CS 420/520
Data Communication Systems

- Course Overview
  - —**Instructor:**
    - Dr. Axel Krings
    - Office, JEB 320
    - Office Hours to be announced, or by appointment
    - krings@uidaho.edu, (208) 885-4078
    - http://www.cs.uidaho.edu/~krings/CS420
  - —**Text**:
    - *Data and Computer Communications,* William Stallings, Prentice Hall.
  - —**Grading**:
    - CS420: Assignments, Three Exams
    - CS520: Assignments, Three Exams, Term Project

Syllabus and Scope of Course

- We will cover most of the chapters with selected topics from other sources
- This course will introduce you to the concepts, terminology, and approaches used in data communication systems.
- I expect you to walk away from this class being familiar with a wide variety of concepts and protocols (and detailed knowledge of some of them). In the future you should be able to use this knowledge to:
  - — make intelligent decisions about network use, design and management,
  - — be able to pick up and learn details of a particular system as you need it
  - — be able to quickly find protocol descriptions and problem solutions/ discussions
  - — be able to discuss data communication systems with supervisors and co-workers on the job

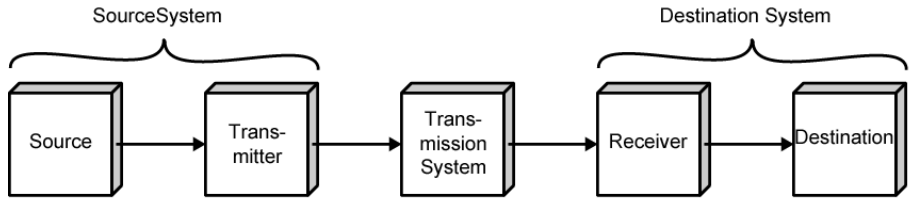
A Communications Model

- 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

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	

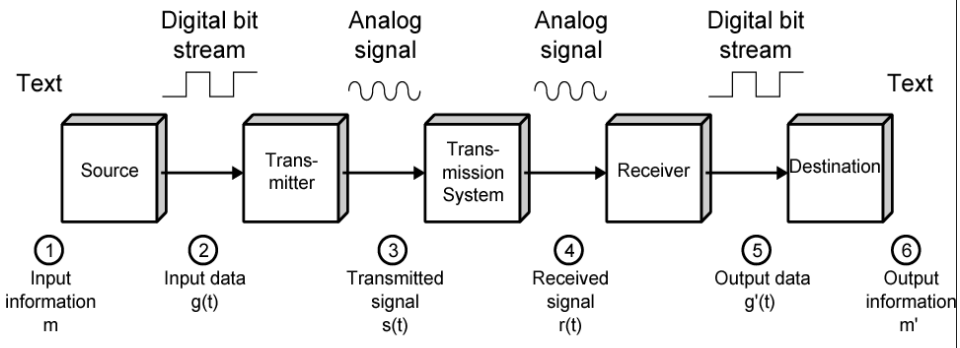
Simplified Communications Model - Diagram



(a) General block diagram

(b) Example

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, e.g.,
  - —Wide Area Network (WAN)
  - —Local Area Network (LAN)

Wide Area Networks

- Large geographical area
- Crossing public rights of way
- Rely in part on common carrier circuits
- Alternative 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

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

Frame Relay

- Packet switching systems have large overhead to compensate for errors
- Modern systems are more reliable
- Errors can be caught in end system
- Most overhead for error control is stripped out

Asynchronous Transfer Mode

- ATM
- Evolution of frame relay
- Little overhead for error control
- Fixed packet (called cell) length
- Anything from Mbps 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

LAN Configurations

- Switched
  - —Switched Ethernet
    - May be single or multiple switches
  - —ATM LAN
  - —Fibre Channel
- Wireless
  - —Mobility
  - —Ease of installation

Metropolitan Area Networks

- MAN
- Middle ground between LAN and WAN
- Private or public network
- High speed
- Large area

Networking Configuration