

Computer Tech Talk

Small Networks
By Dennis Henson

Do You Need a Network?
Do you need to share the same data among several computers? Want to use one printer with several computers? How about paying once for an internet connection and sharing it with your other computers? If you answered yes to any of these questions, then you need a computer network. And if you are handy, you can do it yourself.

Networks Defined.
Modern PCs are built to talk to each other, but sharing information between PCs requires an external network. A network is a collection of external electronic boxes, connecting wires or radio signals, and circuits within each computer. This article and the accompanying diagram provide information for the most common type of small computer network, an Ethernet local area network (LAN).

Components. There are usually three electronic units in a network: a modem, a router, and Network Interface Cards (NICs). See the diagram. If you have high-speed internet service, your cable or DSL service providers has installed an inside modem to convert the signals on the pole for your computer use. You usually lease the modem for a few dollars a month, but you can buy them. You connect to the modem over an 8-wire cable called an Ethernet cable. You can't just buy a roll of the right kind of cable, plug one end into each computer and short together all the same color wires to make computers talk to each other. You must install at least an Ethernet switch box. To handle addressing of each computer, and to act as your agent on the internet, you need a sophisticated switch called a router. A router:

(1) provides each computer (or printer) in the network with a unique address to communicate,

(2) manages and routes the data traffic between network devices,

(3) acts as the sole device seen by your modem (and the outside world).

Home or small office routers cost between \$30 and \$130.

Wired or Wireless? If name you can choose called an you can run cables to all SSID, and the channel for network devices in your home or office, then a wired router is required. You can purchase a router that is strictly for wired use. Many people find that wiring an existing facility is too much trouble, or they have a need to wander about with their computer without wires. In this case, a wireless router is the ticket. Wireless is actually an incomplete description of this type of router. Most wireless routers come with at least four wired ports.

These are the minimum requirements. I highly recommend you enable security features to prevent unauthorized access of your data!

Wireless Security.
Wireless networks have special security issues. Signals from these networks can travel over 1500 feet outside. Be careful to whom you provide your wireless signal. Check the router owner's manual and activate the level of security that you need. Consider implementing security features

The Wiring. For a wired network, you must have special cables designed for high speed communications between the components. Cables can be purchased ready-made in specific lengths or can be terminated on-site by qualified technicians from bulk rolls. Using the latest routers and NICs, wired networks can communicate up to 1 billion bits-per-second (bps).

A Wireless Network. Most modern notebook (laptop) computers come with wireless networking built-in. A small circuit card inside the bottom of the computer and an antenna coiled around the display inside the case do the trick. If you have an older laptop no wireless capability built-in, you can plug in a "credit card" size wireless PCMCIA wireless NIC. External and internal wireless network capability can be added to a desktop PC by installing a circuit card (NIC) or external USB device. Adding wireless devices to existing PCs range in price from \$30 to \$80.

Flavors of Wireless. There are currently four popular IEEE 802.11 wireless signal types you can setup. Each type is designated by a letter name: "a", "b", "g", or "n". The deeper you go down the alphabet, the more capable the wireless system and the more the cost. Speeds vary from one million bps to 200 million bps. The most popular wireless signal type at this time is mode "g". Note -- Internet download speeds are still limited by your internet provider no matter how fast your local network communicates.

Wireless Router Setup. When you install a wireless router, you must supply some information: a unique network

(1) disable broadcast of the network name (no SSID gets out).

(2) secure router management with a non-default user name and strong password.

(3) encrypt data transmissions using a security key (WEP), or better yet Wi-Fi-Protected-Access (WPA).

(4) filter access by serial number (MAC address). Accept only PCs you have authorized.

(5) disable remote wireless management of the router.

Do not leave your data vulnerable to wireless network access from outsiders. If your home network is out in the country away from everyone, that's one case. If your data are sensitive, or you live or work in close proximity to others, you should "lock down" your network to prevent others from using your data without permission. Recent experience in a Lexington apartment brings this point home. While implementing a secure wireless network, we saw three other wireless networks available for immediate use. Signals were strong, unprotected, and ready for use by anyone.

Side Notes. A router is not required to share data between strictly two PCs that have no need for internet access. Just purchase an Ethernet cross-over cable, and then manually assign each PC a compatible network address. A NIC within each PC is still necessary.

The Details. There are some technical details about small computer networks that are beyond the scope of this article. I would be happy to

discuss technical questions via email at: hcs@mchsi.com

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