D-Link®
Building Networks for People

Manual

Version 1.00

DWL-G650M

Wireless 108G MIMO Notebook Adapter

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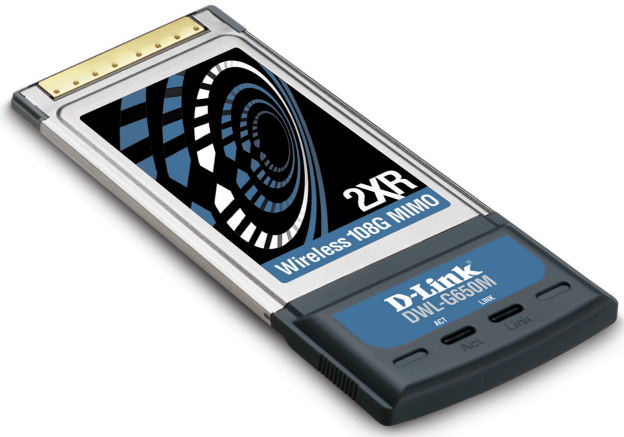
Package Contents



- **D-Link DWL-G650M 108G MIMO**
  Wireless Notebook Adapter
- Manual on CD
- Printed Quick Installation Guide

If any of the above items are missing, please contact your reseller.

Minimum System Requirements

- A computer or laptop with an available 32-bit Cardbus slot
- Windows XP/2000
- At least 64MB of memory and a 500MHz processor
- An 802.11g or 802.11b access point (for Infrastructure mode), or another 802.11g or 802.11b wireless adapter (for Ad-Hoc, Peer-to-Peer networking mode.)

Introduction

The D-Link DWL-G650M 108G MIMO Wireless Notebook Adapter is an 802.11g high-performance, wireless adapter that brings wireless networking to your laptop or desktop PC.

With a maximum wireless signal rate of up to 108Mbps, you can connect to a wireless network at home, at the office or at any wireless hotspot. Now you can stay connected wherever you are and wherever you go.

The DWL-G650M is Wi-Fi compatible, meaning that it can connect and interoperate with other 802.11b and 802.11g Wi-Fi-compliant wireless routers, access points and adapters. The DWL-G650M connects to any available Cardbus slot on a laptop Windows -based computer. A laptop computer with a DWL-G650M can be positioned virtually anywhere at a workstation to achieve the best available wireless signal reception - whether that workstation is in your office, on your deck or patio, by the pool, at the local coffee shop, or in an airport terminal while waiting to board your next flight.

The adapter works with Microsoft Windows XP/2000 operating systems to ensure that you'll be up and running on a wireless network in just a matter of seconds.

The DWL-G650M provides an increased level of security with WPA-PSK. **WPA-Personal** is directed at home users who do not have the server based equipment required for user authentication. The method of authentication is similar to WEP because you define a "Pre-Shared Key" on the wireless router/AP. Once the pre-shared key is confirmed and satisfied on both the client and access point, then access is granted. the encryption method used is referred to as the Temporal Key Integrity Protocol (TKIP), which offers per-packet dynamic hashing. It also includes an integrity checking feature which ensures that the packets were not tampered with during wireless transmission.

*Maximum wireless signal rate derived from IEEE Standard 802.11g specifications. Actual data throughput will vary. Network conditions and evironmental factors lower actual data throughput rate.

Features and Benefits

- **Provides maximum wireless signal rate of up to 108Mbps***
- **Fully 802.11b/802.11g compatible**.
- **Better Security with WPA-PSK -** In addition to 64-,128-bit WEP encryption, you can also securely connect to a wireless network using WPA-PSK.
- **Utilizes Smart Antenna technology**.
- **Supports Infrastructure networks via an access point and Peer-to-Peer communication in Ad-Hoc mode**.
- **User-friendly configuration and diagnostic utilities**.

**Maximum wireless signal rate derived from IEEE Standard 802.11g specifications. Actual data throughput will vary. Network conditions and environmental factors lower actual data throughput rate.*

Wireless Basics

D-Link wireless products are based on industry standards to provide easy-to-use and compatible high-speed wireless connectivity within your home, business or public access wireless networks. D-Link wireless products will allow you access to the data you want, when and where you want it. You will be able to enjoy the freedom that wireless networking brings.

A wireless local area network (WLAN) is a computer network that transmits and receives data with radio signals instead of wires. WLANs are used increasingly in both home and office environments, and public areas such as airports, coffee shops and universities. Innovative ways to utilize WLAN technology are helping people to work and communicate more efficiently. Increased mobility and the absence of cabling and other fixed infrastructure have proven to be beneficial to many users.

Wireless users can use the same applications they use on a wired network. Wireless adapter cards used on laptop and desktop systems support the same protocols as Ethernet adapter cards.

