

802.11a / 802.11b (Wi-Fi)

What is 802.11?

802.11 is an IEEE standard for wireless LANs that enables computing devices such as laptops and PDAs to connect to LANs and to the Internet.

Wireless LANs are being used in place of and, in some cases, to supplement wired LANs. Compared to wired networks, wireless networks

- are cheaper to install (no cabling to individual users is needed),
- are quicker for provisioning users,
- are more flexible and scaleable,
- support relocation of devices such as desktop PCs and printers,
- support mobility for devices such as laptops and PDAs (you can take your laptop to any conference room or use it in the airport), and
- allow devices to network with each other as they enter the range of the wireless LAN.

Client devices (laptops, PDAs, PCs with special cards) communicate with a base station (also known as an access point), not directly with each other. The base stations are connected via cable to a computer network. Each client and each base station has both a radio transmitter and a receiver. One or more base stations are located in appropriate places within the building to ensure complete coverage. The wireless LAN operates in a manner similar to a shared Ethernet when resolving collisions between multiple transmitters.

The 802.11 standard has two very important variants: 802.11a and 802.11b (also known as Wi-Fi). 802.11 was designed to support speeds of up to 2 MB. 802.11a and 802.11b are modifications to 802.11 to support higher speeds.

Some differences between the 802.11b and 802.11a standards are:

- 802.11b is being widely adopted. It
 - operates in the 2.4 GHz frequency band (can conflict with other users of the 2.4 GHz frequency band such as Bluetooth and microwaves; the conflict with Bluetooth is being resolved),
 - supports bandwidths of up to a maximum of 11 MB with a range of about 150+ feet (bandwidth decreases with the range), and
 - has 3 data channels

- 802.11a supports a higher bandwidth than the 802.11b. 802.11a is aimed at next generation applications such as real-time video and multimedia conferencing. It is not widely deployed yet – 802.11a equipment is just starting to become available. It will be more expensive than 802.11b equipment. The 802.11a standard
 - operates in the 5 GHz frequency band (it is certified only for indoor use since satellites use the same frequency band),
 - supports bandwidths of up to a maximum of 54 MB with a maximum range of about 150+ feet (bandwidth decreases with the range), and
 - has 12 data channels

The two variants 802.11a and 802.11b standard are essentially similar. Because they operate in different frequency bands, 802.11a and 802.11b

- do not interfere with each other, but
- they are not compatible with each other.

Where will 802.11a and 802.11b (Wi-Fi) be used?

Wi-Fi (and 802.11a when deployed) is currently being used to replace wired LANs in enterprises/organizations such as

- Hospitals
- Universities
- Airports
- Coffee shops
- Warehouses
- Homes

Security

Indoor wireless LANs are shared networks and their range is not limited to a particular area of a building or to within a building itself. Consequently:

- unauthorized users can access the network
- the network can be tapped using “sniffer” software, i.e., eavesdropping is possible.

The 802.11b and 802.11a standards define authentication and encryption standards to ensure that only authorized users can access the network and to prevent eavesdropping.

Where Can I Find More Information?

- [The IEEE 802 website](http://www.ieee802.org) (http://www.ieee802.org)
- [Wireless Ethernet Compatibility Alliance \(WECA\)](http://www.wi-fi.org) (http://www.wi-fi.org)