



# Chapter 1

Data Communications and Networks  
Overview



# Reading Materials

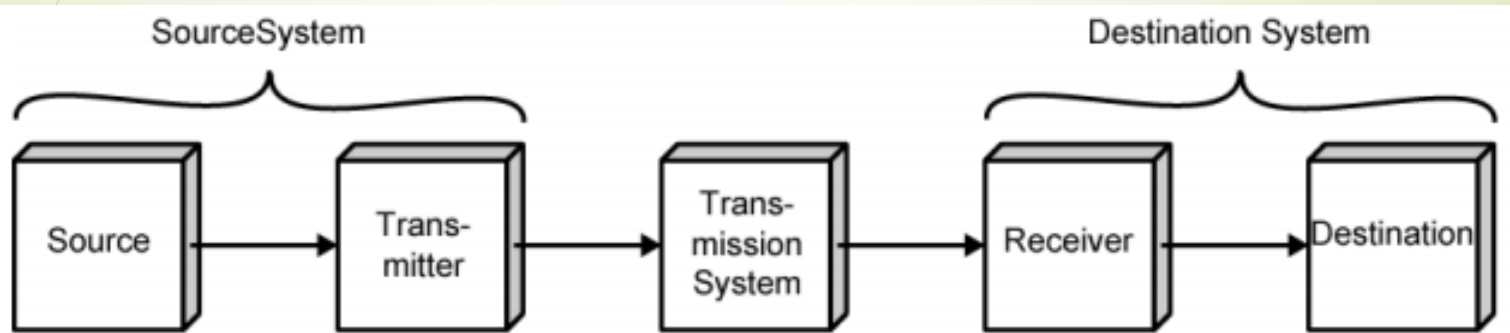
- ▶ **Data and Computer Communications,**  
William Stallings
- 



# A Communications Model

- ▶ Source
  - ▶ Generates data to be transmitted
- ▶ Transmitter
  - ▶ Converts data into transmittable signals
- ▶ Transmission System
  - ▶ Carries data
- ▶ Receiver
  - ▶ Converts received signal into data
- ▶ Destination
  - ▶ Takes incoming data

