EE:450 – Computer Networks

Discussion Session #1
Spring 2017

Teaching Assistant 1

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Teaching Assistant 4

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My Responsibilities

- Conducting a weekly discussion
- Maintaining Piazza (We will use Piazza)
  - **You may ask questions as "Anonymous"**
- Conducting office hours (**open to all students**)
- Designing and grading projects
- Assisting (via e-mail)
  - In case you don't feel comfortable using Piazza
  - **Regardless** of your enrollment in the discussion session and **Regardless** on which discussion session you attend your email should be forwarded to your designated TA (TBD)

TA Assignments (TBD)

- Students will be divided between the TAs
- The designated TA will be responsible for answering the emailed questions from his assigned students
  - The student can only email his designated TA if he has any questions
 - Emails sent to different TA will be forwarded to the students' designated TA

Course webpages

- Class Website (you must visit the class website frequently):

  - courses.uscden.net

  - Webcasts for both lecture and discussion are available (all sessions)

  - Lecture and discussion notes, assignments, solutions, labs and project as well as important class announcements/news will be posted on the website

  - Whenever a document is posted on the website, you will be notified by email with EE450 in the subject line

  - DO CHECK and READ your emails every day!

  - TAs may make mistakes – We appreciate your constructive feedback

# Homeworks
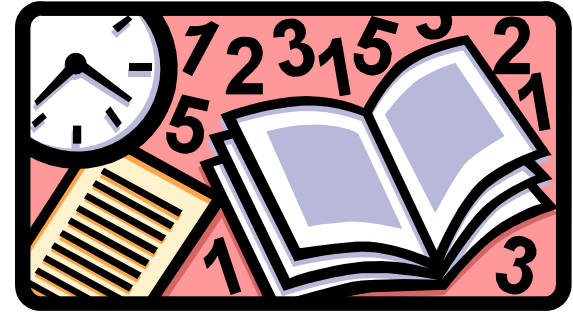
- 5 – 6 homeworks this Semester
  - Unless you are registered with DEN, you must submit HWs and Labs in Lecture Class on the due date
  - Due date of HWs/Labs for DEN Remote Students is the day after the announced due date, at 11:59 am (just before noon)
  - HW/Lab must NOT be emailed to TA or the professor
- Goal of Homework
  - To help you learn the Material
  - For you to gain experience in solving networking-related problems
- Homework is difficult
  - Help is available – but not at last minute
  - Start Early – Cannot answer 20 emails an hour before homework is due
  - Come to discussion/office hours with Questions

Extra Credit Labs
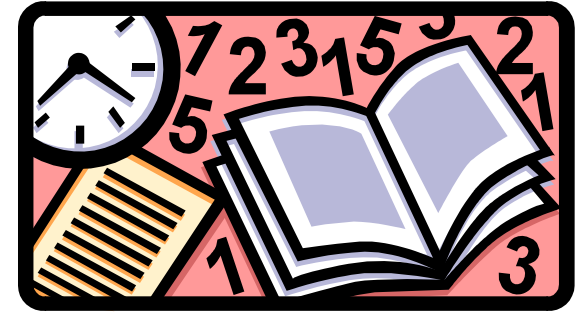
- Extra credit Labs **(Strongly recommended)**
    - Protocol analysis using Wireshark (Ethereal)
        - 2 labs, assigned before the Midterm
    - Network simulation using OPNET/NS3
        - 3 labs, assigned after the midterm
    - Each lab is worth 4 points added to your midterm grade out of 100

i.e. you can potentially earn 20 points of extra credit if you Successfully fulfill all 5 labs

Introduction to Wireshark (Ethereal) and Instructions for Downloading and Installing OPNET Academic Version will be posted on DEN>Course documents in the corresponding folders

# Hard Deadline Policy Regarding Collecting Graded Assignments and Grade Adjustments

- Once grades for an assignment are ready for viewing on DEN, TAs will notify the class by email and announce a deadline as the last day to collect the graded assignment and resolve grading issues

- Due to extremely limited storage space, graded assignments for on-campus students that are not collected by the deadline will be disposed of and the students' grade in that assignment will be penalized by 50%

- Please note that NO grade adjustments are allowed or accepted after the deadline for a specific assignment. This applies to students in both sessions as well as DEN remote students

How and When to Collect/Resolve

- On-campus students have about 2 weeks from the time of the notification email to:

  - Collect their assignment from Professor Zahid during his office hours on Tuesdays and Thursdays.

  - Contact the designated grader (and if necessary the designated TA) to resolve any grading issues and have their grade updated in the grade book.

