SNS COLLEGE OF TECHNOLOGY

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COIMBATORE-641 035, TAMIL NADU

DEPARTMENT OF COMPUTER APPLICATIONS

23CAT601 - DATA COMMUNICATION AND NETWORK

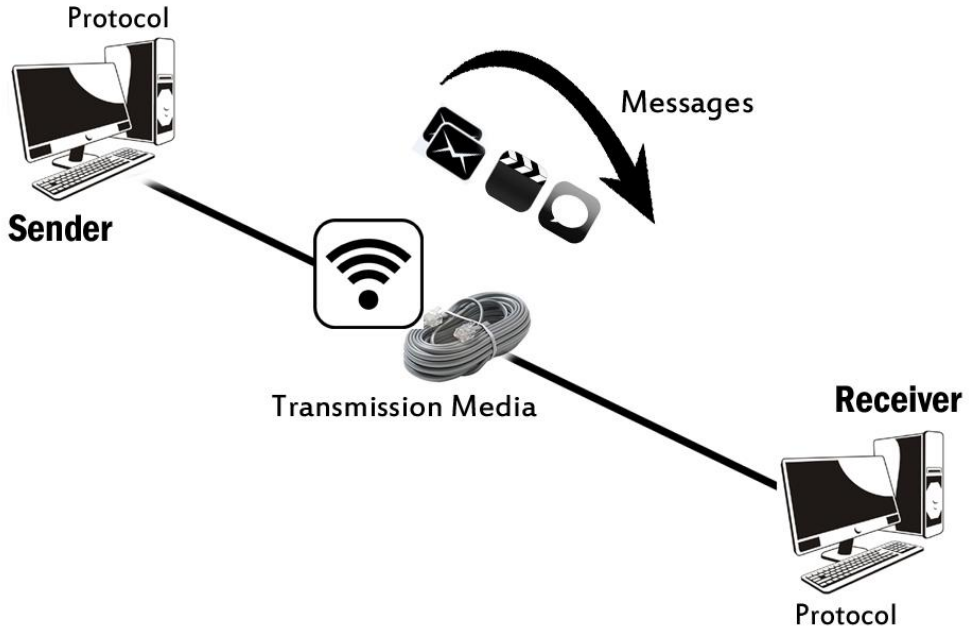
CLASS : I YEAR / I SEMESTER

UNIT I – DATA COMMUNICATION

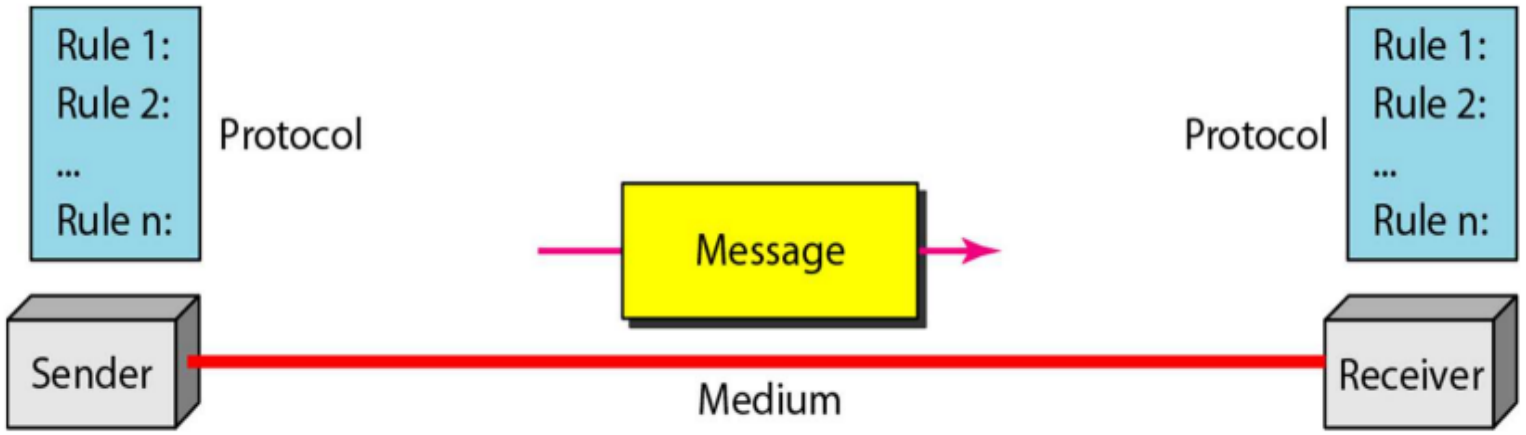
TOPIC – INTRODUCTION TO NETWORKS

Data Communication Network

- ✓ A Network is a group of two or more electronic devices that are interconnected for exchanging data and sharing resources.
- ✓ A computer network is a set of nodes connected by communication links.
- ✓ A node is nothing but a device to send or receive data and the communication links defines the channel or the transmission media through which the data is transferred.
- ✓ Whereas the exchange of data between two nodes via some transmission channel defines Data Communication



