AirPort Extreme

Technology Overview
October 2003

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Introduction

Apple was the first company to popularize wireless networking products for consumers with the introduction of AirPort in 1999. Since then, millions of AirPort products have been sold, providing affordable and easy-to-use wireless technology for homes, small businesses, and campuses alike.

With AirPort Extreme, Apple is once again leading the way in wireless networking solutions with a new generation of wireless products that are faster and more flexible than before, while still maintaining the traditional AirPort simplicity and ease of use. Like the original AirPort technology, AirPort Extreme enables you to connect to the Internet without wires, additional phone lines, or complicated networking hardware from just about anywhere in your home, school, or office. AirPort Extreme allows you to share a single Internet connection with up to 50 users—Mac or PC.

But AirPort Extreme doesn't stop there: It's turbocharged with 802.11g, the next generation of wireless technology. 802.11g, used in the AirPort Extreme Base Station and the AirPort Extreme Card, is designed to deliver data rates of up to 54 megabits per second (Mbps)—almost five times faster than before.[1] With performance like that, products such as AirPort Extreme are redefining wireless communications and spurring innovative applications that weren't previously feasible over wireless networks.

In addition to offering dramatic speed benefits, AirPort Extreme is loaded with powerful hardware and software features. These include wireless sharing of a USB printer, wireless bridging of base stations and other options to increase the range of your network, and enhanced management tools in the AirPort Admin Utility.

Like Apple's previous AirPort products, AirPort Extreme is based on global standards. It uses the IEEE 802.11g standard, which is compatible with the 802.11b standard in widespread use around the world, so AirPort Extreme products are fully compatible with existing Wi-Fi Certified 802.11b networks. This means that not only does 802.11g provide AirPort Extreme with bandwidth of up to 54 Mbps, but it also works with all Wi-Fi Certified 802.11b and 802.11g products for Macintosh and Windows.[1] 802.11g technology is an exciting development in wireless communications, and Apple is proud to be one of the first companies to offer products using it.

With wireless networks now prevalent everywhere from college campuses and business complexes to hotels and cafés, this is the time to discover the benefits of AirPort Extreme wireless networking for yourself, as well as for your family, students, or employees.

Product Overview

AirPort Extreme consists of two components: the AirPort Extreme Card and the AirPort Extreme Base Station. Together they represent the future of high-speed wireless networking. As you'd expect, they're as easy to set up and use as the original AirPort. In addition, they offer much greater speed and increased flexibility in configuring your wireless network.

Because AirPort wireless networking is a comprehensive hardware and software solution, Apple also provides AirPort Setup Assistant and AirPort Admin Utility software.

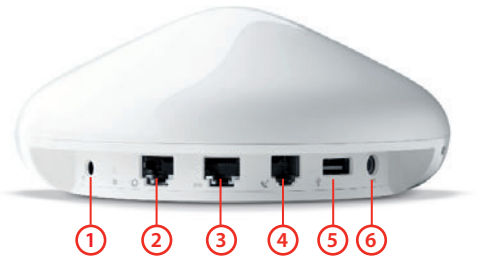
AirPort Extreme Base Station

The AirPort Extreme Base Station offers you the following advantages:

- **Speed.** With data rates of up to 54 Mbps, AirPort Extreme opens up new uses for wireless networks, such as streaming media.[1]
- **Compatibility.** Both the AirPort Extreme Base Station and the AirPort Extreme Card are Wi-Fi Certified for 802.11b and 802.11g interoperability.[1]
- **Flexibility.** The AirPort Extreme Base Station lets you share a USB or Ethernet printer with multiple users wirelessly and tailor the range of your wireless network.[2]

AirPort Extreme Base Station

1. AirPort activity light
2. Power light
3. LAN/Modem activity light
4. Internal antenna



1. External antenna connector (one model only)
2. 10/100BASE-T Ethernet WAN port (RJ-45)
3. 10/100BASE-T Ethernet LAN port (RJ-45)
4. Modem port (RJ-11) (one model only)
5. USB printer port
6. Power port

- **Ease of use.** AirPort Extreme features the superb ease of use that made the original AirPort system so popular. AirPort Setup Assistant makes it easy to configure the AirPort Extreme Base Station and set up your computer to access it. In most cases, you'll have your wireless network up and running in a matter of minutes.

AirPort Extreme Card

The AirPort Extreme Card is smaller than a business card, yet it can transfer data in a flash because of the blazing data rates—up to 54 Mbps—provided by the 802.11g specification. Install the card in an AirPort Extreme–compatible Mac system, and you're ready to take advantage of this speed using an AirPort Extreme Base Station. The AirPort Extreme Card is also compatible with thousands of "hot spots"—Wi-Fi Certified 802.11b or 802.11g access points—located in airports, hotels, cafés, and other public businesses.

What Is 802.11 Wireless Technology?

What's Wi-Fi?
The term "Wi-Fi" (Wireless Fidelity) refers to certification by the Wi-Fi Alliance, an international nonprofit association of 802.11 product vendors.

Wi-Fi Certification means that an 802.11 product has been tested and found to be interoperable with other certified products. That means you can use your Wi-Fi Certified product with Wi-Fi Certified 802.11 networks, whether they are Mac or Windows-based networks. Although 802.11 products that don't have Wi-Fi Certification may work fine with certified devices, the Wi-Fi Certified logo is your assurance of interoperability.

802.11a: Wireless networking for the 5GHz band
The 802.11a standard is a version of 802.11 for the 5GHz radio band. Despite its name, 802.11a was released after 802.11b and offers a significant speed increase. Like 802.11g, it provides data rates of up to 54 Mbps and supports more simultaneous users than 802.11b. However, 802.11a technology has been hampered by its lack of compatibility with existing 802.11b networks and products. Also, because of current regulatory restrictions, it has been certified for use in far fewer countries than 802.11b or 802.11g.

In 1990, the Institute of Electrical and Electronics Engineers (IEEE) began developing a way to provide the benefits of Ethernet (802.3) networks without wires. The result was the IEEE 802.11 standard, often called "wireless Ethernet." IEEE 802.11 wireless local area networks (WLANs) use radio frequencies, primarily on the 2.4-gigahertz (GHz) band. The most popular implementation of this technology currently is 802.11b, which is in use all over the world.

Since the release of the initial 802.11 standard, various working groups continue to develop enhancements to make it faster, more compatible, and more secure.

In 1999, Apple was the first company to make 802.11b technology available to consumers with its AirPort wireless solution. AirPort brought this complicated technology to a consumer product that was affordable, easy to set up, and easy to use—without requiring users to have any special knowledge of wireless networks. Wireless networks based on 802.11b technology soon began to grow in popularity. As a result, today more users than ever before expect Internet access wherever they take their portable computers, more businesses and educational institutions recognize the cost savings of not having to run networking cables through a building, and more families want to share their cable or DSL connection at home. There's an increasing demand for wireless networking technologies that can handle more users at higher speeds.

802.11g

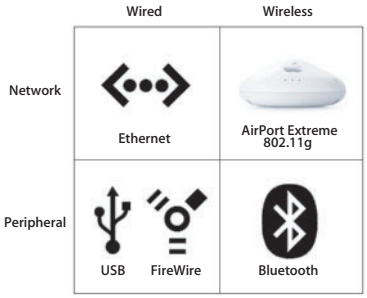
The latest version of 802.11 is the 802.11g standard. 802.11g offers a maximum data rate of 54 Mbps—nearly five times faster than 11-Mbps 802.11b products now in widespread domestic and international use.[1]

Wi-Fi Certified 802.11g devices such as the AirPort Extreme Base Station are also compatible with 802.11b; that is, 802.11g access points support Wi-Fi Certified 802.11b devices, such as the previous version of AirPort. When 802.11b devices use an AirPort Extreme Base Station, they receive the same bandwidth as they would with an 802.11b access point—a maximum data rate of 11 Mbps. Similarly, the 802.11g AirPort Extreme Card enables users to access both 802.11g and 802.11b networks. If you already have an AirPort Base Station at home and you purchase a new Mac with an AirPort Extreme Card, you can use this Mac to access your existing AirPort network.

Because 802.11g networks operate in the popular 2.4GHz frequency band, they are occasionally subject to interference by devices such as microwave ovens and cordless phones. However, such interference generally only causes a decreased data rate, not a loss of connection or loss of data. That disadvantage is offset in normal use by the more robust signals associated with the 2.4GHz band, which readily pass through solid objects such as walls. Since AirPort Extreme operates in the 2.4GHz frequency band, it is approved for use in the same countries as 802.11b products.

