

# Wireless (Select Models Only) User Guide

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## Product notice

This user guide describes features that are common to most models. Some features may not be available on your computer.



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# 1 Using wireless devices (select models only)

Wireless technology transfers data across radio waves instead of wires. Your computer may be equipped with one or more of the following wireless devices:

- Wireless local area network (WLAN) device—Connects the computer to wireless local area networks (commonly referred to as Wi-Fi networks, wireless LANs, or WLANs) in corporate offices, your home, and public places such as airports, restaurants, coffee shops, hotels, and universities. In a WLAN, each mobile wireless device communicates with a wireless router or a wireless access point.
- HP Broadband Wireless Module (WWAN device)—Provides access to information wherever mobile network operator service is available. In a WWAN, each mobile device communicates to a mobile network operator's base station. Mobile network operators install networks of base stations (similar to cell phone towers) throughout large geographic areas, effectively providing coverage across entire states, regions, or even countries.
- Bluetooth® device—Creates a personal area network (PAN) to connect to other Bluetooth-enabled devices such as computers, phones, printers, headsets, speakers, and cameras. In a PAN, each device communicates directly with other devices, and devices must be relatively close together—typically within 33 feet of each other.

Computers with WLAN devices support one or more of the following IEEE industry standards:

- 802.11b, the first popular standard, supports data rates of up to 11 Mbps and operates at a frequency of 2.4 GHz.
- 802.11g supports data rates of up to 54 Mbps and operates at a frequency of 2.4 GHz. An 802.11g WLAN device is backward compatible with 802.11b devices, so they can operate on the same network.
- 802.11a supports data rates of up to 54 Mbps and operates at a frequency of 5 GHz.

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 **NOTE:** 802.11a is not compatible with 802.11b and 802.11g.

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- 802.11n supports data rates of up to 270 Mbps and may operate at 2.4 GHz or 5 GHz, making it backward compatible with 802.11a, b, and g.

For more information on wireless technology, refer to the information and Web site links provided in Help and Support.

## Identifying wireless and network status icons

Icon	Name	Description
	Wireless	Identifies the location of the wireless lights, the wireless button, and the Wireless Assistant software.
	Network status (connected)	Indicates that one or more of your WLAN or LAN drivers are installed and one or more WLAN devices are connected to the network.
	Network status (disconnected)	Indicates that one or more of your WLAN or LAN drivers are installed but no WLAN devices are connected to the network.



## Using the wireless controls

You can control the wireless devices in your computer using these features:


- Wireless button or wireless switch (referred to in this guide as the wireless button)
- Wireless Assistant software (select models only)
- Operating system controls

## Using the wireless button

The computer has a wireless button, one or more wireless devices, and one or two wireless lights, depending on the model. All of the wireless devices on your computer are enabled at the factory, so the wireless light is on (blue) when you turn on the computer.

The wireless light indicates the overall power state of your wireless devices, not the status of individual devices. If the wireless light is blue, at least one wireless device is on. If the wireless light is off, all wireless devices are off.

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 **NOTE:** On some models, the wireless light is amber when all wireless devices are turned off.


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Because the wireless devices are enabled at the factory, you can use the wireless button to turn on or turn off the wireless devices simultaneously. Individual wireless devices can be controlled through Wireless Assistant software (select models only).

## Using Wireless Assistant software (select models only)

A wireless device can be turned on or off using the Wireless Assistant software. If a wireless device is disabled by the Setup Utility, it must be reenabled by the Setup Utility before it can be turned on or off using Wireless Assistant.

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 **NOTE:** Enabling or turning on a wireless device does not automatically connect the computer to a network or a Bluetooth-enabled device.

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To view the state of the wireless devices, click **Start > Windows Mobility Center > Wireless Assistant**, which is located in the bottom left of Windows® Mobility Center.

If the network status icon is not displayed in the notification area, at the far right of the taskbar, and Wireless Assistant is installed, complete the following steps to reapply the WLAN device driver:

1. Open Wireless Assistant by clicking the wireless icon in Windows Mobility Center.
2. Click **Properties > Wireless Assistant > Apply**.

For more information, refer to the Wireless Assistant software Help:

1. Open Wireless Assistant by clicking the wireless icon in Windows Mobility Center.
2. Click the **Help** button.

## Using operating system controls

Some operating systems also offer a way to manage integrated wireless devices and the wireless connection. For more information, refer to the user guide for your operating system.

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## 2 Setting up a WLAN (select models only)

Setting up a WLAN allows you to connect multiple computers together, share a printer, and access the Internet without using cables.

To simplify the setup process, HP provides a downloadable Network Assistant that discovers your router and the wireless devices in your computer and sets up a secure WLAN in minutes.


