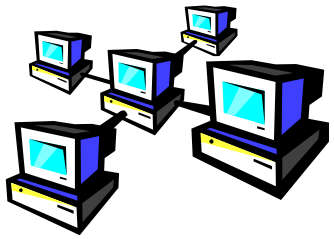
LAN Overview (5.1)

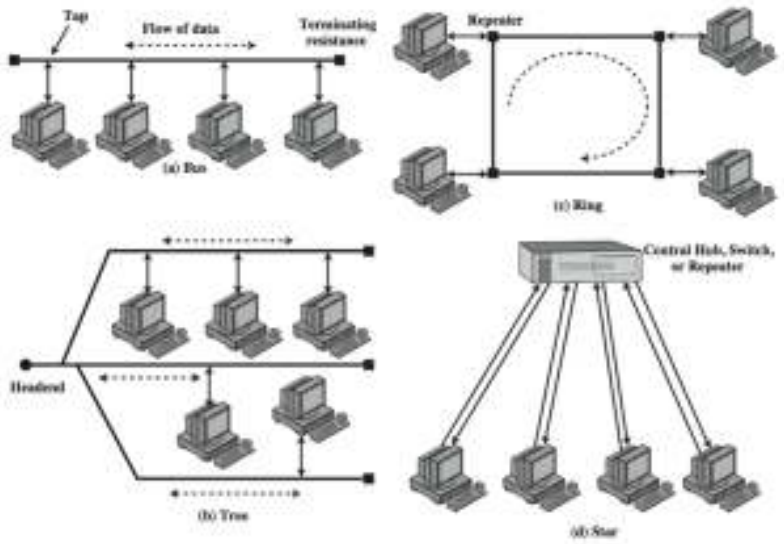
CSE 3213
Fall 2011

Local Area Networks (LANs)

- usually owned by the organization that is using the network to interconnect equipment
- key elements:
  - topology
  - transmission medium
  - wiring layout
  - medium access control



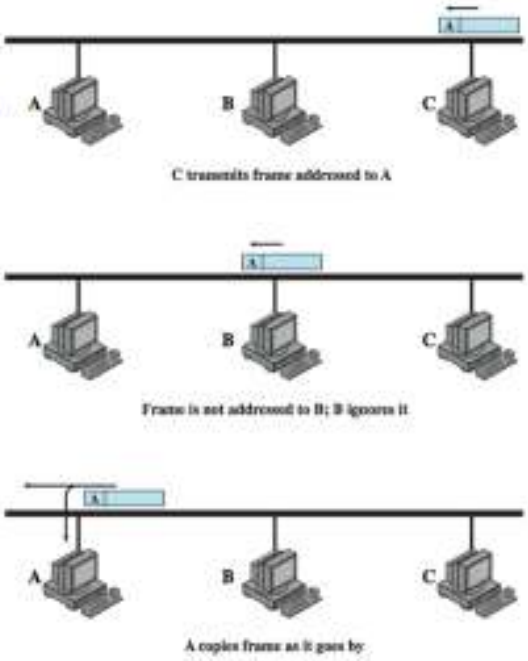
LAN Topologies



Bus and Tree

Bus:	Tree:
• stations attach through tap to bus • full duplex allows transmission and reception • transmission propagates throughout medium • heard by all stations • terminator at each end	• a generalization of bus • branching cable with no closed loops • tree layout begins at headend and branches out • heard by all stations

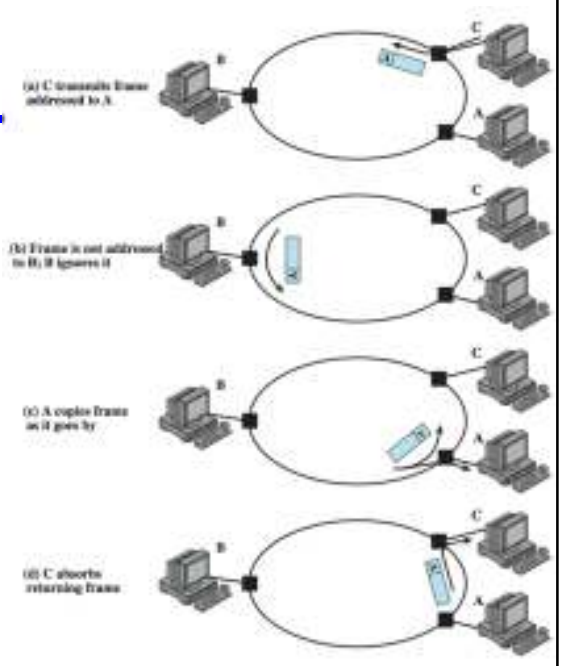
Frame Transmission on Bus LAN



Ring Topology

- a closed loop of repeaters joined by point-to-point links
- receive data on one link & retransmit on another
  - —links unidirectional
  - —stations attach to repeaters
- data transmitted in frames
  - —circulate past all stations
  - —destination recognizes address and copies frame
  - —frame circulates back to source where it is removed
- medium access control determines when a station can insert frame

Frame Transmission Ring LAN



Star Topology

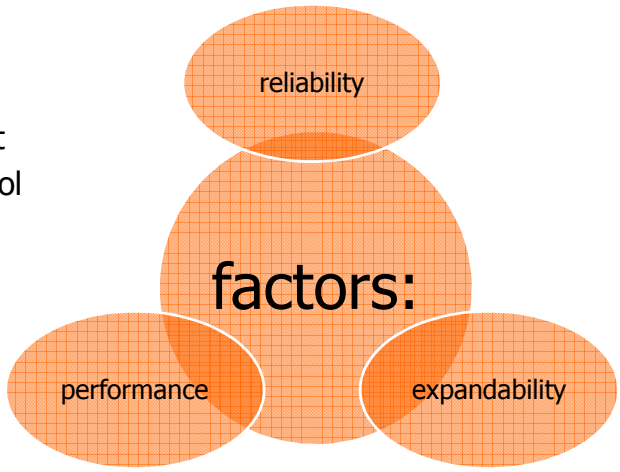
- each station connects to common central node
  - —usually via two point-to-point link
    - one for transmission and one for reception

central node

- operate in broadcast fashion
- physical star, logical bus
- only one station can transmit at a time (hub)
- can act as frame switch

Choice of Topology

—medium
—wiring layout
—access control



Bus LAN Transmission Media

twisted pair

- early LANs used voice grade cable
- scaling up for higher data rates not practical

baseband coaxial cable

- uses digital signaling
- original Ethernet

cont…

Bus LAN Transmission Media (2)

broadband coaxial cable

- used in cable TV systems
- analog signals at radio and TV frequencies
- expensive, hard to install and maintain

optical fiber

- expensive taps
- better alternatives available

* only baseband coaxial cable has achieved widespread use

Ring and Star Topologies

Ring

- very high speed links over long distances
- potential of providing best throughput
- single link or repeater failure disables network

Star

- uses natural layout of wiring in building
- best for short distances
- high data rates for small number of devices

Choice of Medium

- constrained by LAN topology
- capacity
  - to support the expected network traffic
- reliability
  - to meet requirements for availability
- types of data supported
  - tailored to the application
- environmental scope
  - provide service over the range of environments

Media Available

Reading

- Section 15.1, Stallings' book
- Next time: Chapter 16 Ethernet

15