



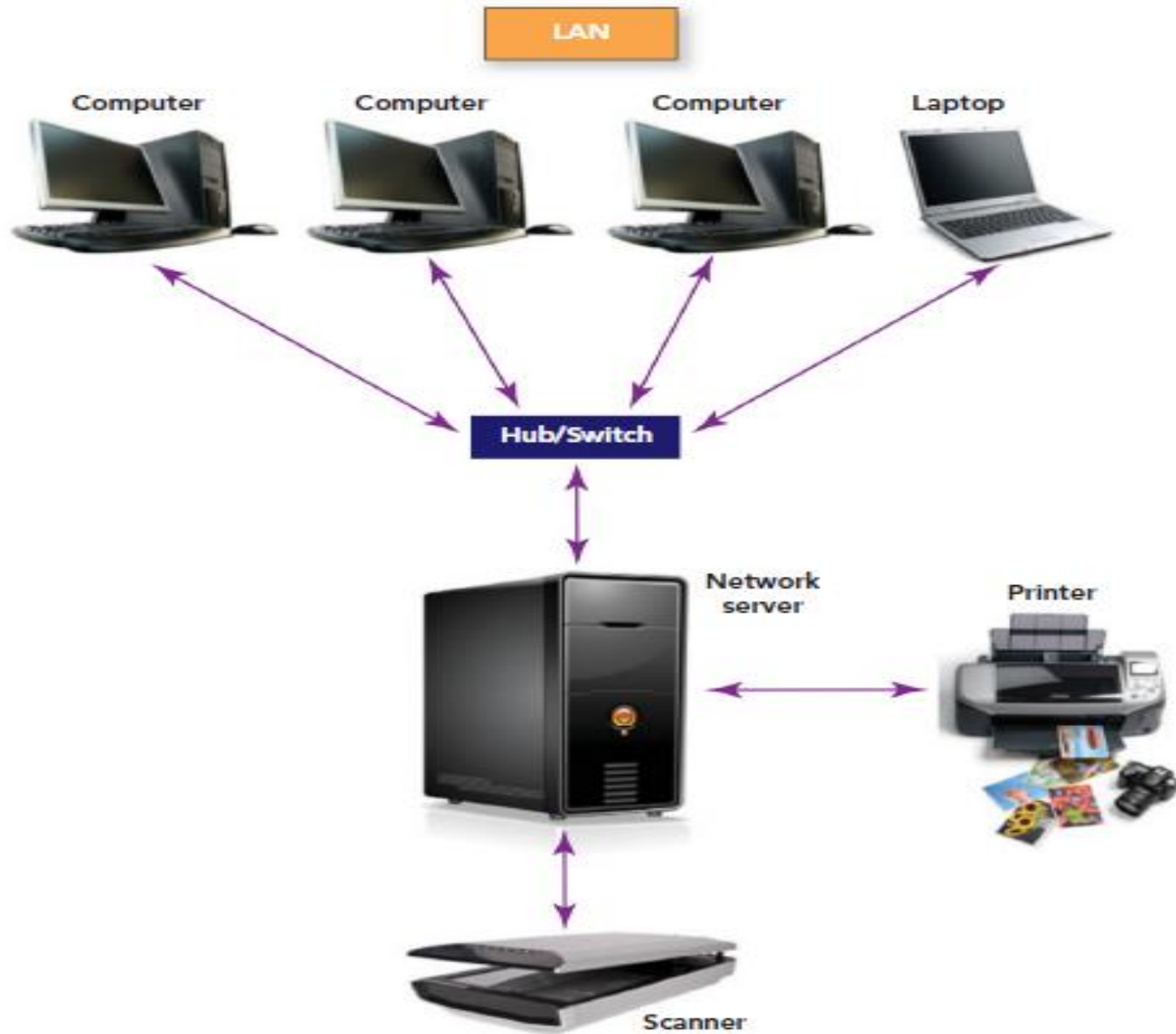
Dr./ Ahmed Mohamed Rabie Sayed

Chapter 7

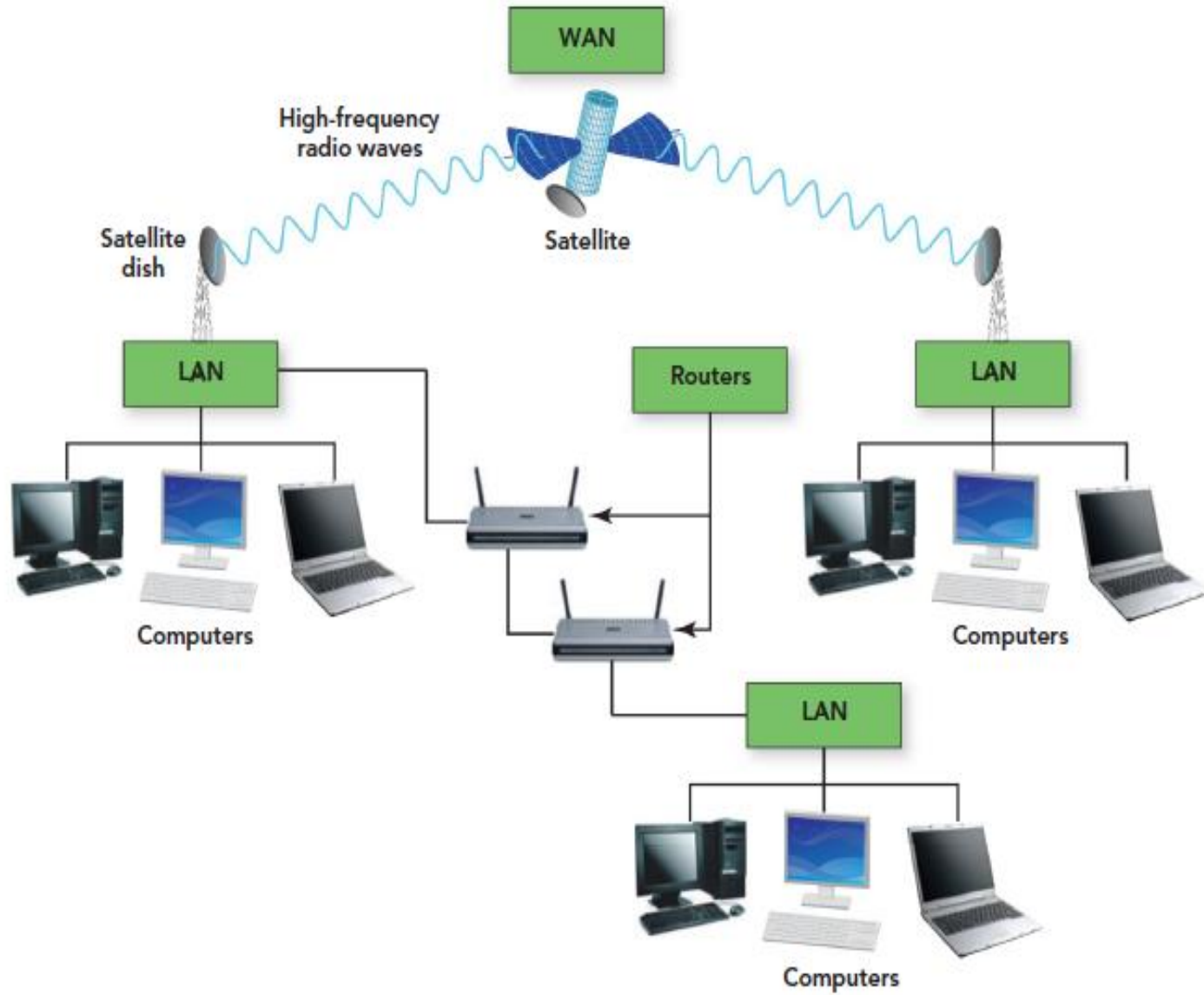
Networks

A **network is a group of two or more computer systems linked together to exchange data and share resources, including expensive peripherals.**

A local area network (LAN) uses cables, radio waves, or infrared signals to link computers or peripherals, such as printers, within a small geographic area, such as a building or a group of buildings.