Bluetooth
Bluetooth is an innovative short-range wireless technology standard that lets you connect many peripheral devices to your computer without cables. Using a Bluetooth-enabled mobile phone or handheld computer, you can quickly and easily synchronize your important data. For example, you could use Bluetooth in conjunction with Apple's iSync software to synchronize Address Book contacts, iCal calendars, and Safari bookmarks between your Mac, your mobile phone, and your handheld computer. With Apple's Bluetooth wireless keyboard and mouse, you can eliminate cable clutter on your desk.

Bluetooth complements the capabilities of AirPort. If 802.11 can be thought of as "wireless Ethernet," Bluetooth can be likened to "wireless USB."



Like 802.11b, the 802.11g-based AirPort Extreme allows entire families to share a single Internet connection. Schools can set up mobile computer labs on carts that go easily from room to room instead of having to move students to and from a dedicated computer lab. Business users can retrieve vital files during meetings rather than postponing important decisions.

For these reasons, Apple has adopted 802.11g as the foundation of AirPort Extreme. Other companies have also recognized the benefits offered by 802.11g and are developing products based on it.

802.11b

The best known 802.11 standard is 802.11b, which has a top data rate of 11 Mbps. 802.11b networks have become prevalent all over the globe and will be a valuable resource for the foreseeable future. Because of the ease of use and affordability of 802.11b networks that AirPort pioneered, for example, home users can now work and play on the Internet without sitting at their desks all the time.[3]

Because of their popularity, 802.11b wireless networks have also engendered the "hot spot" phenomenon. In the United States alone, thousands of hotels, airports, cafés, and other businesses with a large number of mobile computer users have installed these 802.11b access points so their customers can use the Internet without having to connect a cable to an Ethernet network. It isn't difficult to envision a day when you can connect to the Internet wherever you happen to be.

802.11b offers network connectivity at rates equivalent to those of the original Ethernet networks. As users want to do more and more wirelessly, such as transfer large files and access streaming video, the demand for higher throughput has outgrown what 802.11b can provide. Hence the impetus for developing 802.11g, which is compatible with 802.11b but able to handle increasing bandwidth demands.

Comparison of major 802.11 implementations[4]

	802.11g	802.11b	802.11a
Maximum data rate	54 Mbps	11 Mbps	54 Mbps
Range in which maximum data rate is available	59 feet	150 feet	39 feet
Maximum range (approximate)	240 feet at 6 Mbps	300 feet at 1 Mbps	123 feet at 6 Mbps
Frequency band	2.4GHz	2.4GHz	5GHz
Compatible with wireless hot spots in coffee shops, airports, and other locations	Yes	Yes	No
Available worldwide	Yes	Yes	No
Power requirements (approximate)	1.5W	1W	2W–2.5W

The AirPort Extreme Base Station in Depth

The two models of the AirPort Extreme Base Station offer not only 802.11g networking, but also wireless printing and more flexible wireless network configuration.

When used with AirPort Extreme–enabled Macintosh computers, an AirPort Extreme Base Station can transfer data at up to 54 megabits per second (Mbps)[1]—nearly five times the data rate of 802.11b. Because 802.11g includes support for the 802.11b specification, 802.11b users can also use the base station.

Each AirPort Extreme Base Station supports up to 50 users simultaneously, enabling an entire household, department, or classroom of users to share a single printer, read email, surf the web, chat, and do other online tasks productively.[3]

High-Speed Access

What can you do with 54 Mbps of bandwidth? Here are some of the possibilities:

- **Media streaming.** At 54 Mbps, services such as streaming audio and video wirelessly finally become feasible. You can stream your music playlists to other Mac computers on your AirPort Extreme wireless network without the hassle of copying files, thanks to Apple's Rendezvous technology and the Music Sharing feature in iTunes 4. At 54 Mbps, your music can stream continuously without stopping to rebuffer the stream. Similarly, editors in a video production studio can review daily digital video footage wirelessly at astonishing speeds.
- **High-speed file sharing between computers.** Need to get a file from one computer to another at home or while you're in a meeting? File transfers are now faster than ever—without the hassle of finding and hooking up to an Ethernet connection.

Wireless Printing

The AirPort Extreme Base Station delivers cost-effective printing for multiple users by making it possible to share a USB printer wirelessly. Just connect a printer to the USB port, and it instantly becomes available to all the users on your network.[2] You can even share multiple print queues. No more buying extra printers, moving a printer from room to room, emailing files to the one computer that's connected to the printer, or running expensive, unsightly cables.

In addition, if you already have an Ethernet network set up with a printer on it, you can connect the network to your base station using the LAN port and share that printer with other AirPort users on your wireless network.

Rendezvous
AirPort wireless networking works with the revolutionary Rendezvous technology in Mac OS X version 10.2 or later. Rendezvous lets you create an instant network of computers and other devices without any configuration. It makes the services and capabilities of each device—such as file sharing and printing—dynamically discoverable by other devices on the network using the standard IP networking protocol.

For example, suppose there's a Rendezvous-enabled printer on your wireless network, and you also have Rendezvous enabled on your PowerBook or iBook computer. As soon as you bring the computer into range of the network, it detects the presence of the printer and makes it available in Print Center. Rendezvous also works over wired IP networks such as Ethernet.

Wireless Range

With the AirPort Extreme Base Station, it's easier than ever to manage the coverage of your wireless network.[3] You can extend the range of a single base station or add another base station without cabling.

Internal antenna
Its internal antenna allows an AirPort Extreme Base Station to deliver uniform coverage to a broad area. If you could view the radio waves coming from the base station, you would see that they create an almost perfect sphere reaching about 150 feet from the base station. The internal antenna allows AirPort Extreme Card users to achieve data rates of up to 54 Mbps up to 50 feet away from the base station, and data rates of up to 11 Mbps at up to 150 feet from the base station. AirPort Card and other 802.11b card users can obtain data rates of up to 11 Mbps at up to 150 feet from the base station.[1]

External antenna
For greater coverage, you can add an external antenna to one model of the AirPort Extreme Base Station.[5] The antenna connector accepts either a directional antenna, enabling you to extend the range of the base station in one specific direction, or an omnidirectional antenna, enabling you to extend your coverage area across a single floor of a house or building. This capability can reduce the number of base stations you need to cover a given area. For example, a school could use a directional antenna to bring temporary classrooms into the coverage area of the AirPort network instead of having the expense of installing Ethernet cables from the main building to the temporary building.

Directional and omnidirectional antennas that have been certified by Apple are available from the Apple Store (www.apple.com/store).

Optional External Antennas

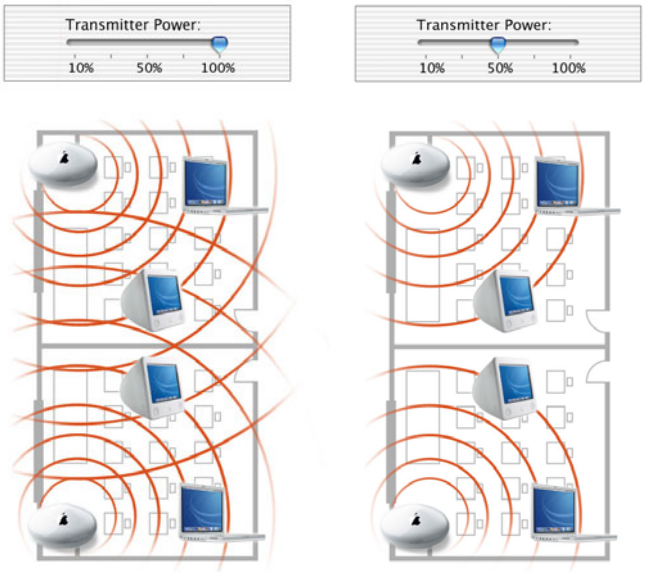
Directional antenna
Provides up to 500 feet at 11 Mbps and up to 170 feet at 54 Mbps.

Omnidirectional antenna
Provides up to 250 feet at 11 Mbps and up to 85 feet at 54 Mbps.

Transmission Power Control

The Transmission Power Control setting in the AirPort Admin Utility software lets you adjust the range of your network by increasing or decreasing the amount of power the base station transmits. This feature can help prevent network overlap in an environment with multiple base stations. By transmitting less power to the internal antenna, you can prevent your network's radio waves from traveling outside a specific conference room or building.

