

Intel® Wireless Gateway

User's Guide

July 9, 2001

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Patents

This product is covered by one or more of the following U.S. and foreign patents:

U.S. Patent No.

4,360,798;	4,369,361;	4,387,297;	4,460,120;	4,496,831;	4,593,186;	4,603,262;	4,607,156;	4,652,750;	4,673,805;	4,736,095;	4,758,717;	4,816,660;
4,845,350;	4,896,026;	4,897,532;	4,923,281;	4,933,538;	4,992,717;	5,015,833;	5,017,765;	5,021,641;	5,029,183;	5,047,617;	5,103,461;	5,113,445;
5,130,520;	5,140,144;	5,142,550;	5,149,950;	5,157,687;	5,168,148;	5,168,149;	5,180,904;	5,216,232;	5,229,591;	5,230,088;	5,235,167;	5,243,655;
5,247,162;	5,250,791;	5,250,792;	5,260,553;	5,262,627;	5,262,628;	5,266,787;	5,278,398;	5,280,162;	5,280,163;	5,280,164;	5,280,498;	5,304,786;
5,304,788;	5,306,900;	5,321,246;	5,324,924;	5,337,361;	5,367,151;	5,373,148;	5,378,882;	5,396,053;	5,396,055;	5,399,846;	5,408,081;	5,410,139;
5,410,140;	5,412,198;	5,418,812;	5,420,411;	5,436,440;	5,444,231;	5,449,891;	5,449,893;	5,468,949;	5,471,042;	5,478,998;	5,479,000;	5,479,002;
5,479,441;	5,504,322;	5,519,577;	5,528,621;	5,532,469;	5,543,610;	5,545,889;	5,552,592;	5,557,093;	5,578,810;	5,581,070;	5,589,679;	5,589,680;
5,608,202;	5,612,531;	5,619,028;	5,627,359;	5,637,852;	5,664,229;	5,668,803;	5,675,139;	5,693,929;	5,698,835;	5,705,800;	5,714,746;	5,723,851;
5,734,152;	5,734,153;	5,742,043;	5,745,794;	5,754,587;	5,762,516;	5,763,863;	5,767,500;	5,789,728;	5,789,731;	5,808,287;	5,811,785;	5,811,787;
5,815,811;	5,821,519;	5,821,520;	5,823,812;	5,828,050;	5,850,078;	5,861,615;	5,874,720;	5,875,415;	5,900,617;	5,902,989;	5,907,146;	5,912,450;
5,914,478;	5,917,173;	5,920,059;	5,923,025;	5,929,420;	5,945,658;	5,945,659;	5,946,194;	5,959,285;	D305,885;	D341,584;	D344,501;	D359,483;
D362,453;	D363,700;	D363,918;	D370,478;	D383,124;	D391,250;	D405,077;	D406,581;	D414,171;	D414,172			

Invention No. 55,358; 62,539; 69,060; 69,187 (Taiwan); No. 1,601,796; 1,907,875; 1,955,269 (Japan);
European Patent 367,298; 367,299; 367,300; 414,281; UK 2,072,832; France 81/03938; Italy 1,138,713

A63132-001

About This Document

Reference Documents

This guide refers to the following documents:

Part Number	Document Title
A63132-001	Intel® Wireless Gateway <i>Quick Install Guide</i>
A63132-001	Intel® Wireless Gateway <i>Regulatory Approval Guide</i>
A63132-001	<i>Internet Service Provider (ISP) Worksheet</i>

Conventions

Keystrokes are indicated as follows:

ENTER	identifies a key.
FUNC, CTRL, C	identifies a key sequence. Press and release each key in turn.
Press A+B	press the indicated keys simultaneously.
Hold A+B	press and hold the indicated keys while performing or waiting for another function. Used in combination with another keystroke.

Typeface conventions used include:

<angles>	indicates mandatory parameters in syntax.
[brackets]	for command line, indicates available parameters; in configuration files, brackets act as separators for options.
GUI Screen text	indicates the name of a control in a GUI-based application.
<i>Italics</i>	indicates the first use of a term, book title, variable or menu title.
Bold	indicates important user information, license provisions or warranty conditions.
Screen dialog	indicates screen dialog and user input options, and the exact syntax of items.
Screen text	indicates text and data displayed in an application screen on a computer monitor.
Terminal text	indicates text shown in a radio terminal LCD screen.
<u>URL</u>	indicates a Uniform Resource Locator, such as a Web page address.

About This Document

This document uses the following for certain conditions or information:



indicates tips or special requirements.



indicates conditions that can cause equipment damage or data loss.



indicates a potentially dangerous condition or procedure that only product-trained personnel should attempt to correct or perform.

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Chapter 1. Introduction

A *Local Area Network* (LAN) is a network in one location. Users at that location share files, printers, and other services. In a LAN, a networked computer that requests services is called a client. A *Wireless Local Area Network* (WLAN) is a type of LAN that uses high frequency radio waves rather than wires to communicate and transmit data among the network clients and devices. It is a flexible data communication system implemented as an extension to, or as an alternative for, a wired LAN.

In a WLAN, wireless adapters are installed in clients, also called wireless clients. The adapter allows the wireless client to communicate with the WLAN without cables. Instead, wireless clients send and receive information through a path in the air called a channel.

The standards for a WLAN are based on the IEEE 802.11b standard. All Intel 802.11b-compliant devices interoperate with other 802.11b-compliant wireless devices from other vendors. The WiFi certification logo indicates that the wireless device has been tested by an independent organization and is 802.11b-compliant.

A wireless client operates in either infrastructure mode or peer-to-peer mode.

1.1 Infrastructure Mode: A WLAN with Access Points

In infrastructure mode, wireless clients send and receive information through one or more access points. Access points are strategically located within an area to provide optimal coverage for wireless clients. Access points and wireless clients constitute a WLAN.

Access points can be connected to a LAN of wired or wireless clients. The access points send and receive information from the LAN through this connection.

An *Extended Service Set Identifier* (ESSID) is used to identify the wireless clients and access points in a WLAN. All wireless clients and access points in the WLAN must use the same ESSID. A *Basic Service Set Identifier* (BSSID) uniquely defines each wireless client and access point.

1.2 Peer-to-Peer Mode (Ad Hoc): A WLAN without Access Points

In peer-to-peer mode, wireless clients directly send and receive information to other wireless clients without using an access point. In contrast to infrastructure mode, this type of WLAN does not contain access points; therefore, a WLAN operating in peer-to-peer mode does not apply to the Intel® Wireless Gateway.

1.3 Identifying a WLAN

An ESSID and BSSID are both *Service Set Identifiers* (SSID) that identify and control the wireless client's access to a given WLAN. The SSID is sometimes referred to as the network name. For simplicity, this guide refers to an ESSID and BSSID as simply an SSID. The SSID indicates what WLAN you are referring to. In most cases, the user interface displays the SSID.

When installing an access point or wireless adapter in a wireless client, the installation program asks you to enter the SSID. Intel cannot provide you with this information, as it is specific to your network; although, you may choose to use the default SSID, 101, for the Intel® Wireless Gateway.

All wireless clients and access points in a WLAN must use the same network name. The section *Configuring the Intel® Wireless Gateway* explains how to specify the SSID for the Intel® Wireless Gateway.

Chapter 2. About the Intel® Wireless Gateway

The Intel® Wireless Gateway functions as an IEEE 802.11b-compliant wireless access point and broadband router for residential and business environments. It can also operate as a wireless access point only. As an access point, the Intel® Wireless Gateway communicates with wireless clients via radio frequency channels. It connects with wired clients through a LAN port and with the Internet through a cable or xDSL modem.

The Intel® Wireless Gateway supports up to 252 clients. Up to 16 of the 252 clients can be wireless. The built-in Ethernet wireless access point runs at 11 *Megabits per second* (Mbps), and the LAN (wired) port runs at 10/100 Mbps. The range of wireless coverage for indoor use is up to 300 feet and up to 1500 feet for outdoor use. The *Network Address Translation* (NAT) feature allows 64 clients to simultaneously communicate out to the Internet.

The Intel® Wireless Gateway provides the following protocols and features:

- Network Address Translation (NAT)
- Dynamic Host Configuration Protocol (DHCP)
- Virtual Private Networking (VPN)
- Routing Information Protocol (RIP 1 and RIP 2)
- Virtual server properties
- Encryption
- Roaming
- Automatic Rate Selection and Rate Scaling
- Antenna Diversity

The last four features are described in the next section. Refer to *Configuring the Intel® Wireless Gateway* or *Glossary* for information on the other protocols and features.

2.1 Features

2.1.1 Security

In a WLAN, wireless clients and access points send and receive information through the air. Without implementing security, it is possible for an unauthorized person to intercept the information.

A common way of implementing security and protecting information is *encryption*. Encryption applies a set of instructions, called an *algorithm*, to information. The instructions combine the *plain* or *clear* text of information with a sequence of hexadecimal numbers, called an *encryption key*.

Before transmitting information over the airwaves, the wireless client or access point *encrypts* or scrambles the information. The access point or wireless client receiving the information uses the same key to *decrypt* or unscramble the information. The information is only readable to WLAN devices that have the correct encryption key. The longer the key is, the stronger the encryption.

The form of data encryption used by the Intel® Wireless Gateway is called *Wired Equivalent Privacy* (WEP). When encryption is enabled, you must set the WEP key in the client to match the

WEP key used by the access point because you will ONLY associate to access points that have a matching WEP Key. For added security, change the encryption key often. WEP, or encryption, is an optional feature that can be enabled or disabled.

