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COMPARISON OF WIRELESS NETWORK OVER WIRED NETWORK AND ITS TYPE

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Abstract

Wireless network has become one of the major requirements in today world. People expect wireless network in home, shopping mall, university etc. Nowadays, we cannot imagine the life without network. In this paper focuses on what the different types of networks are. Why wired network is preferred over wireless network. We will further compare the wired network with the wireless network and also present different type of wireless network. This paper provides the basic knowledge about Wired, Wireless, Wireless LAN, and WIMAX network. Comparison between wired and wireless has been performed with respect to different factor such as Reliability, Visibility, installation etc. Comparison proves that wireless network is better than wired network when compared with respect to mobility, Cost, Reliability.

Keywords: Wired Network; Wireless Network; Wireless LAN.

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1. Introduction

Wired network: The term wired network can be defined as the connection of n nodes through wired connection. The wired cables are mostly Ethernet. The data are transmitted between these nodes using different topology like Bus- topology, Mesh –topology, Star topology etc. These topologies provide different method for data transmission like in bus topology, a back bone is provided for the transmission of the data between two nodes. These backbones are generally LAN. There is no central computer in Bus –topology. Information can be send only by one node at the time if more than one node sends the data interference will occur.

The advantage of wired network is that it has high bandwidth and low interference. The security in the wired network is better than the wireless network because the node to node transmission occur through physical medium. The disadvantage of wired network it gives low speed compared to wireless. Wired network are more expensive than the wireless.

Wireless network: The term wireless network stands for the network where the connections are made without the physical wired connection. Wireless network are of different type like Wireless LAN, Wireless PAN, Wireless Ad-hoc network etc. These networks are preferred according to the usage. Nowadays, the wireless network is preferred over wired due to low cost and mobility. In wireless network it does not support central system because the nodes in the wireless network are not fixed. The disadvantage of wireless network is they need a high security than the wired network because the data is transmitted in air hence there is more chance of interception which can be improved by encryption technique. Wireless system are easy to install, connectivity is possible without the physical cabling.

Wireless LANs: Wireless LANs stand for wireless local area network. It is used for small area like school, office. It has the radios of 100-300 feet. This network provides a low cost transmission with higher bandwidth. Wireless LANs support a cellular architecture. The organisation is subdivided into cells and is managed by Base station. Wireless LANs use radio or infrared light to provide internet signal. These provide a mobile access, and provide a better throughput compared to the wired Ethernet. These systems are easy to maintain as compared to wired network.

WIMAX Network: WiMAX is a wireless broadband technology. WiMAX provide broadband service in a cost effective manner to the customer. It provides the speed upto 40 Mbps and covers 3-10 km. WiMAX provide access to broadband under MAN of a point to multipoint multi-vendor environment. The throughput of WiMAX is between Wifi and 4G mobility. WiMAX provide the solution for many problem they face due to increase in customer demand, discarding there existing infrastructure investment because it can interoperate across various network type.it can operate in both 3G and wireless and wired network. This paper is further divided into following sections. Section II explains related work. Section III presents Comparison of Wired and Wireless network. Section IV presents type of wireless network. **Conclusion** and References are included in Section V and section VI respectively.

2. Literature Survey

Karanvir Singh Manderet al; “Comparison of WLAN with WIMAX Networks” [1] have presented the author makes the comparison of WLAN and WIMAX algorithm. The paper presents that the fact WIMAX deals with the shortcoming of WLAN. WLAN is used only for the small area whereas WIMAX has no such limitations and the performance is better than WLAN.

Prof. Satish K. Shah et al; “Performance Evaluation of Wired and Wireless Local Area Networks” [2] have presented the comparison between the performance of wired and WLAN network using OPNET simulation tool. Different parameters such as delay, throughput, and collision were studied in wired network. The result shows wireless network performs better than the wired network for limited no of users. As the no of user increases in the network the

performance is degraded. In Wireless network traffic increases. It poses more collision which causes retransmission and the performance of the network degrades.

