The Digital Home
What You Need

What you need to set up a home network

The variety of options for home networking can make buying decisions difficult. Before you decide what hardware to get, you should decide what type of network technology (the way computers in a network connect to or communicate with one another) to use. This article describes and compares the most common network technologies and lists hardware requirements for each.

Network technologies

The most common types of network technology are wireless, Ethernet, and HomePNA (home phone line), and Powerline. When choosing a network technology, consider the location of your computers and the desired speed of your network. The costs of these technologies are similar. The sections below compare these four technologies.

Wireless

Wireless networks use radio waves to send information between computers. The four most common wireless network standards are 802.11b, 802.11g, 802.11a and 802.11n.

Speed

- 802.11b: transfers data at a maximum rate of 11 megabits per second (Mbps). Downloading a 10-megabyte (MB) photo from the Internet under optimal conditions takes about 7 seconds.
- 802.11g: transfers data at a maximum rate of 54 Mbps. Downloading a 10-megabyte (MB) photo from the Internet under optimal conditions takes about 1.5 seconds.
- 802.11a: transfers data at a maximum rate of 54 Mbps. Downloading a 10 megabyte (MB) photo from the Internet under optimal conditions takes about 1.5 seconds.
- 802.11n: depending upon the number of data streams the hardware supports, 802.11n can theoretically transmit data at up to 150 Mbps, 300 Mbps, 450 Mbps, or 600 Mbps.

Note

The transfer times listed are under ideal conditions. They aren't necessarily achievable under normal circumstances because of differences in hardware, web servers, network traffic conditions, and so on.

Pros	• It's easy to move computers around because there are no cables. • Wireless networks are usually easier to install than Ethernet.
Cons	• Wireless is often slower than the other three technologies. • Wireless can be affected by interference from things such as walls, large metal objects, and pipes. Also, many cordless phones and microwave ovens can interfere with wireless networks when they're in use. • Wireless networks are typically about half as fast as their rated speed under all but ideal conditions.

Ethernet

Ethernet networks use Ethernet cables to send information between computers.

Speed	Ethernet transfers data at either 10, 100, or 1000 Mbps, depending on the type of cables used. Gigabit Ethernet is the fastest, with a transfer rate of 1 gigabit per second (or 1000 Mbps). (For example, downloading a 10 megabyte [MB] photo from the Internet under optimal conditions takes about 8 seconds on a 10 Mbps network, about 1 second on a 100 Mbps network, and less than a second on a 1000 Mbps network.)
Pros	• Ethernet networks are inexpensive and fast.
Cons	• Ethernet cables must be run between each computer and to a hub, switch, or router, which can be time-consuming and difficult when the computers are in different rooms.

HomePNA

HomePNA networks use existing home telephone wires to send information between computers.

Speed	HomePNA 2.0 transfers data at 10 Mbps. HomePNA 3.0 transfers data at 128 Mbps. (For example, downloading a 10-megabyte [MB] photo from the Internet under optimal conditions takes about 8 seconds on a HomePNA 2.0 network and about 1 second on a HomePNA 3.0 network.)
Pros	• HomePNA uses the existing telephone wiring in your home. • You don't need hubs or switches to connect more than two computers in a

Cons	• You need a phone jack in each room where you want to have a computer, and all jacks must be on the same phone line.

HomePNA network.

Powerline

Powerline networks use existing home electrical wiring to send information between computers.

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Speed	A Powerline network can transfer data at up to 200 Mbps. For example, downloading a 10-megabyte (MB) photo from the Internet under optimal conditions can take less than a second on a Powerline network.
Pros	• Powerline uses the existing electrical wiring in your home. • You don't need hubs or switches to connect more than two computers in a Powerline network.
Cons	• You need an electrical outlet in each room where you want to have a computer. • Powerline networks can be affected by interference and "noise" on the line.

Hardware requirements

There are several kinds of hardware used in home networks.

• Network adapters: These adapters (also called network interface cards, or NICs) connect computers to a network so that they can communicate. A network adapter can be connected to the USB port on your computer or installed inside your computer in an available Peripheral Component Interconnect (PCI) expansion slot.
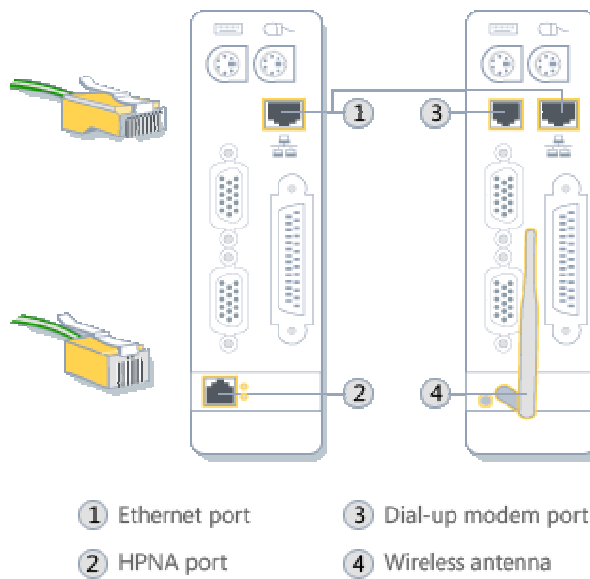
Wireless, Ethernet, and HomePNA network adapters

