# Module 1: Introduction to Networking

# Scope of a Network

- Networking is everywhere.
- Networks support the way we learn and gives a new dimension to our cognizance.
- Networks support the way we communicate.
- Network support the way we work.
- Networks provide a pathway to transfer information.

# Background

- Merging of computers and communications has had a profound influence on the way computer systems are organized.

- Once-dominant concept of the "computer centre" as a room with a large computer to which users bring their work for processing is now totally obsolete (although data centres holding thousands of Internet servers are becoming common).

- The old model of a single computer serving all of the organization's computational needs has been replaced by one in which a large number of separate but interconnected computers do the job.

- These systems are called **computer networks**.

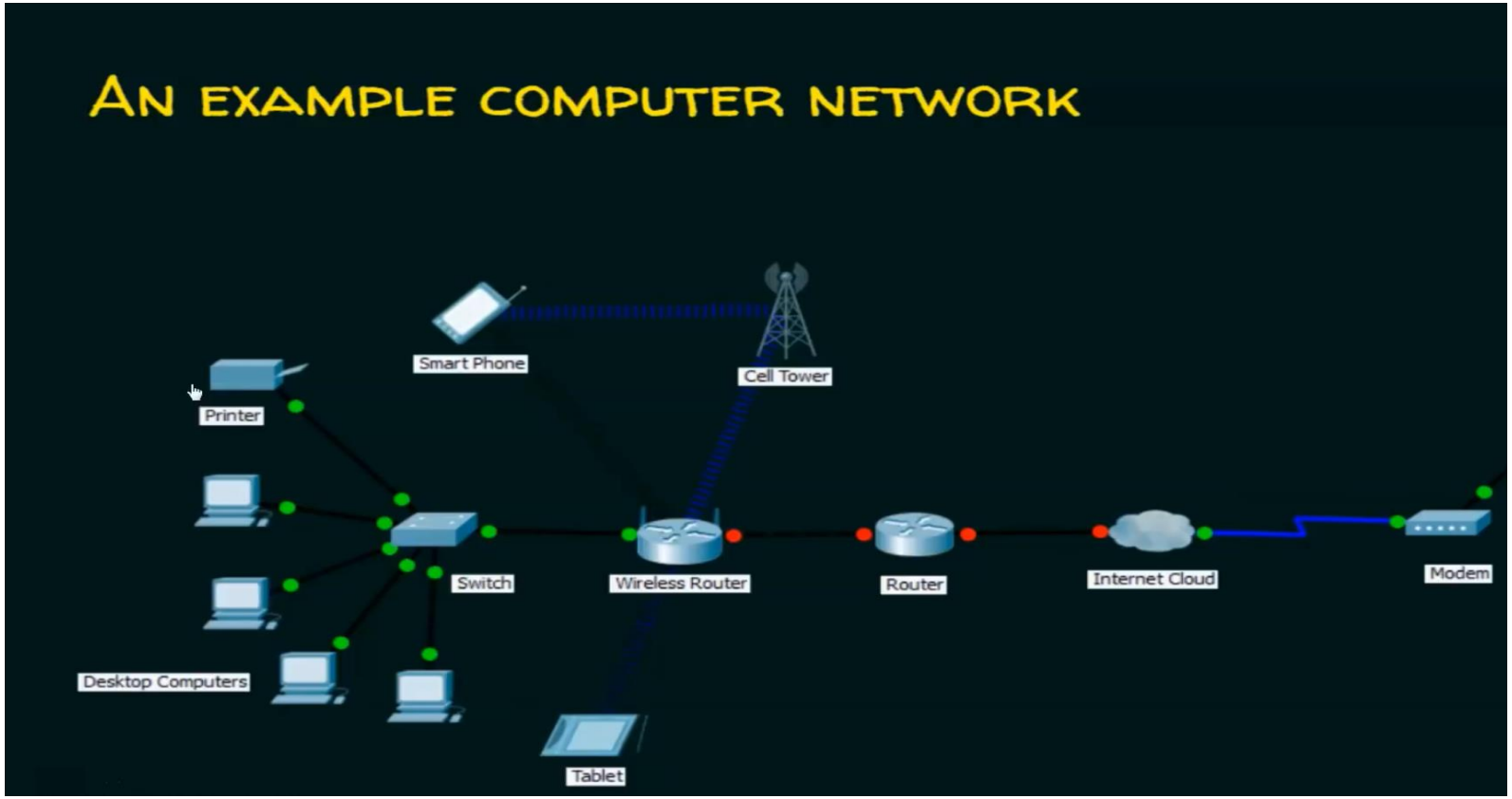
# Definition of “Computer Networks”

- A Computer network is a set of nodes connected by communication links.

