



Wireless glossary

802.11: The IEEE standard that specifies a carrier sense media access control and physical layer specifications for 1 and 2 megabit per second wireless LANs.

802.11b: The IEEE standard that specifies a carrier sense media access control and physical layer specifications for 5.5 and 11 megabit per second wireless LANs.

802.11a: The IEEE standard, operating in the 5Ghz license-free frequency-band providing data throughput up to 54Mbit/s.

802.11g: The IEEE standard, operating in the 2.4Ghz license-free frequency-band, providing up to 54Mbit/s.

802.3: The IEEE standard that specifies carrier sense media access control and physical layer specifications for Ethernet LANs.

100BaseT: An IEEE standard (802.3) for operating 100 Mbps Ethernet networks (LANs) with twisted pair cabling and a wiring hub.

Ad-Hoc Mode: A client setting that provides independent peer-to-peer connectivity (without access points) in a wireless LAN. An alternative set-up is where PCs communicate with each other through an AP. See AP and Infrastructure Mode.

AP (Access Point): A hardware device, or software used in conjunction with a computer, that serves as a communications "hub" for wireless clients and provides a connection to a wired LAN. An AP can double the range of wireless clients and provide enhanced security.

Application software: A software program running on top of the operating system (Windows, UNIX, Mac) that has been created to perform a specific task for a user. Examples include word processing software like Word/Word Perfect, spreadsheets like Excel or Lotus 123, home finance packages like Quicken, etc.

Bandwidth: Specifies the amount of the frequency spectrum that is usable for data transfer. It identifies the maximum data rate that a signal can attain on the medium without encountering significant loss of power.

Beam width: The angle of signal coverage provided by a radio. By using a directional antenna to increase gain, Beam width may be decreased.

Boot Protocol (BOOTP): The protocol used for the static assignment of IP addresses to devices on the network.

Bridge: A device used to connect LANs by forwarding packets across connections at the Media Access Control (MAC) layer.

Client: Any computer connected to a network that requests services (files, print capability) from another member of the network.

CSMA/CA (Carrier Sense Multiple Access/Collision Avoidance): CSMA/CA is the principal medium access method employed by IEEE 802.11 WLANs. It is a "listen before talk": method of minimising (but not eliminating) collisions caused by simultaneous transmission by multiple radios. IEEE 802.11 states collision avoidance method rather than collision detection must be used, because the standard employs half duplex radios—radios capable of transmission or reception—but not both simultaneously. Unlike conventional wired Ethernet nodes; a WLAN station cannot detect a collision while transmitting. If a collision occurs, the transmitting station will not receive an ACKnowledge packet from the intended receive station. For this reason, ACK packets have a higher priority than all other network traffic. After completion of a data transmission, the receive station will begin transmission of the ACK packet before any other node can begin transmitting a new data packet. All other stations must wait a longer pseudo randomised period of time before transmitting. If an ACK packet is not received, the transmitting station will wait for a subsequent opportunity to retry transmission.

CSMA/CD (Carrier Sense Multiple Access/Collision Detection): The LAN access method used in Ethernet. When a device wants to gain access to the network, it checks to see if the network is free. If it is not, it waits a random amount of time before retrying. If the network is free and two devices access the line at exactly the same time, their signals collide. When the collision is detected, they both back off and each waits a random amount of time before retrying.

Complementary Code Keying (CCK): Modulation technique used by IEEE 802.11-compliant wireless LANs for transmission at 5.5 and 11Mbps.

dBi: A ratio of decibels to an isotropic antenna that is commonly used to measure antenna gain. As a rule, the greater the dBi value, the higher the antenna gain value. This results in a more acute angle of coverage.

DSSS and FHSS: Wireless LAN products are available in three different technologies -- direct-sequencing spread-spectrum (DSSS), frequency-hopping spread-spectrum (FHSS) and infrared. DSSS and FHSS are spread-spectrum techniques that operate over the radio airwaves in the unlicensed ISM band (industrial, scientific, and medical). DSSS uses a radio transmitter to spread data packets over a fixed range of the frequency band. FHSS uses a technique by which the signal transmitted hops among several frequencies at a specific rate and sequence as a way of avoiding interference.

Differential Binary Phase Shift Keying (DBPSK): Modulation technique used by IEEE 802.11-compliant wireless LANs for transmission at 1Mbps.

Differential Quadrature Phase Shift Keying (DQPSK): Modulation technique used by IEEE 802.11-compliant wireless LANs for transmission at 2Mbps.

Dipole: A type of low gain (2.2 dBi) antenna consisting of two (often-internal) elements.

Direct Sequence Spread Spectrum (DSSS): A type of spread spectrum radio transmission that spreads its signal continuously over a wide frequency band.

Directional Antenna: An antenna that concentrates transmission power into a direction thereby increasing coverage distance at the expense of coverage angle. Directional antenna types include Yagi, patch and parabolic dish.

Diversity Antennas: An intelligent system of two antennas that continually senses incoming radio signals and automatically selects the antenna best positioned to receive it.

Dynamic Host Configuration Protocol (DHCP): A protocol available with many operating systems that automatically issues IP addresses within a specified range to devices on a network. The device retains the assigned address for a specific administrator-defined period.

