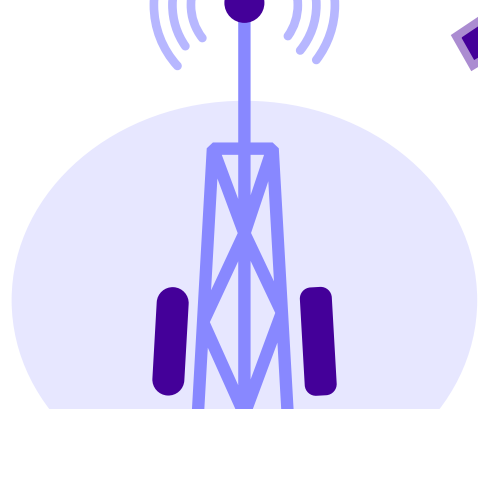


The Evolution of Wi-Fi

The 802.11 standard and subsequent generations are the basis for Wi-Fi networks and represent the world's most widely used wireless computer networking protocols. As of 2024, 19.5 billion Wi-Fi devices are in use, over 15.14 billion connected IoT devices, and over 5.35 billion Internet users worldwide. Wi-Fi also significantly contributes to the global economy. The Wi-Fi Alliance estimates that Wi-Fi drove \$3.5 trillion in global economic value in 2023 and will drive over \$4.9 trillion in 2025.

So, how did Wi-Fi become such an integral part of our daily lives? Follow along with our timeline and insights to understand how Wi-Fi has evolved over the last several decades and join us in celebrating 25 years of Wi-Fi innovation.



1942

Ethernet was invented by Bob Metcalfe.

1971

The FCC first made unlicensed spread spectrum available in the ISM Bands, opening the door for the development of Wi-Fi.

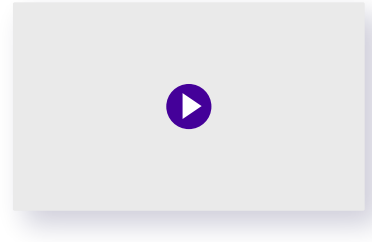
1989

The first wireless deployment happens as a research project (Wireless Andrew) at Carnegie Mellon University.



1997

Apple adopts Wi-Fi for their iBook series of laptops. This was the first mass consumer product to offer Wi-Fi network connectivity.



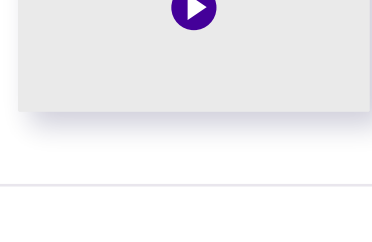
802.11a (Wi-Fi 2) is unveiled. 802.11a introduced 5 GHz Wi-Fi connectivity and was the first Wi-Fi specification to feature a multi-carrier modulation scheme (OFDM) to support high data rates.

2000

DID YOU KNOW?

The Wi-Fi Alliance's main task is ensuring Wi-Fi products' interoperability by providing certification testing. The goal is to ensure compatibility between Wi-Fi devices.

Wi-Fi Alliance introduces WPA, Wi-Fi Protected Access. A stop-gap security certification using TKIP encryption along with better methods of authentication.



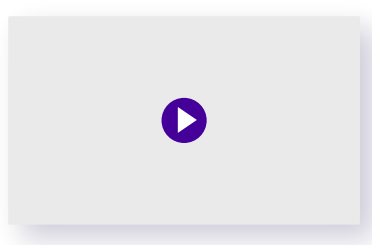
2004

DID YOU KNOW?

To validate identity, WPA2-Enterprise mandated 802.1X authentication, while WPA2-Personal required a pre-shared key credential.

The Internet hit 1 billion users.

The term Wi-Fi is added to the Merriam-Webster English dictionary.



2008



Wi-Fi is now in 25% of homes worldwide.

2013

DID YOU KNOW?

This was the first Wi-Fi standard to use multi-user MIMO (MU-MIMO) technology.

Wi-Fi becomes a way of life: IDC finds that Wi-Fi is the second most important thing people do not want to live without, ranked only behind food. Wi-Fi Alliance reports that over 10 billion Wi-Fi devices have been sold.

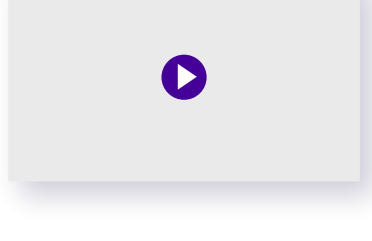
2018

Wi-Fi 6 is introduced based on the 802.11ax standard and operates in both the 2.4 and 5 GHz bands, achieving 9.6 Gbps.



