EE:450 – Computer Networks

Discussion Session #1

Fall 2019

Teaching Assistant 1

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Teaching Assistant 4

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- Office Hours
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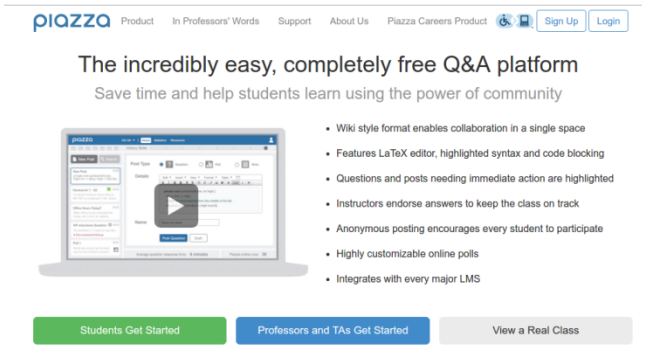
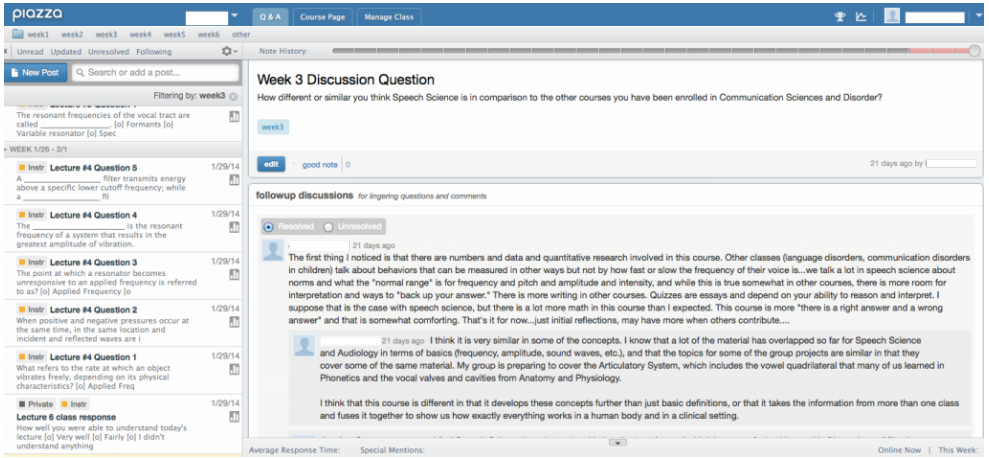
My Responsibilities

- Conducting a weekly discussion
- Maintaining the course web site
- Conducting office hours (**open to all students**)
- Designing and grading projects
- Assisting (via e-mail)
  - **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)

Piazza Discussion Board



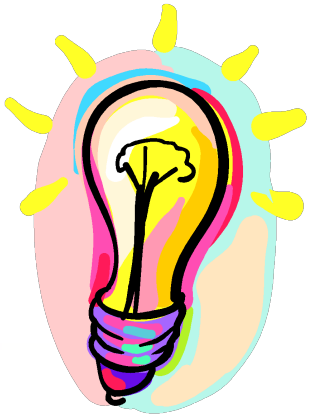


- You will receive an email to join EE450 discussion board in Piazza website.
- We encourage you to use it for posting questions regarding to Homeworks/Labs/Project.
- The TAs will answer your questions, so people visit this website often and make sure to check if your question was asked before to avoid double posts.
- Also, if necessary, you can post anonymously.

TA Assignments (TBD)

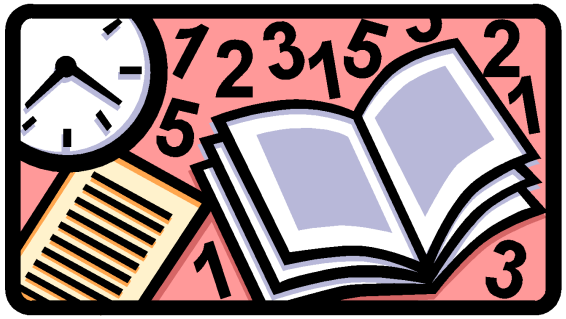
- Student will be divided between the TAs
- The designated TA will be responsible for answering the emailed questions from his assigned students
  - The student can only email his designated TA if he has any questions
  - Emails sent to different TA will be forwarded to the student designated TA
- However, we **strongly recommend** that you use Piazza class discussion board for your questions. This way it will benefit everyone.