People use WLAN technology for many different purposes:

Mobility - Productivity increases when people have access to data in any location within the operating range of the WLAN. Management decisions based on real-time information can significantly improve worker efficiency.

Low Implementation Costs - WLANs are easy to set up, manage, change and relocate. Networks that frequently change can benefit from WLANs ease of implementation. WLANs can operate in locations where installation of wiring may be impractical.

Installation and Network Expansion - Installing a WLAN system can be fast and easy and can eliminate the need to pull cable through walls and ceilings. Wireless technology allows the network to go where wires cannot go - even outside the home or office.

Inexpensive Solution - Wireless network devices are as competitively priced as conventional Ethernet network devices.

Scalability - WLANs can be configured in a variety of ways to meet the needs of specific applications and installations. Configurations are easily changed and range from Peer-to-Peer networks suitable for a small number of users to larger Infrastructure networks to accommodate hundreds or thousands of users, depending on the number of wireless devices deployed.

Standards-Based Technology

The DWL-G650M Wireless Cardbus Adapter utilizes the **802.11g** standard.

The IEEE **802.11g** standard is an extension of the 802.11b standard. It increases the data rate up to 54Mbps within the 2.4GHz band, utilizing **OFDM technology.**

This means that in most environments, within the specified range of this device, you will be able to transfer large files quickly or even watch a movie in MPEG format over your network without noticeable delays. This technology works by transmitting high-speed digital data over a radio wave utilizing **OFDM** (**O**rthogonal **F**requency **D**ivision **M**ultiplexing) technology. **OFDM** works by splitting the radio signal into multiple smaller sub-signals that are then transmitted simultaneously at different frequencies to the receiver. **OFDM** reduces the amount of **crosstalk** (interference) in signal transmissions. The D-Link DWL-G650M will automatically sense the best possible connection speed to ensure the greatest speed and range possible.

802.11g offers the most advanced network security features available today, including: WPA , 802.1x, TKIP, AES and Pre-Shared Key mode. These security features are explained in more detail in the *Introduction* section of this manual.

The DWL-G650M is backwards compatible with 802.11b devices. This means that if you have an existing 802.11b network, the devices in that network will be compatible with 802.11g devices at speeds up to 11Mbps in the 2.4GHz range. Also based on the IEEE **802.11b** standard, the DWL-G650M is interoperable with existing compatible 2.4GHz wireless technology with data transfer speeds of up to 11Mbps.

Installation Considerations

The DWL-G650M lets you access your network using a wireless connection from virtually anywhere within its operating range. Keep in mind, however, that the number, thickness and location of walls, ceilings, or other objects that the wireless signals must pass through, may limit the range. Typical ranges vary depending on the types of materials and background RF (radio frequency) noise in your home or business. The key to maximizing wireless range is to follow these basic guidelines:

- Keep the number of walls and ceilings between the DWL-G650M and other network devices to a minimum - each wall or ceiling can reduce your DWL-G650M's range from 3-90 feet (1-30 meters.) Position your devices so that the number of walls or ceilings is minimized.
- Be aware of the direct line between network devices. A wall that is 1.5 feet thick (.5 meters), at a 45-degree angle appears to be almost 3 feet (1 meter) thick. At a 2-degree angle it looks over 42 feet (14 meters) thick! Position devices so that the signal will travel straight through a wall or ceiling (instead of at an angle) for better reception.
- Building materials can impede the wireless signal - a solid metal door or aluminum studs may have a negative effect on range. Try to position wireless devices and computers with wireless adapters so that the signal passes through drywall or open doorways and not other materials.
- Keep your product away (at least 3-6 feet or 1-2 meters) from electrical devices or appliances that generate RF noise.

Getting Started

There are basically two modes of networking:

Infrastructure – using an access point or router, such as the DI-624M.

Ad-Hoc – directly connecting to another computer, for Peer-to-Peer communication, using wireless network adapters on each computer, such as two or more DWL-G650M Wireless Network adapters.

On the following pages we will show you an example of an **Infrastructure Network** and an **Ad-Hoc Network**.

An **Infrastructure** network contains an access point or router. The **Infrastructure network** example shown on the following page contains the following D-Link network devices (your existing network may be comprised of other devices):

- A wireless router - **D-Link 108G MIMO DI-624M**
- Laptop computers with a **D-Link 108G MIMO DWL-G650M**
- A cable modem - **D-Link DCM-202**

Setting up a Wireless Infrastructure Network

For a typical wireless setup at home, please do the following:

1. You will need broadband Internet access (a cable or DSL-subscriber line into your home or office).
2. Consult with your cable or DSL provider for proper installation of the modem.
3. Connect the cable or DSL modem to your broadband router. (*See the Quick Installation Guide included with your router.*)
4. Install the D-Link DWL-G650M 108G MIMO Wireless Notebook Adapter into an available cardbus slot on your laptop computer. (See the Quick Installation Guide included with the DWL-G650M.)
5. Install another D-Link DWL-G650M 108G MIMO Wireless Notebook Adapter into an available cardbus slot on your laptop computer. (See the Quick Installation Guide included with the DWL-G650M.)

