

A BASIC STUDY OF WIRELESS NETWORKS AND TYPES OF WIRELESS NETWORKS

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ABSTRACT -Recently there have been many advances in wireless communication technology, especially in the field of wireless sensor networks, which have had rapid development and successful application in the consumer electronics market. As a result, wireless networking has attracted more interest from academic communities and other fields. From an industrial point of view, wireless networking has many advantages, including flexibility, low cost, ease of deployment, etc. Therefore, wireless networks can play an important role in industry and be used for smart factories and manufacturing systems. A wireless network is a computer network that uses wireless data connections between network nodes. Wireless networking is a method by which homes, telecommunications networks, and commercial establishments avoid the costly process of running cables through a building or connecting between different equipment locations. This article will see what wireless networks and types of wireless networks are and how they are used in everyday life. In this article, what wireless networking is and how it is used, and what the types of wireless networks are explained.

Key Words: WLAN, WPAN, WLAN, Wireless ad hoc network, WMAN, WWAN, Cellular network .

1. INTRODUCTION

A wireless network is a computer network that uses wireless data connections between network nodes.[1] Wireless networking is a method by which homes, telecommunications networks, and commercial establishments avoid the costly process of running cables through a building or connecting between different equipment

locations. Administrative telecommunications networks are usually implemented and managed using radio communications. Examples of wireless networks include cellular telephone networks, wireless local area networks (WLANs), wireless sensor networks, satellite communication networks, and terrestrial radio networks.

2. HISTORY

WIRELESS NETWORKS

The first professional wireless network was developed under the brand ALOHAnet in 1969 at the University of Hawaii and became operational in June 1971. The first commercial wireless network was the WaveLAN product family, developed by NCR in 1986.

- 1973 – Ethernet 802.3
- 1991 – 2G cell phone network
- June 1997 – 802.11 "Wi-Fi" protocol first release
- 1999 – 803.11 VoIP integration

3. Wireless Networks And their Types

3.1 Wireless pan

A Wireless Personal Area Network (WPAN) connects devices in a relatively small area, usually within reach of a person. For example, the Bluetooth radio and Invisible Infrared Light

provide WPAN for connecting the headset to the laptop. ZigBee also supports WPAN applications. [2] WiFi PANs are gaining popularity (2010) as device designers begin to integrate WiFi into a wide variety of consumer electronic devices. Windows 7's "My WiFi" and "Virtual WiFi" capabilities have made WiFi PANs simpler, and easier to install and configure. [3]

3.2 Wireless LAN

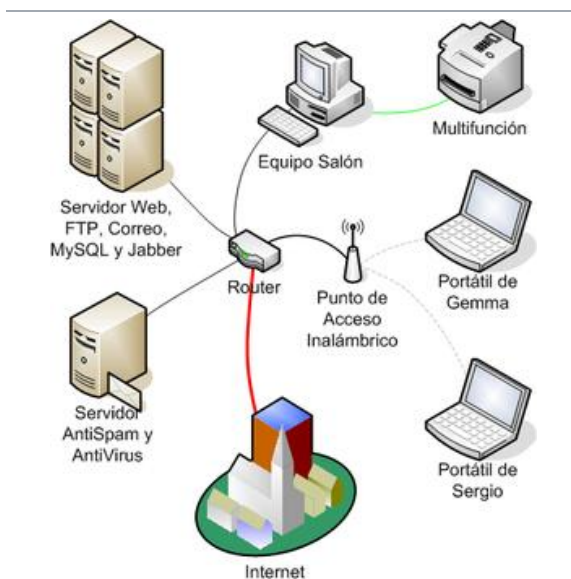


Fig 1 Wireless LAN

A WLAN (wireless local area network) uses a wireless delivery method to connect two or more devices over a short distance. It typically provides a connection through an access point for Internet access. Spread spectrum or OFDM technology allows users to move within the local coverage area and stay connected to the network.

Products that use the IEEE 802.11 WLAN standard are sold under the WiFi brand name. Fixed wireless technology implements a point-to-point connection between two remote computers or networks. Often, dedicated microwaves or modulated laser beams are used in the line-of-sight path. It is commonly used in cities to connect networks of two or more buildings without installing a wired connection. To connect to your mobile device using WiFi, you can use a device such as a WiFi router or the private hotspot feature of another mobile device.

3.3 Wireless ad hoc network

A wireless ad hoc network is also known as a wireless mesh or mobile ad hoc network (MANET), is a wireless network consisting of radio nodes organized in a mesh topology. Every node forwards messages on behalf of other nodes and each node performs routing. [4] Ad hoc networks can "self-heal" by automatically rerouting nodes that have lost power. Various network layer protocols are required to realize a mobile ad hoc network, such as distance-sequencing distance vector routing, association-based routing, on-demand distance vector routing special, and dynamic source routing.

