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 from the March 07, 2001 edition

# The wired house

James Turner Special to The Christian Science Monitor

As the Internet has evolved from a curiosity to a hobbyist toy, and finally to a day-to-day necessity, the trusty computer in the den with a modem and an AOL account no longer cuts it for a growing number of families.

Mom may need to get some files from work to go over after dinner, Dad may want to check out the baseball standings, the son may be off looking for a Brittany Spears video, and the daughter might be up for a multiplayer game of Sim City 3000.

A growing number of families, an estimated 23 percent of American households, according to market-research company Parks Associates, have more than one PC in the house. With many schools now using the Internet as part of their curricula and e-mail replacing "snail mail," there will be even more competition among family members for that single Internet connection.

That's why as many as 18 percent of those multiple-PC households have now installed a home network, and it's no wonder that it was one of the hot themes at this year's Consumer Electronics Show in Las Vegas.

The wiring process involves a lot of decisions and technologies, based on whether the system to be networked is personal computer (PC) or Apple Macintosh (Mac) driven.

Fortunately, the industry has realized that not everyone putting in a home network is a rocket scientist, and the process is much more user-friendly than even a year ago.

A properly designed home network offers more than just shared access to the Internet. It lets members of the family share files or use a printer located in another part of the house. In fact, even those households without Internet access might want to consider installing a home network, just to gain these benefits.

There are three main components of a home network: connectivity, the firewall/router, and wiring the house.

## Connecting to the Internet

Connectivity - your outside access to the Internet - breaks down to two main choices right now. Some communities have broadband (high speed) access through a cable-TV provider using a device called a cable modem.

Others can get high-speed access through the phone company using a technology called Digital Subscriber Line (DSL). A fortunate few can get access either way, and can choose the most economic solution.

Cable modems and DSL are each available to about 60 percent of North American households, according to a study by Kinetic Strategies, a broadband market research company. For the remainder, there are products designed to share a 56K dial-up modem connection. These include recent releases of the Microsoft Windows operating system and other products, but it may make more sense in those cases to simply put in an extra phone line or two, and let each computer have its own connection.

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This is what a lot of people seem to be doing already: Parks Associates estimates that only 7 percent of home networkers are sharing a dial-up connection.

Once you've got a broadband connection to the Internet, the next trick is to get enough addresses to hook up all your computers. Every computer on the Internet has a unique numeric address, called an IP address.

Unfortunately, when the Internet was first designed, the engineers underestimated the popularity of their creation. As a result, just as telephone numbers are running out in some large cities, IP addresses are also in short supply.

As a result, Internet Service Providers (ISPs) usually only offer a single IP address with your DSL or cable modem service. If you have two or three computers, there's no direct way to hook them all up to the same line. One notable exception to this is AT&T Broadband (a cable-modem provider), who will allocate up to three addresses for a small additional fee.

For the rest of the broadband households (or those unwilling to pay an additional fee), a home router will be required. These devices, available for between \$100 and \$200 at most chain computer stores, perform some sleight of hand with IP addresses.

You begin by plugging a cable between the DSL or cable modem and the router. This cable is commonly referred to as a Cat-5 or Ethernet cable, and has connectors that resemble those in phone cables, only wider.

You will next connect all of your computers to the other connector on the router. Some routers have multiple connectors, others only a single one. If your router only has one connection, you'll also need to purchase a hub switch, a small device costing about \$30, which turns a single network connection into many, but most routers include a 4-port hub these days.

#### Routing the outgoing traffic

What the router is doing is tricking the outside world. It assigns fictitious "test" addresses to all the computers inside your home, and instructs them to send all outgoing Internet traffic through the router.

When the traffic is received at the router, it rewrites it to make it appear that the router sent the information and sends it out over the Internet. When the reply is received, it forwards it back to the computer that originally made the request.

These home routers also provide a firewall - a security gateway - that prevents hackers from gaining access to the computers in your house. The entire process of configuring the router is done using a Web browser (such as Netscape or Internet Explorer) on one of the computers attached to the router.

If you have a cable modem or DSL provider that supports multiple IP addresses, you do not need the router, you can attach a hub directly to the DSL or cable modem and go from there. However, you will lose the firewalling benefits of the router, and may make yourself more vulnerable to electronic intruders.

Each PC to be hooked up to the network must also have a network interface. (Many Macs have a built-in network-interface capacity.) Until recently, the only choice was to purchase a card that you installed inside your computer. Now, however, a number of network-interface devices that attach to a USB port have become available. These are much easier to install and don't involve opening the computer's case, which home users would be unlikely to do anyway.

#### Setting up the wires

If all the computers in your house were in one room, this would be the end of the story. You could simply run Cat-5 cables from the hub to all of your computers, and be finished. However, it is rarely that simple. You need some way to get that Internet data to your daughter's room at the end of the hall, the home office down in the basement, and perhaps even one of the new "Internet Appliances," like 3Com's Audry, in the kitchen.

The traditional solution was to run physical wires from the hub to each location. And, in fact, if you're building a new house, this is not a bad solution.

It is easy enough to lay Cat-5 cable, at the same time all the other household wiring is being run.

In fact, a company called Home Director offers a product that will not only allow Internet data to be sent anywhere in the house, but also audio, telephone, and video. In other words, you can put a DVD in your player downstairs, then run up to the bedroom and watch it on the TV, or blast reveille through the speakers in your son's room at 7:30 in the morning.

According to a spokesman for Home Director, fully wiring a new house adds between \$700 and \$1,500 to the construction cost. Parks Associates estimates that as many as 48 percent of new homes will be prewired by the end of 2004.

In an existing home, especially an older one, running new cabling through the walls can be a much more costly and uncertain venture. A single Cat-5 connection between rooms on the same floor can run into the hundreds of dollars in an older home. Fortunately, a number of alternatives exist.

One possibility, assuming you have phone jacks in all the rooms you wish to wire for the Internet, is to use a product such as 3Com's HomeConnect phone-line adapter, which can turn your existing internal phone wiring into a local area network, albeit a slow one. You attach one of these devices (which run for under \$100 each) from each computer to a phone jack.

Viola! you have an instant network with no new wiring. And it doesn't interfere with the existing voice and fax use of the phone line. The drawback: It may be slower than other connections.

In the near future, another attractive possibility is to use electrical outlets. Currently being field-tested in 500 homes and with retail sales planned later this year, products from the HomePlug Powerline Alliance will allow high-speed networking in the house simply by plugging the device into the wall.

Members of the alliance, which includes names like Radio Shack, 3Com, Cisco, and Intel, plan to offer connectivity using your outlets for around \$70 to \$80 per computer.

The ultimate freedom comes with wireless solutions, but at a cost. For example, the 3Com Wireless Home Gateway combines a firewall/router with a wireless networking hub, which you would connect to your broadband Internet connection.

You then put cards into your laptops and PCs that combine a network interface with a wireless transmitter. You can locate them anywhere within 300 feet of the gateway, just the thing for lazing out on the hammock with your laptop.

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