Meal Plan 1

Self-Service Internet Access:
Setting Up a Wireless Network

Ever since you started offering high-speed Internet access, your “restaurant” has been overflowing with customers. The wait for a table is sometimes over an hour. In a real restaurant, you’d hire more staff and find a bigger building with more seating space. However, in a world of shrinking budgets, librarian-chefs need to think about the most affordable options. So maybe it’s time to serve up cafeteria-style Internet access, where the patrons just help themselves. In other words, you offer wireless Internet access, and your patrons use their own laptops rather than the library’s public computers. Patrons who own a laptop or another wireless device often prefer to use their own equipment. Those who don’t have a laptop tend to benefit as well because of the shorter wait times for desktop computers.

This section covers the fundamentals of setting up a wireless network for your library patrons. In it, you’ll find some of the critical factors you need to consider before you dive into the world of wireless networking.

TOPICS TO BE COVERED:

- What Is a Wireless Network?
- Why Offer a Wireless Network to Your Patrons?
- Information Security in a Wireless World
- Creating Separate Wireless Networks for Greater Security
What Is a Wireless Network?

A wireless network is similar to a wired network, but instead of using cables, it communicates using radio frequency signals. There are dozens of different flavors of wireless networking: Cell phones, satellites and radios all communicate wirelessly. However, in this book, the term “wireless networking” refers to a technique for interconnecting computers wirelessly at the building level. This kind of wireless network is sometimes referred to as wi-fi, an 802.11 network or a “wireless local access network (LAN)” or “WLAN.” These networks have a radius of 300 feet under ideal circumstances. Throughout this book, the terms “wireless network” and WLAN will be used.

At a minimum, there are three pieces to a wireless network:

- First, there’s the **wireless access point** (discussed in more detail later in this section). The center of a wireless network acts like the hub, or switch, of your wired network, though it also has many of the features of a standard router. On one side, it connects to the Internet, usually through a standard Ethernet cable, and on the other side, it broadcasts a wireless signal.

- Also, there are “**wireless devices**.” These are the computers and gadgets that use the access point in order to hook into your network and your Internet connection. The first wireless device that comes to mind for most people is a laptop computer. However, there are hundreds of gadgets that can access wireless networks these days. Library patrons use cell phones, smartphones, personal digital assistants (PDAs), personal gaming devices (like Playstation) and more to connect themselves to wireless networks. Through the rest of this book, “laptop” will be used as shorthand for all of the wireless devices out there.

- Each wireless device has a **wireless network adapter**—a specific piece of hardware that connects a computer to a WLAN. Wireless adapters come in all shapes and sizes. Some adapters are built into the computer. Others need to be purchased separately and then plugged into the Universal Serial Bus (USB) port or PC Card port.

A Basic Wireless Network
Why Offer a Wireless Network to Your Patrons?

The obvious answer is that patrons are asking for wireless access. It's convenient for them because they frequently carry their documents and personal information around on their laptops and handheld devices. When using the Internet on their laptops, they don’t have to make any configuration changes or copy any files. They can just connect and start working. Furthermore, they don’t have to wait in line and use the computer in 30- or 60-minute chunks, as they do when they’re using the library’s wired computers. Also, patrons without laptops benefit because the lines for the public computers are shorter.

According to a recent article in eWeek, 2007 will be the first year that major PC manufacturers make more money from laptop computer sales than they do from desktop sales. Also, wireless is now available in 54.2 percent of all public library branches, so patrons are beginning to expect it, especially those who know how cheap and easy it is to set up an access point.

The Why Behind Wireless

“Patrons love it. One teenager walked into one of our libraries the first day they got wireless and literally screamed, 'This is the happiest day of my life!' I love that story, because I've been really worried about that kid ever since, but he was really thrilled to think that that was available. And of course, visitors and tourists love it.”

Linda Lord
Maine State Library, ME (reporting a story from Inese Gruber, Windham Public Library, ME)

“We upgraded our bandwidth and with the package we saved enough money to add the wi-fi. Weird, huh! But, that and patrons “hounding” us to get with the act, is how we came about getting the wireless Internet. I love having wireless; it has made life easier with bandwidth not being such a bugaboo. Nice technical term!”

