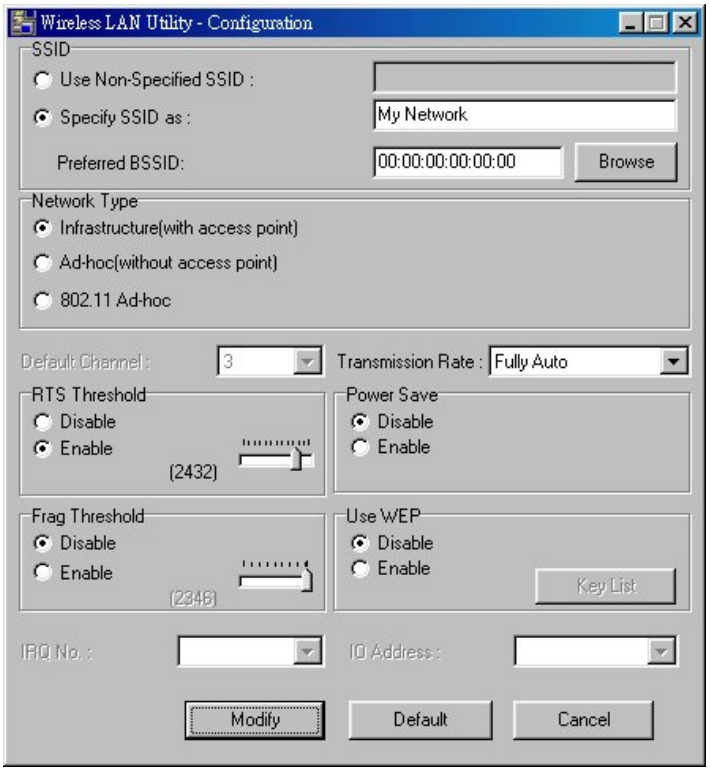
B. Network Configuration

The Network Configuration menu provides allows you to view and modify current configuration of the 11Mbps Wireless PC Card more easily and simply. The configuration settings include: **SSID**, **Network Type**, **RTS Threshold**, **Frag. Threshold**, **Transmission Rate**, and **Use WEP**.



B-1 SSID

The SSID is a unique ID given to the Access Point. Wireless clients associating to any Access Point must have the same SSID. Select **Specify SSID as** and enter a specific SSID (Access Point) you desire to connect with. Alternatively, you may select **Use Non-Specified SSID** (default setting). This allows your wireless adapter to automatically associate to any Access Point in the vicinity of your wireless adapters. You can leave Use Non-Specified ESSIS filed blank, or enter the name "**ANY**" (all characters in upper-case). It is recommended you select the **Specify SSID** option. This will prevent your computer from unintentionally connecting to a different wireless network. If there are more than two Access Points using the same SSID, you may specify the one you want to connect with by entering its MAC address in the **Preferred BSSID** field. By clicking the "**Browse**" button you may select the MAC address of the Access Point you desire to connect to.

When moving your computer to another location within the network environment, and it is out of range of the current Access Point, the roaming functionality will automatically connect your computer to the newest Access Point. This is so called "Roaming" functionality. For further description, see the following page and the Appendix A on page 30.

B-2 Network Type

To connect your wireless station to a local network infrastructure as described in Appendix A " Network Configuration" on page 30, set the station operation mode to **Infrastructure** (with Access Point, default setting). In case you do not wish to connect to a network infrastructure, but prefer to setup a small wireless workgroup also described on page 30, you can enable the **Ad-Hoc** (without Access Point) or **802.11 Ad-Hoc** tick box and set your wireless stations with the same channel. . Be aware that when the **802.11 Ad-Hoc** mode is selected, be sure to set your wireless stations with the same SSID.

NOTE: The 11Mbps Wireless PC Card works with any IEEE802.11 and 802.11b compliant Access Points.

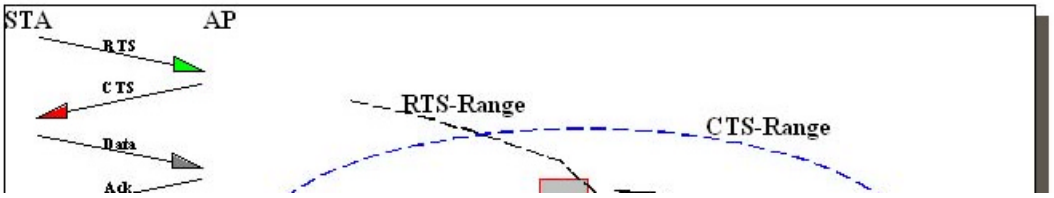
B-3. Transmission Rate

The 11Mbps Wireless PC Card provides various data rate options for you to select. Data rates options include **Fully Auto**, **Fixed 1Mb/s**, **Fixed 2Mb/s**, **Auto Select 1M or 2M**, **Fixed 5.5Mb/s**, and **Fixed 11Mb/s**. In most networking scenarios, you will see that the factory-set default "**Fully Auto**" will prove the most efficient. This setting will allow your 11Mbps Wireless LAN PC Card to operate at the maximum data rate. When the communications quality drops below a certain level, the PC Card will automatically switch to a lower data rate. Transmission at lower data speeds are usually more reliable. However, when the communications quality improves again, the 11Mbps Wireless LAN PC Card will gradually increase the data rate again, until it has reached the highest available transmit rate.

