Wi-Fi Solutions to Education

Poonam[1], Sonal Aggarwal[2], Rajat Ghai[3], Nikhil Yadav[4]

B.Tech (Student), Department of ECE Dronacharya College of Engineering,Gurgaon, India[1]
B.Tech (Student), Department of ECE Dronacharya College of Engineering, Gurgaon, India [2]
B.Tech (Student), Department of ECE Dronacharya College of Engineering, Gurgaon, India [3]
B.Tech (Student), Department of ECE Dronacharya College of Engineering, Gurgaon, India[4]

Abstract: Wi-Fi, short form for Wireless Fidelity is a wireless networking technology in which an electronic device is allowed to connect to the Internet by using radio waves .It is based on IEEE 802.11 standards. The Wi-Fi technology is in-built in many of the electronic devices such as PDAs, laptops, smart phones etc which allows the users to access the internet whenever they are near access point called hotspot. In education information and technology refers to teaching and learning the subject which invest understanding of functions and let us use effectively information and communication technologies.

It is not only students who must have thorough understanding related to information and communication technology, educators is also need to be trained in how to use technology and need to enroot good understanding of it. Wi-Fi has become a necessity in today's modern era and its usefulness has increased now-a-days.

Keywords: Wi-Fi, LAN, Access Point, WPA

INTRODUCTION

In education information and technology refers to teaching and learning the subject which invest understanding of functions and let us use effectively information and communication technologies.

It is not only students who must have thorough understanding related to information and communication technology, educators is also need to be trained in how to use technology and need to enroot good understanding of it. Educators need to be comfortable in using technologies so that they can impart proper knowledge to the students. Teaching using different technologies is not that easy as it sounds. A trainer or teacher must have arrant experience of how to plan, create and deliver instructions within technology settings. Teacher has to make sure that they are able to gather useful, meaningful and known information from the class. [3]

Not only students but also teachers get to learn something different with all the latest technologies

Nowadays Wi-Fi has become a necessity more than a requirement. It is available everywhere from school to colleges to various spots like McD, KFC etc. School uses 802.11n Wireless LAN so that excessive cost of cabling student's devices can be reduced. Wireless communication not only improves teacher-parents relation but also provide campus wise safety which easily lodge all the requirements related to classroom connectivity. It remits unique classroom monitoring compatibilities.

According to a survey conducted in USA around 90% of people are in favor of Wi-Fi in their college and say it is essential to education just like Classroom and computers are and nearly 3 of 5 said that they would not attend college if there will be no facility for the Wi-Fi. Even 79% of students said that their college life would have been a lot harder without Wi-Fi access. [4]

SHORTCOMINGS OF TODAY'S EDUCATION STRUCTURE

Today's higher education are facing dual problem
- One is rising cost of information technology
- And other is avoiding tecnological obsolescence and providing reliable, high performance infrastructure.

With increment of digital content in classroom, urge of Wi-Fi has been rise more and more. [5]

Surpassing learning management system with augmented video and online collaborative tools have forced many universities to keep pace with the growing technologies. To add in it even today's students are smart enough to get what they all need instantly through any device.

Other surveys which are a bit absurd include:
- In USA nearly 48% will give up beer for Wi-Fi.
- 72% will wear opponent's team colors
- 44% use Wi-Fi to give a head start on an assignment before a class was finished.
- More than half of student uses Wi-Fi to check their e-mails, social networking sites etc. [4]

WIRELESS LAN AND WORKING OF WI-FI

It can be described as a data transmission system designed to lend a network between various computing devices which is location independent. And to provide such kind of network radio waves are used rather than a cable wire structure. In corporate enterprise Wireless LAN only is used to entrench the connection between existing wired network and group of client computers. This wireless network provides these client computers access to all the resources and services. With educational system wireless network are also on a brink of becoming a conventional connectivity solution. [6]

IEEE has used 802.11 as the standard specification in 1997 for wireless LANs. This version provides 1Mbps and 2Mbps data rates including set of fundamental services.

The Wi-Fi network transmits information across the network by making use of radio waves. The computer consists of the adapter which is used to convert the data into radio signal. This signal is then transmitted to the decoder known as router via antenna. The decoded data is then send to the Internet through wired Ethernet connection. [4]

WI-FI TECHNOLOGY

A. IEEE 802.11b
It is the most popular wireless technology and is least expensive and came in late 1999. It operates at 2.4 GHz radio spectrum with an actual speed of 4-6 Mbps. Its range is 100-150 feet. The main disadvantage of this technology is that interference from mobile phones and Bluetooth devices reduces the transmission speed.

B. IEEE 802.11a
This technology was introduced in 2001 and is more expensive as compared to IEEE 802.11b. It is not compatible with 802.11b and operates at 5 GHz with an actual speed of 15-20 Mbps. Its range is 50-75 feet.

