

Computer Networks (CSE 3205)

BOOK LIST

1. Computer Networks by Andrew S. Tanenbaum
2. Data Communications and Networking by Behrouz A. Forouzan
3. Cryptography and Network Security by Stallings

WHAT IS COMPUTER NETWORK?

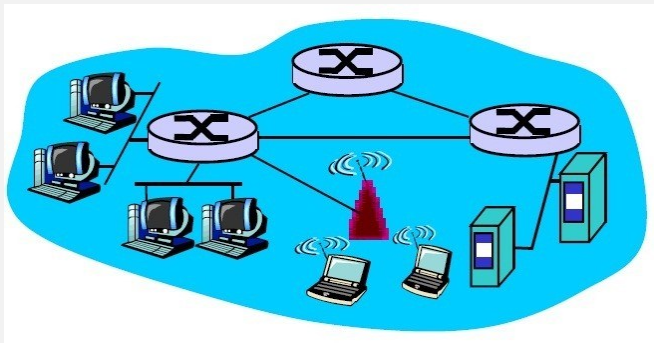
- A computer network is a **group** of computer systems and other computing hardware devices that are linked together through communication channels to facilitate **communication** and **resource-sharing** among a wide range of users.¹

¹<https://www.techopedia.com/definition/25597/computer-network> = >

WHAT IS COMPUTER NETWORK?

We use **Computer network** to mean,

A collection of **autonomous computers** *interconnected* by a **single technology** with **networking device(s)**. Two computers are said to be interconnected if they are **able to exchange information**.

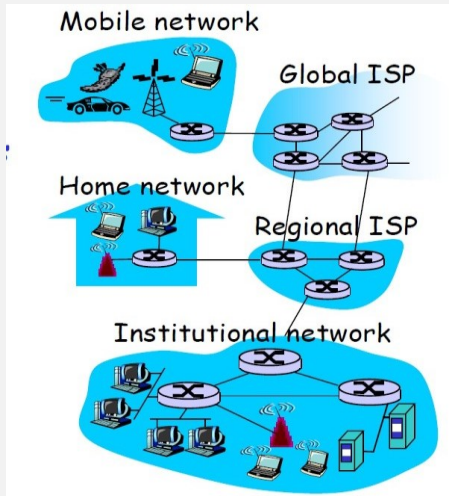


DIFFERENCES OF COMPUTER NETWORK AND DISTRIBUTED SYSTEM

- **Computer Network:** A collection of autonomous computers interconnected by a single technology with networking device(s).
- **Distributed System:** A collection of autonomous, independent computers appears to its users as a single coherent system. Usually, it has a single model or paradigm that it presents to the users. Often a layer of software on top of the operating system, called middleware, is responsible for implementing this model.
 - Example: World Wide Web (WWW)
- In a computer network, this coherence, model, and software are absent

WHAT IS INTERNET?

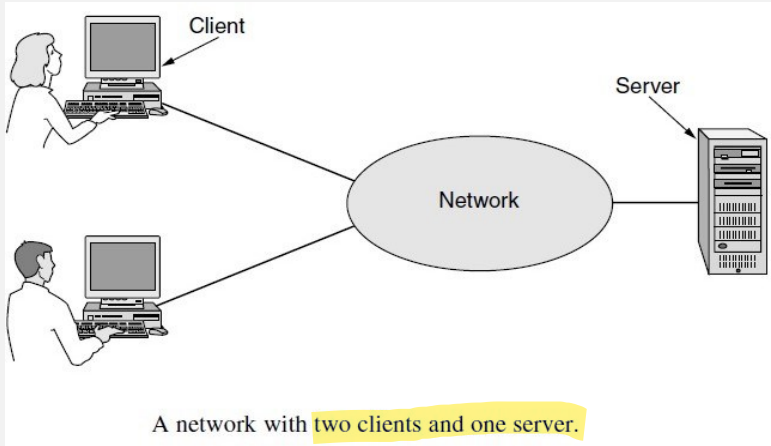
A network of networks.