If you wish to balance speed versus reliability, you can also select any of the above options. **Fixed 11Mb/s** or **Fixed 5.5Mb/s** is used in a networking environment where you are certain that all wireless devices can communicate at the highest data rate. **Fixed 1Mb/s**, **Fixed 2Mb/s**, **Auto Select 1M or 2M** are used often in networking environments where the range of the wireless connection is more important than speed.

B-4. RTS Threshold

RTS Threshold is a mechanism implemented to prevent the "Hidden Node" problem. "Hidden Node" is a situation in which two stations are within range of the same Access Point, but are not within range of each other. The following figure illustrates an example of the "Hidden Node" problem. Both stations (STA) are within range of the Access Point, however, they cannot hear each other. Therefore, they are hidden nodes for each other. When a station starts data transmission with the Access Point, it might not notice that the other station is already using the wireless medium. When these two stations send data at the same time, they might collide when arriving simultaneously at the Access Point. The collision will most certainly result in a loss of messages for both stations.



Thus, the RTS Threshold mechanism provides a solution to prevent data collisions. When you enable RTS Threshold on a suspect "hidden station", this station and its Access Point will use a Request to Send/Clear to Send protocol (RTS/CTS). The station will send an RTS to the Access Point, informing that it is going to transmit the data. Upon receipt, the Access Point will respond with a CTS message to all station within its range to notify all other stations to defer transmission. It will also confirm the requestor station that the Access Point has reserved it for the time-frame of the requested transmission.

If the "Hidden Node" problem is an issue, please specify the packet size. The RTS mechanism will be activated if the packet size exceeds the value you set. It is highly recommended that you set the value ranging from 0 to 1500.

NOTE: Enabling RTS Threshold would cause redundant network overhead that could negatively affect the throughput performance instead of providing a remedy.

B-5. Frag Threshold

Fragmentation mechanism is used for improving the efficiency when high traffic flows along in the wireless network. If your 11Mbps Wireless LAN PC Card often transmit large files in wireless network, you can enable the Fragmentation Threshold by clicking the **Enable** button and the mechanism will split the packet. The value can be set from 256 to 2346. The default value is **Disable**.

B-6. IRQ NO./IO Address

To avoid device conflict, you may modify the IRQ No. and IO Address for your device (Only available under Windows NT).

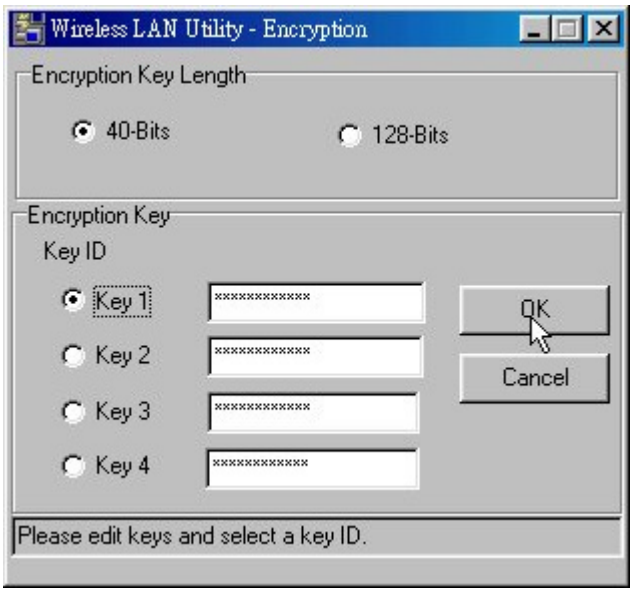
B-7. Power Save

The Power Save option is designed to conserve battery life of you computer. When Power Save is enabled, your 11Mbps Wireless LAN PC Card will go into sleep mode to minimize power consumption.

NOTE: When power saving mode is enabled, the Access Points you use need to support power saving as well so that the communication can be established.

B-6. Use WEP (Wired Equivalent Privacy)

To prevent unauthorized wireless stations from accessing data transmitted over the network, the 11Mbps Wireless LAN PC Card offers highly secure data encryption, known as WEP. If you require high security in transmission, please select the **Enable** item and click the **Key List** button.



The Wireless LAN PC Card supports two types of Encryption Key length: **40-Bits** and **128-Bits**. You may need to enter 4 different encryption keys and select one of them to encrypt your transmission data. The key value of your choice may either be:

For 40-Bits encryption:

- Five alphanumeric characters in the range of "a-z", "A-Z" and "0-9" (e.g. MyKey), or:
- 10 digit hexadecimal values in the range of "A-F" and "0-9", preceded by the characters "**0x**" values (e.g. 0x11AA22BB33).