# Simplified Communications Model



(a) General block diagram



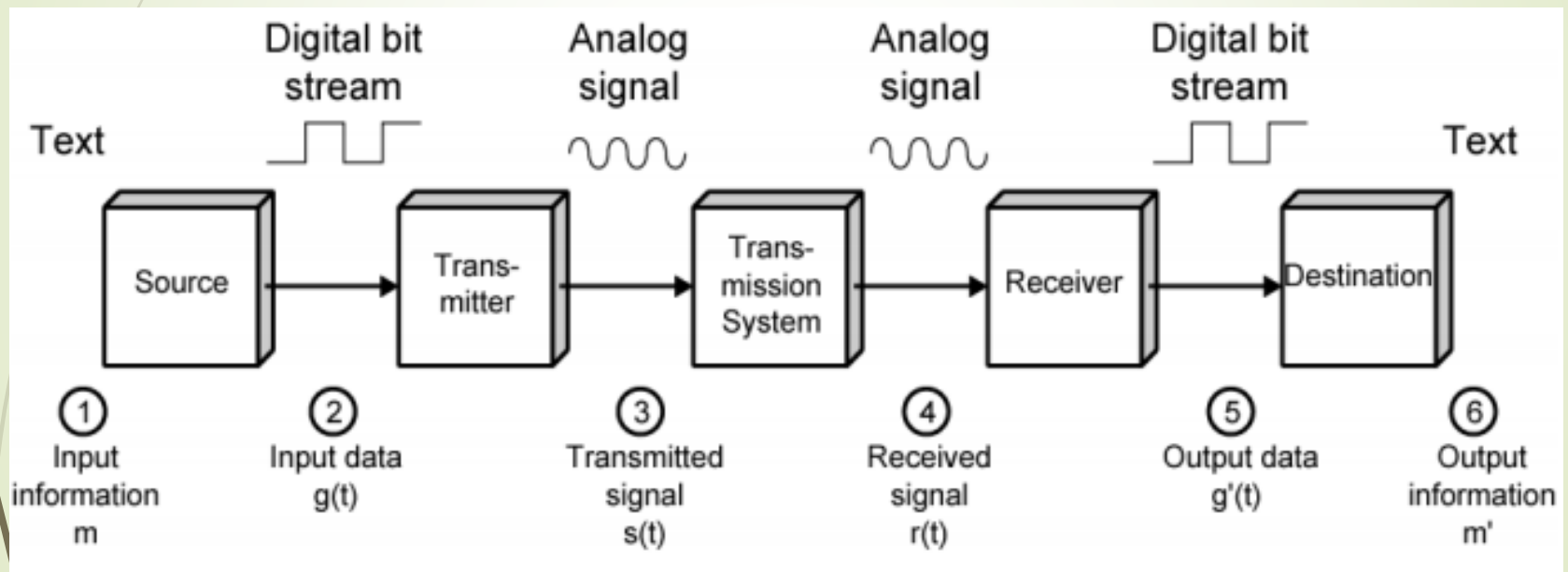
(b) Example



# Communications Tasks

Transmission system utilization	Addressing
Interfacing	Routing
Signal generation	Recovery
Synchronization	Message formatting
Exchange management	Security
Error detection and correction	Network management
Flow control	

# Simplified Data Communications Model





# Networking

- Point to point communication not usually practical
  - Devices are too far apart
  - Large set of devices would need impractical number of connections
- Solution is a communications network

# Wide Area Networks

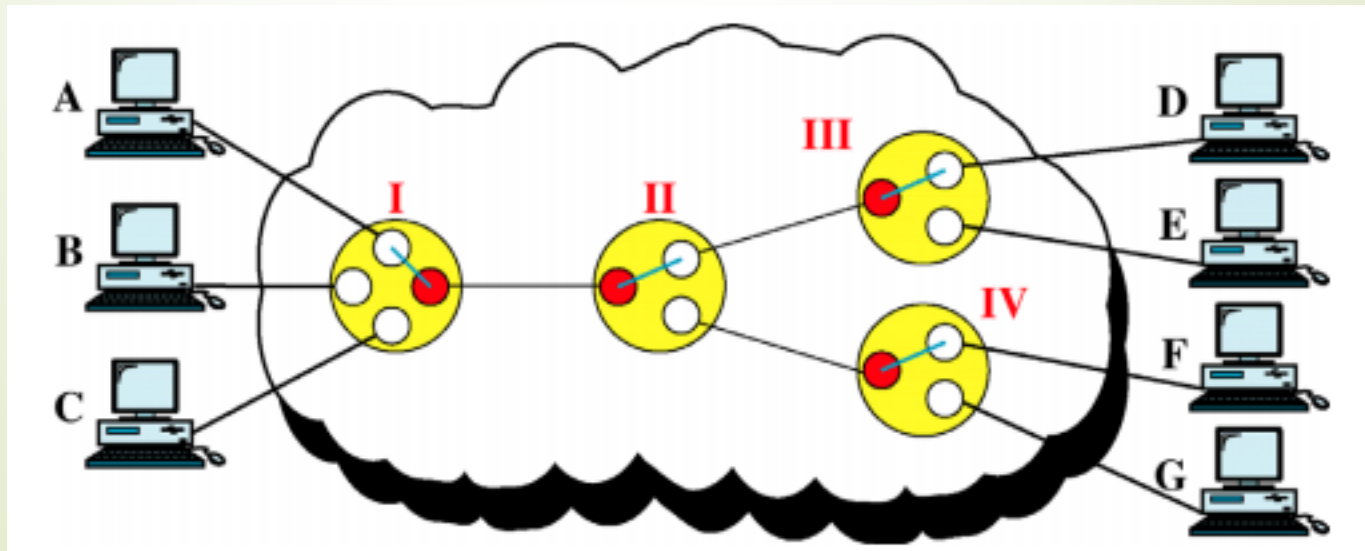
- ▶ Large geographical area
- ▶ Crossing public rights of way
- ▶ Rely in part on common carrier circuits
- ▶ Enabling technologies
  - ▶ Circuit switching
  - ▶ Packet switching
  - ▶ Frame relay
  - ▶ Asynchronous Transfer Mode (ATM)





