WI- FI TECHNOLOGY AND ITS APPLICATIONS IN ICT ERA IN LIBRARY AND INFORMATION CENTRES: A STUDY

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Abstract

The paper presents the technological aspects of Wi-Fi technology and explores some of the major issues of wireless networks in libraries and components of the Wi-Fi technology. Fortunately, the technology has advanced considerably and can be deployed for keeping in view the user's needs; the libraries provide new technology-based services to them. To know the use of these new facilities/services among the library users, without sacrificing the security of library's network. Infrastructure facilities require for the libraries to go Wi-Fi network. Availability of commercial and free Wi-Fi services. Advantages and disadvantages of Wi-Fi services are also discussed.

Keywords: Wi-Fi technology, Access Point, ISP, ISDN, IEEE 802.11, WLAN, VPN, Protocol

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Introduction

Information and Communication Technology has created a sense of urgency and has created new possibilities for the development of new products and delivery of services. The area of services is experiencing tremendous changes at the user level as well as service provider level. Recent advances in networking technology have changed the way to communicate the information. Every day new technologies are emerging in networking field and libraries are adopting these technologies for the benefits of the users. Information technology has unfolded the technical capability to produce and disseminate information. Information and communication technology (ICT) has not only the potential to transmit information at greater speed and precision but also the capacity to deal large amount of diversified information. Over the past years, Wireless Fidelity (Wi- Fi) has popularized and become the dominant networking technology. Earlier networking was done through wiring but now various light and wave emitting technologies are in use. Wi-Fi is one of such emerging technologies, with the help of which, communication between computers can be done without cables. Wireless Internet access uses radio frequency signals to exchange information between a computer and the Internet. Wireless local area networks enable network users with laptops or devices equipped with wireless network interface cards to remain constantly interconnected while roaming within the range of a base station. Fixed access points can also be interconnected with wide area networks, such as the Internet or intra-corporate local area networks.

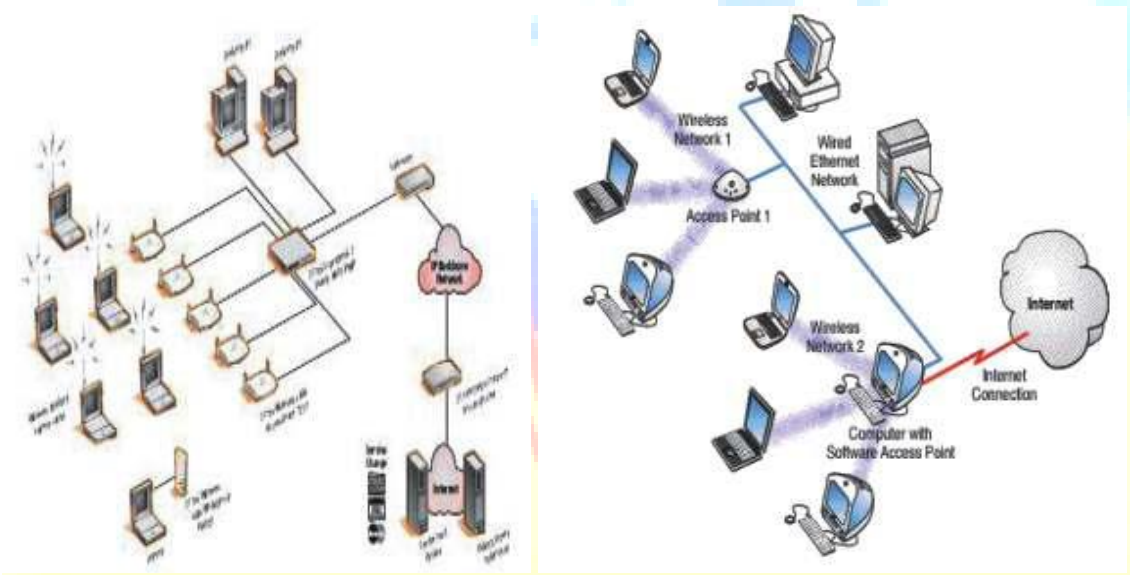
What is Wi-Fi?

