Data Communications and Computer Networks

University of Education

Lecture 01 – Introduction to Data Communications and Computer Networks

Lecture 01 - Roadmap

- **Introduction**
- Course Objectives, Outline and Grading Policies
- A communication Model
- Key tasks of a Communication System
- Data Representation
- Direction of Data Flow
  - Simplex, Half Duplex, Full Duplex
- Connection Types
  - Point-to-point, Multi Point

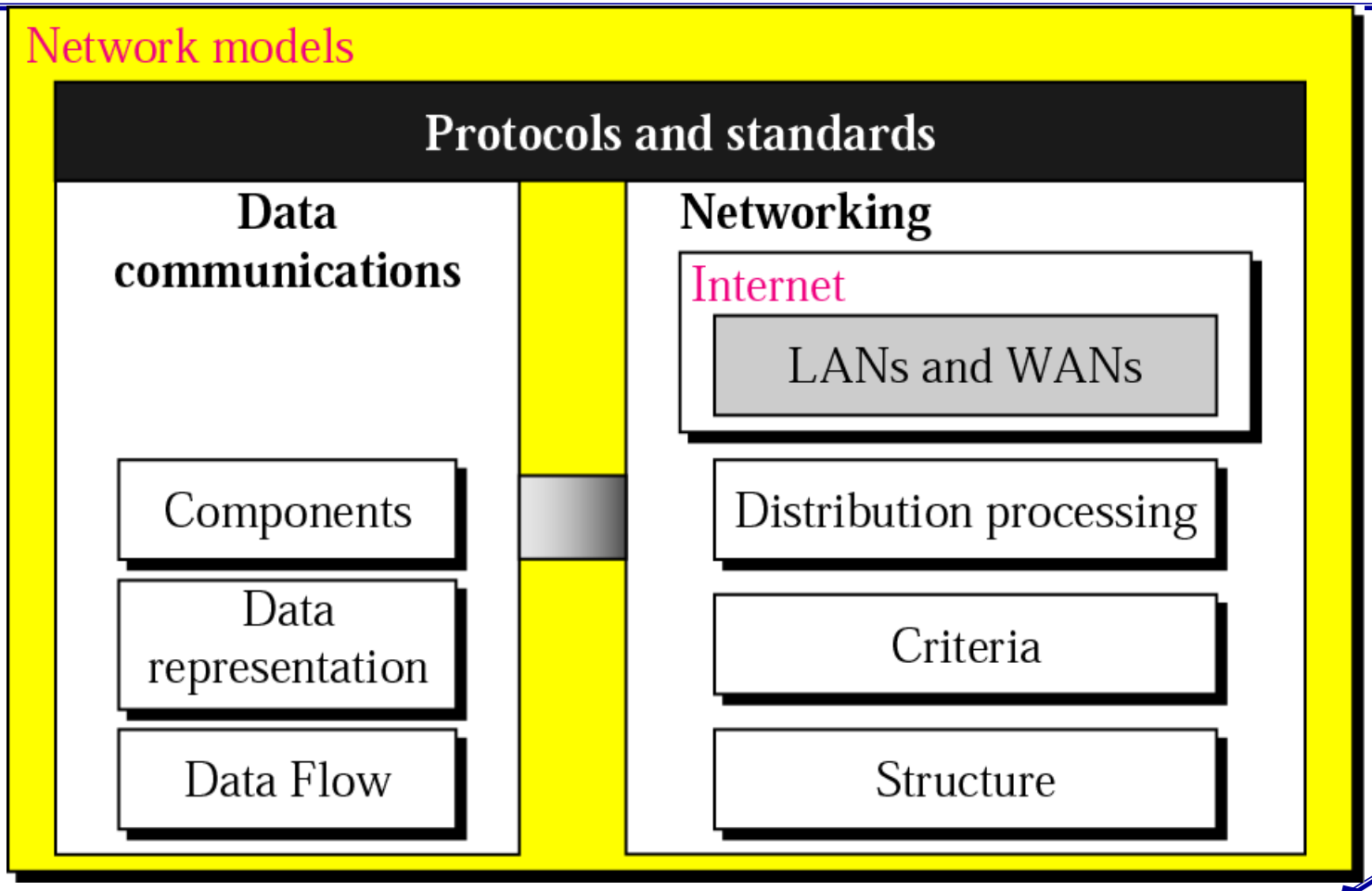
Course Aim and Objectives

- To provide students with a comprehensive introduction to fundamental concepts of data communication and computer networks for building a sound foundation for subsequent courses in the field of networking.
- To introduce the layered architecture approach with reference to OSI Model.
- To examine the characteristics of different transmission media.
- To understand the basic encoding and modulation techniques.
- To understand various error detection, flow and error control techniques.