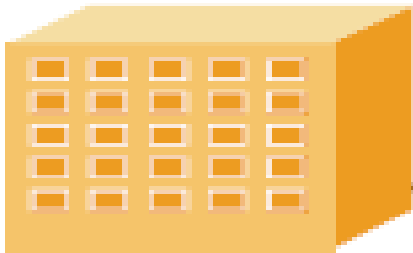


A wide area network (WAN) uses long-distance transmission media to link computers separated by a few miles or even thousands of miles.



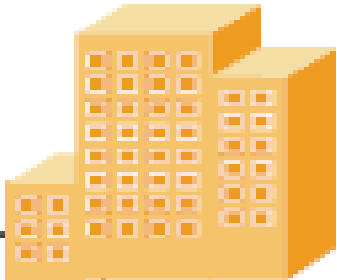
A metropolitan area network (MAN) is a network designed for a city or town. It is usually larger than a LAN but smaller than a WAN.

MAN



City Court

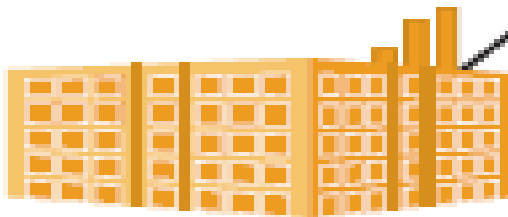
20 km



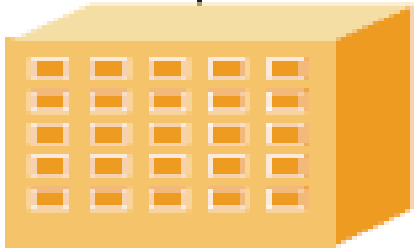
City Hall

60 km

80 km

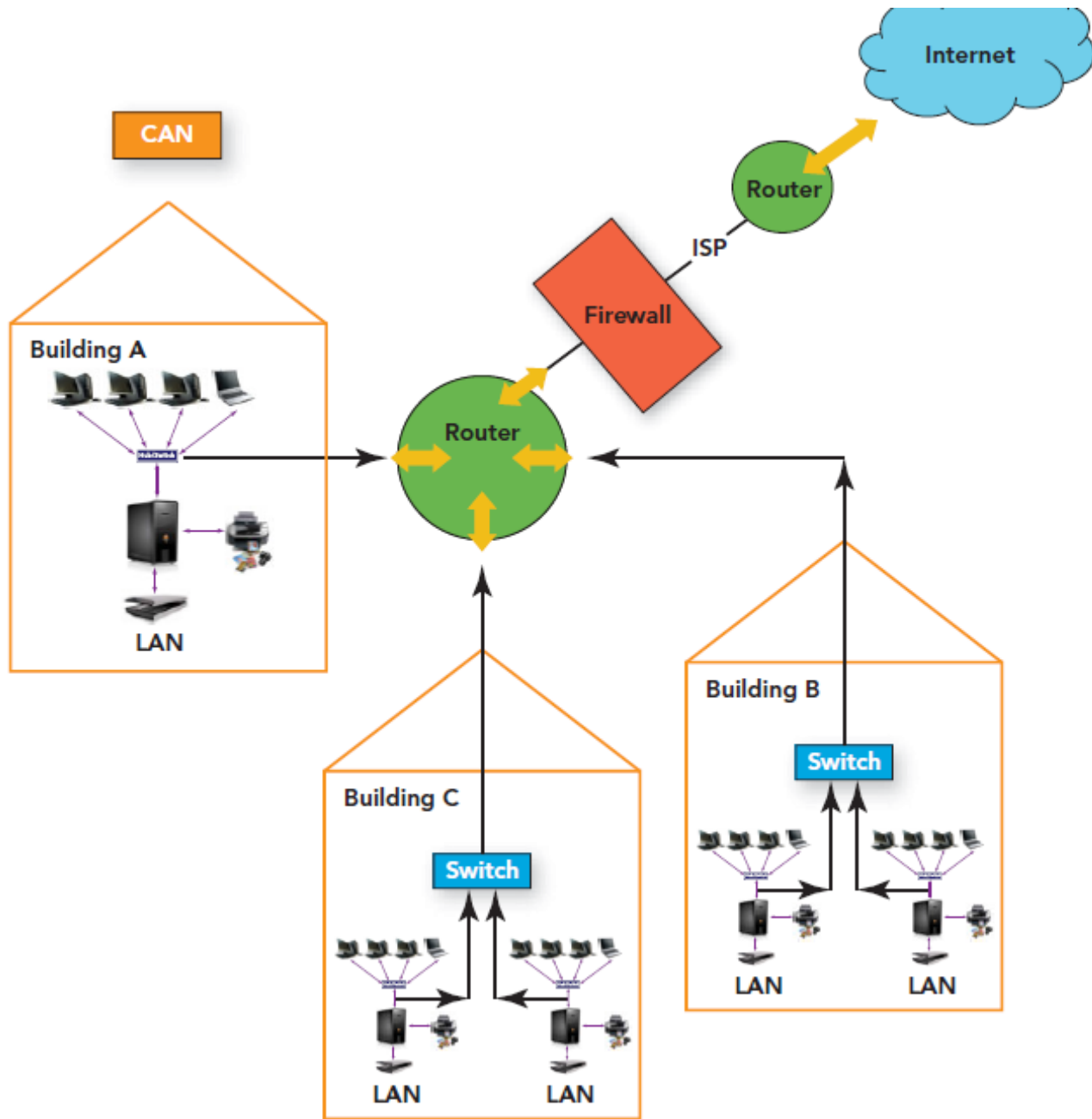


**Local Department
of Transportation**



**Local Department
of Education**

Campus Area Network (CAN) includes several LANs that are housed in various locations on a college or business campus. Usually smaller than a WAN, CANs use devices such as switches, hubs, and routers to interconnect.



Personal Area Network (PAN): This is a network created among an individual's own personal devices, usually within a range of 32 feet.



Any device connected to a network is referred to as a node.

Each node on the network has a unique logical address, or name, assigned by the software in use.

Physical address, called the data link control address, data link control/connection identifier (DLCI), or media access control (MAC) address which is built into the hardware.

A network interface card (NIC) is an expansion board that fits into an expansion slot, or adaptor, that is built into the computer's motherboard. It provides the electronic components to make the connection between a computer and a network.

