

# 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.<sup>1</sup>

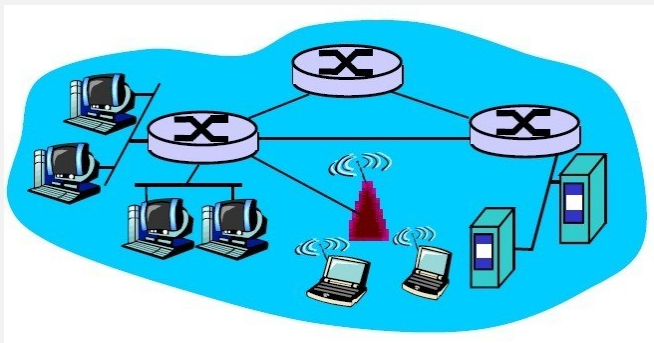
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<sup>1</sup><https://www.techopedia.com/definition/25597/computer-network> = >

# 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.

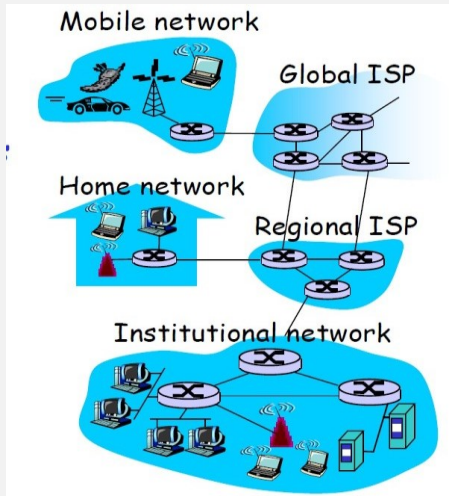


## DIFFERENCES OF COMPUTER NETWORK AND DISTRIBUTED SYSTEM

- **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?

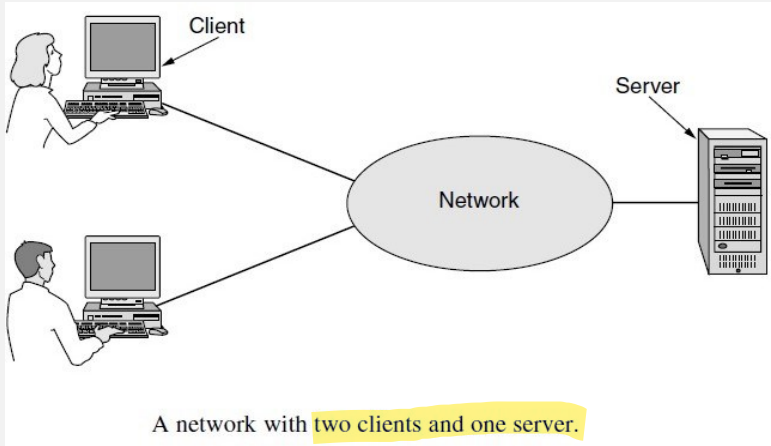
A network of networks.



## I.I USES OF COMPUTER NETWORK

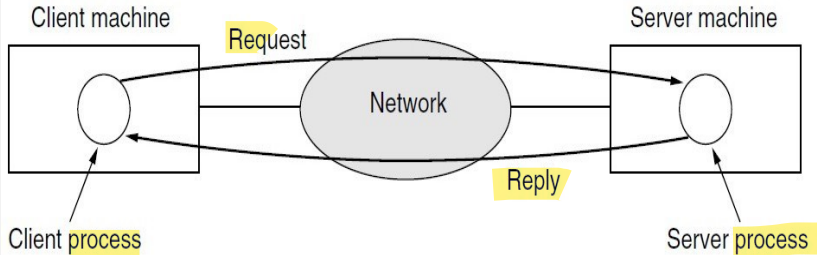
1. Business Application: Resource Sharing , VoIP  
(Voice over IP) IPTV
2. Home Applications: Peer to Peer Communication
3. Mobile Users:
4. Social Issues: Email service, Social networking

# FUNDAMENTAL OF COMMUNICATION



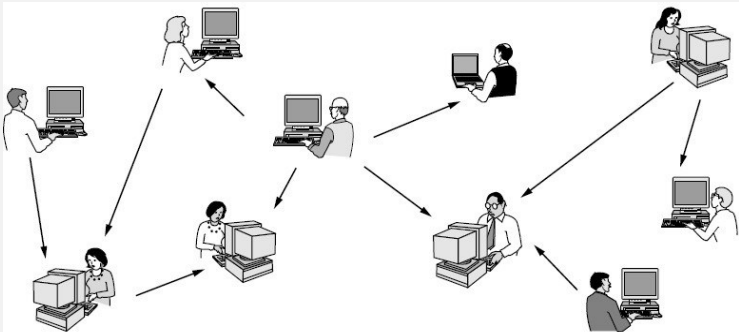


# FUNDAMENTAL OF COMMUNICATION



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.

