IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

Study of Wifi Networking

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***Abstract* :** Wi-Fi, an acronym for Wireless-Fidelity which is the wireless way to handle networking.The main aim of this paper is wireless networking achieved by Wi-Fi.This paper introduces Wi-Fi technology and states the history of this technology in brief.We then deal with the different ways of wireless networking,connecting wi-fi and with wi-fi security.This paper concludes with the pros and cons of this technology and it's future. Wireless networking has very important features as it offer firm and user's flexibility, and portability with in the budget. It allow the users to get access to the network without the physical wired tied between them. It uses high frequency radio waves to communicate between devices. Early users of wireless technology primarily have been the military, emergency services, and law enforcement organizations. These services have stringent service requirements from the network infrastructure. These requirements supersede the requirements of general traffic data. The protocols used for such services are Enhanced Distributed Coordination Function(EDCF) and Hybrid Coordination Function(HCF). To get a better understanding of these protocols, we will also understand Distributed Coordination Function(DCF) and Point Coordination Function(PCF).Wifi or Wireless Fidelity is a wireless standard of wireless Networking. Formerly , Wi-Fi was used on to wireless devices and Local Area Network (LAN), but now is more used for Internet data accessing. 802.11 standard was legitimated in 1997 and operated at a frequency of 2.4 GHz. WIFI technology requires small antenna, lightweight, inexpensive, and easy to be produced.

Keywords :- : LAN-Wi-Fi, Ad-hoc, Infrastructure, Construction of the network

I. INTRODUCTION

With the widespread use of mobile terminals, such as laptop, Wireless Fidelity(Wi-Fi) phone, PDA, etc, the demand for wireless access has become increasingly prominent[1]. In recent years, the wireless networks developed rapidly. Among so many wireless standards, WiFi technology won the favor of people because of its lower construction and operating costs, higher data rate, farther transmission distance and better extensibility, etc. Wi-Fi, so called wireless broadband, is widely applied in the mobile connection of home and small office network because of its flexibility and mobility. Especially in recent years, the number of wireless access point(AP) is increased rapidly. This makes the applications of wireless network more convenient and efficient. Besides, the APs can be set in public areas. Wireless metropolitan area networks exist in foreign countries based on wireless network standard. Some domestic universities also have been covered by the wireless local area networks(WLAN). Therefore, the position of WiFi in WLAN will become increasingly strong. Wi-Fi Networking Equipments Wi-Fi is a wireless network consisting of wireless network adapter and AP . AP is commonly called as access point or a network bridge, which is a bridge between traditional wired local networks and wireless local network. Wireless network adapter is the client device responsibling for receiving transmit signals from AP. The common Networking Scheme Compared with wired networks, the construction of wireless network is more flexible and convenient. For the networking with two computers, point-to-point structure can be used and the wireless AP is not required. For the networking with more than two computers, the infrastructure mode is used. A wireless AP (or wireless router) is adopted as the center of network [13]. (1)Ad-Hoc network Ad-Hoc network is the simplest wireless LAN topology. It is also known as point-to-point network or peer-to-peer network. It consists of a group of computers with wireless interfaces (wireless client). These wireless clients share the same workgroup name, extended service set identifier(ESSID) and password. Any two sites on the network can communicate directly .A whole new industry has been developed by wireless networking for voice telephony. Adding mobile access to the telephony mix had profound influences on the voice calls market because callers could be connected to individuals, not computers. We are at the height of an equally profound shift in networking for computers.Wireless telephony has been popular becuase it allows people to communicate with each other regardless of venue. For Internet access, modern technology aimed at computer networks promise to do the same. Thus far, 802.11 has become the

