

# Computer Network and Wireless Networking

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## ABSTRACT

The communication is bringing fundamental changes to data networking and telecommunications. Broadband wireless networks, wireless LAN, mobile radio networks and cellular system, combine to produce mobile computing and communication anywhere. This paper presents an overview of wireless networking with emphasis on most standard: such as Bluetooth and wifi, cellular networks. The Main example of wireless Communication is Bluetooth, WiFi. The paper is also advances some of the major security risks that wireless network face. Computer network are made up of interconnected computer devices which communicate with each other and these networks are categorized by their sizes.

**Keywords :** LAN, WiFi, wireless networking, MAN, PAN, OSI, WLAN

## I. INTRODUCTION

Wireless technology uses radio waves to transmit information without cables. The wireless communication have been used since 1876. The invention of the computer and the subsequent creation of communication networks can be hailed at the most significant accomplishment of the 21st century. This invention has transformed the way in which communication and information processing takes place. The network functionality of computer system has been exploited by the government, business, and individuals with immense benefits being reaped by all. The main example of wireless network is like Wi-Fi and Bluetooth. In wireless system the communication between two devices without wired. In this technology uses radio waves to transformation information without cables or wired. This technology is now widely used to create wireless computer networks. The smallest network is a personal area network is range few meters.

### Computer Networks:

Computer networks are made up of interconnected computing devices which communicate with each other and these networks are categorized by their sizes. The smallest network is a personal area network its range is few meters...The main example of pan is Bluetooth...that is used few meters. Wireless PANs

make use of technologies such as Bluetooth to replace cabling as data is moved from device to device. The LAN which is design to cover the buildings... it extends from few hundred meters. Wireless LANs are implemented in facilities such as campuses and busy business locations. Metropolitan Area Networks (MANs) connect different buildings and facilities within a city. These networks mostly make use of wired connections with fiber optic transmissions providing the fastest speeds. The biggest networks are wide area network. The wide area network which is connects cities and countries. Up to speed 40Gbps...The PAN is totally different from other network its range is very few meters like a Bluetooth. The LAN is local area network that is covering the buildings. Its speed is faster than other network.

### What is Wireless Networking?

Wireless networks are computer networks that are not connected by cables of any kind. The use of wireless network enables enterprise to avoid the costly process to introducing cables into buildings or as a connection btw different equipment locations. Network that uses wireless data connections between network nodes. Wireless networking is a method by which homes, telecommunications networks, the costly process of introducing cables into a building, or as a connection between various equipment

locations. Wireless telecommunications networks are generally implemented and administered using radio communication. This implementation takes place at the physical level (layer) of the OSI model network structure. Examples of wireless networks include cell phone networks, wireless local area networks (WLANs), Wireless local area network. The wireless is the network which is used INS homes ,telecommunications..All wireless networks make use of waves in the electromagnetic spectrum range. For example, Wireless local-area networks which covers the Area of buildings.LAN is very high speed than other network .The wireless LAN is a local area network it is fast than other network. Wireless networks also use the Open System Interconnect (OSI) reference model in the transmission of data. . At the Physical layer, the data is transmitted in the form of radio waves..The wireless system is used in OSI model to transmit the data between layers.

### **What we need to Build a Wireless Networking**

Before a wireless network can be built it is important to run a site survey. While this step may be ignored when implementing a small wireless network, it is of extreme importance when building a large wireless network. This is because wireless networks operate the same frequency band used by other equipment such as garage-door openers and microwave ovens and avoiding interference from such equipments is importance if the goal of reliable communication is to be achieved by the wireless network. Ganesh and Pahlavan (2000) note that the largest investment cost in setting up a wireless network is the cost of the physical site location.

There are a number of hardware and software components that are required in implementing a wireless network. One integral hardware device is an access point which is the device linking the wireless network to a wired LAN. Wi-Fi Alliance is notes that the access point is the device that transmits and receives the signals which are used for communicating between the computing devices in the network. Wireless access points have varying capacities and the size chosen is dependent on the speed desired in the network. The device should be placed at a central location and at a high vantage point in order to avoid obstacles and ensure that as many users have access to the network. There are a number of significant factors

that one has to consider when acquiring the hardware for the wireless network. Interoperability of the equipment is an important factor if the network is to support all the available protocols (such as . The range which the network is expected to span is also an important consideration. Specifications such as the transmission power and the antenna gain should be used to calculate the range of the equipment. It is the important run for site survey.