The most common Wireless Technology is called WiFi, Which means 'Wireless Fidelity'. This is actually a combination of different protocols that use the IEEE 802.11 (Institute of Electrical and Electronics Engineers) specification standard. The Wi - Fi is an option on most computing devices, including notebooks, cell phone, etc.. The growth of Wi-Fi will be due to enterprise demand for mobile connectivity and the technology's ability to affect business process and dissemination of information. Wi-Fi is short for “wireless fidelity”, and is another name for a wireless communications standard called “IEEE 802.11b” or “802.11g”. 802.11b is the older slower version of this standard, sending and receiving data at 11 megabits per second; 802.11g is the newer, faster standard, capable of 54 megabit-per second communications. Laptops often feature built in wireless network cards or accept plug in adapters that support either 802.11b or g protocols. Both standards provide broadband connections to the Internet and allow users to surf

the Web and use e-mail. Increasingly coffee houses, hotels, schools, airports, and (imagine this!) libraries are making Wi-Fi available to attract and meet customers' needs. A Wi-Fi hotspot network is composed of one or more access points, which are the "point" at which laptop or pocket PC users, connect to the wireless network.

Components of Wi-Fi Technology

The following diagram is an example of a hotspot network setup. The access point, firewall, and switch shown in the figure could be changed according to the requirements of the network. (For example, a 3Com® Wireless LAN Access Point 8750 could be used if simultaneous 802.11a, 11b, and 11g support is required.) For more information on 3Com products, see the product sections at http://www.3com.com/ or talk to your local 3Com reseller for recommendations.



Hotspots network

- ***Access point***

An access point (AP) in Wi-Fi is essentially a compact radio transmitter with an antenna that connects to a wired connection, such as an Ethernet network, or digital subscriber line (DSL)

or cable service supplied by an Internet Service Provider (ISP). The 3Com Wireless Access Point 7250 supports up to 253 wireless users at speeds up to 54 Mbps at distances up to 325 feet. Multiple access points can provide overlapping coverage throughout a site. APs can be installed almost anywhere because power and data are supplied over one cable and different antenna options offer various coverage configurations. AP in Wi-Fi can vary greatly in feature depending on their cost, some access points give an option of roaming where wireless clients can transparently switch from one AP to another

- ***Network switch***

A network switch such as the 3Com SuperStack® 3 Switch 4400 PWR provides installation flexibility by distributing power and data over the same network cable through its built-in Power over Ethernet (PoE) capability. The 3Com switch supports up to 24 wireless access points. The switch also separates user traffic on the wireless network, for example, separating public user traffic from business operations traffic to keep business communications private and secure. The switch also prioritizes traffic usage for uninterrupted Internet access.

- ***Secure router***

The secure router detects and protects the wireless network and its users from Internet hacker attacks. The 3Com Office Connect® Secure Router also supports two private communications channels, or virtual private network (VPN) tunnels, for secure siteto-site or remote user-to-site data and e-mail exchange.

- ***Wireless LAN bridge (optional)***

A wireless LAN workgroup bridge expands a Wi-Fi hotspot's revenue potential by enabling laptop or pocket PC users without built-in wireless capability to connect to the hotspot network. Leisure spot businesses can rent a 3Com a/b/g Wireless LAN Workgroup Bridge and LAN cable to customers or guests who want the added convenience of Internet access during their stay.

- ***Wireless authentication and billing gateway***

Enables hospitality and leisure spot businesses to control access to the Wi-Fi hotspot network by conducting authentication checks similar to credit card or member ID authentication. The gateway also tracks wireless usage for billing purposes and provides payment transaction services. It interoperates with hotel, airport, or other leisure spot reservation systems to verify appropriate customer or guest use. 3Com has developed partnerships with leading authentication gateway vendors in order to offer plenty of choices and a local regional presence throughout the

world. 3Com has thoroughly tested authentication gateway partner products with select 3Com wireless network products to ensure smooth network installation and integration.