Course Aim and Objectives cont..

- To introduce basic network devices and LAN technologies.
- To provide fundamental concepts of switched networks.
- To provide the IP addressing concepts and Subnetting skills.
- To provide the necessary skills for LAN implementation

Course Overview



Text Books

- **Data Communications and Networking by Behrouz A. Forouzan, Fourth Edition, McGraw-Hill, 2003**
- **Data and Computer Communications by William Stallings, Ninth Edition**

Course Details

- 3 Credit hours course
- Course Outline:
  - Discussion of lecture-wise plan for 32 lectures
  - Course Outlines are available at student photocopy shop, web site.
- Grading policy and Sessional evaluation criteria
  - Assignments
  - Project

A Communications Model

- Source

  Generates data to be transmitted

- Transmitter

  Converts data into transmittable signals

- Transmission System

  Carries data

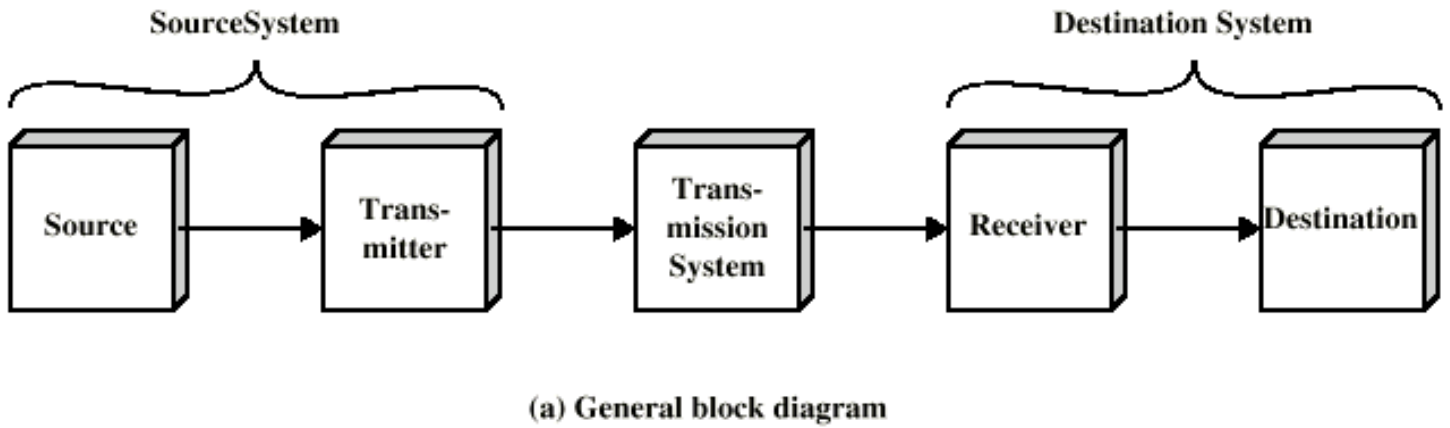
- Receiver

  Converts received signal into data

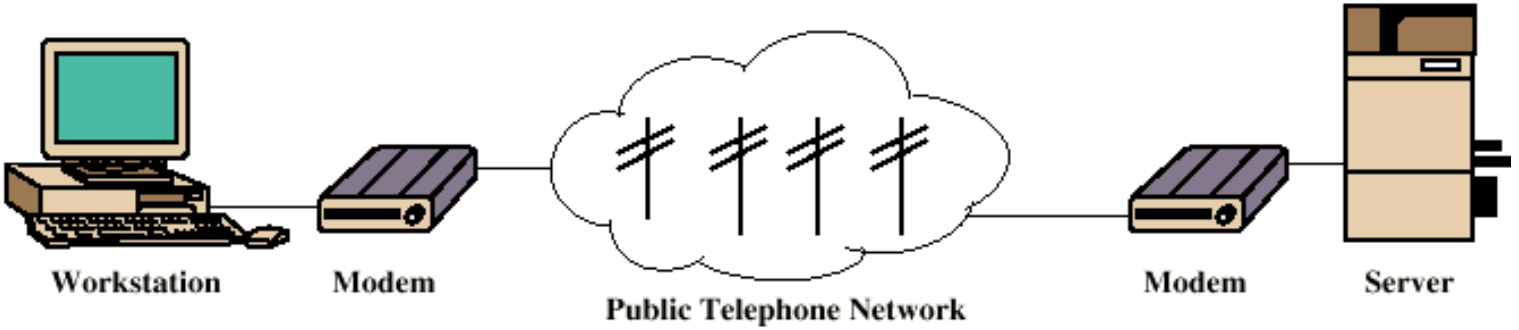
- Destination

  Takes incoming data

