Wireless (Select Models Only)
User Guide

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 Mobile Broadband Module—A wireless wide area network (WWAN) device that 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 10 meters (approximately 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.

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

- Wi-Fi CERTIFIED 802.11n draft 2.0 supports data rates of up to 300 Mbps and may operate at 2.4 GHz or 5 GHz, making it backward compatible with 802.11a, b, and g.

    NOTE: The specifications for the 802.11n WLAN are draft specifications and are not final. If the final specifications differ from the draft specifications, it may affect the ability of the computer to communicate with other 802.11n WLAN devices.

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

Identifying wireless and network icons

Icon	Name	Description
	Wireless (connected)	Identifies the location of the wireless lights and the wireless buttons on the computer. Also identifies the Wireless Assistant software on the computer and indicates that one or more of the wireless devices are on.
	Wireless (disconnected)	Identifies the Wireless Assistant software on the computer and indicates that all of the wireless devices are off.
	HP Connection Manager	Opens HP Connection Manager, which enables you to create a connection with an HP Mobile Broadband device (select models only).
	Network status (connected)	Indicates that one or more of your network drivers are installed and one or more network devices are connected to the network.
	Network status (disconnected)	Indicates that one or more of your network drivers are installed but no network 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)

● HP Connection Manager 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.

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

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) or through Computer Setup.

NOTE: If the wireless devices are disabled by Computer Setup, the wireless button will not work until you reenable your devices.

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 Computer Setup, it must be reenabled by Computer Setup before it can be turned on or off using Wireless Assistant.

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

To view the state of the wireless devices, follow either of these steps:

Position the mouse pointer over the wireless icon in the notification area, at the far right of the taskbar.

– or –

Open Wireless Assistant by double-clicking the icon in the notification area.

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

1. Open Wireless Assistant by double-clicking the icon in the notification area.

2. Click the **Help** button.

Using HP Connection Manager (select models only)

You can use HP Connection Manager to connect to WWANs using the HP Mobile Broadband device in your computer (select models only).

To start Connection Manager, click the **Connection Manager** icon in the notification area, at the far right of the taskbar.

– or –

Select **Start > All Programs > HP Connection Manager > HP Connection Manager**.

For more details about using Connection Manager, refer to the Connection Manager software Help.

Using operating system controls

Some operating systems also offer a way to manage integrated wireless devices and the wireless connection. For example, Windows® Network Connections allows you to set up a connection, connect to a network, manage wireless networks, and diagnose and repair connections.

To access Network Connections, click **Start > Control Panel > Network and Internet Connections > Network Connections**.

For more information, refer to Help and Support. Click **Start > Help and Support**.

2   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.

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

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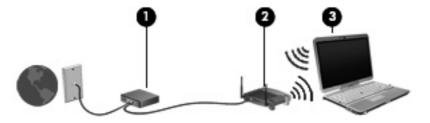
To use the WLAN device in your computer, you must connect to a WLAN infrastructure (provided through a service provider or a public or corporate network).

Setting up a WLAN

To set up a WLAN and connect to the Internet, you need the following equipment:

- A broadband modem (either DSL or cable) **(1)** and high-speed Internet service purchased from an Internet service provider (ISP)

- A wireless router (purchased separately) **(2)**

- The wireless computer **(3)**

The illustration below shows an example of a wireless network installation that is connected to the Internet.

As your network grows, additional wireless and wired computers can be connected to the network to access the Internet.

For help in setting up your WLAN, refer to the information provided by your router manufacturer or your ISP.

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) 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, and 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 then 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 uses a WEP key to encode or encrypt all network data before it is transmitted. 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.

Connecting to a WLAN

To connect to the WLAN, follow these steps:

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

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

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 are prompted to enter a network security key, which is a security code. Type the code, and then click **Connect** to complete the connection.

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

   NOTE: If you do not see the network you want to connect to, select **Start > Connect To > Show all connections**. A list of options will appear that includes creating a new network connection, as well as troubleshooting connection issues.

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

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.

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

- Information from your ISP and the manufacturer's instructions 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 is 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.

