CIS 788
Recent Advances in Networking

Raj Jain

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Overview

- How
- What
- When
- Why
How am I going to grade you?

What are we going to cover?

When are you going to do it?

Why you should not take this course?
Grading

- Quizzes (Best 2 of 3) 40%
- Class participation 10%
- Homeworks + Project 15%
- Project 35%

Most of the homeworks will be related to the project.
Text Book

- None
Supplementary Texts

- Recent ANSI, ATM Forum, ITU, IEEE Standards
Prerequisite: CIS677

- Protocol Layers: ISO/OSI reference model
- Physical Layer: Coding, Manchester
- Transmission Media: UTP, Cat 5, Microwave, Radio
- Data Communication: Asynchronous vs synchronous, Baud, bit, and Hz, Half-Duplex vs Full-duplex, Modulation/Demodulation
- Packet Transmissions: Framing, Bit stuffing, byte stuffing
- Flow Control: On-Off, Window
- Error Detection: Parity, Checksum, Cyclic Redundancy Check
Prerequisites (Cont)

- Error Recovery: Start and Stop, Go back \( n \), Selective Reject
- LANs: Aloha, CSMA/CD, Ethernet, IEEE 802.3, Token Ring/IEEE 802.5, FDDI
- LAN Addressing: Unicast vs multicast, Local vs Global
- LAN wiring: 10Base5, 10Base2, 10Base-T, 100Base-T4, 100Base-TX, 100Base-FX
- Extended LANs: Hubs, Bridges, Routers, Switches
- Routing: Distance Vector vs Link State, Spanning tree, source routing
- Network Layer: Connectionless vs connection oriented
Schedule (Tentative)

6/24/97 Course Overview, Networking Trends
6/26/97 Basic Concepts: Data Networks
7/1/97 Basic Concepts: Telecommunications Networks
7/3/97 ATM - Intro
7/8/97 LAN Emulation and IP Switching
7/10/97 Quiz 1
7/15/97 Virtual LANs and LAN Switching
7/17/97 Gigabit Ethernet
7/22/97 Multimedia: Compression Standards
Schedule (Cont)

7/24/97 Multimedia over IP: RSVP, RTP
7/29/97 Multimedia over ATM
7/31/97 Quiz 2
8/5/97 Wireless LANs and WANs
8/7/97 Residential broadband: Cable Modems, xDSL
8/12/97 Mobile Networking: Mobile IP, Wireless ATM
8/14/97 IPng - IP Next Generation (IPng)
8/19/97 Quiz 3
8/21/97 Graduating Seniors’ grades due
Project

- A survey paper on topic of your choice
- Stages:
  - Literature search
    - CD ROMs: Compendex, Books in Print, WWW
  - Reading
  - Writing
- 7.5 Hrs/week/person on project
- 7.5 Hrs/week/person on class
Project Topics

- ATM
  - IP Switching: Ipsilon, Tag, SITA, ARIS, CSR, MPOA
  - Voice over ATM
  - Video over ATM
  - TCP/IP over ATM
  - Wireless ATM
  - ATM over Satellites
  - ATM Security
  - ATM products
- ATM Deployment
- ATM vs competition (SONET, IP, Frame Relay, Gigabit Ethernet, SMDS)
- RBB
- Signaling 4.0
- PNNI
- ATM Network Management
- Cells in Frame
- LANs
  - Quality of service
  - Virtual LANs
  - Gigabit Ethernet
  - Multimedia over LANs
  - Wireless LANs
- IP
  - Integrated Services, QoS mechanisms
  - Multimedia over IP: RSVP, RTP, RTCP, RTSP
  - Multicast over IP: Mbone, IDMR, MOSPF, PIM, CBT
  - IPv6
  - Mobile IP
  - Network monitoring
  - IP Security
  - IP over ATM: NHRP, MARS, LANE, MPOA
Virtual Routers

- Satellite Networks: LEO, GEO, MEO
- Cable data networks
- Multimedia Compression Standards: H.323, MPEG4
- Video over Internet
- Internet Telephony
- Gigabit Networking
- Gigabit/Terabit switches/routers
Project Schedule

- 7/1/97: Topic selection
- 7/8/97: Literature search results due
- 7/15/97: Literature collection
- 7/22/97: Reading
- 7/29/97: Writing
- 8/5/97: Preliminary report due
- 8/12/97: Review
- 8/14/97: Final written Report (HTML Page) due
Office Hours

- Tuesday: 4:30 to 5:00 PM
  Thursday: 4:30 to 5:00 PM

- Office: 297 Dreese Lab, 2015 Neil Ave
Why You Shouldn’t take this course?

