

# EEC-484/584 Computer Networks

Lecture 1

Wenbing Zhao

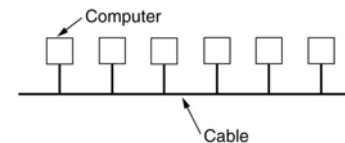
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(Lecture notes are based on materials supplied by  
Dr. Louise Moser at UCSB and Prentice-Hall)



## What is Computer Network?

- A group of computers inter-connected together



Local Area Network

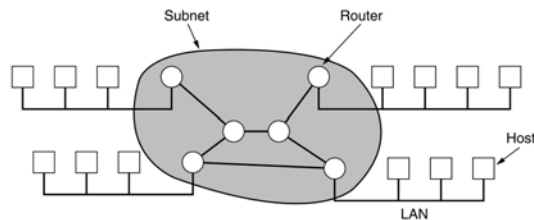
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## What is Computer Network?

- A group of computer inter-connected together



Wide Area Network

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## What are the Elements in a Computer Network?

- Hosts – computers
- Communication medium – cables, wireless medium (EM waves)
- Routers – forward a packet from one place to another, decide on a path from source to destination
- Protocols – rules governing the communication

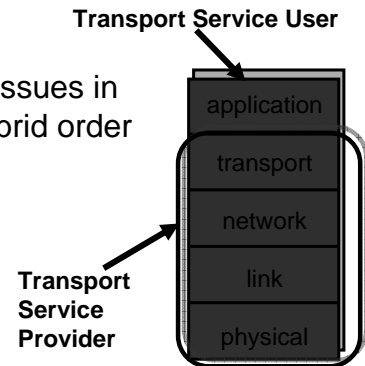
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## Achieving Connectivity is not Easy

- Layered approach
- We will study the issues in each layer in a hybrid order
  - Application
  - Physical
  - Link
  - Network
  - Transport



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## Course Objectives

- Good understanding of the computer networking technologies
  - How connectivity is achieved?
- Hands on experience
  - Labs: observe how protocols work
  - Projects: implement a protocol

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## Topics

- Overview of computer networks
  - Types of computer networks
  - Reference models
  - Protocols, services and interfaces
  - Circuit switched vs. packet switched
  - Connection oriented vs. connectionless

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## Topics

- Application Layer
  - HyperText Transfer Protocol (HTTP)
  - Domain Name Service (DNS)
  - FTP, Email
- Physical Layer
  - Main service: communicate bit streams over wired or wireless medium
  - Theoretical basis for data communication

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## Topics

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- Data Link Layer
  - Main service: provide point-to-point single hop communication service to higher layer
  - Framing: group bits together
  - Error control
  - Flow control

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## Topics

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- Data Link Layer
  - Basic communication protocols
  - Medium access control protocols

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## Topics

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- Network layer
  - Main service: routing over multiple hops
  - Routing algorithms
  - Internet Protocol (IP)
  - IP address allocation
  - Internet Control Protocols: ICMP, ARP, DHCP

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## Topics

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- Transport layer
  - Main service: End-to-end reliable communication
  - User Datagram Protocol (UDP)
  - Transport Control Protocol (TCP)
- Network security
  - Cryptography preliminaries
  - Secure communication

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## Labs

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- Purpose: Observe how protocols work
- Tools used: Ethereal
- 5 labs
  - HTTP
  - DNS
  - IP
  - ICMP
  - TCP

*"Tell me and I forget. Show me and I remember. Involve me and I understand."*  
- Chinese proverb

Lab instructions taken from Kurose's book

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## Labs

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- Lab sessions are mandatory unless an exception is granted in advance
- I will not accept the lab report if you do not show up during the lab session

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## Projects

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- Project 1: Socket programming - reliable communication
  - Implementation of a set of reliable communication protocols used in data link layer
- Project 2: Implementation of DHCP protocol
  - For graduate students only
  - Undergraduate students can complete it for extra credit
- Open to alternative project ideas