For 128-Bits encryption:

- 13 alphanumeric characters in the range of "a-z", "A-Z" and "0-9" (e.g. WEPencryption).
- 26 digit hexadecimal values in the range of "A-F" and "0-9", preceded by the characters "**0x**" values (e.g. 0x11AA22BB33123456789ABCDEFF)

NOTE: To allow encrypted data communications, you must set the same encryption key values on all wireless stations and/or Access Points. For example, if you use Key 1 on your PC card, and the value is (e.g. MyCar), the same value must be assigned to Key 1 for all other client stations. The values you enter on the encryption tab, will only be visible the first time you enter the keys. After closing this tab, all key values will be displayed as "**xxxxxxxxxxx**" every time the tab is displayed again.

C. Diagnostics Tools Screen

The Diagnostics Tools helps you diagnose the wireless LAN environment. The following explains each tool and details instructions of how to perform diagnostics tools.

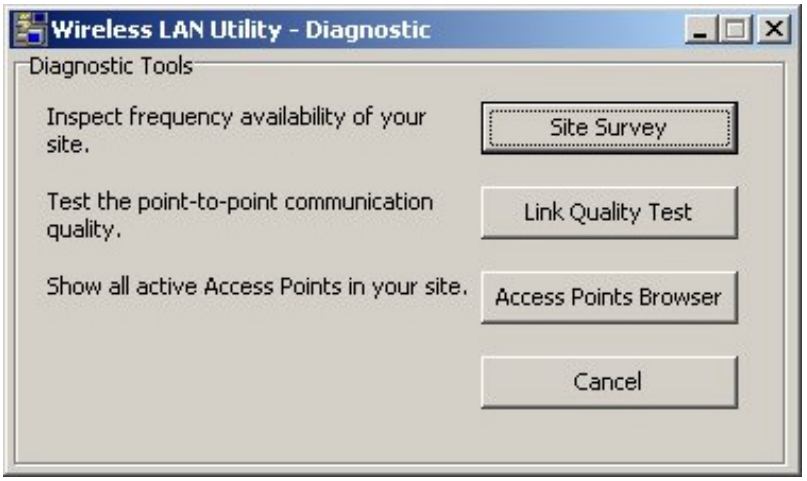


Fig. Diagnostic Tools

- ☐ **[Site Survey]** - Check wireless channel quality for your wireless network environments.
- ☐ **[Link Quality Test]** - Test point-to-point communication quality.
- ☐ **[Access Point Browser]** - Display all active Access Points at your site.

The instructions of performing each diagnostic tool are as follows:

C-1. Site Survey

When the Site Survey screen is displayed, the channel quality of all 14 radio channels will be displayed. These channel quality measurements are shown on each gauge for the 14 radio channels. The **higher** the blue bar is, the **better** quality you have (i.e., less interference).

The channel quality is scanned channel-by-channel repeatedly. You may see some of the gauges changing their height occasionally. To determine the channel quality in a longer time span, you can refer to the average channel quality measurement from the small-shaped dot in each channel quality gauge.

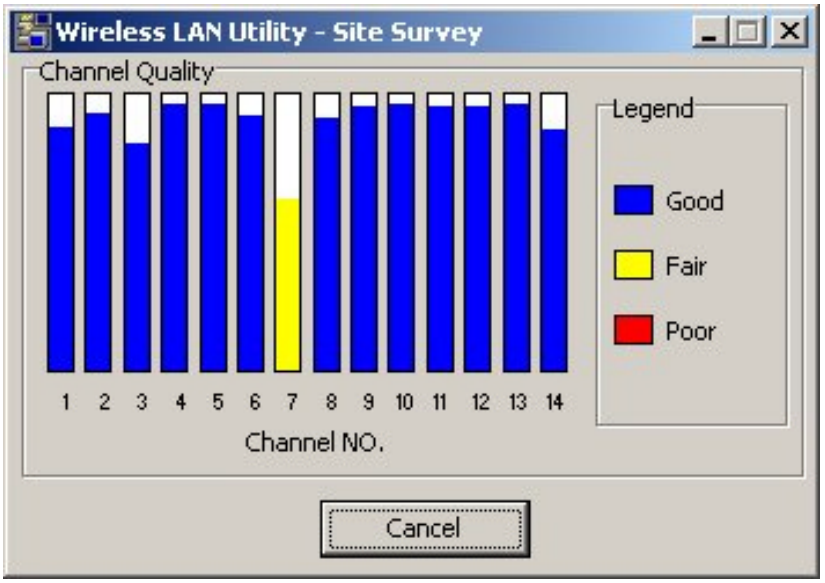


Fig. Site Survey

C-2. Link Quality Test

Link Quality Test is a useful diagnostic tool for you to test point-to-point data transmission quality between two wireless LAN stations. Or, if you use the Infrastructure wireless LAN configuration, you can test the transmission quality between your wireless LAN station and Access Point.

When Link Quality Test Screen is displayed, you may choose one of the roles that this wireless LAN station should perform.

1. **Act as Master test station (Ad-Hoc):**

Input the MAC address of the destination slave test station before pressing the **Start** button. The slave MAC address can be found from the slave test station's screen. The "Master Test Station" window will be displayed after pressing **Start**.