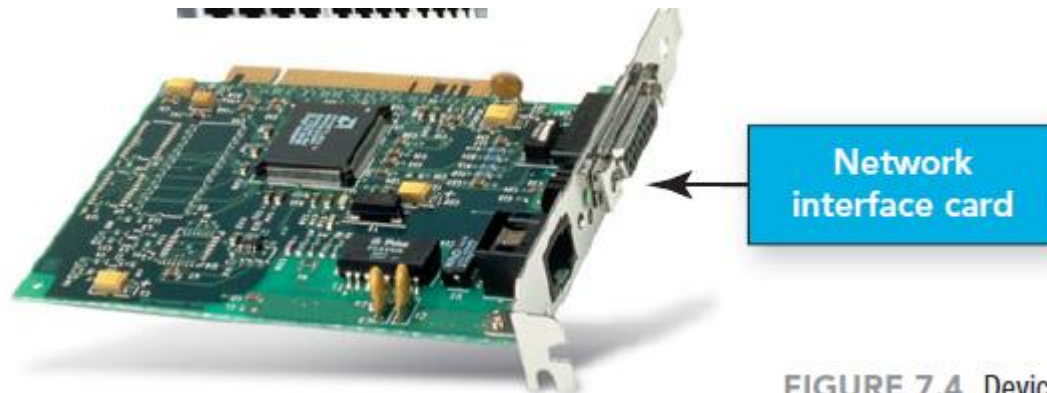


FIGURE 7.4 Devices

A hub is a simple, inexpensive device that joins multiple computers together in a single network but does not manage the traffic between the connections.



Switches are more intelligent than hubs. Instead of just passing data packets along the network, a switch contains software that inspects the source and target of a data package and attempts to deliver it to that destination.



A router is a more complex device, or in some cases more complex software, that is used to connect two or more networks. Routers also have the capability to inspect the source and target of a data package and determine the best path to route data or locate alternative pathways so that the data reaches its destination.



Three common means for a mobile user to connect to a network

USB wireless network adapter



Wireless PC card



Wireless connectivity provided by the embedded processor



A USB dongle is a device that is inserted into a USB port and adds additional features to the base system, such as enabling network connectivity, increasing RAM memory, and permitting Bluetooth communication.

A wireless access point, also known as an AP or WAP, is a node on a network that acts as a receiver and transmitter of wireless radio signals between other nodes on a network. A WAP can also act as a joint or bridge.



The file server also contains the **network operating system (NOS)** an operating system designed to enable data transfer and application usage among computers and other devices connected to a local area network.

A network operating system provides the following:

- **File directories that make it easy to locate files and resources on the LAN.**
- **Automated distribution of software updates to the desktop computers on the LAN.**
- **Support for Internet services such as access to the World Wide Web and e-mail.**
- **Protection of services and data located on the network.**
- **Access to connected hardware by authorized network users.**

Network administrators (sometimes called *network engineers*) install, maintain, and support computer networks.