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## Projects

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- Single person or two-person team
- Deliverables for each project
  - Project report describing design, implementation, user's guide for your program, and performance measurement results
  - Fully commented source code
  - Test input and output data
  - Demonstration and possibly code review

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## Projects

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- For each project, I will provide
  - Project description
  - Java skeleton code for you to start with
  - A binary jar file of a reference implementation
- If you choose to use a different language, you are on your own. Sorry

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## Class Participation

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- 10% of the course credit
- I may perform a roll call in the beginning of each class/lab to determine the attendance
- To obtain the full credit for class participation, you must satisfy ALL of the following conditions:
  - You do not miss more than 2 lectures
  - You do not miss any quiz and lab sessions
  - You asked at least 10 questions during the semester
- You will lose all 10% credit if you miss more than 6 lectures/labs

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## Class Participation

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- Send me an email with the following information for each question you have asked within 24 hours after each lecture:
  - The question you asked
  - My response
  - Your comment on my response and suggestion for improvement, if any

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## Class Participation

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- You are also encouraged to give me advice/suggestions on how you would like me to improve my teaching to make it more conducive
- For each piece of advice/suggestion, it will be counted as 2 questions

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## Quizzes

- 5 quizzes. Basically one quiz for each layer, except quiz #1
- I will count the scores of the best 4 quizzes
- Each quiz lasts about 1 hour
- The quizzes are closed book and closed notes, except that you are allowed to bring with you a one-page cheat sheet no larger than the US letter size (double-sided allowed)

## Quizzes

- No makeup quizzes!
- No midterms and final exam

## Grading

- Class participation 10%
- Quizzes 40%
- Labs
  - 20% for graduate students
  - 40% for undergraduate students
- Projects
  - 30% for graduate students
    - Project#1 10%; Project#2 20%
  - 10% for undergraduate students

## Grading

- Labs are optional for undergraduate students
- If you choose not to do the labs
  - The quizzes will be counted as 60% and
  - The project (#1) will be counted as 30%

## Do not cheat!

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- Do not copy other student's lab report, quizzes or projects
- Do not copy someone else's work found on the Internet
  - Including project implementation and report
  - You can quote a sentence or two, but put those in quote and give reference
  - You can build your projects on top of open source libraries, but again, you need to explicitly give acknowledgement and state clearly which parts are implemented by you

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## Consequences for Cheating

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- You get 0 credit for the project/lab/quiz that you have cheated
- If the task is worth more than 25% of the course, it is considered a major infraction
- Otherwise, it is considered a minor infraction

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## Consequences for Cheating

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- For major infraction and repeated minor infractions
  - You will get an F grade, and
  - You may be suspended or repulsed from CSU
- CSU Code of Conduct
  - <http://www.csuohio.edu/studentlife/conduct/StudentCodeOfConduct2004.pdf>

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## Reference Texts

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- Andrew S. Tanenbaum :
  - Computer Networks
    - 4th Edition, Prentice-Hall, 2003
- James F. Kurose, Keith W. Ross,
  - Computer Networking: A Top-Down Approach Featuring the Internet
    - 3<sup>rd</sup> Edition, Addison-Wesley, 2004

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## Instructor Information

- Instructor: Dr. Wenbing Zhao
  - Email: [wenbing@ieee.org](mailto:wenbing@ieee.org)
  - Lecture hours: T Th 4:00-5:50pm
  - Office hours: M W 4:00-6:00pm and by appointment
- Anonymous email:
  - [teachingcsu@gmail.com](mailto:teachingcsu@gmail.com)
  - Password:
  - if you are not happy, please do let me know
- Course Web site:
  - [http://academic.csuohio.edu/zhao\\_w/teaching/EEC584-F06/eec484.htm](http://academic.csuohio.edu/zhao_w/teaching/EEC584-F06/eec484.htm)

## Homework

- Due September 1, 11:59pm
- Email me the following information
  - How should I call you?
  - The amount of time per week you commit to this course
  - The grade you expect to get
  - If your schedule conflicts with my office hours, what is the best time for you to talk to me?
  - Any topics you are most interested in but not listed
  - Comments and suggestions, if any