Control Your Reach



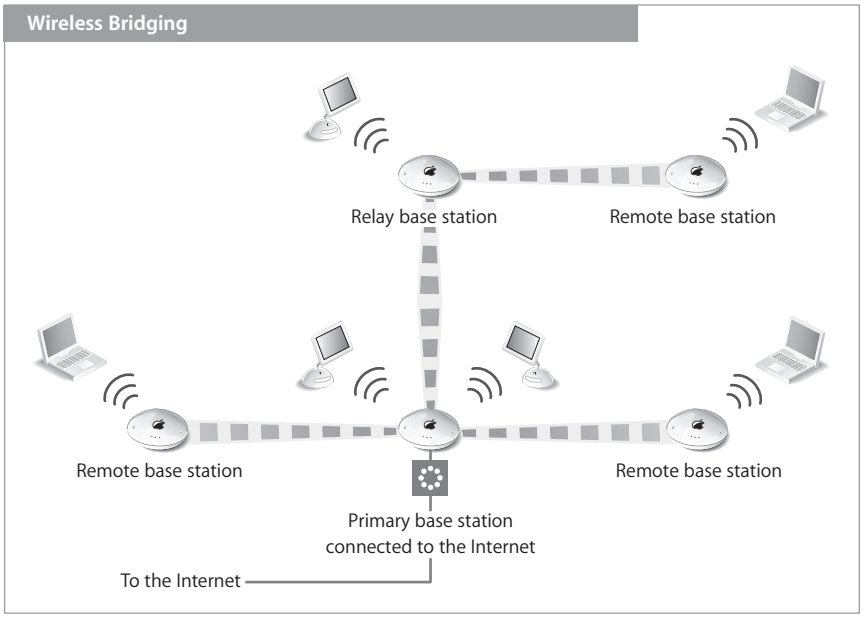
Wireless bridging

Wireless bridging, also referred to as Wireless Distribution System (WDS), is a feature in the AirPort Extreme Base Station that allows you to extend AirPort wireless networking to areas that don't have a physical Internet connection.[6] With wireless bridging, an AirPort Extreme Base Station can connect to another AirPort Extreme Base Station and use its Internet access. Previously, each AirPort Base Station required its own physical connection to the Internet.

One base station is the "primary" station and is connected to your wired network (WAN or LAN). Additional base stations can be connected wirelessly to the primary base station and use its Internet connection. These other base stations can be either stand-alone "remote" base stations or "relay" stations that themselves have remote base stations. Each primary base station can have up to four relay or remote stations connected to it, and each relay station can have as many as four remote stations connected to it, sharing the primary station's physical network connection. All clients associated with any base station in the WDS network can see all available network services, including Rendezvous-enabled devices.

Wireless bridging works with both internal and external base station antennas, enabling you to design the optimum coverage pattern for your specific situation. For example, a school needing to add network connectivity to a temporary classroom building could connect an external directional antenna to a remote base station and point it toward the primary base station in the main school building. In a two-story house, however, the internal base station antennas would probably provide sufficient

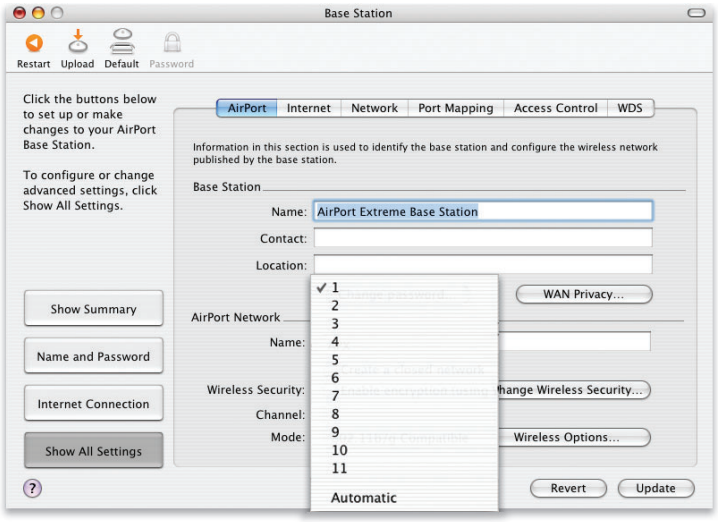
power to reach between the remote unit and the primary base station. The spherical shape of the internal antennas' coverage patterns would help in this situation by allowing the signal to go up and down between the two floors of the house.



Connection Robustness

With AirPort 3.1 software or later, AirPort Extreme provides connection robustness features that enhance the ability of wireless clients to maintain a connection in the face of interference. The software offers three connection robustness features: automatic channel selection, interference robustness, and automatic sensing.

Automatic channel selection
When an AirPort Extreme Base Station is turned on, it checks the wireless spectrum and locates a suitably "quiet" channel on which to operate.



Interference robustness
Wireless interference can come from a variety of sources, including other wireless networks, cordless phones, baby monitors, and wireless video distribution systems. When there is interference, some data packets may not reach their destination. These "lost" packets are automatically retransmitted, so no data is actually lost. Unless the need for resends is great enough to noticeably slow down data transfer, users are often unaware that there has been a problem. However, sometimes interference can be so severe that AirPort Extreme clients actually lose their wireless connection.

A feature called interference robustness is designed to maintain a wireless connection between an AirPort Extreme Base Station and an AirPort Extreme client in the face of severe wireless interference. This feature must be enabled on both the base station and the client computer.

Note that interference robustness provides a stronger connection between the client and base station, but may reduce the overall range of your wireless network.

Automatic sensing
Interference that is not severe enough to jeopardize connectivity may still cause enough packet resends to reduce the data throughput speed. Because interference is often temporary, AirPort Extreme includes an interference-sensing feature that automatically returns the system to its maximum speed when the interference subsides.

Compatibility

The AirPort Extreme Base Station adapts to your needs through support for multiple wireless networks, operating systems, and Internet service providers.

Wireless network compatibility
Both 802.11b and 802.11g users can enjoy the benefits of wireless networking with the AirPort Extreme Base Station.[1] By default, it runs in 802.11b/g compatibility mode to support 802.11b and 802.11g connections simultaneously. That includes connections from AirPort Extreme Cards, AirPort Cards, and other 802.11b and 802.11g products.

When only 802.11g users are connected, the AirPort Extreme Base Station can run up to its full data rate of 54 Mbps. If you always want to maximize the benefits of 802.11g technology, you can use the AirPort Admin Utility to permit only 802.11g connections.

The base station senses when only AirPort Extreme users are connected and increases the throughput of the network to its maximum rate. When one or more 802.11b users connect, the wireless network begins to decrease its maximum data rate to accommodate them. When many 802.11b users are active on the wireless network, the overall network data rate begins to approximate 802.11b rates. However, all 802.11g users will always experience faster data rates than 802.11b users. With performance enhancements in AirPort 3.1 software and later, AirPort Extreme users experience even better performance on an AirPort Extreme network with both 802.11b and 802.11g users.

Because the AirPort Extreme Base Station supports 802.11b, if you have a business with many customers who use mobile computers (such as a café or bookstore), you can use the base station to create a "hot spot" for your customers. Many businesses have found that a wireless network helps attract computer users who appreciate being able to work wherever they go.

Computer compatibility
Because the 802.11g technology used in AirPort Extreme is compatible with 802.11b, users of AirPort-enabled Macintosh computers and Wi-Fi Certified 802.11b Windows-based computers can access AirPort networks.

Users of AirPort Extreme–ready Macintosh systems can enjoy the high-speed capabilities of the AirPort Extreme Base Station simply by adding an AirPort Extreme Card to their systems. (Some PowerBook configurations come with an AirPort Extreme Card already installed.) Of course, the AirPort Extreme Base Station is fully compatible with the 802.11b AirPort Cards in AirPort-enabled Macintosh systems.[1]

The AirPort Extreme Base Station is also designed to work with other 802.11b devices certified by the Wi-Fi Alliance. That means users of Windows-based desktop and portable computers with 802.11b cards can access AirPort Extreme networks.

ISP compatibility
The AirPort Extreme Base Station works with most Internet service providers over a cable modem, DSL modem, or direct Ethernet network connection, or a dial-up modem (in the base station model that has one).

As of version 5.0 of the AOL software, America Online has been compatible with AirPort wireless networking.[7] AirPort is the only solution that allows you to enjoy your AOL account wirelessly when you have a dial-up connection. With AirPort and the iChat software in Mac OS X v10.2 or later, you can chat with AOL Instant Messenger (AIM) users from anywhere in your home or office. The AirPort Extreme Base Station can even enforce AOL parental controls for users on your wireless network.