3 Using HP Mobile Broadband (select models only)

HP Mobile Broadband enables your computer to use wireless wide area networks (WWANs) to access the Internet from more places and over larger areas than it can by using WLANs. Using HP Mobile Broadband requires a network service provider (called a *mobile network operator*), which in most cases is a mobile phone network operator. Coverage for HP Mobile Broadband is similar to mobile phone voice coverage.

When used with mobile network operator service, HP Mobile Broadband 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 supports the following technologies:

● HSPA (High Speed Packet Access), which provides access to networks based on the Global System for Mobile Communications (GSM) telecommunications standard.

● EV-DO (Evolution Data Optimized), which provides access to networks based on the code division multiple access (CDMA) telecommunications standard.

You may need the HP Mobile Broadband Module serial number to activate mobile broadband service. The serial number is printed on a label inside the battery bay of your computer. Some mobile network operators require the use of a subscriber identity module (SIM). A SIM contains basic information about you, such as a PIN (personal identification number), as well as network information. Some computers include a SIM that is preinstalled in the battery bay. If the SIM is not preinstalled, it may be provided in the HP Mobile Broadband information provided with your computer or the mobile network operator may provide it separately from the computer.

For information on inserting and removing the SIM, refer to the "Inserting a SIM" and "Removing a SIM" sections in this chapter.
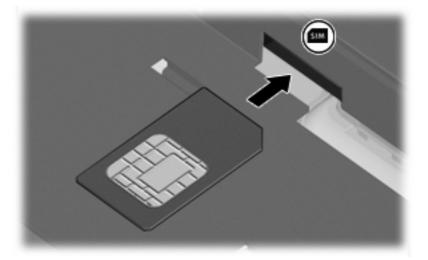
For information on HP Mobile Broadband and how to activate service with a preferred mobile network operator, refer to the HP Mobile Broadband information included with your computer. For additional information, see the HP Web site at http://www.hp.com/go/mobilebroadband (US only).

Inserting a SIM

⚠ **CAUTION:** To prevent damage to the connectors, use minimal force when inserting a SIM.

To insert a SIM:

1. Shut down the computer. If you are not sure whether the computer is off or in Hibernation, turn the computer on by pressing the power button. Then shut down the computer through the operating system.

2. Close the display.

3. Disconnect all external devices connected to the computer.

4. Unplug the power cord from the AC outlet.

5. Turn the computer upside down on a flat surface, with the battery bay toward you.

6. Remove the battery.

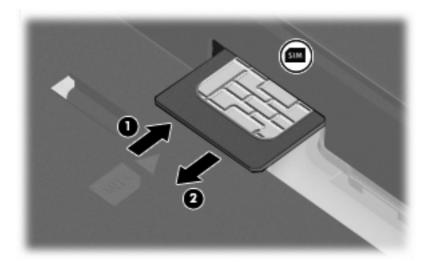7. Insert the SIM into the SIM slot, and gently push the SIM into the slot until it is firmly seated.

8. Replace the battery.

📝 **NOTE:** HP Mobile Broadband will be disabled if the battery is not replaced.

9. Reconnect external power.

10. Reconnect external devices.

11. Turn on the computer.

Removing a SIM

To remove a SIM:

1. Shut down the computer. If you are not sure whether the computer is off or in Hibernation, turn the computer on by pressing the power button. Then shut down the computer through the operating system.

2. Close the display.

3. Disconnect all external devices connected to the computer.

4. Unplug the power cord from the AC outlet.

5. Turn the computer upside down on a flat surface, with the battery bay toward you.

6. Remove the battery.

7. Press in on the SIM **(1)**, and then remove it from the slot **(2)**.

8. Replace the battery.

9. Reconnect external power.

10. Reconnect external devices.

11. Turn on the computer.

Using the external WWAN antenna (select models only)

⚠ WARNING! **Exposure to Radio Frequency Radiation** The radiated output power of this device is below the FCC radio frequency exposure limits. Nevertheless, the device should be used in such a manner that the potential for human contact with the antenna is minimized during normal operation of the computer. Refer to the following section for instructions on positioning the antenna properly.

