Communication System

IICT Lecture 10

Bismillah Jan

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What is Communication?

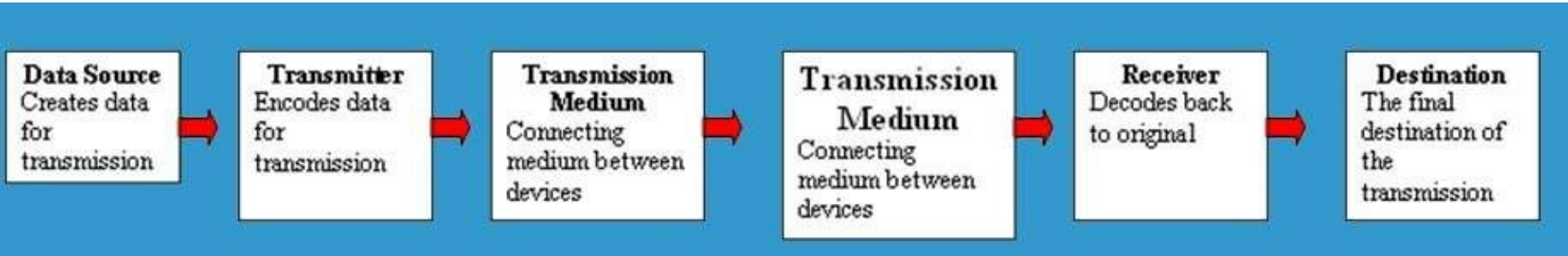
Characteristics of Communication System

- There must be a Sender and Receiver
- A protocol is a set of rules which governs the transfer of data between computers. Protocols allow communication between computers and networks.
- Handshaking is used to establish which protocols to use. Handshaking controls the flow of data between computers
- Protocols will determine the speed of transmission, error checking method, size of bytes, and whether synchronous or asynchronous