Connectivity

The AirPort Extreme Base Station has a full range of connectivity options, including two 10/100BASE-T Ethernet ports—one for wide area network (WAN) connections and one for local area network (LAN) connections. One model of the base station also includes a modem for dial-up access.

WAN
The WAN port connects to a DSL or cable modem to provide high-speed Internet access to the users on your wireless network. Alternatively, it can become a second LAN port if you're using AirPort only as a bridge and have turned off NAT and DHCP.

LAN
The LAN port enables you to connect a single Ethernet-equipped computer or printer to your AirPort wireless network. It can also be used to connect an Ethernet hub, giving wireless users access to the devices (such as printers and file servers) on your local Ethernet network. Putting an AirPort Extreme Base Station between your LAN and the outside world also provides the computers on the LAN with the protection of the built-in network firewall in the base station.

Modem
If you plan to install your AirPort Extreme Base Station in a location that does not have a cable or DSL modem for Internet access, you'll want to get the model that contains a 56K V.90 modem.[8]

Connection sharing with NAT and DHCP
AirPort and AirPort Extreme Base Stations provide secure, efficient sharing of a single Internet connection through two technologies: Network Address Translation (NAT) and the Dynamic Host Configuration Protocol (DHCP).

When the computers on your network are set for DHCP networking, they obtain IP addresses from a DHCP server. As its name implies, it assigns IP numbers dynamically. A DHCP server can change a computer's address assignment as frequently or infrequently as the network administrator deems necessary.

Normally, the DHCP server is located at your ISP. However, AirPort and AirPort Extreme Base Stations can also act as DHCP servers, handing out IP addresses to all your connected computers. Because Apple has designed these units to permit the sharing of a single Internet address in a home, small office, or other site with only one Internet connection, the base stations have to find a way to assign a working IP address to each computer even though only one such address has been provided by your ISP.

This is where NAT comes into the picture. NAT software running on the base station translates between your public and private IP addresses for both incoming and outgoing Internet traffic.

Because the only IP address exposed to the outside world is that of your base station, placing your computers behind the base station's firewall protects them from many kinds of hacker attacks that require knowledge of the target computer's IP address. This approach also keeps your networking costs lower because it enables multiple users in your household or office to share a single Internet connection.

The AirPort Extreme Base Station also lets you dial in to your wireless network. Suppose, for example, that you're on the road and you need a file from your desktop Mac. If your home computer is turned on, ready to share files, and connected to the Internet via DSL or cable through the WAN port on your modem-equipped base station, you can simply dial in to the dedicated number for your base station, log in to the Mac, and retrieve the file. You can also access any other computer on your home network that's set up for file sharing.

Security

Apple has designed the AirPort Extreme Base Station to provide multiple levels of security, so users can enjoy peace of mind when they access an Internet site, manage online financial transactions, or send and receive email. The security of the AirPort Extreme Base Station can also help prevent unauthorized users from gaining access to the wireless network. The base station includes a slot for inserting a Kensington lock to deter theft of the unit itself.

Security for all AirPort networks
Network attacks can occur through wireless as well as wired networks. That's why Apple gives you ways to protect your entire AirPort network and the data that travels over it. Whether you're using AirPort at home, at work, or on the road, the following features will help keep confidential data in and unauthorized users out.

Firewall. You can separate your wireless network from the outside world with firewall protection. The AirPort Extreme Base Station has a built-in firewall that creates a barrier between your network and the Internet, protecting data from web-based IP attacks. The firewall is automatically enabled when you configure the base station to share a single Internet connection. For computers with a cable or DSL modem, AirPort can actually be safer than a wired connection.

Hidden network. Hiding your wireless network keeps the network name—and thus the very existence of the network—private. The network does not show up on a scan of available networks; prospective users must know the network name and—if it is encrypted—also the password to access it.

Password protection and encryption. AirPort incorporates password protection and encryption capabilities that deliver a level of security comparable to that offered by traditional wired networks. Users can be required to enter a password to log in to the network. When transmitting data and passwords, the base station uses either Wi-Fi Protected Access or 128-bit WEP encryption to scramble data and help keep it safe. If you're using AirPort in conjunction with an America Online account, you can even enable AOL parental controls on the AirPort Extreme Base Station. The settings you configure will be enforced for all clients connected to that base station.

Wi-Fi Protected Access (WPA). This new capability in AirPort Extreme greatly enhances over-the-air data protection and access control for your wireless network. WPA includes a strong new encryption algorithm (Temporal Key Integrity Protocol), the ability to check the integrity of the data being sent over the air, and 802.1X user authentication. See the sidebar for more information.

AirPort Extreme supports both WPA and WEP security. To ensure that your AirPort network is as secure as possible, you should use WPA security. WPA supports Macintosh systems with AirPort 3.2 software and Mac OS X version 10.3 "Panther."[9] It also supports WPA-certified Windows computers. If you have Macintosh users who can't upgrade to Panther and AirPort Extreme, you'll instead need to select the WEP option, so they can continue to connect to your AirPort network. Apple has chosen not to support WEP clients on a WPA-protected network because doing so would compromise the outstanding security provided by WPA.

Wi-Fi Protected Access
There have been increasing concerns about the vulnerabilities of the current wireless security standard known as Wired Equivalent Privacy (WEP). In response, the Wi-Fi Alliance, in conjunction with the IEEE, has developed a greatly enhanced security standard called Wi-Fi Protected Access (WPA).

WPA brings together standards-based, interoperable security enhancements that dramatically increase the level of data protection and access control for wireless LANs. It provides wireless LAN users with a high level of assurance that their data will remain protected and that only authorized users will be able to access the network.

The main standards-based technologies in WPA are the Temporal Key Integrity Protocol (TKIP), 802.1X, Message Integrity Check (MIC), and the Extensible Authentication Protocol (EAP). TKIP provides enhanced data encryption, MIC checks the integrity of the data being sent over the air, and 802.1X and EAP offer user authentication.

TKIP addresses the vulnerabilities inherent in WEP encryption, including the frequency with which keys used to encrypt the wireless connection are refreshed. When a user enters the network password, TKIP starts the encryption process. It derives an initial encryption key mathematically from the password. TKIP regularly changes and rotates the encryption key so that the same key is never used twice. This all happens behind the scenes.

WPA has two modes: Enterprise mode, which requires a RADIUS server for user authentication, and Personal mode, which relies on TKIP and password protection.

Security for AirPort networks at home

Home users will appreciate the AirPort capabilities that support AOL parental controls and keep unauthorized people off their network.

AOL parental controls. If you're using AirPort in conjunction with an America Online account, you can enable AOL parental controls on the AirPort Extreme Base Station. The settings you configure are enforced for all clients connected to that base station.

WPA for the home. In a home environment, Wi-Fi Protected Access runs in Personal mode, which does not require a RADIUS server for user authentication. Instead, the person setting up the home AirPort network defines a network password that must subsequently be entered by all users who want to get on the network. In addition to logging the user in to the network, that password starts the TKIP encryption process. Other than setting the network password, no administration is required to make WPA work in the home.

128-bit WEP encryption. AirPort Extreme incorporates password protection and encryption capabilities that deliver a level of security comparable to that offered by traditional wired networks. Users can be required to enter a password in order to log on to the network. When transmitting data and passwords, the AirPort Base Station supports up to 128-bit encryption to scramble data, which helps keep the network safe.

Security for AirPort networks in business and education

Businesses, schools, colleges, and universities want to restrict network communications to authorized users and keep data safe from prying eyes, so AirPort Extreme hardware and software provide a robust suite of security mechanisms.

Transmission Power Control. Because radio waves can travel in all directions, they can extend outside the confines of a specific building. The Transmission Power Control setting in the AirPort Admin Utility permits you to adjust the range of your base station to minimize this spillover and thus reduce the chances of unauthorized persons accessing the network.

MAC filtering. Support for MAC (Media Access Control) filtering lets administrators set up a list of MAC addresses (or AirPort ID numbers) that are allowed to connect to the wireless network.

RADIUS support. The Remote Authentication Dial-In User Service (RADIUS) makes securing a large network easy. RADIUS authenticates users via a remote server. If the address of a user's computer (which is unique to each 802.11 wireless card) is not on your approved address list, the user cannot get on your network. RADIUS is an access control protocol that allows a system administrator to create a central list of the computers that can access the network. Placing this list on a centralized server allows many base stations to access the list and makes it easy to update.