# Determining wireless hardware requirements

Before setting up a WLAN, be sure to have the following:

- **High-speed Internet connection**, such as cable, DSL, or other broadband technology. Your Internet service provider (ISP) will provide you with the modem, Internet service, and the broadband Internet configuration settings.
- **Wireless access point or wireless router**, which provides the gateway for accessing your Internet connection or fixed WLAN.
- **WLAN device for your computer**, such as one of the following:
  - Integrated wireless device
  - PC Card adapter
  - USB adapter

## Preparing the router and the computer

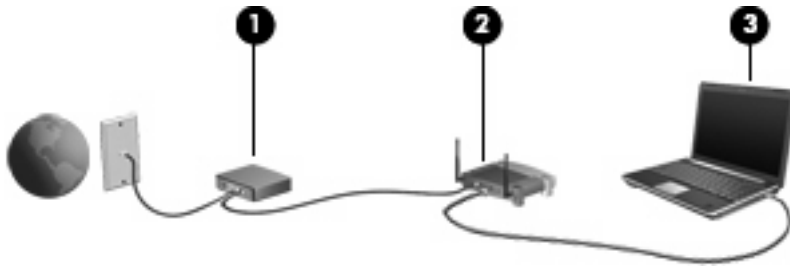
Since the HP Network Assistant is a Web-based application, you must use an Ethernet cable to establish a good Internet connection from your computer through a router and a modem to your ISP.

 **NOTE:** If you do not have an Internet connection, you must contact an ISP and set up your service before you can connect to the Internet.

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Use the following steps to establish the wired connection:

1. If you have not already done so, connect the modem (1) (either DSL or cable modem) to the phone or cable TV jack on the wall.
2. Connect the wireless router (purchased separately) (2) to the cable or DSL modem using an Ethernet cable.
3. Connect the router to the computer (3) using an Ethernet cable.




4. Verify that your computer can access the Internet by opening Internet Explorer and connecting to any Web site, such as <http://www.hp.com>.
5. If you are unable to access the Internet, or receive an error message such as "Cannot Open Internet Site," reset the connection options:
  - a. From the tool bar in Internet Explorer, click **Tools > Internet Options > Connections > LAN settings**.
  - b. In the **Automatic configuration** section, select the **Automatically detect settings** check box, and then click **OK**.
  - c. Close and then reopen Internet Explorer.

## Launching Network Assistant

1. Be sure that your computer is connected to the Internet.
2. Open Wireless Assistant by clicking the wireless icon in Windows Mobility Center.
3. Click **Setup** at the bottom of the window to launch Network Assistant.
4. Click **Next** to begin the router identification process.

Network Assistant will check your system, identify the router, and determine whether the router is connected to the Internet.

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 **NOTE:** Network Assistant supports most commercially available routers. If the router you are using is not listed, you will not be able to use Network Assistant and should use the information provided by your router manufacturer or your ISP to set up your WLAN.

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If you have not already connected the computer to the router using an Ethernet cable, Network Assistant will prompt you to do that now.

5. If Network Assistant identifies the router, it will prompt you for permission to configure the router.

– or –

If Network Assistant cannot identify the router, it will prompt you for additional information. Select the manufacturer and model, and then click **Next**.




# Configuring router settings

When Network Assistant has detected that your computer is connected to the Internet through a router, it will prompt you for permission to continue:

1. Click **Next** to check existing router settings.

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 **NOTE:** If you have already configured a router password, Network Assistant will prompt you to enter that password. If you do not remember the router password, follow the instructions that came with your router to reset the password.

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After Network Assistant checks your existing router configuration, it displays the basic wireless router settings. You may accept the existing values or you may enter new values.

HP recommends that you enter new, unique Service Site Identifier (SSID) values.

2. Type a unique name in the **Network name** box to identify the network.
3. Create a **Network key**. To ensure security, follow these guidelines:
  - Select the **Network key** check box, and then type a combination of 5 to 10 alphanumeric characters in the space provided to create a new **Network key**.
  - or –
  - Select the **Network key** check box, and then click **Generate**. Network Assistant will select a unique network key for you.

## Configuring wireless device settings

After configuring the wireless router, Network Assistant will prompt you for permission to automatically apply the same network name and security settings to the WLAN device on your computer.