Annie Adamson
Caldwell Public Library, Caldwell, ID

MEAT AND POTATOES: YOUR WIRELESS NETWORK

You can get started with wireless networking for somewhere between $50 and $80 if you don’t need any advanced features. Thousands of libraries today are using this most basic of wireless recipes. Linksys, DLink, Buffalo, NetGear and dozens of other companies sell low-cost access points for use in homes and small businesses, and they’re a perfect fit for many libraries. Before setting up an access point and making it available to the public, you have to make some decisions with regards to security and acceptable use policies. (For security, see the rest of this Meal Plan. For acceptable use policies, refer to Meal Plan 4.)

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Overall, the learning curve for installing and configuring an access point is fairly minimal. Here’s what you’ll need:

- A computer (either laptop or desktop) with a Web browser
- An Ethernet cable
- A network port (i.e., a connection to your wired network)
- An electrical outlet

The instructions that come with your access point will have more specific setup information. You may need to get some information from your Internet service provider (ISP) or your network administrator, if you have one. During this process, you should print a copy of the main configuration page(s) for your access point. Also write down the access point’s username and the password you assign. Be sure to store these in a secure location.

Finally, write down the access point’s networking information. Access points usually have two sets of networking numbers. On the wired side, the access point has an Internet Protocol (IP) address that it uses to communicate with the other devices in your library or with your ISP, if it’s connected directly to the Internet. Chances are this IP address is assigned dynamically. On the wireless side, the access point will have a static IP address that you assign (the access point will suggest a number, usually in the 192.168.x.x range). At the same time, again on the wireless side, the access point will probably act as a Dynamic Host Configuration Protocol (DHCP) server, handing out IP addresses to all the laptops in the library. For more information on all these networking terms, see the glossary or check out the “Networking Basics” section in “Other Tasty Recipes” at the end of this chapter.

Before you offer wireless access to the public, you should also ask: Does offering wireless violate the terms of the contract you signed with your ISP? Some ISPs place limits on how you use a high-speed connection, especially if you’re leasing that connection. If this is the case, you may need to renegotiate your contract or find another ISP.

IF YOUR NETWORK NEEDS A BOUNCER, USE A WIRELESS GATEWAY

An access point is OK when you only have a few wireless patrons every day, but when you have dozens of laptop users in the library every hour, things could get a little rowdy. If this describes your situation, you might need to purchase a bouncer for your wireless network. A wireless gateway gives you the muscle you need to keep your wireless users in line.

Wireless gateways add functionality to your wireless network. If a few patrons are hogging all your wireless bandwidth, a gateway can help set limits on the amount that any one person can download. If you want to brag to your board about how much patrons love the new wireless network, a gateway can help you generate usage reports. Bear in mind that a wireless gateway is usually something you must buy in addition to your wireless access point. It doesn’t replace your access point. Wireless gateways start at $150, but they can run more than $1,000. Also, they vary in their functionality, so be sure to do some investigation before you buy. In general, wireless gateways have a steeper learning curve than access points.
E-RATE

Also, keep in mind as you’re shopping for wireless equipment and services that some of these costs may be eligible for E-rate discounts. If you decide to buy a second Internet connection for your wireless network, that may be eligible for discounts, too (for more on obtaining a second Internet connection, see “Creating Separate Wireless Networks” on page 14 of this Meal Plan section). E-rate is a complex program, so contact your state library’s E-rate coordinator for more advice on getting started.

Also, check out “Other Tasty Recipes” at the end of this chapter for other E-rate resources. Appendix G in this cookbook provides a more detailed look at E-rate reimbursements and associated rules.

A Bandwidth Debate

“The debate is as libraries we try to provide free services to accommodate people, but in our instance the bandwidth is an issue. If people are sitting outside taking our bandwidth, we’re getting no benefit for what we’re paying for and it’s affecting what we do. At this point, we’re struggling with that whole issue of where to go forward with strengthening and getting more bandwidth, especially in so many diverse locations. I finally decided that I really think we need to ask patrons to have a card so that we’re at least getting the benefit of the statistic and it’s inside. I know Philadelphia has the city going to a wi-fi zone, and other libraries are looking back and forth on that. Generally, our attitude is what we can do to accommodate, we try to do; but for smaller library systems like ours, the bandwidth is going to be an issue. I also think that it’s going to be an issue of what can we afford.”