Advantages of networking

Reduced hardware costs

Connecting people

Application sharing

Centralized data management

Sharing information resources

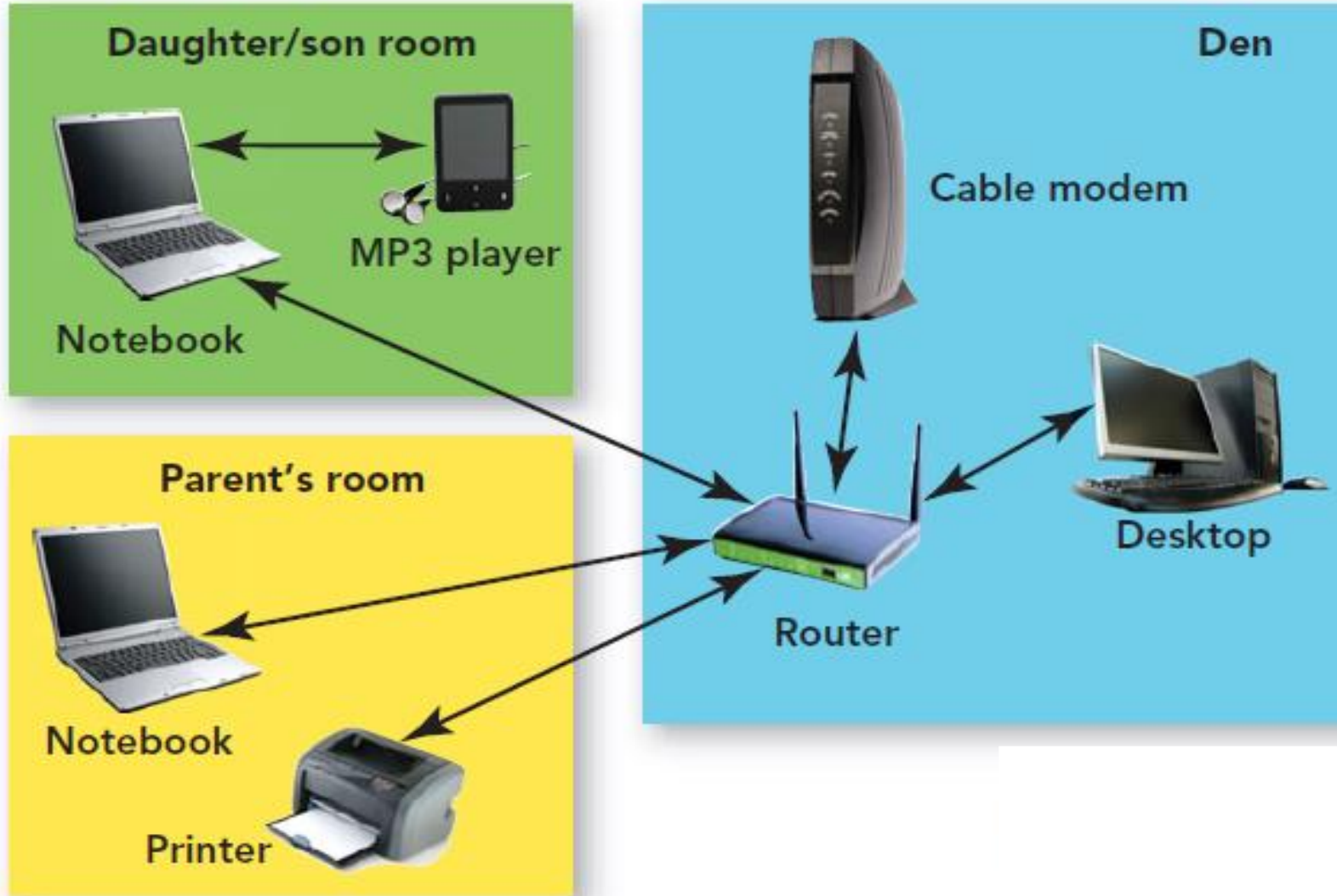
Disadvantage of networking

Loss of autonomy

Lack of privacy

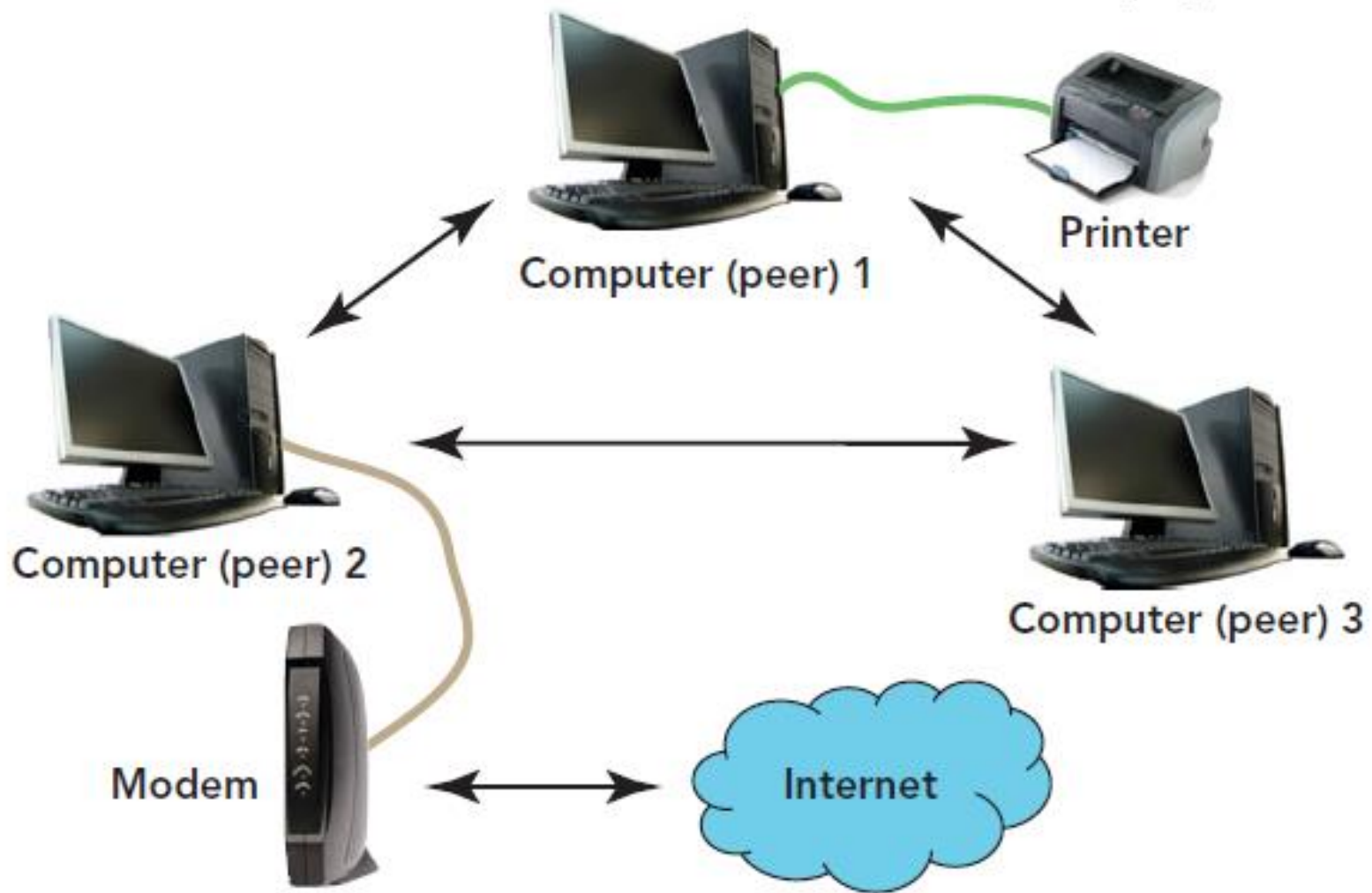
Loss of productivity

LAN

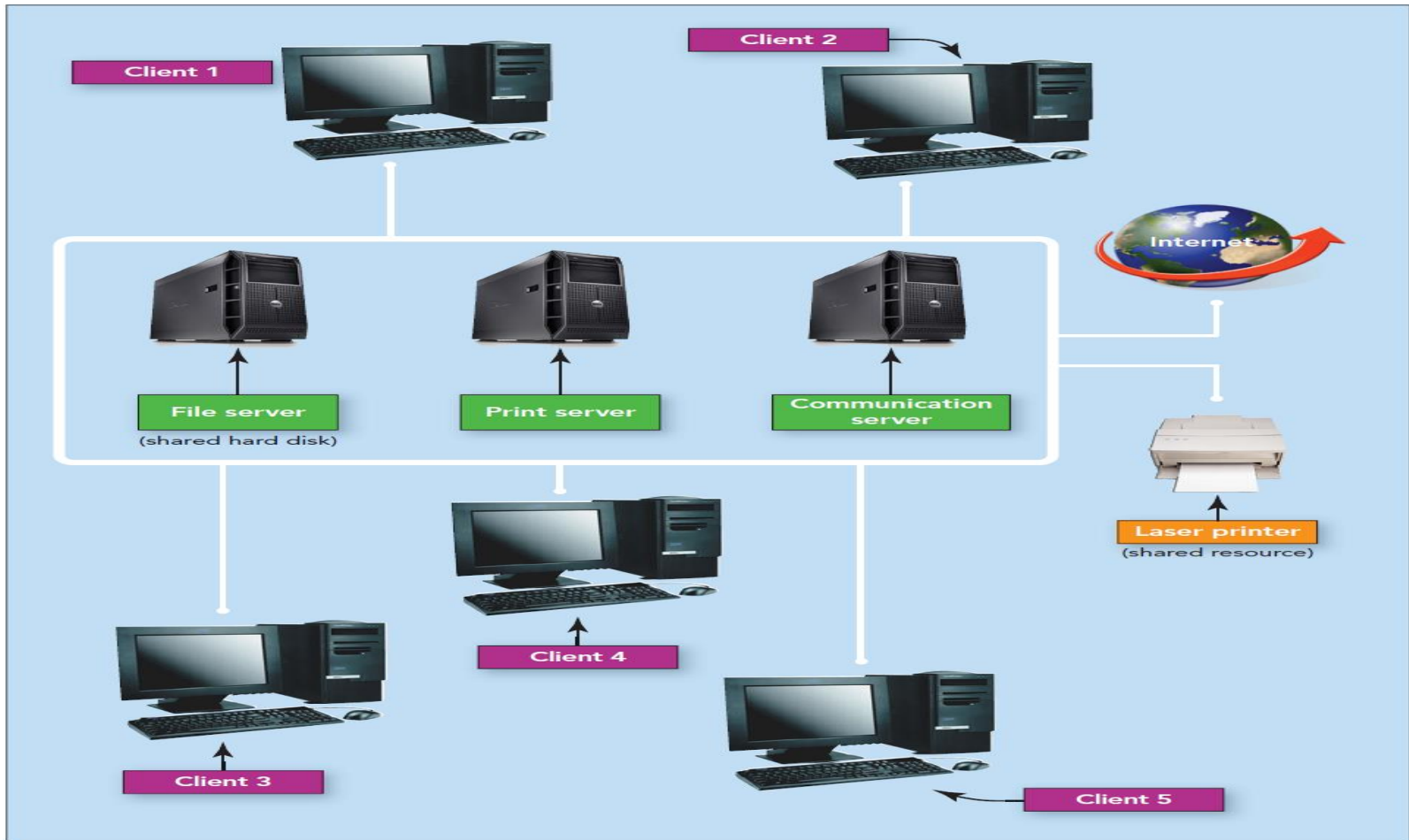


a **peer-to-peer (P2P) network** all of the computers on the network are **equals** or peers—that's where the term *peer-to peer* comes from. So, on a **P2P** network there's no file server, but each computer user decides which, if any, files will be accessible to other users on the network.

