
WI-FI APPLICATIONS IN LIBRARIES

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Abstract

RFID Defines Wi-Fi- Explains the Wireless Transmission Techniques – Describes the characteristic features of Wi Fi – Provides a graphical view of the Architecture of WLAN- Elucidates WLAN Protocols - Discusses the planning in Wi-Fi - Explains the implementation of Wi-Fi in Libraries - Speaks about the Wi-Fi applications in libraries – Mentions the benefits of wireless LAN – Elaborates the major issues of Wi-Fi.

Keywords : Wi-Fi, Wireless Application in Libraries, WLAN

1. Introduction

Imagine a situation wherein you have your lap top but you do not have telephone connection, How will you get your e-mail, pay your bills online, or do anything else you need an Internet connection for?. The answer is: very easily. Simply launch your Web browser, log in and surf! No wires needed. When you're within range of a Wi-Fi Hotspot, the Internet is all around you in the form of high-frequency radio wave.

2. What is Wi-Fi

Wi-Fi is short for "Wireless Fidelity". It is a term that refers specifically to wireless local area networks (WLANs) utilizing the standards spelled out in the IEEE 802.11 specification. The term Wi-Fi has been promulgated by the Wi-Fi Alliance, a nonprofit group of manufacturers who certify the interoperability of products based on the IEEE 802.11 specification. Their intention is to make the 802.11 as a standard for WLAN. Initially, Wi-Fi was used only to identify products and WLANs using the 802.11b standard. "Wi-Fi" is an official, trademarked term accepted and used by manufacturers of IEEE 802.11 networking products.

3. Wireless Data Transmission Techniques

Wireless LAN technology standard 802.11b has the strongest momentum to becoming the main standard for corporate internal wireless LAN networks. The bandwidth of 802.11b is 11 mbits and operates at 2.4 GHz Frequency. The successor of this current 802.11b standard is 802.11a and it is designed to be faster speed and operate at a different frequency. While 802.11a standard and the technology behind it has become available, 802.11b is still widely used today.

Wireless LANs work on Radio wave and infrared frequencies. Data transmission over wireless using Radio Frequency is similar to the techniques used in an ordinary radio, A.M. and F.M. There is a constant carrier signal containing the data to be transmitted. The carrier frequency amplitude could be modulated by a signal or its Frequency could be modulated. Bluetooth technology is one used in many Radio Frequency based Wireless Local Area Networking. Next came 802.11b Wi-Fi (Wireless Fidelity) which has been advancement over Bluetooth.

4. Characteristic Features of Wi Fi

Wi Fi has both positive and negative features. They are :

Characteristic Features of WLAN

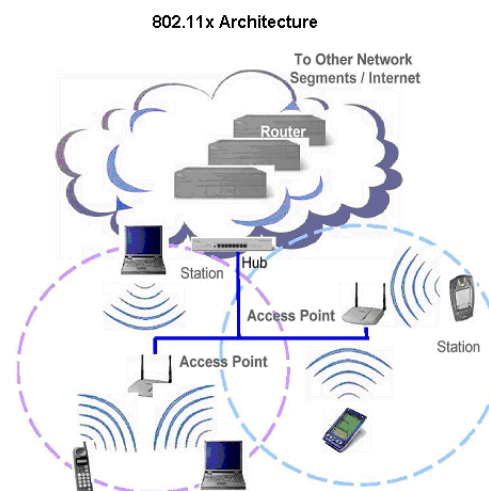
Characteristic	Description
Physical Layer	Direct Sequence Spread Spectrum (DSSS), Frequency Hopping Spread Spectrum (FHSS), Orthogonal Frequency Division Multiplexing (OFDM), infrared (IR).
Frequency Band	2.4 GHz (ISM band) and 5 GHz.
Data Rates	1 Mbps, 2 Mbps, 5.5 Mbps (11b), 11 Mbps (11b), 54 Mbps (11a)
Data and Network Security	RC4-based stream encryption algorithm for confidentiality, authentication, and integrity. Limited key management. (AES is being considered for 802.11i.)
Operating Range	Up to 150 feet indoors and 1500 feet outdoors. ⁹
Positive Aspects	Ethernet speeds without wires; many different products from many different companies. Wireless client cards and access point costs are decreasing.
Negative Aspects	Poor security in native mode; throughput decrease with distance and load.

5. Wi Fi Architecture

A WLAN comprises two types of equipments namely

- a wireless station and
- an access point

A station, or client, is typically a laptop or notebook or personal computer (PC) or a desktop or even a hand held device with a wireless NIC (Network Interface Card). The AP (Access Points), which acts as a bridge between the wireless and wired networks, typically comprises a radio, a wired network interface such as 802.3, and bridging software. The AP functions as a base station for the wireless network, aggregating multiple wireless stations onto the wired network.



6. WLAN Protocols

Similar to the seven layers in the ISO/OSI model of Networks, WLAN also has four important layers namely :

- Wireless Applications Environment (WAE)
- Wireless Session Layer (WSL)
- Wireless Transport Layer Security (WTLS)
- Wireless Transport Layer (WTL)

Between each Layer there are protocols of which the Wireless Application Protocols is most important.