LEAP support. The Lightweight Extensible Authentication Protocol (LEAP) is a security protocol used by Cisco access points that dynamically assigns a different WEP key to each user. AirPort Extreme is compatible with Cisco's LEAP security protocol, enabling Mac users to join Cisco-hosted wireless networks using LEAP.

Setting Up AirPort Extreme

It's easy to set up an AirPort Extreme wireless network.

Before setting up an AirPort Extreme Base Station for Internet access, make sure of the following:

- Your computer has an AirPort Card or AirPort Extreme Card installed.
- Your computer is already configured to access the Internet using its built-in modem, a cable or DSL modem, or an Ethernet network.
- You have an account with an ISP (fees may apply), or you have Internet access through a network.

For more information about using AirPort Extreme with your Internet account, contact your ISP or go to the AppleCare Knowledge Base on the web at kbase.info.apple.com.

Follow these suggestions to prepare for optimal base station setup:

- Choose a suitable location for your AirPort Extreme Base Station. You can place it on a desk, bookcase, or other flat surface, or you can mount it on a wall using the included wall-mount bracket. Locate your base station in the center of your home or office—away from any potential source of interference, such as a microwave oven or large metal appliances, and close to power and phone outlets or a network connection.
- Make sure that your computer has the latest version of the AirPort software installed. For up-to-the-minute information on AirPort software, check these websites:
  – AirPort: www.apple.com/airport
  – Apple support: www.apple.com/support

Once you're ready, you can set up the AirPort Extreme Base Station in three easy steps.

Step 1: Test your Internet connection using your computer
First, verify that you can connect to the Internet via your computer's internal dial-up modem or Ethernet port (using your DSL modem, cable modem, or LAN).

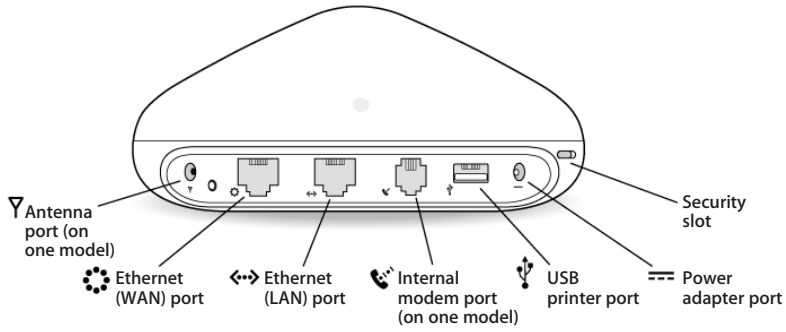
Step 2: Plug in the AirPort Extreme Base Station
Plug the AirPort Extreme Base Station power adapter into the power adapter port and connect it to an electrical outlet. The base station automatically turns on when the power adapter is plugged in and connected to an electrical outlet. There is no power switch.

Important: Use only the power adapter that came with your AirPort Extreme Base Station. Adapters for other electronic devices may look similar, but they might damage the base station.

When you first plug in the base station, the status lights glow white. These lights indicate that the base station is starting up. After a short startup process, the middle light glows white. This means that the startup process, which takes about 30 seconds, is complete.

Next, remove the phone line or Ethernet cable from your computer and connect the AirPort Extreme Base Station to your DSL or cable modem, your Ethernet network, or, if your base station has an internal modem, a standard phone line.

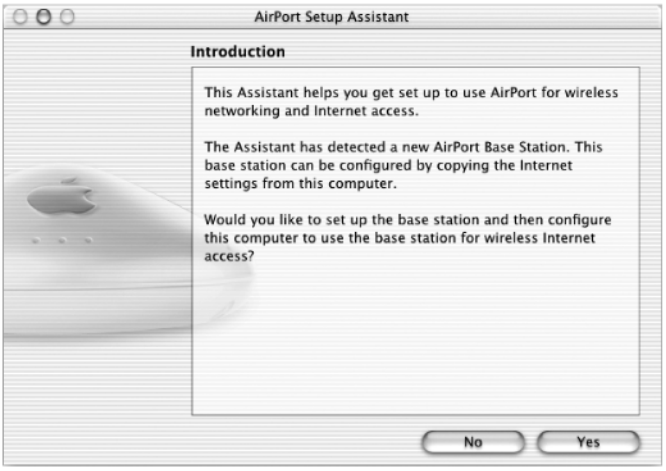
Base Station Ports



- If you have an Internet account that uses a device such as a DSL or cable modem, connect the device to the 10/100BASE-T Ethernet WAN port on the base station.
- If you use an Ethernet LAN for Internet access, such as in a school or office, connect the Ethernet cable to the 10/100BASE-T Ethernet LAN port on the base station.
- You can use the AirPort Extreme Base Station to provide Internet access to non-AirPort computers that are not otherwise connected to the Internet by connecting them to the Ethernet LAN port on the base station. The base station must be connected to the Internet through the Ethernet WAN port or the modem port.
- If you use a standard modem and analog telephone line (the type of telephone line in most residences) to access the Internet, connect one end of the phone cord to the internal modem port on the base station and the other end to your telephone jack. (Requires the AirPort Extreme Base Station with an internal dial-up modem.)

Step 3: Use AirPort Setup Assistant to configure the AirPort Extreme Base Station
Setup Assistant sets up your network, transfers the active Internet settings from your computer to the base station, and configures your computer to access the wireless network created by the base station. AirPort Setup Assistant is located in the Utilities folder in the Applications folder on your hard disk. A preview version of the AirPort Admin Utility for Windows 2000 and Windows XP that permits AirPort networks to be configured from Windows-based computers is available for download at www.apple.com/airport.

Open Setup Assistant and follow the instructions on your screen. Do not open it until you have plugged in the base station and the middle status light glows white.



This screen appears if the computer detects a new AirPort Extreme Base Station and the computer isn't set up to use AirPort. A different screen appears if other networks are in range or the computer is already set up to use AirPort.

AirPort Admin Utility

Once your AirPort Extreme Base Station is up and running, you may need to adjust certain settings. AirPort Admin Utility software is an advanced tool for setting up and managing the AirPort Extreme Base Station. In addition to the Transmission Power Control feature already described, here are some of the other tasks you can do with it.

Internet. You can manage your base station's Internet settings. If your ISP settings change, updating the base station is quick and easy.

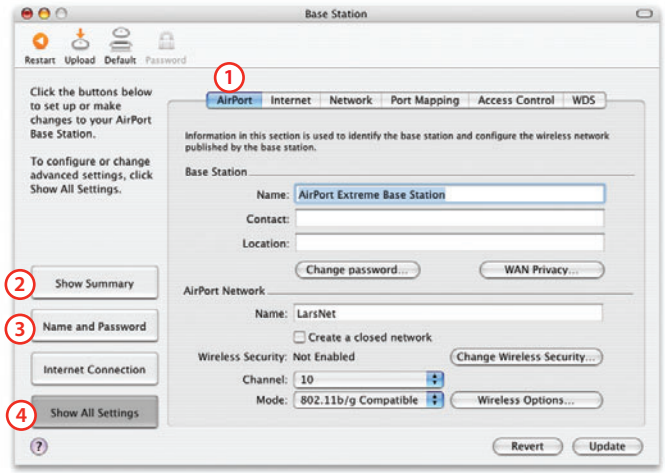
Name and password. You can name and password-protect both your wireless network and the AirPort Extreme Base Station.

Remote management. You can set up and manage the settings of an individual base station or make a global change to multiple AirPort Extreme Base Stations on your network.

SNMP support. Simple Network Management Protocol (SNMP) controls are supported over the WAN port in the AirPort Extreme Base Station, enabling you to manage the base station over the Internet. This capability can be deactivated to prevent SNMP access to the base station.

Channel selection. In an environment where multiple base stations are deployed, they need to use different channels to minimize interference. Even in a network with a single base station, you may need to switch the radio channel being used by the base station to avoid interference from nearby electronic devices such as a cordless telephone. This feature allows you to select a different channel for base station operation. With AirPort 3.1 software and later, you also have the option to choose automatic channel selection, which allows the base station to find the most appropriate or quietest channel when the base station is turned on or restarted.

AirPort Admin Utility



1. Click the tabs for fast access to base station settings.
2. Conveniently see all your base station settings in one place.
3. Quickly change the name and password of your base station and your wireless network.
4. Click here to access all base station settings.