- DEN Remote students have about 2 weeks from the time of the notification email to:

  - Obtain their graded assignment through DEN, resolve the grading issues via email to the designated grader and have their grades updated in the grade book

Project
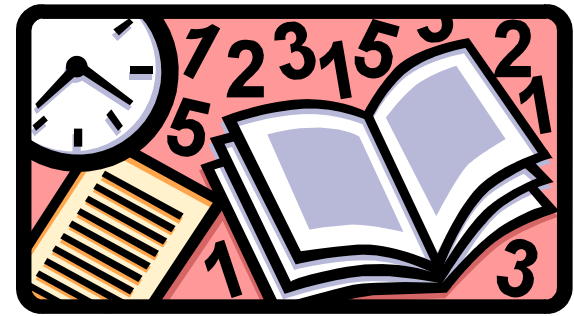
- Client/server socket programming
    - Mandatory (hard deadline strictly enforced)
    - Important to learn (a stepping stone to CS-551)
    - Will expose you to the basics network programming
- Requirements
    - Knowledge of C or C++ programming (Medium to Skillful)
    - Knowledge of Unix (Basic)
    - Knowledge of Network Programming (Network Sockets)
        - If you are new to socket programming, do study this tutorial carefully asap and before starting the project) at
            http://beej.us/guide/bgnet
- TAs will guide and help you only with the project itself
- They will NOT teach you C/C++ programming, debugging, Unix or network programming

Project Platform

- You must run and test your project on a **Virtual Machine** which we will provide
- Provided VM will be **Ubuntu 16.04** and can be loaded with **VirtualBox**
- It will be graded on the same VM as well
- You may write your code in the VM or elsewhere and transfer it to the VM later for testing
- No MS-Windows programs will be accepted

Discussion Class

- **<u>Discussion</u>** is not a *Lecture* Class
- In order to be useful I need your help
- Please come ready with Questions
- Do the homework before hand
  - Start early! HW can not be done in just a few hours
- I want you to be able to point out the tricks or subtleties to some of the problems in networking
- The more exposure you have to the subject, the more prepared you will be for the exams

Format

- I'll typically give a short lecture on some of the key topics for the week
- Go over some extra examples
- Go over any questions
- Let me know:
    - If something is not clear
    - If you can't read my handwriting
    - I'm speaking too fast

Getting Help
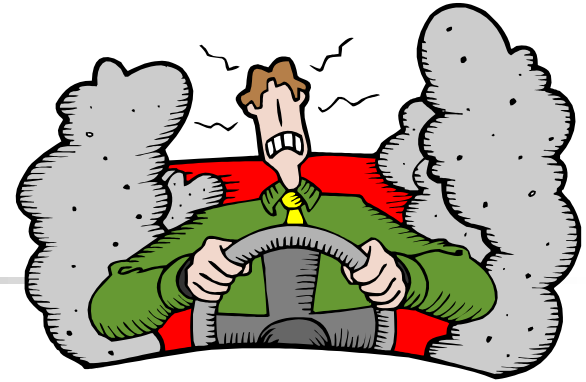
- Methods
  - Ask Me in Class
  - Come to office hours
  - Send me an email (Check your Designated TA)
    - Notice: If you are on campus, It's more effective to come and get help

Other Ideas

- Use the web for help
  - Be careful
  - Searches on Google usually return some very good info
- You may talk with each other about concepts discussed in class, but remember:
  - All assignments (HW, Labs and Project) require individual effort!
  - Don't copy! It doesn't pay off and it is NOT allowed!!!

Why Networks?

- Networks are connections
- Computers are powerful by themselves but many times more powerful when they are connected
- We live in a world where having information is not worth much, but being able to share it is very valuable

