Hardware, Software and Networking

Software

System

Aplication

Hardware

By

P.J.Reginald M.Tech(PhD)

Dept of ECE

Vignan University

Guntur

Introduction

- Hardware is a physical part/ device used in the machine

Ex: Monitor, keyboard, computer data storage, hard disk drive (HDD), graphic card, sound card, memory (RAM), motherboard etc

- Software is a collection of code installed onto your computer's hard drive.

Or

- A general term for the various kinds of programs used to operate computers and related devices

Ex: Browser

Introduction

- All software utilizes at least one hardware device to operate.

  For example, a video game, which is software, uses the computer processor CPU, memory RAM, hard drive and video card to run.
- Word processing software uses the computer processor, memory, and hard drive to create and save documents.

Categories of Hardware

- Input Device
- Output device
- Storage device
- Central processing unit (CPU)
- Telecommunications device
- Connecting device

Input Devices-Scanner, Keyboard

Output devices-Ex: Printer, Monitor

Storage devices

Memory devices

- Main memory is divided into two parts

  Random Access memory (RAM),
  Read Only Memory (ROM)

  Random Access Memory or RAM is a form of data storage that can be accessed randomly at any time, in any order and from any physical location., allowing quick access and manipulation.

  Read-only memory or ROM is also a form of data storage that can not be easily altered or reprogrammed.

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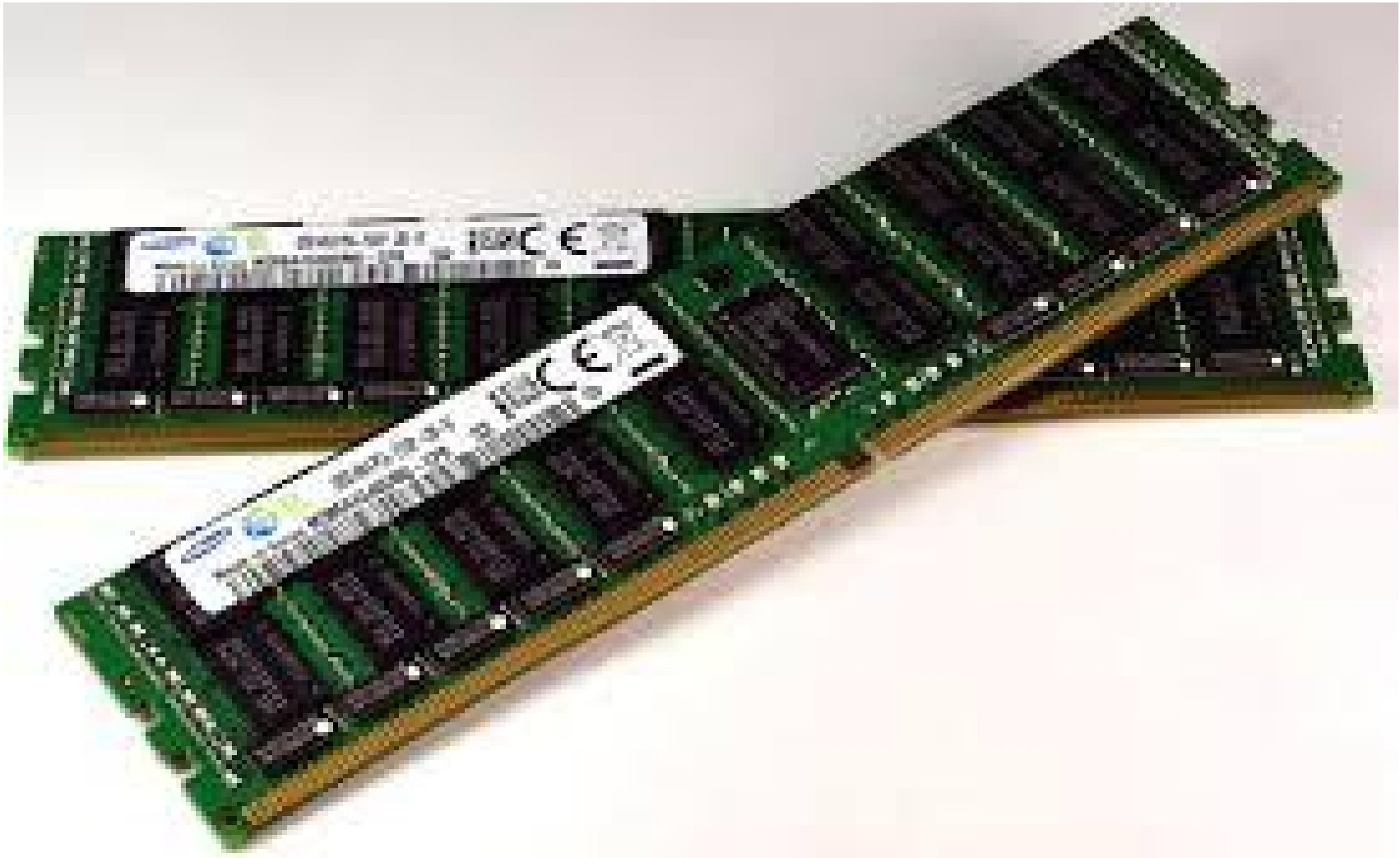
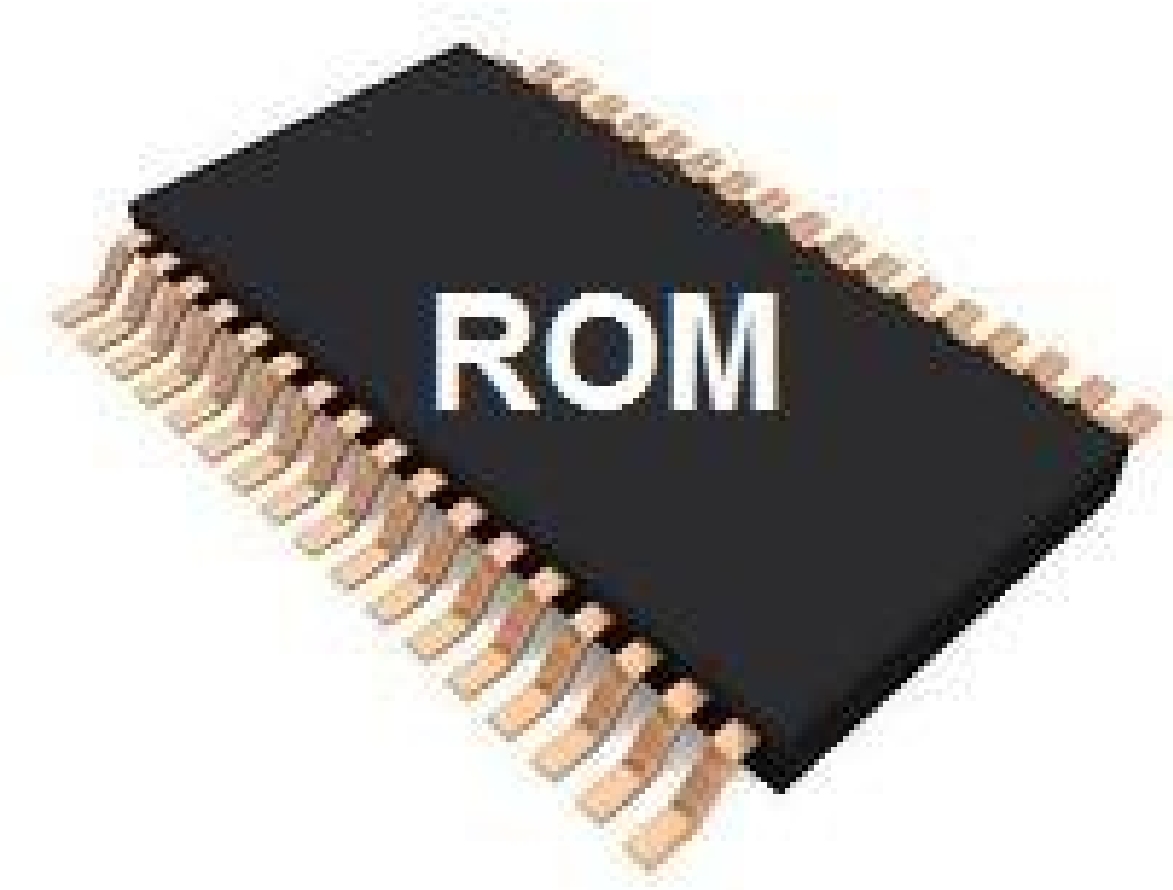
RAM