Course webpages



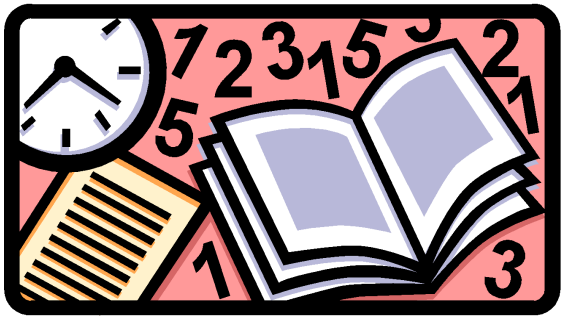
- Class Website (you must visit the class website frequently):
  - http://den.usc.edu
  - Webcasts for both lecture and discussion are available (all sessions)
  - Lecture and discussion notes, assignments, solutions, labs and project as well as important class announcements/news will be posted on the 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

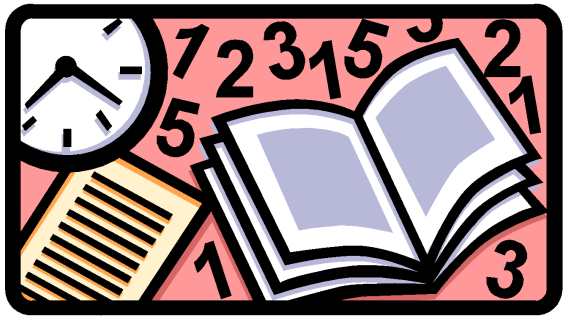
Hard Deadline Policy Regarding Collecting Graded Assignments and Grade Adjustments

- 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

- We will create an Ubuntu virtual machine (VM) and share it with everyone.
- You should load that VM in your laptops using VM applications such as:
  - Oracle VirtualBox (Recommended)
  - VMware etc.
- During grading, TAs will load a fresh copy of the VM and grade your projects on it.
- You may write your code in a Linux editor on the VM (preferred method) or in any other editor elsewhere and copy it to VM later for testing.
- No MS-Windows programs will be accepted.
- Ubuntu VM copy will provided when the project is released.
- In the meantime, we recommend that you get yourself familiar with C/C++ and Linux.

Discussion Class

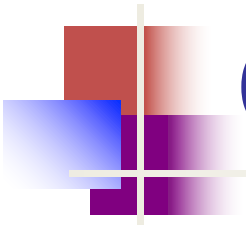
- **Discussion** is not a *Lecture* Class
- In order to be useful I need your help
- Please come ready with Questions
- Do the homework before hand
  - Start early! HW can not be done in just a few hours
- I want you to be able to point out the tricks or subtleties to some of the problems in networking
- 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

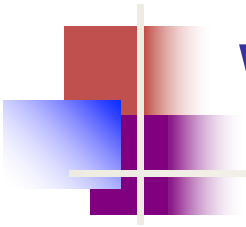
Getting Help

- 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!!!

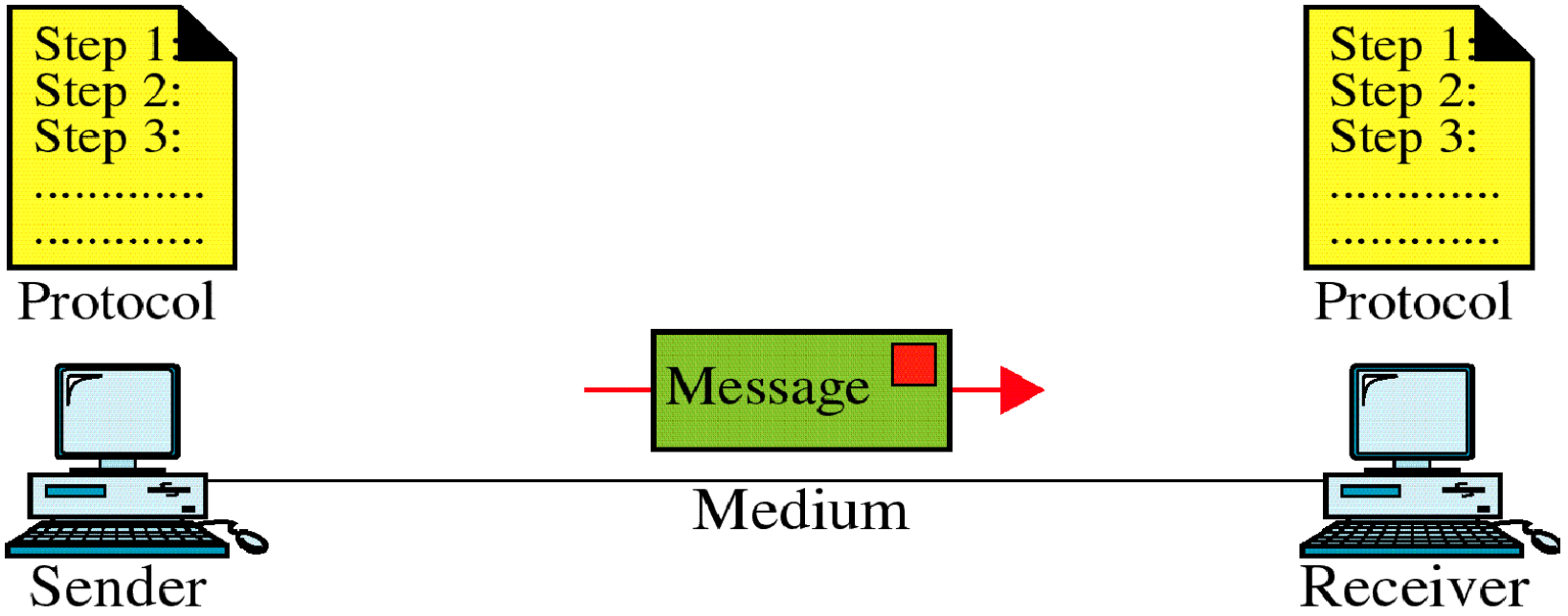


Why Networks?

