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A Brief History of WIFI

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***Abstract*—** Wi-Fi is a family of wireless network protocols based on the IEEE 802.11 family standard and is commonly used for Internet and Internet access devices. Wi-Fi is a trademark of the Wi-Fi Alliance, a non-profit organization that prohibits the use of the term "Wi-Fi eligible" in products that pass the compliance test. As of 2017, the Wi-Fi Alliance includes more than 800 companies from around the world. By 2019, more than 3.05 billion Wi-Fi devices will be shipped worldwide. Devices that use Wi-Fi technology include desktops and laptops, smartphones and tablets, smart TVs, printers, smart speakers, cars and drones. This paper provides a short history of the WIFI.

***Keywords*—** wifi; contact; Wi-Fi devices; IEEE; smart devices.

I. INTRODUCTION

The Wi-Fi protocol uses several components of the IEE 802 family and is designed to work seamlessly with wired Ethernet. Sync devices can use wireless access points as well as wired and Internet devices. Different versions of Wi-Fi are defined by different standards of the IEE 802.11 protocol, based on which they define the different radio band technologies as well as the maximum amplitude and speed that can be achieved. Most WiFi uses UHF and SHFISM radios at 2.4 GHz (120 mm) and 5 GHz (60 mm). These bands are divided into several channels. Channels can be shared across different networks, but only one player can broadcast locally from the channel at a time.

Wi-Fi wavelengths have a relatively high absorption speed and are more suitable for long-distance use. Many common obstacles, such as walls, bars, tools, etc., can significantly reduce the threshold. However, it also helps reduce interference between different networks in a crowded environment. Access points (or access points) usually range from about 20 meters indoors, while some modern outdoor access points range up to 150 meters (490 feet). The coverage area of an access point can be the size of a room with walls that block radio waves, or it can be as large as a square mile if there are too many overlapping access points. Wi-Fi speed and spectrum performance have increased over time. From 2019, some hardware versions of Wi-Fi could reach a maximum of 1 Gbps in the near future.

QR code for automatic Wi-Fi connection

Wi-Fi technology was introduced by the FCC in 1985, which allowed the use of 900 MHz (2.4 MHz), 2.4 GHz and 5.8 GHz radio spectrum tracks for unauthorized use. ... Technology companies have begun building wireless networks and devices to take advantage of the newly available radio frequency spectrum. Without a wireless standard, however, traffic was scattered because devices from different manufacturers were rarely synchronized. Finally, a committee of industry leaders set up a common standard called 802.11, which was approved in 1997 by the Institute of Electrical and Electronics Engineers (IEEE). Two years later, a group of large compatible companies formed Alliance Wireless Ethernet Compatibility (WECA) (now Wi-Fi). Alliance), a global non-profit organization formed to promote the new mobile device. WECA calls this new technology Wi-Fi. The following IEEE standards for Wi-Fi are introduced to provide more bandwidth. The 802.11 standard allows data transfer speeds of only 2 Mbps (Mbps). The 802.11n standard was introduced in 2007 and has a maximum speed of 600 Mbps.

According to IEEE Wi-Fi standards, the available frequency band is divided into several separate channels. These channels often overlap, so Wi-Fi uses remote channels. In each of these channels, Wi-Fi uses the "broadband" technique, in which the signal is split into pieces and transmitted over several frequencies. An advanced spectrum allows low-power signals to be transmitted over the frequency and allows multiple devices to share the same Wi-Fi transmitter. Because indoor Wi-Fi signals usually cover short distances (usually less than 100 meters), the signal can

jump over walls, furniture, and other obstacles and reach different distances, interfering with multiple lanes. The problem is that Wi-Fi combines three different types of signaling (a technique developed by Australian engineer John Osalivan and colleagues) to reduce multi-line interference.

II. DEVELOPMENT

Wi-Fi can be more susceptible to attacks than wired networks, as anyone on a wireless LAN controller might try to access it. To connect to a Wi-Fi network, the user usually needs a network name (SSID) and password. The password is used to encrypt Wi-Fi packets to block interceptors. Wi-Fi Protected Access (WPA) is designed to protect information broadcast over Wi-Fi networks and includes versions of personal and enterprise networks. The evolution of WPA security features includes rigorous security and new security techniques. QR codes can be used to automatically configure mobile Wi-Fi. Modern telephones automatically recognize QR codes when shooting using software.

Wi-Fi has played a key role in connecting people at home and in public places since its inception. We expect quality connectivity everywhere and generally rely on Wi-Fi to keep us productive, organized, functional and even secure. Recent advances in Wi-Fi technology have made a significant contribution to the development of the Internet of Things, which has connected us more than ever before. But how many of us are familiar with the whole history of Wi-Fi technology? When was Wi-Fi Invented? how it works? And how far has it gone in 20 years? Here we look at the history of Wi-Fi, where it came from, how it helped us, and if we need more connectivity, we need the future.