ROM



RAM

- A RAM memory chip is an integrated circuit (IC) made of millions of transistors and capacitors.

  In the most common form of computer memory, dynamic random access memory (DRAM), a transistor and a capacitor are combines to create a memory cell, which represents a single bit of data

- STATIC RAM

  Semi conductor memory.

  Uses flip flop to store each bit of memory so does not need to be periodically refreshed

  Fast and consumes low power

  Expensive and has complex structure(6 transistors) so not used for high capacity applications

- DYNAMIC RAM

  Stores each bit of memory in capacitor in an intrgrated circuit

  Real capacitors leak charge so capacitors need to be refreshed periodically

  Simple structure (1 capacitor and 1 transistor per bit) so it has very high density

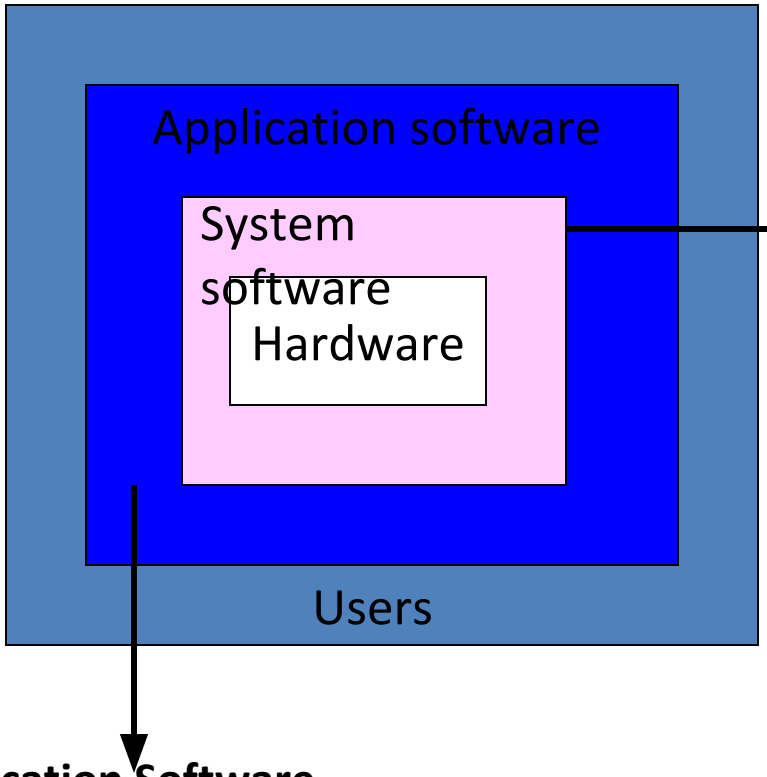
Software

- Computer hardware is useless without software.
- Software is the set of instructions and associated data that direct the computer to do a task.
- Software can be divided into two categories:

