



Milestones

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So, once again, we find ourselves saying it's been a long time between newsletters. And, once again, we'll "blame" our customers for keeping us so busy we haven't had time to get one out. That's not a complaint, mind you—it's a sincere thank you to all those customers for the trust they put in us.

Still, we enjoy doing the newsletter and hope you find it informative and useful. As always, we'd love to hear from you if you have comments or suggestions or if you'd like to find out more about how MCS can help you with your Information Technology needs.

Glenn Rainey

How To...

Wireless Networking Demystified Making the Connectionless Connection

Wireless networking has quickly gone from the height of geekiness to mainstream usage both at work and at home. It makes a lot of sense, too. The ability to access the Internet and/or your network while roaming about your office or home with a laptop or PDA is awfully appealing (the increasing availability of free, public wireless access to the Internet as you travel is another great thing, but that's a subject for another article). Plus, there's the flexibility of not having to provide hard-wired connections to fixed points for each user, even for desktop machines. And, as with all things computer, prices have really fallen for the required hardware while new standards have dramatically improved throughput speeds.

On the other hand, the technology has brought a whole new set of terminology and, although simple in concept, getting a wireless network going can (again, as with all things computer) be a frustrating experience. It also presents a whole new set of security and privacy concerns.

Herewith, an attempt to clarify the terminology and to talk about some of the issues involved in setting up, securing, and troubleshooting your wireless network.

So What Do I Need?

For starters, every device on the network is going to need the wireless equivalent of a network card—the so-called **wireless adapter**. These come in various flavors. There's a PCI version that looks very much like a standard network card with an antenna attached. There are wireless PCMCIA cards for laptops and PDA's, and many laptops today have wireless capabilities already built in. There are also USB adapters that simply plug into your USB port.

On the other end, you need a transceiver that connects to your wired network or physical Internet feed (cable modem, DSL, etc.) and communicates with the wireless devices. This may be an **access point** that is physically plugged into your wired network (through a router, hub, or switch) or it may be a wireless **router**. Typically, if you're adding wireless devices to an otherwise wired network, you'll probably just add an access point (or points) plugged into the network to talk to the wireless components. If you're talking about an entirely wireless network that only covers a relatively small physical area, you'll be better off going with a wireless router

In This Issue:

- How To...
Wireless Networking Demystified — Making the Connectionless Connection
- Shortcuts—Tips and Tricks...
Have You Googled Lately?
- Around MCS—The Home Page

Wireless Networking... continued

which combines the functionality of a router and an access point in one device.

What's All This 802.11 Stuff?

Network communication requires defined standards through which the devices talk to each other, and 802.11 is a family of standards for wireless local area network communication. There are several variants of the standard with the two most common right now being 802.11b and 802.11g. Both use radio frequencies in the 2.4 GHz range. 802.11b offers data transfer rates of about 11 Mbps (megabits per second) while the newer 'g' standard advertises rates of 54 Mbps.

There's also 802.11a that uses the less crowded 5 GHz radio band and also moves data at 54 Mbps but can't talk directly to 'b' and 'g' devices. Some vendors are also touting enhanced versions of 802.11g that boost rates to 108-125 Mbps.

For now, you'll probably want to stick with 802.11g devices (in case you're wondering, 'b' and 'g' devices can coexist on the same network—they'll just communicate at the slower 'b' rate). By the way, you'll also hear the term 'Wi-Fi' used to refer to the 802.11 standard.

Let's Set One Up

Of course, the problem with this topic is that every wireless network is a little different, depending on your specific hardware and needs. We can walk through a typical scenario, however. Let's assume you're setting up a wireless network for your home or office and you've gone out and bought a wireless router. We're going to assume you've already got **broadband** Internet access (a cable or DSL modem) coming in.



Figure 1—Rear Panel of Router

On the back of the router (see Figure 1), there will be several ports where you can plug an Ethernet network cable. Most of them are for connecting wired computers to the

router but one will be used to connect your Internet service. The first thing to do is to shut everything down and plug the network cable coming out of the broadband modem into the proper port on the router (it may be labeled 'Internet' or WAN or physically set apart from the other ports).

Now, you need to physically connect a computer to the router, at least long enough to get it configured (you may have wired devices operating on your network as well as wireless ones—that's what those other ports are for). Plug one end of another network cable into the network card on the PC and the other end into one of the ports on the router.

Turn everything on, working from the outside in. That is, turn on the cable or DSL modem first (it's a good idea to wait a minute or so until it's fully powered up and the lights on it reach a steady state before continuing, see Figure 2). Next, power up the router. Wait 30 seconds or so and, finally, turn on the PC.