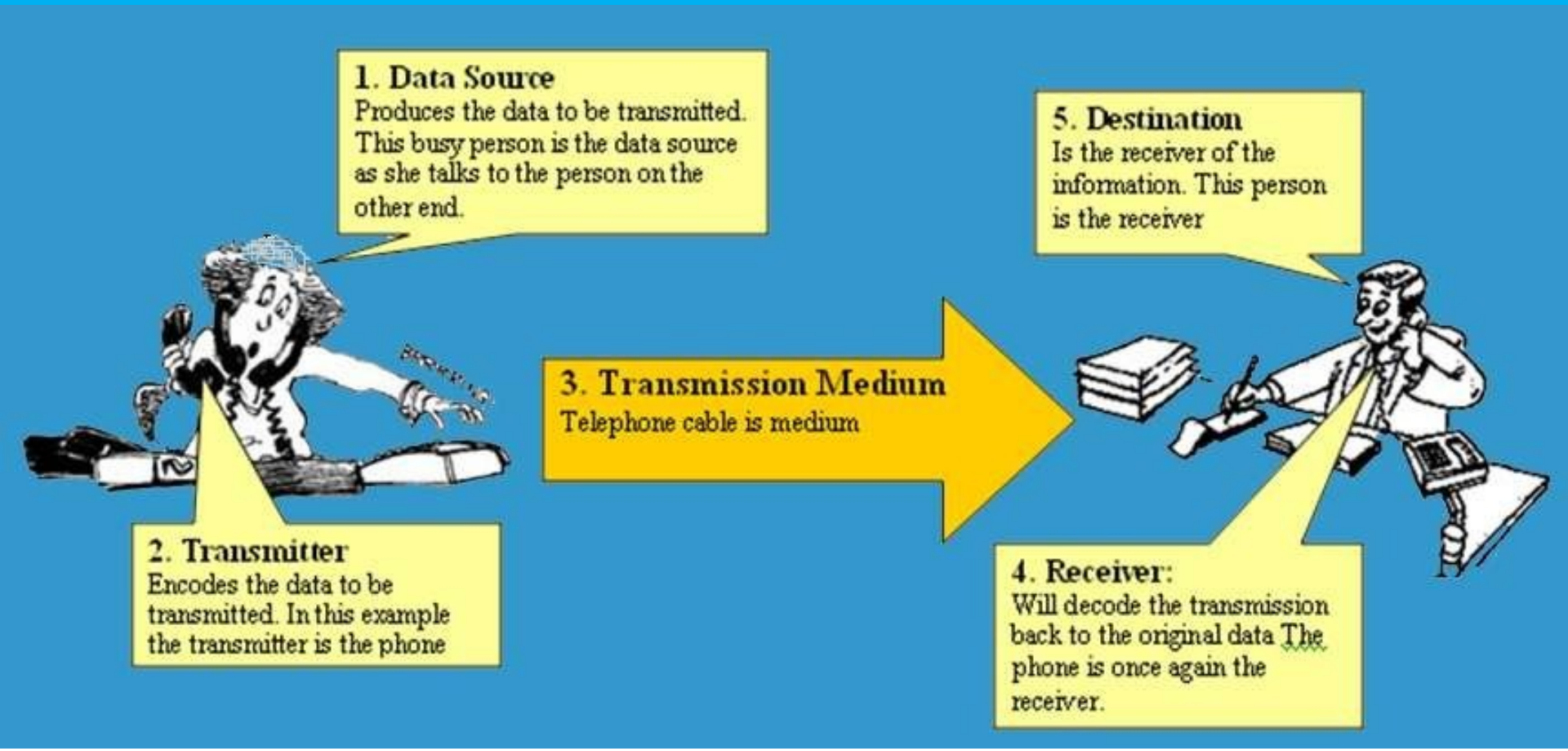
Five Basic Components

Every communication system has 5 basic requirements

- Data Source (where the data originates)
- Transmitter (device used to transmit data)
- Transmission Medium (cables or non cable)
- Receiver (device used to receive data)
- Destination (where the data will be placed)