In most cases, wireless networks are also connected to the internet. A router which is a device that enables a single internet connection to be shared by many computing devices on the same network is applicable in such a scenario. The range personal networking devices that can access the wireless networks is great and it includes; laptops, personal digital assistants, tablet PCs, and pocket PCs. All the devices accessing the network need to be equipped with an operating system that allows for communication across a wireless network. Wireless access points and the client devices that are connected to them must be properly configured in order for them to operate a TCP/IP network. The wireless clients to a network receive their configuration details from a DHCP which gives the devices their IP addresses, default gateways, and subnet masks. In cases where the administrator wishes to greatly restrict the users, the IP addresses may be imputed manually.

### **Wireless technologies:**

At the end of 19th century ,the first wireless communication system were introduced and the technology has significantly been developed over the intervening and subsequent years.Today ,the term wireless refers to a variety of devices and technologies ranging from smart phones to laptops, tabs, computer, printer, Bluetooth.

### **Types of wireless communication technologies:**

In recent days, the wireless communication technology has become an integral part of several types of communication devices as it allows users to communicate even from remote areas .the devices used for wireless communication are cordless telephone, mobile, GPS, units, zigbee technology, wireless computer parts, and satellite television, etc.

## **Satellite:**

The satellite is the wireless communication btw devices. Satellite communication is one of the wireless technologies, which is widely spread all over the world allowing users to stay connected virtually anywhere on the earth. The satellite used in the mode of communication, communication directly with the orbiting satellite via radio signals. Portable satellite phones and modems have more powerful broadcasting abilities than the cellular devices as they have high range, apart from being more expensive in terms of cost, than their counterparts. It is directly connected with orbiting by the use of radio signals.

For example: for outfitting a ship through satellite communications, the traditional communication system is linked with satellite, which allows multiple users to share the same broadcast equipment.

## **Wireless Networking**

Wireless networking technologies connect multiple computers, system and devices together without requiring wires or cables: a wireless local area network or WLAN comes under Wi-Fi.

## **Bluetooth:**

The Bluetooth is a wireless technology. It is very short range communication. The Bluetooth is a personal area network. It is a good example of PAN. Its range is few metres. It is a short range communication. Bluetooth (IEEE 802.15.1) is the technology that is employed to undertake short-range communication. The technology is more convenient than connecting devices with a wire to communicate. Bluetooth operates in a license free band at 2.45GHz and the range is about 10m and due to this short range, the technology is sometimes categorized as a personal area network. The speed of Bluetooth is 2.1 mbps. It is very short range communication.

## **Bluetooth Characteristics:**

- Operates in the 2.4 GHz band - Packet switched
- 1 mill watt - as opposed to 500 mW cell phone
- Low cost
- 10m to 100m range
- Uses Frequency Hop (FH) spread spectrum, which divides the frequency band into a number of hop

channels. During connection, devices hop from one channel to another 1600 times per second

- Data transfer rate 1-2 megabits/second (GPRS is ~50kbits/s)
- Supports up to 8 devices in a piconet (= two or more Bluetooth units sharing a channel).
- Built-in security
- Non line-of-sight transmission through walls and briefcases
- Easy integration of TCP/IP for networking.

## **Wi-Fi:**

Wi-Fi is a short name for Wireless Fidelity. Generally, Wi-Fi refers to any type of IEEE 802.11 Wireless Local Area Network (WLAN). More specifically, Wi-Fi is the industry standard for products as defined by the Wi-Fi Alliance and conforming to IEEE 802.11 standard.

WLANs extend the reach of Local Area Networks (LANs) by providing wireless connectivity. Designed originally for cable replacement in corporate environments, WLANs have become very popular in providing IP connectivity in residential, small office and campus environments. WLANs have experienced phenomenal growth and are now a crucial part of the computer networks. There are two dominant WLAN standards; IEEE 802.11 and HiperLAN.