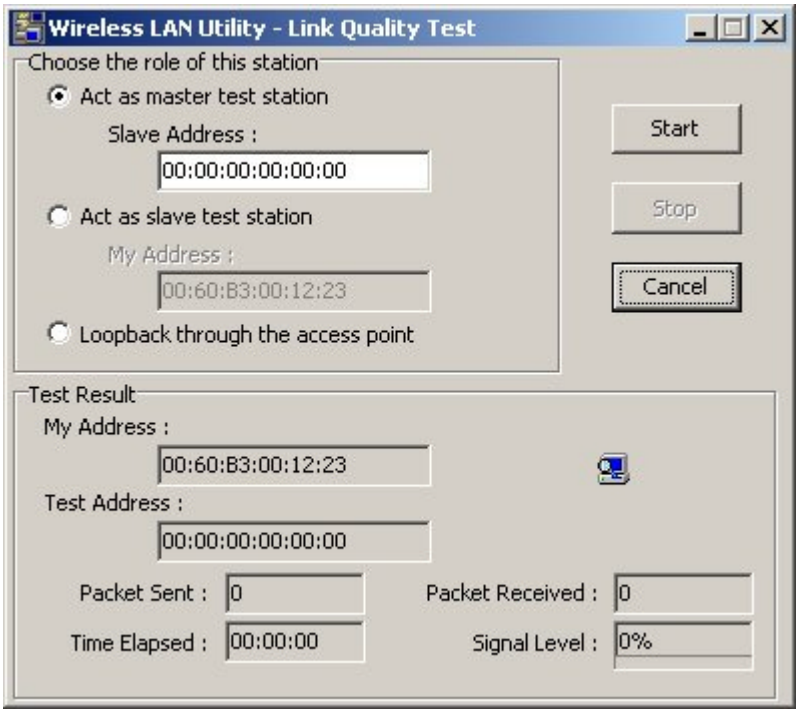


Fig. Act as Master test station

The "Master Test Station" window contains the following status/ statistical information during the Link Quality Test session:

- **Slave / Test Address:** The physical address of the destination slave test station. (The physical address of your own wireless station will be displayed while performing Access Point loopback test.)
- **Packet Sent:** Total test packets that have been sent.
- **Packet Received:** Total responding packets that have been received.
- **Elapsed Time:** Total test time.
- **Signal level:** The signal level when receiving last responding packet. The signal level is calculated as the percentage of its signal level measurement relative to the full signal level.

2. Act as Slave test station (Ad-Hoc):

You can press the **Start** button to start the slave test station. The "Slave Test Station" window will be displayed after pressing **Start**.

The "Slave Test Station" window contains following status/statistical information during the Link Quality Test session:

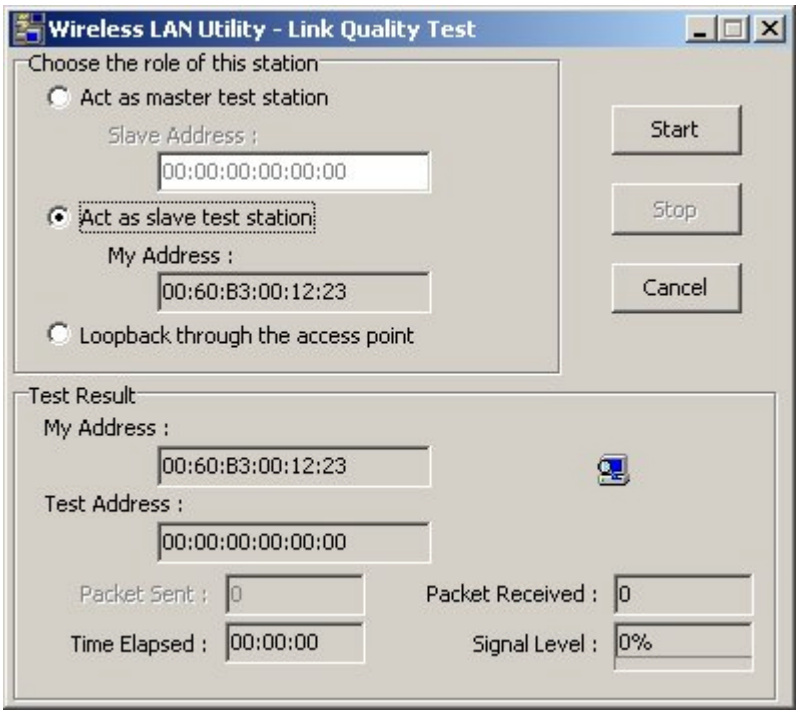


Fig. Act as Slave test station

- **My Address:** The slave test station' s physical address.
- **Packet Received:** Total test packets that have received.
- **Elapsed Time:** Total test time.
- **Signal Level:** The signal level when receiving last test packet. The signal level is calculated as the percentage of its signal level measurement relative to the full signal level.

3. Loopback through Access Point (Infrastructure):

If you use the infrastructure wireless LAN configuration, you may select the Access Point loopback test to verify the communication quality between your wireless station and Access Point. To run the loopback test, select the **Loopback through the access point** item and click **Start**. Note that it only works in the infrastructure mode.

