

# Basic Concepts

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# The relationship of communication devices

- Line Configuration
- Topology
- Transmission Mode
- Categories of Networks
- Internetworks

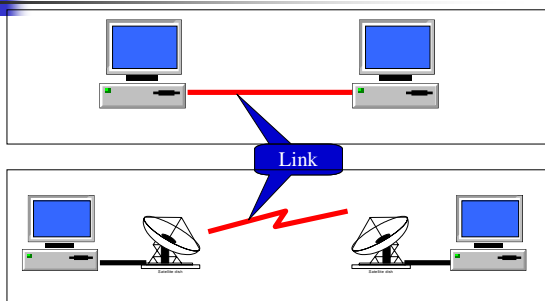
# Line configuration

- Defines the attachment of communication devices to a link
- A link – A physical communication pathway
- 2 possible configurations
  - Point-to-point
  - Multipoint

# Point-to-point

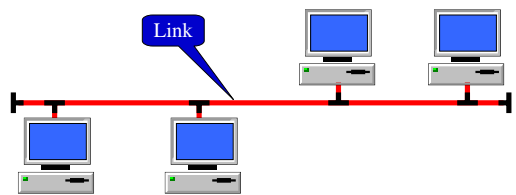
- Link between two devices
- Use entire channel capacity for communication
- Wire or wireless channel (link)

# Point-to-point



# Multipoint

- More than 2 devices share a single link
- Channel capacity is shared



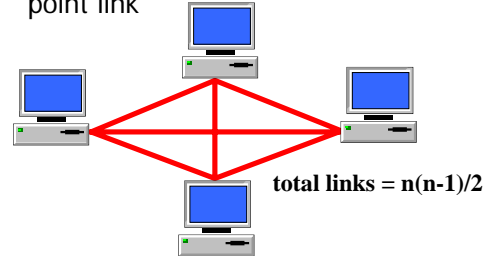
## Topology

- The way a network is physically or logically layout
- 2 or more devices connected to a link
- 2 or more links form a topology
- Basic topologies
  - Mesh
  - Star
  - Tree
  - Bus
  - Ring
  - Hybrid

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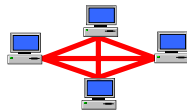
## Mesh Topology

- Each device has a dedicated point-to-point link



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## Mesh Topology

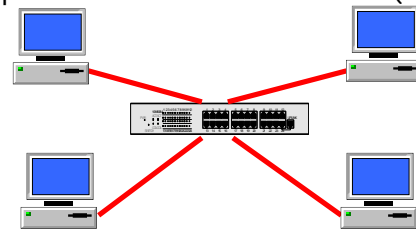


- Advantages
  - High throughput
  - Robust
  - High Security
  - Easy to cope with fault
- Disadvantages
  - Number of cables – space & cost (material, install.)
  - Number of I/O ports
  - Difficult to reconfigure
- Usage
  - Backbone connecting

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## Star Topology

- Each device has a dedicated point-to-point link to a central controller (Hub)



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## Star Topology

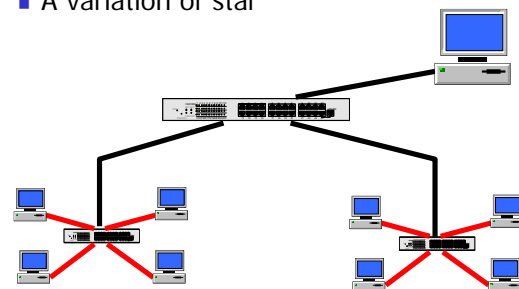


- Advantages
  - Less expensive (cable) than Mesh
  - One I/O port
  - Easy to install and reconfigure
  - Robust
  - Easy to cope with fault
- Disadvantages
  - High Number of cables (cost)
- Usage
  - Ethernet

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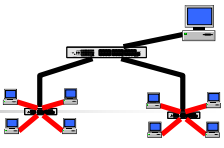
## Tree Topology

- A variation of star



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## Tree Topology

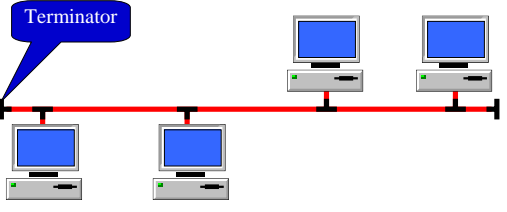


- Advantages
  - Same as star
  - Increase the distance
  - Allow network to isolate / prioritize
- Disadvantages
  - Same as star
- Example
  - Cable TV

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## Bus Topology

- Each node connects to the Bus (a long cable running as a backbone)