There are two WEP encryption methods: 64(40)-bit and 128-bit. 40-bit and 64-bit encryption are identical. Some vendors use the term 40-bit; others use 64-bit. A wireless device that claims to have 40-bit encryption interoperates with a device that claims to have 64-bit encryption, and vice versa. A 64(40)-bit key consists of 10 hexadecimal numbers in two five-digit groups, arrayed as follows:

Key #1: 10111 21314
Key #2: 20212 22324
Key #3: 30313 23334
Key #4: 40414 24344

A 128-bit key has several trillion times as many possible combinations than a 64(40)-bit key. It consists of 26 hexadecimal numbers arranged in two five-digit groups and four four-digit groups, arrayed as follows:

Key #1: 10111 21314 1516 1718 191A 1B1C
Key #2: 20212 22324 2526 2728 292A 2B2C
Key #3: 30313 23334 3536 3738 393A 3B3C
Key #4: 40414 24344 4546 4748 494A 4B4C

All wireless clients and access points in a WLAN must use the same encryption method and key. The following two examples stress how important this point is.

Example 1

The encryption method for an access point is 64(40)-bit. The method for a wireless client is 128-bit encryption. The client and access point cannot communicate with each other, even though the selected key is the same. To resolve this problem, set the access point to use 128-bit encryption.

Example 2

The encryption method is the same for the access point and wireless client. You select key 1 for the access point and key 2 for the wireless client. The wireless client cannot communicate with the WLAN. To resolve this problem, select key 1 for the wireless client.



Use the same key and encryption method for the wireless devices in the WLAN. Otherwise, they cannot communicate with each other.

2.1.2 Roaming

Roaming is the capability of wireless clients to move seamlessly about an area that is covered by more than one wireless access point.

The wireless access points are arranged in a grid or micro-cell configuration, providing overlapping coverage areas. Each Intel® Wireless Gateway must be connected to the wired network to enable this capability. Wireless clients can then travel anywhere throughout the micro-cell coverage area without losing their connections. The number of access points is virtually unlimited; therefore, the size or shape of the coverage area is unliimited. Simply add more access points to provide coverage to the areas desired.

The roaming feature is automatically built-in to the Intel® Wireless Gateway; thus, it is not necessary to configure the roaming for the access point. When configuring your access points set the channels to 1, 6 or 11. These are referred to as non-overlapping channels. Stagger the channels so that no two adjacent access points are configured for the same channel. When a wireless client moves, or roams, about the coverage area, it automatically detects the channel and connects to the respective access point in its coverage area.

For additional information on channel selection and multiple access point placement, go to www.intel.com/support.

2.1.3 Automatic Rate Selection and Rate Scaling

Wireless network adapters and access points can transmit data at one of the following rates: 11, 5.5, 2, or 1 Mbps. As the distance between an adapters and access point increases or decreases, the data rate automatically changes. Other factors, like interference, also affect the data rate. This capability is called rate scaling. Rate scaling maintains optimal communication between wireless clients and the WLAN.

2.1.4 Antenna Diversity

Antenna diversity refers to how wireless network adapters and access points deal with multi-path interference. Multi-path interference is the reflection of the *radio frequency* (RF) signal by metal or other objects. This type of interference is common in an RF environment.

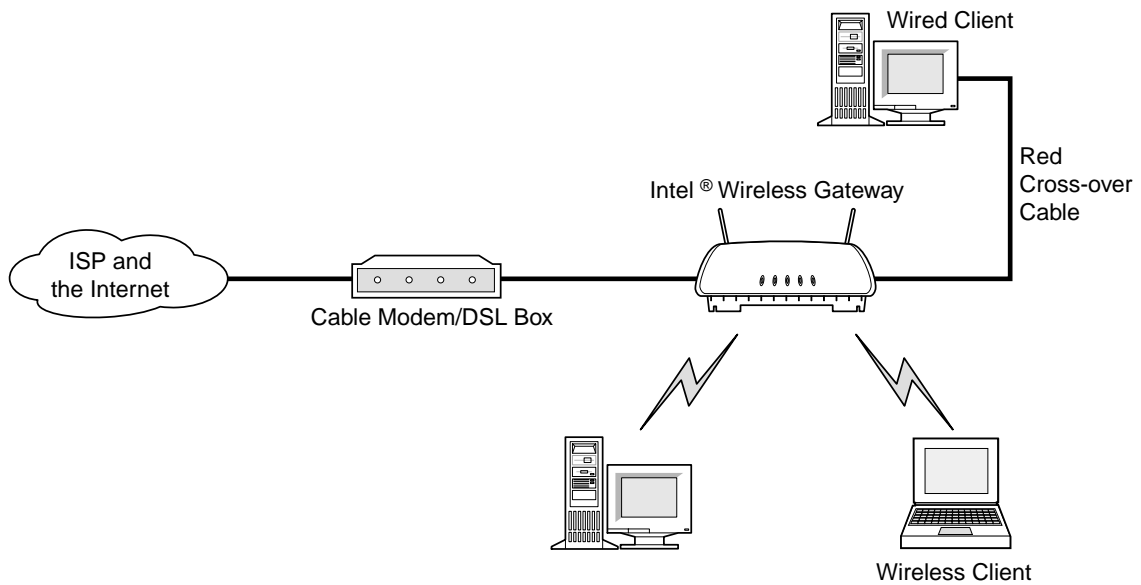
Access points receive multiple signals: the direct actual signal, and one or more reflected signals. The reflected signal is out-of-phase and arrives later than the direct signal. Thus, the optimal signal for processing is the direct signal.

The Intel® Wireless Gateway performs diversity with its two antennae by determining which is the direct signal. This signal is then processed instead of the reflected signal. With the diversity feature, the Intel® Wireless Gateway provides better data throughput and reliability.

2.2 Using the Intel® Wireless Gateway on a Network

There are several ways to implement the Intel® Wireless Gateway on a network. A basic implementation is shown in Figure 1.

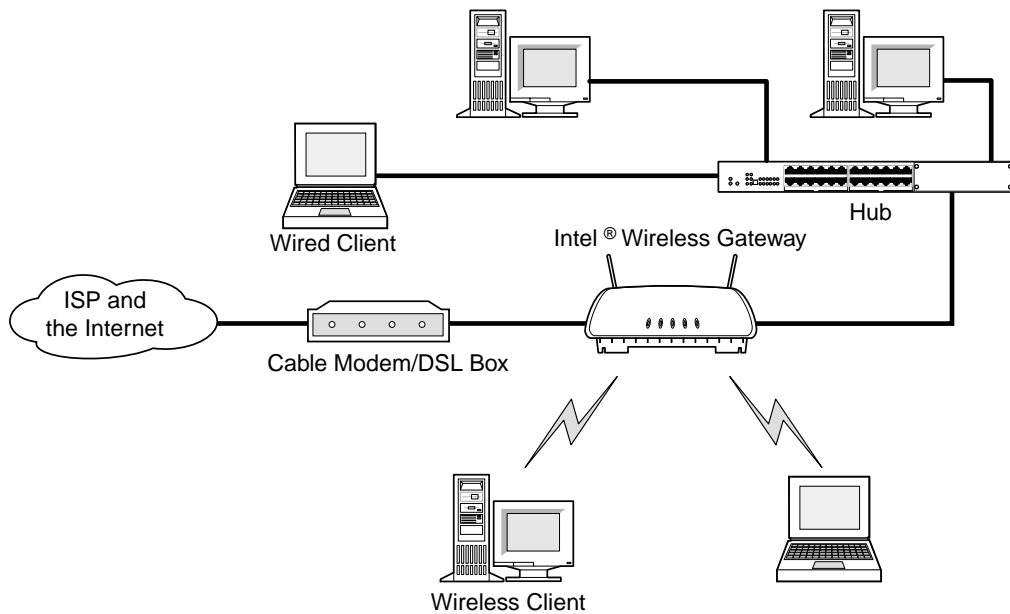
Figure 1. Basic LAN with Wired and Wireless Clients



When a **wired** client is connected to the LAN port of the Intel® Wireless Gateway, a crossover cable is required.

If more than one wired client is connected to the LAN port, implement the WLAN as shown in figure below.

Figure2. LAN with Multiple Wired and Wireless Clients



In situations where more than one access point is required, implement the WLAN as shown in the following two examples.

