COMPARATIVE ANALYSIS BETWEEN WIRED AND WIRELESS TECHNOLOGIES IN COMMUNICATIONS: A REVIEW

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Abstarct- Many telecommunications industry are looking for new ways to maximize their investment in communication networks while ensuring reliable and secure information transmission. There is a variety of communications medium solutions, the two most popularly in used were wireless technology and wired options, such as copper and fiber-optic cable. Wired network has proven its potential in the olden days but nowadays wireless communication has emerged as a robust, most efficient and preferred communication technique. Each of these types of communication medium has their advantages and disadvantages according to its technological characteristics. Wired and wireless networking has different hardware requirements, ranges, mobility, reliability and benefits. The aim of the paper is to compare both the Wired and Wireless medium on the basis of various parameters such as usability, Cost, efficiency, flexibility, coverage, Interference, Reliability, Mobility, Speed, Security etc.

Keywords- Wired and Wireless, Speed, Security, coverage and interference.

I. INTRODUCTION

The concept of communication technology relies greatly on communication mediums (Wired and Wireless). The advance in technology and everyday use of digital technology in sending and receiving informations and messages quickly is very important inany organization or society for both the sender and the recipient, and are now apart of almost every business.In telecommunication engineering and computing terminology, the term "Wired technology" is a type of communication that involve cables or physical medium such as (Twisted-Pair, Coaxial or Fiber-optic) forcommunication or data transmission from source to destination.This is reliable communication, but when a problem occurs especially in terms of wire failure then there will be nocommunication. This type of connection can occur in different ranges of devices such as telephone networks, cable television or internet access, fiber-optic communication, routers, printers, personal computers and so on.

Wireless technology use radio frequency (RF), infrared, microwave, or other types of electromagnetic or acoustic waves in place of wires, cables, or fiber optics to transmit signals or data over a short or long distance.Wireless technology used to share the data, information between two or more points which are not physically connected. The communication distance between the points can be short, medium and long. Communication can be happened between few meters to kilometers range. The two points can be a satellites, telephones, two-way radios,television remote controls, mobile communications, wireless modems, computers, wireless keyboards, GPS unit and many more. Through wireless technology, one can communicate and share the data in long range, which can not be possible through physical interface, Cables or wires.

II. WIRED COMMUNICATION TECHNOLOGY

Wired communications is a broad term that is used to describe any type of communication process that relies on the direct use of cables and wiring to transmit or transfer audio and visual information or data. A classic example of wired communications is the traditional home telephone that is connected to the local telephone switch via wires that are ran from the home to the switch.

The use of wired services remains common and is not likely to disappear in the near future.

Local telephone networks often form the basis for wired communications that are used by both residential and business customers in the area. Most of the networks today rely on the use of fiber-optic communication technology as a means of providing clear signaling for both inbound and outbound transmissions. Fiber optics are capable of accommodating far more signals than the older copper wiring used in generations past, while still maintaining the integrity of the signal over longer distances.

Internet access from computer systems is also a common example of modern wired communications. In fact, telephone service providers often utilize the same wiring to provide both high speed Internet solutions and basic telephone services to residential and business customers. Depending on the nature of the connection, this may require using wiring and cables that have a higher capacity than standard wires. Some system designs need nothing more than the addition of filtering devices that effectively split the signal to allow a single outlet to provide connectivity to both the audio phone network and the Internet. Cable television is also classified as wired communications. Cable is run into each home and

connected to one or more television sets. The same cable is connected with the cable network, making it possible to activate the connection and allow both audio and visual transmissions to be received. This is in contrast to traditional broadcasts that rely on over the air transmissions that must be picked up by a receiver and converted into sound and images that the reception device can process.

In general, wired communications are considered to be the most stable of all types of communications services. They are relatively impervious to adverse weather conditions when compared to wireless solutions. With some forms of wired services, the strength and speed of the transmission is superior to other solutions, such as satellite or microwave transmissions. These characteristics have allowed wired communications to remain popular, even as wireless solutions have continued to advance.

In the advance of technology, IT specialist realizes that the wired communication might be corrupted in different ways which include micro bending, attenuation, macro-bending and so on, also the communication can be interrupted due to external factors such as the human, or natural effect such as the flooding, earthquake and soon. Letter the idea of removing the wired and replace with wireless communication was brought and it overcomes almost all the problems of wired communication even though it has its own disadvantages such as the slow bandwidth and increases the level of intrusion.

