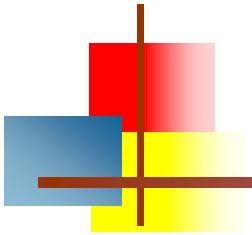


Introduction to Networks & Distributed Computing
CECS 327

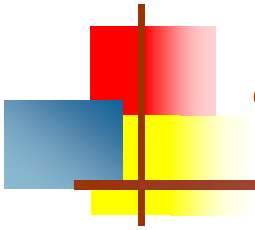
Definition of Networking

- **Network**
  - Any arrangement or fabric of parallel wires, threads, etc. crossed at regular intervals by others fastened to them so as to leave open spaces; netting; mesh.
  - A system of roads, canals, veins, etc. that connect with or cross one another.
  - Radio and TV a chain of transmitting stations controlled and operated as a unit.
  - A group, system, etc. of interconnected or cooperating individuals.
  - The making of nets or netted fabric.

- **A computer network** is a collection of computers interconnected via a transmission medium (e.g., copper wire, optical fiber, microwaves, satellites, WiFi, etc.) The computers can be special-purpose or general-purpose programmable hardware devices.

Types of Networks

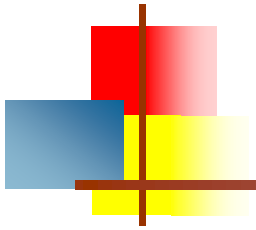
- **LAN** (Local Area Network)
  - **Defn:** A LAN is a network that covers a relatively small area (e.g, a home or business) usually characterized by *high-speed transmission* and primarily connected by switches or hubs. A LAN is consists of privately owned and managed components.
  - **Examples:** Connecting TV, Printer, Phone to a WiFi at home.
- **MAN (Metropolitan area networks):**
  - **Defn:** A MAN is a network that covers medium-sized area (perhaps 1-10 square miles) and in characterized by *medium-to-high transmission speeds* and is connected via switches and internally managed routers. A MAN is consists of privately owned and managed components
  - **Examples:** CSULB network (wired + BeachNet), Network at the Long Beach Boeing Facilities



Types of Networks

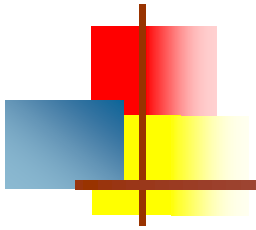
- **WAN (Wide-Area Network)**
  - **Defn:** A WAN is a network that typically covers large distances (100+ miles) and utilize leased telecommunication lines to interconnect switches/routers. WANs are typically characterized by *lower speeds than LANs or MANs*. A WAN is consists of privately owned switches (or routers) and leased transmission links.
  - **Examples:** The Internet, A Provider Network (e.g., Sprint), etc.

- **Other Networks**
  - Plain Old Telephone SERVICE (POTS), Cell Phone networks, Cable TV networks, Satellites networks, SAN (System Area Network), etc.



Motivation: Why use Networks?

- **Availability of resources**
  - Make resources available to anyone on the network regardless of the physical location of the resource or the user.
- **Load sharing**
  - Process a job on the least crowded (or busy) machine.
- **High reliability**
  - Have alternate sources of resources (multiple copies).
- **Human-to-human communication**
  - Allow humans to communicate through email, telephone, teleconferencing, etc

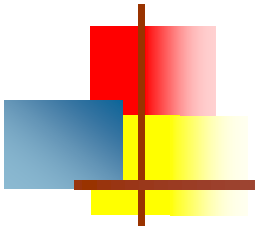


History of Networking

WANs (c. 1970)

- **Driving force behind WANs:** The need for government and university researchers located in various parts of the United States to communicate ideas and data between computers.

- **Beginning of the Internet: ARPANET**
  - Created in the early seventies
  - Funded by ARPA (DARPA)
  - Prototype for what has evolved into the Internet
  - Created by folks from Berkeley, MIT, AT&T Bell Labs, etc.