Pictorial Representation



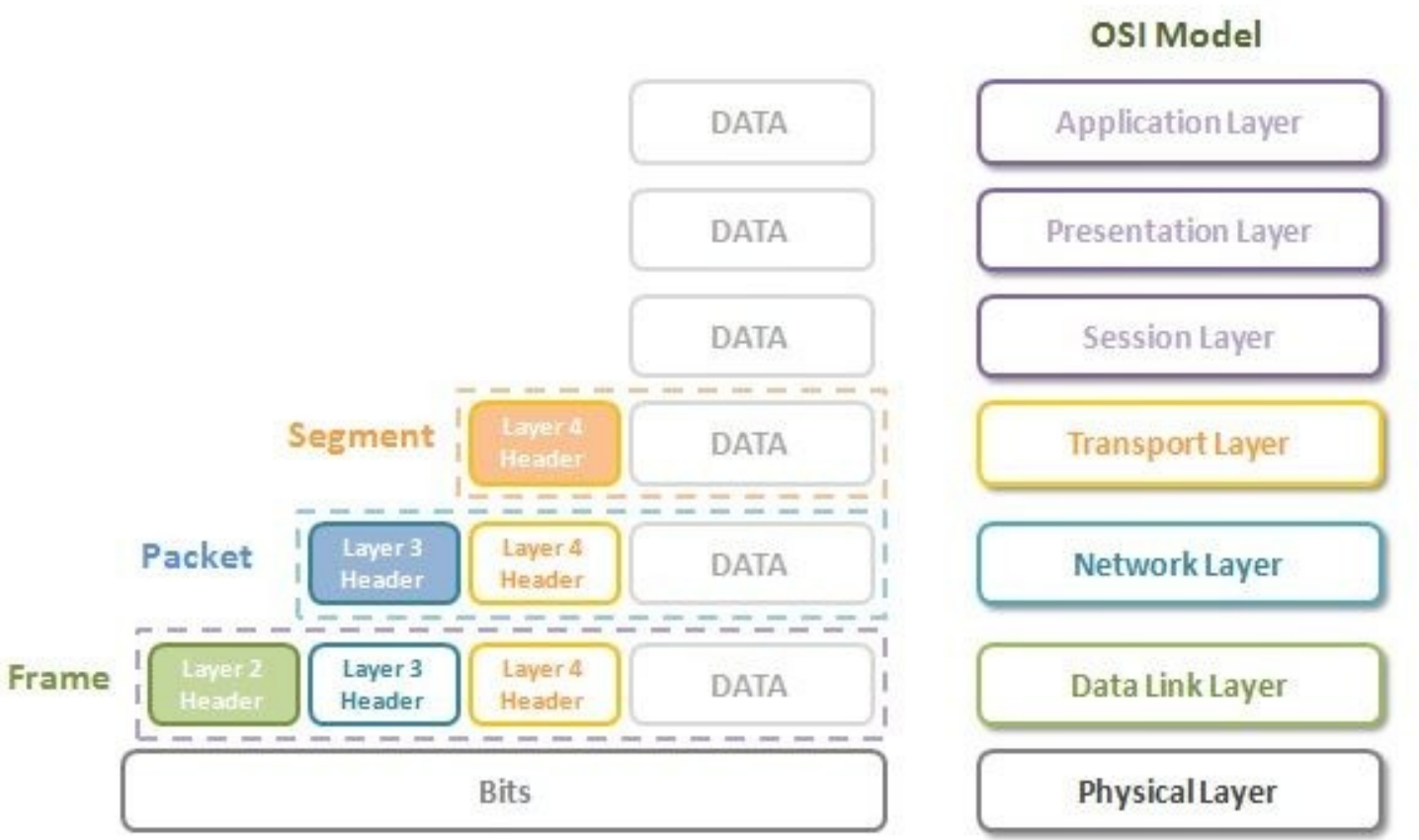
OSI Model

- The Open Systems Interconnection **model** (**OSI model**) is a conceptual **model** that characterizes and standardizes the communication functions of a telecommunication or computing system without regard to its underlying internal structure and technology.
- The OSI model also provides much more information which is included with each package.

7 Layers of OSI Model

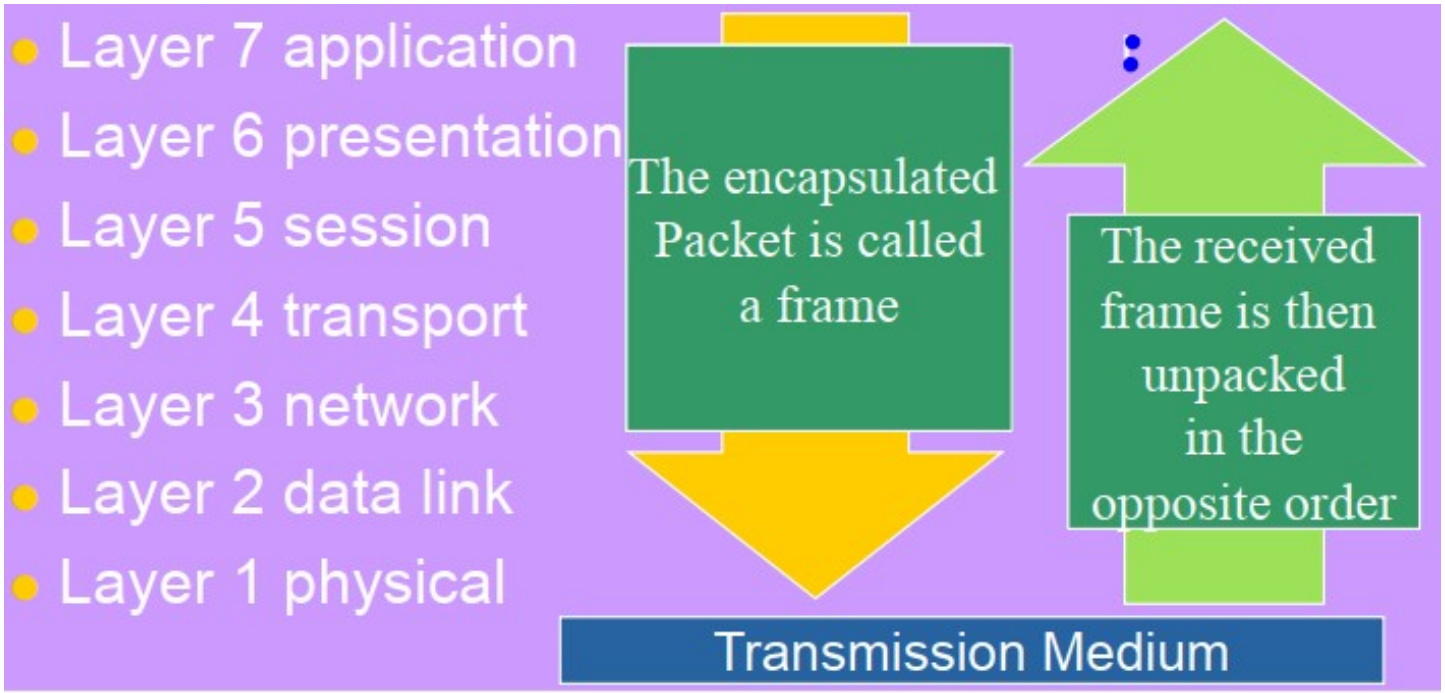
- OSI “Open System Interconnection”
- OSI is not a protocol but a list of protocols divided between 7 layers with each layer having a different set of functions.
- Each packet is layered/packaged with protocols from each of the layers as it is processed.
- The process of layering the protocols around each package is called encapsulation. The final encapsulated data packet is called a frame.