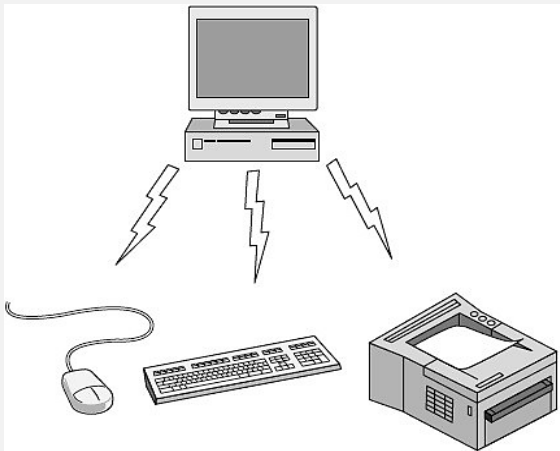
1. **broadcast** links (Broadcast System)
2. **point-to-point** links (**Unicast** System)

# 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

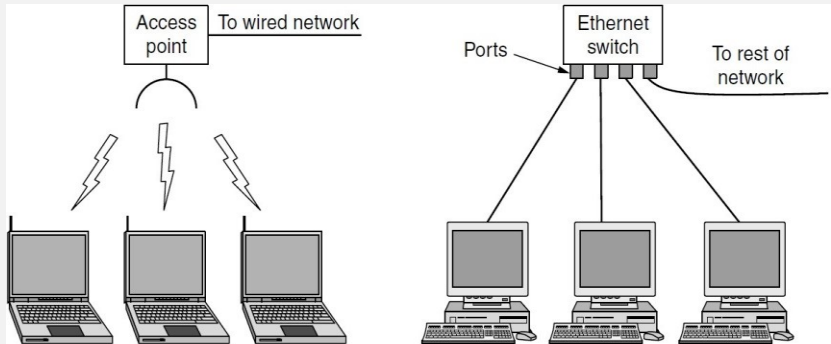
Classification by scale.

# CLASSIFICATION OF NETWORK



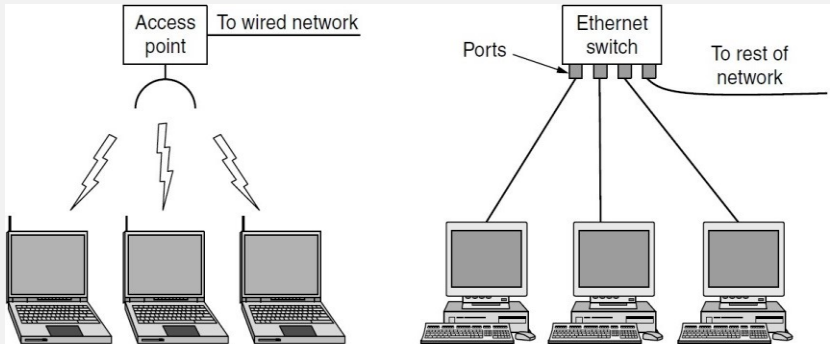
Bluetooth PAN configuration.

# CLASSIFICATION OF NETWORK



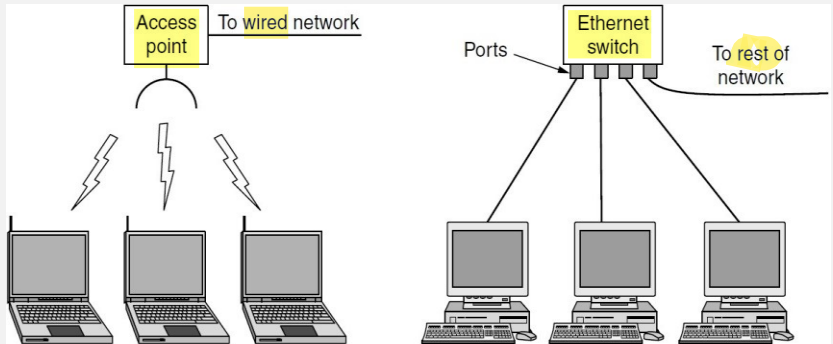
Wireless and wired LANs. (a) 802.11. (b) Switched Ethernet.

