

Designing a Wireless Network

March 28, 2011

Wireless Versus Wired

The reasons we will build a wireless network is to have mobility around the system, and to allow new users to quickly connect. In a wired network, we definitely do not have the ability to move the computers around easily and when a new device is added, we have to add a new patch cable and use another port on a switch.



The wireless device does not require cable receptacles mounted in the wall or wires lying on the floor. We save much money by not having to buy switches. We would definitely build a wireless network if we are managing a small budget.

Benefits of a Wireless Network

- Mobility
- Easy to add a new device
- Low cost
- Aesthetically pleasing

Benefits of a Wired Network

- 1 Gigabit speed
- More secured network

Designing the Wireless Network

When we are building a computer network for mobility, to allow new users to be added easily and to save money, we may need equipment that is not already present. We need wireless routers, wireless bridges or access points and wireless Network Interface Cards (NICs). In an older wired network, these pieces of equipment will probably not be present. While laptop computers have a wireless NIC, a new desktop computer does not typically come with a wireless card. The wireless bridge or access point is not a standard piece of equipment, so we may need to obtain one for larger wireless networks.



A Wireless Router

We will plan to connect a wireless router to the ISP modem that is coming into the building. We will program the wireless router to connect to the ISP dynamically and to distribute IP addresses using the dynamic DHCP addresses. We will setup the router with WPA security so only individuals having the passphrase will be able to join the network.



We will give the client a sheet that has the passphrase, so they can distribute the password when they have visitors.

If the signal strength is low in any area such as the basement, we can add a wireless bridge that will act as a repeater and that are will have the same strength as the rest of the building.

Meeting the Client

We begin to design our wireless network when we meet with the client. At that first conference, we need to discover what they wish to do with their system. This can happen over the telephone or by email, but a site visit can save the installation team valuable time since we will know where the computers will go, the power bars for our devices will have the acceptable power cord length, and we will test the building for signal strength. In larger homes and businesses, we can add more than one wireless access point, so the signal strength is adequate throughout the dwelling.



In the sketch of the home, we should record the signal strength from the wireless router we placed in the building.

Site Visit Equipment List

When we visit a customer, we want to gather sufficient information, so we can create an accurate quote that has the correct number of computers, that we determine the location and the number of wireless access points including the distances to available and open power outlets. We need to bring equipment with us to make a proper site visit,