Setting up a Wireless Ad-Hoc Network

For a typical wireless setup at home (as shown above), please do the following:

1. Install the **D-Link DWL-G650M 108G MIMO** Wireless Notebook adapter into the laptop computer. *(See the Quick Installation Guide included with the product.)*

2. Install the **D-Link DWL-G650M 108G MIMO** Wireless Notebook adapter into the laptop computer. *(See the Quick Installation Guide included with the product.)*

3. Set the wireless configuration for the adapters to Ad-Hoc mode, set the adapters to the same channel, and assign an IP address to each computer on the Ad-Hoc network.

IP Address

When assigning IP addresses to the computers on the network, please remember that the **IP address for each computer must be in the same IP address range as all the computers in the network**, and the subnet mask must be exactly the same for all the computers in the network.

For example: If the first computer is assigned an IP address of 192.168.0.2 with a subnet mask of 255.255.255.0, then the second computer can be assigned an IP address of 192.168.0.3 with a subnet mask of 255.255.255.0, etc.

IMPORTANT: If computers or other devices are assigned the same IP address, one or more of the devices may not be visible on the network.

Using the Configuration Utility

D-Link DWL-G650M 108G MIMO Wireless Notebook adapter uses the **Configuration Utility** as the management software. The utility provides the user an easy interface to change any settings related to the wireless adapter. After you have completed the installation of the DWL-G650M (refer to the *Quick Installation Guide* that came with your purchase) whenever you start the computer, the **Configuration Utility** starts automatically and the system tray icon is loaded in the toolbar (see illustration below.*) Clicking on the utility icon will start the **Configuration Utility**. Another way to start the **Configuration Utility** is to click on **Start>Programs>D-Link Technology > D-Link Wireless Utility.**

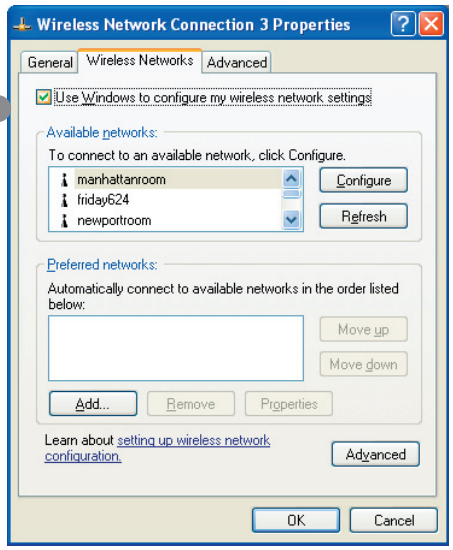
If you are using Windows XP, you can use either the Zero Configuration Utility or the D-Link Configuration Utility.

To use the D-Link Configuration Utility with XP, right-click on the wireless network icon in the taskbar in the lower right-hand corner of your computer screen.

In the window that appears, select **View Available Wireless Networks** and click the **Advanced** button. The screen at right will appear.

Select the **Wireless Networks** tab.

Uncheck the box in the properties window that enables windows configuration.