Some Networking Basics
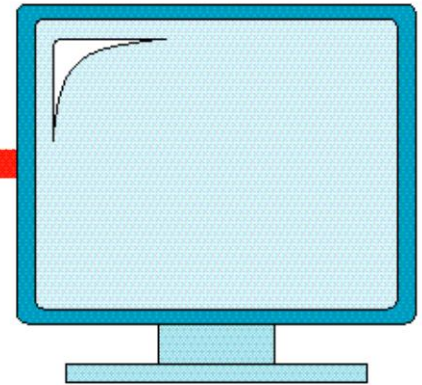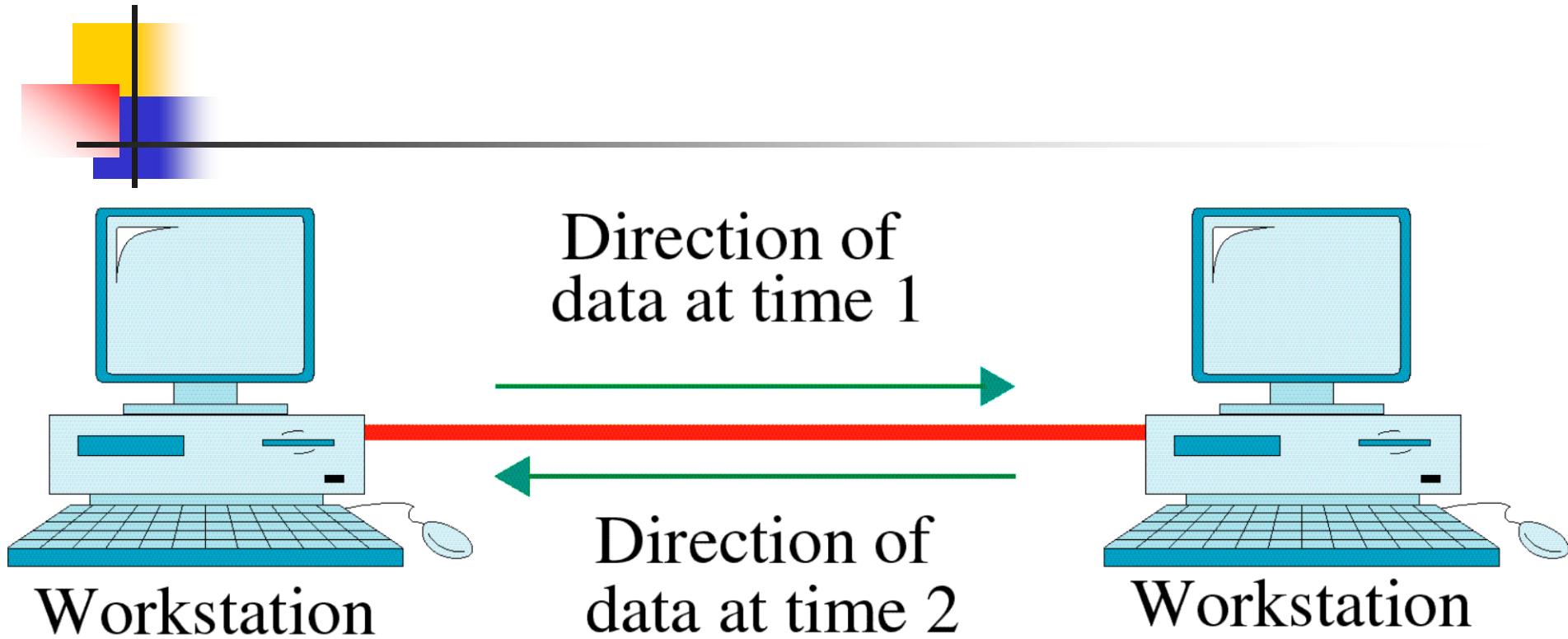