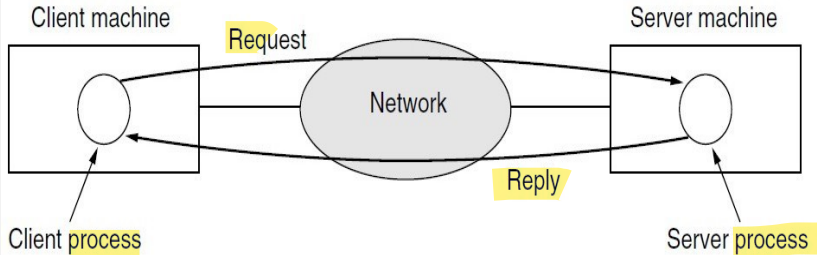
I.1 USES OF COMPUTER NETWORK

1. Business Application: Resource Sharing , VoIP
(Voice over IP) IPTV
2. Home Applications: Peer to Peer Communication
3. Mobile Users:
4. Social Issues: Email service, Social networking

FUNDAMENTAL OF COMMUNICATION

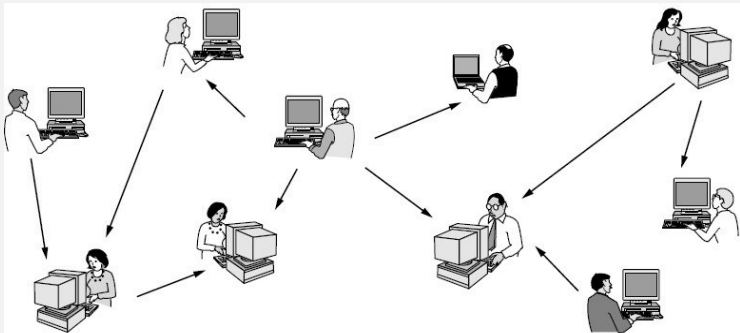


FUNDAMENTAL OF COMMUNICATION



The client-server model involves requests and replies.

FUNDAMENTAL OF COMMUNICATION



In a peer-to-peer system there are no fixed clients and servers.

1.2 NETWORK HARDWARE:

Broadly speaking, there are two types of **transmission technology** that are in widespread use.

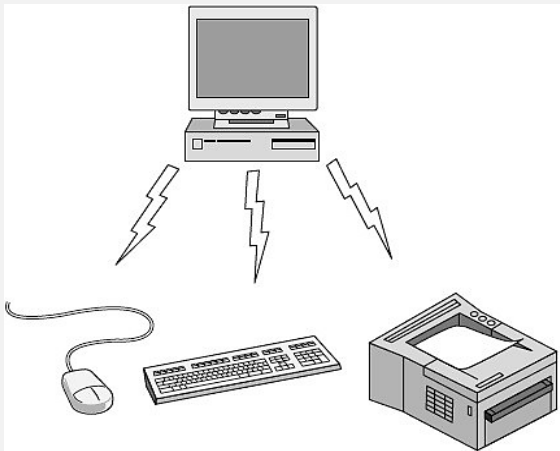
1. **broadcast** links (Broadcast System)
2. **point-to-point** links (**Unicast** System)

CLASSIFICATION OF NETWORK

Interprocessor distance	Processors located in same	Example
1 m	Square meter	Personal area network
10 m	Room	Local area network
100 m	Building	
1 km	Campus	
10 km	City	Metropolitan area network
100 km	Country	Wide area network
1000 km	Continent	
10,000 km	Planet	The Internet

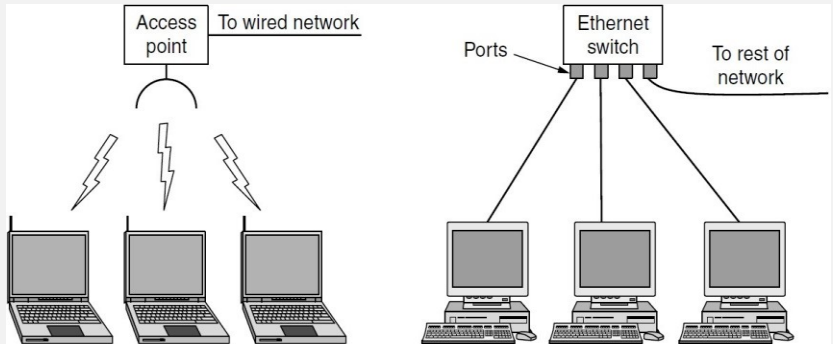
Classification by scale.