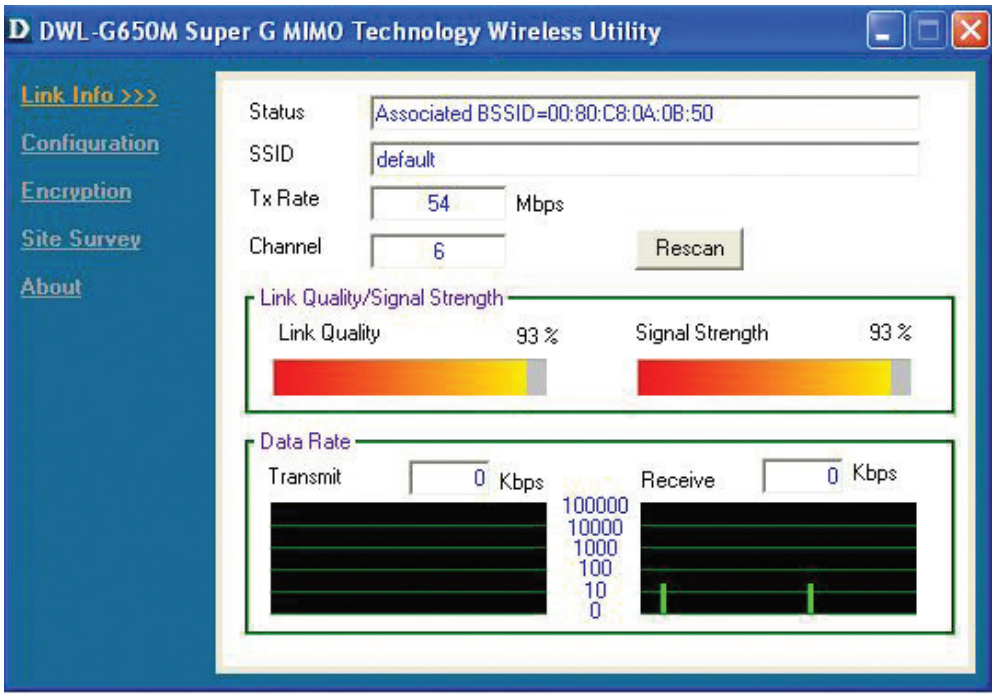


After you have done this, you can then use the D-Link Configuration Utility with XP by clicking on the D-Link Configuration Utility icon.

*Configuration Utility icon in the system tray

If the icon does not display in the taskbar, then click on this icon on your desktop to open.

Link Info



Status: Displays the MAC address of the access point or router to which the DWL-G650M is associated.

SSID: The Service Set Identifier is the name assigned to the wireless network. The factory SSID setting is **default**.

Tx Rate: The default setting is **Auto**; Tx Rate settings are automatically determined for a maximum wireless signal rate of up to 54Mbps (108Mbps* in Turbo mode).

Channel: The default setting is **Auto**. The channel selection is automatically determined by the DWL-G650M.

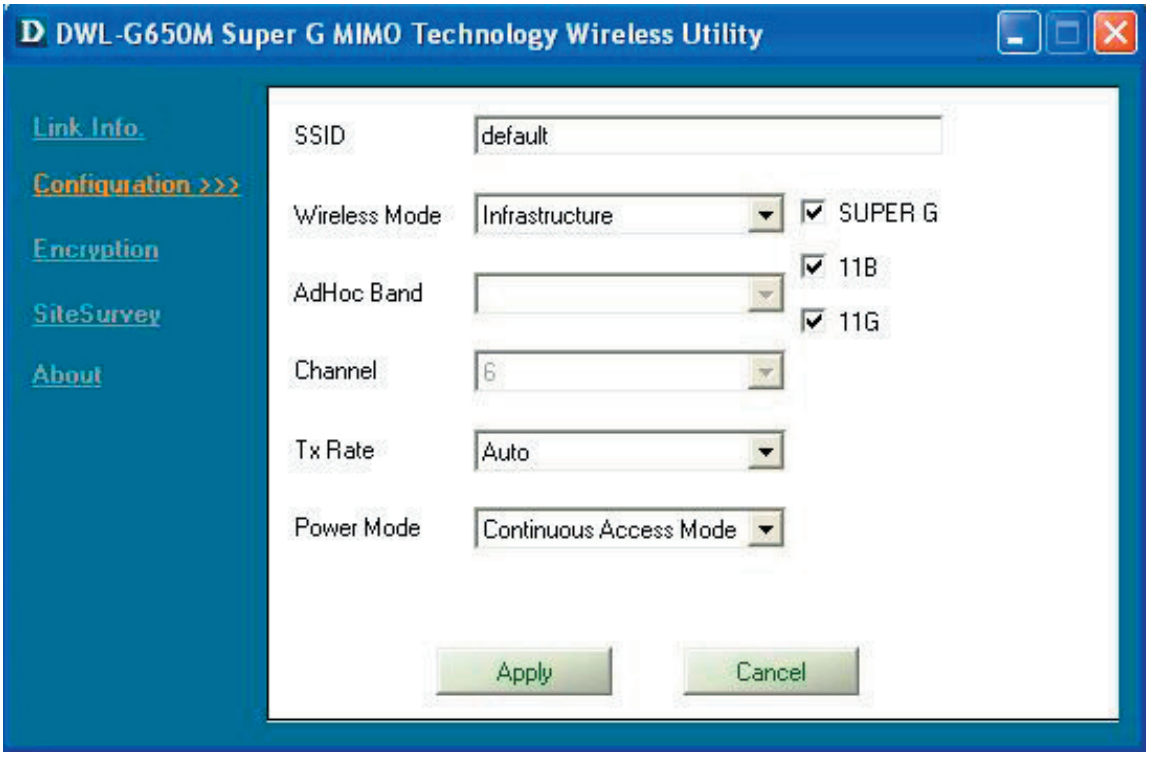
Rescan: Rescans for the strongest signal with the current SSID and associates with that access point or router.

Link Quality: Displays the Link Quality of the DWL-G650M's wireless connection to the access point or router.

Signal Strength: Displays the signal strength and the link quality of the DWL-G650M's wireless connection to the access point or router

Data Rate: Displays the statistics of the data packets that are transmitted and received.

Configuration



SSID: The Service Set Identifier is the name assigned to the wireless network. The factory SSID setting is **default**.

