
Wireless Wi-Fi Library Networks

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Abstract

Wireless connectivity is the preferred connectivity in computer networks. It involves connecting laptops, mobile libraries and even bridges to computer networks, without physical wire connections. Wireless connectivity means that individuals can potentially access the Internet, CD-ROM networks and office networks from anywhere and at any time. The lack of a physical connection means that users are able to roam or work wherever they wish and still have access to the computer network. This paper highlights the key elements in wireless connectivity and its potential for deployment in network of libraries.

Keywords : Wireless LAN, Wireless Access Point, Wireless Network Interface Card

0. Introduction

A wireless network is like any other computer network. It connects computers to computer networks without physical wire connections. A wireless network can provide network access to computers, databases, the Internet and OPACs, both within and between buildings. So that organizations of all sizes are installing and operating wireless networks, known as wireless local area networks (WLANs) or Wi-Fi networks. Low cost, ease of installation, flexibility — these are the basic benefits that are causing the widespread adoption of wireless technologies.

1. WI-FI Network

WLANs provide the same connectivity to the resources that wired networks do. Instead of establishing a connection through a network cable, WLANs move data using radio frequency (RF) transmissions. Practically speaking, a wireless connection operates like an additional hub on the network (see Figure 1).

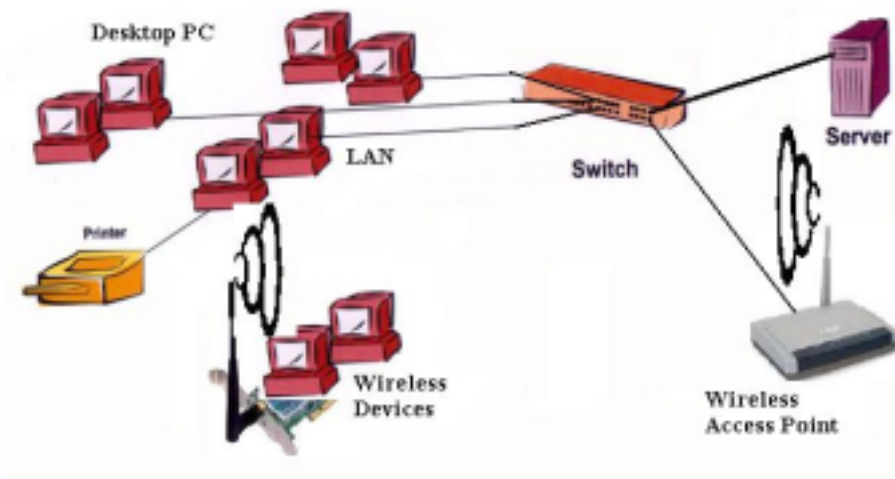


Figure 1: Wireless network functions just like other wired network segment

In place of a direct cable connection between the network and a client, wireless networks employ wireless access points (WAPs), which are physically connected to the network, and wireless network interface cards (NICs), which are installed in each client device. As shown in Figure 1, both WAPs and wireless NICs send and receive RF transmissions, collectively establishing the wireless link [1]. WLANs generally operate at speeds similar to wired networks, although performance can vary. Each WAP installed on a network broadcasts a signal that transmits in an omni-directional pattern. Most commercially available models broadcast from a few dozen feet to over one mile or more. RF frequencies are relatively unimpeded by physical structures such as walls, ceilings, or windows, so the WAP signals can be picked up some distance away from the buildings in which they originate [2]. A single WAP can handle traffic from any number of wireless client devices operating within its broadcast area.

A similar set-up can exist from buildings to vehicles; this allows computers on the vehicle to connect to the network via a transmitter in the laptop, to the receiver/aerial on the building. Such technology is used on mobile libraries and mobile hospital units. Wireless LANs offer many advantages over traditional wired networks, such as mobility, flexibility, scalability and speed, simplicity and reduced cost of installation [3]. Wireless technology can also provide a simple solution when installing networks in listed buildings that cannot, for architectural reasons, have a physical network installed. In many US libraries wireless LANs have already proved very successful. Portage County Public Library in Wisconsin has had wireless access to the Internet since 1997 [4]. The William F. Laman Public Library [5] opted for a wireless network - it cost much less than trying to overcome problems of installing a traditional LAN because of the construction of the building. Both of these libraries allow users to access the library network from anywhere in the building.

2. How Do They Work ?

All wireless technologies use standard technology saddled over a wireless medium - airwaves. The major advantage of this type of technology is that there is no cable between network access points [6]. Wireless networks require: a wireless access point, a wireless PC card, a wireless PC adaptor and a network connection for the access point. The important factor is that only the one access point needs a network connection, rather than each computer as shown in the figure1. The limiting factor of wireless networking is the distance versus bandwidth issue, because the further the computer is from the access point the slower the speed of data rate transfer (megabits per second). Although wireless connection has the possibility of 11Mbps, 22Mbps, 54Mbps, this can be as low as 1Mbps as the distance increases.

Form the above paragraph wireless network requires at least one access point and one or more Wireless NIC for the library network. The number of NIC depends on the size and need of computers to connect through the wireless connectivity while the number of the wireless access points depends on area that we want to cover.