CLASSIFICATION OF NETWORK



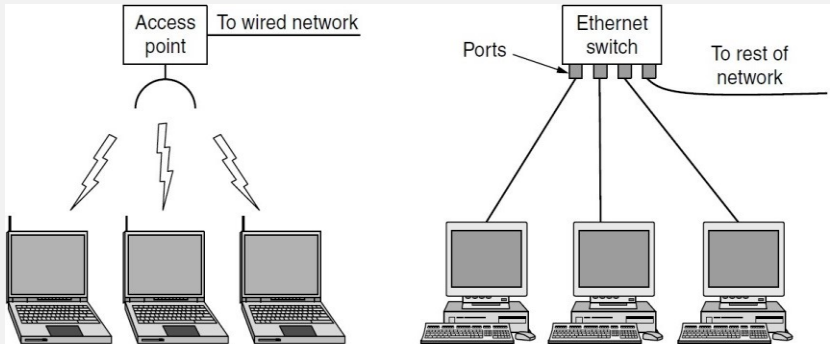
Bluetooth PAN configuration.

CLASSIFICATION OF NETWORK



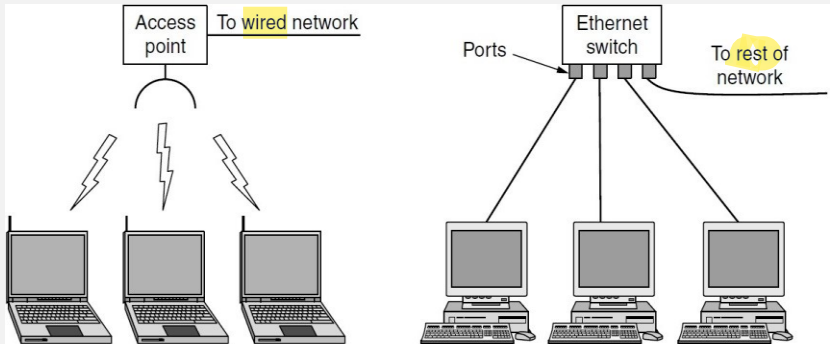
Wireless and wired LANs. (a) 802.11. (b) Switched Ethernet.

CLASSIFICATION OF NETWORK



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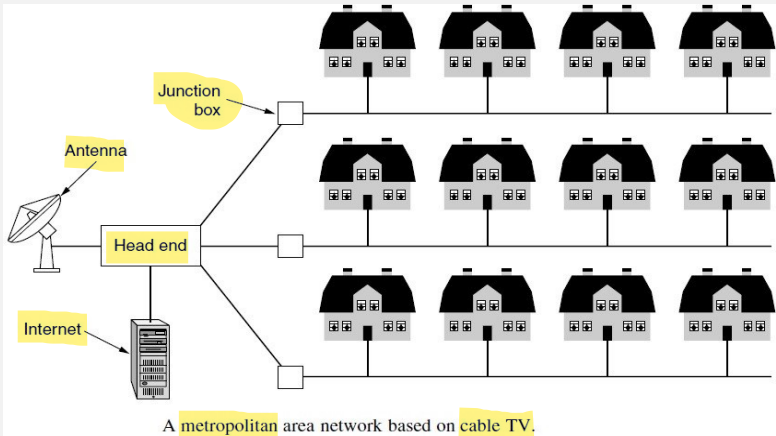
CLASSIFICATION OF NETWORK

CAN(Campus Area Network)

