

Computers Are Your Future

Chapter 8

Networks: Communicating and Sharing Resources

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What You Will Learn About


- Basic networking concepts
- Advantages and disadvantages of networks
- Peer-to-peer and client/server LANs
- Importance of network protocols
- Most widely used LAN protocol
- Special components of a WAN
- The difference between circuit-switching and packet switching networks

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Network Fundamentals

➤ A computer **network** consists of two or more computers linked together to exchange data and share resources.

- LAN – local area network (small geographic area)
- WAN – wide area network (large geographic area)



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Communication Devices

Routers – connect two or more LANs or WANs

- Can determine the best path to route data.
- LANs often use switches which are similar to routers.



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Communication Devices

File server

- High capacity, high speed computer
- Large hard drive
- Contains a network operating system (NOS)



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Network Fundamentals

Network administrators

- Install
- Maintain
- Support
- Interact with users
- Troubleshoot problems



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Advantages of Networks

- Reduced hardware costs
 - Example: Buy 1 printer for 20 people to share instead of 20 printers
- Application sharing
- Sharing information resources
- Centralized data management
- Connecting people

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Disadvantages of Networks

- Loss of autonomy
- Lack of privacy
- Security threats
- Loss of productivity



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Local Area Networks (LANs)


- Users can share software, data, and peripherals.
- LANs require special hardware and software.
- Computers connected to a LAN are called **workstations** or **nodes**.
- Types of LANs:
 - Peer-to-peer
 - Client-server

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LAN Hardware and Software

Networking Hardware

- **Network interface card (NIC)** – Provides the connection between the computer and the network
- Inserted into a computer's expansion slot



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LAN Hardware and Software

Networking Software

- Operating system that supports networking (Unix, Linux, Windows, Mac OS)
- Additional system software

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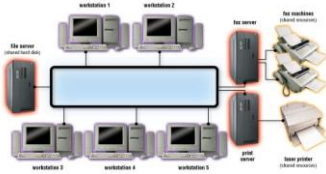
Peer-to-Peer Networks



- All computers on the network are treated as equal.
- There are no file servers.
- Users decide which files and peripherals to share.
- Peer-to-peer is easy to set up. Many people set up home networks.

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Client-Server Networks



- Typical corporate networks are **client-server**.
- The network requires file servers, networked computers (clients), and a network operating system (NOS).
- Clients send requests to servers for programs and data, and to access peripherals.

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LAN Topologies

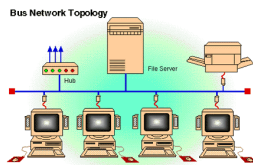
- The physical layout of a LAN is called its **topology**.
- Topologies resolve the problem of **contention**, which occurs when multiple users try to access the LAN at the same time.
- A collision is the corruption of data that can occur when two workstations transmit simultaneously.

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LAN Topologies

The most common LAN topology is called a “bus” network.

Multiple computers, printers, and other devices are connected to a central cable. This cable is called the bus.



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Protocols

- **Network Protocols** are rules or standards that specify how computers can communicate over a network.
- A **protocol suite** is the total package of protocols that specify how a network functions.
- Ethernet – LAN standard for large and small business
- Uses a protocol called CSMA/CD

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WAN

- Wide Area Network
- Covers large geographical area
 - a university campus
 - a city
 - a country
- The Internet is a world-wide network of computer networks.

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Modulation Protocols

- **Modulation protocols** are communications standards to which modems conform.
- **Data transfer rate** is the rate at which two modems can exchange data. It is measured in bits per second (bps).
- A modulation protocol called **V.90** enables modems to transfer data at up to 56 Kbps.

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Wi-Fi “Wireless Fidelity”

- Wireless LAN
- Uses a central server or access point
- Advantages
 - Fast (11 Mbps)
 - Reliable
 - Long range
 - Up to 1000 feet in open areas
 - 250 – 400 feet in closed areas



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Backbones



- **Backbones** - high-capacity transmission lines, can be regional, continental, or transcontinental.
- Internet backbones can carry 2.5 gigabits of data per second.

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