



NETGEAR

Everybody's connecting.

The ABGs of Wireless LAN

Frequently Asked Questions

February 2003

Frequently Asked Questions

What is an access point (AP)?

Access points are to wireless LANs what base stations are to mobile cellular networks. The base station in a mobile cellular network aggregates and manages all the mobile clients and interfaces with the public switched landline network. Similarly, access points (APs) connect the wireless LAN to the wired network. An AP is a device that both transmits and receives network data. It is typically connected to the wired backbone through the use of a standard Ethernet cable. Essentially, the wireless equivalent to a LAN hub, the AP receives, buffers and transmits data between the WLAN and the wired infrastructure. The number of users an AP supports is determined by the technology utilized. The AP, or the antenna connected to it, is generally mounted high on a wall or ceiling to enable line-of-sight transmission to the adapters. APs have ranges from less than 100 feet to 1,000 feet, depending on technology and configuration. Some routers also have APs built-in.

Do I need a wireless access point?

Typically, networks are set up with a wireless AP. This is called infrastructure mode. However, WLAN cards can be configured to ad-hoc mode, where computers talk directly to each other and do not need an AP. However, without an AP, the two computers will talk only to each other, not to the LAN or Internet.

What is a wireless network interface cards (NICs)?

LAN adapters take the form of PC NIC (network interface cards), PC cards (both 16-bit and 32-bit versions, such as PCMCIA and CardBus) for notebooks, USB for both notebooks and desktops, and PCI for desktops. NIC adapters provide the interface between the network operating system and the antenna, creating a transparent connection to the network.

What hardware components make up a WLAN network?

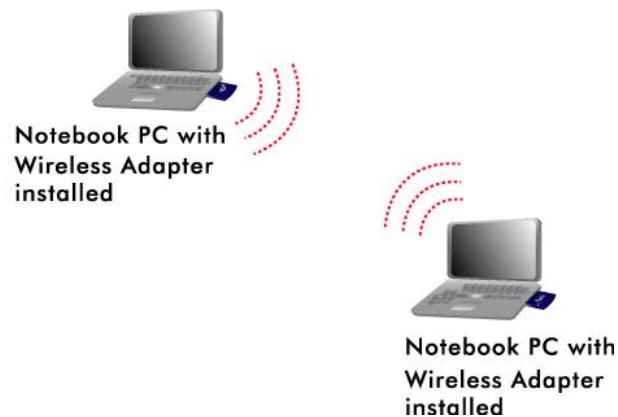
WLAN networks need, at a minimum, two 802.11 adapters in client devices such as laptops. Most WLANs have an access point, which connects wireless users to the wired LAN. Routers, hubs, and switches are also used to connect access points to the wired LAN—some manufacturers build these capabilities into the same package.



Access Points, Routers and Adapters

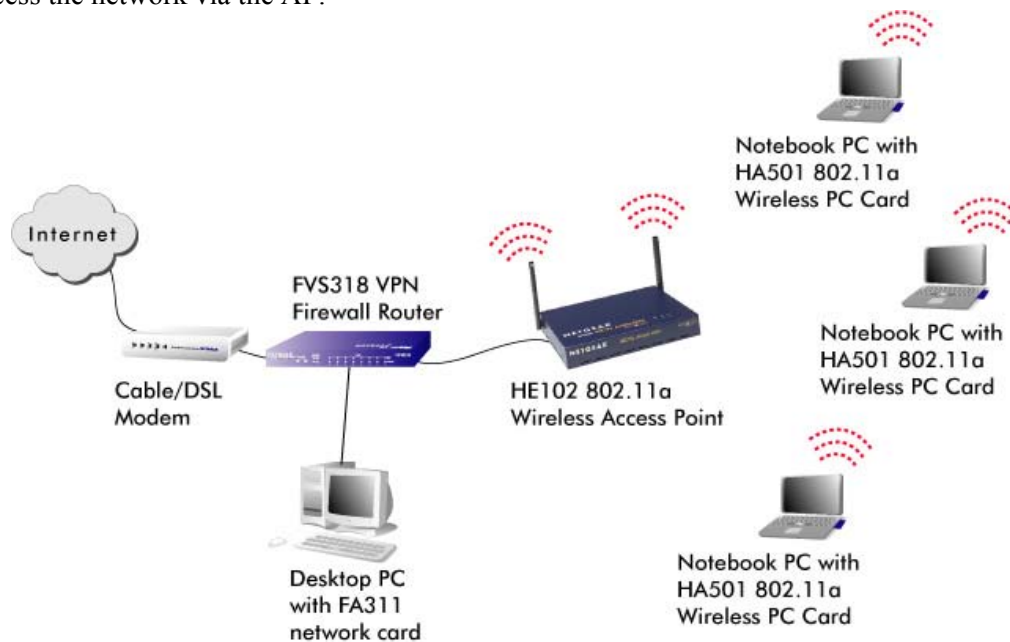
What is peer-to-peer network and how is it set up?