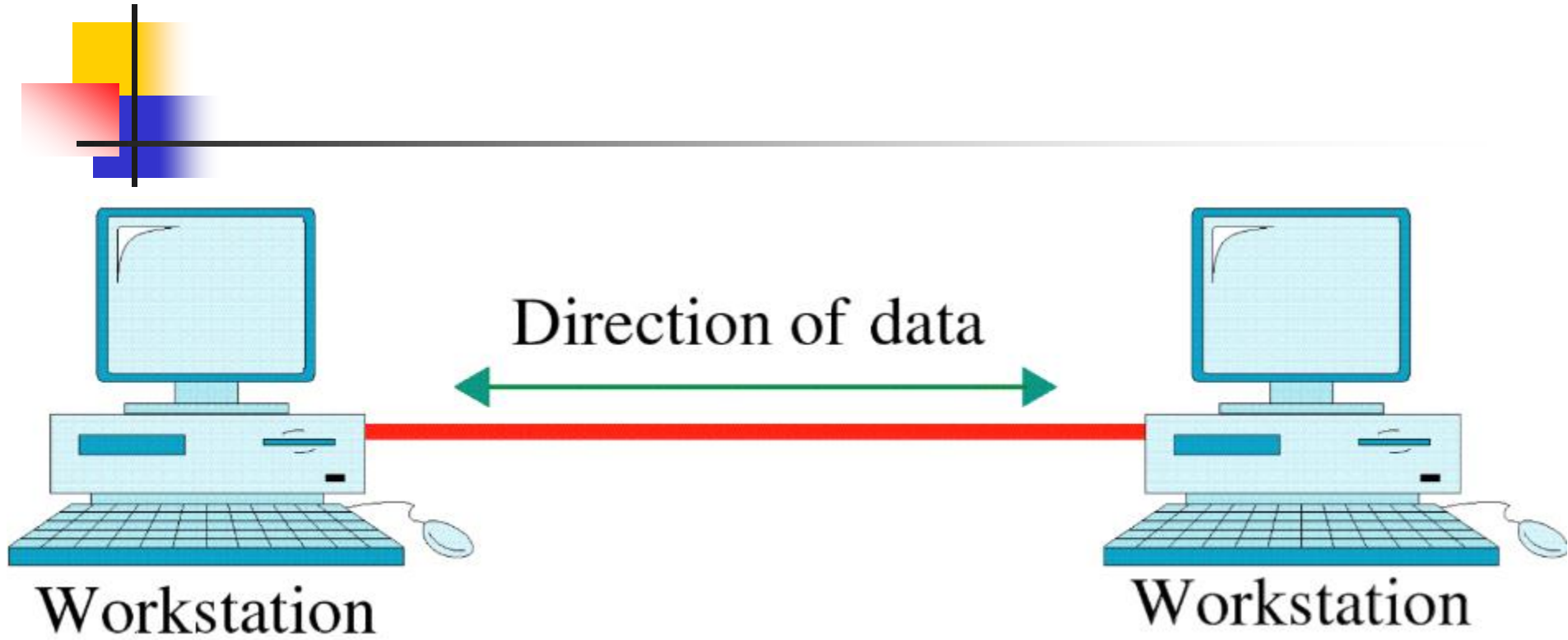- Lets Define a Communication System
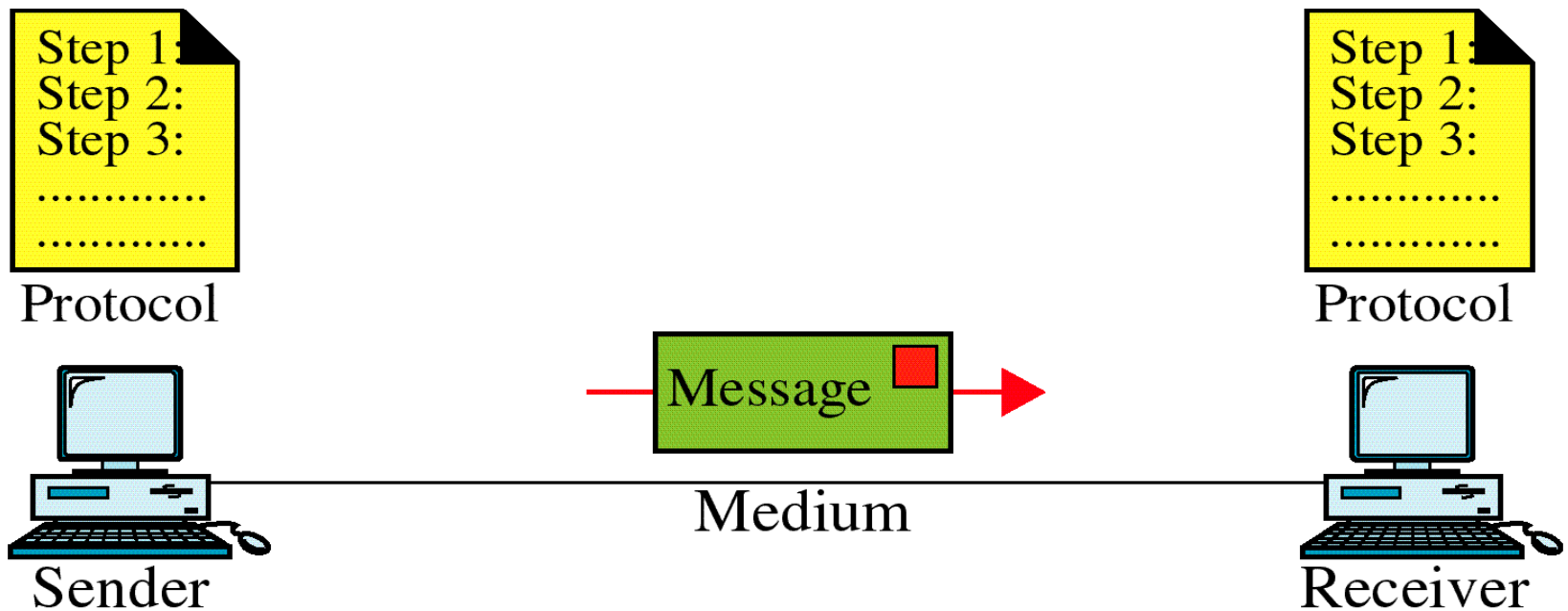
Three goals

