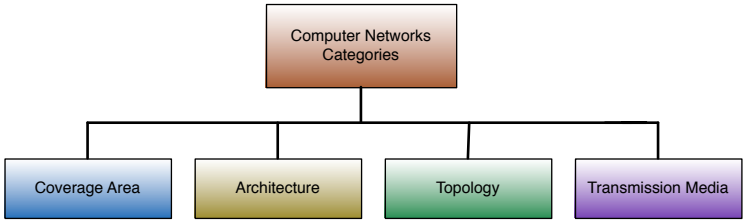
Computer Networks
#2 Definition

Universitas Komputer Indonesia

Computer Network categories

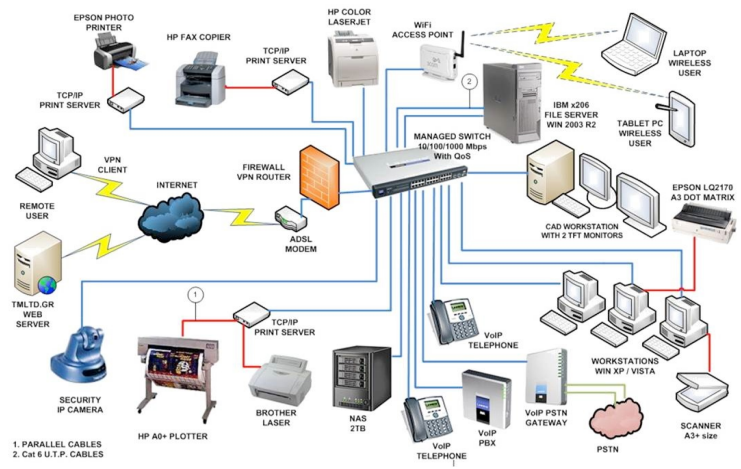


Coverage Area

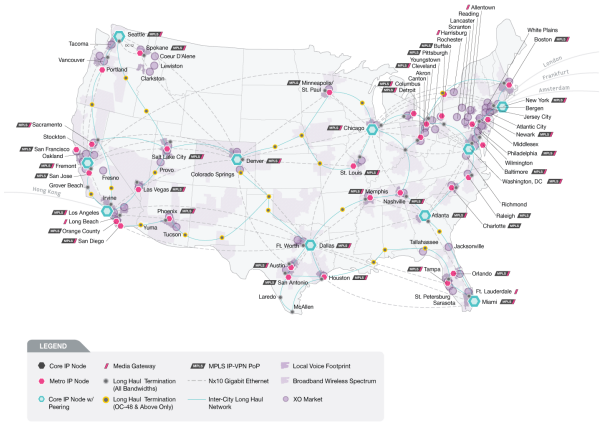
- Personal Area Network (PAN)
- Local Area Network (LAN)
- Metropolitan Area Network (MAN)
- Wide Area Network (WAN)

Personal Area Network

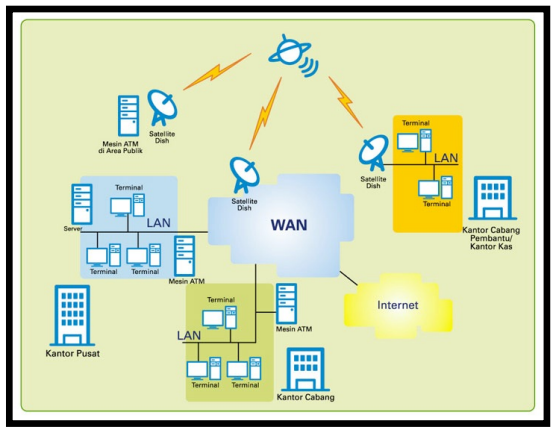
Local Area Network



Metropolitan Area Network

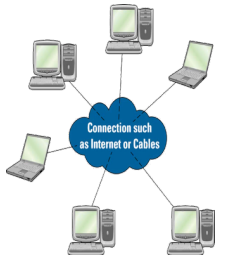


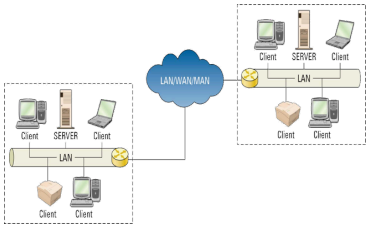
Wide Area Network



Architecture

- Peer to Peer (P2P) Network :
  - any network without a central file server and in which all computers in the network have access to the public files located on all other workstations
- Client Server Network:
  - Client - a computer that is designed to request information from a server ☛ A PC using an Internet browser is a client.
  - Server - a computer that is dedicated to providing information in response to external requests; requires server operating system





Topology

- **Logical topology,** or signal topology, is the arrangement of devices on a computer network and how they communicate with one another.
- **Physical topology**, is how devices are connected to the network through the actual cables that transmit data, or the physical structure of the network. Physical topology defines how the systems are physically connected. It represents the physical layout of the devices on the network.