Infrastructure Facilities to go Wi-Fi in Libraries

Wire free connectivity in network, is a simple as putting up a wireless access point, practically is not so simple. Many variables are to be considered for successful deployment. We need the following infrastructure to go Wi-Fi in Libraries.

- ***Broadband Internet connection***

A broadband Internet connection through an Internet Service Provider (ISP) is available
Plus installation costs. Broadband Internet access typically is achieved using DSL, cable, ISDN (Integrated Services Digital Network), or dedicated frame relay access.

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A broadband Internet connection through an Internet Service Provider (ISP) is available plus installation costs. Broadband Internet access typically is achieved using DSL, cable, ISDN (Integrated Services Digital Network), or dedicated frame relay access points or range extenders. Popular access point brands include Linksys http:// www.linksys.com, and Net Gear http://www.netgear.com. Access point (definition) acts similar to a hub (not a switch) on a wired LAN (definition), the total bandwidth is divided among all users using an access point (see the Bandwidth Availability section of Wireless Security). More importantly, the total bandwidth available is going to be limited by the speed of library internet connection (which is typically much slower, e.g., a T1 (definition) line is only capable of 1.544Mbits per second). An important consideration, especially if your Wi-Fi access is going to be sharing its internet connection with your wired LAN, may be the ability to limit bandwidth and/ or protocols (e.g., http, https, ftp, etc.) either via the AP itself, or through another firewall or router.

- ***Know How to connect to Library network***

An understanding of what your patrons will need to know to connect to your network
Typically those bringing laptops into your library will know the ropes. But you might want to put together a brochure for the good of your staff as well as your public. Most of the libraries have all written great instructions to their patrons for awareness. Because patrons are used to an expectation of privacy in a library setting, it is especially important to inform your patrons of the necessity of properly safeguarding their computers and data when using relatively insecure public Wi-Fi.

- ***An 'Acceptable Internet Use' Policy***

Wireless users should abide by your library's acceptable Internet Use Policy. This is for your protection as much as their education. Some libraries offer filtered wireless access to the Internet, others don't. In terms of policy, wireless Internet access is probably no different than your wired Web workstation-related policies. There's an extensive compilation of good internet policies on Web junction.

- ***Means of protecting your staff network from Wi-Fi users***

Libraries have staff workstations, circulation systems, mail, and web or content servers.

With any kind of public Internet access, wired or wireless, we can make constrain non-staff access to library applications and servers. There are two alternatives: a) Connect both staff and public access through one point of Internet access, and protect your staff-side with a bombproof firewall (usually a hardware firewall); or b) Connect staff resources to one Internet connection (don't forget the firewall), and connect public access (wired or wireless) to the Internet through another completely separate connection. This second option is probably the simplest to implement, and with broadband costs coming down, becoming more affordable.

Commercial Wi-Fi

Commercial Wi-Fi services are available in places such as Internet cafes, coffee houses and airports around the world (commonly called Wi-Fi-cafés), although coverage is patchy in comparison with cellular.

- (http://www.wisezone.net) provides commercial Wi-Fi for airports, universities, and
- independent cafes in the US;
- T-Mobile provides hotspots in many sectors in the U.S;
- Pacific Century Cyber Works provides hotspots in Pacific Coffee shops in Hong Kong;
- Other large hotspot providers in the U.S. include Boingo, Wayport and iPass;

Sify, an Indian internet service provider, has set up 120 wireless access points in Bangalore, India in hotels, malls and government offices.

Free Wi-Fi

While commercial services attempt to move existing business models to Wi-Fi, many groups, communities, cities, and individuals have set up free Wi-Fi networks, often adopting a

common peering agreement (http://www.freenetworks.org/peering.html) in order that networks can openly share with each other. Free wireless mesh networks are often considered the future of the internet. Many municipalities have joined with local community groups to help expand free Wi-Fi networks. Some community groups have built their Wi-Fi networks entirely based on volunteer efforts and donations. Many universities provide free Wi-Fi internet access to their students, visitors, and anyone on campus. However, there is also a third subcategory of networks set up by certain communities such as universities where the service is provided free to members and guests of the community such as students, yet used to make money by letting the service out to companies and individuals outside.