Figure 2—Front Panel of Router

At this point, you're ready to configure the router. You'll most likely connect to it through a browser (unless your manual indicates otherwise) using Internet Explorer or whatever program you use. Launch that program and type in the **IP address** of the router into the browser's address field. The IP address will be provided in the router documentation. Typically, you'll enter something like <http://192.168.0.1>. Enter the user name and password to access the router (also provided in the documentation). This should take you into the router's setup program. Again, it's difficult to be too specific since every one is a little different and uses somewhat different terminology, but, here goes.

The first type of settings you'll need to deal with have to do with your Internet connection. These should have been provided to you by your ISP (Internet Service Provider)

or, if you already have a computer connected to the Internet through this connection, you can look at the settings on this computer. For Windows 2000 or XP, go to the Network option in Control Panel, right-click on Local Area Network Connection and choose Properties, find the TCP-IP entry, click on 'Properties' and write down all the settings from all the tabs (you may also have to click on the 'Advanced' button to see them all).

For starters, you'll need to tell the router about getting an IP address for connecting to the Internet. Most likely, the correct setting will be 'Obtain an IP address automatically', meaning you're potentially assigned a different one by your ISP every time you connect. It's possible you have a static IP address—you have the same one each time you're on the Internet. In this case, you'll need to enter that specific address into the router along with the **subnet mask** and **default gateway** information provided by your ISP. Next are **DNS** settings. If your ISP provides you with these, you'll need to enter them into the router.

Keep in mind that, if you have static IP address and DNS info to enter into the router, you'll most likely need to remove those settings from the PC connecting to the Internet. In other words, the router will now get that info from your ISP. Any PC's (either wired or wireless) are hidden behind the router and should be set to obtain an IP address and DNS information automatically from it.

Depending on your ISP's setup, you may also have to enter additional information: host and domain name and login name and password (if you must log on each time you access the Internet).

Once all that's done, you should be able to connect to the Internet. Save the settings in the router, close down your browser and go back in and see if you can access a website.

If so, you're ready to establish some basic wireless connectivity. Log back into the router itself and look for something like

'Wireless Settings' on its menu. You'll probably find a screen showing you the SSID (the default network name for your wireless network) and that any wireless security settings are disabled. This is just so you can establish/test your wireless connection—trust me, we ain't gonna leave things this way! Make sure wireless communication itself is enabled—some routers have that turned off by defaults.

Now, go to your laptop or other wireless device and see if you can connect. Open the program that came with your wireless adapter. You should have something like a



'Site Survey' option that will search for any wireless networks in range that are broadcasting their **SSID**. Alternatively, there will be a way to set up and store a profile for connecting to a specific wireless network. Since we have all security turned off right now in the router, all you should have to provide is the SSID. Using either method, see if you can connect to the wireless network and access a website just to be sure you're communicating all the way out to the outside world. If so, congratulations! Now, let's talk about keeping the outside world (or, at least, the unwanted portions of it) out of your network.

Security Considerations

A typical wireless network can broadcast for several hundred feet. If you don't enable security on it, someone could be sitting outside your office or home with a laptop riding your Internet connection for free, or, worse

Wireless Networking... continued

yet, doing bad things with the files on your computers. Fortunately, there are several levels of security that can be established. **Please don't overlook this step!** If you do, at least keep a lookout for strange marks outside. There's a whole new hobby (???) that's sprung up called war chalking whereby people drive around looking for open wireless networks and leave a chalk symbol somewhere in the vicinity to mark them for others.

The first step we'd recommend is turning off the broadcast of your SSID. Why advertise yourself to the world? There will be a setting somewhere in the wireless router to turn it off which means that anyone connecting to your network will have to know the name to enter into their wireless adapter settings.

Second, consider **MAC Address** filtering. Every network card in the world has a unique MAC address built into it. You can configure your wireless router to allow access only to certain MAC Addresses which you specify. Typically, you can either enter the MAC Address manually or let the router 'discover' any cards that are currently connected to it and add them to its approved list. To determine the MAC Address of the card in your PC, click on the 'Start' button, choose 'Run', and type in 'command' or 'cmd' in the 'open' prompt. Click on 'ok' to take you to a command prompt. Type 'ipconfig /all'. You should see a line labeled 'Physical Address' followed by an entry consisting of six pairs of numbers/letters separated by dashes. That's your MAC Address.