OSI Model


OSI Model
DATA
Application Layer
DATA
Presentation Layer
DATA
Session Layer
Segment
Layer 4 Header
DATA
Transport Layer
Packet
Layer 3 Header
Layer 4 Header
DATA
Network Layer
Frame
Layer 2 Header
Layer 3 Header
Layer 4 Header
DATA
Data Link Layer
Bits
Physical Layer

OSI Model

- OSI Reference Model



Service Performed at Each Layer

- Layer 7 application
- Layer 6 presentation
- Layer 5 session
- Layer 4 transport
- Layer 3 network
- Layer 2 data link
- Layer 1 physical

- Identification, authentication
- Format conversion
- Set-up coordinate conversation
- Ensures error-free transfer
- Routing of data through network
- Error control and synchronization
- Placing signals on the carrier

Service Performed at Each Layer

- Layer 7 application
- Layer 6 presentation
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- E-mail, Web browser, Directory
- POP, SMTP, FTP, HTTP, DNS
- Sockets
- TCP
- IP
- PPP, Ethernet, Token ring
- 100baseT

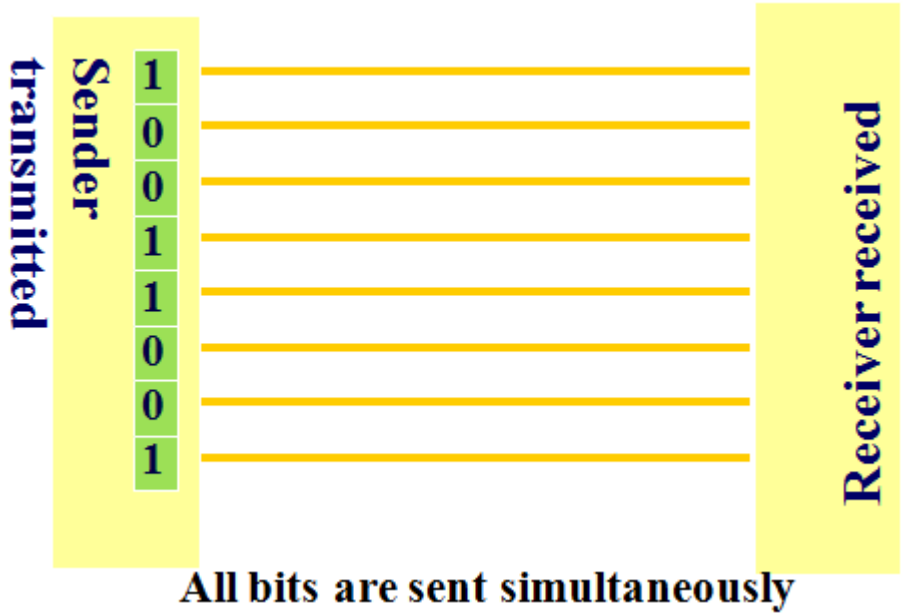
Transmitting and Receiving in Comm. Systems

Serial Transmission

- Data is transmitted, on a single channel, one bit at a time one after another
- Much faster than parallel because of way bits processed (e.g. USB ar

Parallel Transmission

- Each bit has it's own piece of wire along which it travels
- Often used to send data to a printer



Why not to use Parallel instead Serial?