Prof. Vilas Deotare et al; “Wired equivalent security algorithm for Wireless LAN”[3] have presented an security algorithm for Wireless LAN. As the number of nodes increases in the Wireless network there is more chance interception. The algorithm uses encryption and decryption to covers Wired Equivalent Protocol (WEP). The author has used RC4 and CRC-32 algorithm to develop a better security for the wireless local area network. This algorithm has developed a better security and provides an access control and prevents the disclosure of data to unauthorized party.

SachiPandey et al; “Performance Analysis of Wired and Wireless Network using NS2 Simulator” [4] have presented the comparison between the performance of wired and wireless network. This paper also present the simulation result of routing based on the wireless network. TORA and Zone routing protocol are the two routing protocol on wireless network. The performance is analysed on the basis of packet delay and end to end delay and is based on NS2 based simulation. The result states that in static routing the routing is not possible if the link is beaked whereas in dynamic routing technique the routing is possible even if the link is beaked. In wireless routing protocol many routing protocol were used and the result were analysed using the NS2simulator tool. The result proved that ZRP has higher delay than TORA.

KarthikLakshminarayanan et al “Bandwidth Estimation in Broadband Access Networks”2004. [5]The author has focused on broadband access networks, such as cable modem and 802.11-based wireless networks. The author analyse the existing methods and tools for capacity and available bandwidth estimation, and present a new available bandwidth estimation technique, *Probe-Gap*, that overcomes some of the difficulties in the existing system. The paper has focused on rate regulation using token bucket in cable modem networks, and non-FIFO scheduling and burstiness caused by multi-rate links in 802.11 networks and also find key finding the causes the problem in 802.11 networks. ProbeGap, a new one-way-delay based technique for estimating available bandwidth that alleviates the problems caused by non-FIFO scheduling, frame-level contention, and bursty cross-traffic. While this technique shows promise when the broadband link is considered in isolation, evaluating it in wider settings remains a goal for future work.

Anthony C. Ijeh et al; “Security Measures in Wired and Wireless Networks” [6] The purpose of this paper provide the review on the case study of the existing protocol.it states that “Wireless protected access Wi-Fi protected access; version 2 (WPA2) protocol” has provided a stronger encryption and it has longer key which takes longer to decrypt. Paper states that the location privacy is tough than the security of data transmitted in wireless network. The study states that how the data transmitted was restricted to the defined area. The author has made a survey study by asking the question the experienced staff, finding the staff theory about the need of security and the barrier of security needs.

3. Comparison between Wired and Wireless Network

- 1) **Installation** – The installation is difficult in wired network because in wired network the device should be connected with wire, more no of component such as wire are required

whereas in wireless system. Installation is easy since no such components required. Even the time for connectivity in wired network is more than in wireless network since no physical connection is required.

- 2) **Mobility** – Wireless network is preferred over Wired due to mobility. Wired network allows only a limited mobility due to fixed connection whereas in wireless network it provides a mobile connection and there is no limit for mobility.
- 3) **Visibility of node on network**- In wired network all the nodes are visible to other node whereas in wireless network there are some hidden nodes.
- 4) **Visibility network to network**- When the devices are connected to wireless network it shows the visibility of other wireless network whereas in wired devices other wired devices are not visible.
- 5) **Speed and Bandwidth** –The speed of wired devices are more than wireless devices. The speed of wired devices can be up to 100 mbps whereas the wireless devices can be up to 54 mbps.
- 6) **Security** – The security of the wired network is better than the wireless network. The security of wireless network can be easily affected because the transmutation is posed in the air.
- 7) **Reliability** – The reliability of wired network is better wireless because in wireless if the router is braked down the whole system get influenced.
- 8) **Cost** – Cost of wireless network are less for larger area and it is easy to maintain the wireless system than the wiredsystem.

4. Types of Wireless Network

There are different types of Wireless network listed below-

- 1) Wireless PAN
- 2) Wireless LAN
- 3) Wireless MAN
- 4) Wireless WAN
- 5) Wireless Ad-hoc network

- 1) **Wireless PAN:** Wireless PAN stands for wireless personal area network. Wireless PAN is used for transmission of data over the shorter distance like the data transfer between two devices. The two example of Wireless PAN is Bluetooth and Infrared. A Bluetooth device uses WPAN technology. This is used to transfer the data over the shorter distance. The operation of Bluetooth device works only on MAC layer and physical layer whereas Infrared is used to transfer the data in linear order. Wireless PAN is the network that does not require any fixed infrastructure and data transfer are cheaper in Wireless PAN.

