What is a Computer Network?

What is a Network?

- In its simplest form, a network is nothing more than “two connected computers sharing resources with one another.”

- It is composed of two main aspects:
  - **Physical Connection** (wires, cables, wireless media)
  - **Logical Connection** (data transporting across the physical media)

Some Basic Networking Rules

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- The computers in a network must use the same procedures for sending and receiving data. We call these ***communication protocols***.
- Data must be delivered uncorrupted. If it is corrupted, it's useless. (There are Exceptions)
- Computers in a network must be capable of determining the ***origin*** and ***destination*** of a piece of information, i.e., its **IP** and ***Mac Address***.

Type of Computer Networks (by size)

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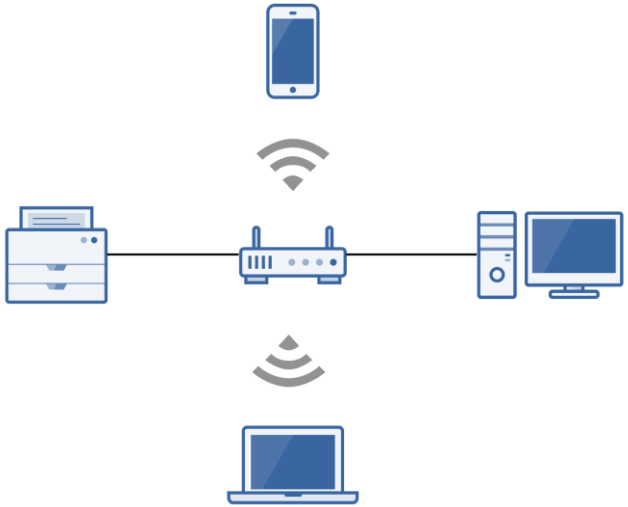
- Personal Area Network (PAN)
- Local Area Network (LAN)
- Wireless Local Area Network (WLAN)
- Campus Area Network (CAN)
- Metropolitan Area Network (MAN)
- Wide Area Network (WAN)

Personal Area Network (PAN)

- Ultra-small networks used for personal use to share data from one device to another.
- Can be wired (PAN) or wireless (WPAN):
  - USB
  - Bluetooth
  - NFC
  - ANT+
- Examples:
  - Smart Phone to Laptop
  - Smart Watch to Smart Phone
  - Smart Phone Hands-Free Car Calling
  - Heart Rate Monitor to Smart Phone

Local Area Network (LAN)

- A computer network within a small geographical area, such as a single room, building or group of buildings.
- Considered to be self-contained:
  - All devices are directly connected via cables and/or short-range wireless technology.
  - Doesn't require a leased telecommunications line from an Internet Service Provider (ISP).
- Examples:
  - Home Network
  - Small Business or Office Network



Wireless Local Area Network (WLAN)

- A LAN that's dependent on wireless connectivity or one that extends a traditional wired LAN to a wireless LAN.
- Most home networks are WLANs.

Campus Area Network (CAN)

- A computer network of multiple interconnected LANs in a limited geographical area, such as a corporate business park, government agency, or university campus.
- Typically owned or used by a single entity.

Metropolitan Area Network (MAN)

- A computer network that interconnects users with computer resources in a city.
- Larger than a campus area network, but smaller than a wide area network.

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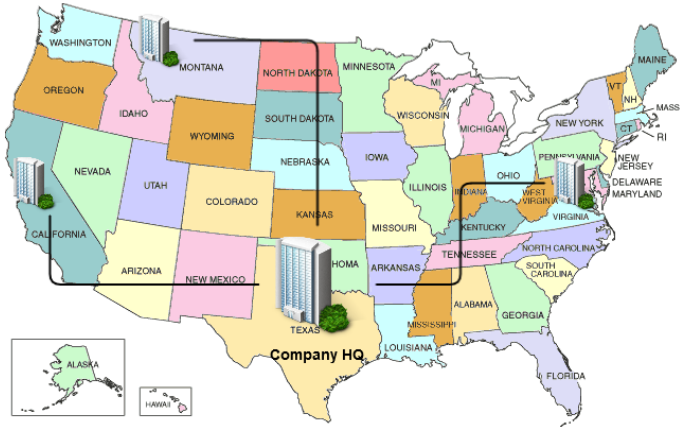
Wide Area Network (WAN)

- A computer network that extends over a large geographical distance, typically multiple cities and countries.
- WANs connect geographically distant LANs.
- Typically use leased telecommunications lines from ISPs.
- Examples:
  - The Internet
  - Corporate Offices in Different States



Network Architecture

Peer-to-Peer vs. Client-Server

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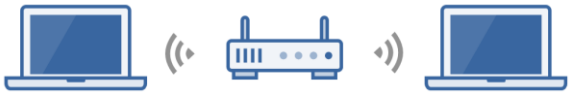
Network Architecture

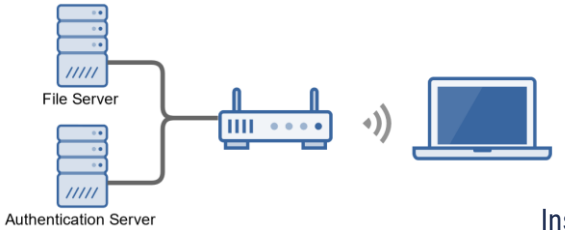
Peer-to-Peer

- All computers on the network are peers
  - No dedicated servers
  - There's no centralized control over shared resources
- Any device can share its resources as it pleases
- All computers can act as either a client or a server
- Easy to set-up, and common in homes and small businesses



Client-Server

- The network is composed of client and servers
  - Servers provide resources
  - Clients receive resources
- Servers provide centralized control over network resources (files, printers, etc.)
- Centralizes user accounts, security, and access controls to simplify network administration
- More difficult to setup and requires an IT administrator



Why Build a Computer Network?

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- Before computer networks, people sent and received information by hand, using the postal service. This is slow and can be unreliable.
- Computer networks enable faster, more efficient modes of communication, i.e., email, video conferencing, etc.
- Computer networks and the sharing of electronic data encourage the use of standard policies and procedures.
- Computer networks provide backup and recovery support for our data, i.e., redundancy.
- Computer networks lead to cost savings.