Also known as ad-hoc mode. A peer-to-peer network is a WLAN in its most basic form. Two PCs equipped with wireless adapter cards form a simple peer-to-peer network, enabling the PCs to share resources. An access point is not present in a peer-to-peer network. This type of network requires no administration or pre-configuration, but also bypasses the central server, inhibiting client/server sharing. Typical peer-to-peer applications include ad-hoc collaborative workgroups, sharing resources in small/branch offices, games, demos, or remote control of another PC.



What is infrastructure mode and how is it set up?

This WLAN setup requires a client adapter and access point. The access point is connected via Ethernet to the wired backbone (a cable/DSL router in the home, for example). The wireless clients access the network via the AP.



Can a product be upgraded from 802.11b to 802.11a or 802.11g?

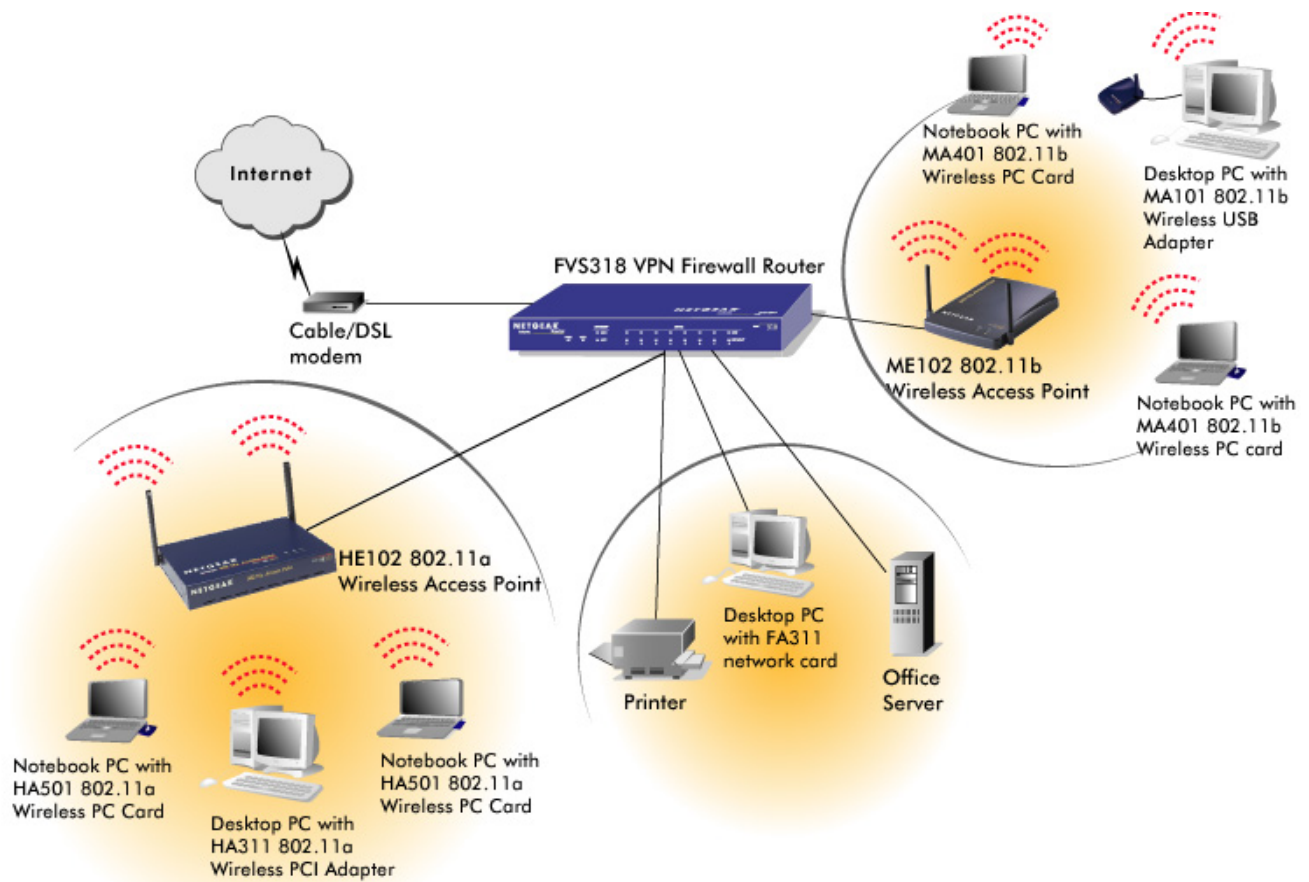
In general, products cannot be upgraded from one protocol to another. Each protocol uses very different technology, chipset and adheres to unique specifications.