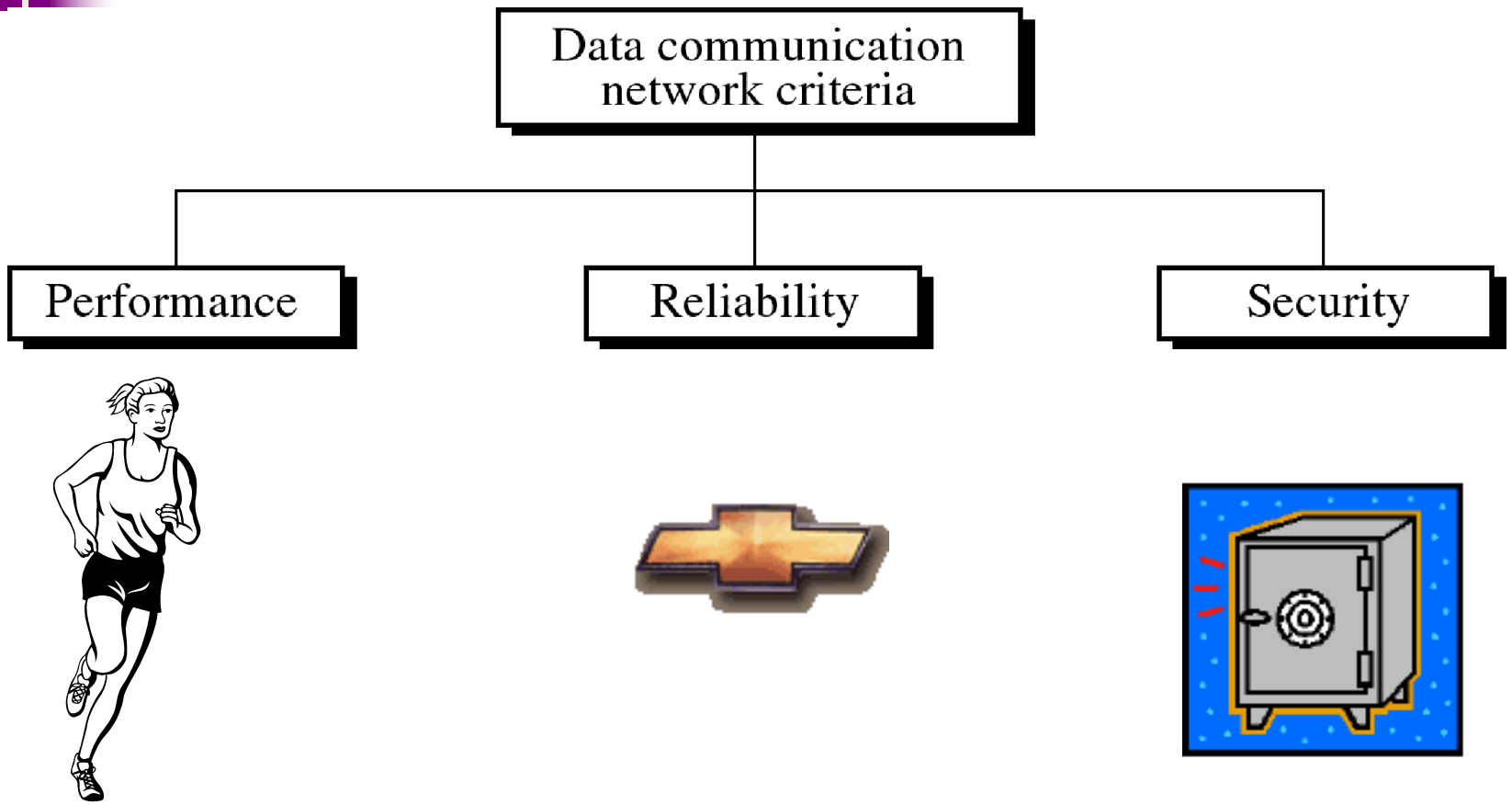
- Networks are connections
- Computers are powerful by themselves but many times more powerful when they are connected
- We live in a world where having information is not worth much, but being able to share it is very valuable