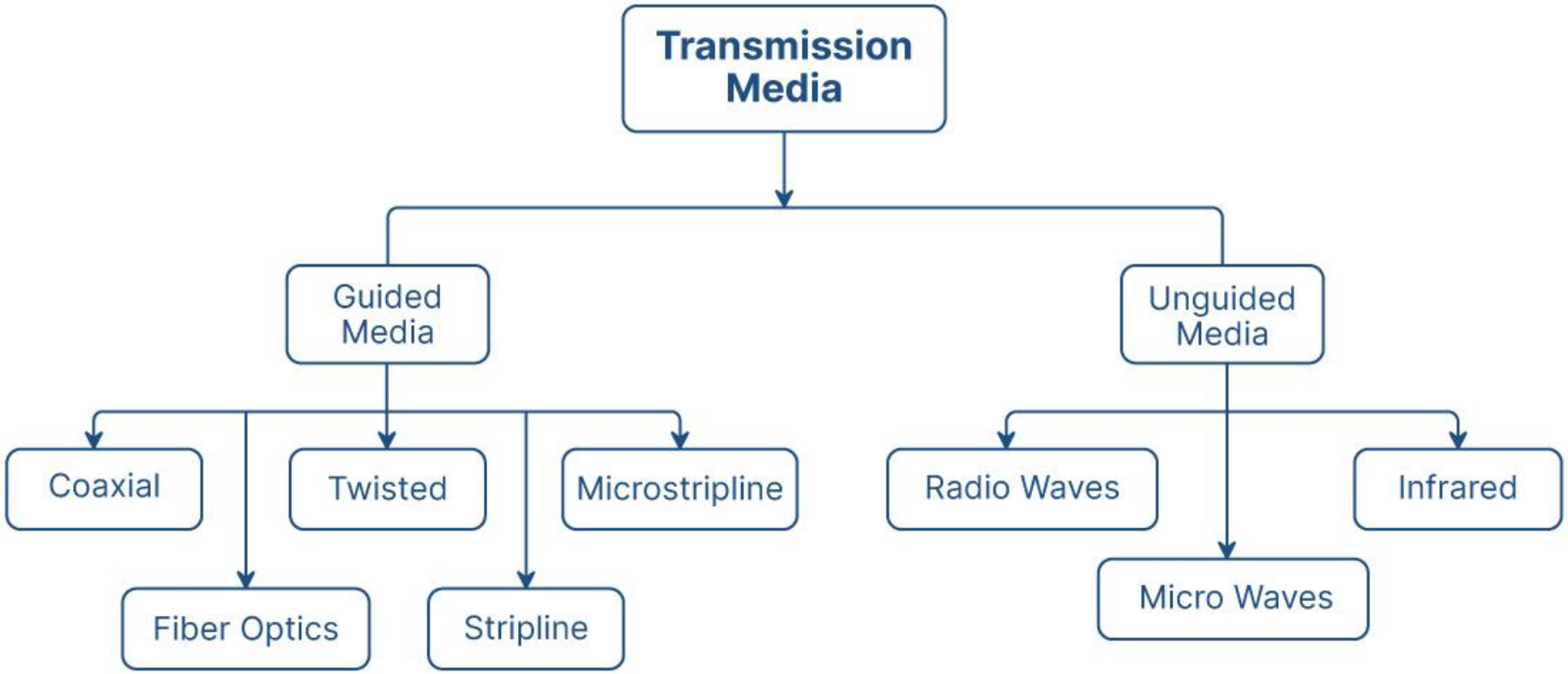
Components



1. Sender
2. Receiver
3. Message
4. Transmission Medium
5. Protocols

1. **Sender:** The sender is the device that **sends the data message**. It can be a computer, workstation, telephone handset, video camera, and so on.
2. **Receiver:** The receiver is the device that **receives the message**. It can be a computer, workstation, telephone handset, television, and so on.
3. **Message:** The message is the **information to be communicated**. Popular forms of information include text, numbers, pictures, audio, and video.
4. **Transmission medium:** The transmission medium is the physical / Virtual path by which a message travels from sender to receiver. Transmission medium may be **wired (Guided)** or **wireless (Unguided)**
5. **Protocol:** A protocol is a **set of rules** that govern data communications. It represents an agreement between the communicating devices. Without a protocol, two devices may be connected but not communicating, just as a person speaking French cannot be understood by a person who speaks only Japanese.

Transmission Medium



Elements of a Protocol

1. **Message Encoding –** which encodes / decodes the messages to signals or waves for transmission