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## Bus Topology

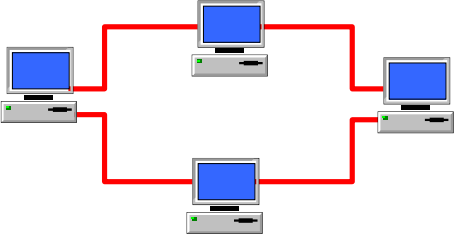


- Advantages
  - Easy to install
  - Less cable compare to other topologies
- Disadvantages
  - Difficult to cope with fault
  - Difficult to modify
  - Not robust

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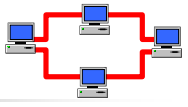
## Ring Topology

- Each device has a dedicated point-to-point with its neighbors



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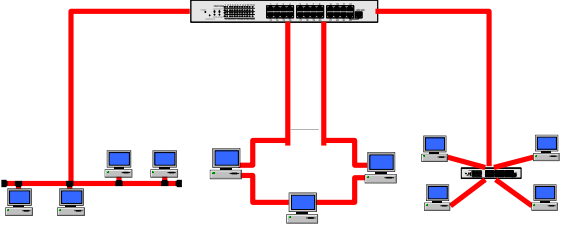
## Ring Topology



- Advantages
  - Easy to install
  - Easy to cope with fault
- Disadvantages
  - Not robust

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## Hybrid Topologies



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## The relationship of communication devices

- Line Configuration
- Topology
- **Transmission Mode**
- Categories of Networks
- Internetworks

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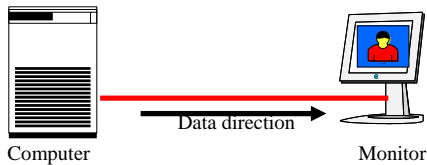
## Transmission mode

- The direction of signal flows between two linked devices
- Three types of transmission modes
  - Simplex
  - Half-duplex
  - Full-duplex

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## Simplex

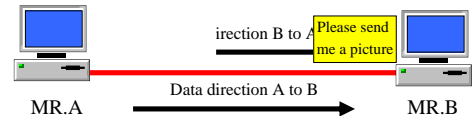
- Unidirection
- While one node transmits, the other receives



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## Half-Duplex

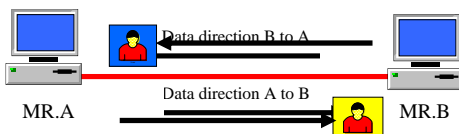
- Each node can both transmit and receive
- One at a time



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## Full-Duplex

- Each node can both transmit and receive at the same time



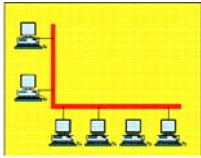
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## Categories of Networks

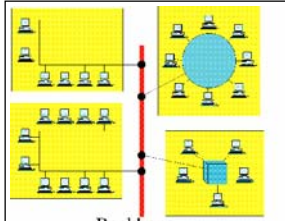
- Local Area Network (LAN)
- Metropolitan Area Network (MAN)
- Wide Area Network (WAN)

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## Local Area Network (LAN)



Single building LAN

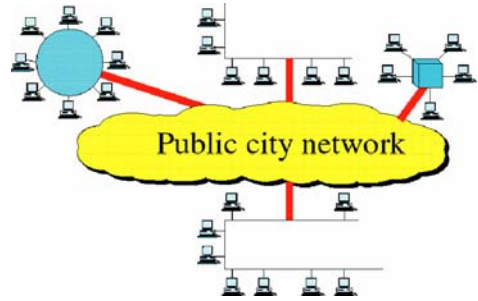


Multiple building LAN

Backbone

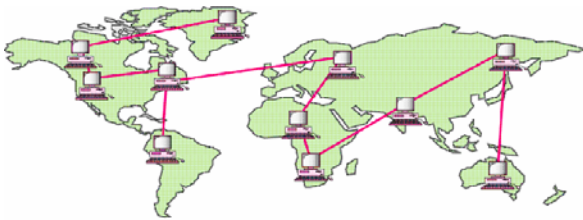
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## Metropolitan Area Network (MAN)



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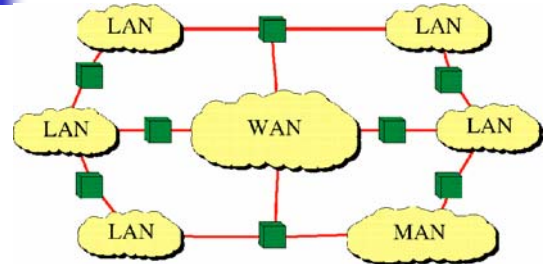
## Wide Area Network (WAN)



Enterprise Network: WAN owned by a company

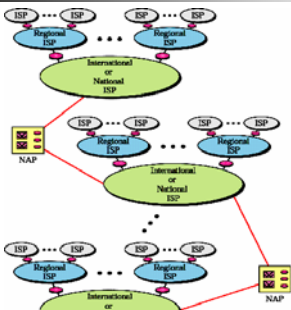
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## Internetworks



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## Internet (Conceptual View)



ISP: Internet Service Provider  
NAP: Network access point  
(switching station)

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