

WIRELESS COMMUNICATION TECHNOLOGY

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ABSTRACT: communication between one person to another without the help of any other wires is known as wireless communication. Moving on to the present technology, wireless communication plays a vital role in our day to day life. Electrical gadgets used by us were completely wireless and the best examples for wireless communication are mobile phones and computers. These includes WIFI, BLUETOOTH, etc. , introduction of **BLUE EYE** technology and **LIFI** technology leads to the development of the software.

KEY WORDS : Introduction, types of wireless communications, history, services, applications, categories of implementations of devices and standards, advantages, about the author and co-authors, references

1. INTRODUCTION

Wireless communication is a broad term that incorporates all procedures and forms of connecting and communicating between two or more devices using a wireless signal through wireless technology, Communication technology and devices. Wireless communication plays a significant role in day to day life. Besides communication, Wireless technology has become an integral part of our daily activities.

The transmission of data or information from one place to another wirelessly is referred as wireless communication. It involves in the sharing of data without any help of any wires. Wireless communication is the fastest growing and most vibrant technological areas in the communication field. It is the transfer of information or power between two or more points that are not connected by an electrical conductor. The most common wireless technologies use RADIO WAVES.

2. TYPES OF WIRELESS COMMUNICATIONS

The different types of wireless communication mainly include IR wireless communication, satellite communication, broadcast radio, Microwave radio, Bluetooth, Zigbee etc.

2.1 Satellite Communication

Satellite communication is one type of self contained wireless communication technology; it is widely spread all over the world to allow users to stay connected almost anywhere on the earth. When the signal (a beam of modulated microwave) is sent near the satellite then, satellite amplifies the signal and

sent it back to the antenna receiver which is located on the surface of the earth. Satellite communication contains two main components like the space segment and the ground segment. The ground segment consists of fixed or mobile transmission, reception and ancillary equipment and the space segment, which mainly is the satellite itself.



Satellite Communication

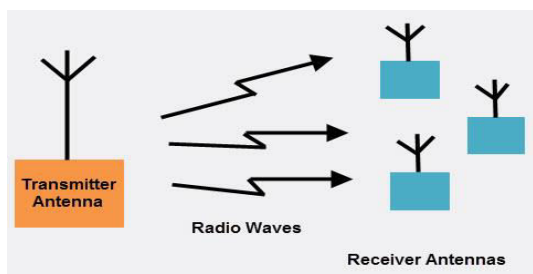
2.2 Infrared Communication

Infrared wireless communication communicates information in a device or systems through IR radiation . IR is electromagnetic energy at a wavelength that is longer than that of red light. It is used for security control, TV remote control and short range communications. In the electromagnetic spectrum, IR radiation lies between microwaves and visible light. So, they can be used as a source of communication. For a successful infrared communication, a photo LED transmitter and a photo diode receptor are required. The LED transmitter transmits the IR signal in the form of non visible light, that is captured and saved by the photoreceptor. So the information between the source and the target

is transferred in this way. The source and destination can be mobile phones, TVs, security systems, laptops etc supports wireless communication.

2.3 Broadcast Radio

The first wireless communication technology is the open radio communication to seek out widespread use, and it still serves a purpose nowadays. Handy multichannel radios permit a user to speak over short distances, whereas citizen's band and maritime radios offer communication services for sailors. Ham radio enthusiasts share data and function emergency communication aids throughout disasters with their powerful broadcasting gear, and can even communicate digital information over the radio frequency spectrum.



Broadcast Radio

Mostly an audio broadcasting service, radio broadcasts sound through the air as radio waves. Radio uses a transmitter which is used to transmit the data in the form of radio waves to a receiving antenna (Different Types of Antennas). To broadcast common programming, stations are associated with the radio N/W's. The broadcast happens either in simulcast or syndication or both. Radio broadcasting may be done via cable FM, the net and satellites. A broadcast sends information over long distances at up to two megabits/Sec (AM/FM Radio).

Radio waves are electromagnetic signals that are transmitted by an antenna. These waves have completely different frequency segments, and you will be ready to obtain an audio signal by changing into a frequency segment.

Bluetooth Technology

The main function of the Bluetooth technology is that permits you to connect a various electronic devices wirelessly to a system for the transferring of data. Cell phones are connected to hands free earphones, mouse, and wireless keyboard. By using Bluetooth device the information from one device to another

device. This technology has various functions and it is used commonly in the wireless communication market.



