CprE 489
Lecture 2

Fall Semester 1997

Scales of Networks

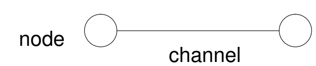
- Parallel Computer - 1 meter, 10 - 100,000 nodes
  very little data loss or corruption, very regular topology
- Local Area Network (LAN) - 10 m - 1 km, 10 - 1,000 nodes
  some data loss, often a simple bus interconnect
- Metropolitan Area Network (MAN) 1k - 10k, 100 -
  more data loss, irregular topology, dynamic routing
- Wide Area Network (WAN) - 10 km - 10,000 km, 1,000 - 1M nodes
  more data loss ,irregular topology, dynamic routing
- Internet - world wide, 100 million nodes

Generic vs. Specific Networks

- Generic Networks - Classes of networks without refering to a specific one
  Appletalk
  Ethernet
  Novell NetWare
  SNA
  ATM
  FDDI
  An internet
- Specific Networks - actual instances of networks
  UW campus network
  ARPANET
  The Internet

Basic Network Building Blocks

- Point-to-point channel:



- Broadcast channel:

Network Addressing

- Point-to-Point Communication
  One Source and One Destination Address
- Broadcasting Communication
  One source and All Destinations (no address requird)
- Multicast Communication
  One source and a set of Destination Addresses

- Bit per Node -- One bit address per node
  Header carries N bits as part of address
- Encoded Address -- Log N bits per node
  Heaser carries k (a set of) Log N bit addresses

Basic Data Units

- Packet

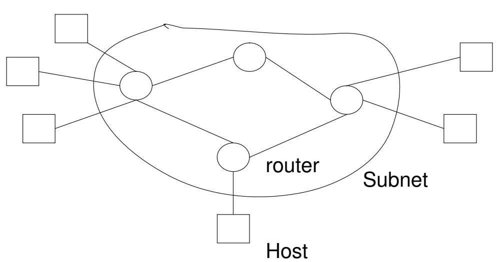
header	data

- Data often of variable length
- Header contains
  - destination address
  - source address
  - packet length
  - protocol information
  - sequence number for reordering

- Frames - often have header and trailer
- Cells - usually fixed length

Network Structure (Cont.)

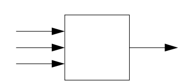
- Packet-Switched or Store-and-Forward Network



- Router
  Packet Switching Node
  Interface Message Processor (IMP)
  Data Switching Exchange

Router Functions

- Receive packets of data destined for different destination
- Buffer the packets (store)
- Send packets to other routers or hosts (forward)
- Multiplex - Packets from several sources forwarded to the node



- Demultiplex - Packets from one source forwarded to separate nodes