- Due to inconsistencies on channels data arrives at different times
- Because of the way it is transmitted packet switching cannot be used
- The above two points makes parallel slower than serial and requires higher bandwidth.
- Parallel transmissions are rarely used anymore

Synchronous VS Asynchronous Transmission

Synchronous Transmission

- All data sent at once and no packet switching

Asynchronous Transmission

- Uses stop/ start bits
- most common type of serial data transfer
- Allows packet switching
- Allows sharing of bandwidth (i.e. talk on phone while another person is using internet)

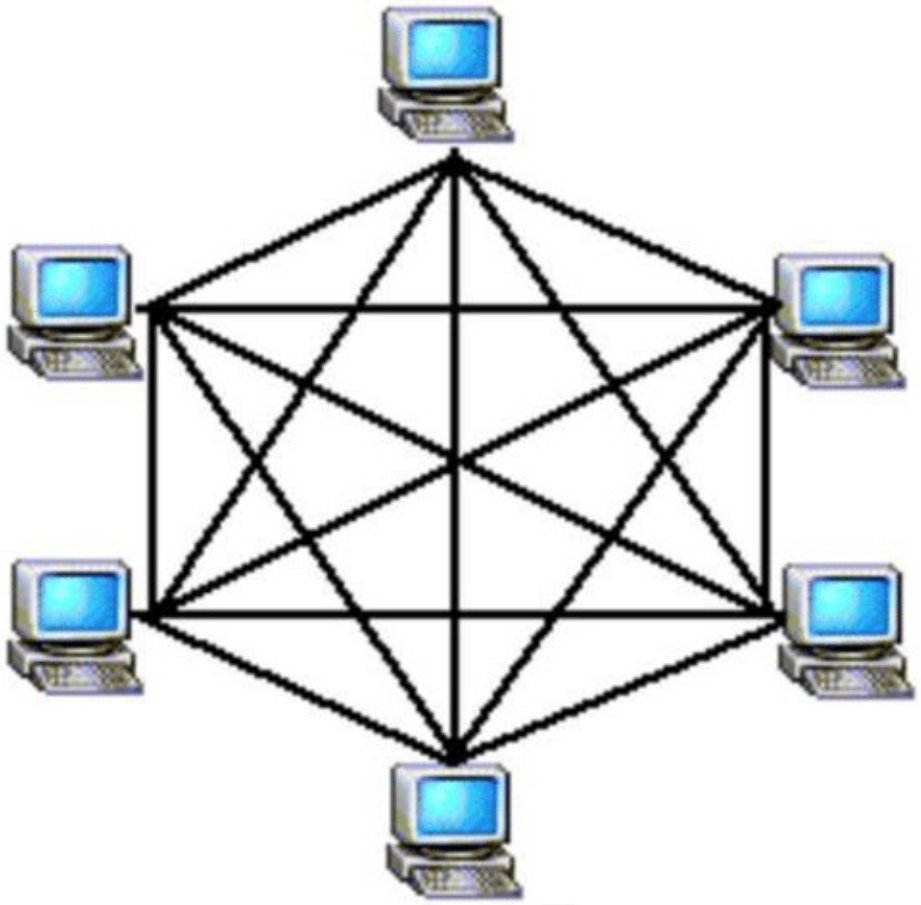
Transmission Directions

- Simplex: One direction only
- Half duplex: Both directions but only one direction at a time
- Full duplex: send and receive both directions at once