Some Networking Basics

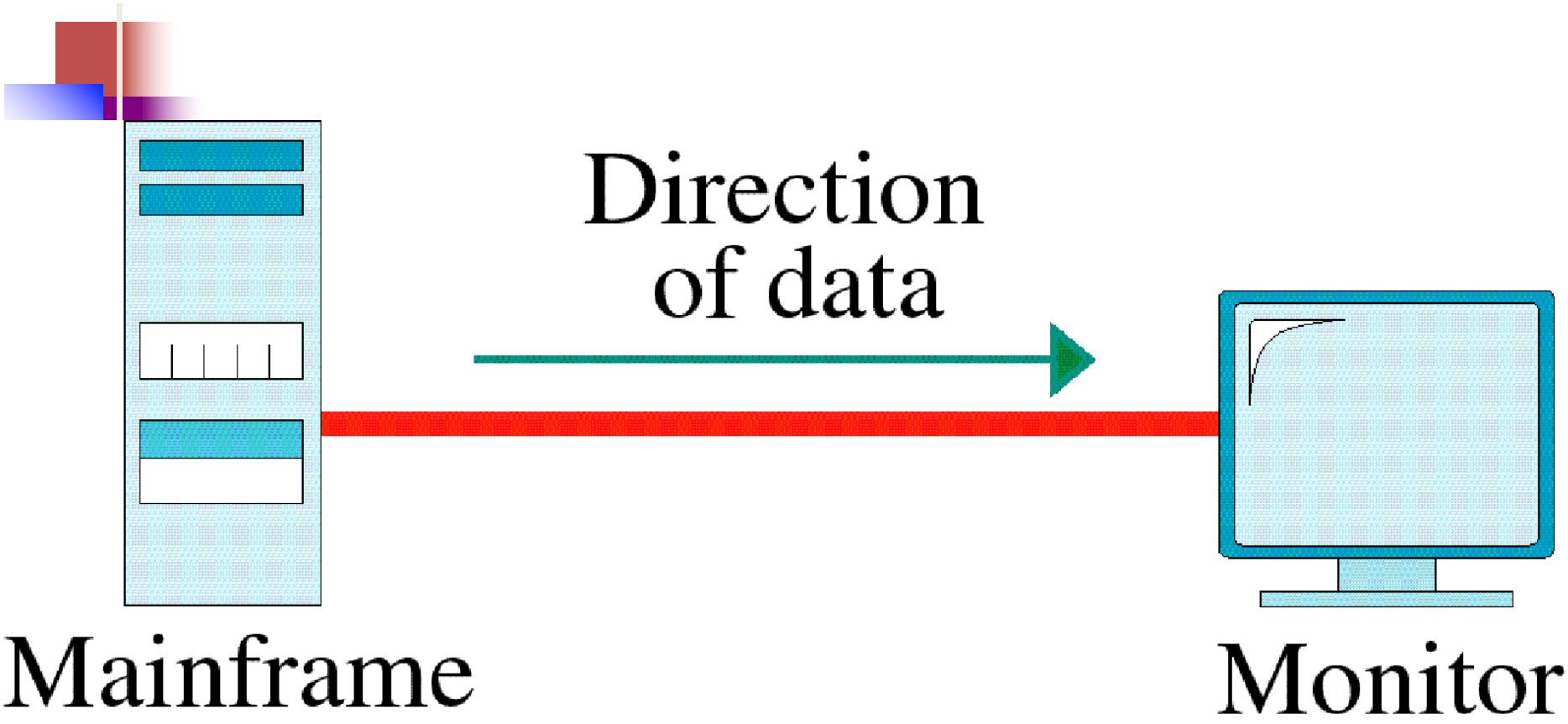
- Lets Define a Communication System



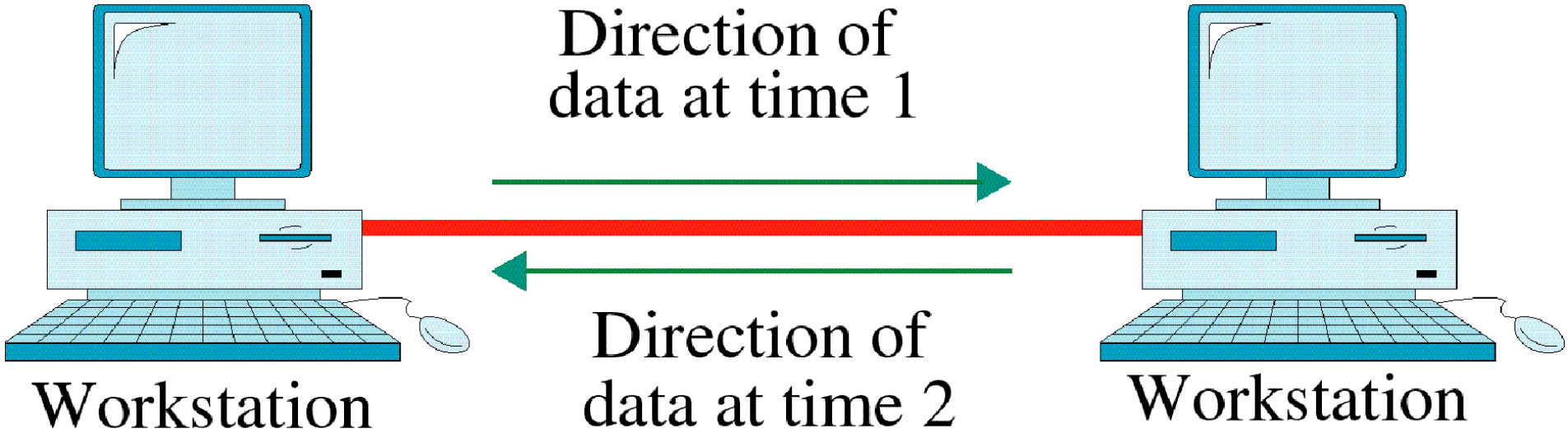
Three goals

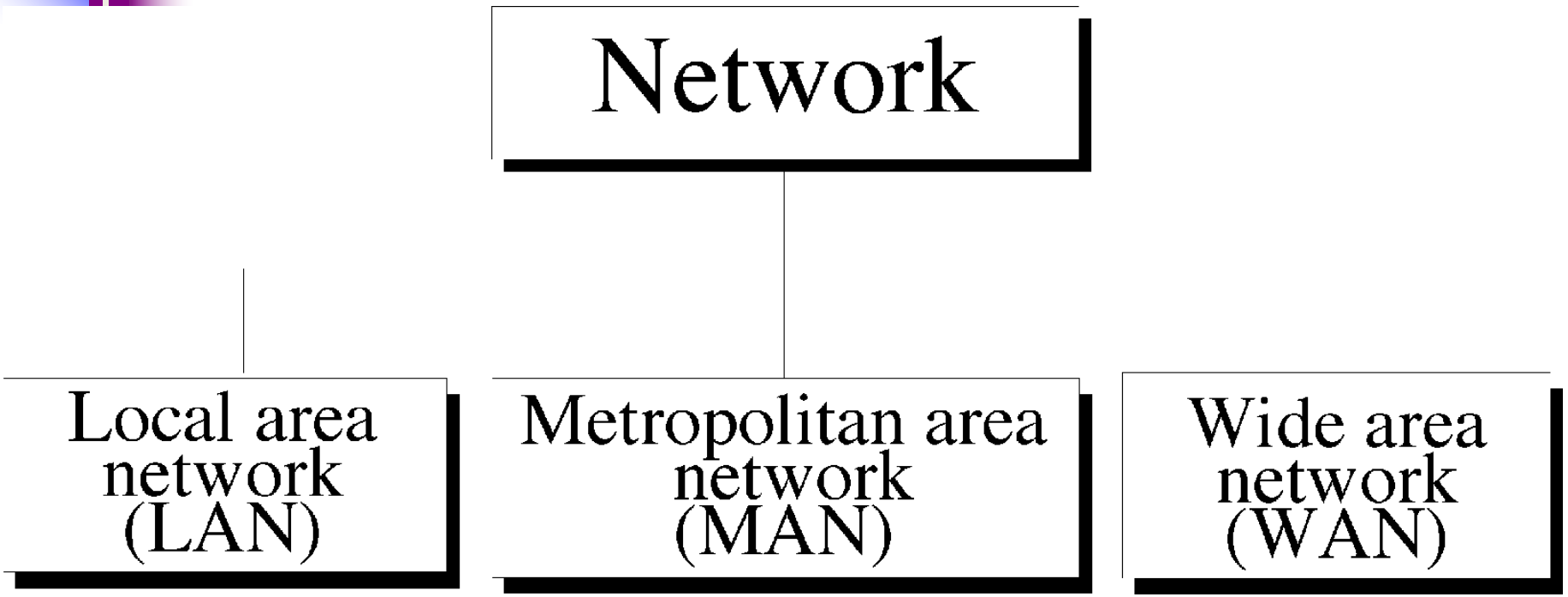