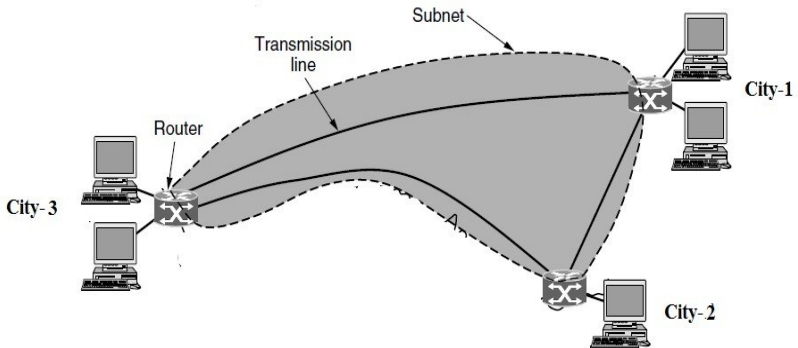
- A campus network, campus area network, corporate area network or CAN is a computer network made up of an **interconnection of local area networks (LANs)** within a **limited** geographical area.²

²https://en.wikipedia.org/wiki/Campus_network

CLASSIFICATION OF NETWORK



CLASSIFICATION OF NETWORK



WAN that connects three branch offices in Australia.

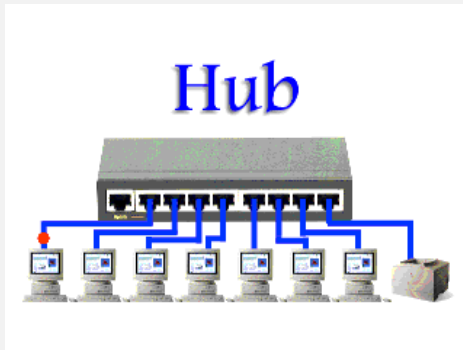
INTERNETWORKING DEVICES

- Descending in increasing power and complexity
 - Hubs
 - Bridges
 - Switches
 - Routers
 - Gateways

HUB

A hub interconnects **two or more workstations** into a **local area network**. A simple interconnecting device that requires **no overhead** to operate.

When a workstation transmits to a hub, the hub immediately **resends** the **data frame** out **all connecting links**.



BRIDGES

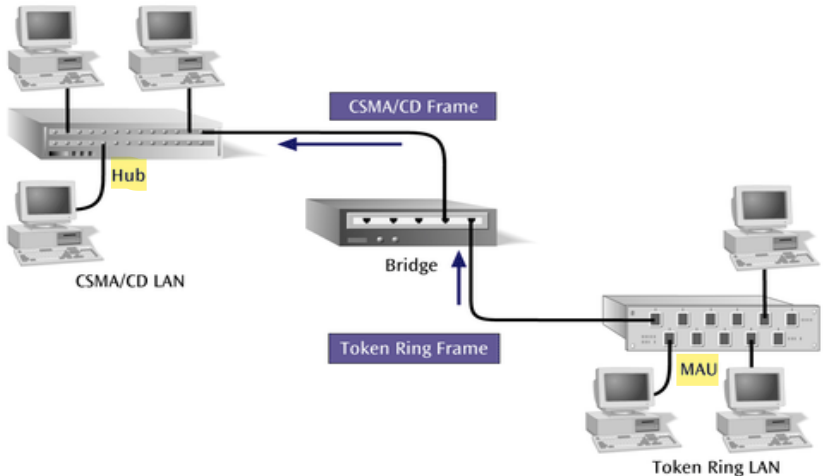
A **bridge** can be used to **connect two similar LANs**, such as two CSMA/CD LANs.

A bridge can also be used to **connect two closely similar LANs**, such as a CSMA/CD LAN and a **token ring LAN**.