Figure 3. LAN with Multiple Access Points, Wired Clients, and Wireless Clients, Scenario 1

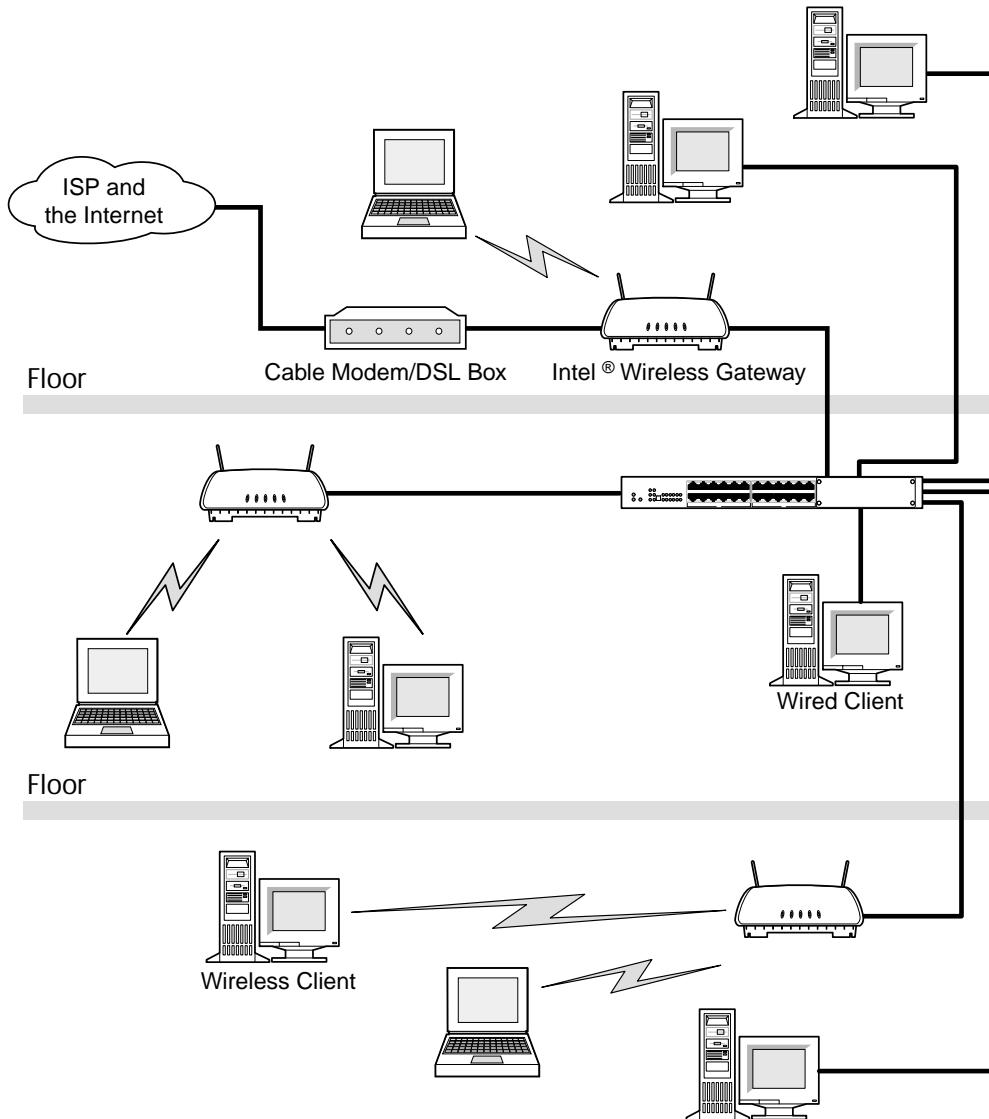
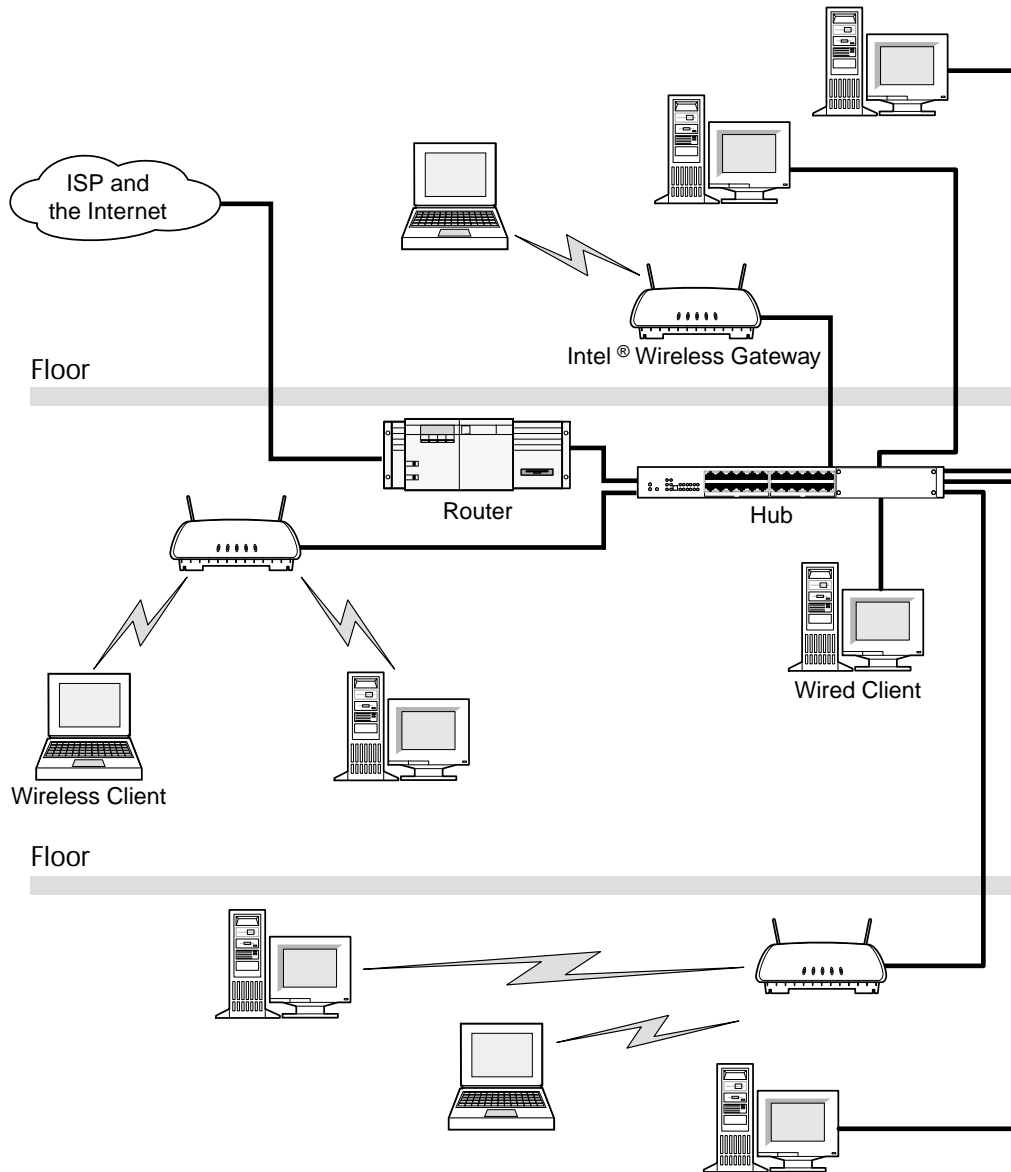


Figure 4. LAN with Multiple Access Points, Wired Clients, and Wireless Clients, Scenario 2



2.3 Local Area Network (LAN) System Requirements

Make sure that the wired clients, wireless clients, cable/xDSL modem, and Intel® Wireless Gateway meet the requirements below.

2.3.1 Wired Clients

- 10 or 10/100-speed wired Ethernet network adapter
- Transmission Control Protocol/Internet Protocol (TCP/IP) installed

- Windows 95 or higher (dependent upon what the above adapter supports)

2.3.2 Wireless Clients

- Any 802.11b-compliant network adapter
- Windows 95 or higher (dependent upon what the above adapter supports)

2.3.3 Cable or xDSL Modem

- 10-speed Ethernet connection

2.3.4 Minimum Cable Requirements for the Intel® Wireless Gateway

- Ethernet CAT-5 crossover cable (only needed for a direct LAN port connection to a network client. This is supplied with the Intel® Wireless Gateway)
- Standard Ethernet CAT-5 cable from the LAN port to a hub or switch
- Standard Ethernet CAT-5 cable from the *Wide Area Network (WAN)* port to a cable/xDSL modem

2.4 LED Behavior

The Intel® Wireless Gateway has five *light emitting diodes* (LED), or link lights, on its front side. The following table defines the behavior for each LED:

Table 1. Intel® Wireless Gateway LEDs

LED	Indicates	Activity
STS	Status	Blinks when unit is resetting
WAN	Wide Area Network (cable/xDSL connection)	Blinks with data activity present
LAN	Local Area Network	Blinks with data activity present
WLAN	Wireless LAN	Blinks continually, faster with larger amounts of data activity
PWR	Power	Continually lit when power connected

2.5 Installation

This guide does not cover installation for the Intel® Wireless Gateway through a **wired** connection. If you are installing the Intel® Wireless Gateway through a wired connection, refer to the *Intel® Wireless Gateway Quick Install Guide* that accompanied your CD. The *Quick Install Guide* is also available on the CD.

For instructions on installing the Intel® Wireless Gateway through a **wireless** connection, review Chapter 3 of this guide.

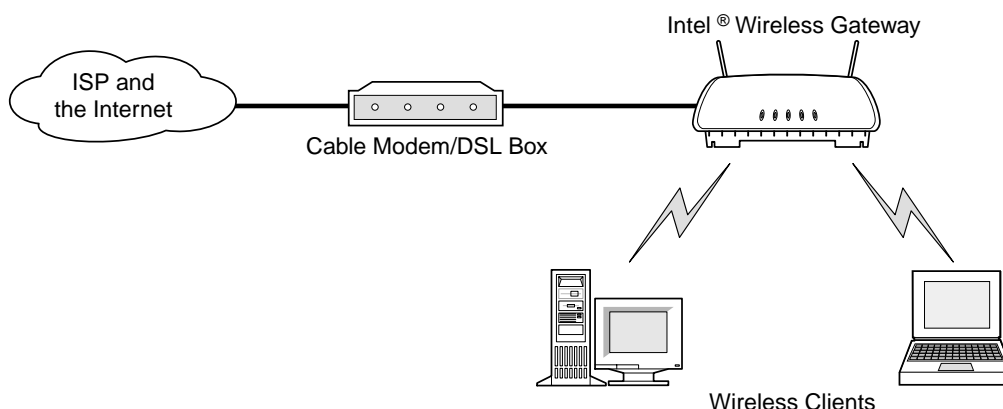
Chapter 2. About the Intel® Wireless Gateway

The remainder of this guide documents the configuration process for the Intel® Wireless Gateway. Before attempting to configure the device, ensure that your package is complete and that the Intel® Wireless Gateway is properly installed.