# CLASSIFICATION OF NETWORK



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

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## CLASSIFICATION OF NETWORK

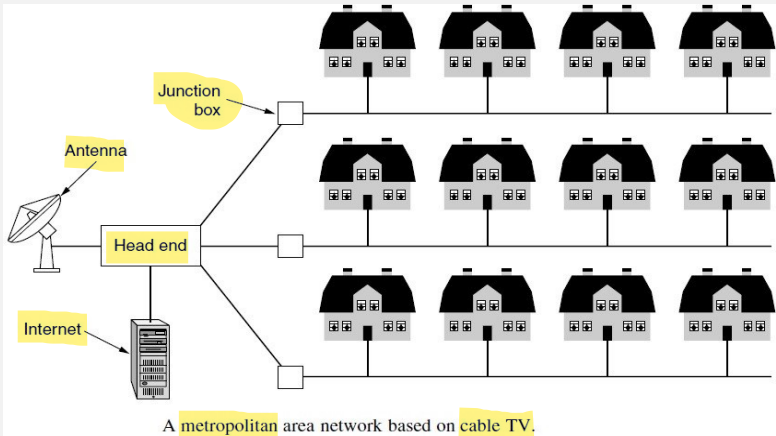
### CAN(Campus Area Network)

- 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**.<sup>2</sup>

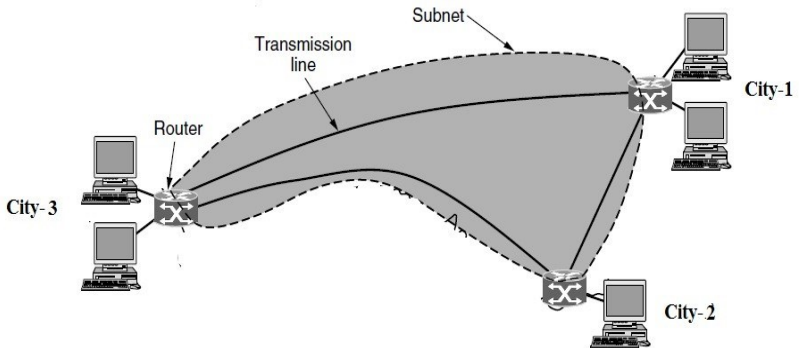
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<sup>2</sup>[https://en.wikipedia.org/wiki/Campus\\_network](https://en.wikipedia.org/wiki/Campus_network)

# CLASSIFICATION OF NETWORK



# CLASSIFICATION OF NETWORK



WAN that connects three branch offices in Australia.

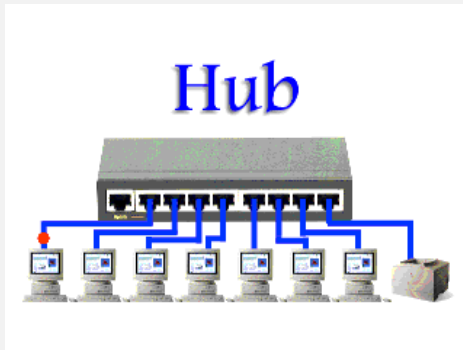
## INTERNETWORKING DEVICES

- 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

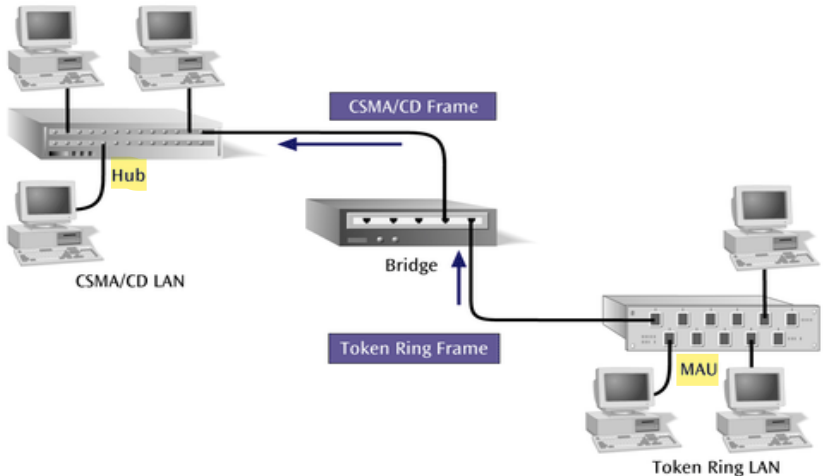
A **bridge** can be used to **connect two similar LANs**, such as two CSMA/CD LANs.

