Volume 1, Issue 1, 2016, pp. 05-11

website: www.ijoetr.com

International Journal of Emerging Trends in Research

A Comparative Analysis of Wired and Wireless Network Architecture

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Abstract

Network usage efficiency is important for network applications, such as audio, video-streaming, which are sensitive to data delivery delay. Researches in this area have been done in the last ten years. In this paper, we present an overview of major directions in previous researches on wired and wireless network pricing for efficient usage. We address here whether differences between wired and wireless network technology merit different treatment with respect to net neutrality. The primary focus is on applications and traffic management, rather than device attachment. We first review the pertinent aspects of network architecture and discuss the main differences between wired and wireless networks, and make a conclusion which one is more better and also we turn more specifically to how wired and wireless networks differ with respect to traffic management, and conclude that wireless networks require some different types of traffic management than wired networks but wireless networks have more convenient working as compared to other type of wired networking

Keywords: Traffic management; Congestion Control; Wired network; Wireless network.

1. Introduction

There are two kinds of network technologies:

- Wired - communicates through data cables (most commonly Ethernet-based)
- Wireless - communicates through radio waves

Wired Home Networks:

A type local area networking technology which is based on a special type of cable which is used to transfer data from one place to another in the form of analog and digital signals, these cables are called as coaxial cables. They also carry signals of radio of different frequencies which also pays an

important role in transferring the data between two operating systems or computers. This type of technology is termed as wired home network. The maximum data transfer rate of this technology is 10 MB per seconds. The cables which are used to configure wired network are special; because they behave as analog and as well as digital and its speed is quite equal to twisted pair cable. Ethernet works or operates in a narrow range and it is little bit difficult to configure as compared to wireless networking technologies. Wired network is very costly to install because to install the coaxial cables we need lot of money and time. So, nowadays its alternative technology i.e. peer to peer is used to reduce the expenses and also increase the reliability and networking. So point to point management is install instead of those costly cables everywhere. Common examples are Ethernet or wired LAN etc.

Wired networks have been around for decades. Wired networking technology found today is known as Ethernet. The data cables, known as Ethernet network cables or wired (CAT5) cables, connect computers and other devices that make up the networks. Wired networks are best when you need to move large amounts of data at high speeds, such as professional-quality multimedia. The benefits of having a wired network include:

- Relatively low cost
- Offers the highest performance possible
- Fast speed - standard Ethernet cable up to 100Mbps.
- Faster speed - Gigabit Ethernet cable up to 1000Mbps.[1]

Wireless Home Network:

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 network 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.

In the field of wireless networking another system, introduce which is helpful for ding the networking in the home called as wireless home network. It is defined as the connection that is build for the wireless networking in the home for the sake of sharing different types of resources such as printing in the home at the same time on the internet is referred as Wireless home Networking.

If we can predict how a user behaves, in terms of using the wireless network, then we can attempt ambitious system-level approaches for resource allocation within the wireless local-area-network (WLAN) as well as provide hints to the user device itself on when to power off which components. Much work has been done to characterize wireless network usage at coarse time-resolution and in the

aggregate [2]. More recently, there have been some attempts to study the fine time scale characteristics of wireless network traffic and link layer behavior as well as solutions to the inherent difficulties of wireless data-collection at this resolution [3]. In some cases, these studies are exploratory in others they treat specific extreme cases such as congestion or interference [4].

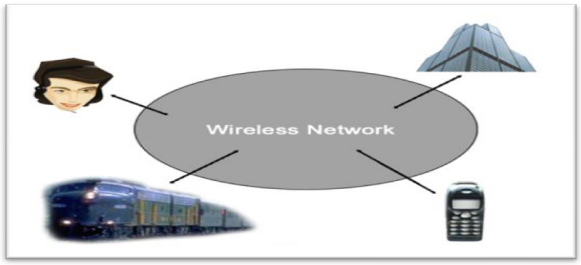

Figure 1: Wireless Network

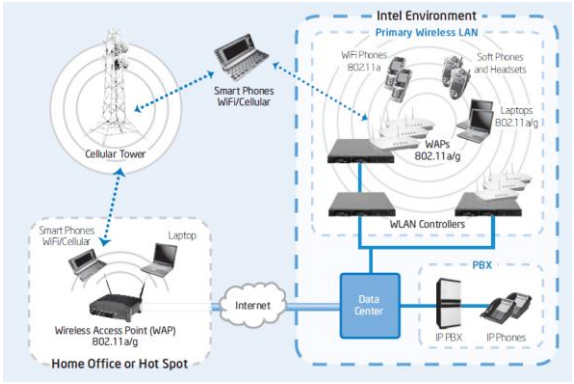

Figure 2: Overview of our primary wireless architecture.

Wireless networks don't use cables for connections, but rather they use radio waves, like cordless phones. The advantage of a wireless network is the mobility and freedom from the restriction of wires or a fixed connection. The benefits of having a wireless network include:

- Mobility and freedom - work anywhere
- No restriction of wires or a fixed connection
- Quick, effortless installation
- No cables to buy
- Save cabling time and hassle
- Easy to expand

Also known as Wi-Fi, or Wireless Fidelity, wireless networks allow you to use your network devices anywhere in an office or home. You can check your e-mail or surf the Internet on your laptop anywhere in your house. There is no need to drill holes in the wall and install Ethernet cables. You can network anywhere – without wires. Outside your home, wireless networking is available in public "hotspots," such as coffee shops, businesses, hotel rooms, and airports. This is perfect for those of you who do a lot of traveling [5].