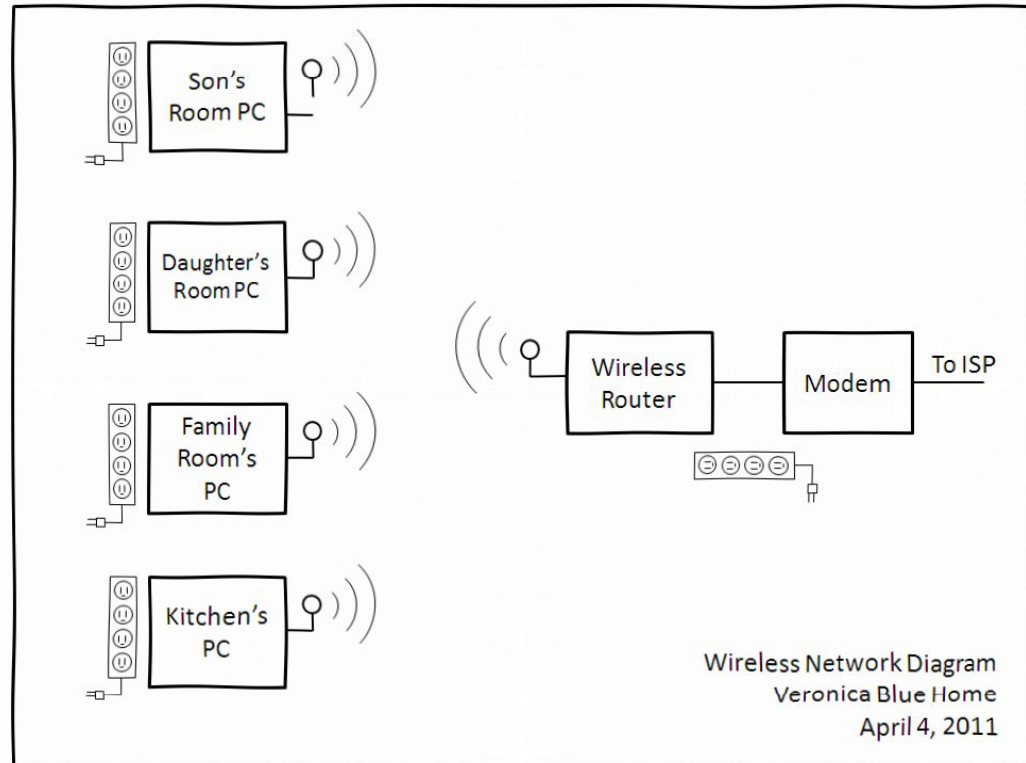
Site Visit Checklist

- Pen / paper/ notepad
- Flashlight
- Measuring tape
- Wireless router
- Digital camera
- Standardized LAN diagrams
- Red pen
- Ladder

We need a notepad and pens to record the customer requests and to sketch the ideas. We need a flashlight to see in dark areas such as crawl spaces where the ISP cable could go. We need a measuring tape to determine distances to open power outlets, so the surge protectors have a long enough cord. We can have standardized diagrams to reduce the time to make sketches and a digital camera to capture the images of the rooms. On some site visits, we may need a ladder to look above a drop ceiling where cables will run.

Sketching a LAN Diagram

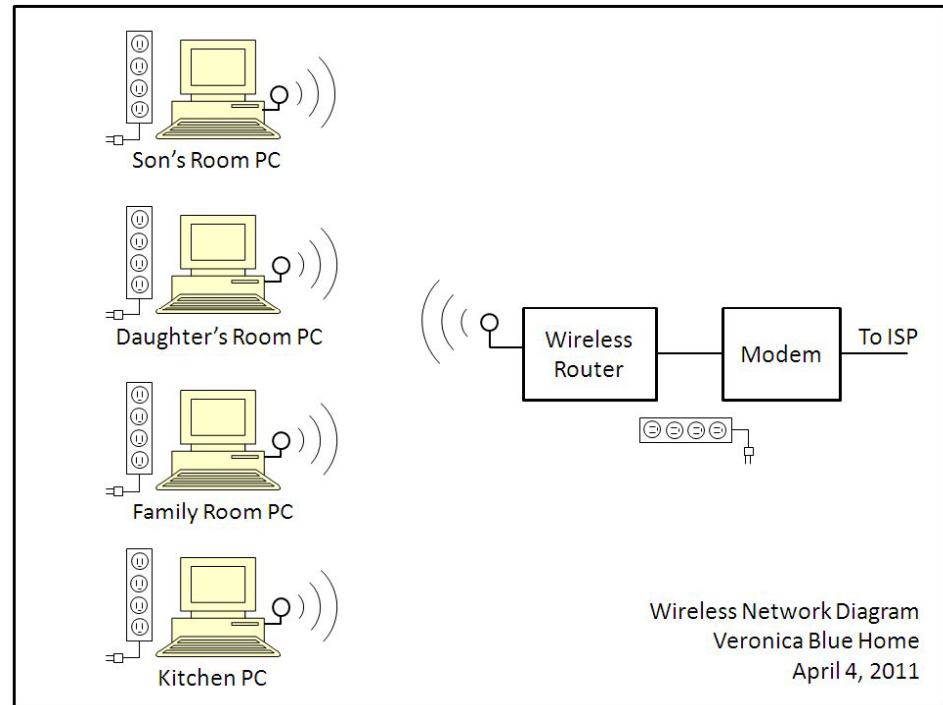
When we visit the building where the new wireless network will be built, we need to identify where the customer will locate each Personal Computer (PC). We can also determine where the Internet Service Provider (ISP) will bring the cable or fiber line into the building. In some cases, the customer can already have a ISP connection.