Connie Barrington
Imperial County Free Library, CA

HIRING A CATERER: WORKING WITH A HOTSPOT PROVIDER

You’re not the first person who’s heard the words “public wireless network” and felt overwhelmed. You’re already preparing 10 other meals, the eggs are burning and the soufflé is falling. The time has come to call in a caterer and outsource this particular course on your library’s menu. In the wireless world, these caterers are known as hotspot providers. A hotspot is any publicly available wireless network that is available by intent. Hotspot providers generally do any or all of the following functions:

- Do all the tech support.
- Supply the equipment.
- Help with the marketing.
- Provide a Web-based management console that you can use to monitor and control your hotspot. Perhaps most importantly from a librarian’s perspective, many hotspot providers will handle all of your patrons’ tech support questions. Asking your circulation and reference staff to handle dozens of laptop connection problems

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every day impacts their ability to perform all their other crucial librarian tasks. Hotspot providers usually charge between $300 and $500 for initial setup and installation. In addition, they then charge you a monthly service fee.

**Wireless Access Outsourcing**

“We outsource our public wireless access. When I first got to Scottsdale Public Library in 2003, the network administrator was starting a pilot project with a homegrown wireless system. It was great because we could finally provide the free wireless access the public had been asking for. But it wound up taking a big toll on the front-line staff because people were coming up and asking them to troubleshoot their laptops. Not only did the staff not have time (troubleshooting access issues on an unfamiliar computer can be very time consuming), a lot of them didn’t have the technical knowledge to do it. This put the front line staff in the position of not being able to deliver good customer service.

That’s when we ran across Ethostream, a company whose primary business is providing wireless access for hotels. The best thing about them is that they provide you an 800 number to give directly to your customers. So, we have a little bookmark that we hand out with basic configuration information and the number to call if they have problems.

Generally people don’t have to do any configuration; they just open up their browser and are online as soon as they accept Ethostream’s acceptable use policy. Should they have any problems, they can call the 800 number and talk with an Ethostream help desk technician who will help them work through their configuration issues. Since most everyone who has a laptop also has a cell phone, it’s a great solution.”

Aimee Fifarek
Scottsdale Public Library

Most small and mid-sized libraries can get by with a commercial hotspot provider for the services they need. However, there are a few features that you can only get by partnering with your Integrated Library System (ILS) vendor (ILS refers to your online catalog). In most cases, these extra features are probably not worth the additional trouble and expense. However, if you want your wireless gateway to connect to your patron database, you should talk with your ILS vendor.

For more information on setting up a wireless hotspot, either on your own or in collaboration with a provider, see the “Hotspot Providers” resource links under “Other Tasty Recipes” at the end of this Meal Plan.
Information Security in a Wireless World

As with so many things in IT, security is a matter of balance and trade-offs. The most secure option for any computer or networking device is to shut it off and lock it in a bank vault. Of course, at that point, it’s not very accessible or usable. So in the following two sections, bear in mind that you have to strike the right balance between security on the one hand and accessibility/usability on the other hand. The wireless network has to be relatively user-friendly for your patrons, but it also has to be user-friendly for you and your staff in terms of the amount of time it takes you to administer and maintain the equipment. However, if your network is too open and too insecure, in the long run, no one will be able to access it, because it’ll be down for repairs all the time. At every step along the way, you’ll need to think about how each decision affects your network’s security and how it affects your network’s accessibility.

PROTECTING YOUR LIBRARY

An open wireless network can pose a risk to your library if it is not secured properly. Here’s how to minimize problems:

- **First, change the administrative password on your wireless access point or wireless router!** Most name-brand access points come with a fairly simple, well-known default username and password. Therefore, anyone with a laptop who knows the default admin password could drive by your building, connect to your access point, take it over and lock you out. You could reclaim control by restarting the access point and clearing all settings, but you’d have to reconfigure it. However, anyone who’s used the access point in the meantime has had their security compromised.

- Be sure to document your password in a secure place, so that only those people who need access to it can get it when needed.