A third level of security is the **encryption** method. Even if you've prevented someone from connecting to your network, unencrypted data passing across it can still be snatched out of the air by a determined snoop. There are two commonly used encryption methods for wireless networks—**WEP** and **WPA**.

WEP is an early standard. It let's you choose between 64 and 128-bit encryption and also requires you to specify a pass phrase of up to 16 characters from which the system generates a WEP key that both router and card must agree on.

WPA is a later and much stronger (and therefore recommended) standard. You may find it listed in your router settings as WPA as well as WPA2 (a later version of the standard) and possibly in both Personal and Enterprise flavors. In most cases, one of the personal standards is sufficient. You'll be asked to choose an encryption type—either TKIP (Temporal Key Integrity Protocol) or AES (Advanced Encryption Standard). You'll also specify a pass phrase from 8 to 63 characters in length.

The key thing to remember is that whatever method and settings you use in the wireless router must also be used in your wireless network card setup in order to communicate. As mentioned earlier, your wireless card software should allow you to set up and save a profile with the required parameters to connect to the router. It probably also has a site survey option where it will search for any wireless networks within range and allow you to connect (prompting you for pass phrase and any additional information needed). Just remember that the router must be broadcasting its SSID in order to show up in the site survey.

So, you've done it. You've:

- physically connected your wireless router
- configured the router to access the Internet
- implemented a security scheme
- connected to the wireless network with your laptop or other device.

There's one final step—enjoy!

Glossary

802.11-family of standards published by IEEE (Institute of Electrical and Electronics Engineers) that define communication protocols for wireless networks).

Access point-a device that is physically connected to a wired network and transports data between it and a wireless network. Also referred to as a base station.

Broadband-any high-speed (i.e., non-dialup) Internet access. For most of us, that's going to mean a cable modem or a DSL (Digital Subscriber Line from a phone service provider) modem.

Default gateway-the default connection to another network (i.e., your route into the Internet). Typically, it's the IP address of a router.

DNS-Domain Name Server or Domain Name Services. Computers on the Internet that keep track of domain names and their associated IP addresses. That's what let's you type in www.milestonecomputer.com and find us without knowing our IP address.

Encryption-process of transforming or encoding data so it can only be understood by a receiver with the means of decrypting it.

IP address-stands for Internet Protocol address. It's a unique identifier for each computer or device on the Internet or a local network. It's always in the form of 4 sets of numbers between 0 and 255, separated by dots (for example, 10.10.0.1).

MAC Address-short for Media Access Control. It's a unique identifier for an individual network card in the form of six pairs of hexadecimal numbers (XX-XX-XX-XX-XX-XX where X is a digit or a letter from A-F).

Router-a device that connects one network to another (i.e., the Internet to your internal network).

SSID-Service Set Identifier-set of up to 32 characters that make up the name or id of a wireless network. For open networks, the SSID is broadcast to all devices within range. For closed networks, you have to know it in order to log in.

Subnet mask-an addressing tool for partitioning a network into segments. It splits an IP network into a series of subgroups or subnets.

WEP-short for Wired Equivalency Privacy. An early security/encryption protocol that was intended to provide wireless networks with a very basic level of protection. WEP is not as secure as WPA but some older routers and cards may not support the latter.

Wi-Fi-short for wireless fidelity. Another name for the 802.11 standard.

Wireless adapter-the wireless equivalent of a network card. Every wireless device needs one in order to 'talk' to the network.

WPA-WiFi Protected Access. A much stronger encryption standard than WEP.

“Whatever you do, work at it with all your heart, as working for the Lord, not for men”

- Colossians 3:23 (NIV)

Shortcuts—Tips and Tricks

Have You Googled Lately?

You know you've made it big when (1) your company or product name becomes the term people use generically to describe an entire category (think Coke, Band-Aid, etc.) and (2) your name becomes a verb. Both could be said of Google, the Internet search engine that's been much in the news of late.



Many people don't say they're going to search for information on the Internet anymore. Instead, it's "I'll Google such-and-such."

And, with good reason—Google remains one of the best search engines around.

To help you get more out of this tool, here's a how-to on adding the Google toolbar to Internet Explorer and a few tips on using some of the lesser known features of the engine.