3.4 Wireless MAN

A wireless metropolitan area network, is a type of wireless network that connects multiple wireless local area networks. WiMAX is a type of wireless MAN and is described by the IEEE 802.16 standard. [5]

3.5 Wireless WAN

A wireless WAN is a wireless network that typically covers large areas, such as between neighboring towns or between towns and suburbs. These networks can be used to connect company branches or as a public Internet access system. Wireless connections between access points are typically point-to-point microwave links using satellite dishes in the 2. GHz and 5.8 GHz bands, rather than the omnidirectional antennas used with smaller networks. A typical system includes base station gateways, access points, and wireless bridging relays. Other configurations are mesh systems where each access point also acts as a relay. When combined with renewable energy systems such as photovoltaic solar panels or wind systems, they can be stand-alone systems.

3.6 Cellular network

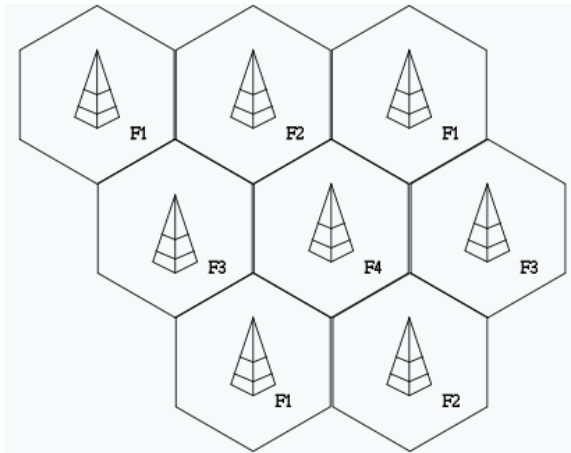


Fig 2 Example of frequency reuse factor or pattern 1/4

A mobile network or cellular network is a radio network distributed over land areas called cells, each served by at least one fixed-location transceiver, known as a base station or cell site. In cellular networks, each cell is characterized by using a different set of radio frequencies than all adjacent cells to avoid interference. When connected, these cells provide wireless coverage over a large geographic area. This allows a large number of portable transceivers (cell phones, pagers, etc.) to communicate with fixed transceivers and phones anywhere in the network via the base station. Originally targeted at mobile phones, with the development of smartphones, the mobile phone network sends data regularly in addition to the phone.

- Global Systems for Mobile Communications (GSM): GSM networks are divided into three main systems. This is a base station system, an operational and support system. Mobile phones connect to base stations, base stations connect to operation and support stations. Then establish a connection to the exchange where the call is routed. GSM is the most popular standard and is used in most mobile phones. [6]
- Personal Communications Service (PCS): PCS is a wireless band available for mobile phones in North America and South Asia. Sprint happened to be the first service to set up PCS.
- DAMPS: Due to advances in technology, the updated version of AMPS, Digital Advanced Mobile Phone Service, will be discontinued. The new GSM network replaces the old system.

3.7 Private LTE/5G networks

Private LTE / 5G networks use licensed, shared or unlicensed radio frequencies to deliver voice and data to edge devices (smartphones, embedded modules, routers, gateways). increase. 3GPP defines a private 5G network as a non-public network. Non-public networks typically use smaller deployments to meet the organization's needs for reliability, accessibility, and maintainability.

3.8 Open Source

Open source private networks are based on collaborative, community-driven software that relies on peer review and production to use, modify and share the source code.

OAI[7] provides an open source software using talent from around the world to build wireless cellular Radio Access Network (RAN) and Core Network (CN) technologies.

Firecell[8] provides the world's first open source 4G and 5G private network solutions. They are a strategic member of OAI

3.9 Global area network

A global area network (GAN) is a network used to support mobile phones over an arbitrary number of local wireless networks, satellite coverage, etc. The main challenge in mobile communications is transferring user communication from one local coverage area to another. In the IEEE 802 draft, this concerns the successor of terrestrial wireless LANs. [9]

3.10 Space network

A space network is a network used for communication between spacecraft, usually near Earth. An example of this is NASA's space network. A sparse network has far fewer links than the maximum number of links possible in that network (opposite is a high density network). Research on sparse networks is a relatively new field, primarily inspired by research on real-world networks such as social and computer networks.

4. CONCLUSION

Recently, there have been many advances in wireless communication technology, especially in

the field of wireless sensor networks, which have rapid development and successful applications in the consumer electronics market. As a result, wireless networks are gaining more attention from the academic community and other disciplines. From an industrial perspective, wireless networks offer many advantages, including flexibility, low cost, and easy deployment. Therefore, wireless networks can play an important role in the industry and can be used in smart factories and manufacturing systems. This article explained what a wireless network is, how to use it, and what types of wireless networks it is.

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