

# **CIS 788**

# **Recent Advances in**

# **Networking**

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7/



- 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
- ❑ H. J. R. Dutton and P. Lenhard, "Asynchronous Transfer Mode (ATM): Technical Overview," **2nd Ed**, Prentice-Hall, 1995, ISBN 0-13-520446-1.
- ❑ S. Saunders, "The McGraw-Hill High-Speed LANs Handbook," McGraw-Hill, 1996
- ❑ B. Dorling, et al, "Internetworking over ATM," Prentice-Hall, 1996, ISBN 0-13-612384-8, 260 pp.
- ❑ U. Black, "Emerging Communications Technologies," Prentice-Hall, 1994, ISBN 0-13-051500-0, 428 pp.

# 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 Drees Lab, 2015 Neil Ave

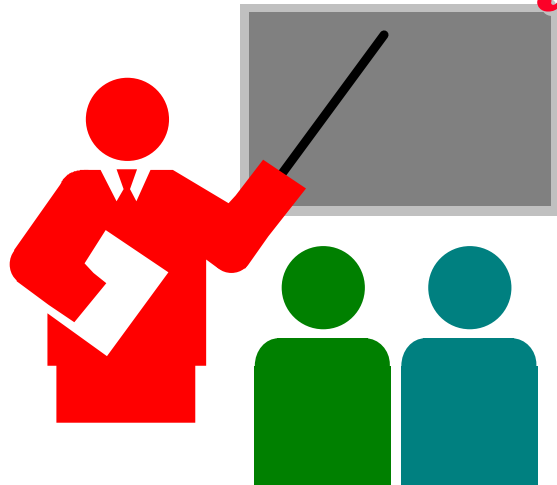
# Why You Shouldn't take this course?

- 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.

# Summary



- ❑ 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?

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- Datalink refers to the 2nd layer in the ISO/OSI reference model
- Category 5 unshielded twisted pair cable is better than category 3 cable.
- Finding path from one node to another in a large network is a transport layer function.
- 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](mailto: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:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Prior Networking Background:  
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\_\_\_\_\_  
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