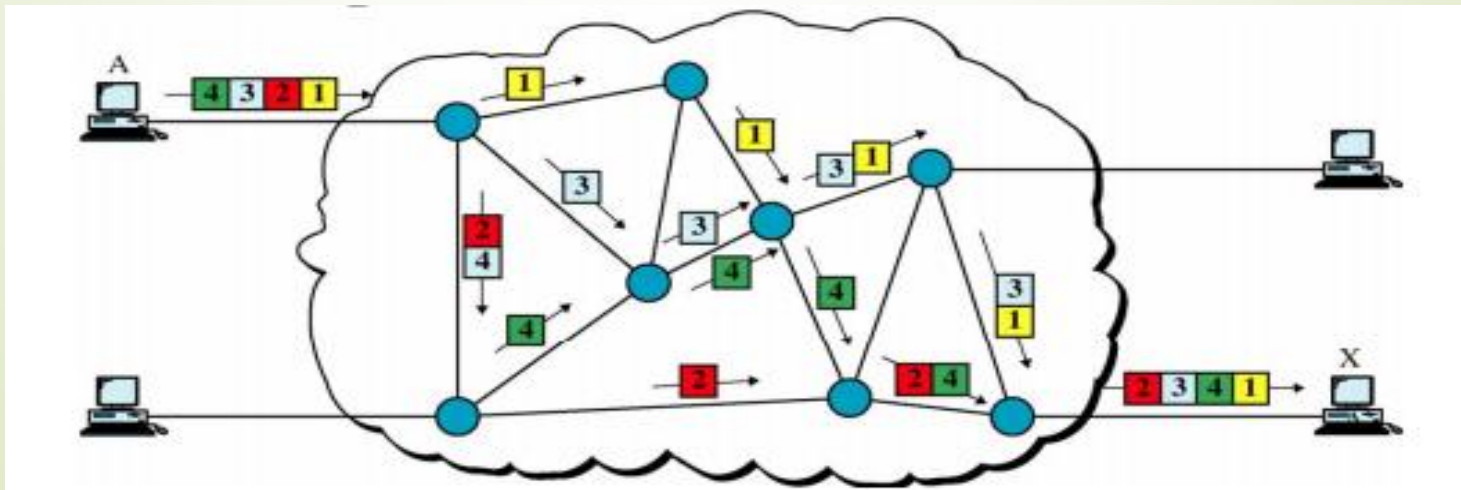
# Circuit Switching

- Dedicated communications path established for the duration of the conversation
  - e.g. telephone network



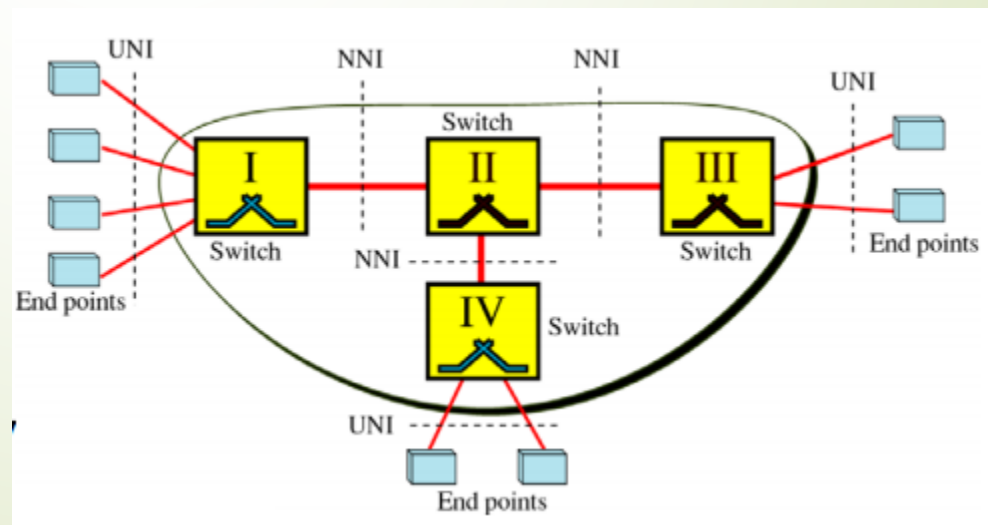
# Packet Switching

- Data sent out of sequence
- Small chunks (packets) of data at a time
- Packets passed from node to node between source and destination
- Used for terminal to computer and computer to computer communications