Data communication network criteria
Performance
Reliability
Security

Simplex

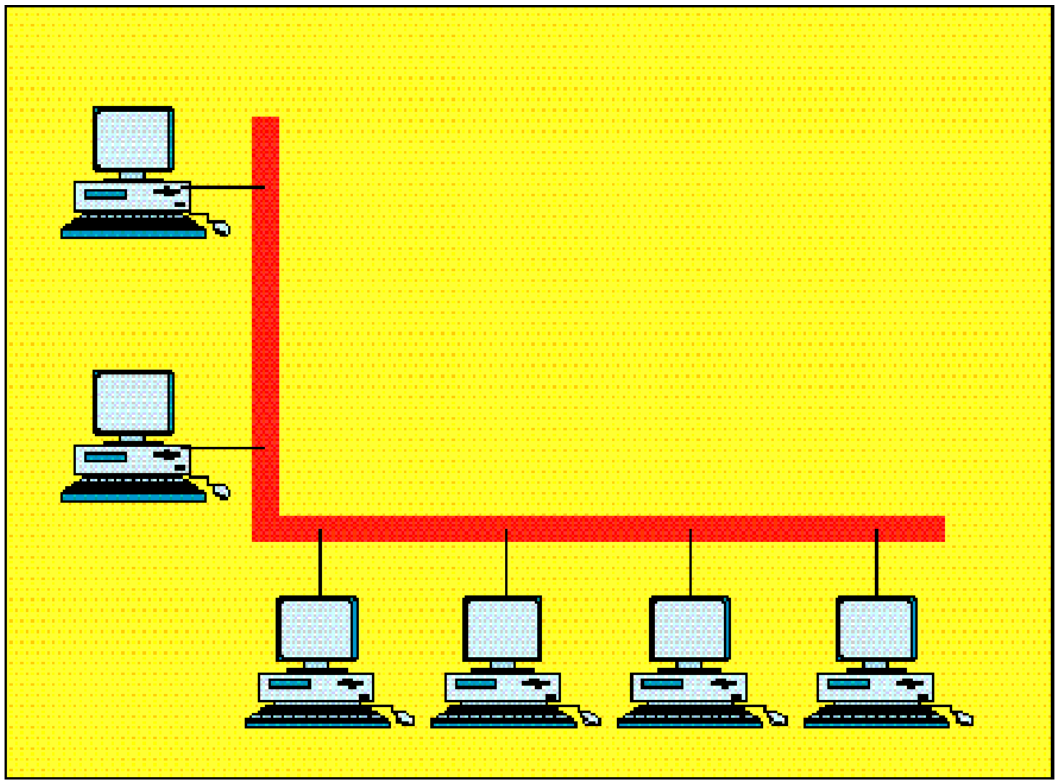


Half-Duplex


Direction of
data at time 1