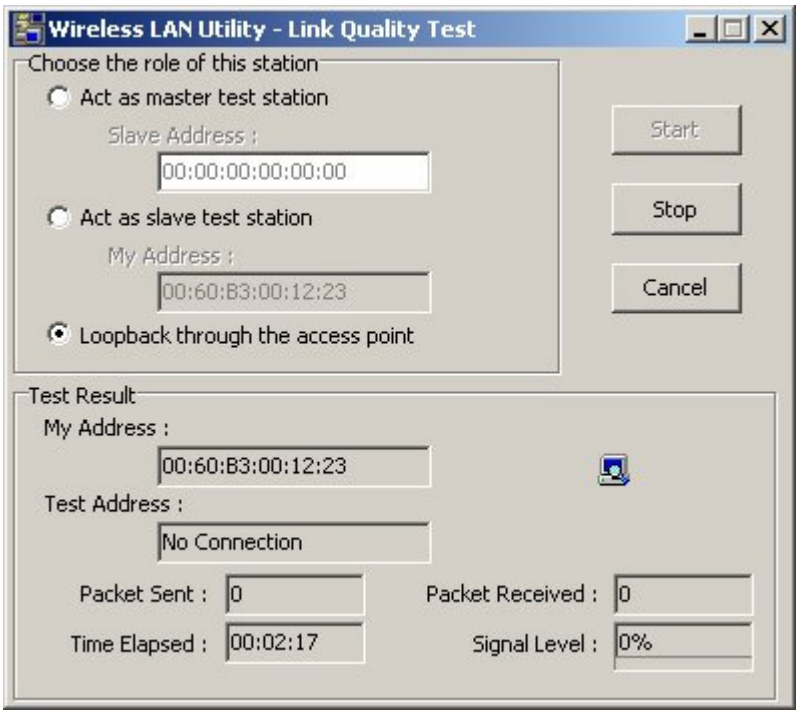


Fig. Loopback through Access Point

- ☐ **Packet Sent:** Total test packets sent.
- ☐ **Packet Received:** Total responding packets received.
- ☐ **Elapsed Time:** Total test time.
- ☐ **Signal level:** The signal level when receiving last responding packet. The signal level is calculated as the percentage of its signal level measurement relative to the full signal level.

C-3. Access Point Browser

Select the **Access Point Browser** and you will see a screen shown as below. Choose **Go**, and all the active Access Points will be displayed on the screen.

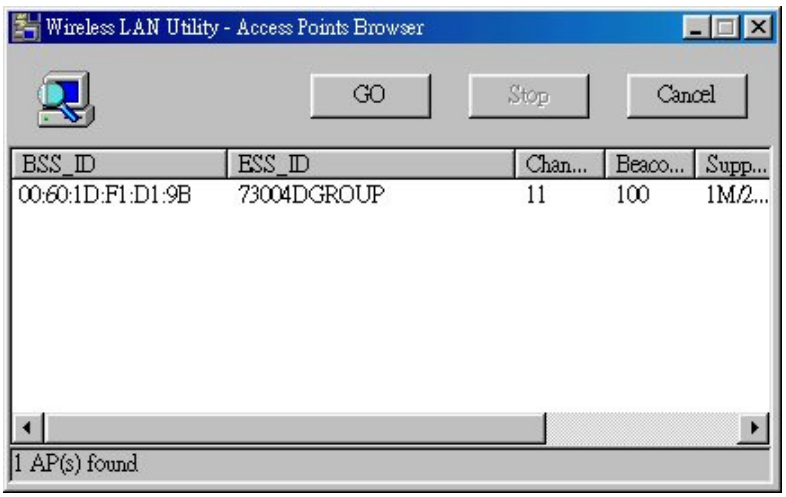


Fig. Access Point Browser.

Each row of the Access Point information contains the following columns:

- **BSS_ID:** The BSS ID (MAC address) of the Access Point.
- **ESS_ID:** The ESS ID of the Access Point.
- **Channel**: The operating channel number of the respective access point.
- **Beacon:** Each Access Point broadcasts "beacon" periodically. The wireless station will process these beacons to keep in touch with the network. It counts the beacons cumulatively from the beginning of the Access Point Browser session. This item only shows in the Single-Channel browser screen.
- **Supported Rates**: The data rates that the PC card will support. For the 11Mbps product the supported rates are 11M, 5.5M, 2M, and 1M.
- **Capacity**: This is information from the beacon of the Access Point. When communicating with any Access Point, it will display "ESS". This means that the Access Point is capable of infrastructure mode. When the device is in Ad-Hoc mode, you will not see any information in this column.
- **Signal Level**: This signal level is in the range from 27 to 154. A high number means that you have a strong signal. This information is for engineering purposes. Please use the diagnostic tool to determine your signal strength. Refer to page 24 for information.
- **Noise Level**: This measurement is the actual amount of noise within your area. This information is for engineering purposes. Please use the diagnostic tool and make sure you are above 70 percent. There may be situations where you are close to your access point, but your signal is below 70 percent. This may indicate high noise. Refer to page 24 for information.