Chapter 3. Installing the Intel® Wireless Gateway through a Wireless Connection

The implementation of an Intel® Wireless Gateway as shown in the figure below includes only wireless clients. This type of setup requires that you install and configure the Intel® Wireless Gateway with a wireless client. For instructions on installing the Intel® Wireless Gateway through a wired connection, refer to the *Quick Install Guide* included with the unit.

Figure 5. LAN with only Wireless Clients (WLAN only)



3.1 Before You Begin

Perform the following steps before plugging in any power cables:

1. Verify that the package contains the items listed in the *Quick Install Guide*.
2. Remove the Intel® Wireless Gateway unit from the box:
3. Apply the regulatory compliance labels to its under side. For instructions, see the *Intel® Wireless Gateway Regulatory Approval Guide*.
4. Remove the cradle from the box, and slide it onto the Intel® Wireless Gateway.
 - With one hand, hold onto the top of the access point, between the antennae.
 - With the other hand, hold the handle on the cradle.
 - Align the rails on the cradle to slide into the grooves on the back of the access point.
 - Slide the cradle and access point together until the rails snap into place.
5. Fill out your *Internet Service Provider (ISP) Worksheet*. Generally, your ISP or installer provides this information. If not, call your ISP for assistance.
6. Make sure that the wireless client you use for setup and configuration is configured to obtain an IP address automatically:



The following instructions vary depending on your operating system. If you are unable to access the network settings with these steps, refer to the documentation that accompanied your computer or operating system software. Or, consult online Help for Windows†, and search for **TCP/IP**.

- Go into the network settings properties for your network adapter by selecting **Start**, then **Settings**, then **Control Panel**, and finally **Network Settings**.
- Right click **Network Connection** or **Adapter**.
- Click **Properties**.
- Select the **TCP/IP** option.
- Click **Properties**.
- Check the box **Obtain an IP address automatically**.

You are now ready to configure the Intel® Wireless Gateway through a wireless client. This process varies slightly from that of a wired client. When using the Web Management Tool from a wireless client, it is especially important that you follow the Setup Wizard as directed in the next section.

After completing the configuration process, the guide instructs you to save the settings and restart the Intel® Wireless Gateway. After doing so, go back to the wireless adapter and change the settings to match the Intel® Wireless Gateway. If you attempt to configure the Intel® Wireless Gateway and do not complete the process, it is sometimes difficult to configure the wireless adapter so that it communicates with the Intel® Wireless Gateway again.

Chapter 4. Configuring the Intel® Wireless Gateway

To configure the Intel® Wireless Gateway for your network, locate a client computer that has a wireless or wired connection to the network. From the computer, use one of the following tools to configure the network settings for the Intel® Wireless Gateway:

- Web Management Tool (recommended)
- Intel® Wireless Gateway Manager
- Telnet
- Console Port

The recommended tool for configuring the Intel® Wireless Gateway is the Web Management Tool. This software is already installed on the Intel® Wireless Gateway. To access the Web Management Tool, open a Web browser on the client.

You can also configure the access point by installing the Intel® Wireless Gateway Manager directly onto the client. For more information about installing and using this software, refer to the Intel support Web site at <http://www.intel.com/support>.



Before attempting to configure the Intel® Wireless Gateway with the Web Management Tool, make sure that there is an active wired or wireless connection from the client to the Intel® Wireless Gateway LAN port. For assistance, refer to *Troubleshooting for the Web Management Tool*. Only one user from a network can configure the device. If you attempt to access the setup system while another user is configuring the device, your request will be denied.

Adjust each of the network settings listed in Table 2 for each client in the WLAN.

Table 2. Network Settings for each Client

Item	Setting
Network Name (SSID)	Applies to wireless clients only. Identical to the network name (SSID) used for the Intel® Wireless Gateway.
IP Address	<i>*See below</i>
Subnet Mask	<i>*See below</i>
Default Gateway	<i>*See below</i> If manually configured, this is usually the address of the Intel Wireless Gateway.
Primary DNS	<i>*See below</i> If manually configured refer to your <i>Internet Service Provider Worksheet</i> .
Secondary DNS	<i>*See below</i> If manually configured, refer to your <i>Internet Service Provider Worksheet</i> .

* Either automatically assigned by a DHCP Server or manually configured.

**** By default, the Intel® Wireless Gateway acts as the DHCP server for the network and automatically provides all clients with the network configurations listed in Table 2, except for the network name.**

The Intel® Wireless Gateway has been configured with the default network settings listed in Table 3. To ensure proper functionality, network settings for the device and other devices on a network must coincide.

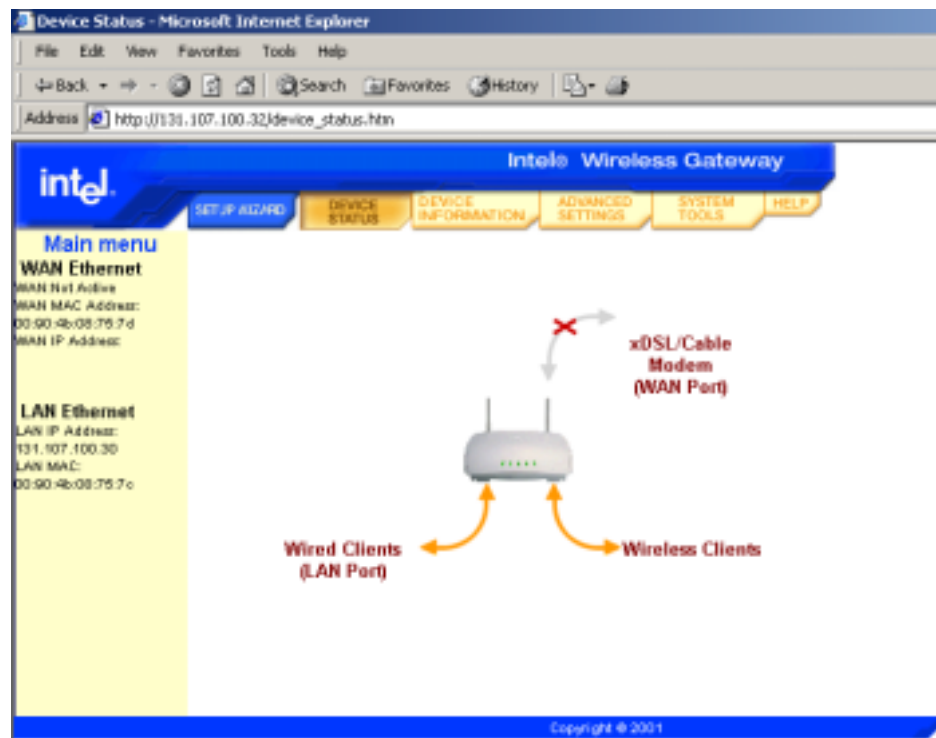
Table 3. Intel® Wireless Gateway Default Settings

Item	Default Setting
Password	Intel
IP Address	192.0.2.1
Device Subnet Mask	255.255.255.0
LAN MAC Address	Unique for each Intel® Wireless Gateway
WAN (10M) IP Address	0.0.0.0 (Must be acquired from a DHCP server)
WAN MAC Address	Unique for each Intel® Wireless Gateway
Device Function	Access Point and Gateway
NAT	Enabled
LAN DHCP Server	Enabled
LAN DHCP Client	Disabled
WAN DHCP Client	Enabled
Network Name (SSID)	101
Channel	11
Security (Encryption)	No Encryption

4.1 Web Management Tool

The Web Management Tool includes both a way of updating network settings for the Intel® Wireless Gateway as well as reviewing information regarding the device. You can display the network settings or connection status for your network, view system diagnostics, intruder logs, or routing tables, reload the default or user-defined settings, and upgrade the firmware version for the Intel® Wireless Gateway. Refer to the online help file for commonly asked questions and help topics. The **Help** button is located in the top right-hand corner of each Web Management Tool page.

Image 1. Web Management Tool Home Page



4.1.1 Starting the Web Management Tool

Use the IP Address for the Intel® Wireless Gateway to access the Web Management Tool. To start the tool, do the following:

1. Open a Web browser.
2. Enter the IP address in the address field, <http://<IP Address>>. If this is the first time updating the network settings for the Intel® Wireless Gateway or if the IP address is set to the factory default listed in Table 3, use the default IP Address, <http://192.0.2.1>.



Note

If the IP address for the Intel® Wireless Gateway has been changed, use the new IP address to access the Web Management Tool.

4.1.2 Navigating through the User Interface

The Web Management Tool *User Interface* (UI) has selections on the top and left sides of the screen. When you click a selection at the top of the screen, the selections along the left side of the screen change.

The Device Status, Device Information, and Help selections are for your information and for troubleshooting purposes only. A password is not required to access this information. The remaining selections along the top of the screen are used to change the settings for the Intel® Wireless Gateway. To make these selections, a password is required for security purposes. If the

password has been changed for the Intel® Wireless Gateway, use the new password; otherwise, use the default password listed in Table 3.

4.1.3 Setup Wizard

Use the Setup Wizard to step through the configuration process for basic network settings. Click **Setup Wizard** at the top of the screen to begin.

Follow the **BACK/NEXT** links as indicated in the main screen to move from one screen to the next. To implement the changes you made to the settings, you must save and restart the Intel® Wireless Gateway. Otherwise, the device uses the previous settings.

Time Settings

When you click **Setup Wizard**, the Time Settings page is displayed. Use this page to select your local time zone from the drop-down list.

Click **NEXT** to continue.