Ethernet: The most widely used LAN access method, which is defined by the IEEE 802.3 standard. Ethernet is normally a shared media LAN meaning all devices on the network-segment share total bandwidth. Ethernet networks operate at 10Mbps using CSMA/CD to run over 10BaseT cables.

Frequency Hopping Spread Spectrum (FHSS): A type of spread spectrum radio transmission in which the transmitter and receiver hop in synchronisation from one frequency to another according to a prearranged pattern.

Fresnel Effect: A phenomenon related to line of sight, whereby an object that does not obstruct the visual line of sight obstructs the line of transmission for radio frequencies.

Gain: A method of increasing the transmission distance of a radio by the concentration its signal in a single direction, typically through the use of a directional antenna. Gain does not increase a radio's signal strength, but simply redirects it. Therefore, as gain increases, the decrease in angle of coverage is inversely proportional.

Gateway: A network point that acts as an entrance to another network.

Gigahertz (GHz): One billion cycles per second. This is a unit of measure for frequency.

Hidden Node: A station on a wireless LAN that attempts to transmit data to another station but, due to its location relative to the others, cannot sense that there is a third station simultaneously communicating with the intended recipient. Lost message and multiple retries is the result.

Hz (Frequency) (Hertz): The international unit for measuring frequency, equivalent to the older unit of cycles per second. One megahertz (MHz) is one million hertz. One Gigahertz (GHz) is one billion-hertz. The standard US electrical power frequency is 60 Hz, the AM broadcast radio frequency band is 0.551.6 MHz, the FM broadcast radio frequency band is 88108 MHz, and wireless 802.11 LANs operate at 2.4 GHz.

IEEE: Institute of Electrical and Electronics Engineers, (New York, www.ieee.org). This is a membership organization that includes engineers, scientists, and students in electronics and allied fields. It has more than 300,000 members and is involved with setting standards for computers and communications.

IEEE 802.11: IEEE 802.xx is a set of specifications for LANs from The Institute of Electrical and Electronic Engineers (IEEE). Most wired networks conform to 802.3, the specification for CSMA/CD based Ethernet networks or 802.5, the specification for token ring networks. 802.11 is the definition of the standard for wireless LANs encompassing three incompatible (non-interoperable) technologies: Frequency Hopping Spread Spectrum (FHSS), Direct Sequence Spread Spectrum (DSSS), and Infrared.

Infrastructure Mode: A client setting providing connectivity to an AP. As compared to Ad-Hoc Mode where PCs communicate directly with each other, wireless-clients configured in Infrastructure Mode all pass data through a central AP. The AP not only mediates wireless network traffic in the immediate neighbourhood, but also provides communication with the wired network. See AD-Hoc and AP.

IP: The Internet Protocol (IP) is a method or protocol by which data is sent from one computer to another on a network, i.e. the Internet. Each computer on the Internet has at least one address that uniquely identifies it from all other computers on the Internet. When you send or receive data (for example, an e-mail note or a Web page), the message gets divided into little chunks called packets. Each of these packets contains both the sender's Internet address and the receiver's address. Any packet is sent first to a gateway computer that understands a small part of the Internet. The gateway computer reads the destination address and forwards the packet to an adjacent gateway that in turn reads the destination address and so forth across the Internet until one gateway recognises the packet as belonging to a computer within its immediate neighbourhood or domain. That gateway then forwards the packet directly to the computer whose address is specified. Because the data is divided into a number of packets, each packet can if necessary, be sent by a different route across the Internet. A packet is treated as an independent unit of data so packets can arrive at their destination in a different order than they were sent in. Another protocol, the Transmission Control Protocol, (TCP) then reassembles the packets in the right order.

IP Address: An IP address is a 32-bit number that identifies each sender or receiver of information that is sent across the Internet. An IP address has two parts: the identifier of a particular network on the Internet and an identifier of the particular device (which can be a server or a workstation) within that network.

ISA (or PCI): A local bus standard for connecting peripherals to a personal computer. Within a computer, the bus is the transmission path on which signals and data transfers occur between the CPU, system memory, and attached devices such as a network card, sound card, or CD-ROM drive.

Isotropic: An antenna (or a theoretic construct of an antenna) that radiates its signal 360 degrees both vertically and horizontally-- a perfect sphere.

ISO Network Model: The International Standards Organisation (ISO) has developed a network model that consists of seven different levels, or layers. By standardising these layers, and the interfaces in between, different portions of a given protocol can be modified or changed as technologies advance, or systems requirements are altered. The seven layers are:

1. Physical
2. Data Link
3. Network
4. Transport
5. Session
6. Presentation
7. Application

The IEEE 802.11 Standard encompasses the physical layer (PHY) and the lower portion of the data link layer. The lower portion of the data link layer is often referred to as the Medium Access Controller (MAC) sub-layer.

ISP (Internet Service Provider): An organisation that provides access to the Internet. Small ISPs provide service via modem and ISDN while the larger ones also offer private line hookups (T1, fractional T1, etc.). The major online services such as America Online provide Internet access but are still known as "online services", not ISPs. They offer the members only content, forums and services in addition to Internet access.