Will 802.11a replace 802.11b?

No. Each of these protocols has its own strengths and weaknesses. As well, there are tens of millions of 802.11b products already in use. This installed base will be around for a long time.

Can 802.11a and 802.11b be used on the same network?

Yes, in two ways. First, by using a dual-band AP. Second, by using two different access points these protocols can co-exist on the same network and access each other via a router.



Are 802.11b and 802.11g upward compatible with 802.11a?

No. 802.11b and 802.11g devices cannot communicate directly to an 802.11a network. A dual-band access point can be used, but technically, these are two different networks in the same airspace, each able to access the network resources.

Can I use an 802.11a card in an 802.11g network?

The two types of networks are not compatible. While both have connection speeds of 54 Mbps, they operate on different frequencies.

Is 802.11g backward compatible with 802.11b?

Yes. 802.11b devices are specified by the IEEE to work in 802.11g networks. However, 802.11g devices will have speeds of up to 11 Mbps, unable to operate at 54 Mbps.

Can I use 802.11g in an 802.11b network? Will there be a speed increase?

802.11g devices are specified by the IEEE to work in 802.11b networks. However, 802.11g devices will continue to operate at 11 Mbps, with no speed increase.

What is the impact of having both 802.11b and 802.11g clients on the same network?

As part of the IEEE specification, when 802.11g devices detect the slower 11b devices, 11g devices will start doing an RTS/CTS handshake (request-to-send/clear-to-send) for every packet prior to sending the actual packet. This can slow down network performance. It is optimal to have fewer 802.11b clients on the network or upgrade them to 802.11g.

When there is a combination of several 802.11b and 802.11g clients on an 802.11g-based network (802.11g access point and routers), the actual throughput for 802.11g (when connecting from 11g to 11g) is reduced from 22 Mbps down to approximately 10 Mbps, while 802.11b clients maintain throughput between 4-4.5 Mbps.

Why is the actual throughput of 802.11a slightly higher than 802.11g?

The IEEE specification/protocol as well as the timing are different with 11a at 5 GHz and 11g at 2.4 GHz, so there will always be a throughput difference. Timing refers to the precise thousandths and millionths of seconds that the product listen or wait before they transmit packets over the air.

Will 802.11g replace 802.11b?

At this time, we expect that both lines of products will be available through the end of 2003. 802.11b products are expected to be more affordable through 2003.