Wi-Fi was invented in 1997 and was first made available to consumers by a commission called 802.11. This led to the creation of the IEEE802.11 standard, which is the standard that defines WLANs. Basic details were then set for WLN, which allows wireless data transfer between devices at a maximum speed of two megabytes per second. This led to the production of prototypes (routers) in accordance with IEEE802.11, and Wi-Fi for home use was introduced in 1999.

The final version of 802.11n appeared in 2009 much faster and more reliable than the previous version. This performance improvement is related to MIMO (Multi-Input Output), which uses multiple antennas to improve communication between transmitter and receiver. This significantly increased the amount of data without the need for bandwidth or power transmission.

To solve this problem, dual-band, dual-band routers were created. These routers had two types of radios that could support 2.4 GHz and 5 GHz connections simultaneously. By default, devices within the range of a dual-band router automatically connect at high speeds and efficient frequencies of 5 GHz. However, if the device is behind or behind a wall, the 2.4 GHz device can be used as a backup.

III. METHODS

The 801.11ac was designed to improve the 5 GHz band: it was four times the width of 801.11n Wi-Fi and supported more antennas to send data faster. In 2012, the idea of designing a box was launched, which Eric Suare described as the focus of signaling and data transfer concentration to get more data to the device. "Instead of sending a signal from a wide area in the hope of reaching the destination, he focused the signal and headed straight for the target," he said.

Using Wi-Fi is a feature of Rethink Wireless today: "Wi-Fi is improving performance and is one of the most common wireless technologies used today. It is easy to install, easy to use and "It's affordable. Wi-Fi hotspots are now installed in homes and public places, providing easy access to the Internet from smartphones to encryption."

However, Wi-Fi is nothing more than an internet connection for reading emails or surfing social networks. Enables users to integrate and exchange a wide range of information through electronic and computing devices. According to Wi-Fi.org.org, the Internet of Things is "one of the most exciting waves of innovation in the world" and "its potential is still evolving." Wi-Fi companies like Purple show how to open up business capabilities: By increasing the number of Wi-Fi-enabled devices, Purple provides highly accurate user data to customers through qualified services Offers itself. Enables many social media and digital marketing tools.

In 1985, the FCC decided to open three frequency bands for unauthorized use in the radio spectrum.

The band, also known as the "Junk Band", was 900 MHz, 2.4 GHz and 5.8 GHz.

These strips were used for microwave ovens cooked using radio waves. Therefore, one of the conditions for using these bands to communicate was to ignore the interference of other devices using a wide range of technologies such as frequency jumping.

Manufacturers have immediately begun to develop their own solutions that provide communication with these frequencies. While some did a great job alone, their obvious weakness was the lack of connection between the solutions.

Technical standards are extensive documentation. When people start implementing these standards, they often define them in different ways, such as the 802.11 standard.

In 1999, the six major manufacturers formed a new industrial union to improve mutual compatibility.

There was a lot of interest in the New Testament, but they needed a good name for themselves and their standards. He hired Mark's advisers to come to a place that was "a little more memorable than IEEE 802.11b Continuity Direct."

Consultants suggested a "Wi-Fi" industry for "Hi-Fi" from the music world. No, that does not mean abbreviations or acronyms. In fact, despite occasional failed attempts to introduce terms such as wireless loyalty, Wi-Fi does not need anything.

However, the term "Wi-Fi" quickly caught on and survived.

The New Industry Association has become a Wi-Fi alliance, and today hundreds of technology providers are part of it. The Alliance promotes wireless technology, protects "Wi-Fi" as a seal of approval, and endorses wireless products.

However, the IEEE 802.11 Committee is still responsible for developing the standards.

In 1999, Apple introduced the first built-in Wi-Fi laptop for the consumer, the iBook G3. The shape and color of the popular laptop was unparalleled, which is why people compare it to Barbie accessories and toilet seats.

Wi-Fi laptops soon arrived, and in 2004 the first Wi-Fi Alliance certified cell phone was introduced. One of the first models had a Nokia 9500 collar. One of the first models had a Nokia 9500 collar.

Since the introduction of the iBook, the number of connected devices has increased dramatically and Wi-Fi is the most common type of connection.

In 2015, the 802.11 Commission produced a series of YouTube short films to mark its 25th anniversary. In the video below, Dave Bagby, a member of the committee, explains how much he loved wireless when he started working on quality. He also revealed what he believed was the most important factor in success.