The AirPort Extreme Card in Depth

The AirPort Extreme Card is smaller than its predecessors, fitting into AirPort Extreme–ready Macintosh computers. Despite its size, this card allows you to transfer data nearly five times as fast as the previous AirPort Card.

An AirPort Extreme Card is built into the 17-inch PowerBook G4 and can be preinstalled in other Macintosh computers at the time of purchase. It's also simple to install an AirPort Extreme Card yourself. Just open your computer, slip the card into the dedicated slot, attach the cable from the antennas already built into the computer, and close everything up. Then follow the easy steps in the AirPort Setup Assistant software, and you're done!

Installing an AirPort Extreme Card in the 12-inch PowerBook G4

1. Open your computer.
2. Insert the card into the dedicated slot.
3. Attach the cable from the antennas already built into the computer and close everything up.

Now you're ready to start enjoying the benefits of wireless networking—not just at home, but also at school or in the office. In addition, an increasing number of hotels, airports, cafés, libraries, and other businesses and public buildings around the world have implemented 802.11b "hot spots." You can use these wireless Internet access points freely, because AirPort Extreme is compatible with any Wi-Fi Certified 802.11b or 802.11g network.[1] Just take your computer within range of a hot spot and you're ready to start surfing! It's a great way to check your email or view a website when you're on the go.

Of course, to get the full speed benefits of your AirPort Extreme Card, you'll want to use it with an AirPort Extreme Base Station. As 802.11g systems are deployed in place of 802.11b networks, you'll have more and more locations where you can enjoy data rates of up to 54 Mbps. Imagine how convenient that will make web browsing, file sharing, and printing. You can access any AirPort Extreme or Wi-Fi Certified 802.11b base station without hassles; you don't need to change any hardware or software settings. Everything is automatic.

File Sharing

AirPort Extreme makes it easier than ever to exchange files with colleagues. You can take advantage of Mac OS X file sharing even in areas where no base station has been installed, because AirPort Extreme and AirPort or other 802.11b-enabled computers can communicate directly with each other.[1]

Printing

With an AirPort Extreme Card and Mac OS X v10.2.7 or later, you'll be able to use a USB printer that's connected to your local AirPort Extreme Base Station.[2] You can also print on any Ethernet printers that are on a wired network linked to the base station. The Rendezvous technology in Mac OS v10.2 or later will even find available printers and other network services for you and display them in your printer, file server, and other services listings automatically. Just choose one and go. There's no configuration needed. For a list of compatible USB printers, visit www.apple.com/airport/printcompatibility.html.

Internet Sharing

When your computer has a physical connection to the Internet, you can allow other AirPort-enabled computers to share that connection.[3] Simply click a checkbox in the Internet pane in the Sharing preferences of Mac OS X to activate this capability. Although sharing an Internet connection this way doesn't offer the security benefits of using an AirPort Extreme Base Station, it is quick and easy.

Using AirPort Extreme

You use an AirPort Extreme wireless network just as you would a wired network. If your network is connected to the Internet, you can run your usual Internet applications to view websites, download email, and so on. If network services such as file servers or shared printers are available, you can select them just as you would on an Ethernet network.

The AirPort menu gives you important information right from your Mac OS X desktop. This menu (accessible via the AirPort icon in your menu bar) shows you the current signal strength your computer is receiving and lists the available AirPort Extreme, AirPort, and other Wi-Fi Certified 802.11b or 802.11g networks. It also lets you quickly create a direct computer-to-computer wireless connection when you and another wireless user are out of range of a base station, or when you need a direct connection between two computers.

Easy to Get Connected

1. Turn AirPort on from the AirPort menu.
2. Select the network connection.
3. Start surfing the Internet.

Automatic Network Reconnection

You can set your system preferences so that your computer automatically rejoins a wireless network after you restart the system or it wakes up from sleep. Go to the AirPort pane in the Network preferences of Mac OS X and choose the option you prefer. For example, you may want to have the computer join the most recently used network that's currently available to it. Mac OS X can even keep track of your network password for automatic login.

AirPort in the Real World

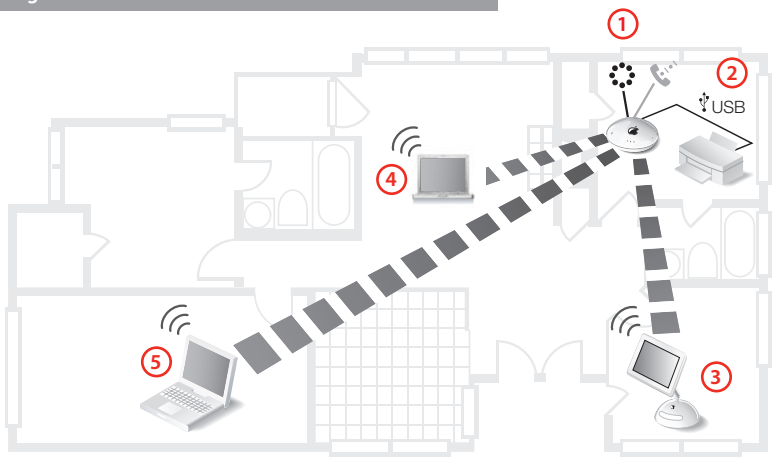
Today millions of AirPort and AirPort Extreme products are already in the hands of users in homes, educational institutions, and businesses. This section highlights the benefits of AirPort Extreme wireless networking at home, in K–12 and higher education, in small business, and on the road.

AirPort at Home

No matter how well designed your home is, chances are that it doesn't have a phone jack or broadband connection everywhere you'd like to use a computer. Thanks to AirPort, you can solve that problem without running cables all over your house.

An AirPort Extreme Base Station lets you and your family share a single Internet connection to surf the web, access email, or enjoy multiplayer games throughout your house.[3] With a transmission range of approximately 150 feet from the base station, AirPort lets you take your notebook or desktop computer where you want, not just where there's a phone jack or network cable. Everyone else in your home who has a Mac or Windows computer with an AirPort or compatible card can also access the Internet through your wireless network.

Using AirPort at Home



A single affordable AirPort Extreme Base Station can provide a multitude of services for members of your household. Here are just a few examples.

1. Internet connection.
2. Shared access to printer.
3. Support for any Apple computer with an AirPort Card.
4. Support for any Apple computer with an AirPort Extreme Card.
5. Support for non-Apple systems with compatible wireless networking cards.

AirPort is simple to set up and use. Both models of the AirPort Extreme Base Station come with an Ethernet port that you can connect directly to a DSL or cable modem. AirPort Setup Assistant walks you through the easy process of configuring the base station.

Even if you don't have a broadband Internet connection, you'll find AirPort very convenient for sharing files between the computers in your home. With AirPort Extreme Cards installed, file transfers will zip by at up to 54 Mbps. Even if some of your family's computers have 802.11b cards, they can communicate up to their maximum speed of 11 Mbps—plenty fast for most home uses. And notebook computers become truly portable in your home, allowing you to surf the Internet, work, and play where it is most comfortable for you.

The AirPort Extreme Base Station includes a USB printer port, allowing your whole family to share a single printer throughout the house, wirelessly. It's easy, convenient, and cost-effective.[2]

One model also includes a 56K modem—the perfect solution for homes without cable or DSL connections, and a great backup even for those that do. (A dial-up Internet service account is required to use the modem for Internet access; fees may apply.) Not only does the modem enable the base station to dial out to the Internet, you can also use it to dial in to your home network from remote locations.

AirPort in K–12 and Higher Education

With wired networks, computers are often tied to inconvenient locations that are typically chosen for economic rather than instructional reasons. An AirPort wireless environment gives educators the freedom to use technology where it best suits the needs of students, faculty, and administrators—without the high cost of installing extra wiring. In addition, Apple engineered a number of advanced features into AirPort Extreme. We also made sure it would work with your existing networks and with both Mac and Windows computers—more reasons AirPort is the cost-effective choice for networks with many users.

An AirPort system offers the following benefits to educational institutions.

Technology that supports education. With wired networks, technology controls where you can use computers. With an AirPort wireless environment, you can put them wherever you need them—the library, a lab, or even the cafeteria.[3]

Significant capital savings. AirPort lets schools, colleges, and universities provide network connectivity in classrooms, labs, libraries, offices, student unions, dorms, and other areas without the expense of additional wiring.

Standardized, secure networking. To protect your technology investment, AirPort is built on IEEE 802.11 standards. It supports 802.1X and is certified for Wi-Fi Protected Access (WPA). It also includes firewall protection and 128-bit encryption to help keep your data safe. Other security features include the ability to deactivate computer-to-computer file transfers, support for RADIUS authentication, and Cisco LEAP support for AirPort Extreme clients.