We will determine where the modem and the router will sit. We should setup the wireless router and test the signal strength to each location where a wireless device will sit. In some cases, we will need a wireless bridge to extend our wireless network. We draw a sketch showing everything we need.

Draw a Diagram

A diagram should show all the hardware we need to purchase. If we have a floor plan of the building, our blueprint can show the devices in the exact room and location where they will be installed. Do not forget to account for power receptacles. In a wireless network, we can have a patch cable that connects the wireless router to the ISP's modem.

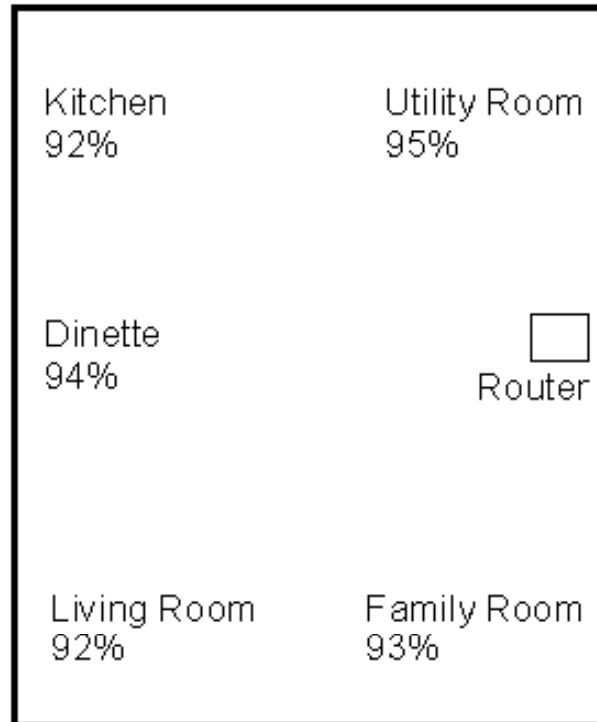


A personal computer can require two power receptacles, one for the desktop unit and the second for the monitor. The customer may require a printer, and speakers which will also need a power plug. If the router and modem are at the same desk, there will be two more plugs. Count the plugs you need at each workstation.

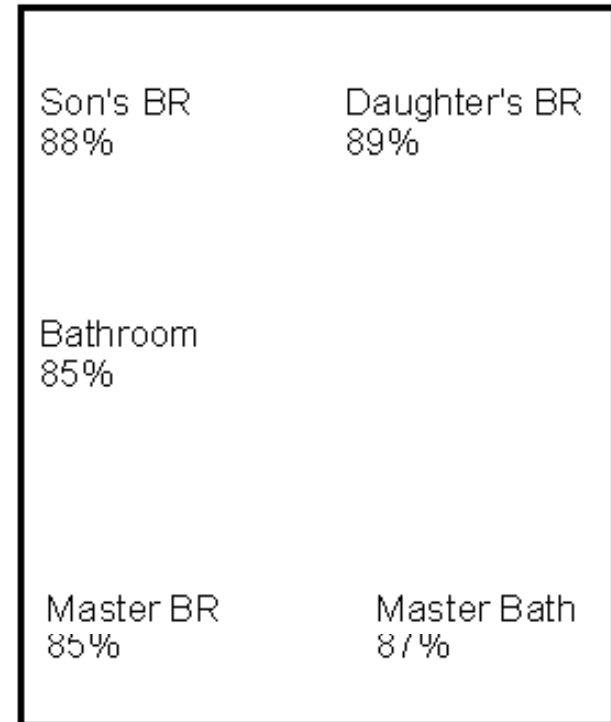
Signal Strength Diagram

We should make an internal document for our use that show the signal strength. In the sketch of the home, we should record the signal strength from the wireless router we placed in the building. We record the signal strength percent on the diagram.

First Floor



Second Floor



If the signal strength goes very low, we will add a wireless bridge to repeat the signal. The wireless bridge can be connected by air or by wire if necessary.