Chapter 5 Troubleshooting

1. Problem Solving

- ***11Mbps Wireless PC Card cannot work properly***

  Solutions:

  a. Installation:

  - Insert the PCMCIA adapter into Notebook's slot again. The Power and Link LED should be on if the adapter is properly inserted.
  - Make sure the antenna is installed on the 11Mbps Wireless PC Card correctly.
  - Check if the I/O and IRQ for the 11Mbps Wireless PC Card has conflict problem with other devices.
  - For Windows 95/98/ME/NT/2000 system, make sure a PCMCIA card service driver is installed on your computer. See Chapter 2 Hardware Installation for 11Mbps Wireless PC Card on page 4.

  b. Configuration Mismatch

  - Use the utility "Loopback Test" to check the link status with the AP associated with (Infrastructure Mode).
  - Use the utility "Master -- Slave Test" to check the link status between the cards (Ad-Hoc Mode).
  - Use the utility "Site Survey" to check whether there is high interference around the environment.
  - Ensure you set the correct IP address for the 11Mbps Wireless PC Card. Use the Ping command to ping the unit itself.
  - If Netbeui is installed and relevant parameters are set properly, you can go to Neighborhood to check if you can see your PC.

  a. Check the Settings for the Access Point.

  - Make sure the Access Point is powered on and all the LEDs are working normally.
  - Use the Ping command to ping any other host. If the host does not respond, your Access Point might not be connected to the network.
  - Re-configure and reset the Access Point.
  - Use Web Management/Telnet of the Access Point to check whether all the Access Points are connected to the network.

- ***The 11Mbps Wireless PC Card station cannot communicate with the computer on the Ethernet when the Infrastructure mode is configured.***

  Probable Causes & Solution:

  a. Make sure the Access Point with which the station associated is powered on.
  b. Start Site Survey Utility to verify the operating radio channel is in good quality. Or, change the Access Point and all the stations within the BSS to another radio channel.
  c. Make sure the station is configured with the same security option with the Access Point, either turn off or turn on with the same security key.
  d. Make sure the BSS ID is the same as the Access Point for a roaming disabled station, or the ESS ID is the same as the Access Point for a roaming enabled station.

Appendix A Network Configuration

The 11Mbps Wireless LAN products support the same network configuration options of the legacy Ethernet LANs as defined by IEEE 802 standard committee.

The 11Mbps Wireless LAN products can be configured as:

- Ad-Hoc for departmental or SOHO LANs
- Infrastructure for enterprise LANs
- LAN-Interconnection for point-to-point link as a campus backbone.