1. Click **Next**, and Network Assistant will configure the wireless settings.

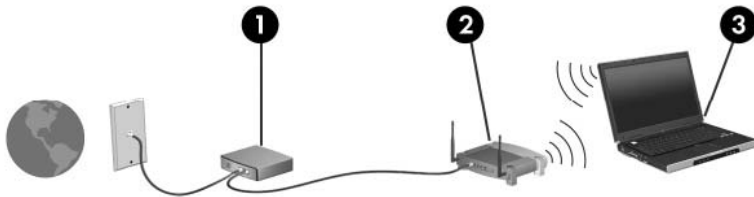
During the configuration process, informational messages are displayed above the network status icon in the notification area, at the far right of the taskbar.

When Network Assistant successfully configures the router and WLAN device, connects your computer to the WLAN, and verifies that a wireless Internet connection exists, it displays a “Congratulations” page.

2. If you will be connecting additional computers to the WLAN, click **Save the wireless setup package**. Otherwise, click **Finish** to exit Network Assistant.
3. Disconnect the Ethernet cable from your computer, if you like. The WLAN is now connected.

The illustration below shows a WLAN installation connected with the following equipment:

- A broadband modem (either DSL or cable) **(1)**
- A wireless router **(2)**
- A wireless computer **(3)**



## Saving and using the wireless setup package

After Network Assistant completes the first connection, it prompts you for a decision about connecting other computers to your WLAN.

- Click the **Save** button to copy the *PCConnect.exe setup wizard* and your settings to a removable disc.
- Click **Finish** to exit Network Assistant.
- To connect another computer device to the WLAN, insert the disc containing the setup wizard into the computer or device that has a WLAN device, and run the wizard.

The computer or device will be automatically configured to connect to your WLAN.

- When you change the network name or network key, run Network Assistant again to create a new setup wizard.

# Protecting your WLAN

Because the WLAN standard was designed with only limited security capabilities—basically to foil casual eavesdropping rather than more powerful forms of attack—it is essential to understand that WLANs are vulnerable to well-known and well-documented security weaknesses.

WLANs in public areas, or “hotspots,” like coffee shops and airports may not provide any security. New technologies are being developed by wireless manufacturers and hotspot service providers that make the public environment more secure and anonymous. If you are concerned about the security of your computer in a hotspot, limit your network activities to noncritical e-mail and basic Internet surfing.

When you set up a WLAN or access an existing WLAN, always enable security features to protect your network from unauthorized access. The common security levels are Wi-Fi Protected Access (WPA)-Personal and Wired Equivalent Privacy (WEP). Because wireless radio signals travel outside the network, other WLAN devices can pick up unprotected signals and either connect to your network (uninvited) or capture information being sent across it. However, you can take precautions to protect your WLAN:

- **Use a wireless transmitter with built-in security**

Many wireless base stations, gateways, or routers provide built-in security features such as wireless security protocols and firewalls. With the correct wireless transmitter, you can protect your network from the most common wireless security risks.

- **Work behind a firewall**

A firewall is a barrier that checks both data and requests for data that are sent to your network, and discards any suspicious items. Firewalls are available in many varieties, both software and hardware. Some networks use a combination of both types.

- **Use wireless encryption**

A variety of sophisticated encryption protocols is available for your WLAN. Find the solution that works best for your network security:

- **Wired Equivalent Privacy (WEP)** is a wireless security protocol that encodes or encrypts all network data before it is transmitted using a WEP key. Usually, you can allow the network to assign the WEP key. Alternatively, you can set up your own key, generate a different key, or choose other advanced options. Without the correct key, others will not be able to use the WLAN.
- **WPA (Wi-Fi Protected Access)**, like WEP, uses security settings to encrypt and decrypt data that is transmitted over the network. However, instead of using one static security key for encryptions as WEP does, WPA uses “temporal key integrity protocol” (TKIP) to dynamically generate a new key for every packet. It also generates different sets of keys for each computer on the network.

- **Close your network**

If possible, prevent your network name (SSID) from being broadcast by the wireless transmitter. Most networks initially broadcast the name, telling any computer nearby that your network is available. By closing the network, other computers are less likely to know that your network exists.




**NOTE:** If your network is closed and the SSID is not broadcast, you will need to know or remember the SSID to connect new devices to the network. Write down the SSID and store it in a secure place before closing the network.

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## 3 Using a WLAN

With a WLAN device, you can access a wireless local area network (WLAN), which is composed of other computers and accessories that are linked by a wireless router or a wireless access point.


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 **NOTE:** The terms *wireless router* and *wireless access point* are often used interchangeably.

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- A large-scale WLAN, such as a corporate or public WLAN, typically uses wireless access points that can accommodate a large number of computers and accessories and can separate critical network functions.
- A home or small office WLAN typically uses a wireless router, which allows several wireless and wired computers to share an Internet connection, a printer, and files without requiring additional pieces of hardware or software.