C. IEEE 802.11g
It was introduced in 2003 combining the features of both the standards. It operates at 2.4 GHz radio frequency with an actual speed of 54 Mbps. Its range is 100-150 feet and is compatible with IEEE 802.11b standard. [1]
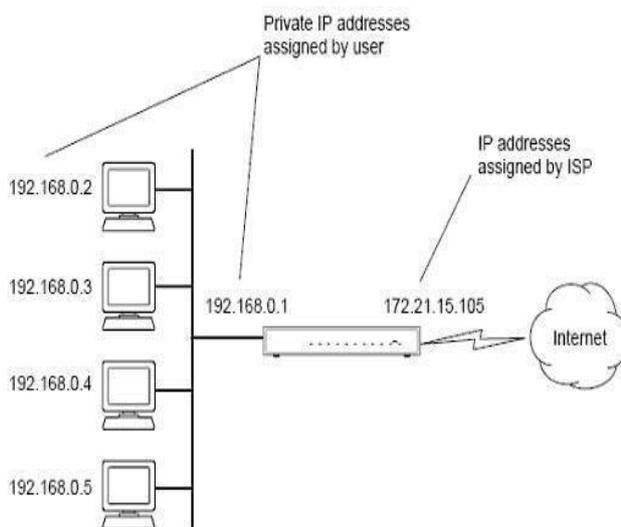
WIRELESS LAN ARCHITECTURE

Fig 1. Wireless LAN Architecture

The Wireless LAN architecture consists of the following essential components:

D. Access Point
It is a routing device which is used to transmit data between wired and wireless networking devices. APs are configured nodes on WLAN which acts as central transmitter and receiver of radio signals. [2]

Fig 2. Logo of AP

E. Clients
A client is a system that accesses a remote service on another computer by some kind of network. It is referred to as computer hardware or software that access the services provided by the server.

Fig 3. Client-Server connections

F. Bridge
Bridge is a connecting device which is used to connect two or more different networks to establish communication between them. It operates at data link layer and is similar to router but has an additional feature of analyzing the data being forwarded.

G. Wi-Fi Cards
A wireless card is a network card which connects to a radio-based computer network to accept the wireless signal and relay information. For example: PCMCIA card for laptop, PCI card for desktop PC.
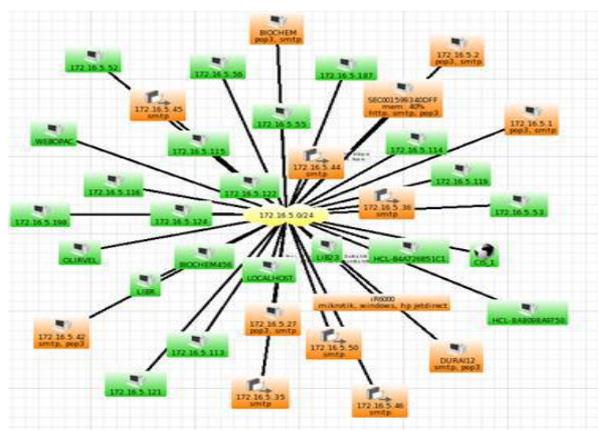
CASE STUDY: A UNIVERSITY LAN

Fig 4. A University LAN

The whole campus is divided into small-small units as buildings are quite closed and thus is considered as one unit. Considering campus is fully covered with thick groves therefore high power RF is used for Wireless Connectivity. And to increase the serviceable area individual AP's are used. [5]

Basic design is based on the hybrid of DSS & WSS. Through this design Wi-Fi covers approximately of 90-95% of the university area. Each unit or we can say group of buildings have OFC termination which is then in turn is terminated in a switch. These switch then in turn is connected to the AP and for powering the AP, POE are used.

Here we just have discussed the strength of Wi-Fi, just like coin has dual side similarly Wi-Fi too have strength as well as snags. These days colleges, university, restaurants as well as hotels, even metro open Wi-Fi hotspots which may not be considered as secure. And why is it so? This question may be agitating you. Here is the answer of all your wringers.

Most Public open Wi-Fi hotspots do not encrypt information which goes back and forth in the air and thus are not secure. [4]

Here are some tips from which you can tell whether a Wi-Fi is secure or not:

- If it does not requires any password.
- If it ask user to provide WEP (Wired Equivalent Privacy)
- If it ask user to provide WPA.

Now to be on safer side always follows the below mentioned instructions:

- If you are using open Wi-Fi hotspot, send your information to only that website which is encrypted.
- To tell whether the file is encrypted or not just check for the https (where, 's' means secure) at the beginning of the website address. And there will also be a lock icon at the top or bottom of the browser window.
- Don't stay permanently signed in to the accounts. Just logout, after using the account. [6]
- Don't use same password on different websites as if you are using same password and if in any case somebody get to know about your password, he can gain access to many accounts.

CONCLUSION

Wi-Fi is the popular name for the wireless Ethernet 802.11b standard for WLANs. [6]

Wireless local area networks (LANs) emerged to share the resources without the use of wires. It avoid need to install cable drops to each device and facilitates mobility. In today's hi-tech world connectivity to networks has become extremely important. The Wi-Fi technology supports for fast roaming and increased overall network capability. Wi-Fi technology has become a necessity in every field of development like in schools, hospitals, colleges, organizations etc. It has become a global set of standards and allows LANs to be deployed without cabling for client devices. However there are some disadvantages which include high power consumption, limited range, interference reduces transmission speed etc. [4]

Wi-Fi is a technology that is experiencing a rapid evolution in standards, devices and applications and has moved beyond the domain of computer feature.

ACKNOWLEDGEMENT

REFERENCES

S. Vasudevan, K. Papagiannaki, C. Diot, J. Kurose, and D. Towsley. Facilitating access point selection in IEEE 802.11 wireless networks. In IMC, 2005

A. J. Nicholson, Y. Chawathe, M. Y. Chen, B. D. Noble, and D. Wetherall. Improved access point selection. In MobiSys, 2006I.

Information through training at MTNL "Wireless Technology", by Heather Shankwiler

Information through training at EFY

Wireless Communication Systems by Brijesh Verma