Bluetooth Technology

Wi-Fi

Wi-Fi is a low power wireless communication that is used by various electronic devices like smart phones, laptops, etc. In this setup, a router works as a communication hub wirelessly. These networks allow users to connect only within close proximity to a router. Wi-Fi is very common in networking applications which affords portability wirelessly. These networks need to be protected with passwords for the purpose of security, otherwise it will access by others



Wi-Fi Communication

Mobile Communication Systems

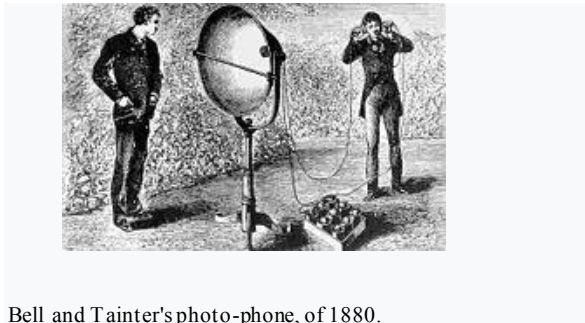
The advancement of mobile networks is enumerated by generations. Many users communicate across a single frequency band through mobile phones. Cellular and cordless phones are two examples of devices which make use of wireless signals. Typically, cell phones have a larger range of networks to provide coverage. But, Cordless phones have a limited range. Similar to GPS devices, some phones make use of signals from satellites to communicate.



Mobile Communication Systems

3. HISTORY

Photo phone



Bell and Tainter's photo-phone, of 1880.

The world's first wireless telephone conversation occurred in 1880, when Alexander Graham Bell and Charles Sumner Tainter invented and patented the photo-phone, a telephone that conducted audio conversations wirelessly over modulated light beams (which are narrow projections of electromagnetic waves). In that distant era, when utilities did not yet exist to provide electricity and lasers had not even been imagined in science fiction, there were no practical applications for their invention, which was highly limited by the availability of both sunlight and good weather. Similar to free-space optical communication, the photophone also required a clear line of sight between its transmitter and its receiver. It would be several decades before the photo phone's principles found their first practical applications in communications and later in fiber-optic communications.

A number of wireless electrical signaling schemes including sending electric currents through water and the ground using electrostatic and electromagnetic induction were investigated for telegraphy in the late 19th century before practical radio systems became available. These included a patented induction system by Thomas Edison allowing a telegraph on a running train to connect with telegraph wires running parallel to the tracks, a William Preece induction telegraph

system for sending messages across bodies of water, and several operational and proposed telegraphy and voice earth conduction systems.

The Edison system was used by stranded trains during the Great Blizzard of 1888 and earth conductive systems found limited use between trenches during World War I but these systems were never successful economically.

Radio waves



Marconi transmitting the first radio signal across the Atlantic.

In 1894, Guglielmo Marconi began developing a wireless telegraph system using radio waves, which had been known about since proof of their existence in 1888 by Heinrich Hertz, but discounted as communication format since they seemed, at the time, to be a short range phenomenon.^[6] Marconi soon developed a system that was transmitting signals way beyond distances anyone could have predicted (due in part to the signals bouncing off the then unknown ionosphere). Guglielmo Marconi and Karl Ferdinand Braun were awarded the 1909 Nobel Prize for Physics for their contribution to this form of wireless telegraphy.

4. SERVICES

Common examples of wireless equipment include

- Infrared and ultrasonic remote control devices
- Professional LMR (Land Mobile Radio) and SMR (Specialized Mobile Radio) typically used by business, industrial and Public Safety entities.
- Consumer Two-way radio including FRS Family Radio Service, GMRS (General Mobile Radio Service) and Citizens band ("CB") radios.

- The Amateur Radio Service (Ham radio).
- Consumer and professional Marine VHF radios.
- Airband and radio navigation equipment used by aviators and air traffic control
- Cellular telephones and pagers: provide connectivity for portable and mobile applications, both personal and business.

5. APPLICATIONS

Mobile telephones

One of the best-known examples of wireless technology is the mobile phone, also known as a cellular phone, with more than 6.6 billion mobile cellular subscriptions worldwide as of the end of 2010. These wireless phones use radio waves from signal-transmission towers to enable their users to make phone calls from many locations worldwide. They can be used within range of the mobile telephone site used to house the equipment required to transmit and receive the radio signals from these instruments.