A-1 Network Topology

- **Ad-Hoc**

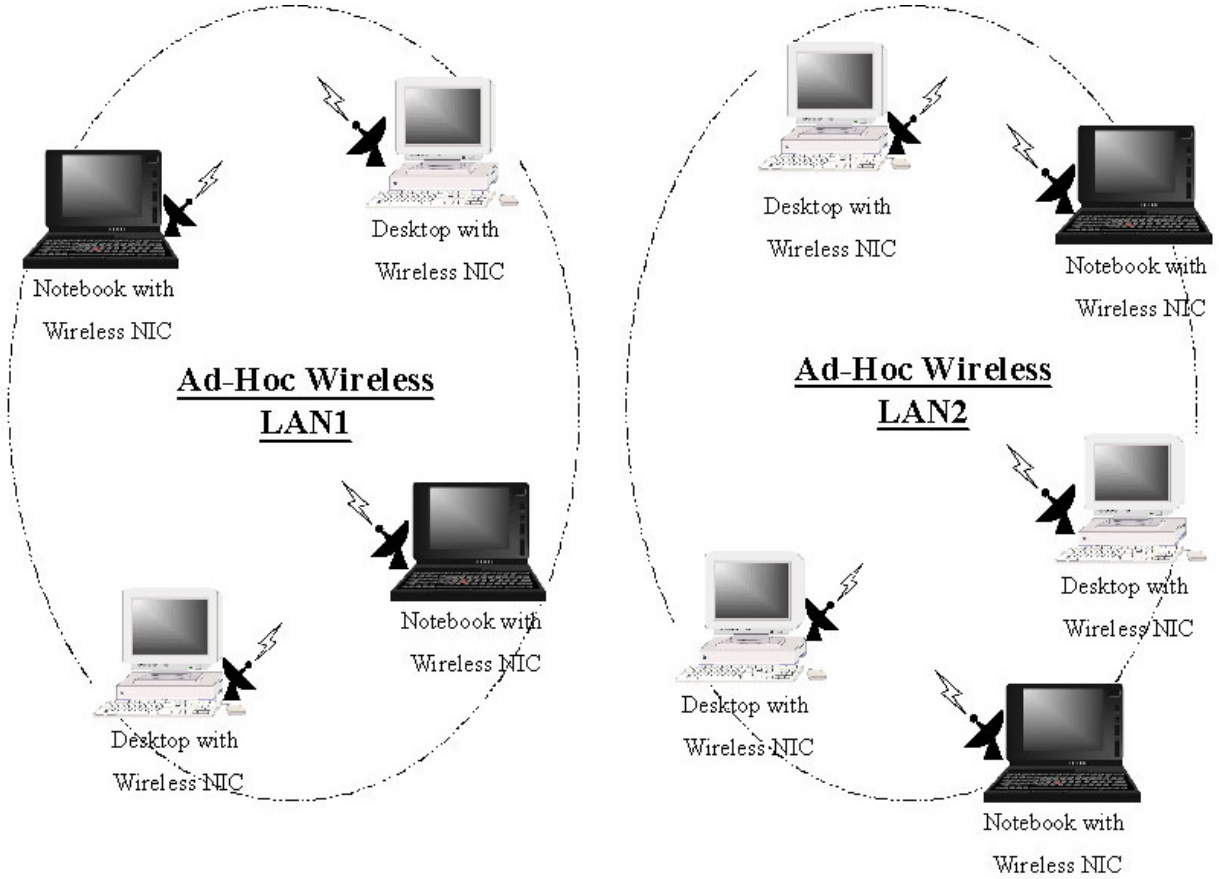


Fig An Example of Ad-Hoc Wireless LAN

An Ad-Hoc wireless LAN is a group of computers, each equipped with one wireless adapter, connected as an independent wireless LAN. Computers in a specific Ad-Hoc wireless LAN must be configured at the same radio channel.

Ad-Hoc wireless LAN is applicable at a departmental scale for a branch or SOHO operation.

◆ **Infrastructure**

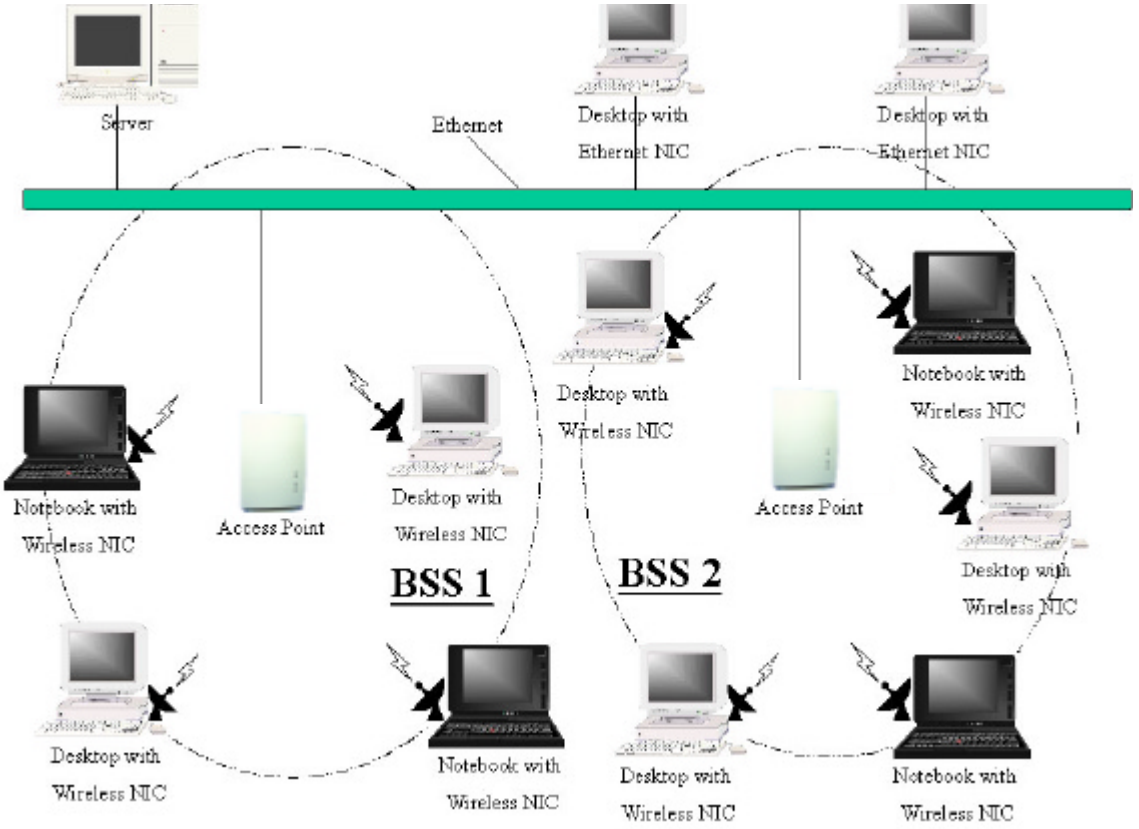


Fig An Example of Infrastructure Wireless LAN

The 11Mbps Wireless LAN devices provides access to a wired LAN for wireless workstations. An integrated wireless and wired LAN is called an Infrastructure configuration. A group of wireless LAN PC users and an Access Point construct a Basic Service Set (BSS). Each wireless-equipped PC in this BSS can talk to any computer in the wired LAN infrastructure via the Access Point.

Infrastructure configuration will extend the accessibility of a wireless station to the wired LAN. Multiple Access Points will allow roaming and it will increase the transmission range. The Access Point is also able to forward data within its BSS. The effective transmission range in an infrastructure LAN is **doubled**.