IEEE 802.11 standard belongs to the family of IEEE 802 standards that include Local Area Network standards and Metropolitan Area Network standards. IEEE 802.11 standard defines over-the-air protocols necessary to support networking in a local area. IEEE 802.11 specifications include physical layer and medium access control layer (MAC) and offer services to a common 802.2 logical link layer (LLC). IEEE 802.11 standard supports two configurations: ad hoc mode and infrastructure mode. The Wi-Fi is a Wireless technology.

## **Cellular networks:**

Cellular network or mobile network is communication network where the last link is Wireless. The network is distributed over land area's called cell, each served by a fixed location called transceiver known as a cell site or base site. In each station there is a base station which is connected to the wired network and which allow the mobile devices in the range to communicate with each other.

### **Features of cellular networks:**

More capacity than single large transmitter. Since the same frequency can be used for multiple links as long as they are in different cells.

Mobile devices use less power than with a single transmitter or satellite since they are closer to the tower. It covers a larger area than a transmitter.

### **Advantages of wireless network:**

**Network security:** The security of wireless is actually very good using the latest encryption technology. This can be overcome by implementing strong passwords and both hardware and software security solutions.

**Public WiFi hotspot:** The Wi-Fi hotspot is available in many streets, coffee shops, railway stations, airports, universities, and hospitals.

**Increased mobility:** Increased mobility is by far the biggest attraction that wireless networking holds for most businesses. When laptops were developed because of the new mobility convenience factor that they brought with them, this gave added impetus to the advantages of being able to work anywhere within range of the wireless network signal.

### **Scalability:**

One of the most inherent problems with a wireless network is coping with expansion. Having to add additional cabling, and reroute existing cables, can be a disruptive and costly process. Whilst every company should plan ahead when installing a wireless network, it is almost impossible to forecast future requirements accurately unless sound planning is carried out.

**Guest use:** Having a wireless network also means that a business can provide secure network access to visiting colleagues from other sites within the organization. It enables them to access the data they need and pick up and respond to their emails. It also grants internet access to visiting customers and suppliers.

**Wi-Fi is cost effective:** Using wireless technology rather than having a hard-wired network can be much more cost effective. The larger the network, both in terms of area and users, the more expensive a hard-wired

network will be installed. It's not just the amount of cabling, but the actual cost of the labor to install the raceway, and chase the cabling all through the premises; through walls, up and down different floors etc.

### **Disadvantages of wireless network:**

**Cost:** Wireless networks are typically inexpensive, but it can cost up to four times more to set up a wireless network than to set up a wired network in some cases.

**Coverage:** The range of a wireless network is limited and typically a wireless router will only allow individuals within 150 to 300 feet to access the network.

**Speed:** Wireless networks are typically slower than wired networks, sometimes even 10 times slower.

### **Security:**

Wireless networks can be accessed by any computer within range of the network's signal so information transmitted through the network may be intercepted by unauthorized users.

**Dependency:** Wireless networks are extremely susceptible to interference so radio signals, radiation, and any other similar type of interference may cause a wireless network to malfunction.

## **II. CONCLUSION**

This paper set out to discuss wireless networks which are increasingly becoming preferred over wired networks by many users. The paper began by offering an overview of networking and then proceeded to define wireless networking and discuss various technologies that are used. From the discussion provided in this paper, it is clear that wireless network solutions are increasing in popularity as they become more affordable and are adopted by more people. This paper has elaborated how wireless networks provide freedom from place restriction, scalability, and flexibility. The most popular technologies are Bluetooth, Wi-Fi, WiMAX, and cellular networks. The paper has confirmed that the mobility of wireless networks is their most desirable characteristic. It has been noted that in spite of their merits, there are few significant issues with wireless networks which are primarily: quality assurance and security issues. Wireless links are

noisier and less reliable than wired links due to the signals are transmitted. Using strong encryption standards and can resolve the security issues inherent with wireless network

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