Simplified Communications Model – Diagram



(a) General block diagram



(b) Example

Communication Tasks

- Transmission System Utilization
- Interfacing
- Signal Generation
- Synchronization
- Exchange Management
- Error Detection and Correction
- Flow Control
- Addressing
- Routing
- Recovery

Communication Tasks Cont…

- Message Formatting
- Security
- Network Management

Data Communications

- Telecommunication, includes telephony, telegraphy, and Television, means communication at a distance.

- Data Communications is the exchange of data between two devices via some form of transmission medium such as a wire cable.

Data Representation

- Text, numbers, images, audio, and video are different forms of Data Representation.

- Text

  In data communications, text is represented as a bit pattern, a sequence of bits.

  Different sets of bit patterns have been designed to represent text symbols. Each set is called a code, and the process of representing symbols is called coding i.e ASCII made by ANSI, Unicode

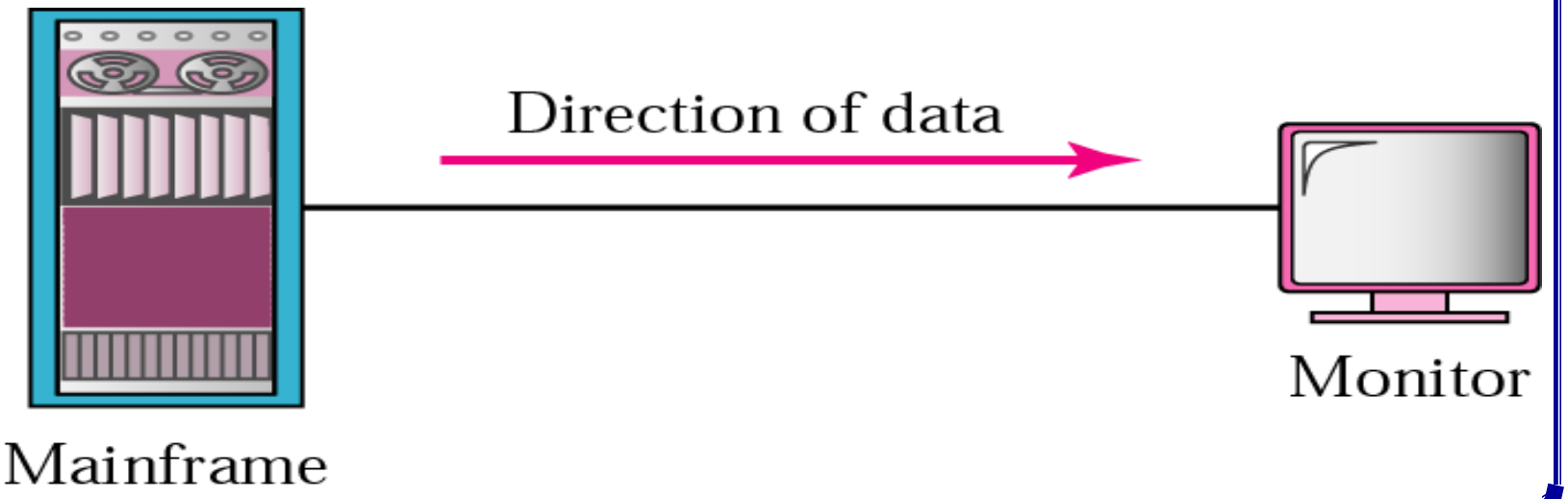
Data Representation cont..