Wireless Mode: Either **Infrastructure** or **Ad-Hoc** will be displayed here. (Please see the *Getting Started* section in this manual for an explanation of these two modes.)

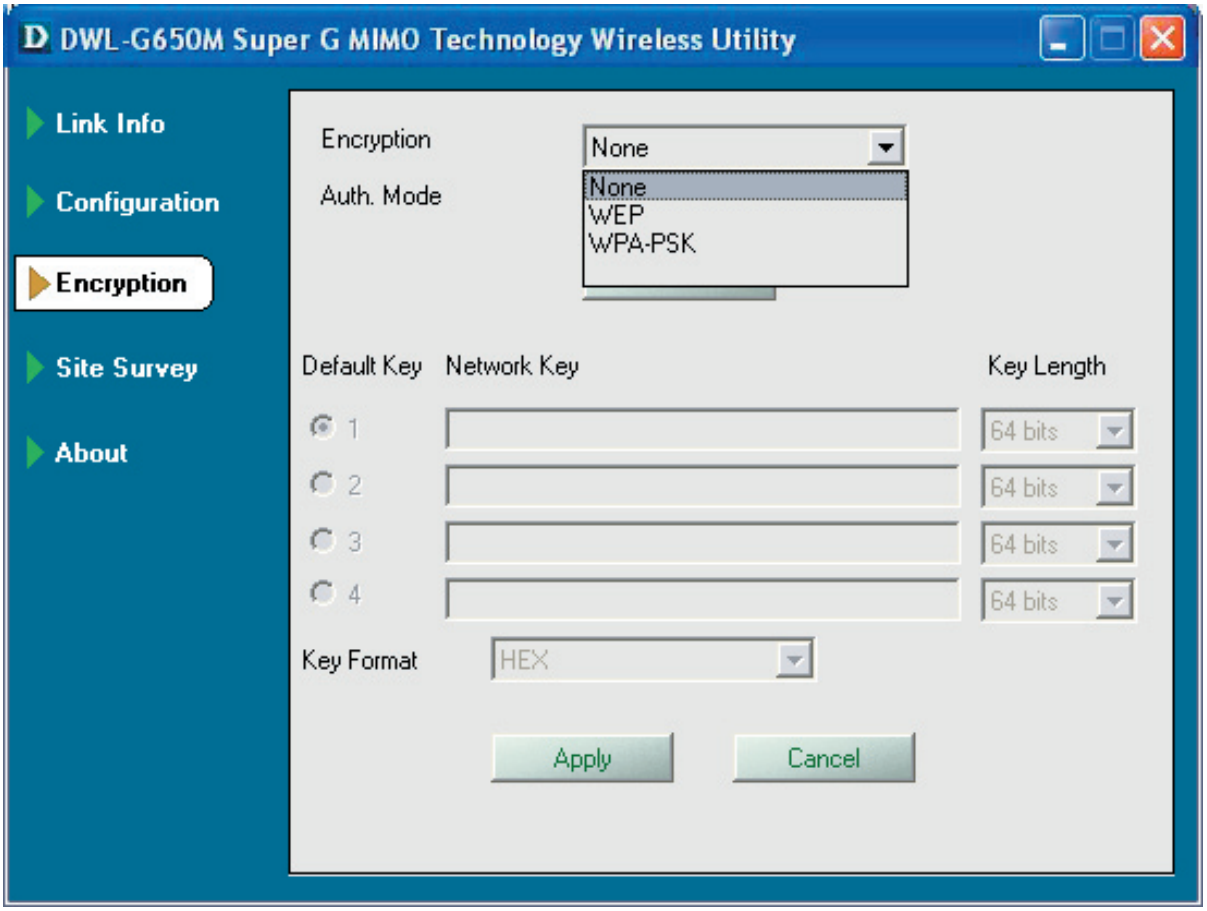
Channel: The channel selection is automatically determined by the DWL-G650M. When in Ad-Hoc mode, you may select a channel manually. The default channel is 6.

Tx Rate: The default setting is Auto. These settings are automatically determined for the maximum wireless signal rate.

Preamble: **Preamble Type** - By default the preamble is set to *Short and Long Preamble*. The preamble defines the length of the CRC block (Cyclic Redundancy Check) used in communication between the access point and the wireless network adapters. CRC is a common technique for detecting data transmission errors. High traffic networks should use the shorter preamble type. The DWL-G650M will automatically determine the best Preamble length.

Power Mode: Continuous Access Mode is the default setting. For best results leave this setting at the default.

Encryption



Encryption: Select the Encryption mode here. The choices are: WEP, WPA-PSK or None. When WPA or WPA-PSK is selected, click **Config** and the pop-up windows, shown on the following pages, will appear on your screen.