Now a day wireless NICs and Access points comes in various range in terms of data transfer speed like 11Mbps, 22Mbps, and 54Mbps. For example D-Link® provides DWL-120 Wireless LAN adapter and DWL1700 Wireless Access Points which can operate on 11Mbps while DWL-520+ PCI Adapter and DWL 1000AP+ Access point can provide network speed of 22 Mbps [7]. Still new and new innovation is and new products from various companies are available in the market for higher speed in wireless network. Depending on the speed and cost factor one can use any of the wireless instruments for the library.

3. Wireless Networks and Libraries

Wireless connectivity gives libraries the opportunities to introduce new services and extend current services to more users.

Richmond Libraries has installed wireless LANs in three branches, which includes wireless access points, installation, configuration, and PC cards. The wireless LAN complements the existing cabled LAN. This enables the local college to run IT awareness courses using laptops when the libraries are closed. [8].

Wireless connectivity may be the cheapest way to network library buildings, especially smaller local libraries. Such networks will provide flexibility in services, allowing users to sit where they wish when accessing the Internet or library OPAC. Users can either access the wireless LAN using their own PCs (having borrowed or purchased a wireless network card from the library), or libraries could loan out networked enabled laptops for use within the library [9]. Wireless networking also provides the opportunities to offer access to library services in alternative locations.

4. Developing Services

Installing wireless networks combined with WAP (wireless Access Protocol) enable Mobile libraries may provide current services, or introduce new and innovative services for the public to utilize through the wireless environment. Mobile messaging or SMS, for example, could be introduced for sending information to users. Collecting users' mobile phone numbers upon registration would allow library staff to send text messages regarding requested items, notify them of events, or issue reminders of overdue items. Some libraries are already developing WAP enabled library Web sites. Both Shropshire [10] and Hampshire Libraries [11], for example, have developed WAP pages that contain basic library information.

5. Issues

Wireless connectivity raises a number of issues for libraries:

5.1 Security

A recent survey highlighted that 25% of organizations not using wireless LANs were held back by security concerns [12]. No library wishes a user to walk into the building and gain access to the private staff network or circulation module of the library management system. Restrictions need to be made on who can access the network and from what access point or building. However, security provisions can be built into wireless LANs making them as secure as most standard LANs. **Unauthorized access** — Unauthorized users accessing network through the WLAN/LAN are a major security concern. We have to provide some mechanism, which will, denies unauthorized users access or limits their access to public network segments such as the Internet. [1] **Unauthorized devices** — Some devices, such as unauthorized laptops or PDAs, can leave you wide open to attack [1]. We have to provide some mechanism to automatically discover any new devices on your network and immediately alerts to administrator.

5.2 Costs

Although running costs can be comparable to traditional wired networks, wireless transmission and reception equipment is generally much more expensive than the cost of comparable wired components. For Example the cost for DWL-520+ PCI Adapter and DWL 1000AP+ Access point of D-Link product is approximately Rs. 11500 and Rs. 18000 respectively [7] while many other wireless instruments are available in the market but the cost differs depending on the requirements and manufacturing company.

5.3 Resources

Wireless networks may provide libraries with the opportunity to introduce new services and increased access to e-content on network. However, all these services need trained staff to develop and support them. With limited resources, development of such new services will need prioritizing alongside existing services.

5.4 Changing Technologies

Wireless technologies are constantly changing, which makes long-term planning difficult. For example, the take-up of WAP phones has been disappointing and the GPRS system may supersede it. Blue tooth looks like being a major influence in wireless networking and yet already has a challenger in Wi-Fi. [13] Libraries therefore need to be flexible when planning their wireless services and keep abreast of the latest developments.

6. Conclusion

The use of wireless connectivity in libraries offers the opportunity to provide the same standard of service to users regardless of location. Not only does a connection to the network and library management system benefit users, but staff can also manage stock and statistical information in a far more efficient way. In addition, wireless networking may offer libraries previously seen as too remote or expensive to network the opportunity for the same high-quality networked services as a central library. Unfortunately, there are many numbers of articles about libraries and wireless connectivity, but there is a wealth of information on wireless technology in general. But this paper provides real information for the library people to establish a new wireless network or to migrate from existing wired network to wireless network. There may be a vertical learning curve ahead of libraries who wish to make use of wireless connectivity, but the benefits of the services and, in particular, the increase in equality of service, will make the initial struggle worthwhile.

7. References

1. Still secure A Guide To Wireless Network Security <http://www.stillsecure.com>
2. Wireless communications and networks by Willam Stalling, LPE, Pearson Education
3. Mobile communications By Schiller, LPE Pearson Education. P-161-163
4. Portage County Public Library <http://library.uwsp.edu/pcl/wireless.htm>
5. William F. Laman Public Library <http://www.pla.org/technotes/wireless2001.html>
6. Williams, Robert. Wireless Community Networks Texas State Library. 1999
<http://www.tsl.state.tx.us/ld/pubs/wireless/contents.html>
7. D-Link India Ltd. <http://dlink.co.in>
8. Richmond Libraries E-mail: d.fernandes@richmond.gov.uk
9. Handheld PCs On A Wireless LAN <http://www.lib.csufresno.edu/>
10. Shropshire Libraries Wap Web site <http://wappy.to/library>
11. Hampshire Libraries Wap Web site <http://www.hants.gov.uk/library/test/wap.html>
12. Angel, Jonathan. Look Ma No Cables. Network Magazine.
<http://www.networkmagazine.com/article/NMG20001106S0004>
13. Wireless communications principles & practices second editions by Theodore s. Rappaport, LPE Pearson Education

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