2. **Message Formatting and Encapsulation –** encapsulate the information to identify the sender and the receiver rightly
3. **Message Timing –** which determines the error control and flow control of a data delivered
4. **Message Size –** based on the capacity of the receiver the message will be broken into packets
5. **Message Delivery Options –** Delivery options categorized into three types

    1. Unicast – One sender & One Receiver
    2. Multicast – One sender & 4 or 5 Receivers
    3. Broadcast – One sender will be sending message to everyone

Networking Devices

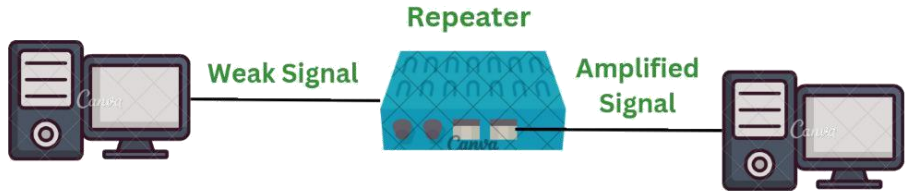
Network devices, also known as networking hardware, are physical devices that allow hardware on a computer network to communicate and interact with one another. For example Repeater, Hub, Bridge, Switch, Routers, Gateway, Brouter, and NIC, etc.

HUB

- A hub is one of the simplest networking devices that connects several computers or other network devices when referring to networking.
- A USB hub, for example, allows multiple USB devices to connect with one computer, even if that computer only has one USB connection. Depending on the hub, the number of ports on a USB hub can range from 4 to over 100.

