CSE 123A
Computer Networks
Winter 2005
Lecture 1: Introduction and Overview
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Today

- Short class
- Course overview, expectations, etc
- Simple network basics
Class Overview

- Course Material
  - Class lectures, textbook readings, and handouts

- Course Assignments
  - Homework questions from book and handouts
    » Handed out on Tuesday, due the following Tuesday
  - A small number of programming projects

- Exams
  - Midterm (TBA) and Final
  - I will be explicit about what is covered in each
Rules

- Assignments are due at the *beginning* of class
- Regrades should be the *exception*
  - Addition errors (happy), significant errors in grading (fine), nit-picking/grade mongering (die)
  - We reserve the right to *completely* regrade your assignments
- Cheating means not doing the assignment yourself
  - No copying, no Google, etc. If you’re not sure, then ask
  - Ok to *talk* with other students about assignments
  - *Gilligan’s Island* rule: if you can remember it after watching a rerun of Gilligan’s Island (or equivalent) then it’s probably ok
- Don’t mess with the professor. He’s a mean man.
Grading

- Homework: 30%
- Projects: 20%
- Midterm: 20%
- Final: 30%
Some hints

- Come to lecture
  - Yes, I will distribute the lectures slides online, and yes some of the material is in the book
  - However, lecture materials are the basis for exams

- Do the homework
  - You will have a hard time with the exams without doing the homework
  - It's 25% of your grade (easily the difference between an A and C)
Some hints II

- Ask questions
  - In class, via e-mail and at office hours
  - Inevitably you won’t understand something… that’s my fault, but you need to help
- Start assignments early
  - There is a statistical relationship between when you start and what grade you get.
- Sleep from time to time
Administrativa

- Web page (up in the next 48 hours)
  [http://www-cse.ucsd.edu/classes/wi05/cse123a/](http://www-cse.ucsd.edu/classes/wi05/cse123a/)

- Textbook
  *Computer Networks: A Systems Approach* (3rd ed) by Peterson and Davie

- Office Hours:
  - W 4:00-5:00pm, AP&M 5220 or by appt

- Discussion section
  - W 2:00-2:50 CENTR 212 (but not this Wednesday)

- TA’s
  - Walter Phillips, David Yu, Timothy Sohn (schedule TBA)
Overall goal

- Understand how network-based communication takes place
  - Fundamental problems
  - Established design principles
  - Standard protocols and implementations

- Understand most of what’s actually happening when you download a Web page
Course material

The key aspects of modern computer networking

- Layering
- Signaling, coding, clock recovery
- Framing/stuffing, error detection/error correction
- Media access protocols
- Bridging/switching
- Queuing/QoS
- Internetworking
- Efficient reliable communication
- Connection management
- Flow Control
- Congestion control
- Routing (intradomain and interdomain, unicast/multicast)
- Router Design
Simple Communication Model

- **Hosts**: endpoints that communicate
  - e.g. workstation, server, PDA, Cell phone
- **Links**: transmission medium (a bit pipe)
  - e.g. Ethernet, 802.11, DSL, Cable Modem

Basic Metrics

Bandwidth, delay, overhead, error rate and message size
Network metrics

- **Bandwidth**
  - Data transmitted at a rate of \( R \) bits/sec

- **Delay or Latency**
  - Takes \( D \) seconds for a bit of data to propagate down link
  - Sometimes used to mean “round-trip time” from one host to another and back again

- **Overhead**
  - Takes \( O \) secs for CPU to put message on wire

- **Error rate**
  - Bit error: Probability that a bit will not arrive intact
  - Message error: Probability that a group of bits will be corrupted

- **Message size**
  - Size \( M \) of data being transmitted
How long to send a message?

- Transmit time $T = \frac{M}{R} + D$
  - 10Mbps Ethernet LAN (M=1KB)
    » $M/R=1\text{ms}$, $D \approx 5\text{us}$
  - 155Mbps cross country ATM link (M=1KB)
    » $M/R = 50\text{us}$, $D \approx 40-100\text{ms}$

- $R*D$ is called the *bandwidth delay product*
  - How many bits can be “stored” be stored in transit
Connecting links

- **Routers/Switches**: moves bits between links
  - *Circuit switching*: guaranteed channel for a session (Telephone system)
  - *Packet switching*: statistical multiplexing of independent pieces of data (Internet)
For Next Time...

- Decide if you’re dropping the class or not
- Skim Peterson & Davie Chap1 (you can skip 1.4)
- Read Chap 2-2.2
- We’re going to cover signaling, coding and clock recovery