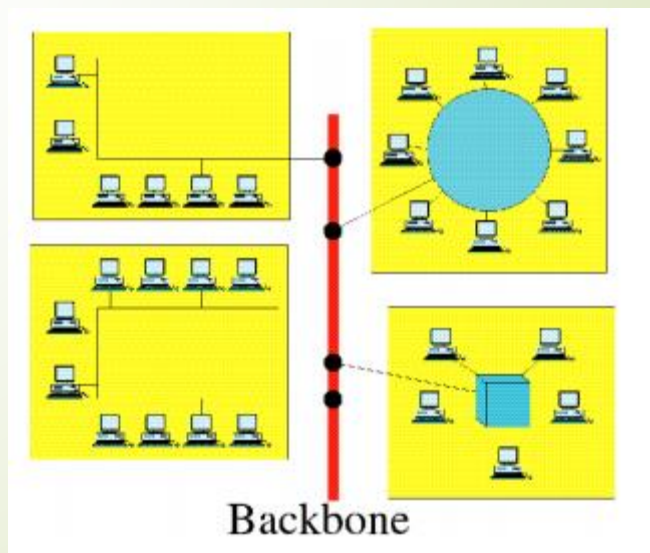
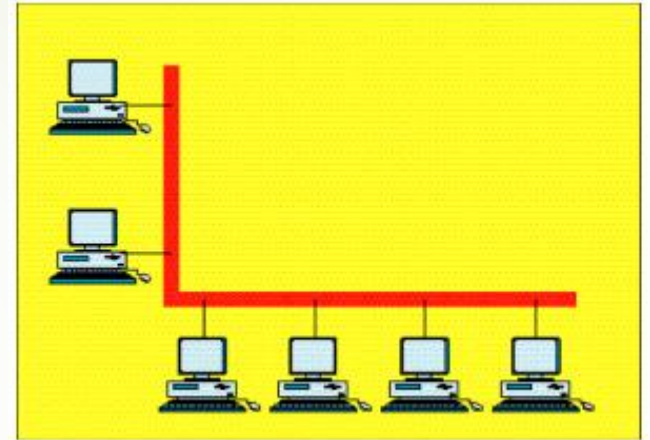
# Asynchronous Transfer Mode

- ATM
- Evolution of frame relay
- Little overhead for error control
- Fixed packet (called cell) length
- Anything from 10Mbps to Gbps
- Constant data rate using packet switching technique.