Create a Quote in a Spreadsheet

In a spreadsheet application, we need to create a quote that details every item in the project. We begin with the wireless router and the cable. Then we add the components of the workstations. We can place warranty statements on the quote.

April 4, 2011		Brian White Network Technician 8200 Pivot St., Columbus, Ohio, 43215 Telephone: (614) 222-9200 bwhite@gmail.com			Customer: M.s. Veronica Blue 85 N. 4th St. Columbus, Ohio 43201 614-999-7979	
Items	Qty	Price	Extended Price			
Wireless N Router	1	\$ 79.99	\$ 79.99			
Category 6 cable, 6 ft	1	\$ 12.00	\$ 12.00			
Workstations - Intel I5 processor, 3.2 Ghz, 6 GB memory, 1 TB hard drive, built-in Gb LAN, 7.1 audio, 18.5" Widescreen LCD monitor, standard keyboard/mouse, DVD-R/CD-R combo, wireless NIC	4	\$ 825.00	\$ 3,300.00			
Speakers	4	\$ 24.99	\$ 99.96			
Laser printer, black and white	1	\$ 99.99	\$ 99.99			
Surge protector	5	\$ 12.50	\$ 62.50			
Windows 7 Operating System	4	\$ 80.00	\$ 320.00			
Microsoft Office Home and Business 2010	4	\$ 199.99	\$ 799.96			
Antivirus software licenses	4	\$ 39.99	\$ 159.96			
Labor - Shop time hours	8	\$ 75.00	\$ 600.00			
Labor - Site time hours	4	\$ 75.00	\$ 300.00			
Warranty of computers, router and components by their manufacturers. Installation of equipment is warranted for 60 days Modem and ISP costs provided by customer						
<u>Sub Total</u>			\$	5,834.36		
Tax at 6.75%			\$	393.82		
<u>Total</u>			\$	6,228.18		

Quotes have the business' name, address and contact information. It also has the date and the customer name and contact data. There is a subtotal, tax amount and grand total.

Write a Cover Letter

The last document we will make is the cover letter. As a professional correspondence, the document has three paragraphs, an opening that quotes a price for their work. The second paragraph summarizes the system and the last paragraph will offer our warrantee and provide the contact information for the client.

Brian White
Network Technician

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Telephone: (614) 222-9200
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April 4, 2011

Ms. Veronica Blue
85 North 4th St.
Columbus, Ohio 43201

Mr. Smith,

We have designed a four-computer network on a wireless network for your home for \$6228.18. The majority of work building your system will be done at our shop as to limit any disruption of your busy schedule.

Your computer network has four personal computers with Intel I5 processors, 6 GB of internal RAM and 1 Terabyte hard drives, DVD-R/CD R/W, NVIDIA wireless NIC, and a 18.5 inch widescreen monitor. The PCs have speakers and the first floor unit will have a black and white laser printer. The four systems will have the Windows 7 operating system, Microsoft Office and Business 2010 application, Adobe Reader, Adobe Flash Player, and Antivirus software. We will install a Wireless Ethernet router, a Category 6 cable, and surge protectors in your home. We will post the manufacturer warranties for you and you will receive your documentation in a permanent binder for easy reference. Our installation warrantee is valid for 60 days.

If you desire to purchase an extended warranty, we will add an additional \$200 a year to covers all equipment. If you wish to contact me to schedule your installation or to make changes to our quote, you can call me at 614-222-9200 Monday through Friday from 8 AM to 5 PM, or email me at bwhite@gmail.com. Thanks you for your consideration.