Wireless Settings

Use the Wireless Settings page to configure the network name (SSID), channel, and security settings for the Intel® Wireless Gateway.



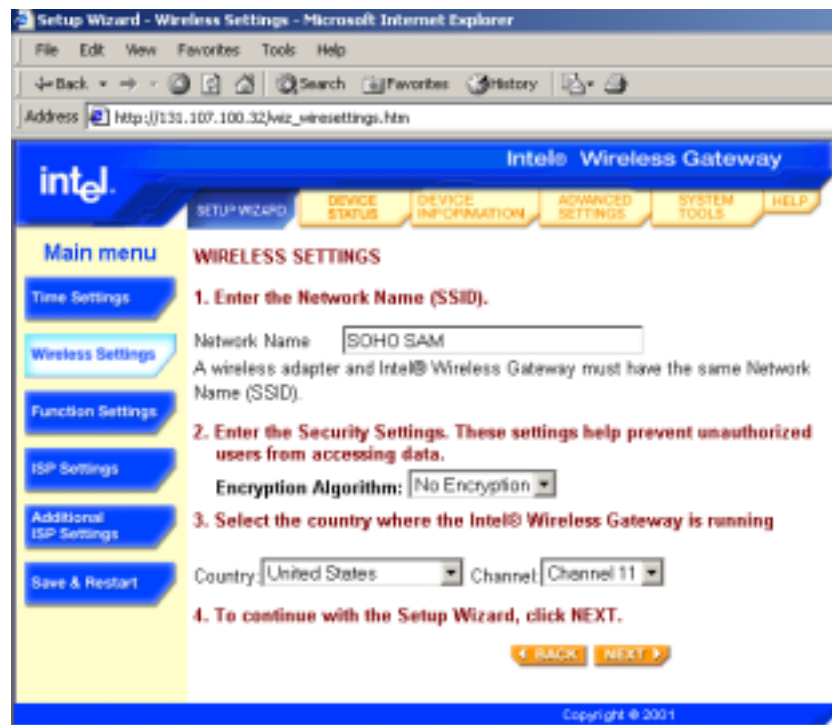
Note

If you are setting up a network with **NO** wired clients (WLAN only), you must change each client's wireless adapter settings to match the Intel® Wireless Gateway settings. Use the factory default for the Intel® Wireless Gateway, unless the default settings have been changed. In this case, note the changes, and use the new settings for each wireless adapter. For assistance configuring a wireless adapter, see the adapter's documentation.

The network name, or SSID, is a value that identifies a collection of **wireless** devices found in a particular network. The network administrator or an authorized person for your network assigns a network name (SSID) to the wireless network. When a computer tries to join a wireless network, it sends the network name (SSID) to the Intel® Wireless Gateway. If the network name (SSID) of the computer and Intel® Wireless Gateway are the same, the computer is permitted to join. For more information about network names, see Chapter 2 of this guide.

Once you know the network name (SSID) assigned to the wireless network, enter it in the **Network Name** field. The SSID can be up to 32 characters in length, and it is case sensitive. This value may be a combination of numeric or alphanumeric characters. If you do not have a network administrator and are setting up a new WLAN and configuring the Intel® Wireless Gateway for the first time, keep the default value listed in Table 3.

Image 2. Wireless Settings



The security settings help prevent unauthorized users from accessing data. For an overview of security, refer to Chapter 2 of this guide. Encryption is an optional feature that may be enabled or disabled. Use the drop-down list to enable the encryption by selecting either **64(40)-bit** or **128-bit**.

When you enable the encryption, a list of four key options appears; select only one key out of the four provided. Use this key for all **wireless devices and access points** in your network. For added security, change your key often. When you change the key on one wireless device, remember that it must be changed for all wireless devices and access points in the network.



If you are adding the Intel® Wireless Gateway to an existing network and will be using an existing encryption key for the wireless clients, contact the person in charge of the network. The same key must be used when configuring the encryption for the Intel® Wireless Gateway. The administrator must propagate any changes to these keys to all **access points and wireless clients** on a network. Changing the key on just one access point or wireless client disconnects it from the rest of the network.

Channel refers to the communication path between wireless clients and access points. The default value for the Intel® Wireless Gateway is channel 11. It is only necessary to set the channel for the access points in your network. The wireless adapter in each wireless client detects the channel that it uses from an access point in the network.

Use the drop-down list to change the communication channel. If there is more than one access point in the network, it is a good idea to spread out the channels used in the wireless network. Use the non-overlapping channels, 1, 6, and 11, as described in *Roaming* in Chapter 2.

Click **NEXT** to continue.

Function Settings

Use the Function Settings page to define the function of the Intel® Wireless Gateway. The Intel® Wireless Gateway may act as either an access point and gateway or simply as an access point only. Use the drop-down list to select one of the following functions:

- **Enable as a Wireless Access Point and Gateway**
- **Enable as a Wireless Access Point Only**

Enable as a Wireless Access Point and Gateway enables the Intel® Wireless Gateway to act as an interface between your wireless clients and the Internet. If you are installing the Intel® Wireless Gateway into an existing network, you may have to change the LAN IP address and IP subnet mask. For example, if the computer's IP address is 130.130.2.1, the access point's IP address may be in the range from 130.130.2.2 to 130.130.2.254; thus, it should appear as *130.130.2.xxx*. If you are setting up a new network, it is recommended that you use the default values for the Intel® Wireless Gateway and configure the clients in the network based on these values.

If **Enable as a Wireless Access Point Only** is selected, choose the method for the device to acquire its LAN IP settings. You can either manually enter the LAN IP settings or allow the Intel® Wireless Gateway to obtain a LAN IP address through a DHCP server on the network. Select the method by clicking one of the options. If you do not specify an IP address, the DHCP server automatically assigns the LAN IP address to the device.



Note

If you select **Enable as a Wireless Access Point Only**, **NEXT** takes you to the Save & Restart page. For this case, skip the next two sections in this guide, and refer to the *Save & Restart* section. Otherwise, refer to the next section, *ISP Settings*.

Click **NEXT** to continue.

ISP Settings

ISP settings are only necessary when the Intel® Wireless Gateway is set to function as an access point and gateway. Refer to the *ISP Worksheet* included with the Intel® Wireless Gateway to determine your ISP settings.

The Intel® Wireless Gateway uses Network Address Translation (NAT) to provide an interface between your network and the Internet. NAT occurs when multiple IP addresses on a private LAN are converted to one public address. This address is sent out to the Internet. NAT adds a level of security as the IP address for a computer connected to the private LAN is never transmitted to the external network. The user may have many private addresses behind the single address provided by the ISP.

Use the ISP Settings page to configure the Internet Protocol (IP) settings for the device. In the fields provided, enter the IP address, IP subnet mask, IP gateway address, and *Domain Name Server* (DNS) IP address provided by your Internet Service Provider (ISP).

Image 3. ISP Settings



Click **NEXT** to continue.

Additional ISP Settings

The Additional ISP Settings page contains additional authentication data that is required by some ISPs. Additional ISP settings are only necessary when the Intel® Wireless Gateway is set to function as an access point and gateway.

If your ISP requires that you input a username and password, use the spaces provided to enter these settings. Use the **Idle Time** drop-down list to specify how long your Internet connection should continue when no activity occurs.

If your ISP requires that you input a host computer name or domain name, enter these settings.

The WAN Ethernet *Media Access Control* (MAC) Address, or Ethernet Address, is a hardware address that uniquely identifies every device on a network. If your ISP requires this piece of information, enter it in the **WAN Ethernet MAC Address** field.

Click **NEXT** to continue.

Save & Restart

Use the Save & Restart page to submit all the network setting changes you have made. Click **Save & Restart** to update the network configurations for your Intel® Wireless Gateway and reset the device.



If you have wireless clients in your network, you must configure the clients' wireless adapters to match the settings for the Intel® Wireless Gateway. For assistance, refer to the adapter's documentation.

4.1.4 Device Status

The Device Status page is the default for the Web Management Tool home page. It graphically displays the current connection status for the Intel® Wireless Gateway and other devices in your network. Connections between network devices are shown with a yellow curving arrow. Inoperative connections are represented by a grey arrow and a red 'X.'

Refer to the left-side of the screen for current WAN Ethernet Settings and the IP address for the Intel® Wireless Gateway.

4.1.5 Device Information

The Device Information page is for user information only. It displays basic and advanced network settings for the Intel® Wireless Gateway. When changes are made to any network settings, those changes are updated in this screen.

4.1.6 Advanced Settings

In Advanced Settings, you can specify server settings, assign permissions, determine routing properties, and define a password for the Intel® Wireless Gateway. Click **Advanced Settings** from the top navigation bar to begin making changes to these network settings.



Click **Save & Restart** from the Advanced Settings menu after making all the changes for the advanced settings. Failing to do so will result in lost settings.

DHCP Server Settings

Dynamic Host Configuration Protocol (DHCP) is a service that automatically assigns IP addresses to devices on a network. Dynamic addressing simplifies network administration because DHCP keeps track of IP addresses rather than requiring an administrator to manage the task. When a client is added to the network, the DHCP Server automatically assigns a unique IP address to the client.

If DHCP is enabled on an Intel® Wireless Gateway, IP addresses are assigned to clients by that Intel® Wireless Gateway.



There can only be one active DHCP Server in your network.

If DHCP is disabled on the Intel® Wireless Gateway and there is no other DHCP Server in the network, you must manually assign IP addresses to each wired and wireless client.

If DHCP is disabled on the Intel® Wireless Gateway and there is a DHCP Server in the network, the Intel® Wireless Gateway and other computers in the network can be configured as DHCP clients. They are automatically assigned IP addresses by the DHCP Server.