  System software

  Application software.
- System software helps the computer to carry out its basic operating tasks.
- Application software helps the user carry out a variety of tasks.

software



System Software

Operating Systems

Schedules computer events

Allocates computer resources

Monitor events

Language translators

Interpreters

Compilers

Application Software

Programming languages

Assembly language

FORTRAN, BASIC, PL/1

PASCAL, C

"4th generation " languages

Utility programs

Routine operations (e.g. sort, list, print)

Manage data (e.g. create files, merge files

System Software

- Manages the fundamental operations of the computer, such as
- - loading programs and data into memory, executing programs,
- saving data to disks,
- displaying information on the monitor, and transmitting data through a port to a peripheral device.

Operating System

- Collection of computer programs that control the interaction of the user and the computer hardware.
- Responsible for directing all computer operations and managing all computer resources.
- Controls basic input and output, allocates system resources, manages storage space, maintains security, and detects equipment failure.
- A part of the operating system code is stored in a ROM and the rest of it resides on a disk.
- Loading the operating system into memory is called booting the computer.

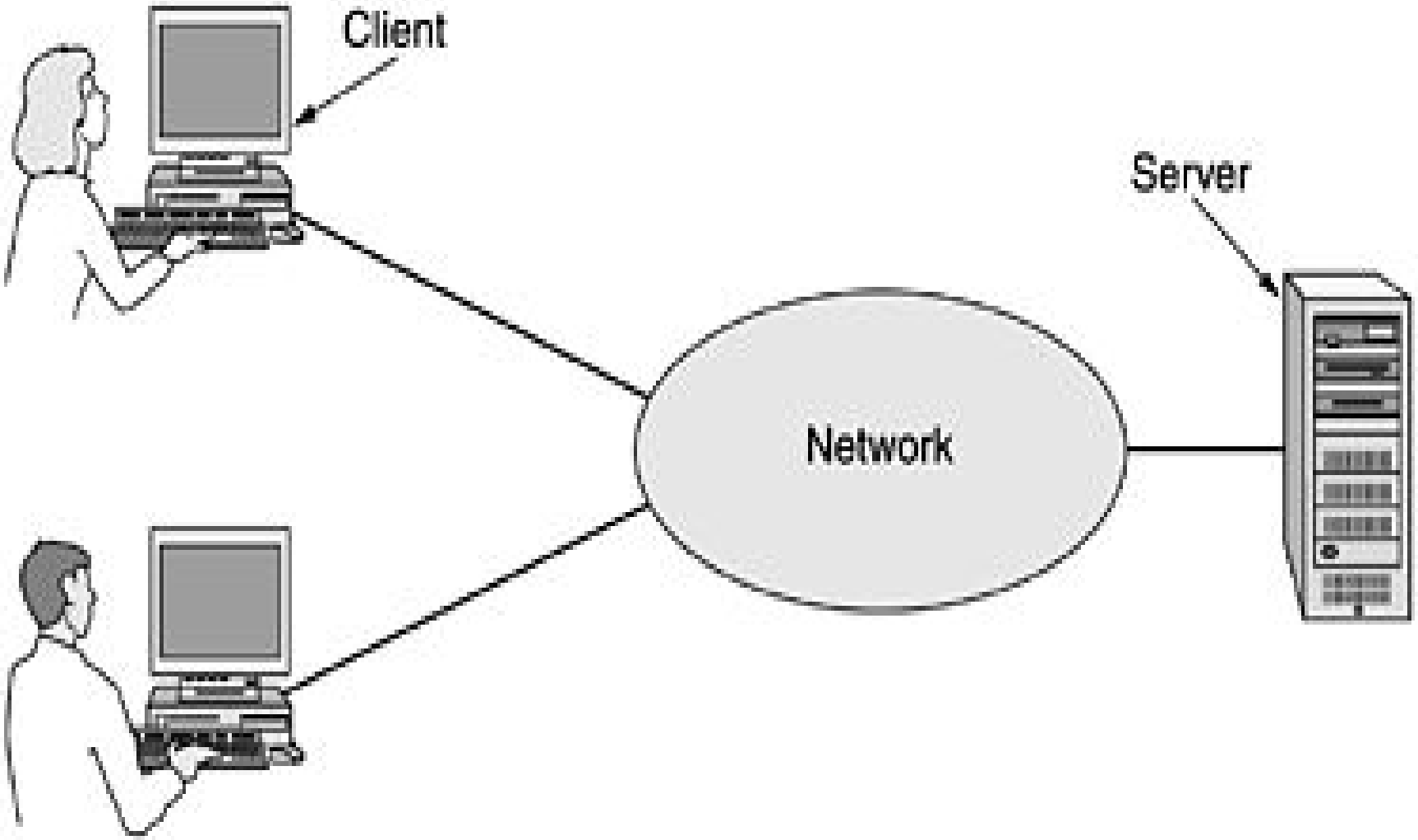
Application software

- Developed for a specific task , such as word processing(MS Word/ WordPerfect), accounting (Lotus 1-2-3/ Excel), or database management (Access/ dBASE).
- We also use graphics and presentation software.
- Most applications are purchased on diskette or CD-ROM.
- They are installed by copying the programs from the diskettes/CD-ROM to the hard disk.