- Network hubs and switches: Hubs and switches connect two or more computers to an Ethernet network. A switch costs a little more than a hub, but it speeds up the transfer rate of information.
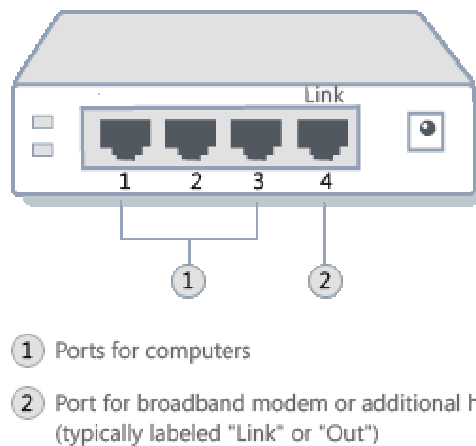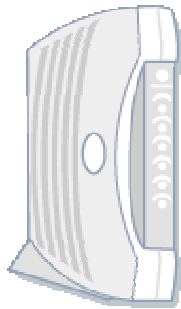

Ethernet hub

- Routers and access points: Routers connect computers and networks to each other (for example, a router can connect your home network to the Internet). Routers also enable you to share a single Internet connection among several computers. Routers can be wired or wireless. You don't need to use a router for a wired network but we recommend it if you want to share an Internet connection. Access points turn wired Ethernet networks into wireless networks. If you want to share an Internet connection over a wireless network, you will need a wireless router or an access point.
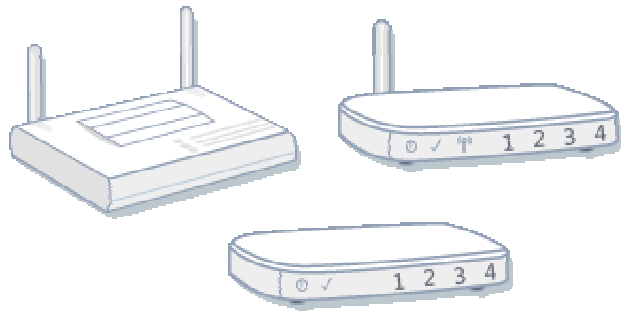
Access point (left); wired router (centre); wireless router (right)

- Modems: Computers use modems to send and receive information over telephone or cable lines. You will need a modem if you want to connect to the Internet.

Cable modem

- Network cables (Ethernet and HomePNA only): Network cables connect computers to each other and to other related hardware, such as hubs and routers.
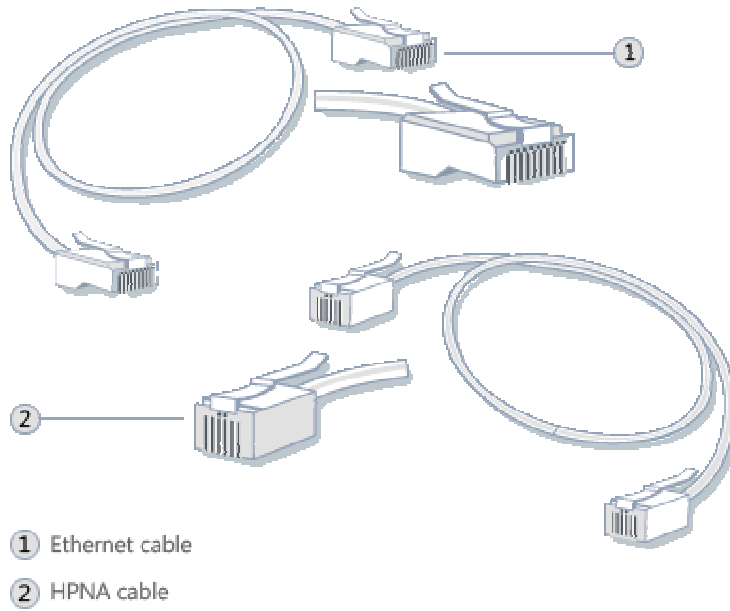
① Ethernet cable
② HPNA cable

Ethernet and HomePNA cables

The table below shows the hardware that you need for each type of network technology.

Technology	Hardware	How many
Wireless	Wireless network adapter	One for each computer on your network (laptops almost always have these built in)
	Wireless access point or router (recommended)	One
Ethernet	Ethernet network adapter	One for each computer on your network
	Ethernet hub or switch (only needed if you want to connect more than two computers)	One (a 10/100 hub or switch is best and should have enough ports to accommodate all computers on your network)
	Ethernet router (only needed if you want to connect more than two computers and share an Internet connection)	One (you don't need a hub or switch if you have a router because it has ports on it for your computers)
	Ethernet cables	One for each computer connected to the network hub or switch (10/100 Cat 5e cables are best)
	Crossover cable (only needed if you want to connect two computers directly to each other and not use a hub, switch, or router)	One

Technology	Hardware	How many
HomePNA	Home phoneline network adapter (HomePNA)	One for each computer on your network (USB-to-phoneline network adapters are best)
	Ethernet router	One, if you want to share an Internet connection
	Telephone cables	One for each computer on your network (use a standard telephone cable to plug each computer into a phone jack)
Powerline	Powerline network adapter	One for each computer on your network
	Ethernet router	One, if you want to share an Internet connection
	Electrical wiring in the home	One electrical outlet for each computer on your network

It's a good idea to find out what kind of network adapters your computers have, if any. You might decide to go with a certain technology because you already have most of the hardware, or you might decide to upgrade your hardware. A combination of technologies might work best for your environment. For example, many people use a wireless router, which accommodates both wired Ethernet connections for desktop computers and wireless connections for laptops.