Networking Devices

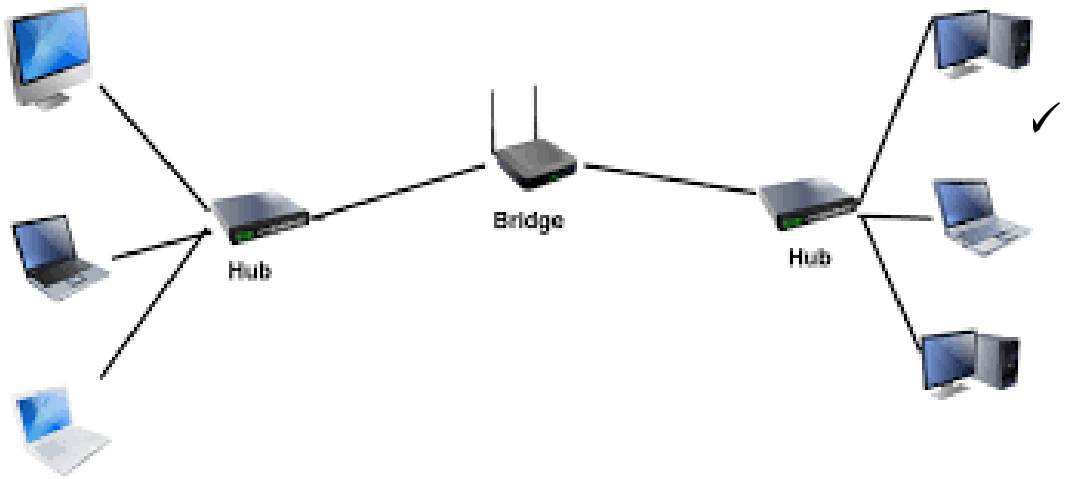
REPEATER



- ✓ 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.
- ✓ An important point to be noted about repeaters is that they not only amplify the signal but also regenerate it.
- ✓ When the signal becomes weak, they copy it bit by bit and regenerate it at its star topology connectors connecting following the original strength.
- ✓ It is a 2-port device.

Networking Devices

BRIDGE

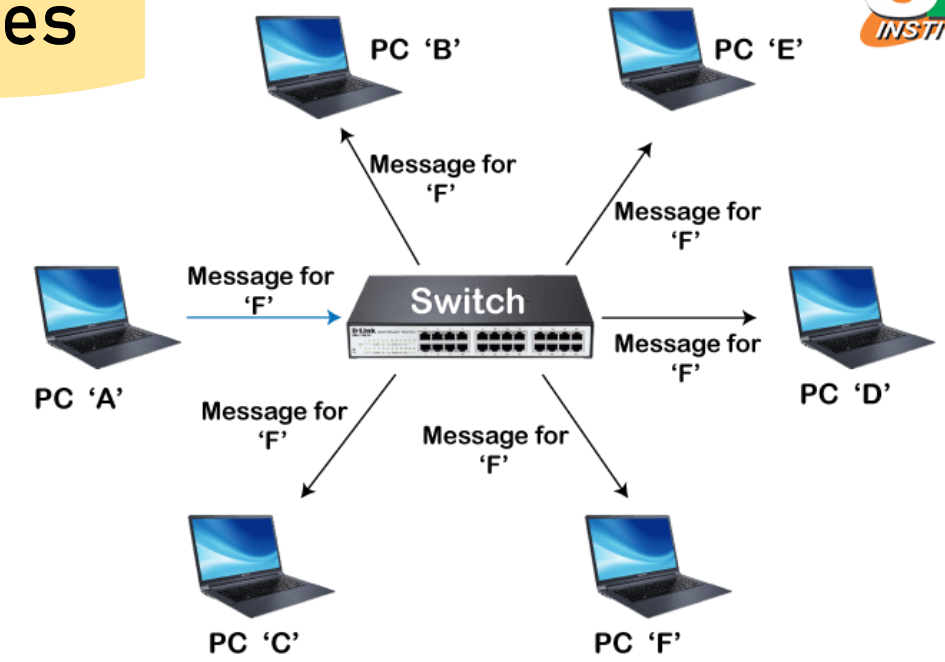


- ✓ A bridge operates at the data link layer. A bridge is a repeater, with add on the functionality of filtering content by reading the MAC addresses of the source and destination.
- ✓ It is also used for interconnecting two LANs working on the same protocol.
- ✓ It has a single input and single output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