PROTECTING YOUR PATRONS’ PRIVACY

As a very discreet and exclusive establishment, you’d like to ensure that every customer in your restaurant has a private room and a private entrance. Unfortunately, in terms of time and money, it’s almost as difficult to make a wireless connection totally private for every patron as it would be to make a restaurant satisfy everyone’s needs. Most libraries don’t consider it their responsibility to protect the data and privacy of patrons who are using their free wireless access. However, if you’d like some more information on this subject, see this article on TechSoup concerning encryption, virtual private networks (VPNs) and other steps laptop users can take to protect themselves.

http://www.techsoup.org/learningcenter/internet/page6044.cfm?cg=searchterms&sg=encryption
Creating Separate Wireless Networks for Greater Security

As another security measure, you should seriously consider separating your wireless network from your staff computers, your Web server, your ILS and other sensitive machines containing patron records or financial information. Remember: When patrons connect to your wireless access point, their laptops could have almost anything installed. A laptop might be crawling with every known worm and virus, or it could have dozens of hacking utilities that can bring down your network. Prevention beats cure every time. However, there are a few complex decisions you have to make before you divide your network.

First, you may need to think about your overall network design. How will your workstations, servers and other devices connect with each other, and what sorts of barriers will you put between different segments of your network? This is a complex decision with many possibilities. It also has implications for how you spend your technology budget. If you design your network poorly, you may end up spending money on expensive equipment that you don’t really need. Try to find a networking consultant to help with this decision. Your state library or your regional library consortium may have this sort of expertise on staff. If not, they can probably refer you to someone who does. Or, your local school system or county government may have a knowledgeable person available. Also, some ILS vendors provide this kind of consultation for a fee.

For the purposes of this section, we’ll assume that you’ve thought about your network design and now you’re just wondering how wireless fits into it. What are the various techniques you could use to make sure that the laptops don’t have too much communication with the other computers in your library?
Libraries have lots of options when it comes to dividing their network. Here are three basic design approaches to creating network segments.

**Option A:** A lot of libraries just throw the laptops to the wolves, in a manner of speaking. In other words, they place the access point outside of the library’s firewall and plug it directly into the router, the cable modem or the Digital Subscriber Line (DSL) modem (see the diagram below). The presumption here is that laptop users connect to unsecured access points all the time in coffee shops and hotels, so they’re already prepared for the worst.

**Laptops Outside the Library’s Firewall**
Option B: A variation on the Option A approach is used by the Missoula, Montana Public Library⁴ and other libraries. Instead of putting the access point somewhere on their existing network, they’ve purchased a second Internet connection specifically for wireless users. This is as segregated and secure as you can get without moving laptop users into another building. With this approach, laptop users in your library can cause problems for other laptop users, but they cannot infect the library-owned equipment. Not only do you get extra security benefits from this approach, but you also ensure that laptop users won’t hog the bandwidth on your primary connection and slow down your wired public computers and staff computers. At first, this approach may seem more expensive, since you’re paying for a second Internet connection month in and month out. However, in the long run, it may save you money on expensive networking equipment and maintenance. A single virus or worm let loose on the library’s wired network can take you and your staff days or weeks to clean up.

If you haven’t already hit up your cable or phone company for a free Internet connection, now might be the time to try. Some cable and phone companies are required to offer free high-speed Internet to schools and libraries according to the terms of their local franchising agreements. However, many cable companies will offer free connections to schools and libraries, regardless of whether or not they’re required to do so. For more information on how to ask your cable company for a free connection, see http://www.ciconline.org/get-cable and http://www.ciconline.org/locator.

The diagram below may give you a better sense of what your network will look like if you take the Option B approach. Bear in mind that the exact type of equipment and high-speed Internet connection may be different in your situation.

**One Network for Library-Owned Equipment and Another for Patron Laptops**

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**Notes from a Chef**

"Some of the local cable companies are actually donating some lines to the library. I know over in east Tennessee, I've got several of the cable companies that are providing free cable access to libraries that want to get a second line, or just a second static IP address to provide wireless. To me, it makes really good sense, because you’re not only saving your bandwidth, you’re also eliminating security concerns from curious folks sniffing across your network for information that you don’t want them to get."

Brad Leek  
Tennessee State Library
**Option C:** Some libraries are concerned about tossing their laptop users out into the open Internet, so they decide to bring them back inside the firewall. However, with this option, you still have to provide some sort of separation between your patron laptops and your staff computers. There are many ways to accomplish this.