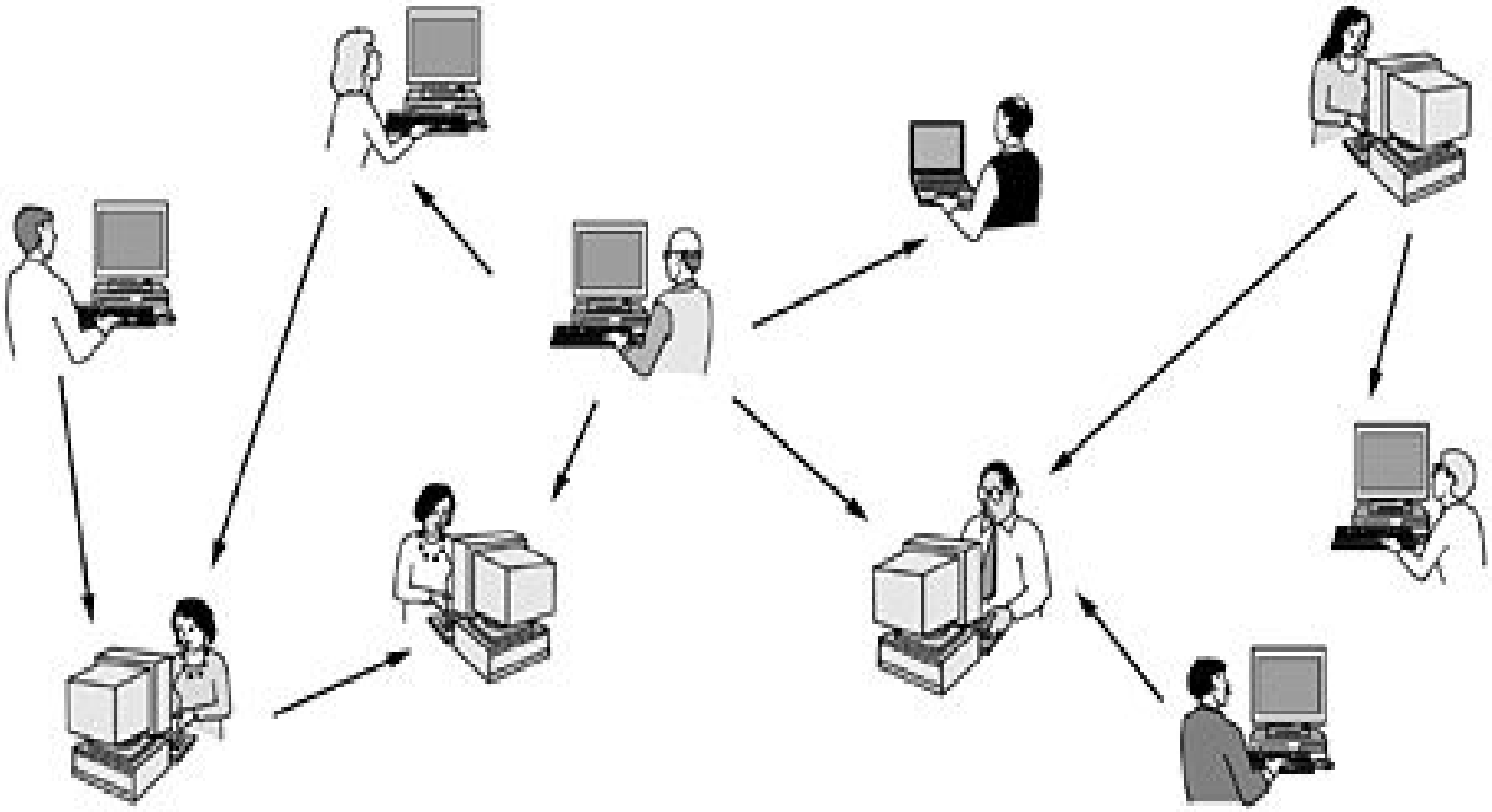
NETWORKING

- ''computer network'' to mean a collection of autonomous computers interconnected by a single technology.
- Two computers are said to be interconnected if they are able to exchange information.
- The connection can be via a copper wire; fiber optics, microwaves, infrared, and communication satellites can also be used.
- Networks come in many sizes, shapes and forms

Client-server model



Peer to Peer systems(No client no server)



Applications of Networks

- **Resource Sharing**
  - Hardware (computing resources, disks, printers)
  - Software (application software)
- **Information Sharing**
  - Easy accessibility from anywhere (files, databases)
  - Search Capability (WWW)
- **Communication**
  - Email
  - Message broadcast
- **Remote computing**
- **Distributed processing (GRID Computing)**

