Wi-Fi

[](http://en.wikipedia.org/wiki/File:Wi-Fi_Logo.svg)

The Wi-Fi logo used by the [Wi-Fi Alliance](http://en.wikipedia.org/wiki/Wi-Fi_Alliance).

**Wi-Fi** is a popular technology that allows an electronic device to exchange data[wirelessly](http://en.wikipedia.org/wiki/Wireless_network) (using [radio waves](http://en.wikipedia.org/wiki/Radio_waves)) over a [computer network](http://en.wikipedia.org/wiki/Computer_network), including [high-speed Internet](http://en.wikipedia.org/wiki/High-speed_Internet) connections.

A device that can use Wi-Fi (such as a personal computer, video-game console, [smartphone](http://en.wikipedia.org/wiki/Smartphone), digital camera, [tablet](http://en.wikipedia.org/wiki/Tablet_computer) or digital audio player) can connect to a network resource such as the Internet via a [wireless network access point](http://en.wikipedia.org/wiki/Wireless_access_point). Such an access point (or hotspot) has a range of about 20 meters indoors and about 100 meters outdoors.

Wi-Fi can be less secure than wired connections (such as [Ethernet](http://en.wikipedia.org/wiki/Ethernet)) because an intruder does not need a physical connection. The early encryption [WEP](http://en.wikipedia.org/wiki/Wired_Equivalent_Privacy), proved easy to break. Higher quality protocols ([WPA, WPA2](http://en.wikipedia.org/wiki/Wi-Fi_Protected_Access)) were added later.

History

802.11 technology has its origins in a 1985 ruling by the US Federal Communications Commission that released the [ISM band](http://en.wikipedia.org/wiki/ISM_band) for unlicensed use.[[3]](http://en.wikipedia.org/wiki/Wi-Fi#cite_note-3)

**The name**

The term *Wi-Fi*, first used commercially in August 2000, was coined by a brand-consulting firm called [Interbrand](http://en.wikipedia.org/wiki/Interbrand" \o "Interbrand) Corporation. The Wi-Fi Alliance had hired Interbrand to determine a name that was "a little catchier than 'IEEE 802.11b Direct Sequence'".

**Advantages**

Wi-Fi allows cheaper deployment of [local area networks](http://en.wikipedia.org/wiki/Local_area_network) (LANs). Also spaces where cables cannot be run, such as outdoor areas and historical buildings, can host wireless LANs.

Manufacturers are building wireless network adapters into most laptops. The price of [chipsets](http://en.wikipedia.org/wiki/Chipset) for Wi-Fi continues to drop, making it an economical networking option included in even more devices.

Different competitive brands of access points and client network-interfaces can inter-operate at a basic level of service. Products designated as "Wi-Fi Certified" by the Wi-Fi Alliance are [backwards compatible](http://en.wikipedia.org/wiki/Backwards_compatible). Unlike [mobile phones](http://en.wikipedia.org/wiki/Mobile_phone), any standard Wi-Fi device will work anywhere in the world.

[Wi-Fi Protected Access](http://en.wikipedia.org/wiki/Wi-Fi_Protected_Access) encryption (WPA2) is considered secure, provided a strong [passphrase](http://en.wikipedia.org/wiki/Passphrase) is used. New protocols for [quality-of-service](http://en.wikipedia.org/wiki/Quality_of_service) ([WMM](http://en.wikipedia.org/wiki/Wireless_Multimedia_Extensions)) make Wi-Fi more suitable for latency-sensitive applications (such as voice and video). Power saving mechanisms (WMM Power Save) extend battery life.

**Limitations**

Spectrum assignments and operational limitations are not consistent worldwide: most of Europe allows for an additional two channels beyond those permitted in the US for the 2.4 GHz band (1–13 vs. 1–11), while Japan has one more on top of that (1–14). As of 2007, Europe is essentially homogeneous in this respect.

A Wi-Fi signal occupies five channels in the 2.4 GHz band. Any two channel numbers that differ by five or more, such as 2 and 7, do not overlap. The oft-repeated adage that channels 1, 6, and 11 are the *only* non-overlapping channels is, therefore, not accurate. Channels 1, 6, and 11 are the only *group of three* non-overlapping channels in the U.S. In Europe and Japan using Channels 1, 5, 9, and 13 for [802.11g](http://en.wikipedia.org/wiki/IEEE_802.11#802.11g) and [802.11n](http://en.wikipedia.org/wiki/IEEE_802.11#802.11n) is[recommended](http://en.wikipedia.org/wiki/IEEE_802.11#Channels_and_international_compatibility).[[*citation needed*](http://en.wikipedia.org/wiki/Wikipedia:Citation_needed)]

[Equivalent isotropically radiated power](http://en.wikipedia.org/wiki/Equivalent_isotropically_radiated_power) (EIRP) in the EU is limited to 20 [dBm](http://en.wikipedia.org/wiki/DBm" \o "DBm)(100 mW).