Direction of
data at time 2
Workstation
Workstation

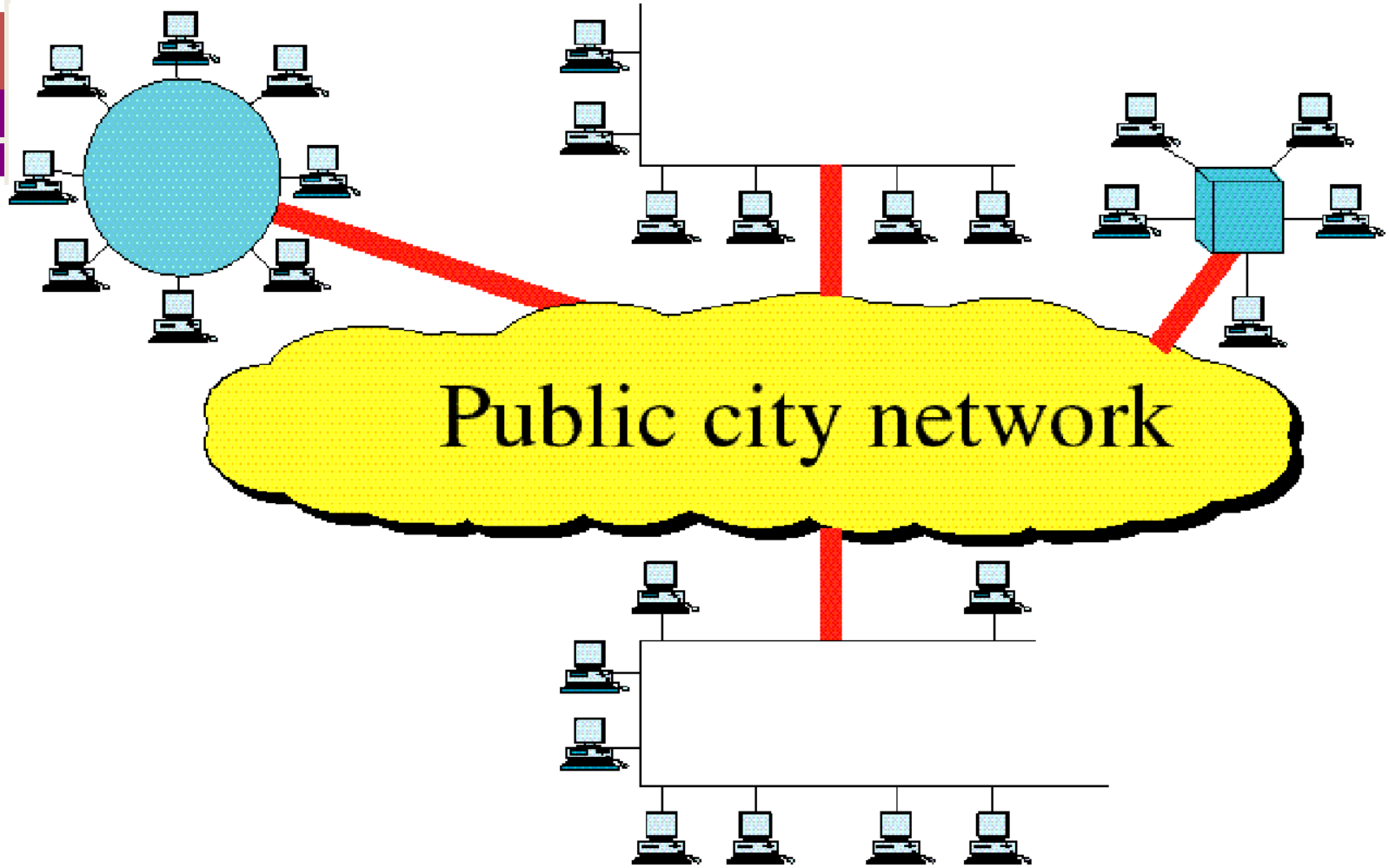

Network
Local area network (LAN)
Metropolitan area network (MAN)
Wide area network (WAN)

