COMPACT DISCOURSE ON WIRELESS NETWORK STANDARDS

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Abstract : In today's technological era the wireless technology is omnipresent. In smart gadgets, in sound framework, in vehicle, or even in furnishings, we can discover these devices that are completed with wireless technology. Wireless communication is the exchange of data between at least two points that are not associated by an electrical conductor. The most widely recognized wireless technology utilize radio frequency. Wireless transmission is a type of unguided media. This paper centers on various wireless communication innovations, their applications and their examination.

Index Terms **- Wireless Technology, Bluetooth, Wi-Fi, Lifi, Radiofrequency**

I. INTRODUCTION

Wireless communication is the transfer of information between two or more points that are not connected by an electrical conductor. The most common wireless technologies use radio. Wireless transmission is a form of unguided media. Wireless communication involves no physical link established between two or more devices, communicating wirelessly. Wireless signals are spread over in the air and are received and interpreted by appropriate antennas. *we can define that wireless technology is a data transferring technology that doesn't use wire.* In more technological definition, wireless technology / wireless communication is a power or information transfer between two or more devices which are not connected through electrical conductor. But, this term has come through several phases of technological history. The term wireless refers to the communication of information over a distance, without requiring wires, cables or electrical conductors. Information is transmitted through air , without requiring any cables by using electromagnetic waves like radio frequencies, infrared, satellite etc.

II. Evolution of Wireless Technology

In 1890, the term "wireless" is used to define transmitting and receiving radio technology, with wireless telegraph as the example. But, stepping the year 1920, the term "radio" replaced "wireless" to be used in the exactly the same technology. *While in the modern use, in early 20s, the term "wireless" started to be used to define the technology that doesn't requires cables. During that time period until now, many people use "wireless" term to refer technology such as Bluetooth, WLAN, NFC, RFID, ZigBee and LTE and many more.* Moreover, to complete the Wireless Technology Introduction information, let's talk about the common way of transmission used in this kind of communication technology. Most wireless technology use radio. They employ radio frequency to communicate to each other.

So, the wired connection is no longer needed. Another way of transmission that used in wireless communication is electromagnetic signal. Here, this communication uses light, electric fields, sound, or even magnetic field to do data transfer

III. Working of Wireless Technology

Inside the wireless phone, there is a compact speaker, a microphone, a keyboard, a display screen, and a power- full circuit board with microprocessors that make each phone a miniature computer. When connected to a wireless network, this bundle of technologies allows people to make phone calls or exchange data with other phones and computers around the world. Wireless networks operate on a grid that divides cities or regions into smaller cells.

With wireless data services, one can receive faxes, browse the Internet, sends and receives emails or play video games, all on the wireless phone. Every cell uses a set of radio frequencies or channels to provide service in its specific area. There is a base station consisting of a wireless antenna and other radio equipment. When one turn on wireless phone, it searches for a signal to confirm that service is available. Then the phone transmits certain identification numbers, so the network can verify the customer information—such as the wireless provider and phone number.

IV. Wireless Communication Technologies

There are numerous wireless communication technologies available that differs in some characteristics. This section entitles wireless technologies and their characteristics.

1. Satellite Communication:-A communications satellite is an artificial satellite that relays and amplifies radio telecommunications signals via a transponder; it creates a communication channel between a source transmitter and a receiver(s) at different locations on Earth. Uses Of Satellites Television : Network TV : Live news broadcasting Telephones :in-flight phone communications on airplanes : After Disaster Navigation : GPS : IRNSS : Google Maps : Offline Maps Weather : Forecasting : Hurricanes : EL Nino Climate and Environmental Monitoring : Polar melting : Ocean temperature : Forest fires : Emission of greenhouse gases Safety : Airborne pollution : Search & rescue missions : Black box : Development : Access to education in rural areas : Developing nations Space Science : Satellite telescopes : Observing space : Monitoring threats on earth Land Stewardship : Underground water : Mineral resources : Measure land Military : Early warning ICBM : Satellite weapons : Military communication : Spy satellites : Missile defense systems (PAD, Brhmos,) : Drones

2. Infrared Communication:- Communication with the help of infrared rays is Security lights : Sensing , Burglar alarms: Sensing , Remote controls , Data links over short distances between computers or mobile phones

3. Broadcast Radio:-Broadcast Radio is the distribution of audio content to a dispersed audience via any electronic mass communications medium, but typically one using the electromagnetic spectrum (radio waves), in a one-to-many model. For example:- AM , FM ,Pirate Radio ,Sports , Police.