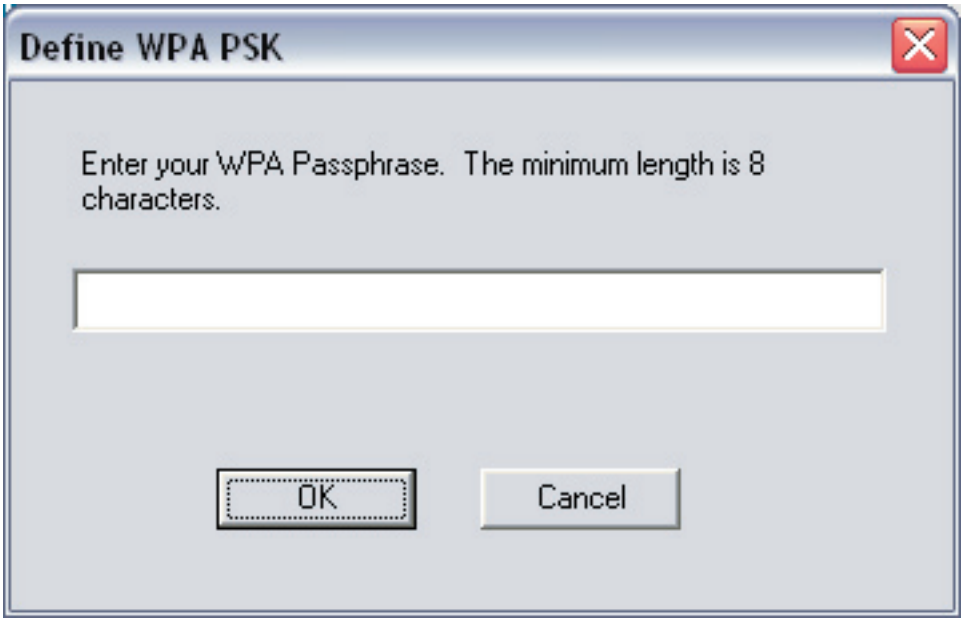
Auth. Mode: Choose one of the following modes:
Open Authentication – the DWL-G650M is visible to all devices on the network.
Shared Authentication – allows communication only with other devices with identical WEP settings.
Auto – the DWL-G650M will automatically select the best Authentication mode for your network.

Config: When you select WPA-PSK in the Auth. Mode pulldown menu, click **Config**. The popup windows shown on the following pages will appear.

Encryption-WPA-PSK

When you select WPA-PSK in the Encryption window, the screen below will appear. Suitable for the home user, WPA-PSK (WPA Pre-Shared Key) is a superior form of security that does not require a RADIUS server in the network.

By using TKIP (Temporal Key Integrity Protocol), the security keys change at set intervals, creating a network that is more secure than one that utilizes WEP encryption