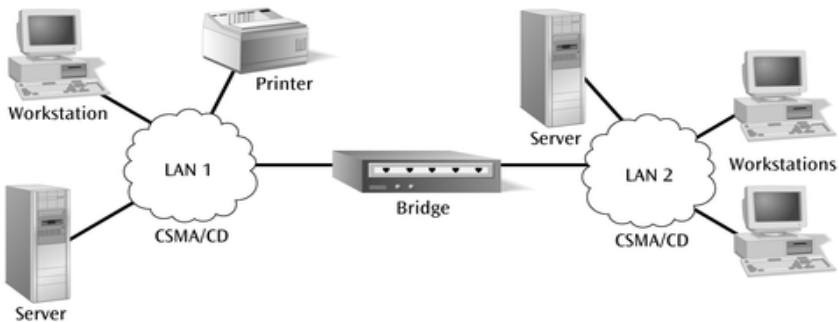
The bridge **examines the destination address in a frame** and either **forwards** this frame onto the **next LAN** or does **not**.

The bridge examines the **source address in a frame** and places this **address in a routing table**, to be used **for future routing decisions**.

A BRIDGE INTERCONNECTING TWO DISSIMILAR LANS



BRIDGE INTERCONNECTING TWO IDENTICAL LANS



SWITCHES

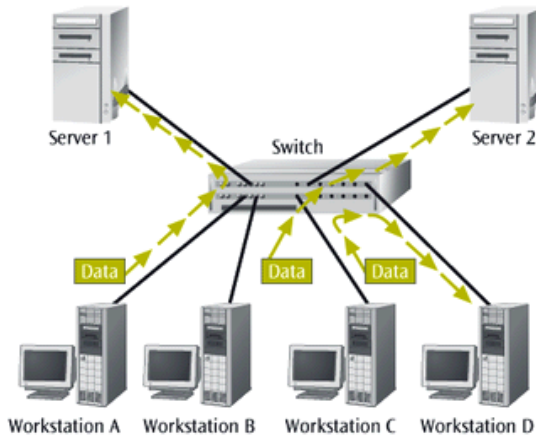
A switch is a combination of a hub and a bridge.

It can interconnect two or more workstations, but like a bridge, it **observes traffic flow and learns.**

When a frame arrives at a switch, the switch **examines the destination address** and forwards the frame out the one necessary connection.

- Workstations that connect to a hub are on a *shared segment*.
- Workstations that connect to a switch are on a *switched segment*.

Switch Example



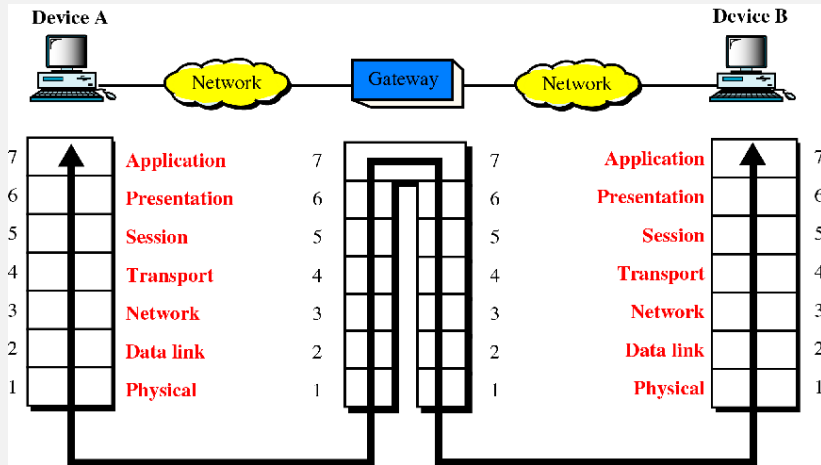
ROUTERS

Thus, routers are often called “**layer 3** devices”. They operate at the third layer, or OSI **network layer**, of the **packet**.

Routers often **incorporate** **firewall** functions.

An example of a router's operation is shown on the next slide.

GATEWAYS (PROTOCOL CONVERTER)



SUMMARY



1. Overview of the OSI Model
2. Computer Network vs Distributed
3. Application of Computer Network
4. System Classification of Network
5. Internetworking devices

ACKNOWLEDGEMENT

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