4. Microwave transmission:-It is the transmission of information or energy by electromagnetic waves whose wavelengths are measured in small numbers of centimeter; these are called microwaves. (low frequency). For example, it is used in small frequency radios, Microwave oven, Microwave Communication

5. Wi-Fi (Wireless Fidelity):- It is a generic term that refers to the IEEE 802.11 communications standard for Wireless Local Area Networks (WLANs). Wi-Fi Network connect computers to each other, to the internet and to the wired network. Its concept is same as Willkie talkies. A Wi-Fi hotspot is created by installing an access point to an internet connection. When Wi-Fi enabled device encounters a hotspot the device can then connect to that network wirelessly. It 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. Many access points can be connected to each other via Ethernet cables to create a single large network. Uses Of WI-FI are: Share your internet , Share resources between PCs ,Print & scan ,Remote control of your entertainment system ,Listen to music, Stream video ,Play online games ,Turn Your Smartphone into a Remote Control , Tether Your Smartphone to Your Computer for Internet Anywhere(Hotspot).

6. Mobile Communication System:-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. Telephony was introduced in India in 1882. The total number of telephones in the country stands at 1002.05 million: 2G, 3G ,4G ,6G : Japan Bluetooth NFC.

7. Wireless power transfer (WPT) or wireless energy:-It is the transmission of electrical power from a power source to a consuming device without using discrete manmade conductors like wireless charging, long range conduction etc.

8. Bluetooth:-It is a wireless technology for transferring data between two devices that are in close proximity with each other. When you click on an icon for a device and you are linked to it, automatically and transparently. Different Bluetooth Versions are Bluetooth 1.0 and 1.0B, Bluetooth 1.1,Bluetooth 1.2 ,Bluetooth 2.0 and Bluetooth 3.0.

9. Lifi:- Li-Fi stands for Light Fidelity. The technology is very new and was proposed by the German physicist Harald Haas in 2011 TED (Technology, Entertainment, Design) Global Talk on Visible Light Communication (VLC). Li-Fi is a wireless optical networking technology that uses light emitting diodes (LEDs) for transmission of data. The term Li-Fi refers to visible light communication (VLC) technology that uses light as medium to deliver high-speed communication in a manner similar to Wi-Fi and complies with the IEEE standard IEEE 802.15.7. The IEEE 802.15.7 is a high-speed, bidirectional and fully networked wireless communication technology based standard similar to Wi-Fi's IEEE 802.11. By Communication through visible light, Li-Fi technology has the possibility to change how we access the Internet, stream videos, receive emails and much more. Security would not be an issue as data can't be accessed in the absence of light. As a result, it can be used in high security military areas where RF communication is prone to eavesdropping. Light Fidelity (Li-Fi) technology is a wireless communication system based on the use of visible light between the violet (800 THz) and red (400 THz). Unlike Wi-Fi which uses the radio part of the electromagnetic spectrum, Li-Fi uses the optical spectrum i.e. Visible light part of the electromagnetic spectrum.

V. Applications of Wireless Technology:

- **Remote Control:-** There are many types of wireless technology remote controllers. The remote control sends a different flashing light message.
- **Item Tracking:-** Items can be track easily, accurately and cheaply by attaching wireless Radio Frequency Identification (RFID) tags to them.
- **Navigation And Location:-** The Global Positioning System (GPS) is a space-based Global Navigation Satellite System (GNSS) that provides location and time information.
- **Wireless Power Transfer:-** Wireless transmission is useful in cases where interconnecting wires are inconvenient, hazardous, or impossible.
- **Remote Monitoring:-** Monitoring patients heartbeat , blood pressure, air temperature, security , building for signs of fire ,etc.
- **Risk Management:-** Monitoring river water level, sea level, signs of fire fighters in a burning building , toxic substance in waterways, bridges for overloading.