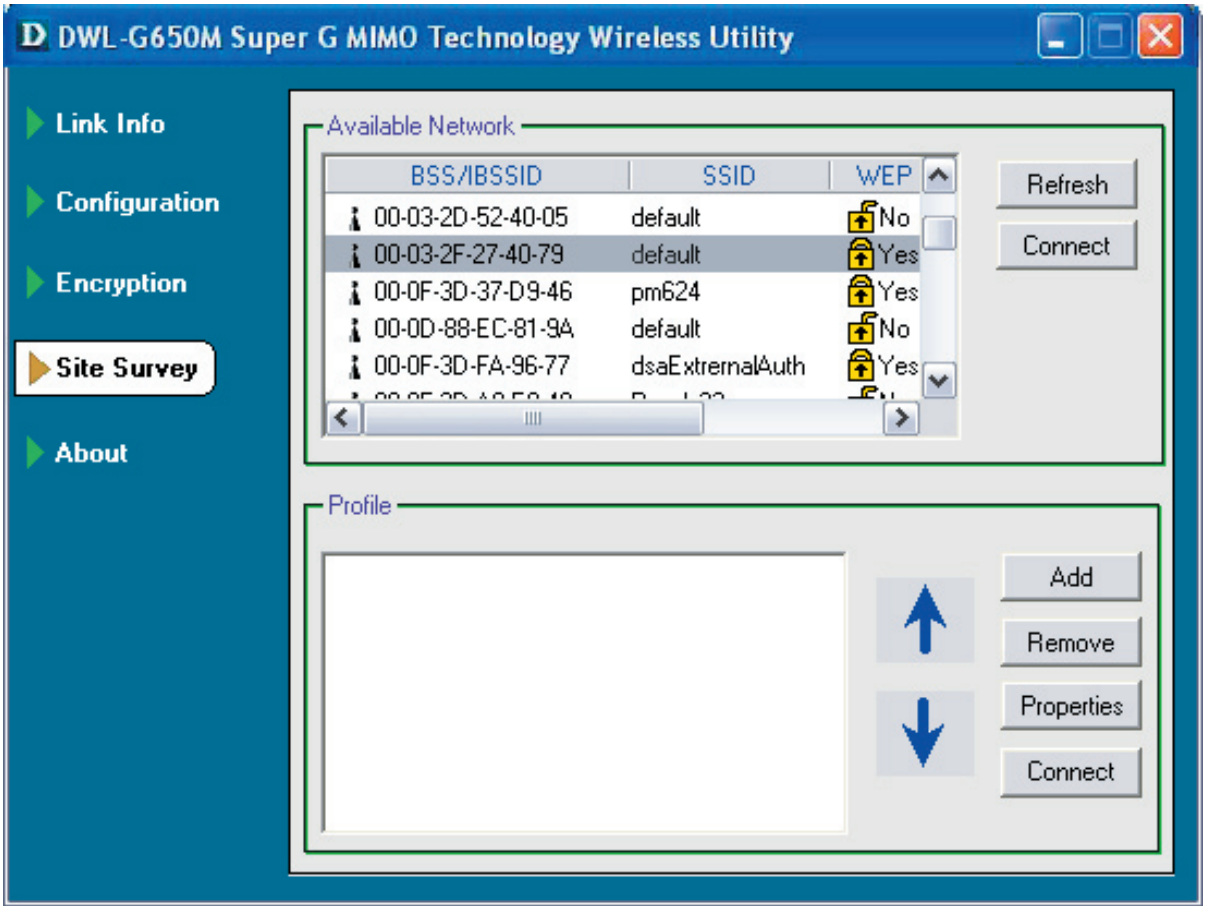


Define WPA PSK: Enter the WPA Passphrase.* All the devices on the network must share this same passphrase in order to communicate on the network.

OK: Click OK to save the passphrase.

*Hint: The longer the key, the more secure your network will be.

Site Survey



Available Network: The top section of the window displays the **Available Networks**. Scroll up and down the list and highlight the network to which you wish to connect. Click on the **Connect** button.

Profile: In the lower half of the screen, you can manage the profiles that you have created. Scroll up and down and highlight the profile that you wish to configure. You can **Add** or **Remove** a profile, or configure the **Properties** of the profile in order to connect with an available network. When you click **Add, Properties** or **Connect**, the popup screen on the next page will appear for configuration purposes.

Refresh: Click on **Refresh** to get the most updated list of available networks.

Connect: Highlight a network profile; click **Connect** to connect to that network.

Add: Click **Add** and the screen on the next page will appear.

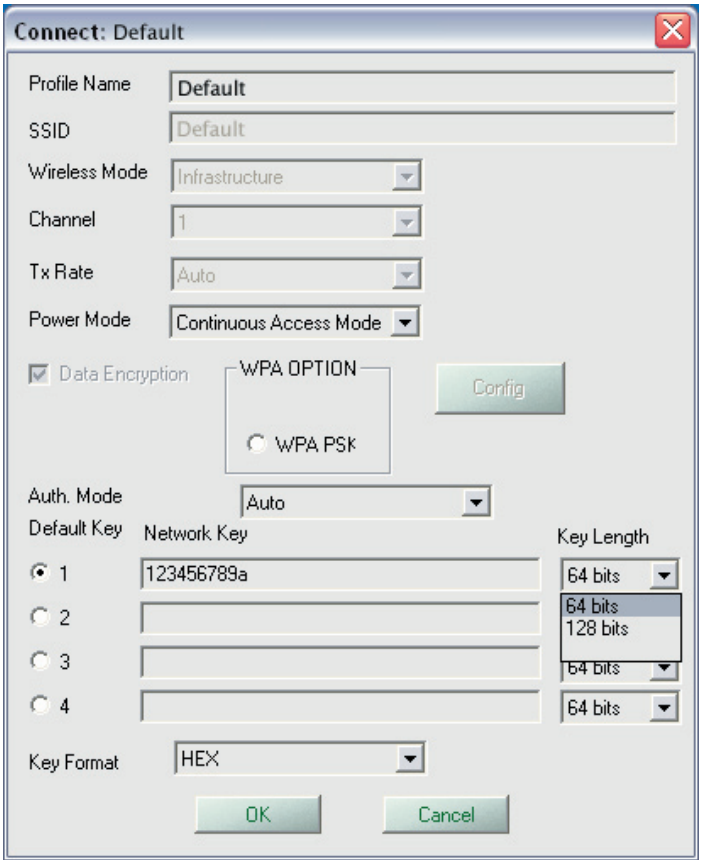
Remove: Highlight a network profile; click **Remove** to remove a network from the profile list.

Properties: Click to configure properties on the popup screen on the next page.

Connect: Highlight a network profile; click **Connect** to connect to that network.

Site Survey - Profile Configuration

When you click **Add**, **Properties** or **Connect** in the **Site Survey** or **Encryption** screen, this popup screen appears for configuration purposes.



Profile Name: Enter a name for the network profile here.