Comparison between Wired or Wireless Home Network: The common postulates on which both technologies are differentiated are as follows:

Table1: Comparison of various features [6]

Features	**Wired Home Network**	**Wireless Home networks**
Networking	The networking of the wired home networks are more faster as compared to other types of wireless networking devices because they are able to provide the speed of more than 1000 Mbps.	The networking of the wireless networking is good and better for the future resources but it is not faster as the wired home networking devices. Wi-Fi is the common types of wireless home network that can provide the reliable working
Cost Comparison	We need many expenses to configure or setup the wired home network. Because we need large money to	As compared to other wired devices it is easy to setup the wireless networking devices at the very low and at the reliable cost
Advantages	More reliable Faster internet Transfer of data at a very faster speed	You can Access internet from any place through hot pots No hassles of cables No need any kind of wiring for installation
Cons	It can't provide mobile network Difficult to lay down the cables and it looks very messy when install outside	Not very much reliable Only best for mobile devices such as Laptops Not faster as compared to wired devices

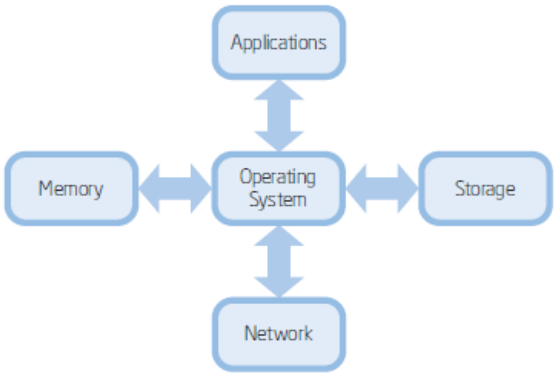

Figure 3: Traditional enterprise computing with wired LANs, a delicate balance

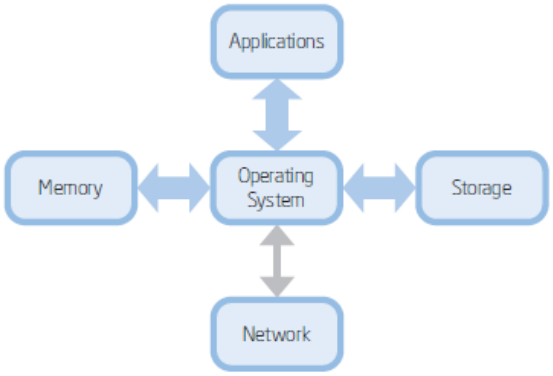

Figure 4: Wireless LANs disturb the balance, limiting network bandwidth

2. Basic difference between wired communication and wireless communication

Table2: Basic difference between wired & wireless network

Wired Communication	**Wireless Communication**
Wired is usually stationary	Wireless communication means portability
Wire systems send data through Cables used UTP or STP (Unshielded twisted pair and shielded twisted pair).	Wireless systems send data through air waves
Wired systems are inherently secure because data is not transmitted over the air	Wireless system are less secure as compare to wired communication because they are open to listening the air for signals
In wired communication interference is very less.	Interference is more as compared to wired communication.
Wired Connection offers more superior performance.	Wireless Connection has less performance as compared to wired connection.

3. Similarities between wired & wireless network

Wired Internet has been the usual choice in homes, but Wi-Fi (wireless) is gaining ground fast [7]. Both wired and wireless can claim advantages over the other; both represent viable options for home and other LANs. They are similar because they can be used as connection from one PC to another or from PC to the net.

The similarities are that they are both connection. The wireless connection connects without a wire connecting to another network like Wi-Fi. While the wired connection needs a wire to connect in a network.

Below we compare wired and wireless networking in four key areas:

- Total cost
- Reliability
- Performance
- Security

Total Cost

Ethernet cables, hubs and switches are very inexpensive. Some connection sharing software packages, like ICS, are free; some cost a nominal fee. Broadband routers cost more, but these are optional components of a wired LAN, and their higher cost is offset by the benefit of easier installation and built-in security features.

Reliability

Ethernet cables, hubs and switches are extremely reliable, mainly because manufacturers have been continually improving Ethernet technology over several decades. Loose cables likely remain the single most common and annoying source of failure in a wired network. When installing a wired LAN or moving any of the components later, be sure to carefully check the cable connections.

Broadband routers have also suffered from some reliability problems in the past. Unlike other Ethernet gear, these products are relatively new, multi-function devices. Broadband routers have matured over the past several years and their reliability has improved greatly.

Performance

Wired LANs offer superior performance. Traditional Ethernet connections offer only 10 Mbps bandwidth, but 100 Mbps Fast Ethernet technology costs little more and is readily available. Although 100 Mbps represents a theoretical maximum performance never really achieved in practice, Fast Ethernet should be sufficient for home file sharing, gaming, and high-speed Internet access for many years into the future.

Wired LANs utilizing hubs can suffer performance slowdown if computers heavily utilize the network simultaneously. Use Ethernet switches instead of hubs to avoid this problem; a switch costs little more than a hub.

Security

For any wired LAN connected to the Internet, firewalls are the primary security consideration. Wired Ethernet hubs and switches do not support firewalls. However, firewall software products like Zone Alarm can be installed on the computers themselves [8]. Broadband routers offer equivalent firewall capability built into the device, configurable through its own software.

4. Conclusion

A study is given about two different networks and their comparison. This paper explained various features of wired and wireless network. The comparison includes the basic difference and similarities of different network which can help to select specific network in various situation depending on customer demand. Wireless devices used to be used only through big companies and large institutes or organizations with certain needs. The need for wireless technology has grown tremendously in the last two years. Wireless technology brings together the two biggest industries together: the Internet with the Mobile technology.

5. Future Scope

The work presented in this paper is survey work of wired and wireless networks including their comparisons. Nothing in the world which can be said complete. There are many applications of both networks. In future, a lot of work can be done to produce new technologies to improve the performance regarding inference, efficiency, security and various other issues related to both network.

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