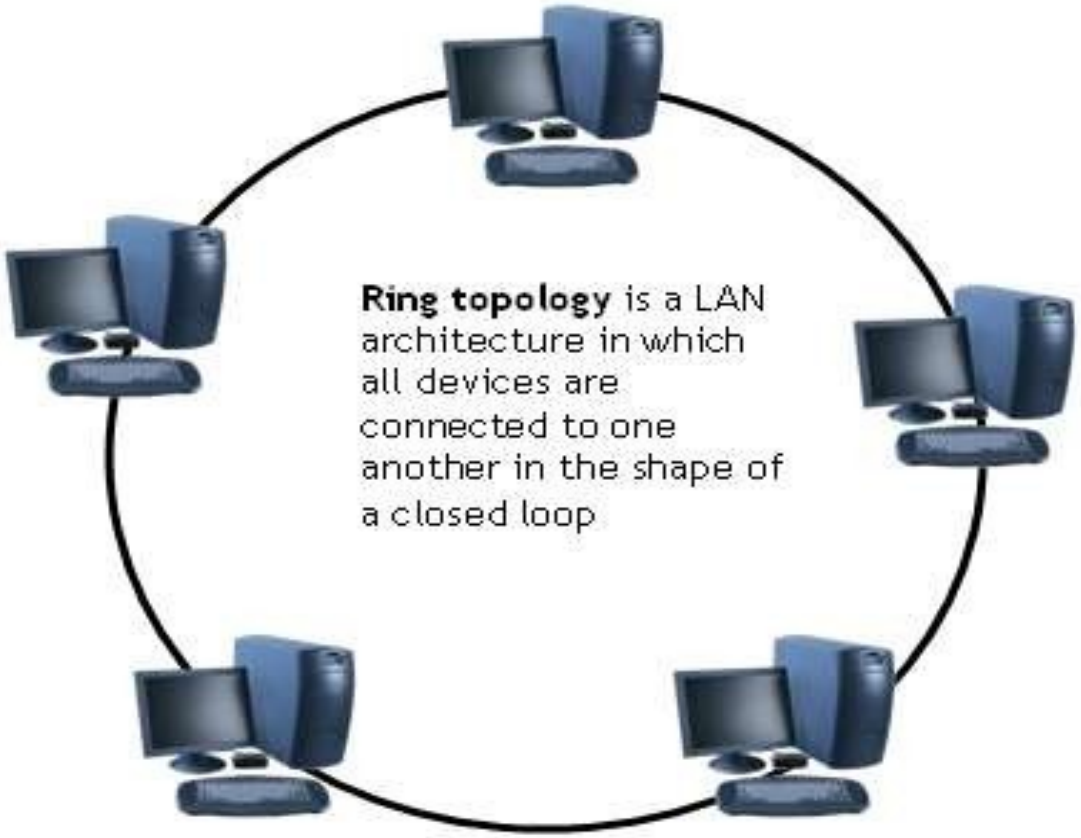
Network Topologies

- Mesh Topology
- Ring Topology
- Bus Topology
- Star Topology

Mesh Topology



Ring Topology

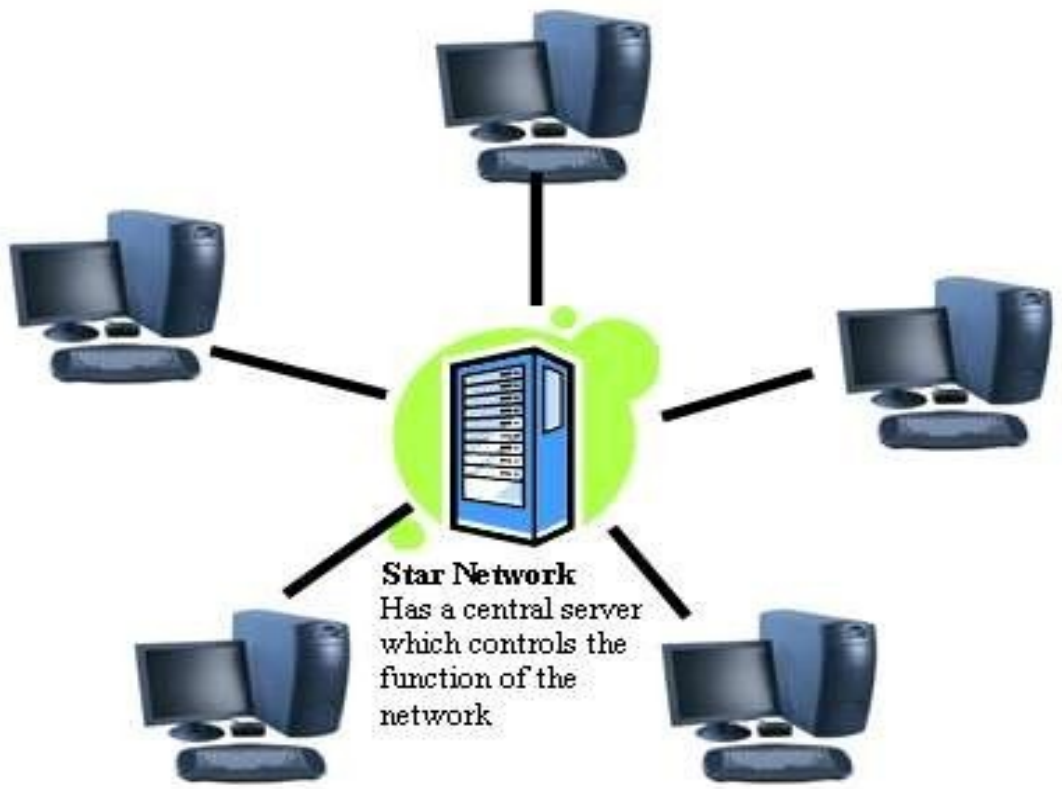


Bus Topology

Bus Topology

In bus topologies, all computers are connected to a single cable or "trunk or backbone", by a transceiver either directly or by using a short drop cable. All ends of the cable must be terminated, that is plugged into a device such as a computer or terminator.

Star Topology



Network Hardware

Bridge

Large networks can be separated into two or more smaller networks using a bridge. This is done to increase speed and efficiency. This type of network is called a segmented LAN and has largely been superseded by the use of switches which can transfer data straight to a computer and thus avoid bottleneck jams which bridges were designed to fix.

Gateway