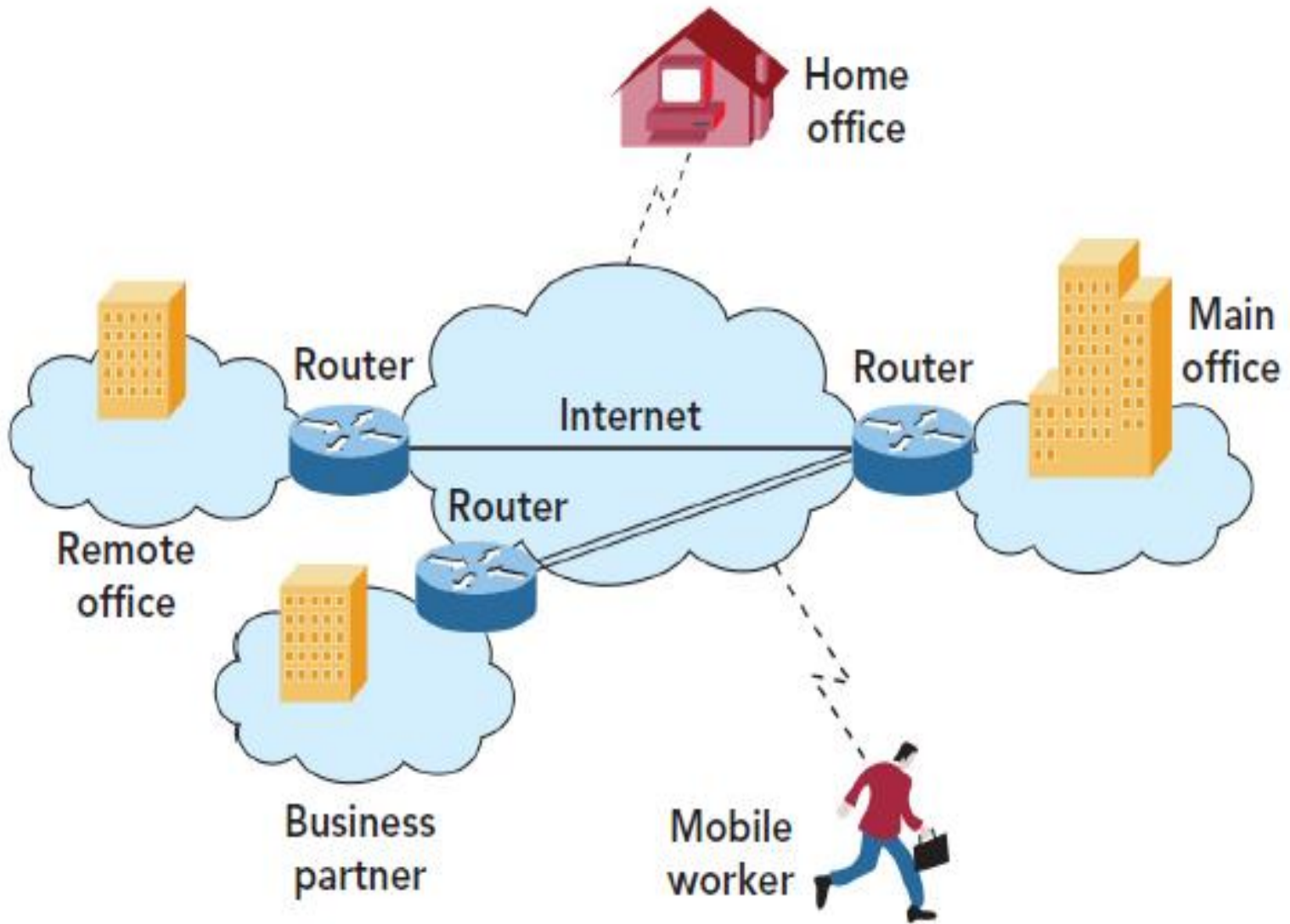
Skype



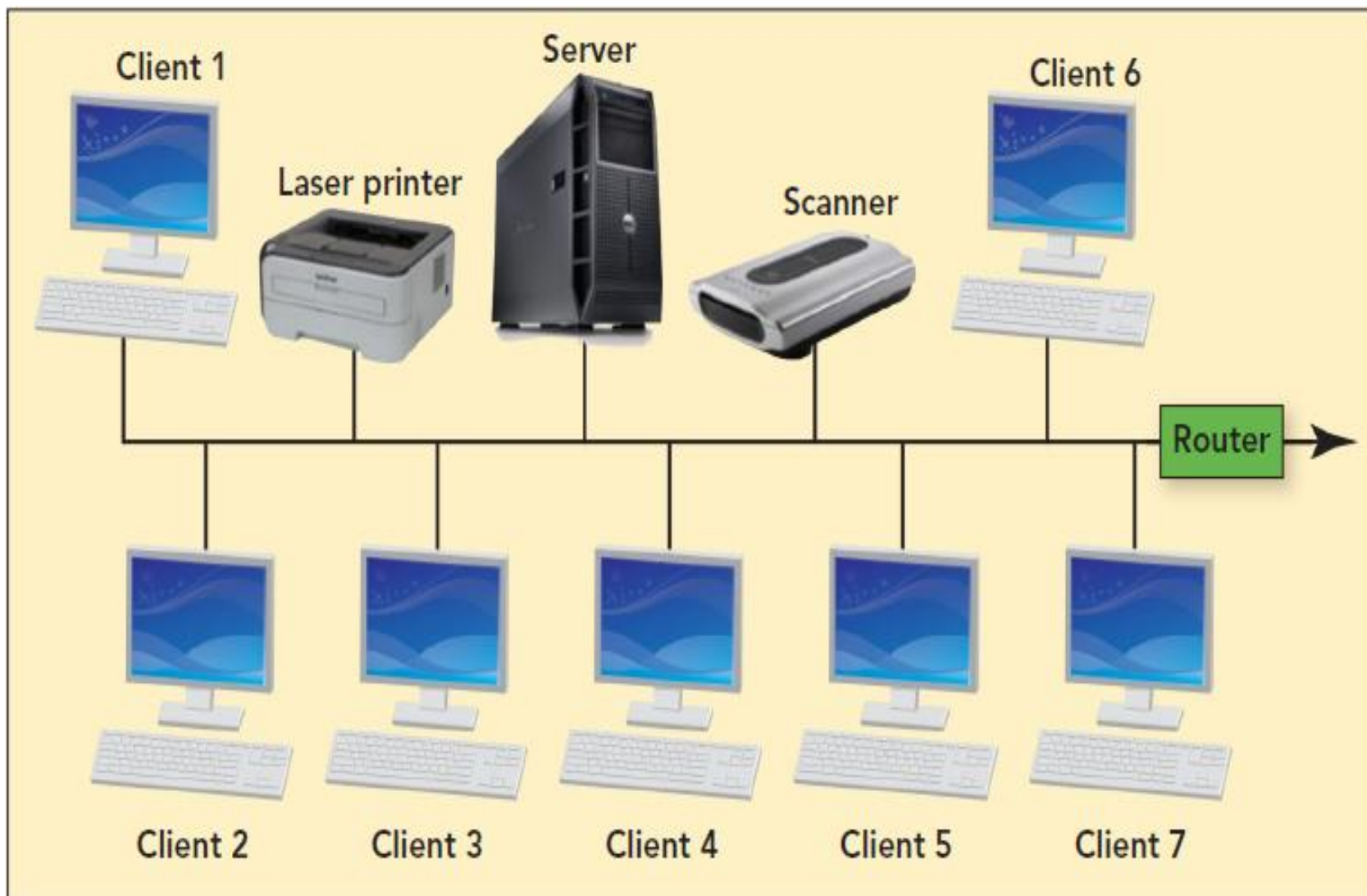
A **client/server** network, which includes one or more servers as well as clients.