The current 'fastest' norm, 802.11n, uses double the radio spectrum/bandwidth (40 MHz) compared to [802.11a](http://en.wikipedia.org/wiki/IEEE_802.11#802.11a) or 802.11g (20 MHz).[[*citation needed*](http://en.wikipedia.org/wiki/Wikipedia:Citation_needed)] This means there can be only one 802.11n network on the 2.4 GHz band at a given location, without interference to/from other WLAN traffic. 802.11n can also be set to use 20 MHz bandwidth only to prevent interference in dense community.[*[citation needed](http://en.wikipedia.org/wiki/Wikipedia:Citation_needed" \o "Wikipedia:Citation needed)*]

**Range**[[edit](http://en.wikipedia.org/w/index.php?title=Wi-Fi&action=edit&section=12" \o "Edit section: Range)]

*See also:*[*Long-range Wi-Fi*](http://en.wikipedia.org/wiki/Long-range_Wi-Fi)

Wi-Fi networks have limited range. A typical wireless access point using[802.11b](http://en.wikipedia.org/wiki/IEEE_802.11#802.11b) or [802.11g](http://en.wikipedia.org/wiki/IEEE_802.11#802.11g) with a stock antenna might have a range of 35 m (120 ft) indoors and 100 m (300 ft) outdoors. [IEEE 802.11n](http://en.wikipedia.org/wiki/IEEE_802.11#802.11n), however, can more than double the range.[[40]](http://en.wikipedia.org/wiki/Wi-Fi#cite_note-wifiplanet-40) Range also varies with frequency band. Wi-Fi in the 2.4 GHz frequency block has slightly better range than Wi-Fi in the 5 GHz frequency block which is used by 802.11a and optionally by 802.11n.

**Data security risks**[[edit](http://en.wikipedia.org/w/index.php?title=Wi-Fi&action=edit&section=13" \o "Edit section: Data security risks)]

The most common wireless [encryption](http://en.wikipedia.org/wiki/Encryption)-standard, [Wired Equivalent Privacy](http://en.wikipedia.org/wiki/Wired_Equivalent_Privacy)(WEP), has been [shown](http://en.wikipedia.org/wiki/Fluhrer,_Mantin_and_Shamir_attack) to be easily breakable even when correctly configured.[Wi-Fi Protected Access](http://en.wikipedia.org/wiki/Wi-Fi_Protected_Access) (WPA and WPA2) encryption, which became available in devices in 2003, aimed to solve this problem. Wi-Fi [access points](http://en.wikipedia.org/wiki/Wireless_access_point) typically default to an encryption-free (*open*) mode. Novice users benefit from a zero-configuration device that works out-of-the-box, but this default

**Distance records**[[edit](http://en.wikipedia.org/w/index.php?title=Wi-Fi&action=edit&section=17" \o "Edit section: Distance records)]

Distance records (using non-standard devices) include 382 km (237 mi) in June 2007, held by Ermanno Pietrosemoli and EsLaRed of Venezuela, transferring about 3 MB of data between the mountain-tops of [El Águila](http://en.wikipedia.org/wiki/Pico_El_%C3%81guila) and Platillon.[[46]](http://en.wikipedia.org/wiki/Wi-Fi#cite_note-46)[[47]](http://en.wikipedia.org/wiki/Wi-Fi#cite_note-47)The [Swedish Space Agency](http://en.wikipedia.org/wiki/Swedish_National_Space_Board) transferred data 420 km (260 mi), using 6 watt amplifiers to reach an overhead stratospheric balloon.[[48]](http://en.wikipedia.org/wiki/Wi-Fi#cite_note-48)

**Embedded systems**[[edit](http://en.wikipedia.org/w/index.php?title=Wi-Fi&action=edit&section=18)]

Increasingly in the last few years (particularly as of 2007), embedded Wi-Fi modules have become available that incorporate a real-time operating system and provide a simple means of wirelessly enabling any device which has and communicates via a serial port.

Safety

The [World Health Organization](http://en.wikipedia.org/wiki/World_Health_Organization) (WHO) says "there is no risk from low level, long-term exposure to wi-fi networks" and the United Kingdom's [Health Protection Agency](http://en.wikipedia.org/wiki/Health_Protection_Agency) reports that exposure to Wi-Fi for a year results in the "same amount of radiation from a 20-minute mobile phone call.