III. APPLICATIONS OF WIRED TECHNOLOGY

Wired technology has a number of key benefitswhich includes but not limited to the following:
Teleconferencing
• It is the simplest wired application for voice communication by using public switched telephone network (PSTN).
• A telephone is used to conduct a conference between more than two people who are separated by a distance.

Videoconferencing
• Two or more people can have a face-to-face meeting when they are geographically separated.
• Cameras, a computer, and videoconferencing software are used to conduct the conference.
This is reliable communication, but when a problem occurs especially in terms of wire failure then there is no more communication. This type of connection can occur between different ranges of devices such as the routers, printers, personal computers and so on

IV. WIRELESS COMMUNICATION TECHNOLOGY

Wireless communications is a fast-growing technology to provide the flexibility and mobility in our today's environment. Observably, reducing the cable restriction is one of the benefits of wireless with respect to cabled devices. Other benefits include the dynamic network formation, low cost, and easy deployment.

Wireless technologies are designed to reduce the time and different type of obstacles created by the cables. Therefore, wireless networks have more convenient working as compared to other type of wired networking. Wireless technology is the type of the computer networking in which computer is connected with the different telecommunication devices wirelessly. It is used for the sake of different purposes such as communication or data transmission etc. these all types of transmission that is related to the wireless networks are carried out with help of different types of waves which have micro wavelength in nature

Wireless communication can be possible via radio frequency (RF), microwave and infrared to providee high speed netwok connections. Technologies like Bluetooth, Wifi, GPS and GPRS uses radio frequencies to communicate between two points whereas Infrared uses Infrared waves for communication. Using wireless technology, information can be exchange in long range, fastly and securely.

Wireless technology has widely spread lately and you can get connected almost anywhere; at home, at work, in libraries, schools, airports, hotels and even in some restaurants.

V. APPLICATIONS OF WIRELESS TECHNOLOGY

Wireless technology has its own key benefitslike wired which also includes but not limited to the following:

Enterprise Network:
An enterprise network is an enterprise's communications backbone that helpsconnect computers and related devices across departments and workgroup networks, facilitatinginsight and data accessibility. An enterprise networkreduces communication protocols, facilitating system and device interoperability, as well as improvedinternal and external enterprise data management.

Home Network or Home Area Network (HAN)
Is a type of local area network that develops from the need to facilitate communication and interoperability among digital devices present inside or within the close vicinity of a home.

Wireless Sensor Network (WSN): Wireless sensor network (WSN) refers to a group of spatiallydispersed and dedicated sensors for monitoring and recording the physical conditions of the environment and organizing the collected data at a central location.