Networking Devices

SWITCH

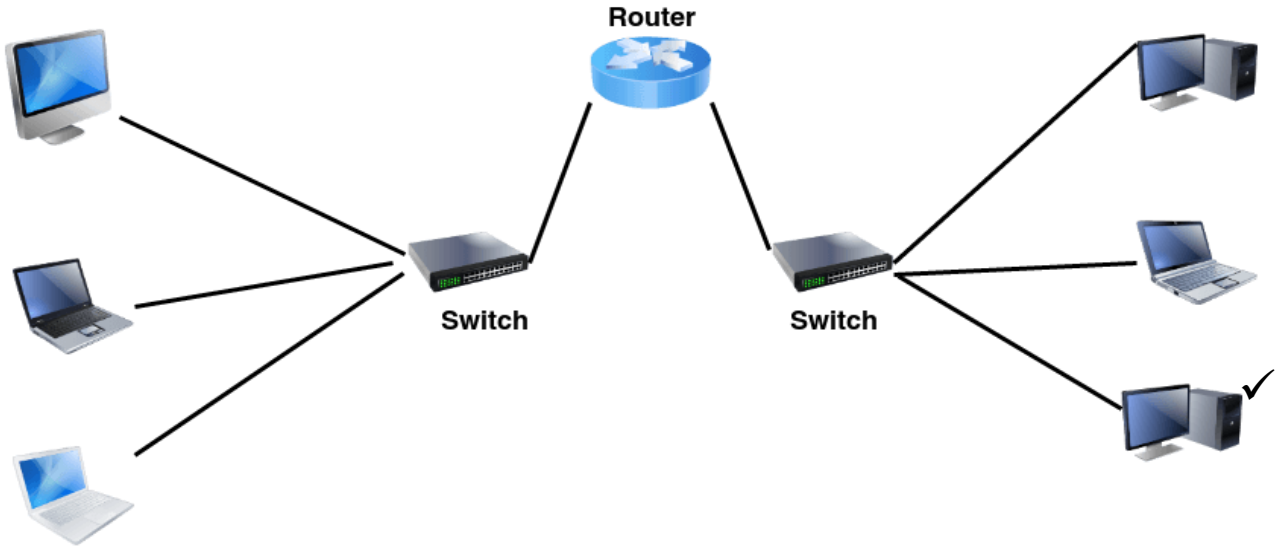
- ✓ A switch is a multiport bridge with a buffer and a design that can boost its efficiency(a large number of ports imply less traffic) and performance.
- ✓ A switch is a data link layer device. The switch can perform error checking before forwarding data, which makes it very efficient as it does not forward packets that have errors and forward good packets selectively to the correct port only.
- ✓ In other words, the switch divides the collision domain of hosts, but the broadcast domain remains the same.



Networking Devices

ROUTERS

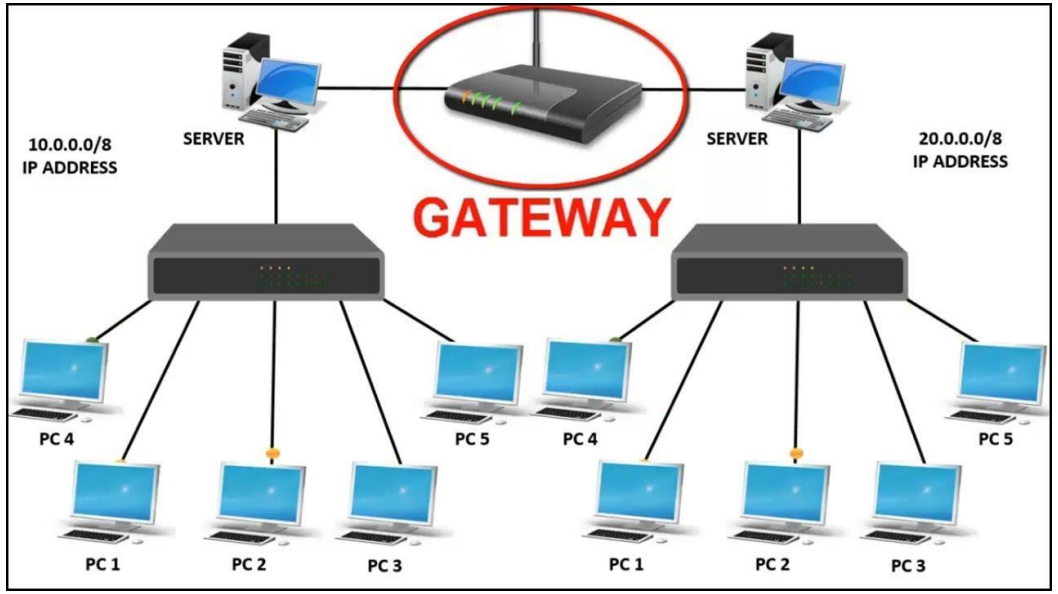
- ✓ A router is a device like a switch that routes data packets based on their IP addresses.
- ✓ The router is mainly a Network Layer device. Routers normally connect LANs and WANs and have a dynamically updating routing table based on which they make decisions on routing the data packets.
- ✓ The router divides the broadcast domains of hosts connected through it.