Connectivity

A network must provide connectivity among a set of computers.

Defn:

A **link** is a communication channel that connects two or more devices. The link may be physical or logical that uses one or more physical links or shares a physical link with other telecommunications links. For example, coaxial cable or optical fiber.

Defn:

The computers connected by the physical medium are called **nodes**.

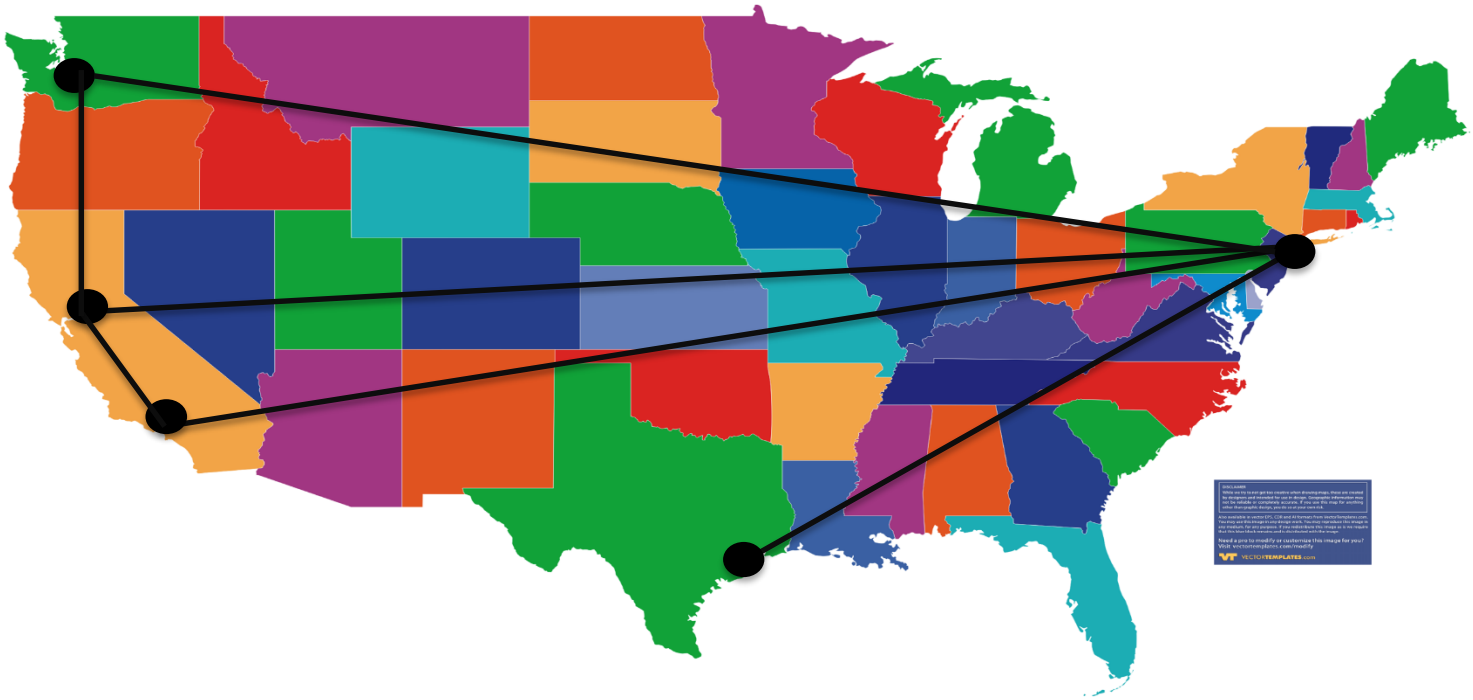
Defn:

A **host** is a node running a user application program. Host machines are interconnected by links to form computer networks.