- **Often used to connect a LAN with a WAN.**
- **Gateways join two or More different networks together.**

Some more

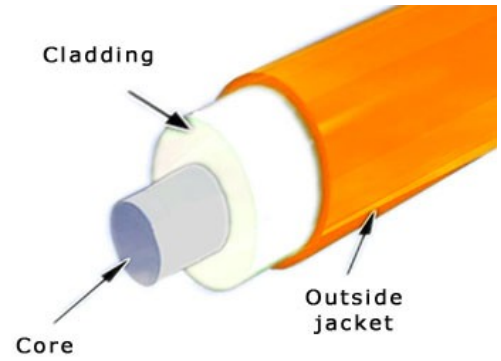
Routers: A router is a networking device that forwards data packets between computer networks. Can be used in place of a switch or bridge.

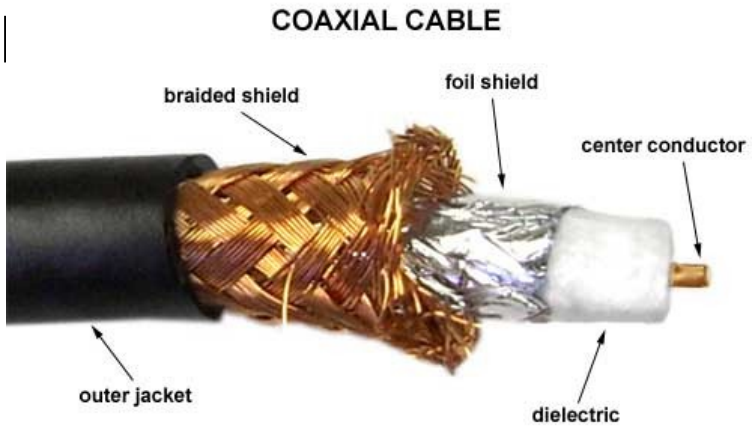
Switches: smart hubs which transmit packets to the
destination port only

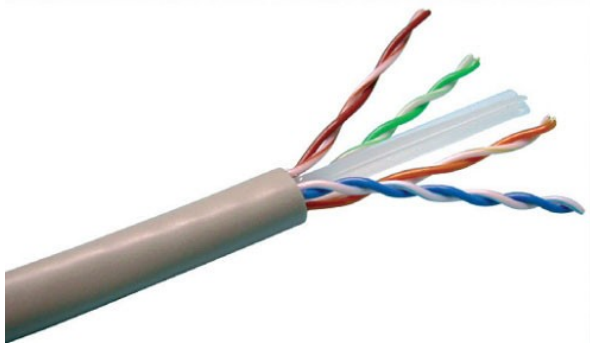
Hubs: like double adapters /power boards in the home
except instead of plugging in extension cords we are plugging

Transmission Media

Twisted pair – Ethernet cable
Coaxial cable –Thick black cable used for higher bandwidth communications than twisted pair (i.e. Optus cable)
Fiber optic – data transferred through pulses of light. Extremely fast.
Non cable methods such as satellite, microwave, wireless and







End of the Lecture