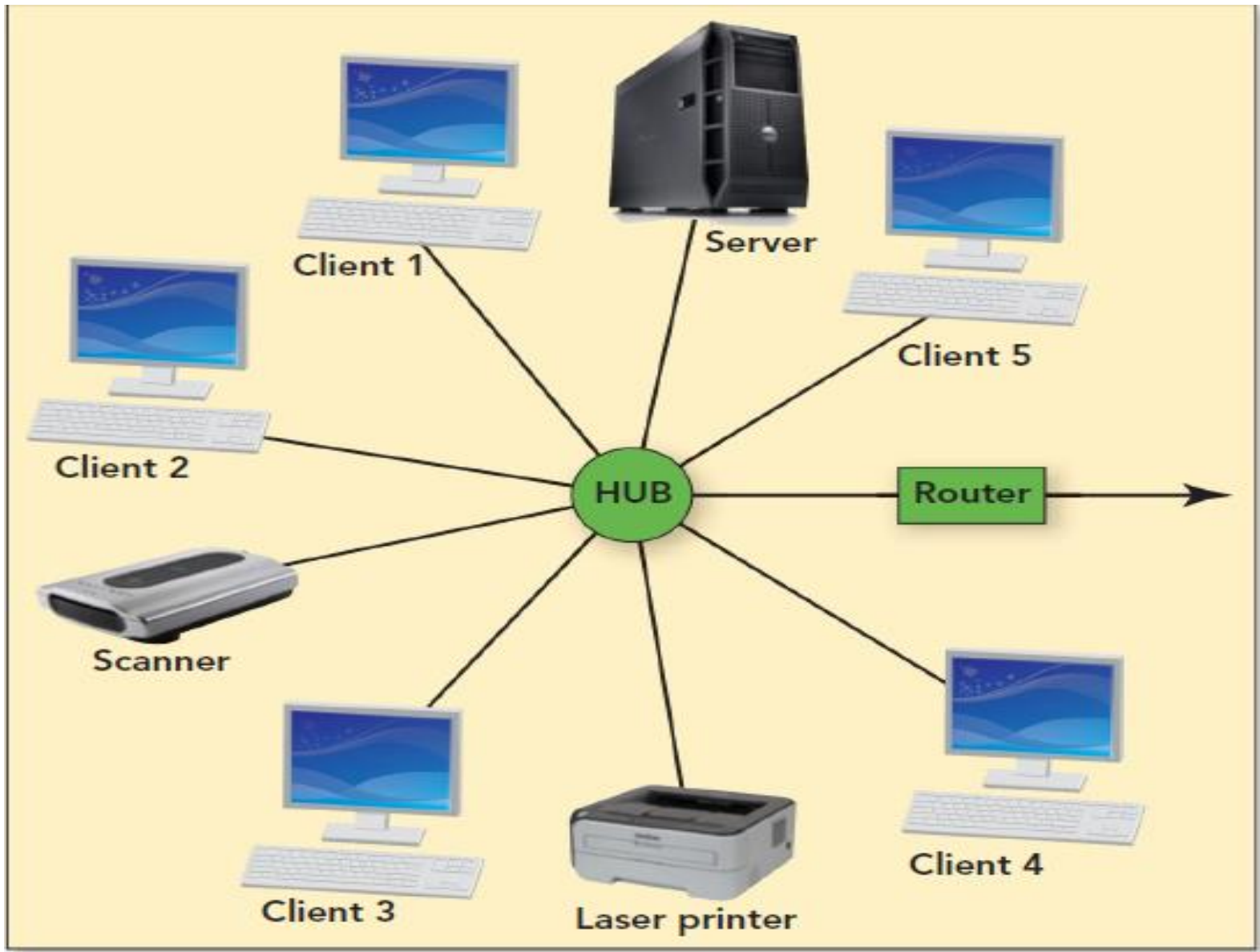
Virtual Private Network (VPN): A VPN operates as a private network over a public network, usually the Internet, making data accessible to authorized users in remote locations through the use of secure, encrypted connections and special software.