- The logical topology defines how the systems communicate across the physical topologies.

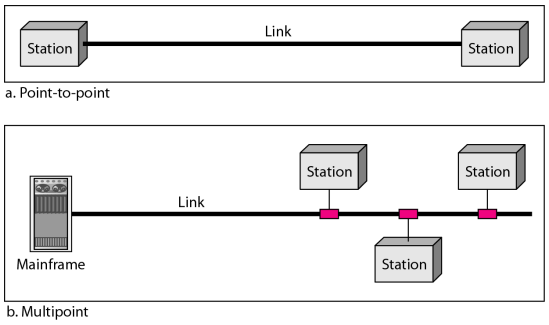
Logical Topology

- Refers to the way in which data are transmitted between nodes
- Describes the way:
  - Data are packaged in frames
  - Electrical pulses are sent over network's physical media
- Logical topology may also be called network transport system

- Logical Topology
  - ✤ Shared Media
  - ✤ Token Based

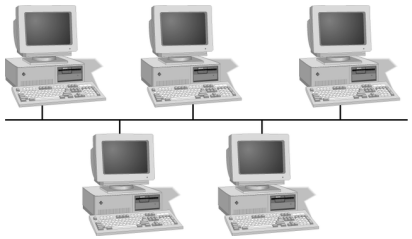
Physical Topology

Types of Connection



Bus Topology

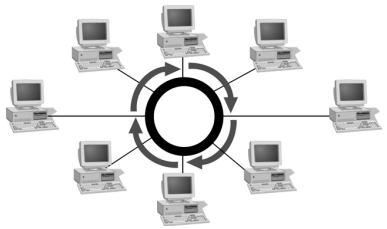
- A Bus topology consists of a single cable—called a bus—connecting all nodes on a network without intervening connectivity devices



- Advantages
  - Works well for small networks
  - Relatively inexpensive to implement
  - Easy to add to it
- Disadvantages
  - Management costs can be high
  - Potential for congestion with network traffic

Ring Topology

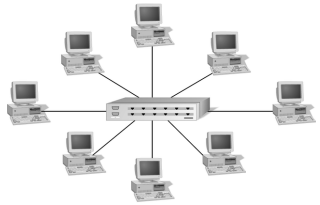
- Ring topology : Each node is connected to the two nearest nodes so the entire network forms a circle
- One method for passing data on ring networks is token passing



- Advantages
  - Easier to manage; easier to locate a defective node or cable problem
  - Well-suited for transmitting signals over long distances on a LAN
  - Handles high-volume network traffic
  - Enables reliable communication
- Disadvantages
  - Expensive
  - Requires more cable and network equipment at the start
  - Not used as widely as bus topology
    - Fewer equipment options
    - Fewer options for expansion to high-speed communication

Star Topology

- Star topology
- Every node on the network is connected through a central device

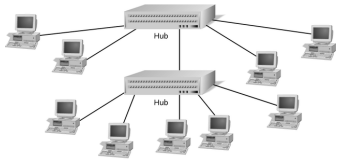


- Advantages
  - Good option for modern networks
  - Low startup costs
  - Easy to manage
  - Offers opportunities for expansion
  - Most popular topology in use; wide variety of equipment available
- Disadvantages
  - Hub is a single point of failure
  - Requires more cable than the bus

Hybrid Topology

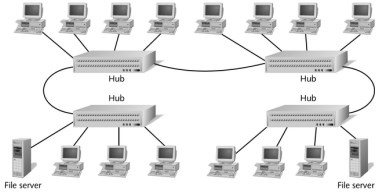
- Star-wired bus

  In a star-wired bus topology, groups of workstations are star-connected to hubs and then networked via a single bus

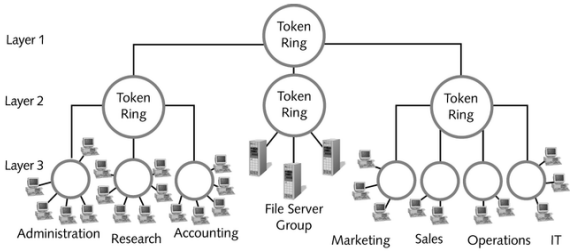


- Daisy-Chained

  A Daisy chain is linked series of devices



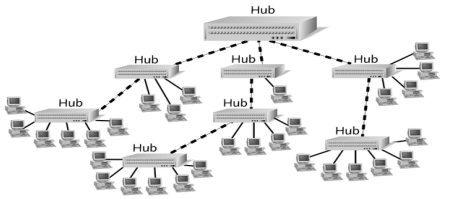
- Hierarchical hybrid topology
- Uses layers to separate devices by priority or function