Most organizations would rely on a firewall in this situation. A firewall is a system designed to prevent unauthorized access to or from a private network. A firewall can be a hardware device, a piece of software or a combination of both. If you have an existing firewall with a spare port, you can plug your access point into that. If not, you may have to buy an additional firewall. Bear in mind that firewalls are expensive and they often have a steep learning curve. If you don’t have the requisite expertise on staff already, you’ll need to contract with a networking/security expert to help you purchase and configure your firewall.

Another advanced solution, which would also require advice and assistance from a networking expert, was implemented by the Fort Collins Public Library (Zhao). For more information about their Virtual Local Area Network (VLAN), go to http://www.webjunction.org/do/PrinterFriendlyContent?id=12368.

The diagram below only works if you own a firewall with several ports or if you own more than one firewall. If you only have two or three ports available on your firewall, you may need to put the staff computers and the servers on the same network segment. Or you may want to consider option A or B above.

**Laptops Inside the Library’s Firewall**
Wired for Protection

“The wireless network is on a totally different network — actually, two different networks — because every wireless access point that we have is divided into two areas, the public and the private. Both of those are on separate networks from the public terminal network. Now, the user never knows that. I mean, it still gets them to the Internet, it still gets them to the same services that they’re trying to get to, they just don’t realize that they’re on totally different networks.”

Jim Buston
Auburn Public Library, Auburn, AL

Wireless Options Comparison

Sorting through the variations of this approach can be confusing. You might want to talk to an experienced network consultant first.

The chart below is an overview of the options discussed

<table>
<thead>
<tr>
<th>SOLUTION</th>
<th>WHY?</th>
<th>COST</th>
<th>TIME AND LABOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access point</td>
<td>Basic wireless connectivity</td>
<td>$50 to $80</td>
<td>One to two hours</td>
</tr>
<tr>
<td>Wireless gateway</td>
<td>Increased control over your wireless network</td>
<td>$500 to $1500</td>
<td>Variable, depending on what features you want, but gateways are more difficult to configure than a regular access point</td>
</tr>
<tr>
<td>Hotspot provider</td>
<td>Ease of maintenance</td>
<td>$500 to $1000 startup cost and $50 per month</td>
<td>Depends on your package, but providers often perform all setup and troubleshooting for you and your patrons</td>
</tr>
<tr>
<td>A second Internet connection</td>
<td>Improved security</td>
<td>$25 to $50 per month</td>
<td>One to two hours</td>
</tr>
<tr>
<td>A firewall with separate VLANs</td>
<td>Improved security</td>
<td>$500 to $1500</td>
<td>Variable, but firewalls are complex devices, and you may need outside help to configure it properly</td>
</tr>
</tbody>
</table>
OTHER TASTY RECIPES

Networking Basics
- Networking Basics
  WebJunction
  A series of short articles on basic networking principles.

E-Rate
- E-rate basics
  A quick overview of E-rate concepts and terminology.
  http://www.kelloggllc.com/erate/primer_06.pdf
- Schools and Libraries Program – USAC
  The official E-rate Web site for schools and libraries.
  http://www.usac.org/sl

Computer Security
- Secure Computing: The Key Ingredients
  TechSoup
  An overview of the most important security software and strategies to protect your
  computers and patrons from harm.
  http://www.techsoup.org/learningcenter/software/page5500.cfm?cg=searchterms&s
  g=security
- Firewalls and You
  TechSoup
  An in-depth look at firewalls: what they are and how to defend your technology with
  them.
  http://www.techsoup.org/learningcenter/networks/page4818.cfm?cg=searchterms&
  sg=firewalls
- Keeping Software Up to Date on Public Access Computers
  WebJunction
  A discussion of the importance of software updates and a handy table to guide
  your updating of some popular software titles.
  http://webjunction.org/do/DisplayContent?id=11946

Hotspots
- Wireless Hotspot Information Page
  Paris-Bourbon County Library, Kentucky
  http://www.bourbonlibrary.org/wireless.htm
- Setting Up Your Own Hotspot
  PC Magazine
  http://www.pcmag.com/article2/0,1895,1883666,00.asp
Small Business Guide to Building Your Own Hotspot

JiWire

Though this article comes from an advertising company and is aimed at small business owners, it’s a comprehensive comparison of several hotspot products, providers and considerations for those thinking about building hotspots.