Networking Devices

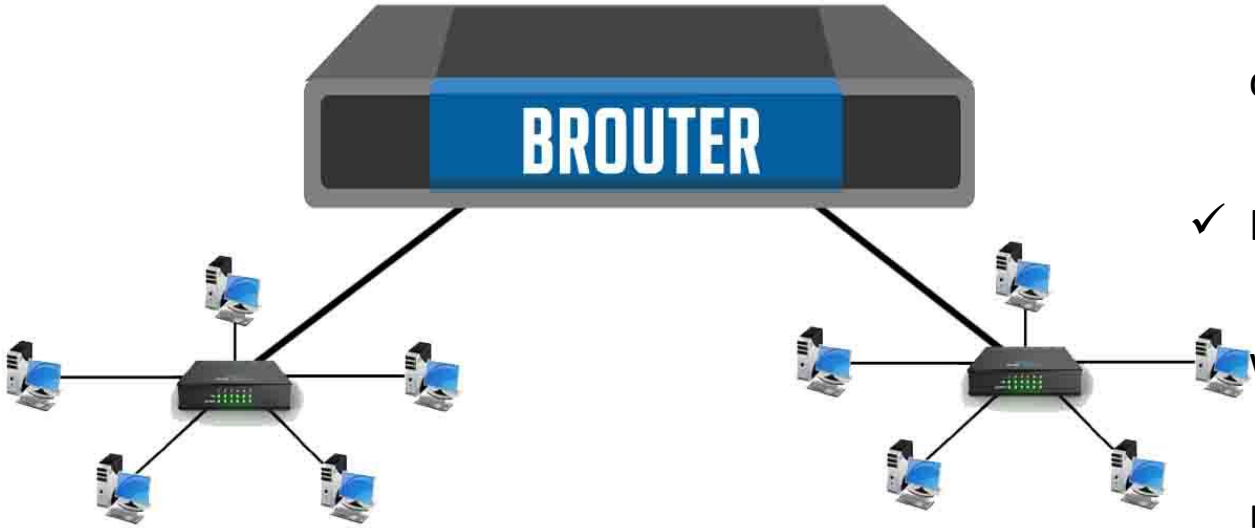
GATEWAY

- ✓ 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.
- ✓ Gateways are also called protocol converters and can operate at any network layer.
- ✓ Gateways are generally more complex than switches or routers. A gateway is also called a protocol converter.



Networking Devices

BROUTERS



- ✓ It is also known as the bridging router is a device that combines features of both bridge and router.
- ✓ It can work either at the data link layer or a network layer. Working as a router, it is capable of routing packets across networks and working as the bridge, it is capable of filtering local area network traffic.

Networking Devices

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.
- ✓ It has a unique id that is written on the chip, and it has a connector to connect the cable to it.
- ✓ The cable acts as an interface between the computer and the router or modem. NIC card is a layer 2 device which means that it works on both the physical and data link layers of the network model.