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

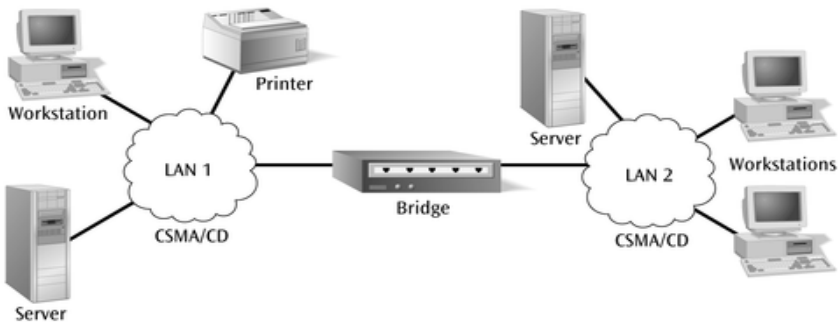
The bridge **examines the destination address in a frame** and either **forwards** this frame onto the **next LAN** or does **not**.

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

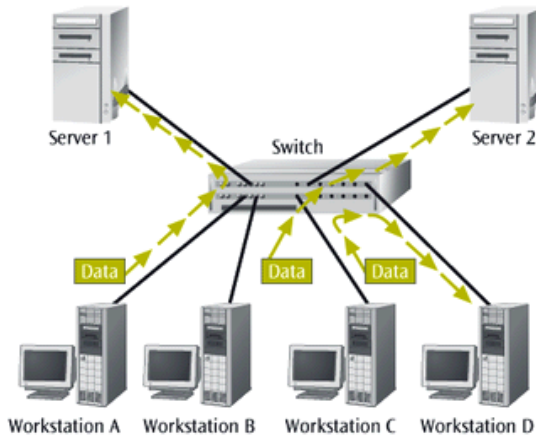
A switch is a combination of a hub and a bridge.

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



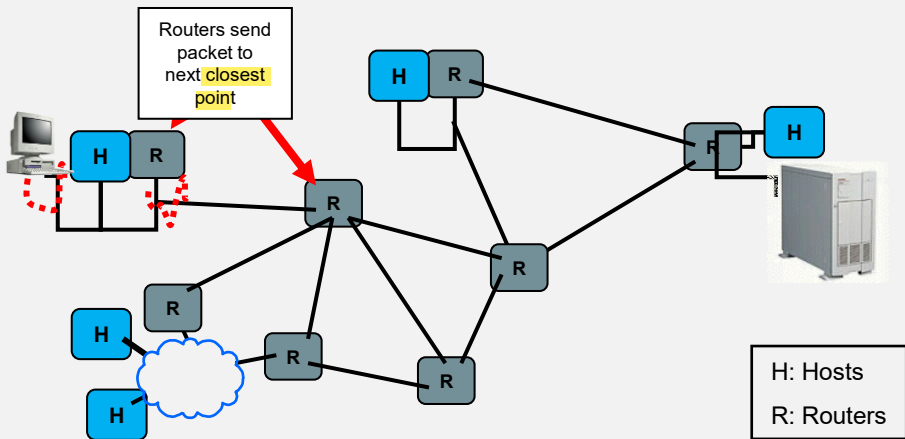
## ROUTERS

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

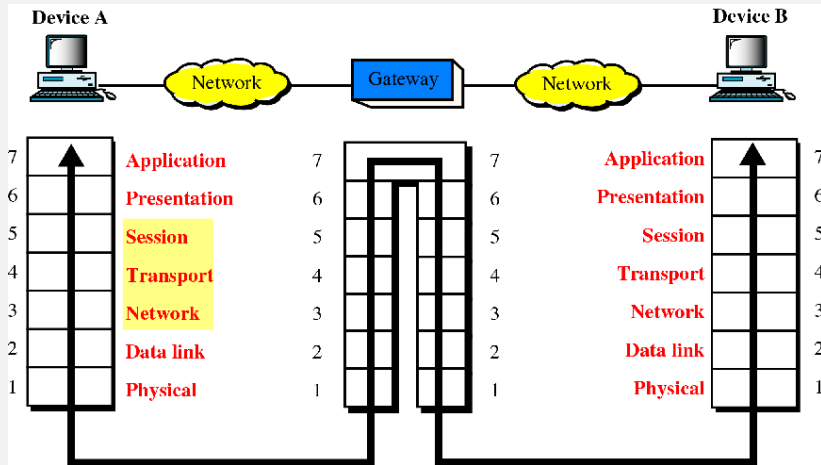
Routers often **incorporate** **firewall** functions.

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

# Routers example



# 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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