- You aren’t ready for the hardwork
- You don’t have 15 hours/week
- You don’t have the background
- You just want to sit and listen
- You were expecting an introductory course
- You are not ready to take the initiative
  Only key concepts will be covered in the class.
  Students are expected to research and read.
- This does not cover what you want
Frequently Asked Questions

- Yes, I do use “curve”. Your grade depends upon the performance of the rest of the class.
- All homeworks are due at the beginning of the next class.
- All late submissions must be preapproved.
- All quizzes are open-book and extremely time limited.
- Quizzes consist of numerical as well as multiple-choice (true-false) questions.
- There is negative grading on incorrect multiple-choice questions. Grade: +1 for correct. -1/(n-1) for incorrect.
- Everyone including the graduating seniors are graded the same way.
There will be a lot of self-reading
Goal: To prepare you for a career in networking
Get ready to work hard
Quiz 0: Prerequisites

True or False?

T  F

T  Datalink refers to the 2nd layer in the ISO/OSI reference model

T  Category 5 unshielded twisted pair cable is better than category 3 cable.

T  Finding path from one node to another in a large network is a transport layer function.

T  It is impossible to send 3000 bits/second through a wire which has a bandwidth of 1000 Hz.
Bit stuffing is used so that characters used for framing do not occur in the data part of the frame.
For long delay paths, on-off flow control is better than window flow control.
Ethernet uses a CSMA/CD access method.
10Base2 runs at 2 Mbps.
The packets sent in a connection-oriented network are called datagrams.
Spanning tree algorithm is used to find a loop free path in a network.

Marks = Correct Answers _____ - Incorrect Answers
Homework 1: Due 6/26/97

- Search web pages, books-in-print CD-ROM (Main library), Compendex CD-ROM (Science and Engineering Library), and Ohio link for one of the following topics:
  - HTML (How to prepare good web pages or HTML Style)
  - ATM products/services
  - Internet Multimedia
  - Gigabit networking
Ignore all entries dated 1993 or before. List others in the following format (5 each):

- Author, “Title,” publisher, year. (for 5 books)
- “Title,” URL [One line description] (for 5 web pages)
- Author, “Title,” source (for 5 articles)

Serially number the references and submit electronically to Jain@netlab.ohio-state.edu (Please note the address carefully). The mail should have a subject field of “CIS 788 Homework 1”
For web page search use at least the following starting points:

- http://www.yahoo.com
- http://lycos.cs.cmu.edu/
- http://www.einet.net/
- gopher://gopher.acs.ohio-state.edu/

Make a list of other interesting search points and share with the class.
Homework 2: Due 7/1/97

- Prepare your personal web page.
- Must include your photograph
- Use meta-HTML commands in the header to indicate title, keywords, description, etc.
- Recommended HTML Editor: Netscape Gold
- Use netlab facilities to take your picture
- Submit a one-page printout
Homework 3: Due 7/3/97

- A system has n layer protocol hierarchy. Applications generate messages of length M bytes. At each of the layers, an h-byte header is added. What fraction of the network bandwidth is filled with headers.
- If the bit string 011101111101111110 is bit stuffed, what is the output string (on wire).
- Sketch the Manchester encoding for the bit stream: 0001110101
- A class B network on the Internet has a subnet mask of 255.255.255.0. What is the maximum number of hosts per subnet.
Student Questionnaire

- **Name:**
- **Email:**
- **Phone:**
- **Technical Interest Areas:**
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- **Prior Networking Background:**
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