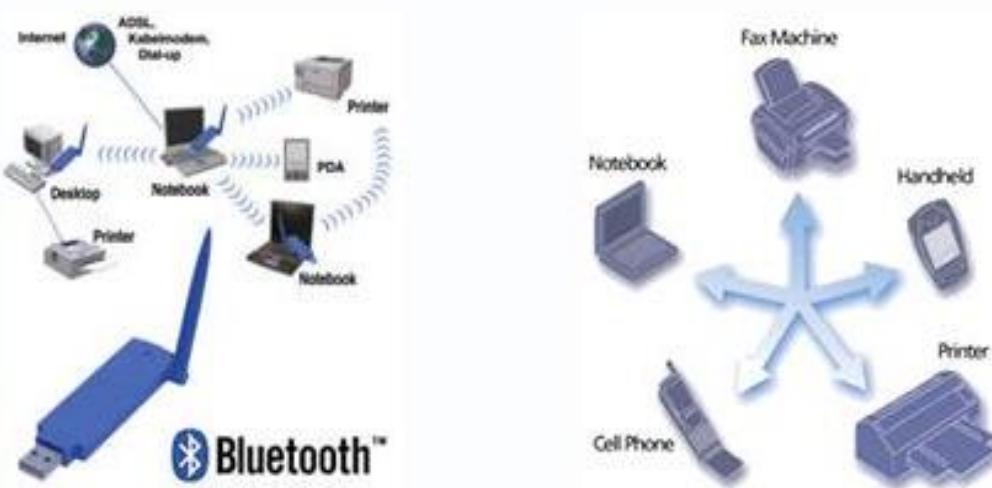


Figure 1: Wireless

2) Wireless LAN: Wireless LAN stands for wireless local area network. It is used for small area like school, office. It has the radius of 100-300 feet. These networks allow the connection in the local area like school, office, and library. Wireless LANs support a cellular architecture. The organisation is subdivided into cells and is managed by Base station. Wireless LANs use radio or infrared light to provide internet signal. These provide a mobile access, and provide a better throughput compared to the wired Ethernet.