Will 802.11g replace 802.11a?

No. Each of these protocols has its own strengths and weaknesses. We expect that 802.11b-only, 802.11g-only & dual band 802.11a/g products will be available in the market throughout 2003. After that, we expect that 802.11g and dual band 802.11a/g products will represent the majority of demand from our customers.

Which will have the best range? 802.11a, 802.11b, 802.11g?

The range of a wireless system is based more on the **frequency band** that it operates in vs. the standard that it uses. Although makers of 802.11a equipment might disagree, the **5GHz** frequency that **802.11a** wireless equipment operates in results in a **shorter range** than 802.11b or g products when used in the typical residential environment.

802.11b and g-based equipment operates in the lower-frequency **2.4GHz** frequency band, which suffers from less signal reduction when passing through the walls and ceilings of your home.

Note that 802.11b and 802.11g's range advantages will tend to be neutralized if your wireless LAN is set up in an "open field" environment that has no obstructions between the Access Point(s) and client(s).

Will WEP slow down my wireless performance?

Although the calculations required to encrypt data with WEP can impact the performance of your wireless network, it's generally seen only when running benchmarks, and not large enough to be noticeable in the course of normal network usage. The performance penalty on enabling WEP will generally be a little higher when using a router that incorporates a built-in WLAN access point, because of the added load of WEP encryption on a CPU that is already handling routing and switching functions for Internet sharing. When using a stand-alone access point, the performance penalty is usually imperceptible.

Can cordless phones interfere with my wireless network?

Depending on the protocol you are using, yes. 2.4 GHz phones, baby monitors, and microwave ovens can interfere with an 802.11b network. 802.11a networks operate in a different frequency range, where there is less interference.

When using WEP, does encryption need to be at the same level?

Yes. Encryption settings must be identical between all points on the wireless network.

What about Bluetooth?

Bluetooth is a technology specification for small form factor, low-cost, short-range wireless links between mobile PCs, mobile phones, and other portable handheld devices, and connectivity to the Internet. Bluetooth covers a range of up to 10 meters in the 2.4GHz spectrum. Because 802.11b and 802.11g WLANs also operate in the same band, there may be interference issues.

What is WPA?

Wireless Protected Access is a new security guideline issued by the Wi-Fi Alliance certification body. The goal is to strengthen security over the current WEP standards by including mechanisms from the emerging 802.11i standard for both data encryption and network access control. For encryption, WPA has Temporal Key Integrity Protocol (TKIP), which uses the same algorithm as WEP, but constructs keys in a different way. For access control, WPA will use the IEEE 802.1x protocol. The Wi-Fi Alliance plans to implement these new security mechanisms as optional features beginning in early 2003, and require them for Wi-Fi compliance later in the year.

What is 802.11?

802.11 can mean 2 things:

- 1) The umbrella term for the IEEE 802.11 family of physical and software layer protocols OR
- 2) The first version of WLAN, ratified in 1997. This protocol offers 2Mbps in the 2.4GHz frequency. Although a few early adopters checked it out, 802.11 products were not widely supported by manufacturers and they quickly lost traction to the much faster 802.11b solutions.

What is a wireless LAN bridge?

Also called extension points, wireless LAN bridges are used to connect LANs in different buildings. A wireless LAN bridge connected to the network in one building can transmit and receive data from another bridge in an adjacent building, much like a point-to-point radio. Wireless LAN bridge products support fairly high data rates and ranges of several miles with the use of line-of-sight directional antennas. Wireless LAN bridges provide an alternative to more expensive leased lines and underground cabling projects.

©2003 NETGEAR, Inc. NETGEAR, the Netgear logo, The Gear Guy, Everybody's Connecting and Auto Uplink are trademarks or registered trademarks of Netgear, Inc. in the United States and/or other countries. Microsoft and Windows are trademarks or registered trademarks of Microsoft Corporation in the United States and/or other countries. Other brand and product names are trademarks or registered trademarks of their respective holders. Information is subject to change. All rights reserved.

February 2003