Installing the Toolbar

To have Google installed as a toolbar in your browser so it's readily available anytime you're on the Web, follow these steps:

- Go to www.google.com
- Click on the 'more' link and then choose 'Google Toolbar' from the options shown
- Choose 'Download Google Toolbar' to download the installer routine (it's called GoogleToolbar Installer.exe—save it on your Desktop or in some readily available folder)

Double-click on the file you just downloaded and follow the instructions to install the Toolbar

Besides making it easy to search from anywhere on the Web, the toolbar offers some other advantages, not the least of which is a pretty good Popup Blocker. It also has an AutoFill option that let's you store personal information and then fill in Web forms with one click.

Cool Stuff to Try

Want a **really big phone book, including a reverse one**? Enter a number (i.e., 336-629-6484) into the Google search box, click on Search and it will return the name and address for that number, along with a map. Alternatively, enter a first and last name and a city, and Google will give you the phone number, address and map for that person.

Need a quick **stock quote**? Enter the ticker symbol for a company or mutual fund listed on the NYSE, American Stock Exchange or NASDAQ and Google will give you a current quote.

Searching for a **definition**? Enter define:, followed by the word you're interested in and you'll get plenty.

How about a **map**? Type in the word 'map' followed by the location you want where location can be a city, a state, a zip code, or a specific street address.

Got some **numbers** to track down? Enter a 12-digit UPC code and get info on the product and manufacturer. Enter an airline name and flight number for status information on the flight. Try your package tracking number from FedEx, UPS or the post office.

Want to **restrict a search** to a specific website? Type in site:, followed by the URL of the site (i.e., www.milestonecomputer.com), followed by your search word or phrase and Google will only return hits from that site.

Pretty cool, eh? And, this still just scratches the surface. For more information and search tips, go to www.google.com/help/features.html. Then, go out and Google something.

Around MCS—The Home Page

Well, easily the biggest news around MCS since our last newsletter is the arrival of one Miss Mary Grace Moffitt on November 5, 2005. Congratulations, Wendy and Zach! It's hard to believe she's already turned one. Of course, on the other hand, she's already attended a couple of staff meetings and the rumor is that Wendy has her writing some simple programs.

With the way time seems to fly, it probably won't seem like any time until she could be working here. We're going to take that as a sign that we're just really busy (but certainly not one that we're getting older). We have been busy. A revamped website. Lots of new clients and interesting projects. We'll be sharing some of those projects as case studies in future newsletters.

We just don't want to get so busy we forget to say thank you to each and every one of our customers. We also don't want to get so busy that

we stop trying to improve. Those of you who are existing customers know that we've been in the habit for some time of periodically sending out surveys to get your input as to how we're doing and suggestions for improvement.

Look for a change coming soon in the way we do that. You'll be getting an e-mail in the near future with a link to a survey page on our website. The survey consists of only one question—on a scale of 1 to 10, how likely would you be to recommend us to someone else? Kind of cuts to the chase, doesn't it? Of course, there's also a space for comments and we want definitely want those, particularly if there are areas where we could be doing a better job in meeting your needs. So, when you get the e-mail, we sincerely hope you'll take a couple of minutes to respond. In fact, we want your feedback at all times so don't wait for a survey to let us hear from you!



Who Is MCS...

MCS has provided our clients with Information Technology solutions since 1980. Our primary focus is the development of **custom database applications**, helping turn data into information that will support business processes and improve decision-making. Manufacturing applications are a special focus although we serve a broad range of business sectors.

We work in a number of **Microsoft database and development platforms** including Access, Visual Basic, Visual Fox-Pro, and SQL Server.

Capturing accurate data in a cost-effective manner is often the first step in turning that data into information so many of our applications include **portable and ADC** (automated data collection) components. We're experienced in developing solutions involving bar-code printing, scanning, and data capture with PDA's and other mobile and wireless devices.

We can help you turn your static website into a dynamic, **database-driven Internet application** that brings it to life and enables it for e-commerce and enhanced communication with your customers and other business partners.

If you're one of the many organizations choosing to **out-source** all or parts of your **IT functions**, we can also help you with areas such as network setup and administration; software and hardware installations; and administering e-mail, virus protection, and backup functions.

We understand that information is the lifeblood of any organization and one of its most critical resources. Our fundamental goal is to help our customers use that resource more effectively. We truly believe in delivering solutions—not just software, hardware, and services. We pride ourselves on listening carefully to our customers to understand their unique needs, working with them as partners, and providing the systems, training, and ongoing support necessary to ensure success.

Contact us for a free consultation to see how we can be of service to you.



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**"TO GLORIFY GOD BY SERVING
OTHERS WITH EXCELLENCE, VALUE,
AND INTEGRITY WHILE SHARING THE
LOVE OF CHRIST."**

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