LAN (Local Area Network): A communications network that serves users within a defined geographical area. The benefits include the sharing of Internet access, files and equipment like printers and storage devices. Special network cabling (10BaseT) is often used to connect the PCs together. Wireless LANs use wireless communications, in a home or office, to network all PCs together so there is no need to run an extra set of cables.

Line of Sight: An unobstructed straight line between two transmitting devices. Line of sight is typically required for long-range directional radio transmission. Due to the curvature of the earth, the line of sight for devices not mounted on towers is limited to 16 miles (26km).

MAC (Media Access Control): In a WLAN network card, the MAC is radio controller protocol. It corresponds to the ISO Network Model's level 2 - Data Link Layer. The IEEE 802.11 standard specifies the MAC protocol for medium sharing, packet formats and addressing, and error detection.

Management Information Base (MIB): A collection of network operational information residing in a virtual store that may be accessed, typically through an SNMP-compliant system, for analysis.

Megahertz (MHz): A unit of measure for frequency equal to one million cycles per second.

Modulation: Any of several techniques for combining user information with a transmitter's carrier signal.

Multipath: The echoes created as a radio signal bounces off of physical objects.

Omni-Directional Antenna: An antenna that provides a 360-degree transmission pattern. These types of antennas are used when coverage in all directions is required.

Packet: A basic message unit for communication across a network. A packet usually includes routing information, data, and (sometimes) error detection information.

Parabolic: A concave or dish-shaped object. Often refers to dish antennas. Peer-to-Peer Network: A network design in which each computer shares and uses devices on an equal basis.

Physical Layer (PHY): Provides for the transmission of data through a communications channel by defining the electrical, mechanical and procedural specifications for IEEE 802 local area networks. Protocol: Rules for communicating, particularly for the format and transmission of data.

NAT (Network Address Translation): The translation of an Internet Protocol address (IP address) used within one network to a different IP address known within another network. One network is designated the internal network and the other is the external. The internal network then appears as one entity to the outside world. In the case of wireless LANs with an outside Internet connection, the NAT capability of Internet sharing software allows the sharing of one Internet connection among all the wireless PCs connected.

PCI (or ISA): A local bus standard for connecting peripherals to a personal computer. Within a computer, the bus is the transmission path on which signals and data transfers occur between the CPU, system memory, and attached devices such as a network card, sound card, or CD-ROM drive.

PHY (Physical Layer): The PHY is the lowest layer within the OSI Network Model. It deals primarily with transmission of the raw bit stream over the PHYsical transport medium. In the case of wireless LANs, the transport medium is free space. The PHY defines parameters such as data rates, modulation method, signalling parameters, transmitter/receiver synchronisation, etc. Within an actual radio implementation, the PHY corresponds to the radio front end and base band signal processing sections.

Roaming: A feature that allows users to move through a facility seamlessly from one AP coverage area to another with no loss in connectivity.

Radio Frequency (RF): A generic term for radio-based technology.

Range: A linear measure of the distance that a transmitter can send a signal.

Receiver Sensitivity: A measurement of the weakest signals a receiver can receive and still correctly translate it into data.

Reverse Polarity TNC (RP-TNC): A connector type unique to certain wireless radios and antennas. Part 15.203 of the FCC rules covering spread-spectrum devices limits the types of antennas that may be used with transmission equipment. In compliance with this rule, wireless LAN providers, equips its radios and antennas with a unique connector to prevent attachment of non-approved antennas to radios.

Simple Network Management Protocol (SNMP): The network management protocol that defines the transfer of LAN operational data between Management Information Bases (MIBs).

Spread Spectrum: A radio transmission technology that "spreads" the user information over a much wider bandwidth than otherwise required in order gaining benefits such as improved interference tolerance and unlicensed operation.

TCP (Transmission Control Protocol): A protocol used along with the Internet Protocol (IP) to send data in the form of individual units (called packets) between computers over the Internet. While IP takes care of handling the actual delivery of the data, TCP takes care of keeping track of the packets that a message is divided into for efficient routing through the Internet. For example, when a web page is downloaded from a web server, the TCP program layer in that server divides the file into packets, numbers the packets, and then forwards them individually to the IP program layer. Although each packet has the same destination IP address, it may get routed differently through the network. At the other end, TCP reassembles the individual packets and waits until they have all arrived to forward them as a single file.

WEP (Wired Equivalent Privacy): WEP data encryption is defined by the 802.11 standard to prevent (i) access to the network by "intruders" using similar wireless LAN equipment and (ii) capture of wireless LAN traffic through eavesdropping. WEP allows the administrator to define a set of respective "Keys" for each wireless network user based on a "Key String" passed through the WEP encryption algorithm. Access is denied by anyone who does not have an assigned key.

WAN (Wide Area Network): A wide area network connects local area networks together. Typical WAN interfaces include plain old telephone (POT) lines, digital subscriber lines (DSL), and Broadband cable, T1/T3 and ISDN, T1/T3.

Yagi Antenna: A type of often-cylindrical directional antenna.◆