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 **NOTE:** To use the WLAN device in your computer, you must connect to a WLAN infrastructure (provided through a service provider or a public or corporate network).


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# Connecting to a WLAN

To connect to the WLAN, follow these steps:

1. Be sure that the WLAN device is turned on. If it is on, the wireless light is on. If the wireless light is off, press the wireless button.


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 **NOTE:** On some models, the wireless light is amber when all wireless devices are turned off.

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2. Select **Start > Connect to**.
3. Select your WLAN from the list, and then type the network security key, if required.
  - If the network is unsecured, meaning that anyone can access the network, a warning is displayed. Click **Connect Anyway** to accept the warning and complete the connection.
  - If the network is a security-enabled WLAN, you will be prompted to enter a network security key, which is a security code. Click **Connect** to complete the connection.

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 **NOTE:** If no WLANs are listed, you are out of range of a wireless router or access point.


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**NOTE:** If you do not see the network you want to connect to, click **Set up a connection or network**. A list of options will be displayed. You can choose to manually search for and connect to a network or to create a new network connection.

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4. After the connection is made, place the cursor over the network status icon in the notification area, at the far right of the taskbar, to verify the name, speed, strength, and status of the connection.

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 **NOTE:** The functional range (how far your wireless signals travel) depends on WLAN implementation, router manufacturer, and interference from other electronic devices or structural barriers such as walls and floors.

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More information about using a WLAN is available through the following resources:

- Information from your ISP and the user guides included with your wireless router and other WLAN equipment
- Information and Web site links provided in Help and Support

For a list of public WLANs near you, contact your ISP or search the Web. Web sites that list public WLANs include Cisco Internet Mobile Office Wireless Locations, Hotspotlist, and Geektools. Check with each public WLAN location for cost and connection requirements.

For additional information on connecting your computer to a corporate WLAN, contact your network administrator or IT department.

## Roaming to another network

When you move your computer within range of another WLAN, Windows attempts to connect to that network. If the attempt is successful, your computer will be automatically connected to the new network. If Windows does not recognize the new network, follow the same procedure you used initially to connect to your WLAN.

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## 4 Using HP Broadband Wireless (select models only)

HP Broadband Wireless enables your computer to access the Internet from more places and over larger areas than WLANs. Using HP Broadband Wireless requires a network service provider (called a *mobile network operator*), which in most cases will be a mobile phone network operator. Coverage for HP Broadband Wireless is similar to mobile phone voice coverage.

When used with mobile network operator service, HP Broadband Wireless gives you the freedom to stay connected to the Internet, send e-mail, or connect to your corporate network whether you are on the road or outside the range of Wi-Fi hotspots.

HP offers two types of broadband wireless modules:

- The HSDPA (High Speed Downlink Packet Access) module provides access to networks based on the Global System for Mobile Communications (GSM) telecommunications standard.
- The EV-DO (Evolution Data Optimized) module provides access to networks based on the code division multiple access (CDMA) telecommunications standard.

For information on HP Broadband Wireless, see the HP Web site at <http://www.hp.com/go/broadbandwireless>.



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## 5 Using Bluetooth wireless devices (select models only)

A Bluetooth device provides short-range wireless communications that replace the physical cable connections that traditionally link electronic devices such as the following:

- Computers (desktop, notebook, PDA)
- Phones (cellular, cordless, smart phone)
- Imaging devices (printer, camera)
- Audio devices (headset, speakers)

Bluetooth devices provide peer-to-peer capability that allows you to set up a personal area network (PAN) of Bluetooth devices. For information on configuring and using Bluetooth devices, refer to the Bluetooth software Help.

## Bluetooth and Internet Connection Sharing (ICS)

When two or more computers are connected using Bluetooth, and Internet Connection Sharing (ICS) is enabled on one of the computers, the other computers cannot connect to the Internet using the Bluetooth network.

HP does **not** recommend setting up one computer with Bluetooth as a host and using it as a gateway through which other computers may connect to the Internet. The strength of Bluetooth is in synchronizing information transfers between your computer and wireless devices including cellular phones, printers, cameras, and PDAs. The inability to consistently connect two or more computers to share the Internet through Bluetooth is a limitation of Bluetooth and the Windows operating system.


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## 6 Troubleshooting wireless connection problems

Some possible causes for wireless connection problems include the following:

- Wireless device is not installed correctly or has been disabled.
- Wireless device or router hardware has failed.
- Network configuration (SSID or security) has been changed.
- Wireless device encountered interference from other devices.

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 **NOTE:** Wireless networking devices are included with select computer models only. If wireless networking is not listed in the feature list on the side of the original computer package, you may add wireless networking capability to the computer by purchasing a wireless networking device.