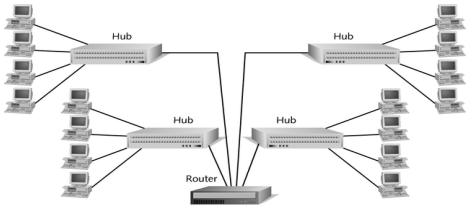
Enterprise Wide Technologies

- Enterprise
  - An entire organization
- Backbone networks
  - Serial backbone
  - Distributed backbone
  - Collapsed backbone
  - Parallel backbone

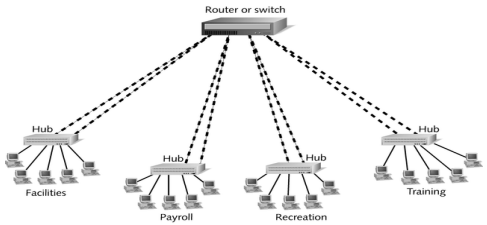
- Serial backbone
  - Two or more hubs connected to each other by a single cable
- Distributed backbone
  - Hubs connected to a series of central hubs or routers in a hierarchy



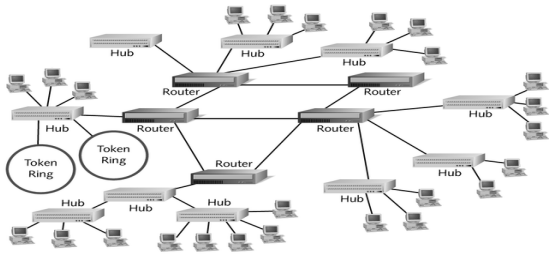
- Collapsed backbone
  - Uses a router or switch as the single central connection point for multiple subnetworks



- Parallel Backbone
  - Collapsed backbone arrangement that consists of more than one connection from central router or switch to each network segment

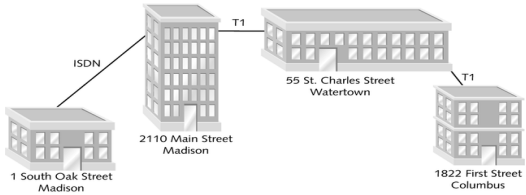


- Mesh networks
  - Routers are interconnected with other routers, with at least two pathways connecting each router

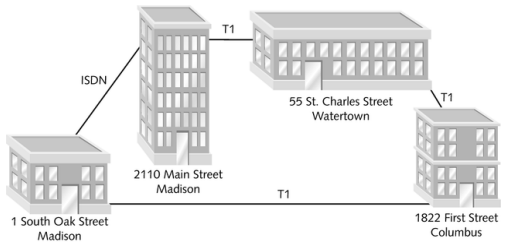


Wide Area Network Topologies

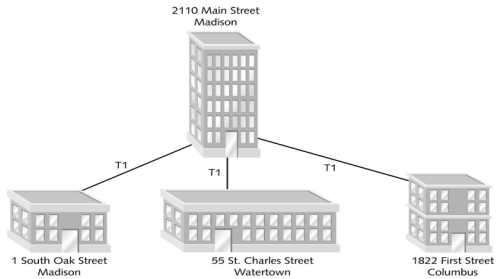
- Peer-to-peer topology
  - WAN with single interconnection points for each location
  - Dedicated circuits
  - Continuous physical or logical connections between two access points that are leased from a communication provider



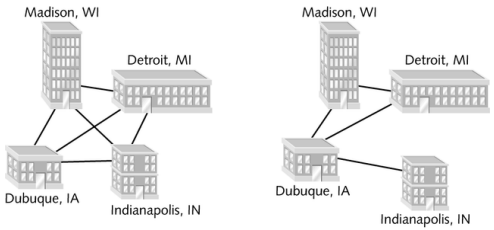
- Ring WAN topology
  - Each site is connected to two other sites so that entire WAN forms a ring pattern



- Star WAN topology
  - Single site acts as the central connection point for several other points

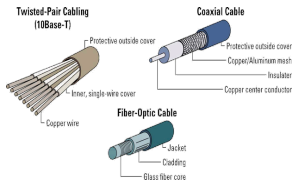


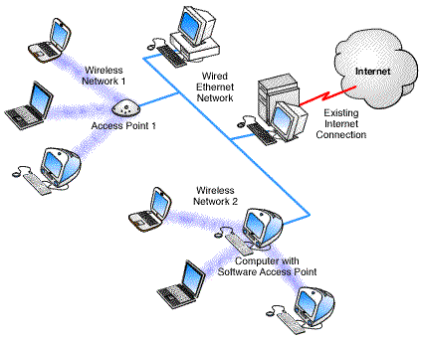
- Mesh WAN topology
  - Many directly interconnected locations forming a complex mesh



Transmission Media

- Wireline





- Wireless