From the DHCP Server Settings page, use the **Enable DHCP Server Functions** checkbox to indicate whether or not the Intel® Wireless Gateway should act as a DHCP server.



Note

The **Enable DHCP Server Functions** box is already checked if the device's function was set to **Enable as a Wireless Access Point and Gateway** from the Function Settings page in the Setup Wizard.

The **IP Address Pool Range** section provides a means of controlling a low and high value for the IP addresses on a network. Use the indicated fields to define the range of addresses for the network.

Image 4. DHCP Server Settings

Specific IP addresses may also be reserved for particular devices in a network. Use the input boxes under **Reserve IP Address** to indicate the IP address and computer name for those devices that should use a manually-defined IP address.

Click **SUBMIT** to store the changes and move to the next section in Advanced Settings.

Virtual Server Settings

Virtual server, in this case, refers to a computer that is not a dedicated server -- that is, the entire computer is not dedicated to running the server software. Through the Intel® Wireless Gateway, the devices on a network can act as virtual servers. Use the Virtual Server Settings page to assign one or more services to specific computers in the network.

In the **Internal IP** field, enter the IP address for each virtual server (computer) on the network. For each computer, select its primary service from the drop-down list. If the computer has more than one service, enter the same IP address in another **Internal IP** field and select a service from the drop-down list.

Table 4 describes the different service options.

Table 4. Virtual Server Service Options

Service	Full Name	Description
HTTP	<i>Hyper Text Transfer Protocol</i>	Defines how messages are formatted and transmitted via the Internet
SMTP	<i>Simple Mail Transfer Protocol</i>	A protocol for sending email messages between servers
POP3	<i>Post Office Protocol</i>	A protocol used to retrieve email from a mail server
FTP	<i>File Transfer Protocol</i>	The protocol used on the Internet for sending files
Telnet	<i>Telnet</i>	A program used to connect your computer to a server on the network
IRC	<i>Internet Relay Chat</i>	A program that sends and receives messages to/from people connected anywhere on the Internet (used for live discussions or chats over the Internet)

Click **SUBMIT** to enter the changes and move to the next section.

Access Control Settings

To deny or grant users access to your wireless network, use the Access Control List. The default setting for access control is **Disable Access Control List**. This feature grants all users with the correct wireless settings to access the WLAN.

Any user who is on the Grant Access List and has the correct wireless settings has access to the wireless network. Any user on the Deny Access List is denied access to the wireless network. This second option is provided in the case that there are many WLAN users and access is denied for only a few of them. Use the drop-down list to change the permissions for the device.

An input box labeled **MAC Address** is displayed when either **Enable Grant Access List** or **Enable Deny Access List** is selected. Use this field, plus the **ADD** button, to enter the MAC address for those workstations that you wish to add to the respective list.

Click **SUBMIT** to move to the next section.

Static Routing

Static routes are manually configured routes to remote networks. That is, the route is predefined and is not discovered by the Routing Information Protocol (RIP), as in dynamic routing. The advantage to using static routing is that network traffic is reduced; thus, static routing is beneficial for slow Internet connections. Routing using static routes is practical for small networks. For larger networks, the router needs to dynamically keep track of changes in the physical wiring of the network, and the use of dynamic routing (RIP) is recommended. The next section describes dynamic routing.

Image 5. Static Routing



To use static routing, manually add the destination IP address, subnet mask, and gateway IP address for each route you are adding to the Static Routing Table, and click **ADD**.



In static routing, the Intel® Wireless Gateway does **NOT** dynamically discover routing information and does **NOT** use RIP.

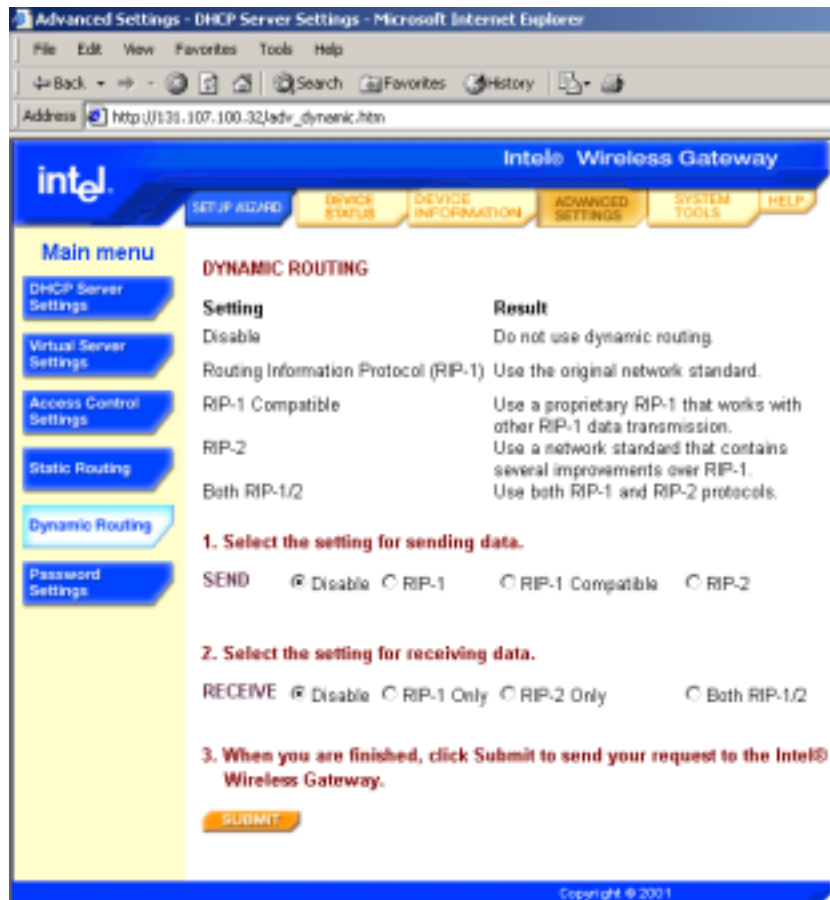
Use the checkboxes beside each route and the **DELETE** button to remove static routes from the Static Routing Table.

Click **SUBMIT** to move to the next section in Advanced Settings.

Dynamic Routing

Routing Information Protocols (RIP-1 and RIP-2) transmit information about the network configuration between routing devices. This enables routers to dynamically determine which networks are accessible and the best routes between networks. Routing using RIP is known as dynamic routing since the network automatically establishes itself and dynamically adapts itself to changes. Although dynamic routing may increase network traffic, it improves efficiency by identifying the shortest route for data to travel from the sender to the receiver, while taking the current state of the network into consideration.

Image 6. Dynamic Routing



Use the drop-down list to select the type of dynamic routing the Intel® Wireless Gateway uses to route data. Select the settings for both sending and receiving data by clicking on one of the option buttons under steps 1 and 2.

Click **SUBMIT** to move to the next section.

Password Settings

When changing the settings for the Intel® Wireless Gateway, you must enter a password. Before proceeding, the Intel® Wireless Gateway authenticates the password to make sure you have permission to access the network settings.

In the Password Settings section, use the password fields to specify a new password. Write down the password and keep it in a secure location for future reference. Click **SUBMIT** to continue.



Click **Save & Restart** to update your advanced network settings. Failing to complete this final step will result in lost data.



If you have wireless clients on your network, you must configure the clients' wireless adapters to match the advanced settings for the Intel® Wireless Gateway. For assistance, refer to the adapter's documentation.

4.1.7 System Tools

Use the System Tools section to view the intruder detection log, routing tables, and system diagnostics regarding the device settings and status. This section also includes features to reload the default settings, load settings that were saved to a file, and upgrade the firmware for the Intel® Wireless Gateway.

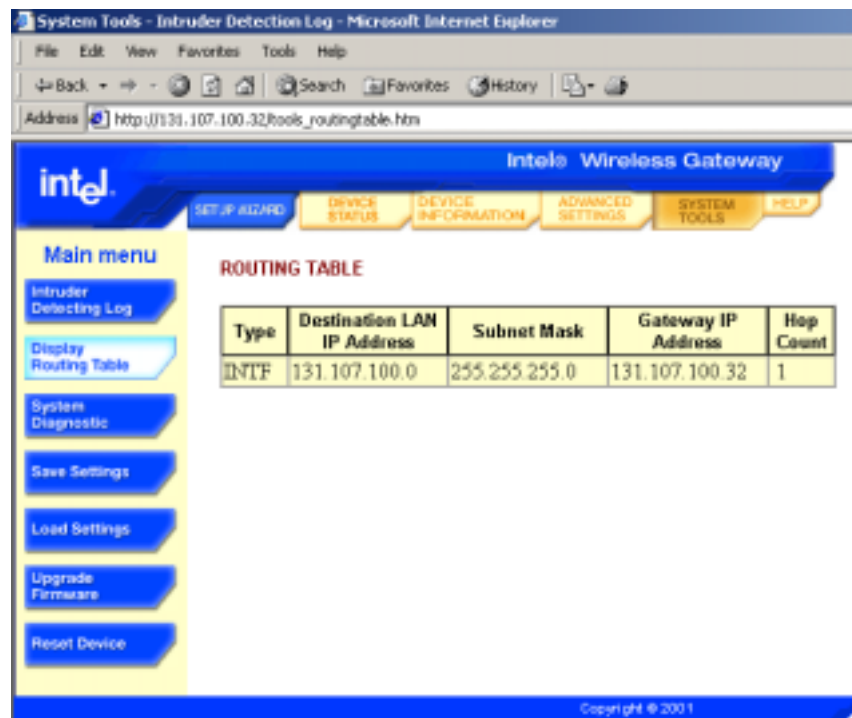
Intruder Detection Log

The Intruder Detection Log displays the index, time, protocol, source IP address, destination IP address, and an event description for unrecognized users who attempt to access your wireless network.