SSID: The Service Set Identifier is the name assigned to the wireless network. The factory SSID setting is **default**.

Wireless Mode: Either **Infrastructure** or **Ad-Hoc** will be displayed here. (Please see the *Getting Started* section in this manual for an explanation of these two modes.)

Channel: The channel selection is automatically determined by the DWL-G650M.

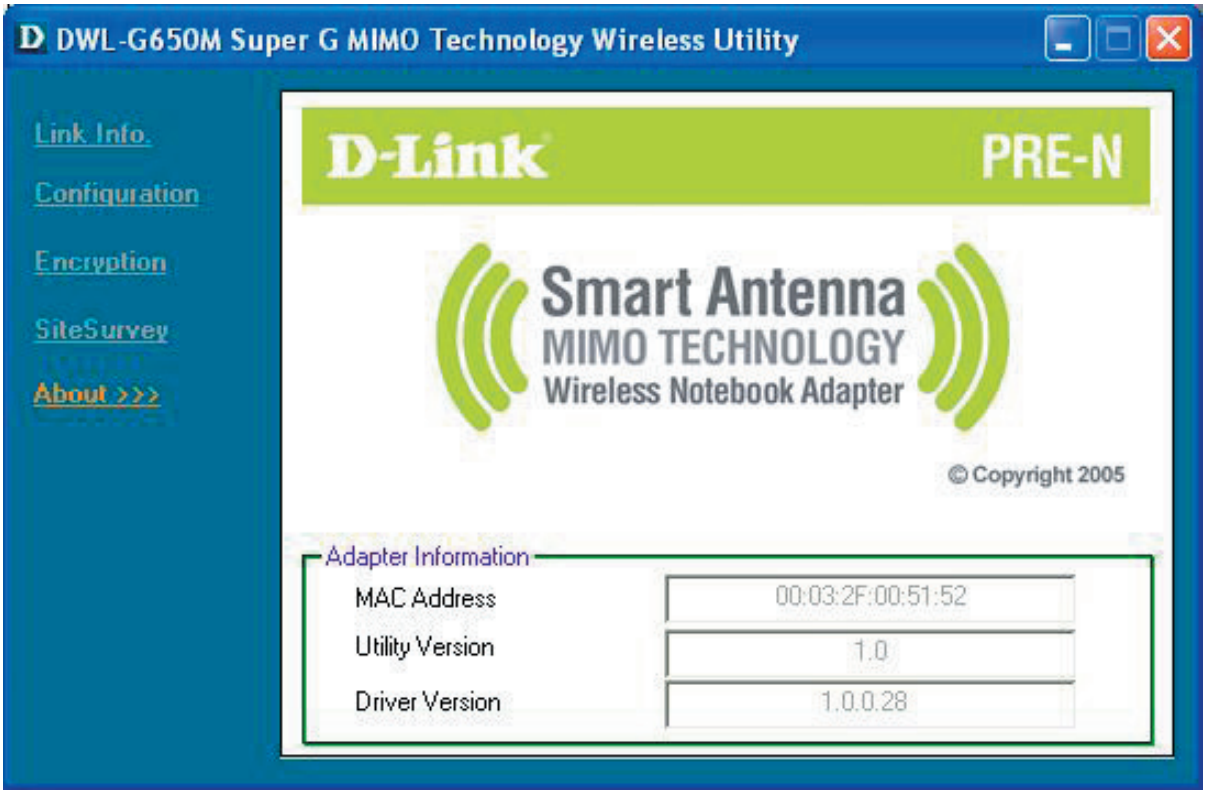
Tx Rate: The default setting is Auto. These settings are automatically determined for the maximum wireless signal rate.

Power Mode: Continuous Access Mode is the default setting. For best results leave this setting at the default.

Site Survey - Profile Configuration

Data Encryption:	Select the Encryption mode here. The choices are: WEP, WPA, WPA-PSK. When WPA or WPA-PSK is selected, click **Config** and the pop-up windows, shown on the following pages, will appear on your screen.
Auth. Mode:	Choose one of the following modes: **Open Authentication** – the DWL-G650M is visible to all devices on the network. **Shared Authentication** – allows communication only with other devices with identical WEP settings. **Auto** – the DWL-G650M will automatically select the best Authentication mode for your network.
Config:	When you select WPA or WPA-PSK in the Auth. Mode pulldown menu, click **Config**. The popup windows shown on the previous pages will appear.
Auth. Mode:	Select Open, Shared or Auto.
Default Key:	Of the four WEP keys entered, select one key as the default key.
Network Key:	Enter the WEP key here.
Key Length:	Select the Key length here, either 64-, 128-bits.
Key Format:	Select Hexadecimal or ASCII format.
OK:	Click OK to save the settings.

About



About: The About screen displays the MAC address, Utility version and the Driver version of the DWL-G650M.