VI. COMPARISONS BETWEEN WIRED AND WIRELESS NETWORKS

S/N	Characteristics	Wired Networks	Wireless Networks
1.	Installation	Difficult to moderate (Because More no. of components are used during installation and require cables to be connected to each and every computer in the network	Easy installation (neat and clean, no untidy cables are used in this
2.	Visibility Node to Node on same network	All of the nodes on a wired network can hear all other nodes	Many nodes on a wireless network cannot hear all of the other wireless nodes on the same network
3.	Visibility Network to Network	Networks are invisible to other wired networks. The presence of one wired network has no effect on the performance of another wired network	Wireless networks are often visible to other wireless networks. One wireless network can affect the performance of other wireless networks.
4.	Time to installation	More (due to connection of each and every computer in the network)	Less (no untidy cable connections involves in this)
5.	Cost	Less (such Ethernet, cables, switches are not expensive)	High (wireless adapters and access points are quite expensive)
6.	User connectivity	Limited (because it operates only on a connected computers linked with the network)	Connectivity is possible beyond the bounds of physical network cabling.
7.	Mobility	Limited (because it operates only on a connected computers linked with the network)	Outstanding (enable wireless user to connect to network and communicate with other users anytime, anywhere)
8.	Reliability	High (Ethernet cables, switches are reliable because manufactures have improving technology over several decades)	Reasonably high (because if the major section like router break down the whole network will be affected)
10.	Efficiency	High	Very High
9.	Speed and Bandwidth	High Up to 100 mbps	Low Up to 54 mbps(depends upon standards 802.11g)
10.	Cables	Ethernet, copper and optical fibers	Works on radio waves (RF) and microwaves
11.	Hubs and switches	Need, hubs and switches for connections	No, need of hubs and switches
12.	Security	Good (by using some software like fire wall software etc.)	Weak (because wireless communication signals travel through the air and can easily be intercepted but it can improve by encryption technique)
13.	Types	Local Area Network (LAN) Metropolitan Area network(MAN) Wide Area Network (WAN)	1. By Network Formation and Architecture: • Infra structure based network • Infra structure less (ad hoc) network 2. By communication coverage area • Wireless Local Area Network (WLAN) • Wireless Metropolitan Area Network (WMAN) • Wireless Wide Area Network (WWAN) • Wireless Personal Area Network (WPAN) 1. By Access Technology • GSM Network • TDMA Networks • CDMA Networks 2. Satellite Networks • Wi-Fi (802.11) Networks • Hyperlan2 Networks • Bluetooth Networks • Infrared Networks
14.	Standards	802.3	• 802.11a • 802.11b • 802.11g
15.	Signal Loss And Fading	Less (because in the wired connections interference will be less)	More (due to more interference, absorption, refraction and reflection etc.)
16.	Interference	Less (Networks are invisible to other wired networks. The presence of one wired network has no effect on the performance of another wired network)	Higher (the potential for radio interference due to weather, other wireless devices, or obstructions like walls)
17.	Connection Set up Time	Less	More
18.	Quality of Service	Better	Poor (Delays and longer connection set up times)

CONCLUSION

Wired and Wireless Technologies are very common in all daily activities and available in workplace, business place as well as in the home. The technologies has been created to store, transmit and receive information's through networks at very high rates of speed. Networks Technology have become essential to completing daily business tasks and most business, those who rely heavily on information technologies, would be crippled without their networks. High costs, difficult installations, copper theft and more are driving operators to consider alternatives to wired solutions. In many industries, including the military, there is evidence that wireless data radios is viable alternative. These technologies

provide long-range, reliable and affordable solutions. A wireless system can potentially save a company millions of dollars in installation fees. Companies can now store detailed information for customers at a very low cost. In the future, the speed of networks will increase as they have in past years. The cost of networks will continue to decline and using a network will be essential for every organization.

REFERENCES

[1] Comparison of wired and wireless net (journal): "COMPARISONS OF WIRED AND WIRELESS NETWORKS: A REVIEW" Kaur et al., International Journal of Advanced Engineering Technology E-ISSN 0976-3945.

[2] Joshua Muscatello, Joshua Martin, "Wireless Networks Security", Prepared for Dr. Wibowo IFMG 250, April 20, 2005.

[3] Dr. R K Bansal, Vikas Gupta, Rahul Malhotra," Performance Analysis of Wired and Wireless LAN Using Soft Computing Techniques- A Review", September 2010.

[4] http://www.technicaljournalsonline.com/ijeat/VOL%20V/IJAET%20VOL%20V%20ISSUE%20II%20APRIL%20JUNE%202014/Article%2009%20V%20II%202014.pdfvisited on 15/12/2015.

[5] http://www.utilityproducts.com/articles/print/volume-16/issue-04/product-focus/transmission-distribution/wired-vs-wireless-technologies-for-communication-networks-in-utility-markets.html visited on 19/01/2016.

[6] http://www.wisegeek.com/what-are-wired-communications.htm

[7] http://store.virginmedia.com/discover/broadband/your-broadband/connecting/connection-type.html

[8] https://prezi.com/5tq_epesekww/10-compare-and-contrast-wired-and-wireless-networks/

[9] http://www.wifinotes.com/wired-vs-wireless-home-networks.html

[10] http://www.techulator.com/resources/4286-Comparison-between-Wireless-Wired-network.aspx

[11] https://www.nibusinessinfo.co.uk/content/pros-and-cons-wireless-networking

[12] http://topics.wisegeek.com/topics.htm?wired-optical-and-wireless-communications#

[13] https://hunktuah.wordpress.com/2012/06/20/wired-communication-media-8/

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