Wi-Fi means wireless redemption. Wi-Fi is a wireless networking technology that enables computers, some smartphones, iPads, game consoles and other devices to communicate via wireless signals. Just as a radio can use radio waves to monitor a radio station, your device can also receive a signal that connects it to the Internet. In fact, a WiFi signal is a high-frequency radio signal.

As radio station frequencies are set, so are Wi-Fi standards. All electronic components of a wireless network, such as your device or router, meet the 802.11 standards of the Institute of Electrical and Electronics Engineering and the Wi-Fi Organization. Wi-Fi Alliance called Wi-Fi a trademark and promoted the technology. This technology is also known as WLAN, which means wireless network. However, Wi-Fi has definitely become the most popular term used by most people.

A router is a key device in a wireless network. Only the router is physically connected to the Internet using an Ethernet cable. The router then sends a high-frequency radio signal that transmits data to and from the Internet. The device you are using receives a signal from the router and reads it and sends the data to your router and the Internet. These transitions are known as up and down operations.

Once you understand that Wi-Fi has many components, you can imagine how difficult it is to call an inventor.

You should first read the 802.11 (Radio Frequency) standard history used to transmit Wi-Fi signals. Second, you need to look at electronic devices for sending and receiving Wi-Fi signals. Not surprisingly, many patents are related to Wi-Fi technology, although there is considerable patent ahead.

Wick Hayes has been called the "father of Wi-Fi" because in 1997 he chaired the IEEE committee that set the 802.11 standard. Before the public became aware of Wi-Fi, Hayes set standards for Wi-Fi cost-effectiveness. The 802.11 standard was introduced in 1997. At that time, 80 802.11 was extended to improve network bandwidth. These include 802.11a, 802.11b, 802.11g, 802.11n and more. This means attachments. The most important thing that the user should know is that the latest version is the best version in terms of performance. So, this is the version you want all your new devices to be compatible with.

WLAN patent holder

A large patented Wi-Fi patent was developed by the Australian Scientific and Industrial Research Authority. CSIRO has developed a chip that dramatically improves the quality of Wi-Fi signals.

IV. **HISTORY**

802.11-1997 (Ideal 802.11 Protocol)

The original IEE 802.11 standard was released in 1997 and updated in 1999, but is now obsolete. In addition to the two net bit rates of 1 or 2 Mbps (Mbps), the forward error correction code is also specified. Three alternative body layer technologies have been identified: 1 MB per second of neutral infrared. Frequency playback at a speed of 1 MB / s or 2 MB / s. And the direct continuity advertising spectrum is running at 1 Mbps or 2 Mbps. Two recent radio

technologies have used microwave transmission in scientific-industrial medicine at a frequency of 2.4 GHz. Some previous WLAN technologies used lower frequencies, such as the 900 MHz ISM bandwidth in the United States.

802.11 b

The 802.11b standard has a maximum data rate of 11 Mbps and accesses the same media as described in the original standard. 802.11b was introduced in the early 2000s because 802.11b was a direct extension of the modulation technology described in the original standard. A dramatic increase in 802.11b output (above the original standard) with a significant drop in price led to the rapid adoption of 802.11b as the ultimate WLAN technology.

Devices running 804.11b interfere with the 2.4 GHz band through other products. 2.4 GHz band devices include microwave ovens, Bluetooth devices, baby monitors, cordless phones and some amateur radios.

802.11a (2012, off DM Figure)

This is actually possible in Section 17 of the 1999 Act. Especially widely used in corporate workplaces around the world. Although the actual change is no longer effective, the term 802.11a is still used by wireless access point manufacturers (cards and routers) to describe how their systems communicate at 5 GHz and 54 MHz. .

The 802.11a standard uses the same protocol and frame formula for the data link layer as the original standard, but is based on the air interface (physical layer) based on the DM. It operates in a 5 GHz band with a maximum data rate of 54 Mbps plus ECC, resulting in a pure source in the middle of 20 Mbps.

Since the 2.4 GHz band is actively used as long as it is not too dense, the use of the relatively unused 5 GHz 802.11a band has a significant advantage. However; such a high carrier frequency also has a disadvantage: the overall effective amplitude of 802.11a is less than 802.11b / g. In theory, due to the short wavelengths, 802.11a signals are easily absorbed in their path through walls and other solids and therefore cannot penetrate up to 802.11b signals. In practice, 802.11b typically has a high threshold at low speeds (802.11b slows down to 5.5 Mbps or even 1 Mbps when signal strength is low). 802.11a is also prone to interference, but fewer signals can be distorted locally, resulting in less interference and better efficiency.

