Topics: Packaging and Sending Strings of Bits

Approach: Discuss fax service, Introduce Internet

Main Ideas: Headers, Sending Bits, Packets of Data

0. Admin
   a. HW11 Due Tuesday, Office Hours Mon + Tues
   b. HW12 (in the book) due Thursday
   c. Important: Final Exam Scheduling M3:30-5:30 or Fri7-9

1. Problem: Millions of Computers, How to Share Data Among them All?
   a. Digitization: storing images, text, sound as numbers
   b. Storage: express numbers in binary, use two states
   c. Transmission: How to send 1’s and 0’s long distances?
   d. The big picture: Getting bits between millions of machines
      - prob1: How to get bits from one place to another?
      - prob2: How to share the communication system?

2. First, an important fact about strings of bits
   a. What image does 1000101010001000101010001 represent?
   b. What more do you need?
   c. Conclusion: when sending data bits, you must also include:

3. Brief History of Solutions to Problem 1
   a. Solution1: Light -- The Beacons of Gondor, smoke signals
   b. Solution2: Electricity/Magnetism
      1799 Alessandro Volta invents the battery
      1820 Hans Christian Ørsted discovers current -> magnetism
      1835 Samuel Morse devises a working telegraph
   c. Demo: Wire with beeper or lightbulb
      This system allows us to transmit 1’s and 0’s

4. Focus on Problem 1: Sending Bits
   a. ex1: your HDD has bits: how can you get them elsewhere?
      ex2: Old MacDonald music cards: how to transfer info?
   b. Procedure: read, send, receive, write
      read holes and flats, send 1’s and 0’s, punch new cards
      Same with HDD: read N’s and S’s, send 1’s and 0’s, write new
      It could even be automated - coils, wires, coils

5. Focus on Problem 2: But there are millions of computers
   a. Point to point wires can’t be the solution
   b. Procedure: Ever hear of a `party line´?
      - What’s the problem?
      - What’s the solution?
      - What does this have to do with DROI?
   c. Program: Ethernet is one example
      One wire connects all computers
      Any computer can send data, all can receive
      But...how do we tell who it’s for? We need something more

6. The fax service problem: Problem -- sharing one wire
   a. We explore a problem: the fax delivery service
   b. How can we keep customers happy?
   c. Version 2: We expand our network to more cities
   d. Conclusion - The two big questions are:
      i. How to share one wire among several people
      ii. How to route data through a network