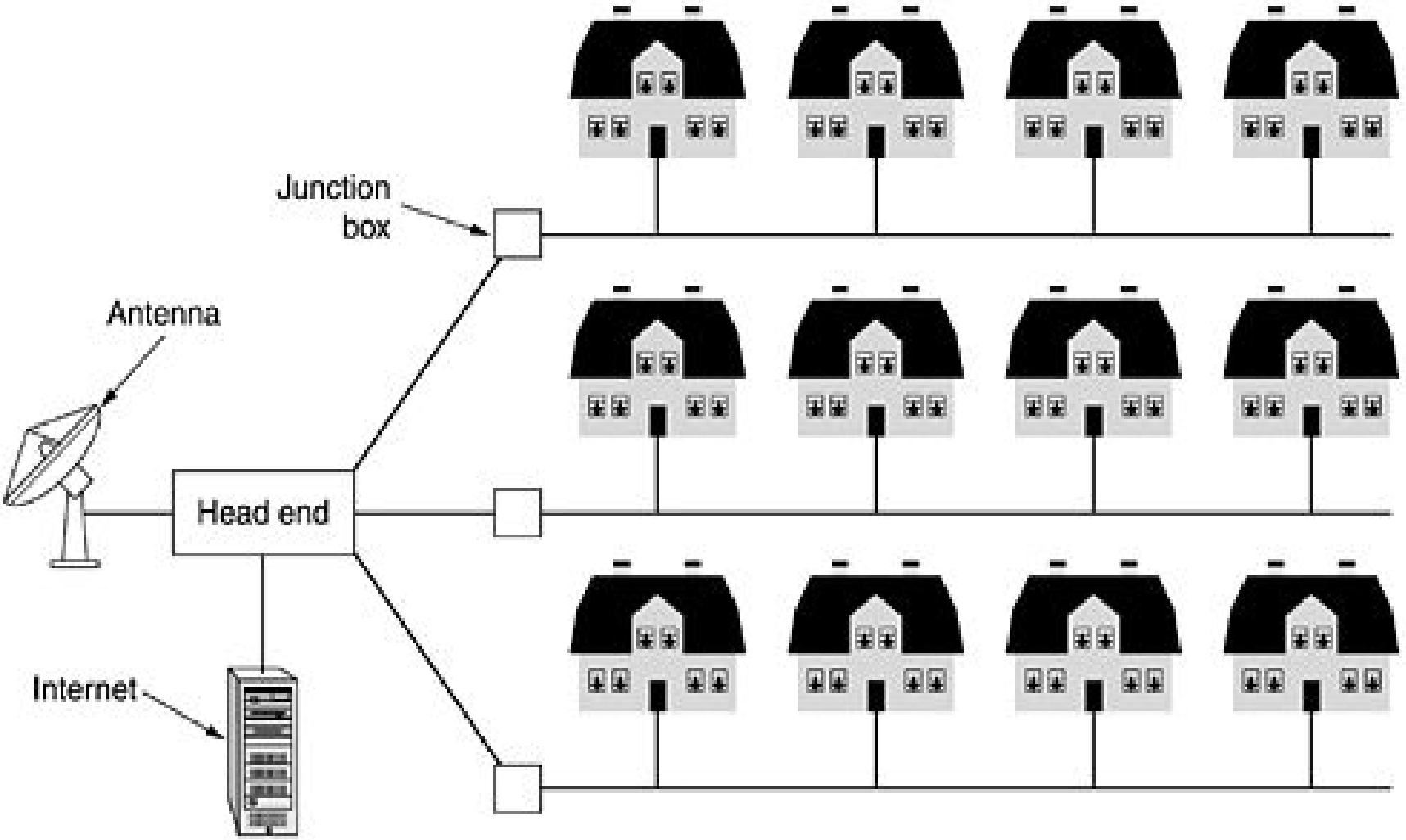
Networking Applications-Summary

- E-mail
- Searchable Data (Web Sites
- E-Commerce
- News Groups
- Internet Telephony (VoIP)
- Video Conferencing
- Chat Groups
- Instant Messengers
- Internet Radio

LAN, MAN & WAN

- Network in small geographical Area (Room, Building or a Campus) is called LAN (Local Area Network)
- Network in a City is call MAN (Metropolitan Area Network)
- Network spread geographically (Country or across Globe) is called WAN (Wide Area Network)

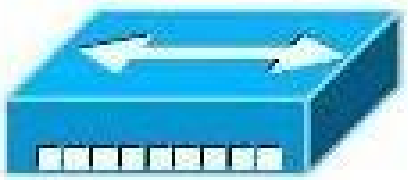
A metropolitan area network based on cable TV



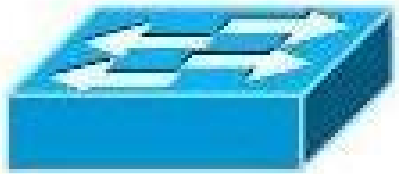
Networking Devices

- HUB, Switches, Routers, Wireless Access Points, Modems etc.