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Before working your way through the sequence of possible solutions to your network connection problem, be sure that device drivers are installed for all wireless devices.

Use the procedures in this chapter to diagnose and repair a computer that does not connect to the WLAN you want to use.

## Cannot connect to a WLAN

If you have a problem connecting to a WLAN, confirm that the integrated WLAN device is properly installed on your computer:

 **NOTE:** Windows includes the User Account Control feature to improve the security of your computer. You may be prompted for your permission or password for tasks such as installing software, running utilities, or changing Windows settings. Refer to Windows Help for more information.

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1. Select **Start > Computer > System properties**.
2. In the left pane, click **Device Manager**.
3. Identify the WLAN device from the Network adapters list. The listing for a WLAN device may include the term *wireless*, *wireless LAN*, *WLAN*, or *802.11*.

If no WLAN device is listed, either your computer does not have an integrated WLAN device, or the driver for the WLAN device is not properly installed.

For more information on troubleshooting WLANs, refer to the Web site links provided in Help and Support.

# Cannot launch WLAN

Windows can automatically repair a corrupted WLAN connection:

- If there is a network status icon in the notification area, at the far right of the taskbar, right-click the icon, and then click **Diagnose and repair** from the menu.

Windows will reset your network device and attempt to reconnect to one of the preferred networks.

- If an “x” is superimposed over the network status icon, one or more of your WLAN or LAN drivers are installed but the computer is not connected.
- If there is no network status icon in the notification area, follow these steps:
  1. Click **Start** and type `network and sharing` in the **Start Search** box.
  2. From the list of search results, click **Network and Sharing Center**.
  3. In the left pane, click **Diagnose and repair**.

When the Network connections window is displayed, Windows will reset your network device and attempt to reconnect to one of the preferred networks.

## Network status icon is not displayed

If the network status icon is not displayed in the notification area after you configure the WLAN, the software driver is either missing or corrupted. A Windows “Device not Found” error message may also be displayed. The driver must be reinstalled.

Get the latest version of the WLAN device software for your computer at the HP Drivers and Downloads Web site. If the WLAN device you are using was purchased separately, consult the manufacturer's Web site for the latest software.

# Current network security codes are unavailable

If you are prompted for a network key or an SSID when connecting to a WLAN, the network is protected by security. You will need to have the current codes to make a connection on a secure network. The SSID and WEP are alphanumeric codes that you enter into your computer to identify your computer to the network.

- For a network connected to your personal wireless router, review the router user guide for instructions on setting up the same SSID codes on both the router and the WLAN device.
- For a private network, such as a network in an office or at a public Internet chat room, contact the network administrator to obtain the Service Site Identifier (SSID) codes, and then enter the codes when prompted to do so.


Some networks change the SSIDs used in their routers or access points on a regular basis to improve security. You must change the corresponding SSID code in your computer accordingly.

If you are provided with new wireless network keys and SSIDs for a network, and if you have previously connected to that network, follow the steps below to connect to the network:

1. Click **Start > Network > Network and Sharing Center > Manage wireless networks**.

A list showing the available WLANs is displayed. If you are in a hotspot where several WLANs are active, several will be displayed.

2. Right-click the network, and then click **Properties**.

 **NOTE:** If the network you want is not listed, check with the network administrator to be sure that the router or access point is operating.

3. Click the **Security** tab and enter the correct wireless encryption data into the **Network security key** field.
4. Click **OK** to save these settings.

## WLAN connection is very weak

If the connection is very weak, or if your computer cannot make a connection to a WLAN, minimize interference from other devices, as follows:

- Move your computer closer to the wireless router or access point.
- Be sure that other wireless devices are not interfering by temporarily disconnecting devices such as a microwave, cordless phone, or cellular phone.

If the connection does not improve, try forcing the device to reestablish all connection values:

1. Click **Start > Network > Network and Sharing Center > Manage wireless networks**.

A list showing the available WLANs is displayed. If you are in a “hotspot” where several WLANs are active, several will be displayed.

2. Right-click a network, and then click **Remove**.



## Cannot connect to the wireless router

If you are trying to connect to the wireless router and are unsuccessful, reset the wireless router by removing power from the router for 10 to 15 seconds.

If the computer still cannot make a connection to a WLAN, restart the wireless router. For details, refer to the router user guide.

## Cannot connect to a wireless network used previously

If you are unable to resolve the issue of a wireless connection that worked previously but does not work now, performing a system restore may be the final option. Microsoft® System Restore, if set up to do so, will create restore points automatically and periodically. Use an existing restore point to return your system to the condition it was in when the wireless connection worked.

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