Connectivity

Two Types of Network Links:

1. Point-to-Point (or store-and-forward) links connect only two nodes

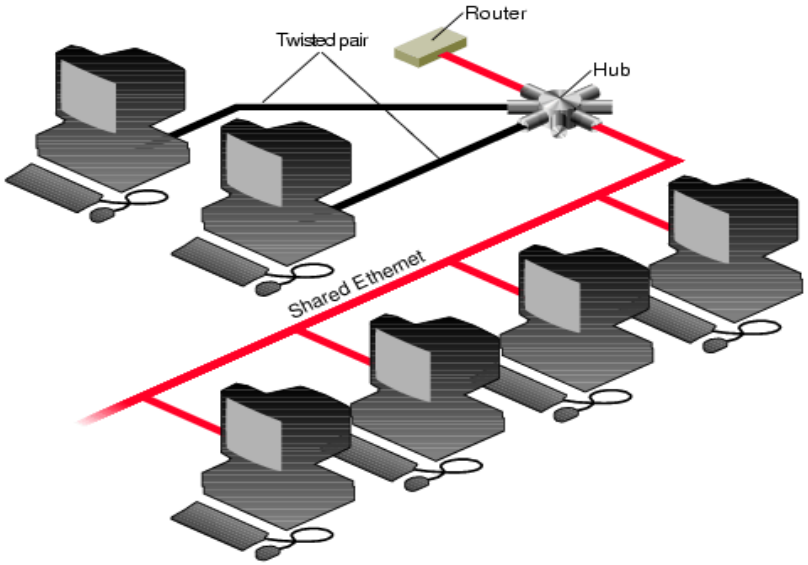


The Internet Backbone is a point-to-point network.

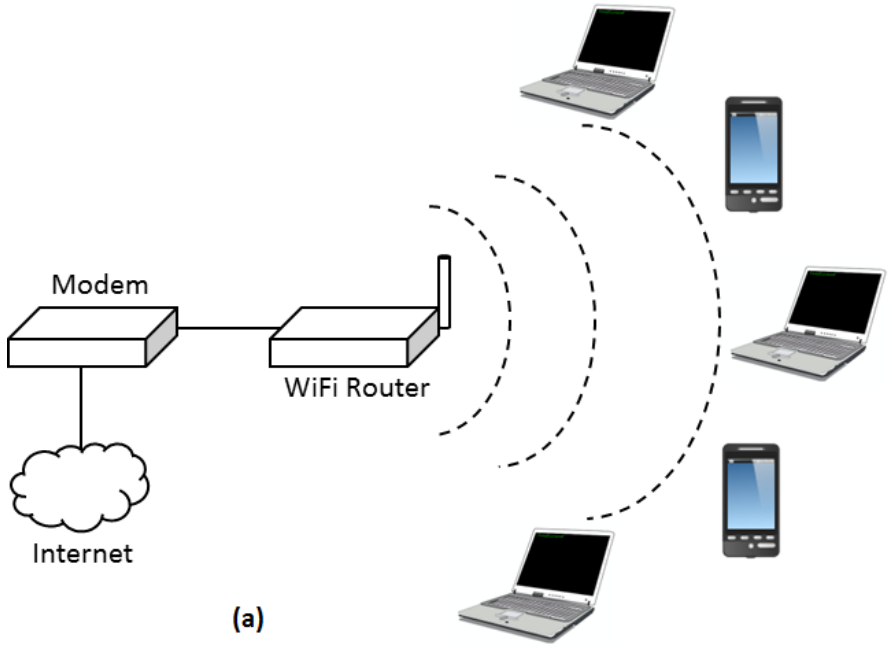
Connectivity

2. **Multiple Access** (or broadcast or shared) links allow more than two nodes to share a single physical medium.

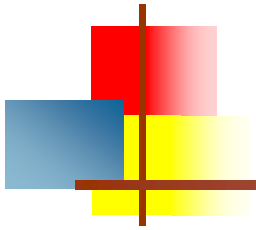
Example 1: Ethernet Busses & Hubs (Generation I & II)



Example 2: WiFi



NOTE: In a shared link, collisions are possible if the protocol/device does not prevent them.



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- Some slides by Dr. Tracy Bradley Maples