- Numbers are also represented by using bit patterns. However , a code such as ASCII is not used to represent numbers; the numbers is directly converted to a binary number.
- Images today are also represented by bit patterns but an image is divided in to a matrix of pixels.
- Audio is a representation of sound. It is a continuous , not discrete.
- Video can be produced either as a continuous entity or it can be a combination of images.

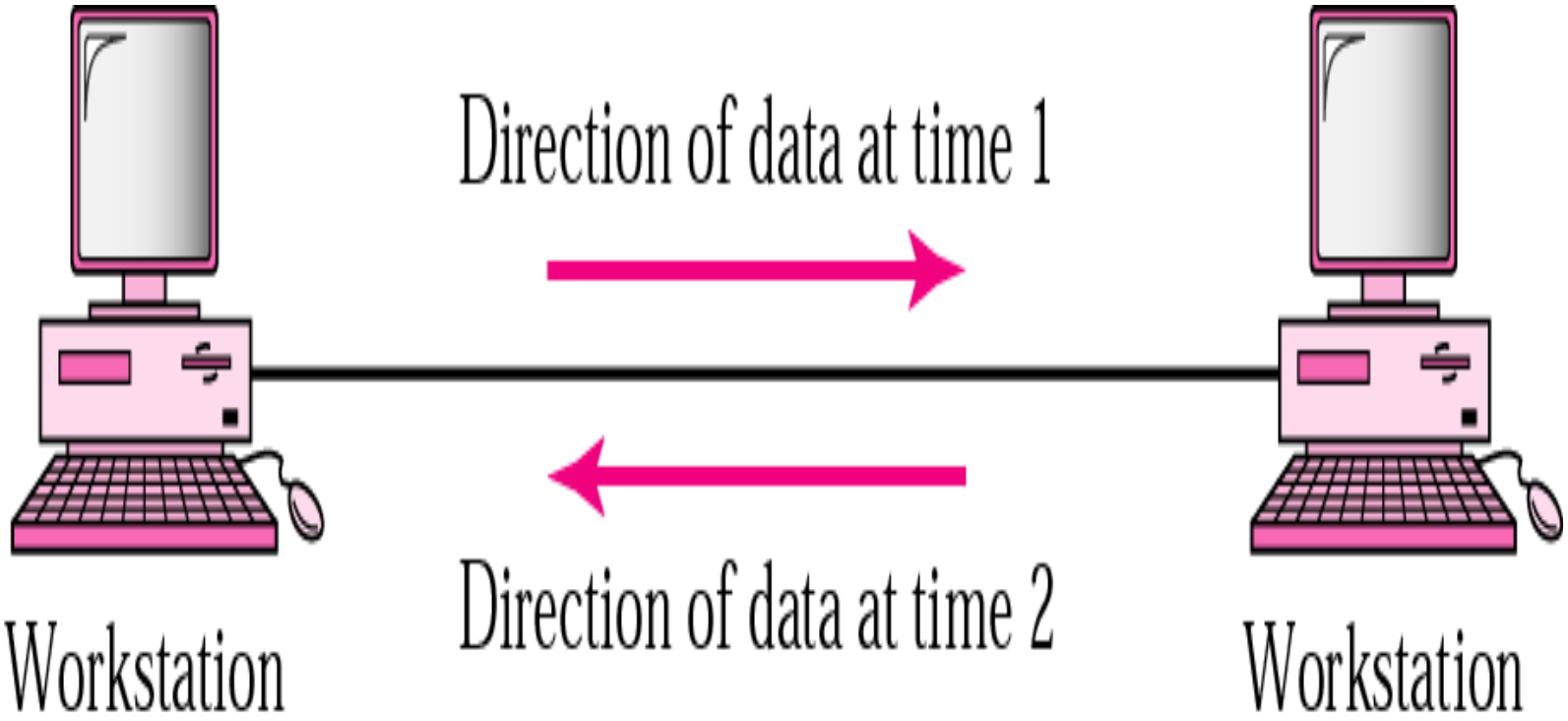
Direction of Data Flow

Communication between two devices can be Simplex, half duplex ,or full duplex.