Data communications

"Wireless Internet" redirects here. For all wireless Internet access, see Wireless broadband. For mobile wireless Internet, see Mobile broadband.

Wireless data communications allows wireless networking between desktop computers, laptops, tablet computers, cell phones and other related devices. The various available technologies differ in local availability, coverage range and performance, and in some circumstances users employ multiple connection types and switch between them using connection manager software or a mobile VPN to handle the multiple connections as a secure, single virtual network. Supporting technologies include:

Wi-Fi is a wireless local area network that enables portable computing devices to connect easily with other devices, peripheries, and the Internet. Standardized as IEEE 802.11 a, b, g, n, ac, ax, Wi-Fi has link speeds similar to older standards of wired Ethernet. Wi-Fi has become the de facto standard for access in private homes, within offices, and at public hotspots. Some businesses charge customers a monthly fee for

service, while others have begun offering it free in an effort to increase the sales of their goods.

Cellular data service offers coverage within a range of 10-15 miles from the nearest cell site. Speeds have increased as technologies have evolved, from earlier technologies such as GSM, CDMA and GPRS, through 3G, to 4G networks such as W-CDMA, EDGE or CDMA2000.^{[20][21]} As of 2018, the proposed next generation is 5G.

Low-power wide-area networks (LPWAN) bridge the gap between Wi-Fi and Cellular for low bitrate Internet of things (IoT) applications.

Mobile-satellite communications may be used where other wireless connections are unavailable, such as in largely rural areas^[22] or remote locations. Satellite communications are especially important for transportation, aviation, maritime and military use

Wireless sensor networks are responsible for sensing noise, interference, and activity in data collection networks. This allows us to detect relevant quantities, monitor and collect data, formulate clear user displays, and to perform decision-making functions

Wireless data communications are used to span a distance beyond the capabilities of typical cabling in point-to-point communication and point-to-multipoint communication, to provide a backup communications link in case of normal network failure, to link portable or temporary workstations, to overcome situations where normal cabling is difficult or financially impractical, or to remotely connect mobile users or networks. New wireless technologies, such as mobile body area networks (MBAN), have the capability to monitor blood pressure, heart rate, oxygen level and body temperature. The MBAN works by sending low powered wireless signals to receivers that feed into nursing stations or monitoring sites. This technology helps with the intentional and unintentional risk of infection or disconnection that arise from wired connections.

6. Categories of implementations, devices and standards

- Cellular networks: 0G, 1G, 2G, 3G, Beyond 3G (4G), Future wireless

- Cordless telephony: DECT (Digital Enhanced Cordless Telecommunications)
- Land Mobile Radio or Professional Mobile Radio: TETRA, P25, OpenSky, EDACS, DMR, dPMR

List of emerging technologies

- Radio station in accordance with ITU RR (article 1.61)
- Radiocommunication service in accordance with ITU RR (article 1.19)

Radio communication system

- Short-range point-to-point communication: Wireless microphones, Remote controls, IrDA, RFID (Radio Frequency Identification), TransferJet, Wireless USB, DSRC (Dedicated Short Range Communications), EnOcean, Near Field Communication
- Wireless sensor networks: ZigBee, EnOcean; Personal area networks, Bluetooth, TransferJet, Ultra-wideband (UWB from WiMedia Alliance).
- Wireless networks: Wireless LAN (WLAN), (IEEE 802.11 branded as Wi-Fi and HiperLAN), Wireless Metropolitan Area Networks (WMAN) and (LMDS, WiMAX, and HiperMAN)

7. Advantages of Wireless Communication

- Any data or information can be transmitted faster and with a high speed
- Maintenance and installation is less cost for these networks.
- The internet can be accessed from anywhere wirelessly
- It is very helpful for workers, doctors working in remote areas as they can be in touch with medical centers.

8. Disadvantages of Wireless Communication

- An unauthorized person can easily capture the wireless signals which spread through the air.
- It is very important to secure the wireless network so that the information cannot be misused by unauthorized user

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S.VENKATA SREERAM studying 1st year B.tech with COMPUTER SCIENCE AND ENGINEERING in Sri Mittapalli College of engineering, tummalapalem, Guntur(dist), Andhra Pradesh. Completed intermediate with **91%** in Sri Chaitanya Jr College, Tenali. He was awarded with “**BEST PRESENTATION AWARD**” by his presentation of paper to **IARDET** on 06-01-2019.

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