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Deductive Review: Dissimilarities and Similarities of Wired and Wireless Computing Networks

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ABSTRACT

Transmission of data packet and communication across Networks previously, has been through wired connection. Wired Network [3] has previously proven its potentials but at present Technological advancement has empowered Wireless communication to emerge as a robust communication option. Both Networking Techniques had their plusses and minuses according to their Network Characteristiccs. The hardware requirements of both Networking techniques coupled with their effectiveness, economy application and characteristics, most often are determinants of their use. This paper review the similarities of wired and wireless Networks and compare the techniques in terms of their physical connections, user connectivity economy of use, varieties and effectiveness of use, etc.

Keywords: Wired, Wireless Computing Network, Economy, Similarities, Communication techniques.

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1. BACKGROUND TO THE STUDY

Communication Networks can broadly be classified as Wired and Wireless on the basis of physical connection to cables.

1.1 Wired Networks

A wired system uses physical cables to transfer data packets between different devices and computer systems. On the basis of types of Cables connection, Wired system is divided into three types, those that use twisted pair wire such as conventional telephone lines; coaxial cable and those that use fibre optic cable. Most wired communication Networks use coaxial and or fiber optic cables to transfer data between connected personal computers (PCs) [1] In a small wired Network, a single router may be used to connect all the computers but a large Networks often involve multiple routers, or switches that connect to each other. One of these devices typically connects to a cable modern or other type of internet connection that provides internet access to all Pcs connceted to the Network [2]

1.2 Wireless Network

Wireless communication transmit data through the air. It use infrared or radio frequency signals to share information and resources between systems. Nowadays, many types of wireless devices are available and their applications are wide spread across many gadgets. Satellite receivers, laptops, pocket size PCs,cellular phone, mobile terminals, PDAs, handheld PCs, and Wireless sensors among others, are examples. The emerging [1,2,3] third generation cellular networks have greatly improved data transmission speed, which enables a variety of higher speed mobile data services. Meanwhile, new standards for short and medium range radio such as bluetooth, 802.11 and 803.11, Hiperlan and infrared transmission are helping to create a wide range of fast, reliable and efficiency application for both enterprise and home networking, making wireless broadband multimedia and data communication in the office and home an ease. In this paper, we review the dissimilarities of wired and wireless communication networks, in section 2. Section 3 disscusses the similarities of both network techniques, section 4 gives the applications of both computing Networks and section, is the conclusion.

2. DISSIMILARITIES OF WIRED AND WIRELESS NETWORKS

The Dissimilarity review of wired and wireless networks in table number 1 below is base on fundamental characteristics of both networks [1,3,4,5].

S/N	Characteristics	Wired Networks	Wireless Networks
1	Physical connection		
	(a) Installation	Difficult to instal due to serveral number of components included in the installation, and requires cables to connect to each and every computer in the network	Easy installation, making the installation neat and clean with no modify cables used.
	(b) Amount of time used to instal	More time as a result of connection of each and every device in the network	Less amount of time as there is no untidy cable connection involves in it.

	(c) Set up time	Less	More
	(d) Cable used	Twisted-pair of copper wire, Ethernet, optic fiber cable	No cable connection, works on radio waves, microwaves.
	(e) Additional components	Need hubs and switches to connect other cables and devices	No need of hubs and switches
2	User connectivity and visibility of Networks (a) User connectivity	Inflexible connectivity, as connectivity is only possible to or from physical locations where the network cabling extends	Flexible connctivity as connectivity is possible beyond the limits of physical network cabling
	(b) Visibility of Networks	Networks are visible to other wired networks and the presence of one wired networks has no effect on the performance of another wired network	Wireless networks are often visible to other wireless networks. One wireless networks can affect the performance of other wireless networks.
	(c) Nodes visibility on the backborne	All nodes on the same wired network are visible to each one of them and can hear all other nodes	Some nodes on a wireless network cannot hear all other wireless nodes on the same network
3	Economy of use (a) Quality of service	Better due to Less jilter, small delays and shorter connection set up times	Poor due to higher jilter, delays and longer connection set up of time.
	(b) Cost of installation	Cost less to install as twisted-pair wire, Ethernet, cables, hubs and switches are not expensive	More expensive. As wireless amplifiers access ports, points, are very expensive.
4	Variability (a) Standards	802.3	• 802.11a • 802.11b • 802.11g

	(b) Types	It can be grouped as • Local Area Network (LAN) • Metropolitan Area Network (MAN) • Wide Area Network (WAN)	A. By network formation and architecture, can grouped into: • Infrared structure based Network • Infrared structureless (Ad-hoc) network B. By communication coverage area, can be grouped as • Wireless Local Area Network (WLAN) • Wireless Metropolitan Area Network (WMAN) • Wireless Wide Area Network (WWAN) • Wireless Personal Area Network (WPAN) b_1: By access technology • GSM Networks • TDMA Networks • CDMA Networks b_2: Satellite Networks • WiFi (802:11) Networks • Hyperlan 2 Networks • Infrared Networks
5	Effectiveness and Efficiency of use (a) Reliability	(i) Negligible Bit Drop Rate (BDR) (ii) Ethernet, cables, switches, Hubs are reliable because manufacturers have improving technology over a long period of times, hence High reliability (iii) Signal loss and fading is less because wired connections interference is low. (iv) Low noise due to Low Bit Error Rate (BER)	(i) High Random BDR (ii) Reasonably low, if the major part like router break down, the entire Network will be affected. (iii) Signal loss and fading is more pronounce due to refraction, absorption, and reflection. (iv) High noise and other factors due to BER.