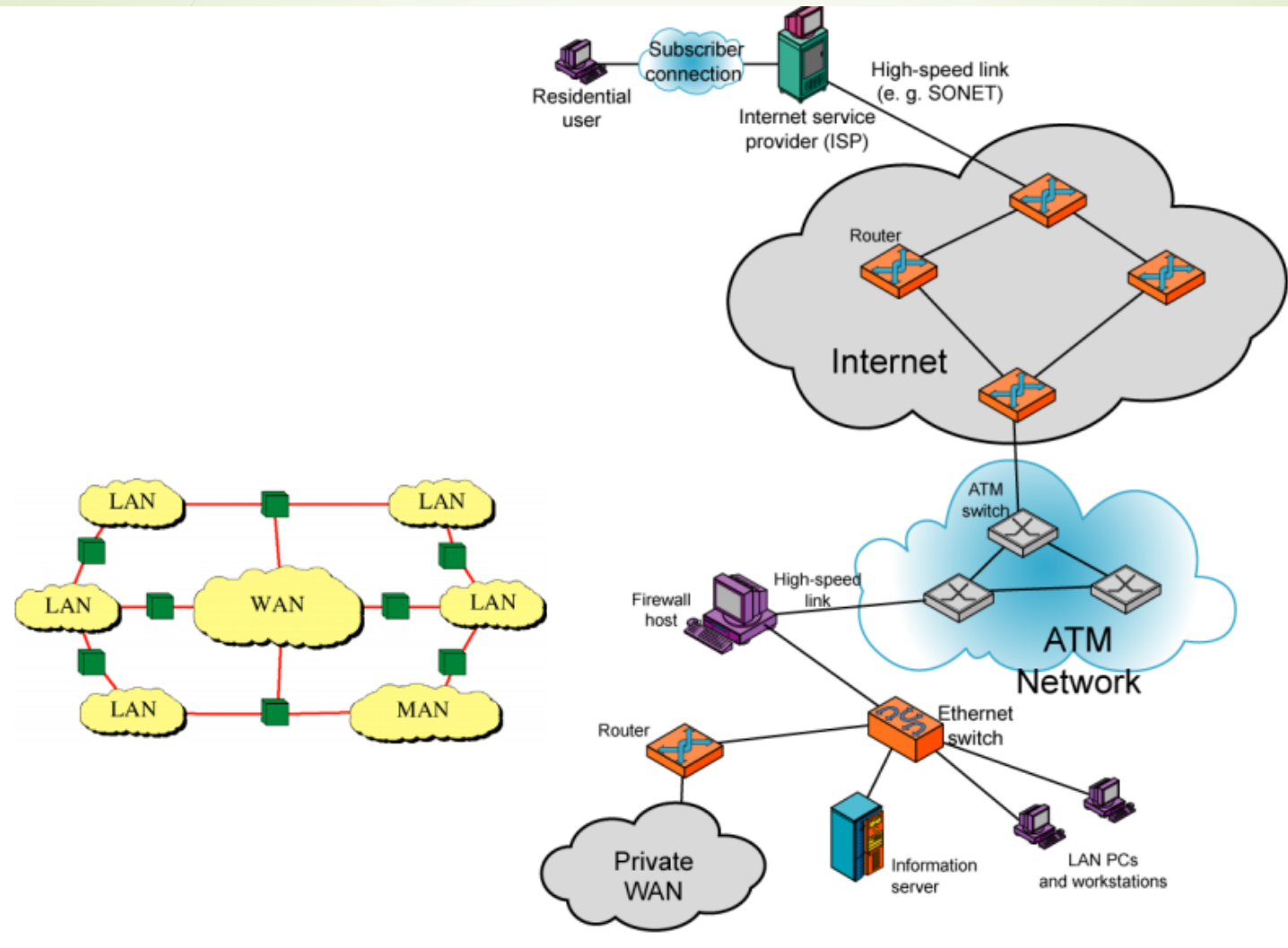


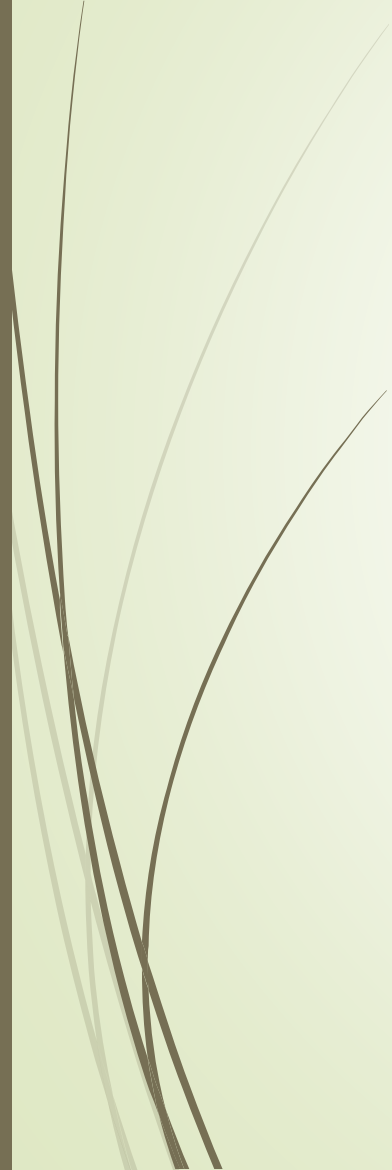
# Local Area Networks

- Smaller scope
  - Building or small campus
- Usually owned by same organization as attached devices
- Data rates much higher
- Usually broadcast systems
- Now some switched systems and ATM are being introduced
- Wireless LAN



# A Networking Configuration







# Courtesy

- Professor Jiying Zhao, University of Ottawa