most popular wireless data networking technology. A wireless network is a flexible data communications system, which uses wireless media such as radio frequency technology to transmit and receive data over the air, minimizing the need for wired connections (What is Wireless LAN, White Paper). Wireless networks are used to augment rather than replace wired networks and are most commonly used to provide last few stages of connectivity between a mobile user and a wired network.Wireless networks use electromagnetic waves to communicate information from one point to another without relying on any physical connection. Radio waves are often referred to as radio carriers because they simply perform the function of delivering energy to a remote receiver. The data being transmitted is superimposed on the radio carrier so that it can be accurately extracted at the receiving end. Once data is superimposed (modulated) onto the radio carrier, the radio signal occupies more than a single frequency, since the frequency or bit rate of the modulating information adds to the carrier. Multiple radio carriers can exist in the same space at the same time without interfering with each other if the radio waves are transmitted on different radio frequencies. To extract data, a radio receiver tunes in one radio frequency while rejecting all other frequencies. The modulated signal thus received is then demodulated and the data is extracted from the signal.

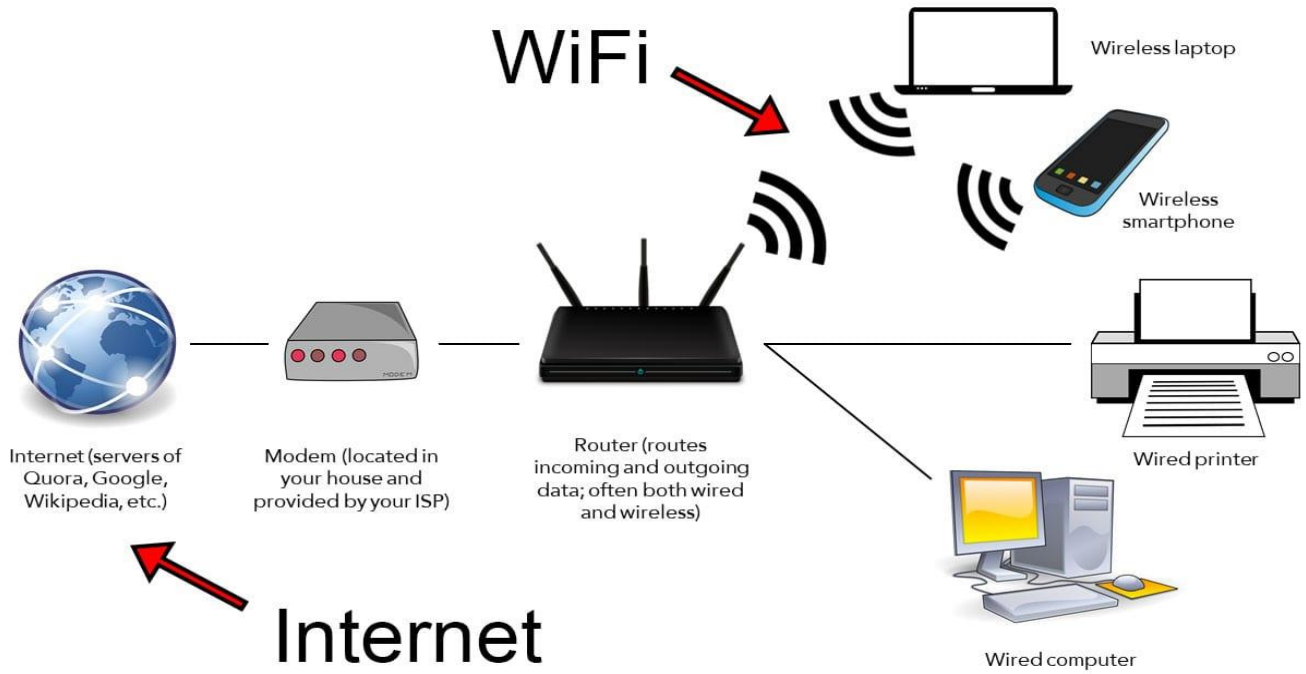
Wireless networks offer the following productivity, convenience, and cost advantages over traditional wired networks:

- Mobility: provide mobile users with access to real-time information so that they can roam around in the network without getting disconnected from the network. This mobility supports productivity and service opportunities not possible with wired networks.
- Installation speed and simplicity: installing a wireless system can be fast and easy and can eliminate the need to pull cable through walls and ceilings.
- Reach of the network: the network can be extended to places which can not be wired
- More Flexibility: wireless networks offer more flexibility and adapt easily to changes in the configuration of the network.
- Reduced cost of ownership: while the initial investment required for wireless network hardware can be higher than the cost of wired network hardware, overall installation expenses and life-cycle costs can be significantly lower in dynamic environments.
- Scalability: wireless systems can be configured in a variety of topologies to meet the needs of specific applications and installations. Configurations can be easily changed and range from peer-to-peer networks suitable for a small number of users to large infrastructure networks that enable roaming over a broad area.
- New Services: Wireless communication systems provide various smart services like SMS and MMS
- Roaming Servces:Using a wireless network system, you can provide service any where any time including train, buses, aeroplanes etc.
- Mentainablity: In a wireless system, you do not have to spend too much cost and time to maintain the network setup.
- Simplicity: Wireless communication system are easy and fast to deploy in comparison of cabled network. Initial setup cost could be a bit high but other advantages overcome that high cost.

Bluetooth and 802.11b have the potential to dramatically alter how people use devices to connect and communicate in everyday life. Bluetooth is a low-power, short-range technology for ad hoc cable replacement; it enables people to wirelessly combine devices wherever they bring them.Conversely, 802.11b is a moderate-range, moderate-speed technology based on Ethernet; it allows people to wirelessly access an organizational network throughout a campus location. Although the technologies share the 2.4 GHz band, have some potentially overlapping applications, and have been pitted against each other in the press, they do not compete and can even been successfully combined for corporate use.One thing is clear, wireless technologies will continue to evolve and offer organizations and end users higher standard of life by making us more mobile and increasing our ability to interact with each other, removing distance as a barrier. There will be a time when a traveler can sit in any airport or hotel and surf the Web or connect to the home office and work. Users will be able to surf or work in places such as malls, parks, or (with smaller handheld computers) just walking down the street. Internet service providers will install larger wireless networks allowing users to connect from anywhere in the city. All of these things are possible with wireless technology.

What is Wi-Fi ?

WiFi is a wireless technology that is primarily used to connect your devices to the internet. To use WiFi, you usually have to enter a WiFi password on your device so you can connect to a local area network (LAN) via a router.Basically, WiFi allows you to surf the web without connecting your device to a phone line or a cable outlet. To do this, you need a WiFi router to take an internet signal from your modem and transform it into a radio signal. Then, your WiFi-enabled devices receive that radio signal and transform it back into an internet signal. This allows you to access the internet on your device wirelessly



Wi-Fi stands for **Wi**reless **Fi**delity. Wi-Fi is based on the IEEE 802.11 family of standards and is primarily a local area networking (LAN) technology designed to provide in-building broadband coverage.WLAN products have established themselves in the marketplace in a very short period of time. The In-Stat/MDR research agency predicts that 8.2 million Wi-Fi units will have been sold by 2003. The surprisingly intense interest shown by consumers and manufacturers alike is an indication that however much the technology may change, it is here to stay (see the Gemma Paulo interview in Chapter 8, “Where No One Has Roamed Before”)

Wirelessly Wired

According to International Data Corporation (IDC), about half of all American households now have a computer. More than 20 million of them have more than one. Most purchases of personal computers are not by first-time buyers, but by those who already have one. IDC also estimates that by 2004, some 4.2 million U.S. homes will have Wi-Fi networks. But you may be asking yourself, “Since I’ve gotten along fine without a network at home, why do I need one now?” A Wi-Fi home network will enable you to

■ Share a single high-speed Internet connection and Internet service provider (ISP) among several PCs at once.

■ Feed one printer from several PCs.

■ Exchange pictures, audio files, and spreadsheets among all your PCs.

■ Back up data between PCs.

■ Remotely control one PC from another.

■ Play games against other players on other PCs in the house or in other locations.

■ Work anywhere around the house.

■ Send live video from your backyard.