Simplex

Mainframe   Direction of data   Monitor

Half-Duplex

Direction of
data at time 1

Workstation

Direction of
data at time 2

Workstation

Full-Duplex

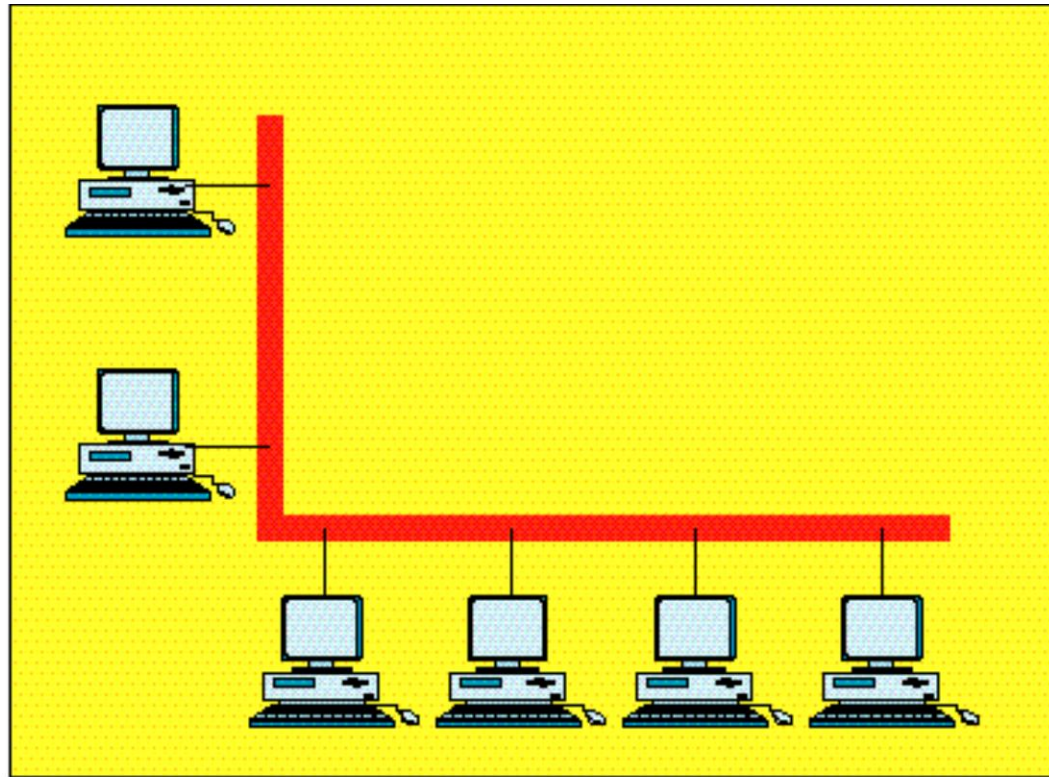Direction of data

Workstation

Workstation
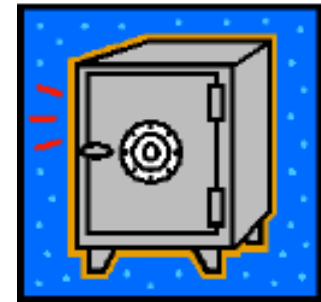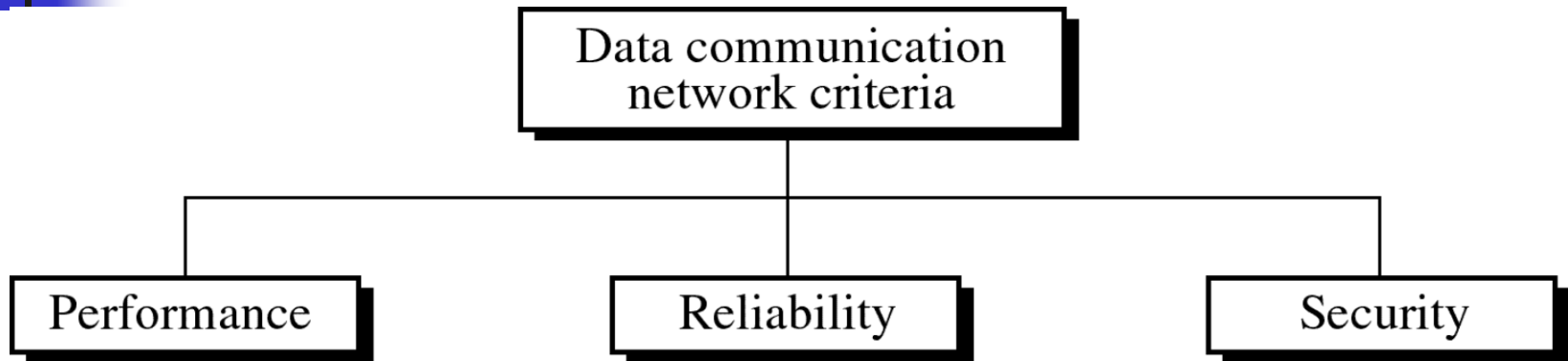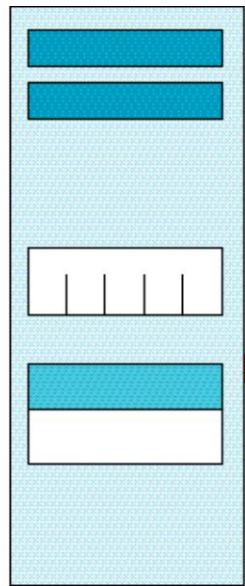
Network