During WWAN operation in tablet mode: To avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna should be no less than 2.5 cm (1 inch) and the antenna should be positioned at a 180-degree angle.

During WWAN operation in notebook mode: To avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna should be no less than 20 cm (8 inches), including when the computer display is closed, and the antenna should be positioned at a 90-degree angle.

△ CAUTION: Do not use WWAN functionality unless the external WWAN antenna is open and in a recommended position.

The external WWAN antenna allows you to connect to a wireless wide-area network (WWAN), and then to the Internet, using the integrated HP Broadband Wireless Module and service from a supported cellular network operator.

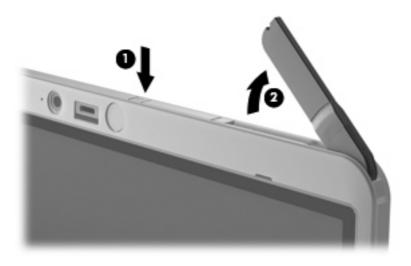**📓 NOTE:** Do not close the external WWAN antenna if you are connected to a WWAN.

NOTE: For optimal transmission, keep the areas immediately around the antenna free from obstructions.

Opening and closing the external WWAN antenna

📓 NOTE: Before connecting to a WWAN, open the external WWAN antenna to a recommended position.

To open the external WWAN antenna:

1. Press the external WWAN antenna release button **(1)**.

2. Lift the antenna to an upright position **(2)**.

3. Position the antenna in one of the following antenna configurations:

- If the computer is in notebook mode, the antenna should be positioned at a 90-degree angle.

- If the computer is in tablet mode, the antenna should be positioned at a 180-degree angle and held away from the body. Refer to the following illustrations to view tablet position configurations that are recommended and not recommended.

⚠ **WARNING!** To avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna should be no less than 2.5 cm (1 inch). Do not position the antenna so that it points toward you. When carrying the computer in tablet mode, be sure that the antenna is as far away from the body as possible.

Recommended:

Not recommended:

To close the external WWAN antenna:

1.   Be sure that you are no longer connected to a WWAN.

2.   Press the antenna down until it clicks into place.

Removing and replacing the external WWAN antenna

To remove the external WWAN antenna:

1.   Open the antenna.

2.   Pull gently on the antenna to remove it from the antenna joint.

To connect the external WWAN antenna:

▲ Align the external WWAN antenna with the antenna joint and press gently until the antenna clicks into place.

4 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)

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

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.

5 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.

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.

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 network you want to use.

Cannot create a WLAN connection

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

1. Select **Start > My Computer**.

2. Right-click in the My Computer window.

3. **Select Properties > Hardware > Device Manager > Network Adapters**.

4. 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 connect to a preferred network

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 **Repair** from the menu.

  Windows resets your network device and attempts 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. **Start > Control Panel > Network and Internet Connections > Network Connections**.

  2. Click on one of the connections.

  3. In the left pane, click **Repair this connection**.

     The Network connections window is displayed, and Windows resets your network device and attempts 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.

To get the latest version of the WLAN device software for your computer, follow these steps:

1. Open your Internet browser and go to http://www.hp.com/support.

2. Select your country or region.

3. Click the option for software and driver downloads, and then type your computer model number in the search box.

4. Press enter, and then follow the on-screen instructions.

NOTE: 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 must have the current codes to make a connection on a secure network. The SSID and network key 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 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 codes, and then enter the codes when prompted to do so.

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

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

1. Click **Control Panel > Network and Internet Connections > Network Connections**.

   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 **Wireless Networks** tab.

4. Select the network, and then click **Properties**.

5. Click the **Association** tab, and then enter the correct wireless encryption data into the **Network key** field.

6. 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.

- Temporarily disconnect other wireless devices such as a microwave, cordless phone, or cellular phone to be sure that they are not interfering.

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

1. Click **Control Panel > Network and Internet Connections > Network Connections**.

   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**.

3. Click the **Wireless Networks** tab.

4. Select a network, and then click **Remove network**.

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 manufacturer's instructions.

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