802.11 g

In June 2003, the third regulatory standard was adopted: 802.11 g. It works in the 2.4 GHz band (for example 802.11b), but similarly uses an OFDM-based broadcast scheme such as 802.11a. Operates at a maximum data rate of 54Mbps without forward error correcting codes, or an average power of approximately 22Mbps.

The 802.11g hardware lags far behind the 802.11b hardware and is therefore devoid of the problems of the previous generation, which reduces bandwidth by about 21% compared to 802.11a.

The proposed 802.11g standard entered the market immediately in January 2003, long before it was adopted, as higher data rates were required and production costs were reduced. In the summer of 2003, most 802.11a / b dual-band products will be available in 2-strip / 3D products that support a and b / g on a portable adapter card or access point. The details of how B and G work together have overcome a long technical trend. On 802.11g networks, however, peer-to-peer activity slows down 802.11b data speeds on any 802.11g network.

Like 802.11b, 802.11g devices interfere with other products operating in the 2.4 GHz band, such as the B wireless keyboard.

802.11

In 2003, the TGMA Working Group was tasked with "summarizing" a number of changes to the 1999 802.11 standard. It is called REVma or 802.11ma.

802.11 n

802.11n is a change from the previous 802.11 standards by combining multiple input and output (MIMO) antennas. 802.11n runs on 2.4 and 5 GHz bands. 5 GHz band support is optional. Works with a maximum net data transfer rate of 54 MB / s to 600 MB / s. The IEEE approved the change and it was released in October 2009.

Prior to final approval, companies moved to 802.11n networks based on Wi-Fi Alliance certifications as part of the draft 802.11n proposal.

802.11

In May 2007, the TGMB Working Group was tasked with "generalizing" many of the changes to the 802.11 standard in the 2007 version. REVmb, or 802.11mb, created a single document with ten changes (802.11k, r, y, n, w, p, z, v, u, s) to the 2007 standard. Repeat coping with many articles. Since its release on March 29, 2012, the new IEEE standard is called 802.11-2012.

802.11ac

IEE 802.11ac-2013 is an IEE 802.11 modification that was released in December 2013 and is based on 802.11n. Modifications above 802.11n include wide channels in the 5 GHz range (80 or 160 MHz vs. 40 MHz), more local currents (up to eight vs. four), and high-order modulation (256 vs. 64 vs. 64). . And in addition multi-user MIMO (MU-MIMO). As of October 2013, high-performance applications will support 80 MHz channels, three local streams and 256 QAM, thus supporting 433.3 MHz per second for local streams, with a total of 1300 MHz. Hz is 80 MHz 5G band channels. Jaga Hertz in the United States.

ISPs announced plans to release Wave 2 devices in 2014 and 2015 that support 160 MHz, four local channels, and MU-MIMO.

802.11ad

IEE 802.11 eddy is a modification that defines a new physical layer for 802.11 networks designed to operate in the

602 GHz bandwidth. The emission specifications at this frequency are significantly different from the 2.4 and 5 GHz bands on which Wi-Fi networks operate. Products that conform to the 802.11ad standard are marketed under the WiGig brand. The certification program is currently being developed by the Wi-Fi Alliance on behalf of the Disqualified Wi-Fi Alliance. The maximum rate of 802.11 AD is 7 Gbps.

V. NOWADAYS

IEEE 802.11F, also known as "White Wi-Fi" and "Super Wi-Fi", is a change that was passed in February 2014 and allows WLAN networks with a white space spectrum between the VHF and UHF bands. Operate from 54 to 790 MHz. Allows.

Using knowledgeable radio technology to broadcast on unused TV channels, standard measures are taken to interfere with large users, such as analog TVs, digital TVs, and wireless microphones.

Access points and stations determine their location using satellite location systems such as GPS, and use the Internet to search for the Geographic Database (GDB) provided by the area regulator to determine which frequency channels Available at a specific time and place. The body layer uses OFDM and is based on 802.11ac.

Damage and reduction of the line due to materials such as bricks and concrete in the UHF and VHF bands is less than the 2.4 and 5 GHz bands, which increases the potential. The width of the frequency channels depends on the control range of 6 to 8 MHz. Four channels can be connected to one or two connected units.

MIMO activation is possible with four streams that can be used for time blocking code (STBC) or multi-user activation (MU). The data rate is 26.7 MHz for local current for 6 and 7 MHz channels and 35.6 MHz for 8 MHz channels. With four local streams and four connected channels, the maximum data rate is 426.7 MHz per second for 66 and 7 MHz and 568.9 MHz for 8 MHz channels.

VI. CONCLUSION

It is obvious how WIFI technology has developed during the last few years.

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Bethany Rowe is a scientist with MS.C in computer sciences.