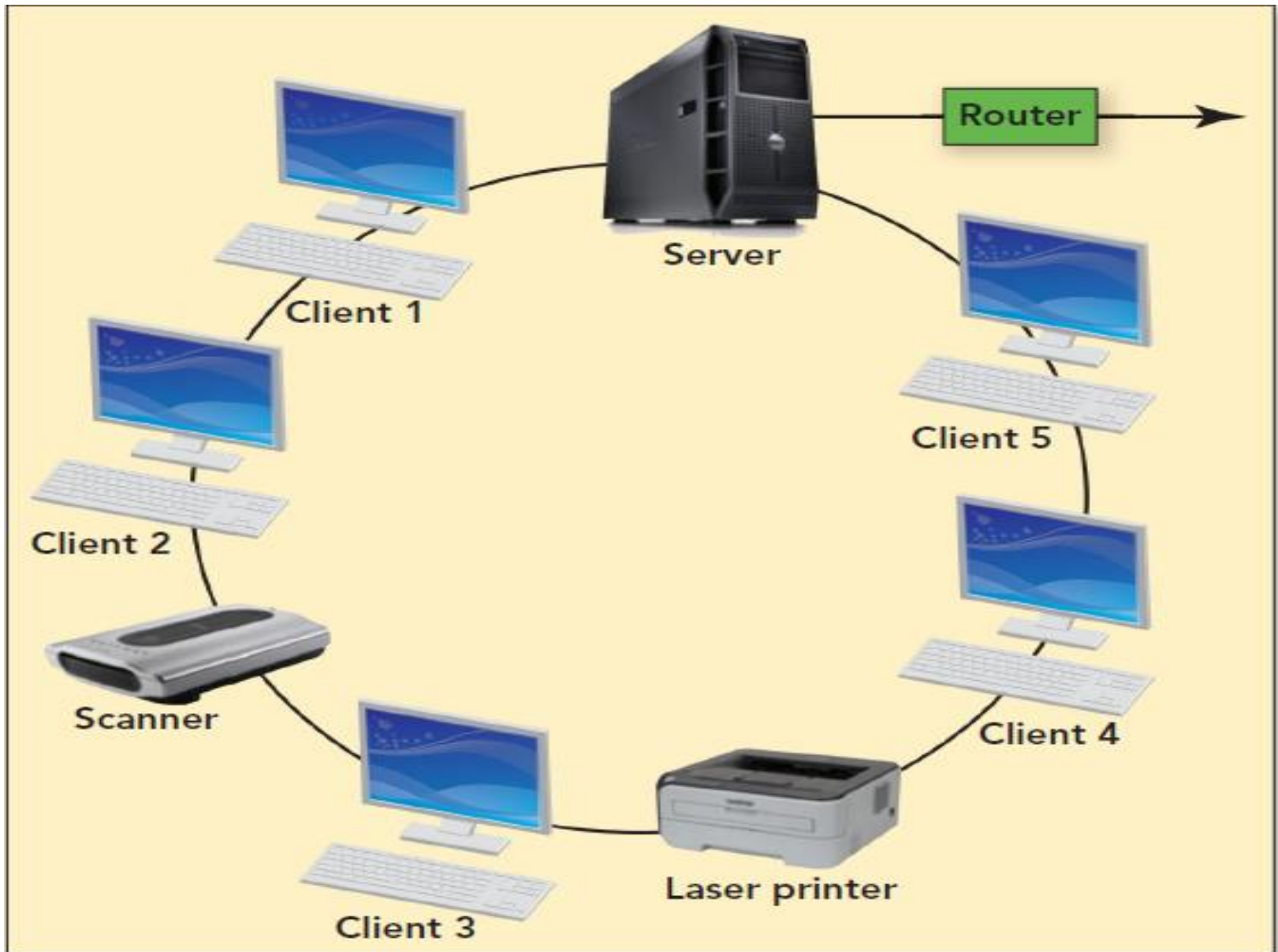
Bus Topology, every node, whether it is a computer or peripheral device, is attached to a common cable or pathway referred to as the bus. At the ends of the bus, special connectors called terminators signify the end of the circuit.



A star topology solves the expansion problems of the bus topology with a central wiring device, which can be a hub, switch, or computer.



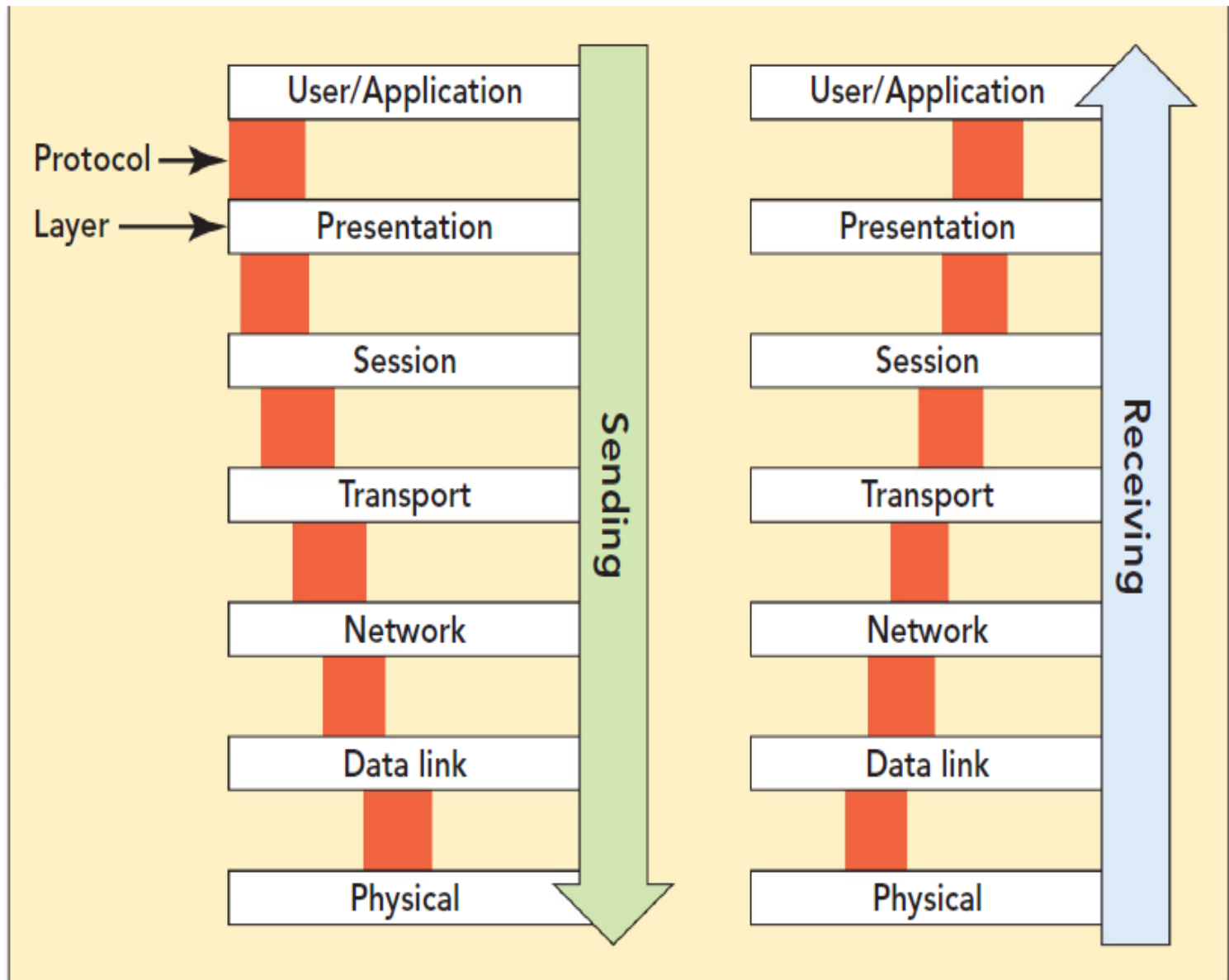
Ring topology, all of the nodes are attached in a circular wiring arrangement. This topology, not in common use today, provides a unique way to prevent collisions. A special unit of data called a **token** travels around the ring. A node can transmit only when it possesses the token.



Protocols (standards or rules) that enable network-connected devices to communicate with each other.

modems must conform to standards called modulation protocols, which ensure that your modem can communicate with another modem even if the second modem was made by a different manufacturer.

Network Layers Because they're complex systems, networks use a network architecture that is divided into separate network layers.



LAN Technologies, By far the most popular LAN standard for large and small businesses is Ethernet

Ethernet uses a protocol called carrier sense multiple access/collision detection, or CSMA/CD. Using the CSMA/CD protocol, a computer looks for an opportunity to place a data unit of a fixed size, called a packet, onto the network and then sends it on its way.

WiFi is a wireless LAN standard that offers Ethernet speeds through the use of radio waves instead of wires a central access point is required.

A point of presence (POP) is a wired or wireless WAN network connection point that enables users to access the WAN. WANs have a POP in as many towns and cities as needed.

