fi Protected Setup - PIN method](image2.png)
II. Push Button Config (PBC)

1. Start PBC pairing procedure at access point side (please refer to the instruction given by your access point's manufacturer), then click 'PBC' button in wireless configuration utility to start to establish wireless connection by WPS. Please be patient (This may require several seconds to one minute to complete).

![Wi-Fi Protected Setup - PBC method](image)

Status: Initial WPS ...

Complete: 

---

![Wi-Fi Protected Setup - PBC method](image)

Push Button Config (PBC)

Cancel

2. When the connection between this wireless network card and access point is successfully established by WPS, and the information about access point you connected to will be displayed.

![Wireless Network Configuration](image)

Status: Associated
Speed: Tx:150 Mbps Rx:300 Mbps
Type: Infrastructure
Encryption: AES
SSID: WPSiedfed737ee2
Signal Strength: 82%
Link Quality: 100%

Network Address:
MAC Address: 00:50:FC:61:21:01
IP Address: 192.160.2.100
Subnet Mask: 255.255.255.0
Gateway: 192.168.2.1

RoNow IP

Close
4 Troubleshooting

This chapter provides solutions to problems usually encountered during the installation and operation of the adapter.

1. What is the IEEE 802.11g standard?
   802.11g is the new IEEE standard for high-speed wireless LAN communications that provides for up to 54 Mbps data rate in the 2.4 GHz band. 802.11g is quickly becoming the next mainstream wireless LAN technology for the home, office and public networks.
   802.11g defines the use of the same OFDM modulation technique specified in IEEE 802.11a for the 5 GHz frequency band and applies it in the same 2.4 GHz frequency band as IEEE 802.11b. The 802.11g standard requires backward compatibility with 802.11b.

   The standard specifically calls for:
   A. A new physical layer for the 802.11 Medium Access Control (MAC) in the 2.4 GHz frequency band, known as the extended rate PHY (ERP). The ERP adds OFDM as a mandatory new coding scheme for 6, 12 and 24 Mbps (mandatory speeds), and 18, 36, 48 and 54 Mbps (optional speeds). The ERP includes the modulation schemes found in 802.11b including CCK for 11 and 5.5 Mbps and Barker code modulation for 2 and 1 Mbps.
   B. A protection mechanism called RTS/CTS that governs how 802.11g devices and 802.11b devices interoperate.

2. What is the IEEE 802.11b standard?
   The IEEE 802.11b Wireless LAN standard subcommittee, which formulates the standard for the industry. The objective is to enable wireless LAN hardware from different manufactures to communicate.

3. What does IEEE 802.11 feature support?
   The product supports the following IEEE 802.11 functions:
   - CSMA/CA plus Acknowledge Protocol
   - Multi-Channel Roaming
   - Automatic Rate Selection
   - RTS/CTS Feature
   - Fragmentation
   - Power Management

4. What is Ad-hoc?
   An Ad-hoc integrated wireless LAN is a group of computers, each has a Wireless LAN adapter, connected as an independent wireless LAN. Ad hoc wireless LAN is applicable at a departmental scale for a branch or SOHO operation.

5. What is Infrastructure?
   An integrated wireless and wireless and wired LAN is called an Infrastructure configuration. Infrastructure is applicable to enterprise scale for wireless access to central database, or wireless application for mobile workers.
6. **What is BSS ID?**
   A specific Ad hoc LAN is called a Basic Service Set (BSS). Computers in a BSS must be configured with the same BSS ID.

7. **What is WEP?**
   WEP is Wired Equivalent Privacy, a data privacy mechanism based on a 40 bit shared key algorithm, as described in the IEEE 802.11 standard.

8. **What is TKIP?**
   TKIP is a quick-fix method to quickly overcome the inherent weaknesses in WEP security, especially the reuse of encryption keys. TKIP is involved in the IEEE 802.11i WLAN security standard, and the specification might be officially released by early 2003.

9. **What is AES?**
   AES (Advanced Encryption Standard), a chip-based security, has been developed to ensure the highest degree of security and authenticity for digital information, wherever and however communicated or stored, while making more efficient use of hardware and/or software than previous encryption standards. It is also included in IEEE 802.11i standard. Compare with AES, TKIP is a temporary protocol for replacing WEP security until manufacturers implement AES at the hardware level.

10. **Can Wireless products support printer sharing?**
    Wireless products perform the same function as LAN products. Therefore, Wireless products can work with Netware, Windows 2000, or other LAN operating systems to support printer or file sharing.

11. **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 series offer the encryption function (WEP) to enhance security and Access Control. Users can set it up depending upon their needs.

12. **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 is, 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.
13. What is Spread Spectrum?

Spread Spectrum technology is a wideband radio frequency technique developed by the military for use in reliable, secure, mission-critical communication 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).