Display Routing Table

Use the Routing Table to view both static and dynamic routing activity. The routing table includes the type of routing activity, destination LAN IP address, subnet mask, gateway IP address, and hop count.

Image 7. Routing Table



System Diagnostics

The Systems Diagnostics page displays both the configuration settings and diagnostics for the Intel® Wireless Gateway. Configuration settings include the device and ISP settings. Diagnostic settings include the ISP Status, Link Status, Current WAN Connection, LAN MAC Table, and WAN MAC Table.

Save Settings

Use the Save Settings page to create a backup file for the current settings for the Intel® Wireless Gateway. If necessary, you can reload these configurations in the future, or they can be loaded to other Intel® Wireless Gateways with a floppy disk.

Load Settings

Either the default settings or user-defined settings can be reloaded to the Intel® Wireless Gateway.



Exercising the load settings option will cause the current settings for your Intel® Wireless Gateway to be lost, unless the current settings have been saved to a file. If you want to create a backup file for the current settings, refer to Save Settings before updating the configurations.

The Load Default Settings page allows you to reload the factory default configurations that came with the device. When this option is exercised, the default IP address is reset to 192.0.2.1. Click **START** to reload the default settings.

It is also possible to reload user-defined settings that have been saved to a file. Use the Load Settings from File page to access network configurations that were at one time saved to a file. To reload the specified configurations, enter the filename with its path, or click **Browse** to search for and enter the filename, then click **START**.

Upgrade Firmware

Intel periodically releases firmware updates to provide improved performance or capabilities. Use the Intel® Wireless Gateway update utility to upgrade the firmware in an Intel® Wireless Gateway.

You must first download the new firmware from the Intel support Website, <http://www.intel.com/support>, and save it to one of the clients in your network.

To upgrade the firmware, enter the filename with the correct path, or click **Browse** to find and enter the firmware file. Click **START** to load the settings for the new firmware version.

Reset Device

Use the Reset Device function if a system failure occurs. Unlike the reset button on the Intel® Wireless Gateway, this feature does **not** reload the factory default settings. It simply resets the device to the network settings that existed on the device before the system failure occurred.

The Intel® Wireless Gateway can also be reset by using a paper clip or small object, holding in the reset button on the back panel for five seconds, and then releasing. While the Intel® Wireless Gateway is reset, the STAT light blinks. After the hardware reset, the settings for the Intel® Wireless Gateway are the factory default settings.



If you were in the process of updating the network settings, those changes are lost when the device is reset.

Click **START** to reset the Intel® Wireless Gateway to its **current firmware settings**, or press the reset button on the Intel® Wireless Gateway to reset the **factory default settings**. Note that these two options do not perform the same task.

4.1.8 Troubleshooting for the Web Management Tool

If you are unable to access the Web Management Tool, try one or a combination of the following tips:



Some tips below step you through accessing and changing certain properties for your network clients. These steps vary for different operating systems. If the instructions do not pertain to your operating system, refer to the documentation that accompanied your computer or operating system software.

- Use Internet Explorer† or Netscape Navigator† (4.0 or higher) as your Web browser.
- Check the Web browser's communication proxy server settings.

1. Open the Control Panel on your computer, and double click the Internet icon from the Control Panel window. This will open a window titled *Internet Properties*.
 2. From the Internet Properties window select the **Connection** tab. Under the heading *Proxy server* select **Access the Internet using a proxy server**, and click the **Advanced** button. This will bring up a window titled *Proxy Settings*.
 3. Try disabling the proxy server setting or setting it to auto-detect.
- Remove or disable any firewall software on the client. For assistance, see the documentation that accompanied the software.
 - Remove any dialup settings in the Web browser.
 1. Open the Network and Dial-up Connections on your computer.
 2. Right click any dial-up connections that you may have, and click **Disable**.
 - Do not enter www along with the IP address. Enter only the IP address. Use `http://192.0.2.1` for the default IP address. If the default IP address has been changed from 192.0.2.1, then you must use the new IP address assigned to the Intel® Wireless Gateway.
 - Ensure the client is set to obtain an IP address automatically from a DHCP server.
 1. Go into the network settings properties for your network adapter by selecting **Start**, then **Settings**, then **Control Panel**, and finally **Network Settings**.
 2. Right click **Network Connection** or **Adapter**.
 3. Click **Properties**.
 4. Select the **TCP/IP** option.
 5. Click **Properties**.
 6. Check the box **Obtain an IP address automatically**.
 - If using a manually assigned IP address for the client, the IP address for the client must be on the same subnet as the Intel® Wireless Gateway.
 1. Follow the instructions above to access the Internet Protocol (TCP/IP) Properties window.
 2. The option **Use the following IP address** should be selected.
 3. Check that the value in the **Subnet mask** field matches that for the Intel® Wireless Gateway.
 - If you are using a DHCP server to provide an IP address to the Intel® Wireless Gateway, you must determine the address that was provided by the DHCP server. For assistance on getting the IP address from the DHCP server, see the documentation for your server or contact the person in charge of your network.
 - As an alternative to the proceeding tips, reset the Intel® Wireless Gateway to its default settings by pressing the reset button on the rear panel of the unit. Or, use the Intel® Wireless Gateway Manager on a wired client to configure the Intel® Wireless Gateway.

More troubleshooting tips are available on the Web Management Tool. To access these tips, open the tool, and click **Help**.

4.2 Intel® Wireless Gateway Manager

The Intel® Wireless Gateway Manager is an alternative solution for configuring the Intel® Wireless Gateway. This software must be installed on one of the clients in the network. Information regarding the Intel® Wireless Gateway Manager can be found on the Intel support Website, <http://www.intel.com/support>.

4.3 Using Telnet

The Intel® Wireless Gateway can be configured via a Telnet session. To configure the access point with Telnet, open a command prompt. If you are using the default IP address for the access point, type `tel net 192.0.2.1`. Otherwise, use the IP address that has been assigned to the access point, `tel net <IP Address>`.

When prompted for a password, enter the password that has been assigned to the Intel® Wireless Gateway. If the password has not been changed, use the default password, `Intel`. Press **Enter**, and a user interface should appear.

4.4 Using a Console Serial Port

The Intel® Wireless Gateway may be configured via a console serial port. To use this option, connect a null-wired serial cable to the console port on the back of the access point and to the serial port of a computer. Use Microsoft HyperTerminal or another similar terminal program to access the Intel® Wireless Gateway. Enter the communication parameters as 115200, N, 8, 1.

When prompted for a password, enter the password that has been assigned to the Intel® Wireless Gateway. If the password has not been changed, use the default password, `Intel`. Press **Enter**, and a user interface should appear.

Chapter 5. Glossary

Access Point: a device on an 802.11b wireless network that receives and retransmits data. It allows computers with wireless network adapters to be connected, typically, to an Ethernet network.

Cable Modem: a device that enables you to hook up your PC to the Internet via a local cable TV line.

Client: a computer on a network.

Dynamic Host Configuration Protocol (DHCP): the process of automatically configuring the TCP/IP settings for every computer on a network.

Domain Name System (DNS) Server Address: allows Internet host computers to have a domain name, such as intel.com, and one or more IP addresses. A DNS server keeps a database of host computers, their respective domain names and IP addresses so that when a domain name is requested, the user is sent to the proper IP address. The DNS server address used by the computers on your network refers to the DNS server for your ISP.

Encryption: a process that scrambles access codes or computer data to prevent unauthorized access. 802.11b wireless networks incorporate Wired Equivalent Privacy (WEP) encryption technologies.

Ethernet: the most widely used local area networking technology. It is an industry-wide standard originally developed by Xerox and formalized in 1980 by DEC, Intel, and Xerox. Ethernet networks transmit data at 10/100 Mbps using a specified protocol.

Ethernet Address (MAC Address): a unique, pre-programmed address, sometimes referred to as a media access control (MAC) address. Each computer on an Ethernet network has its own Ethernet address. This 12-digit hexadecimal address is encoded into the circuitry of the computer's network adapter when it is manufactured. Other devices on the network use this address to identify the computer. This address is not the same as the IP address that is assigned to computers on TCP/IP networks. On these networks, the IP address is associated with the Ethernet address to enable network communication.

IP Address: provides unique identification for each computer on the Internet or on a local network. IP addresses are usually expressed as a group of four numbers separated by periods, for example, 169.254.10.2. None of the numbers can be greater than 255. Each Ethernet interface has an IP address. For the Intel® Wireless Gateway, there is a LAN Ethernet interface and a WAN Ethernet interface; hence, there is a LAN IP address and a WAN IP address.

Internet Protocol: used to send data from one computer to another over the Internet. The IP describes how Internet computers keep track of the IP address of each computer on the network and route packets of data from one IP address to another.

Internet Service Provider (ISP): a company that provides individuals and other companies access to the Internet and other related services such as Web site building and virtual hosting. An ISP has the equipment and the telecommunication line access required to have POP on the Internet for the geographic area served. The larger ISPs have their own high-speed leased lines so that they are less dependent on the telecommunication providers and can provide better service to their customers.

Local Area Network (LAN): a network in one location. The network lets users at that location share files, printers and other services. *See WAN.*

Link Light: a light on a network device that indicates a good network connection. Hubs typically have a link light for each port; although, they may not be labeled as such, and the lights may show other information. These lights often blink for network activity. Some hubs display different

colored lights for 10 Mbps and 100 Mbps. For more information, see the documentation accompanying your product.