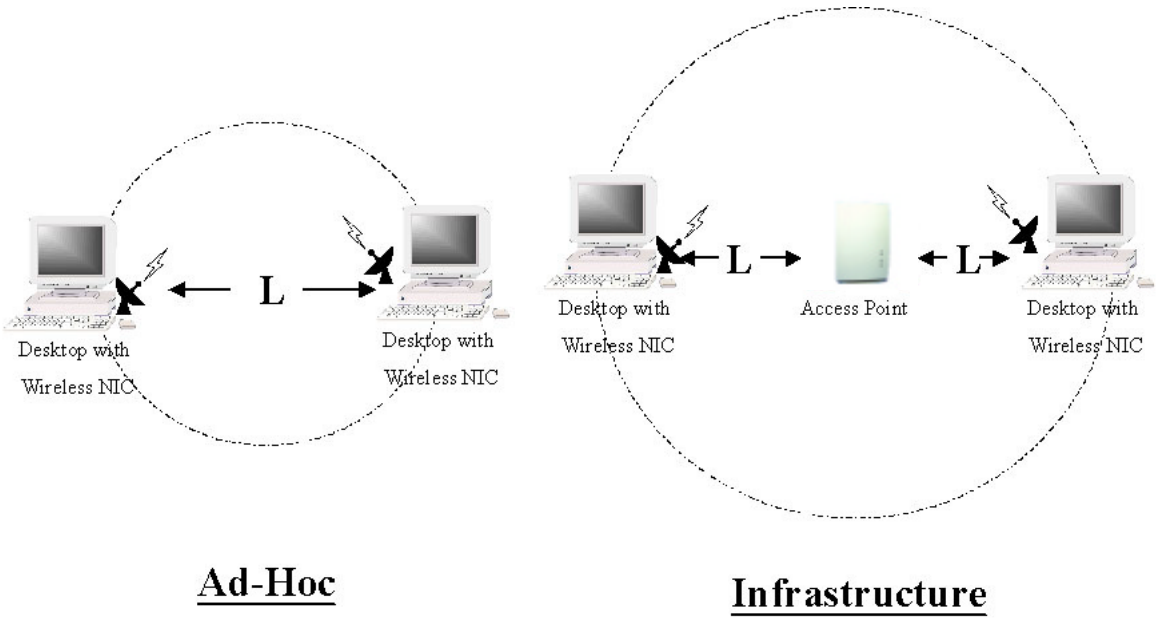


Fig The effective Transmission Range

Appendix B Specifications

Product	**11Mbps Wireless PC Card**
Operating Channels	11 for N. America, 14 Japan, 13 Europe (ETSI), 2 Spain, 4 France
Operating Frequency	2.412-2.462 GHz (N. America) 2.412-2.484 GHz (Japan) 2.412-2.472 GHz (Europe ETSI) 2.457-2.462 GHz (Spain) 2.457-2.472 GHz (France)
Range	11M: 460 feet = 140m (In open environment) 5.5M: 656 feet = 200m 2M: 885 feet = 270m 1M: 1311 feet = 400m
RF Technology	Direct Sequence Spread Spectrum
Modulation	CCK(11Mps, 5.5Mbps) , DQPSK(2Mbps) , DBPSK(1Mbps)
Voltage	3.3V & 5V DC
Power Consumption	Tx power consumption: < 350mA Rx power consumption: < 250mA
Output Power	13 dBm
Sensitivity	@PER < 0.08 11Mbps < -83 dBm 5.5Mbps < -86dBm 2Mbps < -89dBm 1Mbps < -91dBm
Data Rate	1,2,5.5,11 Mbps
Media Access Protocol	CSMA/CA, 802.11 Compliant
Support OS	Windows 95/98/ME//NT4.0/2000, Linux, FreeBSD

Appendix C Glossary

Access Point An internetworking device that seamlessly connects wired and wireless networks together.

Ad-Hoc An Ad-Hoc wireless LAN is a group of computers each with wireless adapters, connected as an independent wireless LAN.

Backbone The core infrastructure of a network. The portion of the network that transports information from one central location to another central location where it is unloaded onto a local system.

Base Station In mobile telecommunication, a base station is the central radio transmitter/ receiver that maintains communication with the mobile radio telephone sets within its range. In cellular and personal communications applications, each cell or microcell has its own base station; each base station in turn is interconnected with other cells' base stations.

BSS Stands for "Basic Service Set." An Access Point associated with several wireless stations.

ESS Stands for "Extended Service Set." More than one BSS can be configured to be an Extended Service Set. An ESS is basically a roaming domain.

Ethernet A popular local area data communications network, originally developed by Xerox Corp., that accepts transmission from computers and terminals. Ethernet operates on 10 Mbps baseband, transmitting over shielded coaxial cable or over shielded twisted pair telephone wire.

Infrastructure An integrated wireless and wired LAN is called an Infrastructure configuration.

PCMCIA PCMCIA stands for Personal Computer Memory Card International Association, which develops standards for PC cards, formerly known as PCMCIA cards. They are available in three types that are about the same length and width as credit cards but range in thickness from 3.3 mm (Type I) to 5.0 mm (Type II) to 10.5 mm (Type III). These cards provide many functions, including memory storage, and acting as landline modems and as wireless LAN.

Roaming A function that enables one to travel with his mobile end system (wireless LAN mobile station, for example) throughout a domain (an ESS, for example) while being continuously connected to the infrastructure.

RTS Threshold Transmitters contending for the medium may not hear each other. RTS/CTS mechanism can solve this " Hidden Node Problem". If the packet size is smaller than the preset RTS Threshold size, the RTS/CTS mechanism will NOT be enabled.