VI. Advantages of wireless technology:

- Easy to use.
- Avoid use of cables.
- Offers productivity, convenience and cost advantages over traditional wired technology.
- Completes the access technology portfolios.
- Goes where cable cannot
- Involves reduced time to revenue.
- Provides broadband access extension.
- Greater flexibility and mobility for users.

VII. Disadvantages of wireless technology:

- Shorter range than wired connections.
- More prone to interferences.
- Several wireless networks can interfere with each other.
- More Expensive.
- Wireless reception varies from area to area, even within your own apartment. It's not always guaranteed that you'll have a connection to the Internet

VIII. Comparative Analysis of wireless standards

Parameter	Bluetooth	Wifi	Lifi
Speed	3Mbps	150Mbps	1Gbps
Spectrum Used	Radiowaves	Radiowaves	Visible Light
Power Consumption	Low	High	Low
Cost	Low	High	Low
Standard	SIG 802.15.1	IEEE 802.11	IEEE 802.15.7
Bandwidth	Low(800Kbps)	High(11Mbps)	Highest(1Gbps)
Security	Low	Medium	High
Range	Low	Medium	Low
Year of Development	1994	1991	2011
Data Density	Low	Low	High

Table 1: Comparison of Wireless Technology standards

IX. Conclusion

Use of Wireless technology is rapidly increasing playing an important role in life of people throughout the world. Majority number of people are relying on the technology directly or indirectly. The use of wireless technology may prove to be a very useful means of saving the lives of many in developing countries. The wireless has already been useful in the saving of many lives in the world. Its future development can prove to be more beneficial.

References

[1] Mobile subscriptions outlook, http://www.ericsson.com/res/docs/2015/ericsson-mobility-report-june-2015.pdf, Accessed August 22, 2015

[2] IEEE 802.11, https://en.wikipedia.org/wiki/IEEE_802.11, accessed August 22, 2015.

[3] E. Perahia and R. Stacey, ―Next Generation Wireless LANs: Throughput, Robustness, and Reliability in 802.11n‖, Cambridge University Press, Cambridge, UK,2008.

[4] Jagdish Rebello, ―WLAN: Differentiation Opportunities Emerge as 802.11n Rapidly Becomes Mainstream, http://www.isuppli.com/Abstract/WLAN-Differentiation-Opportunities-Emerge-as-802-11n-Rapidly-becomes Mainstream.pdf.

[5] Rohde & Schwarz, ―802.11ac Technology Introduction White Paper,‖ March 2012. https://cdn.rohdeschwarz.com/pws/dl_downloads/dl_application/application_notes/1ma192/1MA192_7e_80211ac_technology.pdf

[6] IEEE802.11ac: The Next Evolution of Wi-Fi Standards, A Qualcomm publication, May 2012 https://www.qualcomm.com/documents/qualcomm-research-ieee80211ac-next-evolution-wi-fi.

[7] Barry D. Van Veen and Kevin M. Buckley, ―Beamforming: A Versatile Approach to Spatial Filtering‖, http://www.engr.wisc.edu/ece/faculty/vanveen_barry/ASSP_Mag_88.pdf, published April 1988.

[8] Ruqaia Abd Elrahman Younis Ali and Amin Babiker A/Nabi Mustafa, ―The Advantages of Wi-Fi 802.11ac over 802.11n: A Comparative Study‖, International Journal of Engineering, Applied and Management Sciences (IJEAM), Vol. 23, Issue 01, April 2015,   pp18-22   , http://www.ijeam.com/Published%20Paper/Volume%2023/Issue%2001/IJES%2004/IJEAMApril2015_18_22_Ruqaia.pdf.