Network Adapter: a device expansion card that provides the physical connection between a computer and the network. There are many types of adapters. They include PC cards for laptops, a card that fits into a slot on your computer, just like you install a sound card or modem card, and embedded cards, embedded USB adapters, USB dongle adapters, and USB desktop adapters. Some newer computers have a network adapter already built into the system. PC cards or cards that fit into a slot in the desktop are sometimes referred to as network interface cards, or NICs.

Network Name (SSID): Access points are grouped together by an identifier called an ESSID. The ESSID is also referred to as a Net ID. This identifier is a combination of any letters or numbers that are appropriate for the network environment. ESSID is specifically for access points. When you talk about peer-to-peer networks, you cannot use the term ESSID. Service Set Identifier (SSID) is more generic and is a 32-character name that uniquely identifies all the computers and equipments that make up a wireless network. A type of SSID is ESSID. Another type of SSID is Basic Service Set Identifier (BSSID). The BSSID is the MAC address of a wireless adapter or access point.

Network Address Translation (NAT): occurs when multiple IP addresses on a private LAN are converted to one public address. This public address is sent out to the Internet. NAT adds a level of security because the IP address for a PC connected to the private LAN is never transmitted to the Internet. NAT also allows xDSL/cable routers to be used with low-cost Internet accounts, where only one TCP/IP address is provided by the Internet Service Provider. The user may have many private addresses masked by the single address provided by the ISP. NAT prevents denial-of-service (DoS) from external networks on internal hosts.

Port: a connector on a networking device, used to attach the network cable. Hubs and switches have numerous ports that connect to computers on the network.

Point to Point Protocol over Ethernet (PPPoE): the methodology of authenticating or validating a user or equipment to an ISP, usually via a username and/or password. It is a selection or action that reconfigures a device to the default parameters, as it was originally manufactured.

Protocol: a set of rules for sending and receiving information on a network. The rules determine the format of the data that is transmitted and other aspects of networking, such as how errors are detected and corrected. The protocol driver in each computer is software that adheres to these rules when sending and receiving information. These drivers are also often called protocols.

Transmission Control Protocol/Internet Protocol (TCP/IP): the protocol that computers use to communicate over the Internet. TCP determines how a computer breaks up data into small units, called packets, to be sent to another computer and how the receiving computer reassembles the packets into a single file. IP determines how the packets are routed across the Internet. *See Internet Protocol.*

Virtual Server: a device that performs IP mapping. IP mapping allows remote client access to your network via the Internet.

Wide Area Network (WAN): a communications network that uses devices such as telephone lines, satellite dishes, or radio waves to span a larger geographic area than can be covered by a LAN.

Wireless Local Area Network (WLAN): a type of Local Area Network (LAN) that uses high frequency radio waves rather than wires to communicate and transmit data among the network clients and devices. It is a flexible data communication system implemented as an extension to, or as an alternative for, a wired LAN.

xDSL Modem: DSL is a type of service that allows people to access the Internet via their telephone lines. This service is typically available via a telephone company or service provider.

An xDSL connection is a high-speed digital connection to the Internet using standard copper twisted pair telephone wires. There are several kinds of DSL; the x refers to all of them.

Chapter 6. Customer Support

6.1 Intel Automated Customer Support

You can reach Intel automated support services 24 hours a day, every day at no charge. The services contain the most up-to-date information about Intel products. You can access installation instructions, troubleshooting information, and product information.

6.1.1 Web and Internet Sites

- Support: <http://www.intel.com/support>
- Network Products: <http://www.intel.com/network>
- Corporate: <http://www.intel.com/>
- Newsgroups: <news://cs.intel.com/>
- FTP Host: <ftp://download.intel.com/>
- FTP Directory: /support/network/hardware/

6.1.2 Customer Support Technicians

U.S. and Canada.

For customer support in the U.S. and Canada, call +1 916-377-7000 (7:00 – 17:00 M-F Pacific Time). You can also visit the customer support Website at <http://www.intel.com/support>.

Worldwide Access.

Intel has technical support centers worldwide. Many of the centers are staffed by technicians who speak the local languages. For a list of all Intel support centers, the telephone numbers, and the times they are open, refer to *Customer Support Phone Numbers*: <http://www.intel.com/support/9089.htm>.

6.2 Intel Software License Agreement

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6.3 Limited Hardware Warranty

Intel warrants to the original owner that the hardware product delivered in this package will be free from defects in material and workmanship for three (3) years following the latter of: (i) the date of purchase only if you register by returning the registration card as indicated thereon with proof of purchase; or (ii) the date of manufacture; or (iii) the registration date if by electronic means provided such registration occurs within thirty (30) days from purchase. This warranty does not cover the product if it is damaged in the process of being installed. Intel recommends that you have the company from whom you purchased this product install the product. Intel reserves the right to fill your order with a product containing new or remanufactured components.

THE ABOVE WARRANTY IS IN LIEU OF ANY OTHER WARRANTY, WHETHER EXPRESS, IMPLIED OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTY OF NON-INFRINGEMENT OF INTELLECTUAL PROPERTY, MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ARISING OUT OF ANY PROPOSAL, SPECIFICATION, OR SAMPLE.

This warranty does not cover replacement of hardware products damaged by abuse, accident, misuse, neglect, alteration, repair, disaster, improper installation or improper testing.

If the hardware product is found to be otherwise defective, Intel, at its option, will replace or repair the hardware product at no charge except as set forth below, provided that you deliver the hardware product along with a Return Material Authorization (RMA) number (see below) either to the company from whom you purchased it or to Intel (North America only). If you ship the hardware product, you must assume the risk of damage or loss in transit. You must use the original container (or the equivalent) and pay the shipping charge.

Intel may replace or repair the hardware product with either new or remanufactured product or parts, and the returned hardware product becomes Intel's property. Intel warrants the repaired or replaced hardware product to be free from defects in material and workmanship for a period of the greater of: (i) ninety (90) days from the return shipping date; or (ii) the period of time remaining on the original three (3) year warranty.

This warranty gives you specific legal rights and you may have other rights which vary from state to state. All parts or components contained in this hardware product are covered by Intel's limited warranty for this product; the product may contain fully tested, recycled parts, warranted as if new. For warranty information call one of the numbers below.

6.3.1 Returning a Defective Product

From North America.

Before returning any hardware product, contact an Intel Customer Support Group to obtain an RMA number by calling +1 916-377-7000.

If the Customer Support Group verifies that the hardware product is defective, they will have the Return Material Authorization Department issue you an RMA number to place on the outer package of the hardware product. Intel cannot accept any returned product without an RMA number on the package.

All Other Locations.

Return the hardware product to the place of purchase for a refund or replacement.

6.3.2 Limitation of Liability and Remedies

INTEL'S SOLE LIABILITY HEREUNDER SHALL BE LIMITED TO DIRECT, OBJECTIVELY MEASURABLE DAMAGES. IN NO EVENT SHALL INTEL HAVE ANY LIABILITY FOR ANY INDIRECT OR SPECULATIVE DAMAGES (INCLUDING, WITHOUT LIMITING THE FOREGOING, CONSEQUENTIAL, INCIDENTAL, AND SPECIAL DAMAGES) INCLUDING, BUT NOT LIMITED TO, INFRINGEMENT OF INTELLECTUAL PROPERTY, REPROCUREMENT COSTS, LOSS OF USE, BUSINESS INTERRUPTIONS, LOSS OF GOODWILL, AND LOSS OF PROFITS, WHETHER ANY SUCH DAMAGES ARISE OUT OF CONTRACT NEGLIGENCE, TORT, OR UNDER ANY WARRANTY, IRRESPECTIVE OF WHETHER INTEL HAS ADVANCE NOTICE OF THE POSSIBILITY OF ANY SUCH DAMAGES. NOTWITHSTANDING THE FOREGOING, INTEL'S TOTAL LIABILITY FOR ALL CLAIMS UNDER THIS AGREEMENT SHALL NOT EXCEED THE PRICE PAID FOR THE PRODUCT. THESE LIMITATIONS ON POTENTIAL LIABILITIES WERE AN ESSENTIAL ELEMENT IN SETTING THE PRODUCT PRICE. INTEL NEITHER ASSUMES NOR AUTHORIZES ANYONE TO ASSUME FOR IT ANY OTHER LIABILITIES.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations may not apply to you.

Critical Control Applications.

Intel specifically disclaims liability for use of the hardware product in critical control applications (including, for example only, safety or health care control systems, nuclear energy control systems, or air or ground traffic control systems) by you or your customers, and such use is entirely at the user's risk. You agree to defend, indemnify, and hold Intel harmless from and against any and all claims arising out of use of the hardware product in such applications by you or your customers.

Software.

Software provided with the hardware product is not covered under the hardware warranty described above. See the applicable software license agreement which shipped with the hardware product for details on any software warranty.

6.4 Product Registration

The beginning of a valuable relationship

Register your product today!

As a registered customer, you stay connected and informed by receiving:

- Access to Intel's outstanding technical support for optimum performance.
- Advance notice of product upgrades and new products to give you a competitive edge.
- Information updates to keep you current.
- Special offers for savings on products and evaluation units.

To register, browse the Intel product registration Website,
<http://www.intel.com/product/register>.

Chapter 7. Regulatory Compliance Information

For U.S. and international regulatory compliance information for the the Intel® Wireless Gateway, see the *Intel® Wireless Gateway Regulatory Approval Guide* posted on the Intel customer support Website, <http://www.intel.com/support>.



A minimum separation distance of 20 cm should be maintained between the radiating element of this product and nearby persons to comply with the *Federal Communications Commission (FCC)* rules for radio frequency (RF) exposure.

Instruction Manual
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.