Networking Devices

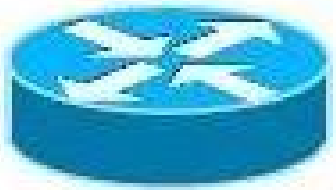


Hub



Switch

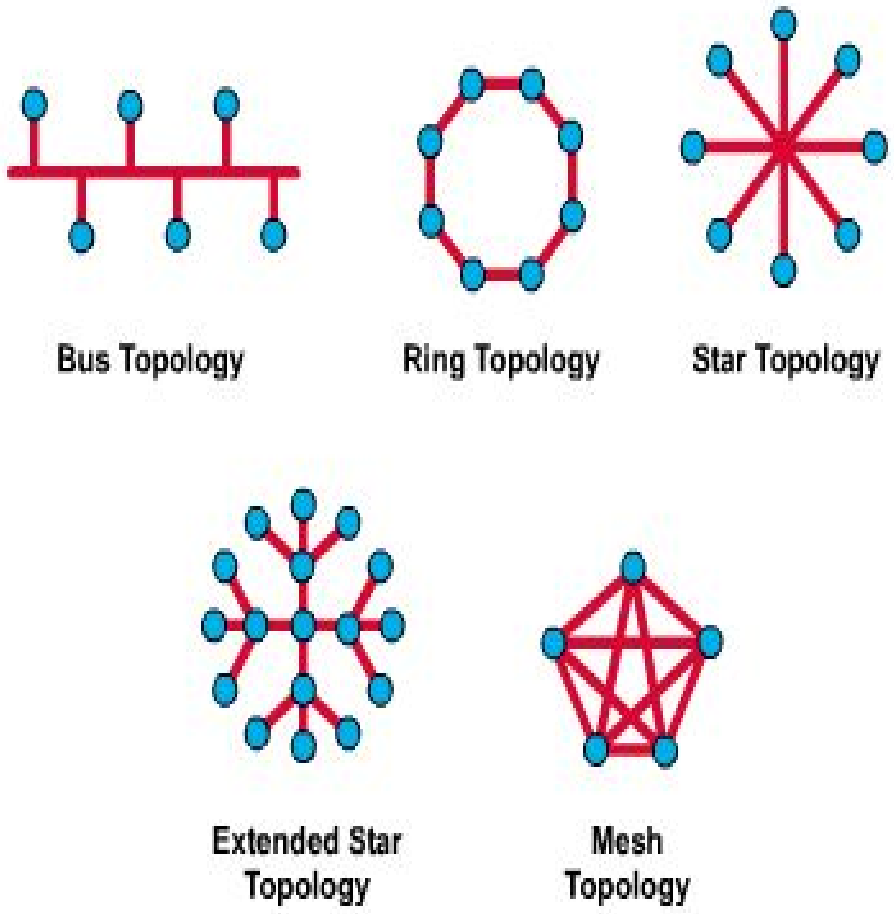
Bridge



Router

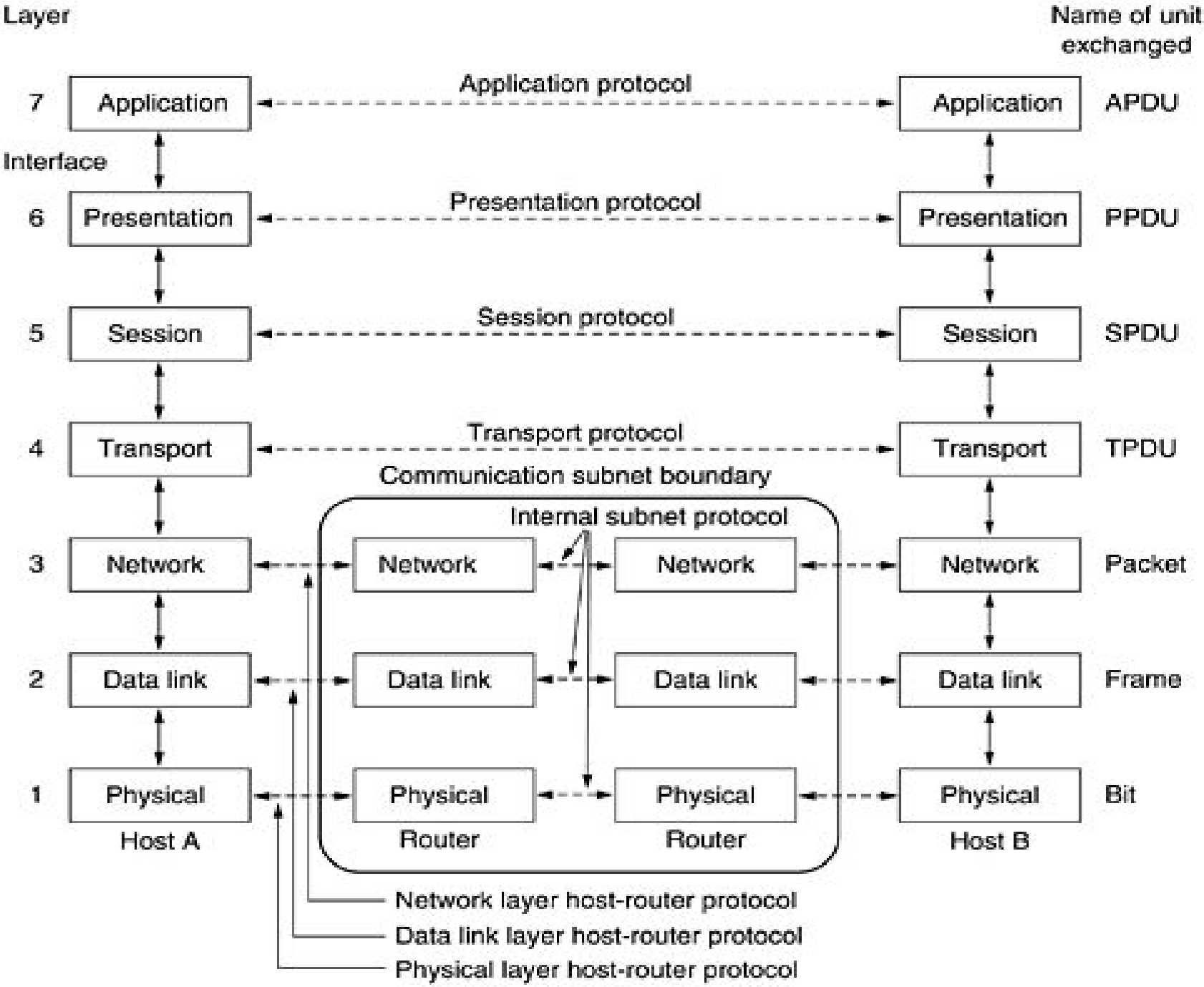
Network Topology

- The network topology defines the way in which computers, printers, and other devices are connected.
- A network topology describes the layout of the wire and devices as well as the paths used by data transmissions.