2020

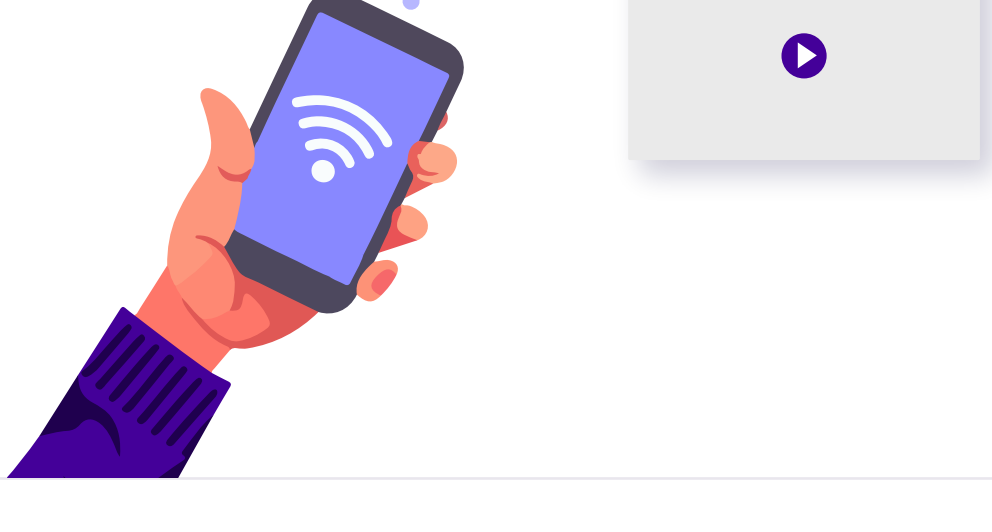
The Wi-Fi Alliance extends Wi-Fi 6 technology to the newly available unlicensed 6 GHz spectrum with a certification dubbed Wi-Fi 6E.



Mark Zuckerberg announces his plan to build the "metaverse" a three-dimensional virtual reality that relies on connectivity.

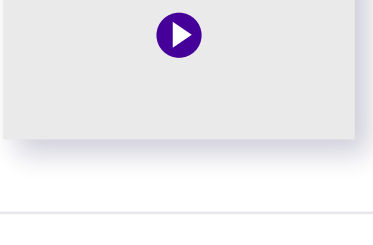
2023

Wi-Fi 7 (802.11be) is introduced and builds on all previous generations of Wi-Fi with the ability to operate in the 2.4, 5, or 6 GHz bands.



2049

Hedy Lamar and George Antheil submit patent for a method of using "Frequency-Hopping" to create a jam-proof radio-guided torpedo.



1970

The University of Hawaii's ALOHANET was the first wireless packet network.

1985

Tim Berners-Lee invented the World Wide Web while working at CERN to help scientists and universities share information globally.

1994

"What was the vision of information networking in 1989 is actually a reality in today's world."

ALEX HILLS
Founding Director of Carnegie Mellon's Information Networking Institute

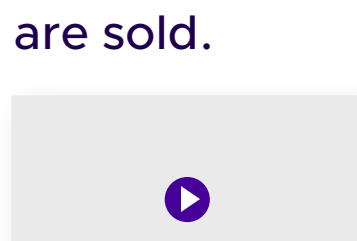
The IEEE releases the base version of the 802.11 standard (Wi-Fi 0), which leveraged frequency hopping technology in the 2.4 GHz band.

1999

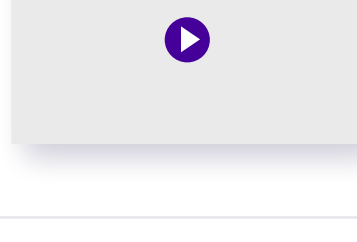
802.11b (Wi-Fi 1) is unveiled. 802.11b operated in the 2.4 GHz band and could achieve data rates of 1-11 Mbps.

The "Internet of Things" was first mentioned by Kevin Ashton.

The Wi-Fi Alliance is formed and holds the Wi-Fi trademark under which most IEEE 802.11 products are sold.



Wi-Fi hot spots start to pop up.



2003

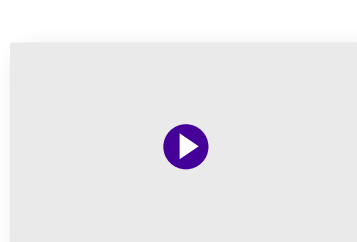
802.11g (Wi-Fi 3) is released, allowing faster data speeds in the 2.4 GHz band while maintaining backward compatibility with 802.11b devices

WPA2, an enhanced version of WPA, is ratified. WPA2 required dynamically generated CCMP encryption keys for data privacy.



2005

802.11n (Wi-Fi 4) is adopted and achieves data rates of up to 600 Mbps while operating in both the 2.4 and 5 GHz bands.



2012

802.11ac (Wi-Fi 5) is introduced and data rates of up to 3.5 Gbps are supported in the 5 GHz band.



2015

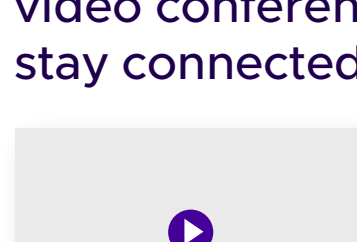
WPA3 certification introduces security enhancements over WPA2, including Management Frame Protection and Simultaneous Authentication of Equals (SAE) to replace Pre-Shared Key (PSK) security.

2019

DID YOU KNOW?

Wi-Fi 6 introduced efficiency enhancements such as orthogonal frequency-division multiple access (OFDMA) technology.

A global pandemic strikes and forces society to avoid contact and remain in their homes. Wi-Fi enables video conferencing so families can stay connected.



2021

Wi-Fi usage is growing, with more than 3.8 billion devices shipping annually and 19.5 billion devices in use.

2024

DID YOU KNOW?

Wi-Fi 7 has the potential of 4x faster data speeds, thus the label of Extremely High Throughput (EHT) wireless. Wi-Fi 7 also introduces for the first time, the concept of multi-link operation (MLO).