The AirPort Extreme Base Station provides a number of additional features important to educators.

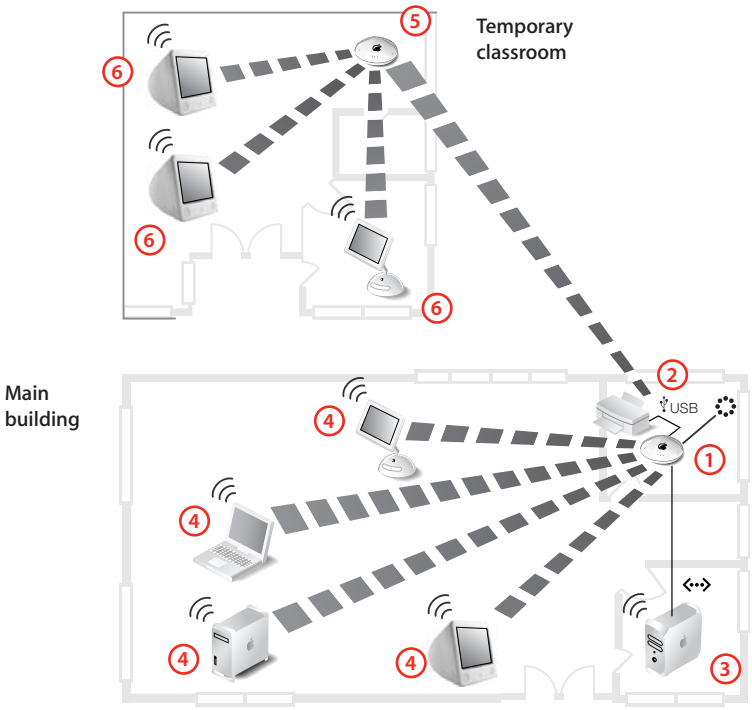
Shared printing. Multiple users can share a single USB printer that's connected to the USB port on the base station, or an Ethernet printer on an Ethernet network that's connected to the base station.[2]

Remote administration. The Remote Access feature in the AirPort Admin Utility enables an administrator to change the configuration of a single AirPort Extreme Base Station or all the base stations on the network, from anywhere on the network.

Range management. The external antenna connector (on one base station model) lets administrators attach an omnidirectional or directional antenna for increased wireless network coverage. Often, simply adding an antenna will enable a temporary classroom or other area to gain network access without the need for another base station. In addition, if you need to prevent your network's radio waves from traveling outside a specific classroom or building, you can use the Transmission Power Control setting in the AirPort Admin Utility to decrease the amount of power the base station transmits and therefore prevent network overlap and interference.

Wireless bridging. The range of your network can also be extended through wireless bridging—installing an AirPort Extreme Base Station that communicates wirelessly with another AirPort Extreme Base Station that has a physical Internet connection.

Wireless Bridging of AirPort Extreme Base Stations



1. Primary base station Internet connection.
2. Shared access to printer.
3. Wired network support for computer via Ethernet LAN.
4. Support for any Apple computer with an AirPort Card or AirPort Extreme Card.
5. Remote base station.
6. Networking support via remote base station.

Wireless mobile lab. K–12 educators will want to learn more about Apple's wireless mobile computer labs. Apple pioneered this concept in 1999 with the iBook Wireless Mobile Lab, a ready-to-use cart with AirPort-enabled iBook computers, an AirPort Base Station, and a printer. Then we added the Mobile Digital Media Studio, a cost-effective solution containing all the digital tools students and teachers need to capture video, pictures, and audio; download research materials; edit; and save their work. Apple's most recent offerings are the Curriculum Mobile Labs, a series of carts featuring leading prekindergarten to 12th-grade curriculum software in math, science, and language.

Each portable lab comes with an AirPort Extreme Base Station and iBook computers with AirPort Cards, enabling teachers to turn any part of the school into a powerful learning center in minutes. Visit www.apple.com/education for more information.

AirPort in Small Business

AirPort lets your small business extend the range of its wired Ethernet network or create a new wireless network.[3]

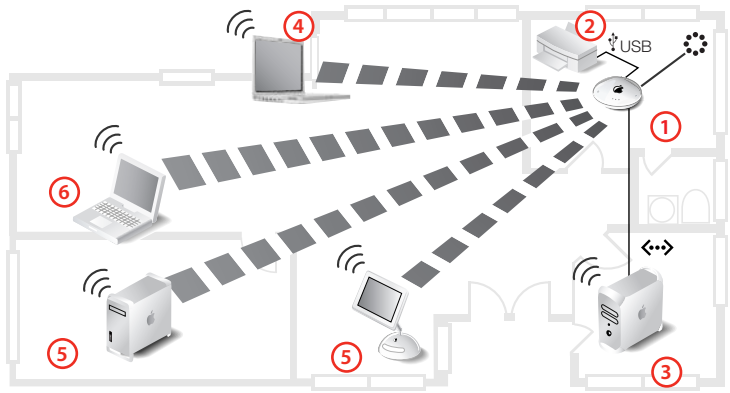
AirPort offers an affordable and flexible solution for your high-speed DSL connection in the office. If you're moving into a new building, you don't need to install a wiring infrastructure at all. Start using AirPort right away and forget about the cost and hassle of cables. It is typically less expensive than running Ethernet cable to all offices and offers more flexibility and freedom.

Because the AirPort Extreme Base Station uses industry-standard 802.11 technology and is Wi-Fi Certified for 802.11b and 802.11g, both Mac and Windows users can take advantage of it for smooth Internet access. It protects all those computers behind its firewall, and as your business grows, it can handle more users without your having to rewire your office to accommodate them.

With the high-speed networking services supported by AirPort, you and your colleagues can work smarter. You'll be able to access remote files from a meeting room without a network connection, then email the files directly to anyone attending or outside the meeting. No more exchanging files on floppy disks or waiting till you get back to your desk. What's more, you're free to roam between multiple base stations while maintaining your Internet connection. It's easy enough that you probably don't need an IT department to manage it.

The external antenna connector on one model of the AirPort Extreme Base Station allows you to extend the range of a single base station, reducing the need for additional base stations. If your office doesn't have Ethernet, you can still provide cost-effective printer sharing for your employees through the USB port or through an Ethernet printer attached to a base station.

Using AirPort Extreme in a Small Business



1. Internet connection.
2. Shared access to printer.
3. Wired network support for computer via Ethernet LAN.
4. Support for any Apple computer with an AirPort Extreme Card.
5. Support for any Apple computer with an AirPort Card.
6. Support for non-Apple systems with compatible wireless networking cards.

AirPort on the Road

With an AirPort Extreme–enabled PowerBook G4 or iBook G4, you're ready to start enjoying the benefits of wireless networking not just at home, but around the world. In the United States alone, thousands of cafés, hotels, airports, and other businesses and public buildings have implemented "hot spots": 802.11b wireless access points that let you access the Internet wirelessly. A growing number of airplanes, trains, and even parks are also becoming Wi-Fi Certified hot spots. AirPort Extreme is compatible with any Wi-Fi Certified 802.11b or 802.11g network, so take your PowerBook or iBook within range of a hot spot and you're ready to start surfing! It's a great way to check your email or view a website when you're on the go.

AirPort software is installed in all PowerBook and iBook systems. Because the computers have antennas already built in and optimally placed (much like a mobile phone), they provide the best possible wireless performance. Some PowerBook and iBook models come with an AirPort Card or AirPort Extreme Card preinstalled; on the others, you can quickly add a card yourself.

It's easy to connect your wireless-enabled notebook to a hot spot right from your Mac OS X desktop. Just turn on AirPort from the AirPort menu in the menu bar, select the network connection, log in, connect to the Internet, and start surfing.

The handy AirPort menu shows you the current signal strength your computer is receiving and lists the available AirPort Extreme, AirPort, and other Wi-Fi Certified 802.11b and 802.11g networks. It also lets you quickly create a direct computer-to-computer wireless connection when you and another wireless user are out of range of a base station.

For convenience, you can set your system preferences so that your computer automatically rejoins a wireless network after you restart the system or wake it from sleep. Go to the AirPort pane in Network preferences and choose the option you prefer. For example, you may want to have the computer join the most recently used network that's currently available. Mac OS X can even remember your network password for automatic login.

Competitive Information

The following provides an overview of AirPort Extreme and other wireless products.