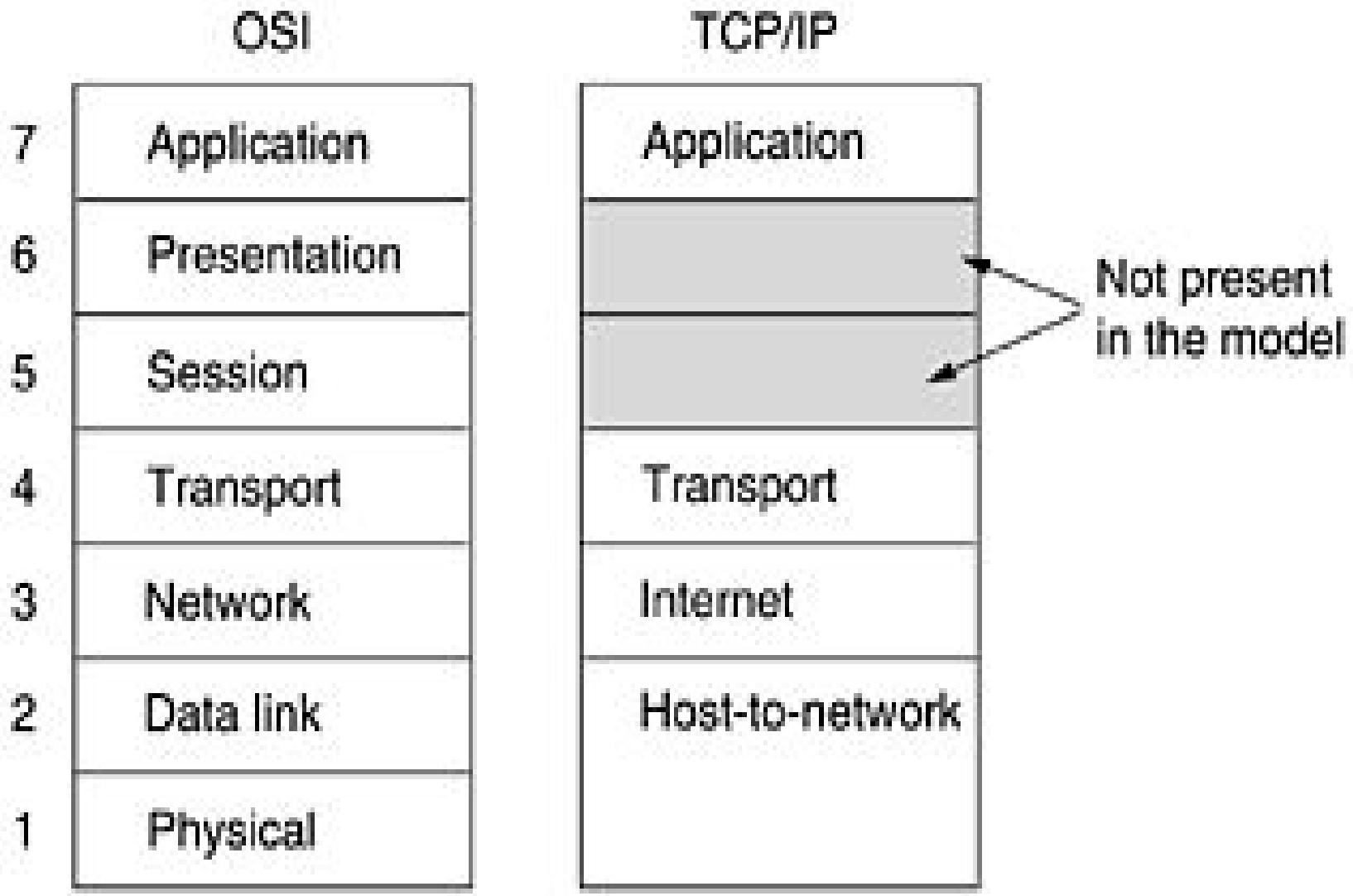
OSI Model

- Open Systems Interconnection (OSI)
- Each layer support the layers above it and offers services to the layers below
- Each layer performs unique and specific task
- A layer only has knowledge of its neighbour layers only
- A layer service is independent of the implementation