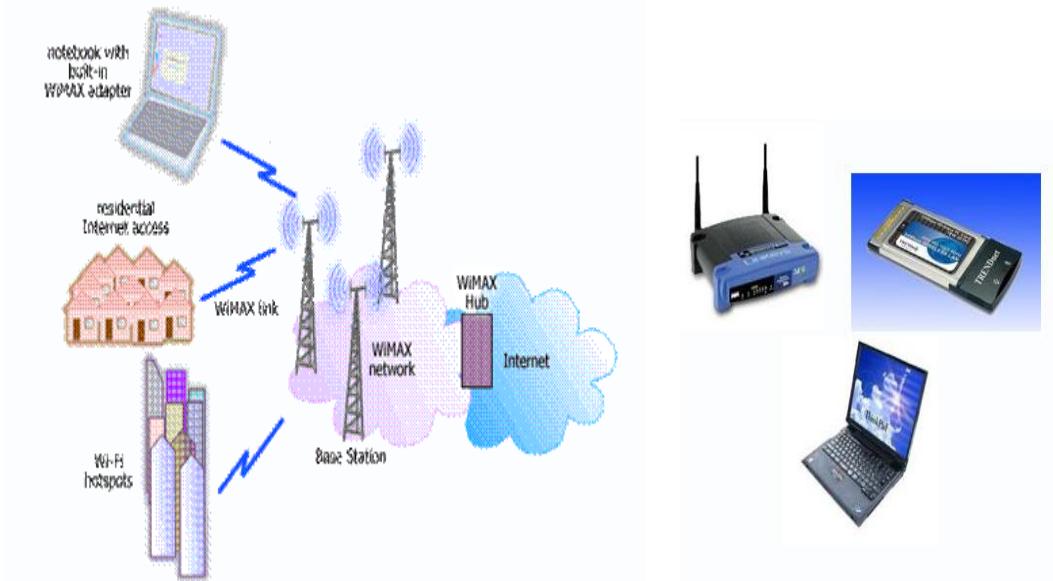


Figure 2: Wireless MAN

Figure 3: Wireless LAN

3) Wireless MAN: Group of network that provides wireless connectivity to a metropolitan city is known as wireless metropolitan area network. The goal of WMAN is to extend the area covered by LAN network in manner that network should be cost efficient, and

support high speed, without extending the wired connection in a network. The WMAN provide mobility to the node with high speed internet in the metropolitan area.

- 4) **Wireless WAN:** Homes and small offices enhanced the growth of WLANs after new wireless networking standard IEEE 802.11n came in existence in 2009. All laptops, tablets and smart phones are equipped with WLANs component and some coffee shops, hotels and public places like shopping malls are also facilitated with WLANs. Wireless Network Interface Cards (NICs) and Access Points (APs) are required along with Internet Service Provider and a device for communication to occur. Low speed WLANS offers of about 1 and 2 Mbps whereas higher data rates WLANs offers up to 1 Gbps and above. IEEE 802.11a offers maximum speed of 54 Mbps and transmission at 48 Mbps, 36 Mbps, 24 Mbps, 18 Mbps, 12Mbps, 9 Mbps and 6 Mbps are also supported thus allowing faster data transmission rate.
- 5) **Wireless Ad-hoc network:** Wireless Ad-hoc network is the collection of more than two devices which has the capability of networking. In Ad-hoc network the communication is possible within the radio range and outside the radio range. Ad-hoc network does not have any fixed infrastructure. They do not support a central system device. The mobile user in this network uses ubiquitous computing capability and information access instead of user's location. Ad-hoc network are less secured than the wired network. The router and the mobility of nodes make the network more hazarders. Wireless Ad-hoc network supports maximum of 11 mbps of speed.

5. Conclusion

This paper describe the two type of network i.e. Wired and Wireless network. Wired network are the network where the nodes are connected through physical medium like wire whereas Wireless network are where the nodes are connected without any physical connection. This paper also describes the comparison between wired and wireless network and states the advantage of wireless network over wired network. This paper further describes the different type of wireless network.

References

- [1] Karanvir Singh Mander, Er. JaspreetKaur (2015) "Comparison of WLAN with WIMAX Networks" International Journal of Advanced Research in Computer Science and Software Engineering.
- [2] Prof. Satish K. Shah, Ms. Sonal J Rane, Ms. Dharmistha D Vishwakarma (2012) "Performance Evaluation of Wired and Wireless Local Area Networks" International Journal of Engineering, Research and Development
- [3] Prof. Vilas Deotare, Sunil Wani, Swati Shelke (2014) "Wired Equivalent Security Algorithm for Wireless LAN" International Journal of Emerging Technology and Advanced Engineering.
- [4] SachinPandey, VibhoreTyagi(2013) "Performance Analysis of Wired and Wireless Network using NS2 Simulator" International Journal of Computer Applications.
- [5] KarthikLakshminarayanan, Venkata N. Padmanabhan, JitendraPadhye "Bandwidth Estimation in Broadband Access Networks".
- [6] Anthony C. Ijeh, Allan J. Brimicombe, David S. Preston, Chris .O. Imafidon "Security Measures in Wired and Wireless Networks"

- [7] NavpreetKaur, SangeetaMonga "Comparison of Wired and Wireless Networks A Review" International Journal of Advanced Engineering Technology.
- [8] Huaizhi Li, Zhenliu Chen, Xiangyang Qin(2002) "Secure Routing in Wired Networks and Wireless Ad Hoc Networks"
- [9] IDhobale J V, IIDr. Kalyankar N V, IIDr. Khamitkar S D (2014) "Wired and Wireless Computer Network Performance Evaluation Using OMNeT++ Simulation Environment" International Journal of Research in Electronics and Communication Technology (IJRECT)

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