7. Planning Wi-Fi in Libraries

Many factors are to be considered in planning a wire free connectivity in a Library. They are :

1. The capacity and the standards available must be considered
2. There should not be any interference in frequencies.
3. Decide what applications are to be run on wireless network.
4. Consider the bandwidth to be required for each connector.
5. Number of connections required on this network at a given time.
6. Area to be covered by this network.
7. Determine the kind of data transfer.
8. Determine the loading capacity of the bandwidth.
9. Decide the number of access points needed to ensure quality service. Wi-Fi can provide access to 80 feet radius but quality decreases with distance.
10. Distance where to place access point by doing its survey. For this quality test should be performed.
11. Uninterrupted power supply has to be ensured
12. Network management software to be used.

8. Wi-Fi in Libraries - How to implement ?

Before implementing the WLAN, a short survey has to be conducted in the Library site to identify the optimum locations for access points and the bandwidth requirements. The survey report should include

1. A summary statement on how Wi-Fi is to be used and what it is intended to achieve including the readers and applications.
2. An analysis of the physical structure and its fitness for wireless resources.
3. Reports of the data resulting from the tools for predicting the likelihood of success of a Wi-Fi implementation and the optimum placement of Access Points. These tools can predict possible problems with high demand, coverage conflicts and overlaps, dead spots, etc. This should include the number of access points needed.

4. Because the rule of thumb is a maximum of 10 to 20 simultaneous connections per Access Point (using 802.11b), the report should predict the current ratio of users to Access Points.
5. A map of the preferred placement of Access Points based on the site survey data generated by the tools. This should also include information on the anticipated configuration of each Access Point for use in management and security of the WLAN. Some of the more obvious configuration items are the name and channel of the AP, the coverage area, encryption type and level, IP addresses and MAC addresses.
6. A plan for how the hybrid combination of wireless and structured wiring will work together.]
7. Security issues based on the anticipated use and audiences determined in the plan and design.
8. The anticipated process for WLAN monitoring, management and maintenance including the tools, the types of equipment that permit remote management, management protocols and approaches.
9. A summary of anticipated security issues and suggested policies and tools for protecting the network. Potential issues include: What is the likelihood of the addition of "rogue" Access Points? What is the possibility of an unregistered WLAN network card coming into the environment? How will these be detected?

9. Wi-Fi applications in libraries

There are many areas in the use of Wi-Fi in libraries. Some of them are :

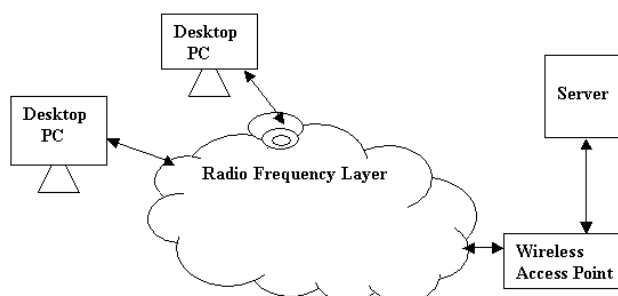
1. For Staff

- a. There will be no maintenance for cables.
- b. All sections can coordinate with other sections like Acquisition, Circulation , Maintenance , Technical, Serial, Thesis etc.

2. For readers

- a. User can access library OPAC in any corner of the library.
- b. User can surf on web – OPACs during search of documents.
- c. User can surf internet in any corner of the library.

10. Simple Wireless Model in Libraries



11. Benefits of Wireless Networking in Libraries

In a wireless networked library access to multiple computers, databases and libraries can be achieved. The important benefits of WLAN are

- It provides faster access to information for library users.
- Using laptop computers library users can access electronic media.
- Sharing of peripherals, files, multimedia resources and databases are easier.
- Improved data base access.
- Simplified network configuration.
- Quick connectivity to the network.
- An excellent solution for libraries with historic buildings and older buildings.

12. Major Issues

Wireless connectivity raises a number of issues for libraries such as :

12.1 Security

A. Unauthorized Access

Unauthorized users accessing network through the WLAN / LAN are a major security concern. There should be some security mechanism which will deny unauthorized user's access or limit their access

B. Unauthorized Devices

Any new device attached to the network may cause problems. Such devices should be identified automatically.

12.2 Costs

The Access points and the Wireless Network cards are costly when compared to wired networks and its components.

12.3 Challenging Technologies

Wireless technologies are constantly changing which make long term planning difficult. Libraries therefore need to be flexible while planning their wireless services and keep abreast of the latest developments.

13. Conclusion

In India, there is a need of cost-effective network for data connectivity where communication infrastructure is lacking. One solution to this problem could be a hybrid network architecture, which combines physical and wireless data transfer to enable high-bandwidth intranet and Internet connectivity. The cost of adding wireless Internet connectivity to handheld devices is on the decrease.

"Bluetooth will be everywhere," said Todd Kort, an analyst at Gartner Inc. in San Jose¹. "The technology for connecting mobile devices to other mobile devices will be included in both standard and low-cost models of desktop and notebook PCs, handhelds and Tablet PCs", he said. Hence it is the right time of the Managers of Library and Information Centres to think of implementing the Wi Fi Technology in their Libraries.

14. Reference

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(Footnotes)

¹ http://www.i4donline.net/issue/April04/mapping_full.htm

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