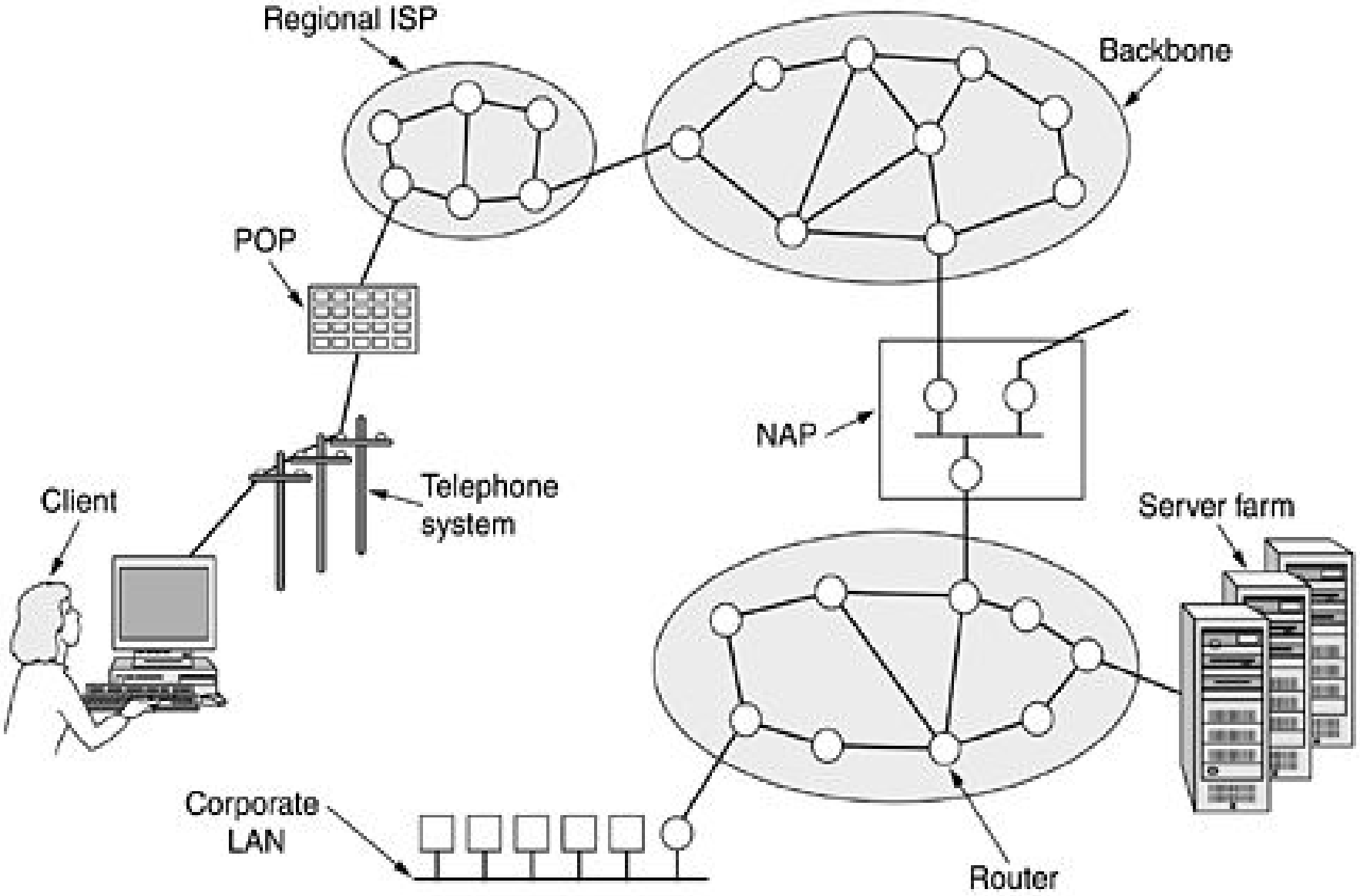

Layer
Name of unit exchanged
7
Application
Application protocol
Application
APDU
Interface
6
Presentation
Presentation protocol
Presentation
PPDU
5
Session
Session protocol
Session
SPDU
4
Transport
Transport protocol
Transport
TPDU
Communication subnet boundary
Internal subnet protocol
3
Network
Network
Network
Network
Packet
2
Data link
Data link
Data link
Data link
Frame
1
Physical
Physical
Physical
Physical
Bit
Host A
Router
Router
Host B
Network layer host-router protocol
Data link layer host-router protocol
Physical layer host-router protocol

TCP/IP model

(Transmission control Protocol/Internet protocol model)


OSI
TCP/IP
7
Application
6
Presentation
5
Session
4
Transport
3
Network
2
Data link
1
Physical
Application
Transport
Internet
Host-to-network
Not present
in the model

Overview of the Internet



- A good place to start is with a client at home. Let us assume our client calls his or her ISP over a dial-up telephone line,

- The modem is a card within the PC that converts the digital signals the computer produces to analog signals that can pass unhindered over the telephone system.

- These signals are transferred to the ISP's POP (Point of Presence), where they are removed from the telephone system and injected into the ISP's regional network.

- From this point on, the system is fully digital and packet switched. If the ISP is the local telco, the POP will probably be located in the telephone switching office where the telephone wire from the client terminates.

- If the ISP is not the local telco, the POP may be a few switching offices down the road
- The ISP's regional network consists of interconnected routers in the various cities the ISP serves.
- If the packet is destined for a host served directly by the ISP, the packet is delivered to the host. Otherwise, it is handed over to the ISP's backbone operator.

Thank you