Backbones are the high-capacity transmission lines that carry WAN traffic.

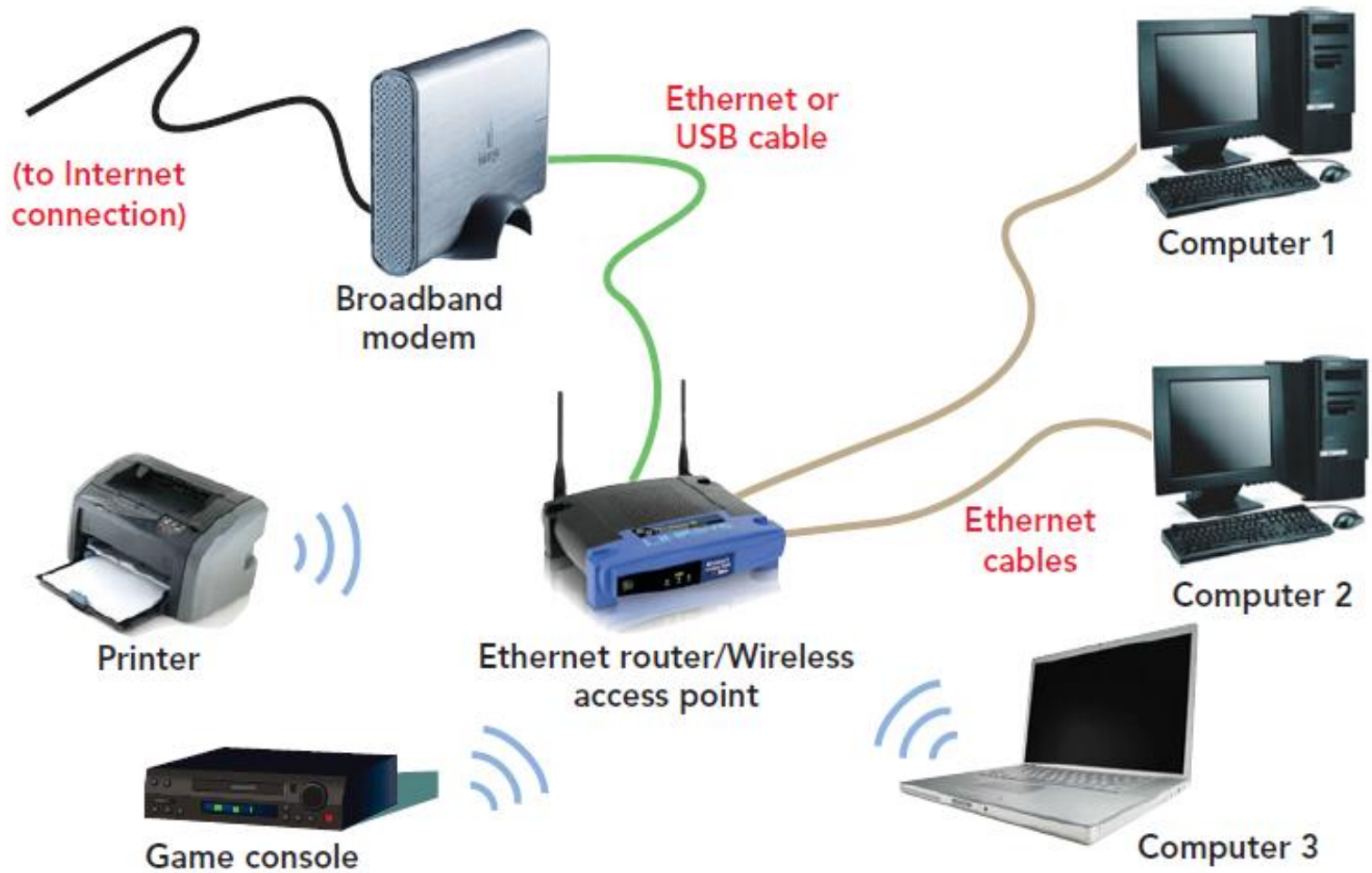
TCP/IP is an abbreviation for **Transmission Control Protocol (TCP)/Internet Protocol (IP)**.

Internet Protocol (IP) because it defines the Internet's addressing scheme, which enables any Internet-connected computer to be uniquely identified.

The Transmission Control Protocol (TCP) defines how one Internet-connected computer can contact another to exchange control and confirmation messages.

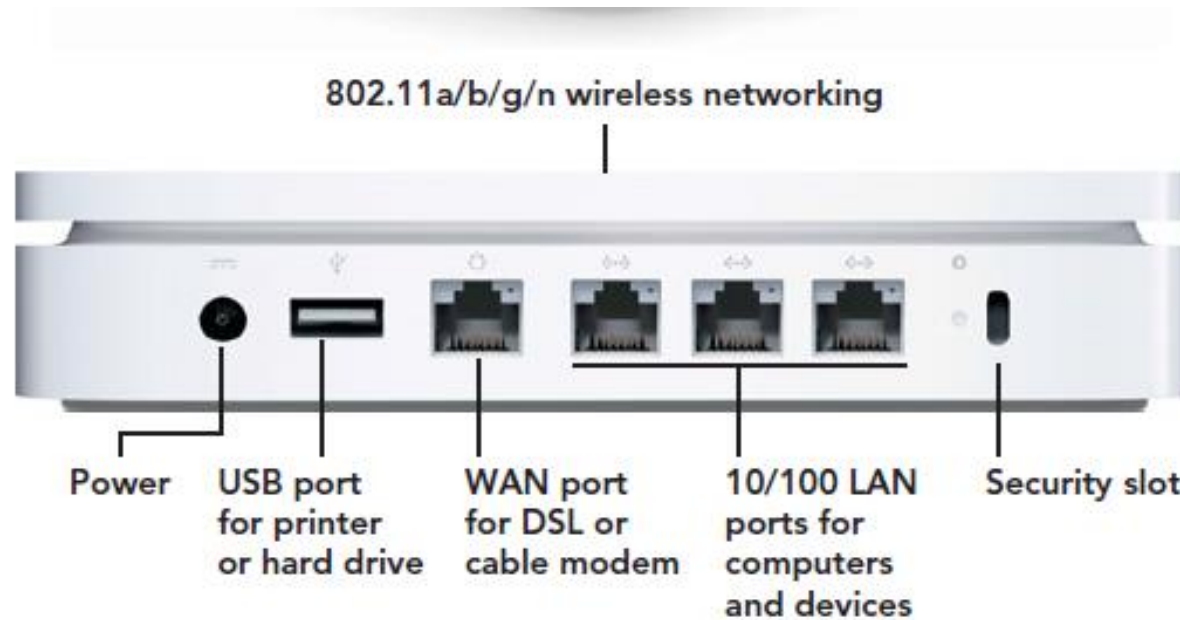
A point-to-point connection is a single line that connects one communications device to one computer. It is widely used with **ATMs** and credit card authorization devices.

A home network, also referred to as a home area network or HAN, is a personal and specific use of network technology that provides connectivity between users and devices located in or near one residence.



Home Ethernet Network Ethernet is a communications standard that uses packets to send data between physically connected computers in a network.

Router



Wireless PC
adapter card



USB adapter



PCI adapter