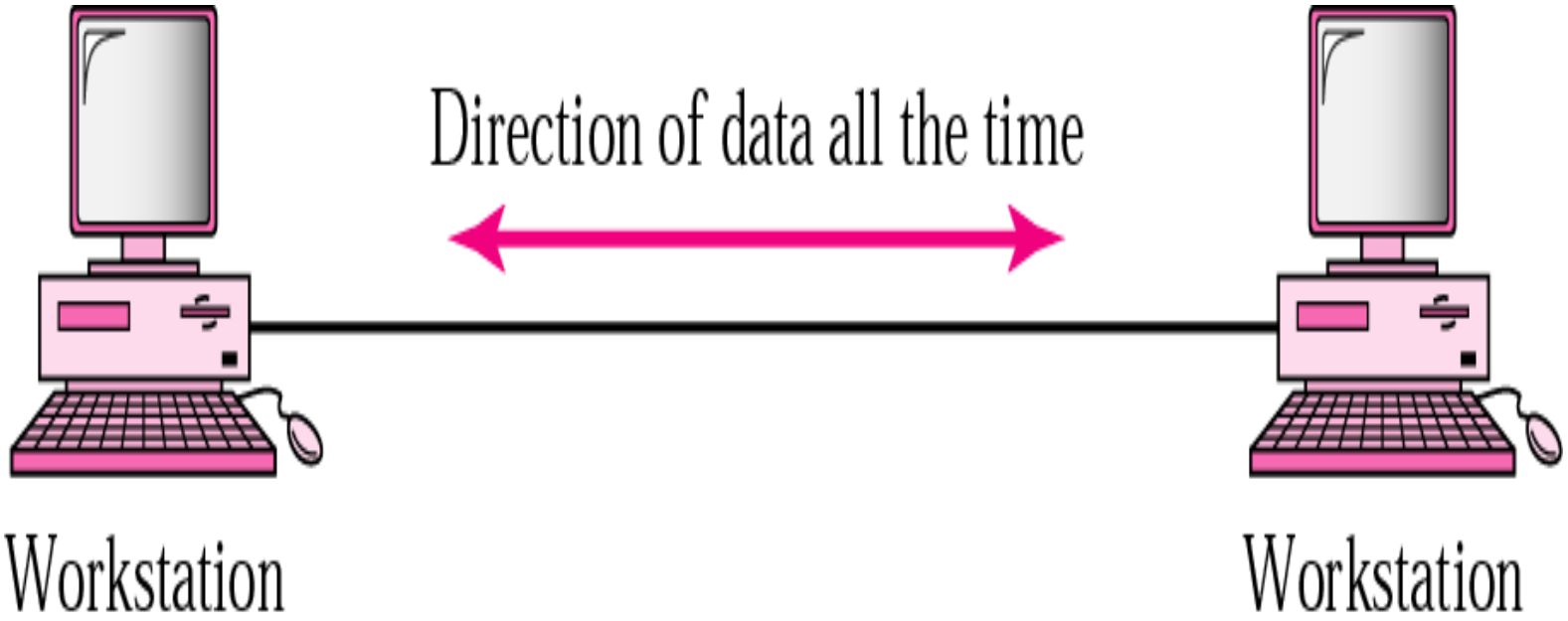
Simplex Mode



Half-duplex


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

Full-duplex



Net Surfing

- Some Good Hyperlinks:
  - http://www.mhhe.com/forouzan
  - http://www.WilliamStallings.com/DCC/DCC7e.html
  - http://www.ietf.org
  - http://www.iab.org
  - http://www.w3.org
  - http://www.ieee.org
  - http://www.acm.org
  - http://www.acm.org/sigcomm
  - http://www.computer.org
  - http://www.comsoc.org