- Local area network (LAN)
- Metropolitan area network (MAN)
- Wide area network (WAN)

Local Area Network

Single building LAN

Metropolitan Area Network

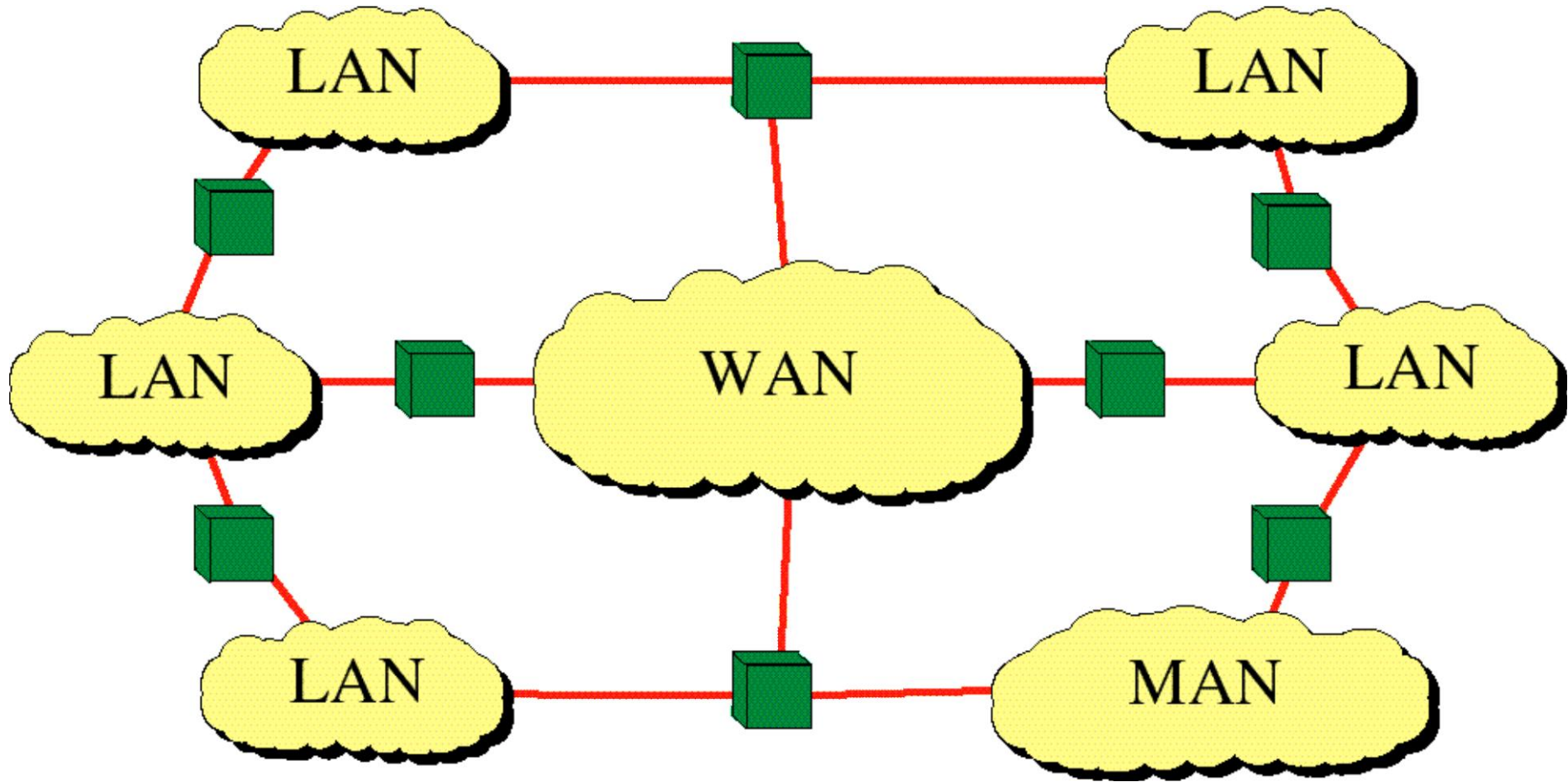Public city network
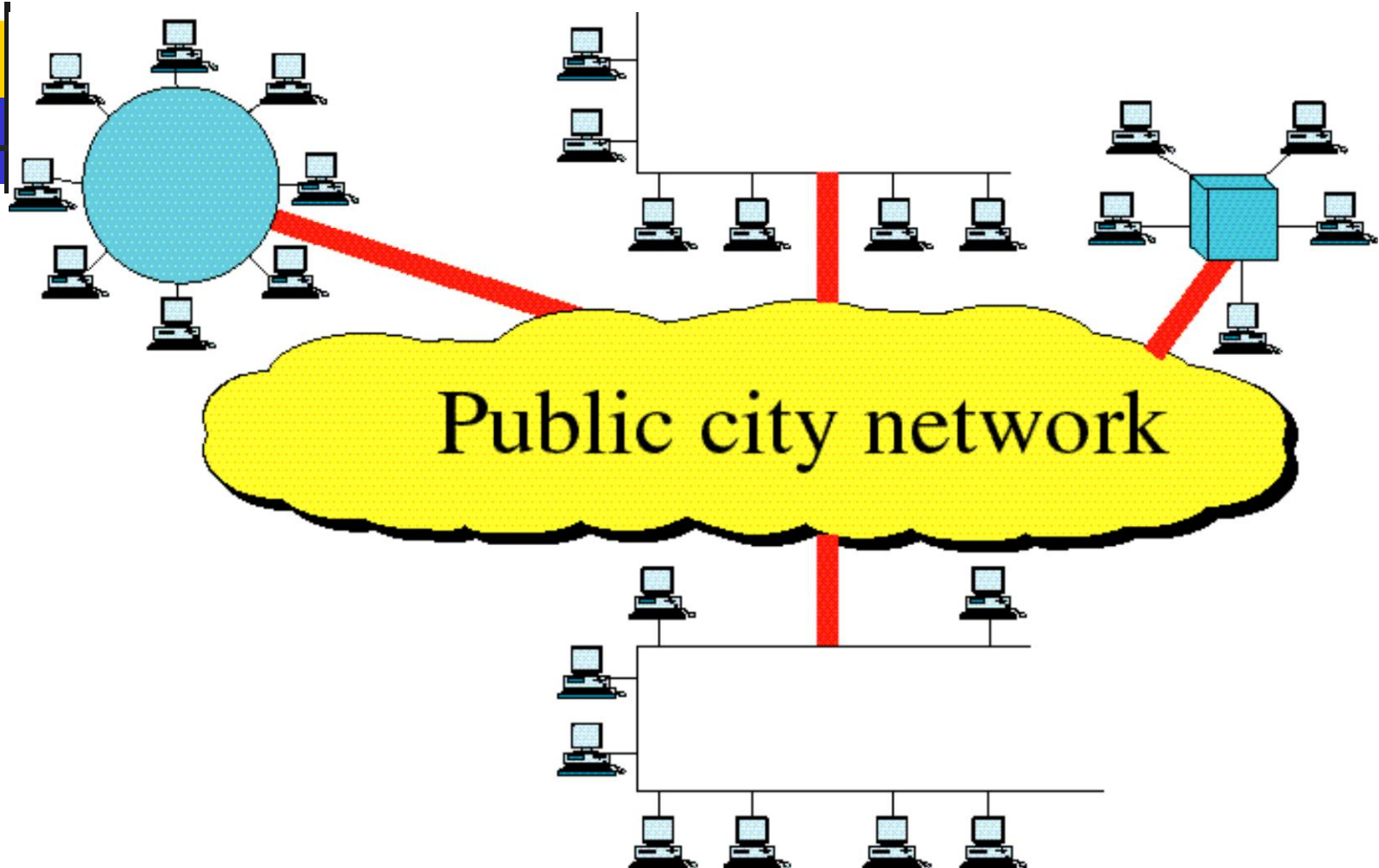
Wide Area Network
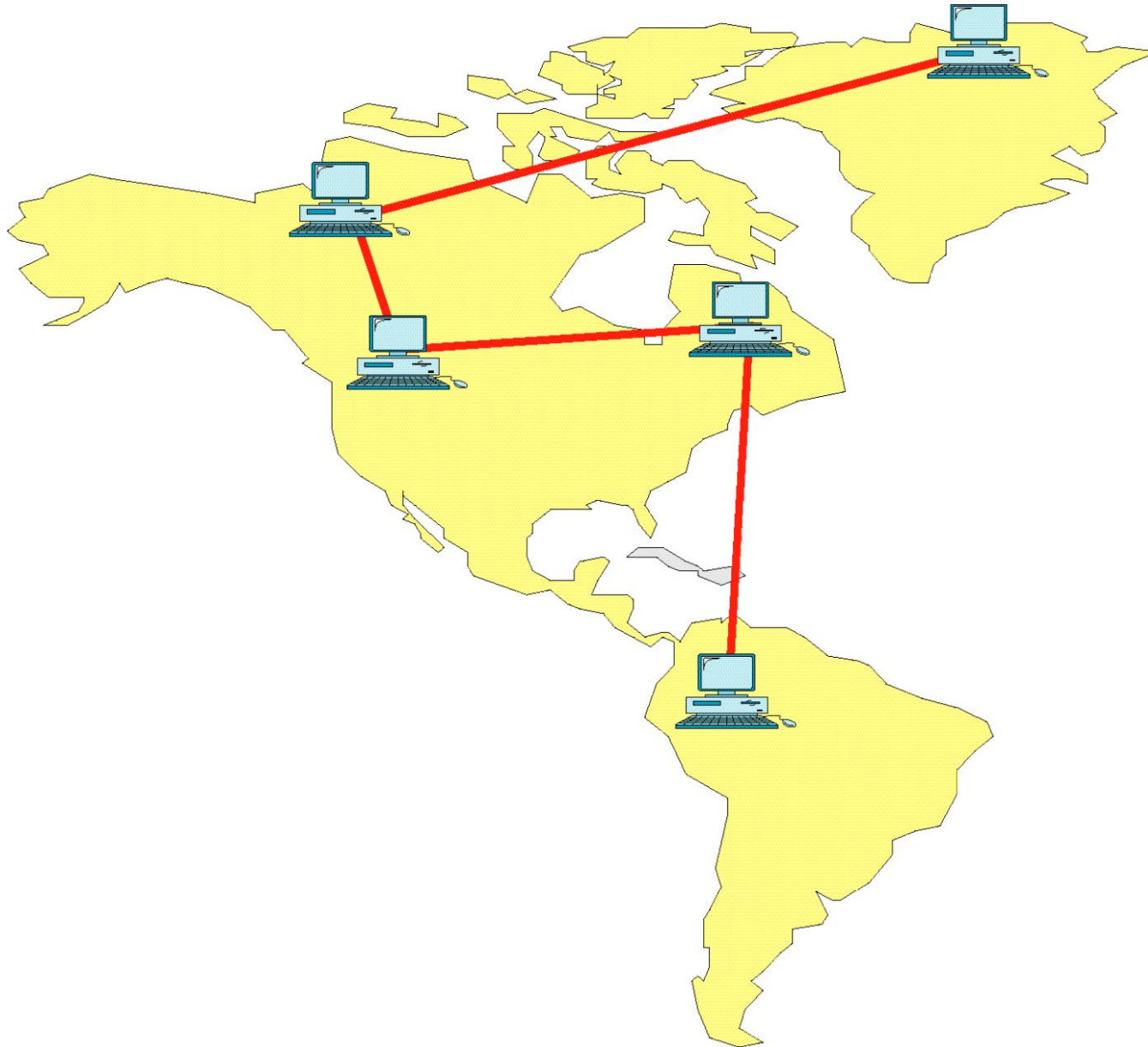
Internetwork (Internet)

Basics continued…

- Communicating parties can be
  - Telephones
  - Cell Phones
  - TV/Radio transmitters/receivers
  - Computers

Basics continued…

- Transmission medium can be
  - Twisted pair copper wire
  - Coaxial cable
  - Optical fiber
  - Or simply air…

Transmission

- **Transmitter**
  - Messages are converted into electrical signals
- **Transmission Medium**
  - <u>Transmitter End</u>: Electrical signals are converted into suitable transmission signals depending on the transmission medium. (EM waves for air, Light for optical fiber, etc)
  - Transmission signals are propagated through the medium
  - <u>Receiver End</u>: Converts the transmission signals into Electrical signals
- **Receiver**
  - Electrical signals are decoded to get the original message back.

SIGNALS

- The electrical signals can be **ANALOG** or **DIGITAL**

- **ANALOG** – the amplitude can take infinite number of values
    - Ex: TV/Radio transmission

- **DIGITAL** – the amplitude can take finite number of values only
    - Ex: Computer Communications (uses two logic values 0 and 1)

We will be dealing with DIGITAL transmissions