Application of Wi-Fi in Libraries

Wi-Fi offers tremendous speeds to user and up to 253 wireless users at speeds up to 54 Mbps stay in one place or at least within 100 meters of the same access point. Users can access library OPAC in any corner of the library, even in stacks while searching for books. Users can surf on Web-OPACs during search of documents. Users can surf internet in any corner of the library without bothering for occupying particular seats.

Libraries have introduced free Wi-Fi Internet access to the patrons those who bringing in their own wireless-equipped laptops can access to the entire range of full-text databases normally accessible from the library's own computers, as well as Internet access. Libraries also will be using Wi-Fi-equipped laptops for PC training as part of the Library Program of computer instruction. The Wi-Fi hotspot network is good news for all patrons, both with and without wireless-enabled devices.

Wi-Fi users can now employ their own laptops to tap into the card catalog and all of the library's research databases without having to wait in line for an available computer terminal, which in turn frees up more space for patrons without their own wireless devices. Anticipated yearly maintenance costs have been kept down primarily because of the APs software, which allows the library's few IT staff members to manage the entire system from one central location, and to create and provision consistent security policies across the network. Within the library, a certain part of the network is dedicated to police and other city employees. It extends out into the parking lot so that they can pull in and get wireless access without having to leave their vehicles.

Advantages of Wi-Fi

- Unlike packet radio systems, Wi-Fi uses unlicensed radio spectrum and does not require regulatory approval for individual deployers.
- Allow LANs to be deployed without cabling, potentially reducing the costs of network deployment and expansion. Spaces where cables cannot be run, such as outdoor areas and historical buildings, can host wireless LANs.
- Wi-Fi products are widely available in the market. Different brands of access points and client network interfaces are interoperable at a basic level of service.
- Competition amongst vendors has lowered prices considerably since their inception.
- Many Wi-Fi networks support roaming, in which a mobile client station such as a Laptop computer can move from one access point to another as the user moves around a building or area.
- Many access points and network interfaces support various degrees of encryption to Protect traffic from interception.
- Wi-Fi is a global set of standards. Unlike cellular carriers, the same Wi-Fi client works in different countries around the world. (3)

Disadvantages of Wi-Fi

- Use of the 2.4 GHz Wi-Fi band does not require a license in most of the world provided that one stays below the 100mWatt limit and one accepts interference from other sources; including interference which causes your devices to no longer function.

- Legislation is not consistent worldwide; most of Europe allows for an additional 2 channels; Japan has one more on top of that - and some countries, like Spain, prohibit use of the lower numbered channels.

- The 802.11b and 802.11g flavors of Wi-Fi use the 2.4 GHz spectrum, which is crowded with other devices such as Bluetooth, microwave ovens, cordless phones or video sender devices, among many others. This may cause degradation in performance.

- Power consumption is fairly high compared to other standards, making battery life and heat a concern.

- To be easily breakable even when correctly configured. Although newer wireless products are slowly providing support for the Wi-Fi Protected Access (WPA) protocol, many older access points will have to be replaced to support it

- Wi-Fi networks have limited range. A typical Wi-Fi home router using 802.11b or 802.11g might have a range of 45 m (150 ft) indoors and 90 m (300 ft) outdoors.

- Interference of a closed or encrypted access point with other open access points on the same or a neighboring channel can prevent access to the open access points by others in the area.

- Free access points (or improperly configured access points) may be used by a hacker to anonymously initiate an attack that would be impossible to track beyond the owner of the access point. (3)

Conclusion

Before going to major service initiative or materials purchase, libraries must careful consider their reader needs, preferences and expected use of the service or material. Library professionals must know some of the technologies and there are always a million Do's and Don'ts for the situations they are approaching for networks and devices are no different. Wi-Fi may offer some better services in the libraries. It provides access to the remote users, where user community can access the databases like CD-Rom databases, bibliographic databases, and services like library web pages, off campus services through the library web pages. Though it offers good and tremendous services it may lacking with some other applications in libraries. Many advanced technologies have come like Wi Max, Skype etc. The New technologies may offer better services than with Wi-Fi services.

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