■ Use your laptop without having to plug anything in.

■ Work at home as you do at work or make your home-based business competitive.

Wireless Wide Area Network (WWAN)

This network enables you to access the Internet via a wireless wide area network (WWAN) access card and a PDA or laptop.

These networks provide a very fast data speed compared with the data rates of mobile telecommunications technology, and their range is also extensive. Cellular and mobile networks based on CDMA and GSM are good examples of WWAN.

Wireless Personal Area Network (WPAN)

These networks are very similar to WWAN except their range is very limited.

Wireless Local Area Network (WLAN)

This network enables you to access the Internet in localized hotspots via a wireless local area network (WLAN) access card and a PDA or laptop. It is a type of local area network that uses high-frequency radio waves rather than wires to communicate between nodes. These networks provide a very fast data speed compared with the data rates of mobile telecommunications technology, and their range is very limited. Wi-Fi is the most widespread and popular example of WLAN technology.

Wireless Metropolitan Area Network (WMAN)

This network enables you to access the Internet and multimedia streaming services via a wireless region area network (WRAN).**T**hese networks provide a very fast data speed compared with the data rates of mobile telecommunication technology as well as other wireless network, and their range is also extensive.

Wireless Broadband Access (WBA)

Broadband wireless is a technology that promises high-speed connection over the air. It uses radio waves to transmit and receive data directly to and from the potential users whenever they want it. Technologies such as 3G, Wi-Fi, WiMAX and UWB work together to meet unique customer needs.

WBA is a point-to-multipoint system which is made up of base station and subscriber equipment. Instead of using the physical connection between the base station and the subscriber, the base station uses an outdoor antenna to send and receive high-speed data and voice-to-subscriber equipment.

WBA offers an effective, complementary solution to wireline broadband, which has become globally recognized by a high percentage of the population.

WiMAX is one of the hottest broadband wireless technologies around today. WiMAX systems are expected to deliver broadband access services to residential and enterprise customers in an economical way.

Loosely, WiMax is a standardized wireless version of Ethernet intended primarily as an alternative to wire technologies (such as Cable Modems, DSL and T1/E1 links) to provide broadband access to customer premises.

More strictly, WiMAX is an industry trade organization formed by leading communications, component, and equipment companies to promote and certify compatibility and interoperability of broadband wireless access equipment that conforms to the IEEE 802.16 and ETSI HIPERMAN standards.

WiMAX would operate similar to WiFi, but at higher speeds over greater distances and for a greater number of users. WiMAX has the ability to provide service even in areas that are difficult for wired infrastructure to reach and the ability to overcome the physical limitations of traditional wired infrastructure.

WiMAX was formed in April 2001, in anticipation of the publication of the original 10-66 GHz IEEE 802.16 specifications. WiMAX is to 802.16 as the WiFi Alliance is to 802.11.

Range

Wi-Fi typically provides local network access for a few hundred feet with the speed of up to 54 Mbps, a single WiMAX antenna is expected to have a range of up to 40 miles with the speed of 70 Mbps or more. As such, WiMAX can bring the underlying Internet connection needed to service local Wi-Fi networks.

Scalability

Wi-Fi is intended for LAN applications, users scale from one to tens with one subscriber for each CPE device. Fixed channel sizes (20MHz).

WiMAX is designed to efficiently support from one to hundreds of Consumer premises equipments (CPE)s, with unlimited subscribers behind each CPE. Flexible channel sizes from 1.5MHz to 20MHz.

Bit rate

Wi-Fi works at 2.7 bps/Hz and can peak up to 54 Mbps in 20 MHz channel.

WiMAX works at 5 bps/Hz and can peak up to 100 Mbps in a 20 MHz channel.

Quality of Service

Wi-Fi does not guarantee any QoS but WiMax will provide your several level of QoS.

As such, WiMAX can bring the underlying Internet connection needed to service local Wi-Fi networks. Wi-Fi does not provide ubiquitous broadband while WiMAX does.