Wireless Networks Connect Libraries to a Mobile Society

Library Technology Reports

An article with some information about partnering with an ILS to set up a hotspot.

http://www.librarytechnology.org/ltg-displaytext.pl?RC=11183


Hotspot Providers

Surf and Sip

This provider’s page on their Internet-Café-In-A-Box wireless networking product.

http://www.surfandsip.com/ps_local

Ethostream

Includes descriptions of EthoStream’s four hotspot packages, including details about their library solutions.

http://www.ethostream.com/solutions.php

Public IP

The home page for a free public hotspot based on Linux.

http://www.publicip.net

Sputnik Express

A description of this vendor’s solution for free hotspots (free for your patrons, but your library will have to pay a monthly fee).


Less Networks

http://www.lessnetworks.com/index.php

Separating Your Wireless Network from Your Wired Network

Planning and Implementing a Library Network Split

WebJunction

A detailed look at some strategies for separating your public computer networks to protect your administrative and staff computer networks.

http://webjunction.org/do/DisplayContent?id=12368
WebJunction
Wireless Success: Missoula (MT) Public Library
http://webjunction.org/do/DisplayContent?id=10998

Other Resources

Blog and Wireless Technology Information Archive of Bill Drew, Tompkins Cortland Community College Library in New York.
Wireless Libraries
http://wirelesslibraries.blogspot.com

Wireless

Maine Learning Technology Initiative –
"The Maine Learning Technology Initiative (MLTI) is a statewide program intended to “transform Maine into the premier state for utilizing technology in kindergarten to grade 12 education in order to prepare students for a future economy that will rely heavily on technology and innovation.” (Task Force on Maine’s Learning Technology Endowment, 2001, p. vi)."
http://www.maine.gov/infonet/wireless/support/index.htm
http://www.maine.gov/mlti/about/index.htm

Personal VPNs and Staying Safe When You’re Using a Hotspot

Five Tips for Secure Wireless Web Surfing
TechSoup
Information you can offer patrons who want to protect themselves and their computers
http://www.techsoup.org/learningcenter/connections/page5998.cfm

Hotspot Shield
AnchorFree
Free software that encrypts and protects data transmission over wireless and wired networks. Based on virtual private networking technology, described in the TechSoup article above.
http://www.anchorfree.com/hotspot-shield

Wireless Encryption and Authentication (WPA-2)

Wireless Security for a Small Library: One Library’s Solution
WebJunction
How the Blackfalds Public Library in Alberta gives patrons a choice of open or protected wireless networks. Includes an illustration of their network.
http://webjunction.org/do/DisplayContent?id=10992
Fast Food — Meal Plan 1 Summary

- At a minimum, there are three pieces to a wireless network: a wireless access point, wireless devices and the wireless network adapter.

- If you don’t need advanced features, you can get started with wireless networking for somewhere between $50 and $80.

- Linksys, DLink, Buffalo, NetGear and dozens of companies sell low-cost access points for homes and small businesses, but they’re also a perfect fit for many libraries.

- Remember, some of the costs for wireless equipment may be eligible for E-rate program discounts. A second Internet connection for your wireless network may also be eligible.

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**MENU 1 CHECKLIST**

- Set download limits for users.
- Use a hotspot provider to do any or all of the following functions:
  - Tech support
  - Supply equipment
  - Marketing assistance
  - Web-based management console to monitor/control your hotspot
  - Answer patron questions
- To protect your library in a wireless network environment:
  - Change the administrative password on your wireless access point or wireless router!
  - Be sure to document the password in a secure place, so people who need access to it can get it.
- As a security measure, separate your staff computers, your Web server, your ILS and other sensitive machines containing patron records or financial information
- Try asking the cable or phone company for a free Internet connection. They may do it!
- Go to [http://www.usac.org/sl/tools/eligible-services-list.aspx](http://www.usac.org/sl/tools/eligible-services-list.aspx) to see whether the specific wireless products and services you are interested in are eligible to receive E-rate program discounts.