Local Area Network

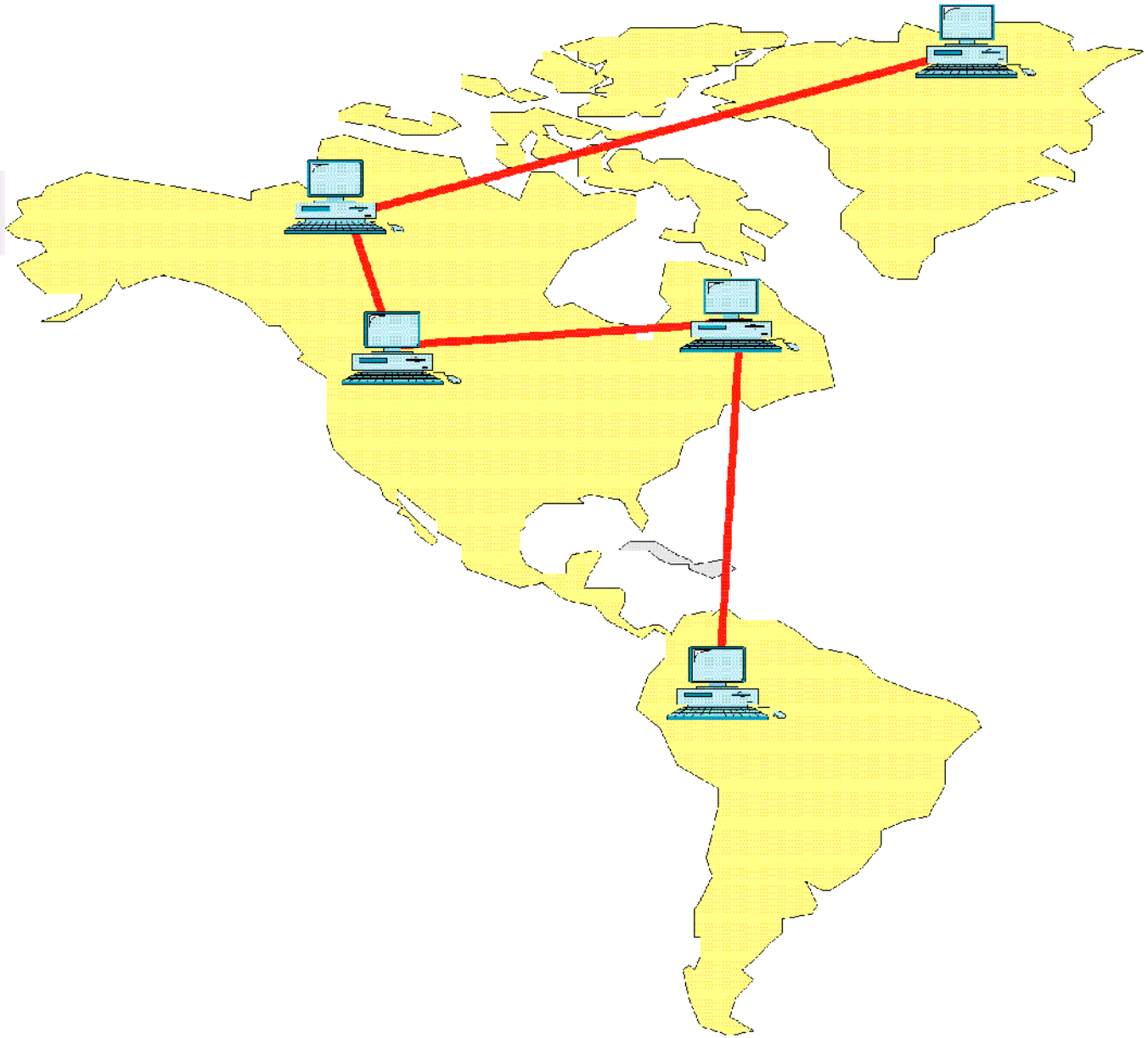


Single building LAN

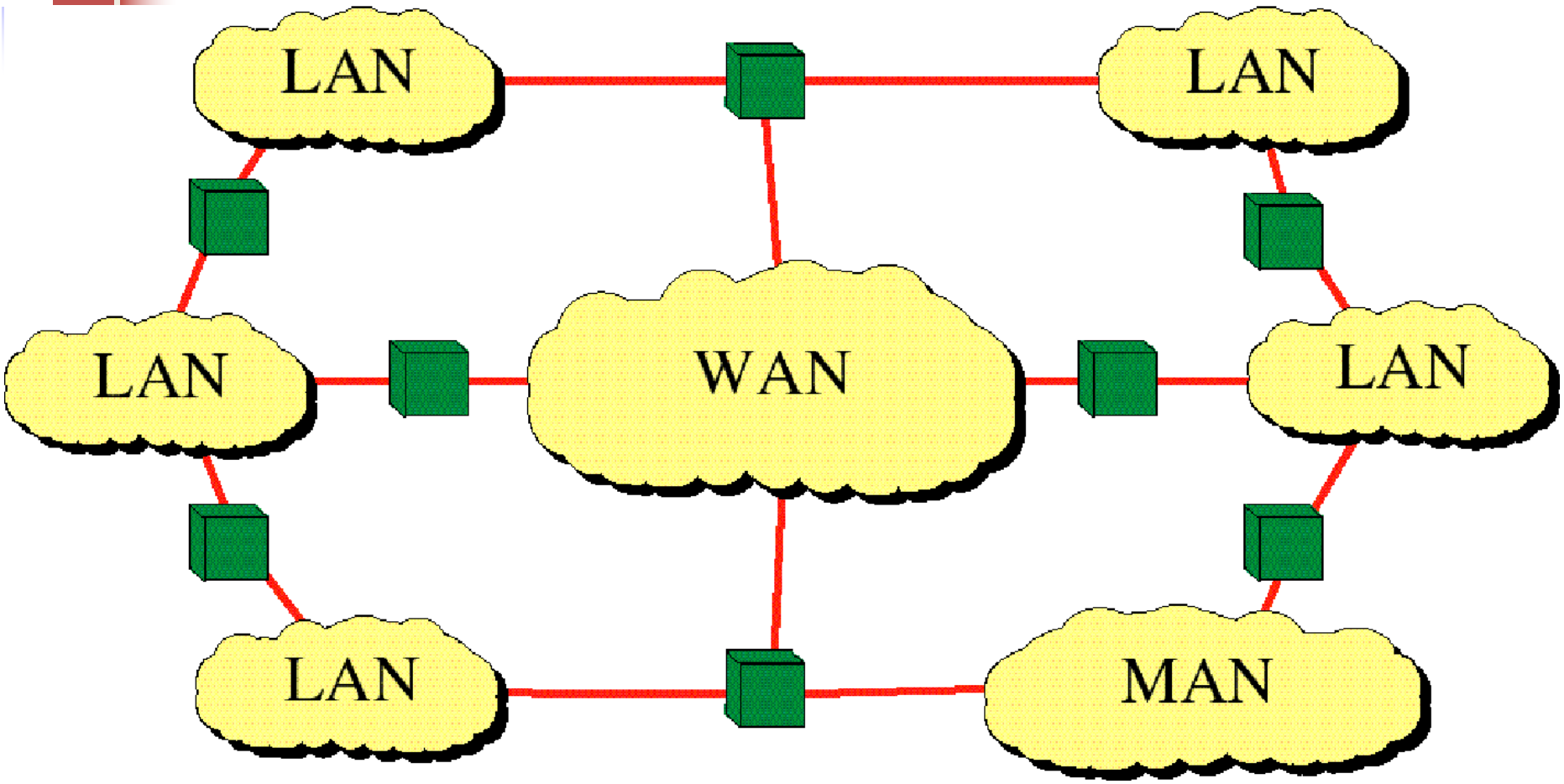
Metropolitan Area Network



Wide Area Network

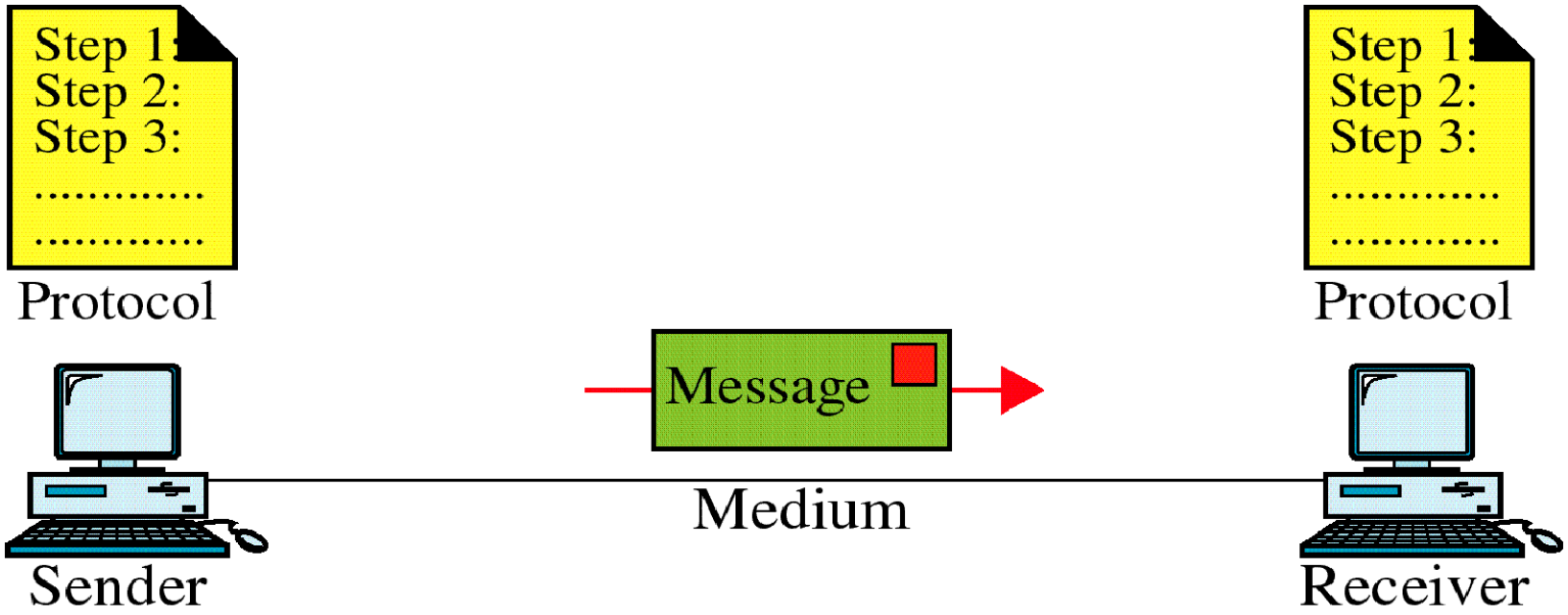


Internetwork (Internet)



Some Networking Basics

- Lets Define a Communication System



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**
  - Transmitter End: 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
  - Receiver End: 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