WiMAX is a wireless broadband solution that offers a rich set of features with a lot of flexibility in terms of deployment options and potential service offerings. Some of the more salient features that deserve highlighting are as follows −

Two Type of Services

WiMAX can provide two forms of wireless service −

Non-line-of-sight − service is a WiFi sort of service. Here a small antenna on your computer connects to the WiMAX tower. In this mode, WiMAX uses a lower frequency range -- 2 GHz to 11 GHz (similar to WiFi).

> **Line-of-sight** − service, where a fixed dish antenna points straight at the WiMAX tower from a rooftop or pole. The line-of-sight connection is stronger and more stable, so it's able to send a lot of data with fewer errors. Line-of-sight transmissions use higher frequencies, with ranges reaching a possible 66 GHz.

OFDM-based Physical Layer

The WiMAX physical layer (PHY) is based on orthogonal frequency division multiplexing, a scheme that offers good resistance to multipath, and allows WiMAX to operate in NLOS conditions.

Very High Peak Data Rates

WiMAX is capable of supporting very high peak data rates. In fact, the peak PHY data rate can be as high as 74Mbps when operating using a 20MHz wide spectrum.More typically, using a 10MHz spectrum operating using TDD scheme with a 3:1 downlink-to-uplink ratio, the peak PHY data rate is about 25Mbps and 6.7Mbps for the downlink and the uplink, respectively.

Scalable Bandwidth and Data Rate Support

WiMAX has a scalable physical-layer architecture that allows for the data rate to scale easily with available channel bandwidth.

For example, a WiMAX system may use 128, 512, or 1,048-bit FFTs (fast fourier transforms) based on whether the channel bandwidth is 1.25MHz, 5MHz, or 10MHz, respectively. This scaling may be done dynamically to support user roaming across different networks that may have different bandwidth allocations.

Adaptive Modulation and Coding (AMC)

WiMAX supports a number of modulation and forward error correction (FEC) coding schemes and allows the scheme to be changed as per user and per frame basis, based on channel conditions.

AMC is an effective mechanism to maximize throughput in a time-varying channel.

Robust Security

WiMAX supports strong encryption, using Advanced Encryption Standard (AES), and has a robust privacy and key-management protocol.

The system also offers a very flexible authentication architecture based on **Extensible Authentication Protocol (EAP)**, which allows for a variety of user credentials, including username/password, digital certificates, and smart cards

Support for Mobility

The mobile WiMAX variant of the system has mechanisms to support secure seamless handovers for delay-tolerant full-mobility applications, such as VoIP.

IP-based Architecture

The WiMAX Forum has defined a reference network architecture that is based on an all-IP platform. All end-to-end services are delivered over an IP architecture relying on IP-based protocols for end-to-end transport, QoS, session management, security, and mobility.

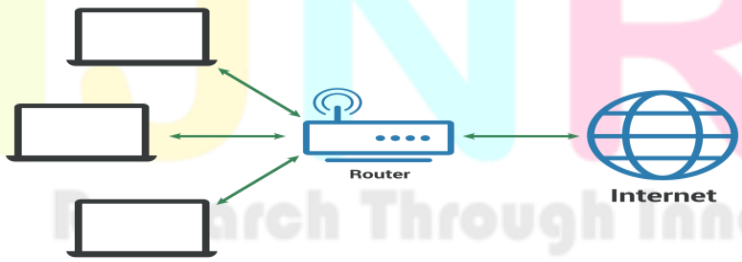
A WiMAX system consists of two major parts −

- A WiMAX base station.
- A WiMAX receiver

II. METHODOLOGY

What does 'LAN' stand for

LAN stands for local area network. A network is a group of two or more connected computers, and a LAN is a network contained within a small geographic area, usually within the same building. Home WiFi networks and small business networks are common examples of LANs. LANs can also be fairly large, although if they take up multiple buildings, it is usually more accurate to classify them as wide area networks (WAN) or metropolitan area networks (MAN).



III. CONCLUSION

Hence we Had studies wifi networking.

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