	(b) Effectiveness	(i) Link asymetry is less problematic because the probability of Transmission Error (TE) much smaller (ii) Speed of processing and bandwidth requirement reasonabily high, up to 100MPs.	(i) High Link asymetry and therefore large probability of transmission error. (ii) Reasonably low, up to 52 mps depending upon used standards.
	(c) Mobility and efficiency	(i) No handoff problem (ii) Low mobility because it operates only on a connected device linked with the Network	(i) High Handoff problem due to user mobility as well as limited frequency coverage. (ii) Mobility is outstanding as it enables wireless users to connect to network, and communicate with other users anywhere, anytime
	(d) Interference	(a) Internal interference. (i) Less, as networks are invisible to other wired networks. The presence of one wired network has no effect on the performance of another wired networks. Credit to cable usage. (ii) Good security by using some designed software for security such as firewall software etc. (b) External interference (i) Not subject to weather conditions (ii) Wired Networks are not affected by urban obstacles, multipath interferences	(i) Internal interference is high as the potential for radio interference due to wireless devices (ii) Weak security as wireless communication signals travel through the air and can easily be intercepted. This can be improve by encryption technique. (i) Externally affected by weather conditions (ii) Highly affected by urban obstracles, multipath interferences, large moving objects, and mobility of wireless end devices.

3. SIMILARITIES OF WIRED AND WIRELESS COMPUTING NETWORKS

Summarily, Wired and Wireless computing Networks are similar in many ways [1,3,4,7].

- Both techniques operate as computing Networks that enable communication between users.
- Wired computing option is a traditional TCP/IP protocol backbone compliance and wireless option use improve TCP/IP protocol in heterogeneous computing Networks, that is, both make use of TCP protocol.
- Both Network oprions are vulnerable to virus attacks
- They are software design based communication techniques for either audio or video and text transmission.
- They are secureless, as vital information not meant for public domain can be intercepted, accessed or alter during storage or transmission, by hackers, and spoofing activities on the networks.
- Their operational success involve costs, and consume electric energy.
- Wired and wireless coputing technique involve some levels of cabling.
- Wired links and wireless links are vulnerable to congestion cause by operating factors like delay, bottleneck bandwidth and BER.
- Wired and Wireless computing techniques are prone to link asymetry hence, are affected by TE.

4. APPLICATION AREAS OF WIRED AND WIRELESS COMPUTING NETWORKS

Wired and Wireless computing are applied in various areas of computing needs as given below [1,3,6].

4.1 Wired computing Networks

4.1.1Teleconferencing

It is the wired application for audio communication using PSTN. Telephone is used to conduct conference between more than two people separated by distnace. It is the simplest form of wired arrangement.

4.1.2 Video conferencing

In this, two or more persons can have face-to-face meeting when they are geographically spread. It involves the use of computer system, cameras, and software for video conferencing to conduct the conference.

4.2 Wireless Computing Networks

4.2.1 Home Area Network (HAN).

It 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.

4.2.2 Enterprise Network

It is an Enterprise's communication backbone that helps connect computers and related devices across departments and work groups Networks, faciliting insight and data accessibility. It reduces communication protocols, enhancing system and device, Interoperability as well as improved internal and external enterprise data management.

4.2.3 Wireless Sensor Network (WSN)

Wireless Sensor Network refers to a group of spatially dispersed and dedicated sensors for monitoring and recording the physical conditions like location, latitude etc of the environment and organising the gathered data at a central location e.g Geographical Positioning System (GPS), etc. unfolding innovation in Wireless Sensor network technology is fast becoming scintilating.

5. CONCLUSION

Wired and Wireless computing Networks are common and in competing use in home, Workplace as well as in the application systems. Previously, wired computing technology has proven its potentials, providing secure and faster means of connectivity but mobility issue – anywhere, anytime, anyone access issue of wired computing is putting wireless computing as an option for users. At present time, wireless computing Networks has emerge as a robust, cost effective and most intellect communication techniques with high and flexible mobility.

Wireless computing technology has been created to store, transmit and receive data through communication networks at very high rates of speed enabling users to store detailed information at a very low cost, that was not possible before. Beside this merit, Wireless computing Networks characteristics vary as access technologies differ, therefore a universal solution for all types of wireless computing networks is unlikely to be developed.

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