Sincerely,

Brian White

Brian White
Network Technician

Attachments: NetworkDiagram (1)
Spreadsheet (1)

Checking the Quote Documents

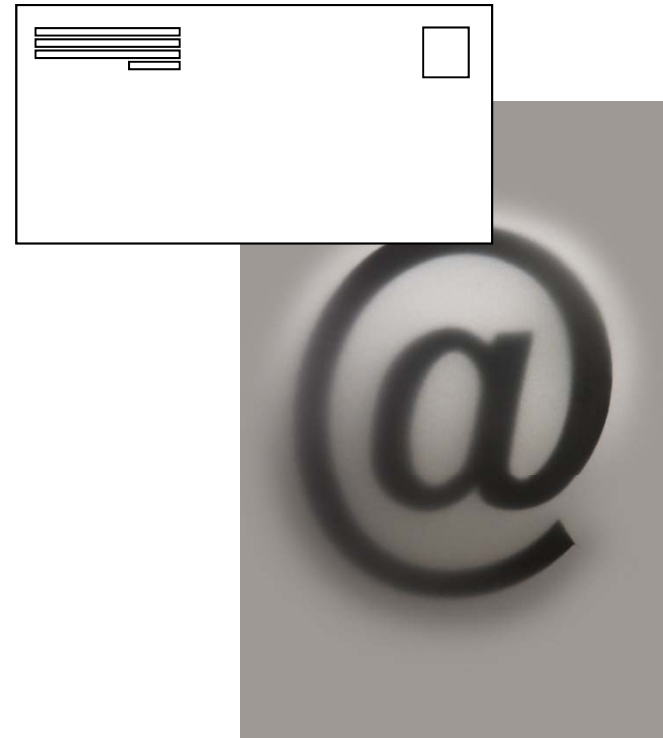
Have another network technician check your three quote documents. You can provide the site visit notes to the checker when they are verifying the quote.

On some more expensive systems, the organization may require a supervisor to sign off on your quote before it is mailed or emailed to the client.



Sending the Quote

We should send the quote to our customer and verify they receive it. We can put a receipt on the email, so we will be sent a return email that our correspondence has been opened. We will find that some customers do not have the capability to open the quote documents because they do not have the software to view them. A good idea is to convert the diagram, quote and cover letter to the PDF format, so they can be read and printed using free Adobe Reader software. Some companies will email their quote so the customer gets the information quickly and then we would send a hardcopy of the documents in the regular mail to handle the printing issue.



Presenting the Quote

For customers who need an explanation of our design, we can give a presentation to them that covers the layout, itemized quote and summarizes how their new system will operate. We can create a Power Point presentation quickly from our work and make a 15 minute slide show. The talk should concentrate on the performance and appeal of the network such as the look of the workstations, the applications that will be on them, and the speed of the connections. Some of our customers may need training on how to use email, handling attachments and more. Adding another item to the quote for training is good customer support and it will help us expand our business.



Accepting and Scheduling

When the customer decided to install the system, we will want to have a contract ready for them to sign. In many cases, they will put as much as 50% down to cover the purchase of equipment. We should schedule an installation date at the meeting with enough time for us to receive the devices and build their system.

We should order the equipment as soon as possible, since some items may take up to two weeks for shipment. Call the customer 48 hours ahead of time to verify the day we will be there setting up their system. While this lesson was designing a wired network, in another tutorial, we will cover the actual installation day.



Review Questions

1. What special item would you bring to a wireless site visit? Explain why the item is needed.
2. Where would we need a patch cable in a wireless network?
3. What are the benefits of a wireless network?
4. What are the benefits of a wired network?
5. What device will repeat the signal to and from the wireless router and solve strength problems?
6. How do we make a signal strength diagram?
7. How are the IP addresses typically issued on a wireless network?
8. What type of security do we want to use?
9. How does a person get the passphrase for our network setup by a professional company?
10. What device needs to be added to a typical desktop computer for a wireless network?

Network Design Exercise

Design a simple wired network for the customer:

Michelle Marshall

9988 Front St.

Dayton, Ohio 44440

304-988-9999

mmarshall@bignet.com

Michelle wants a six computer network for her family with mainstream processors and capabilities. She wants a wireless network for her LAN and a connection to the Internet using a local Internet Service Provider (ISP). The family room will have the family's computer, her office will have her computer. The four children will have a computer in each of their rooms. She wants a network laser printer in the family room.

Create a diagram, spreadsheet quote and cover letter for the job and send the documents to your instructor with attachments. Make an informative PowerPoint presentation highlighting the features of the network you designed.