Node: A device capable of sending or receiving data

Communication Links: A medium to transfer the information

- A computer network is a set of computers connected together to share information



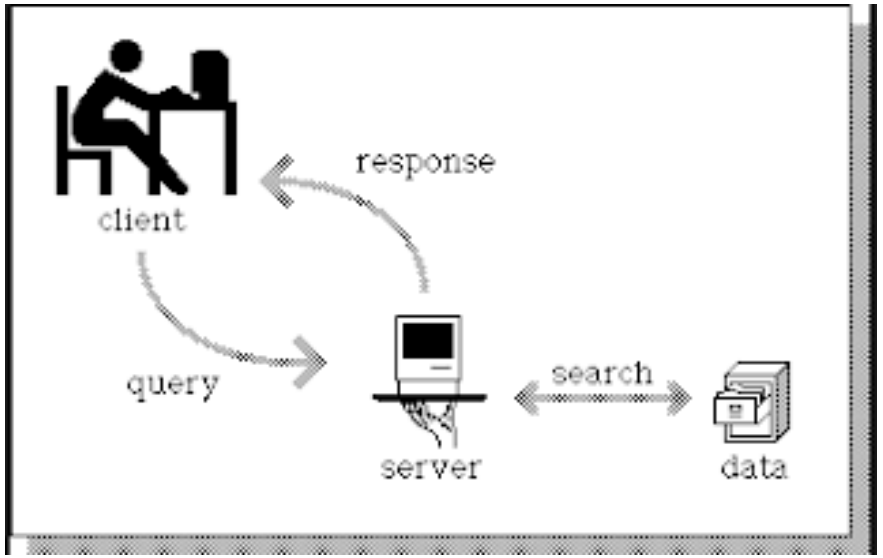

Main goals of Computer Network:

- To facilitate Resource Sharing.
- To save Infrastructural costs.

# What do Computer Networks do ?

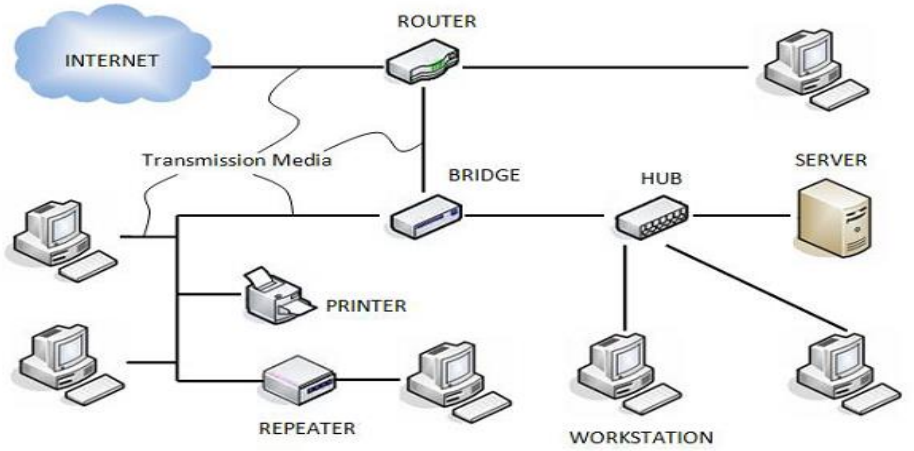
Computer networks carry a large number of tasks through the sharing information.

- Communicating via email, video, instant messaging etc.
- Sharing devices such as printers, scanners and photocopiers.
- Sharing operating systems, files and software on remote systems.
- Allow the network users to easily access and maintain information.



# Components of computer network

- Computer networks components comprise both physical parts as well as the software required for installing computer networks, both at organizations and at home.
- The hardware components are the server, client, peer, transmission medium, and connecting devices. The software components are operating system and protocols.




COMPUTER NETWORK COMPONENTS

# Hardware Components

1. Servers
2. Clients
3. Peers
4. Transmission Media
5. Connecting Devices − Connecting devices act as middleware between networks or computers, by binding the network media together. Some of the common connecting devices are:
6. Routers
7. Bridges
8. Hubs
9. Repeaters
10. Gateways
11. Switches

# Software Components

- **Networking Operating System** − Network Operating Systems is typically installed in the server and facilitate workstations in a network to share files, database, applications, printers etc.
- **Protocol Suite** − A protocol is a rule or guideline followed by each computer for data communication. Protocol suite is a set of related protocols that are laid down for computer networks. The two popular protocol suites are −
  - OSI Model ( Open System Interconnections)
  - TCP / IP Model

# Network Devices

1. **NIC** – NIC or network interface card is a network adapter that is used to connect the computer to the network. It is installed in the computer to establish a LAN.

2. **Repeater** – A repeater operates at the physical layer. Its job is to regenerate the signal over the same network before the signal becomes too weak or corrupted to extend the length to which the signal can be transmitted over the same network.

3. **Hub** – A hub is a basically multi-port repeater. A hub connects multiple wires coming from different branches, for example, the connector in star topology which connects different stations. Hubs cannot filter data, so data packets are sent to all connected devices

**4. Bridge** – A bridge operates at the data link layer. A bridge is a repeater, with add on the functionality of filtering content by reading the MAC addresses of the source and destination. It is also used for interconnecting two LANs working on the same protocol. It has a single input and single output port, thus making it a 2 port device.

**5. Switch** – A switch is a multiport bridge with a buffer and a design that can boost its efficiency(a large number of ports imply less traffic) and performance. A switch is a data link layer device. The switch can perform error checking before forwarding data, which makes it very efficient as it does not forward packets that have errors and forward good packets selectively to the correct port only.

**6. Routers** – A router is a device like a switch that routes data packets based on their IP addresses. The router is mainly a Network Layer device. Routers normally connect LANs and WANs

**7. Gateway** – A gateway, as the name suggests, is a passage to connect two networks that may work upon different networking models. They work as messenger agents that take data from one system, interpret it, and transfer it to another system.