Product	AirPort Extreme Base Station (Better)	AirPort Extreme Base Station (Best)	Sony PCWA-AR300	Linksys WRT54G	Netgear WGT624	D-Link AirPlus Xtreme G D1-624	Buffalo AirStation G54	Microsoft MN-700	Cisco Aironet 1100
Maximum data rate (Mbps)	54	54	54	54	54	54	54	54	11
Wireless protocol	802.11g	802.11g	802.11g	802.11g	802.11g	802.11g	802.11g	802.11g	802.11b
Number of simultaneous users supported	50	50	16	—	—	—	—	—	—
56K modem	No	Yes	No	No	No	No	No	No	No
WAN port for broadband connections	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LAN ports	1	1	1	1	4	4	4	4	1
Wireless printing support	USB and Ethernet	USB and Ethernet	Ethernet	Ethernet	Ethernet	Ethernet	Ethernet	Ethernet	No
Included antenna	Internal	Internal	Internal	External	External	External	Internal	External	External
Support for external range-extending antenna	No	Yes	No	No	No	No	No	No	Yes
Parental controls	AOL	AOL	—	—	Web blocking	—	—	Web blocking	—
WEP and WPA security	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Power over Ethernet	Third party	Third party	No	No	No	No	No	No	Yes
RADIUS support	Yes	Yes	No	No	No	No	No	No	Yes
LEAP support	Yes	Yes	No	No	No	No	No	No	Yes
Wireless range control	Yes	Yes	No	No	No	No	No	No	Yes

Based on manufacturers' published data as of October 2003.

Product Details

Configurations

The following AirPort and AirPort Extreme products are available from the Apple Store online (www.apple.com or 800-MY-APPLE), an Apple Store near you, or an Apple Authorized Reseller.


Order number	AirPort Extreme Base Station M8930LL/A	AirPort Extreme Base Station M8799LL/A
Wireless protocol[1]	802.11g	802.11g
10/100BASE-T Ethernet WAN port	Yes	Yes
10/100BASE-T Ethernet LAN port	Yes	Yes
56K V.90 modem[8]	No	Yes
Internal antenna	Yes	Yes
External antenna connector[5]	No	Yes
USB port[2]	Yes	Yes
Service and support	90 days of free telephone support and one-year limited warranty	


Order number	AirPort Extreme Card M8881LL/A	AirPort Card M7600LL/E
Wireless protocol[1]	802.11g	802.11b

Other Products

- Directional Antenna, order number T6051LL/A
- Omnidirectional Antenna, order number T6052ZM/A

System Requirements

For Macintosh users

- A Macintosh computer with an AirPort Extreme Card or an AirPort Card
- Mac OS X v10.1.5 (with Networking Update), Mac OS X v10.2.7, or later
- Wireless printing over USB requires Mac OS X v10.2.7
- AirPort 3.2 software
- WPA requires Mac OS X v10.3 or later

For PC users
- A PC with a Wi-Fi Certified IEEE 802.11b or 802.11g wireless card

Extended Service and Support

Purchase the AppleCare Protection Plan to extend the service and support for your Mac to up to three full years. The plan also covers an AirPort Card or AirPort Extreme Card, an AirPort Extreme Base Station, and Apple RAM when used with a Mac covered by the AppleCare Protection Plan. For more information, visit www.apple.com/support/products or call 800-823-2775.

Technical Specifications

AirPort Extreme

Wireless data rates[1]
- Up to 54 Mbps for AirPort Extreme– and other 802.11g-enabled computers (data rate depends on environment)
- Up to 11 Mbps for AirPort- and other 802.11b-enabled computers (data rate depends on environment)

Range[1]
- 50-foot range from the base station in typical use at 54-Mbps data rate (range depends on building construction)
- 150-foot range from the base station in typical use at 11-Mbps data rate (range depends on building construction)

Frequency band
- 2.4GHz

Channels
- Channels 1–11 approved for use in the United States, Canada, Latin America, and Taiwan
- Channels 1–14 approved for use in Japan
- Channels 1–13 approved for use in other countries

Radio output power
- 15 dBm

Compatibility
- Wi-Fi Certified for 802.11b and 802.11g interoperability[1]
- Mac computers and Windows-based PCs[10]
- NAT, DHCP, FTP, PPPoE, VPN Passthrough (IPSec, PPTP, and L2TP), PPP client and server (AirPort Extreme with modem only), QuickTime Streaming, DNS Proxy, SNMP
- America Online[7]
- Cisco LEAP

Included software
- AirPort Setup Assistant to configure the computer and base station for Internet access
- AirPort Admin Utility for base station setup and network administration
- Internet Connect to connect to and disconnect from your ISP, monitor connection status, turn AirPort on and off, change networks, and check signal quality
- AirPort menu bar status icon to monitor connection status, check signal quality, change networks, and turn AirPort on and off

AirPort Extreme Base Station

Interfaces

- 10/100BASE-T Ethernet WAN port (RJ-45 connector) for connecting a DSL or cable modem
- 10/100BASE-T Ethernet LAN port (RJ-45 connector) for connecting to wired computers and printers
- USB port for connecting a USB printer[2]
- 56K V.90 modem[8] (RJ-11 connector) for dial-up Internet connections (available on selected models)
- External antenna connector for connecting an external directional or omnidirectional antenna (available on selected models)[5]
- Power port for included power adapter

Security

- Wi-Fi Protected Access (WPA)[9]
- Wireless security (WEP) configurable for 40-bit and 128-bit encryption
- MAC address filtering
- NAT firewall
- Support for RADIUS authentication
- 802.1X, PEAP, LEAP, TTLS, TLS

Positioning options

- Desktop or wall (wall mounting bracket included)

Electrical and environmental requirements

- Line voltage: 100V to 240V AC
- Frequency: 50Hz to 60Hz
- Operating temperature: 32° to 95° F (0° to 35° C)
- Storage temperature: –13° to 140° F (–25° to 60° C)
- Relative humidity (operating): 20% to 90%, noncondensing
- Maximum operating altitude: 10,000 feet
- Maximum storage altitude: 15,000 feet

Agency approvals

- FCC Part 15 Class B, Canada RSS-210, EN 300-328, EN 301-489, ARIB STD-T66, RCR STD-T33, AS/NZS 4771:2000, UL 60950, CSA-C22.2 No. 60950

Size and weight

- Diameter: 6.9 inches (175 mm)
- Height: 3.2 inches (80 mm)
- Weight (without wall mounting bracket): 1.25 pounds (565 grams)[11]

For More Information

For more information about AirPort Extreme, visit www.apple.com/airport.

[1]Achieving data rates of 54 Mbps requires that all users have a computer with an AirPort Extreme Card or other Wi-Fi Certified 802.11g card and connect to an AirPort Extreme Base Station. If a user of a Wi-Fi Certified 802.11b product joins the network, that user will get up to 11 Mbps and AirPort Extreme users will get less than 54 Mbps. Actual speed will vary based on range, connection rate, site conditions, size of network, and other factors. [2]Wireless printing over USB requires Mac OS X v10.2.7 or later and a compatible printer. [3]Wireless Internet access requires a wireless-enabled computer, a base station or other access point, and Internet access (fees may apply). Some ISPs are not currently compatible with AirPort and AirPort Extreme. [4]Comparison based on IEEE 802.11g, 802.11b, and 802.11a specifications, assuming the following conditions: Tx power +15 dBm. Antenna gains 0 dBi on transmit and receive. Diversity 2 level switched (9.8 dB fade margin at 99% coverage). Propagation environment: free space (loss exponent = 2) up to 8.5M; loss exponent = 3.3 above 8.5M intended to represent a semi-open environment (cube farm). Receiver sensitivities: For 1, 2, 5.5, and 11 Mbps measured from the Apple AirPort Card specifications; for the OFDM rates at both 5.2GHz and 2.44GHz measured using the sensitivities in the 802.11a standard. [5]External antenna connector available on selected models. For use with Apple-approved antennas only; sold separately. [6]WDS is supported only with AirPort Extreme Base Stations. [7]Compatible with AOL 5.0 or later in the U.S. only. Simultaneous sharing of an AOL connection requires multiple AOL accounts. [8]Actual modem speeds lower; speed depends on connection rate and other factors. [9]Support for Wi-Fi Protected Access (WPA) requires Mac OS X v10.3 "Panther." Use of WPA reduces the maximum number of network users. [10]Initial setup requires an AirPort- or AirPort Extreme–enabled Macintosh computer. [11]Weight varies by configuration and manufacturing process.