

## UNIT-1 :- Topics:-

- Network hardware & Software
- OSI Reference model
- TCP/IP Reference model
- ARPANET, Internet
- Guided Transmission media:-

twisted pairs

Coaxial cable

fibre optics

Wireless transmission.

PART -1

PART-2

# Network Hardware

• The basic Hardware components in a Network are:-

→ Network cables:- Network cables are the transmission media to transfer data from one device to another

→ Routers:- Router is a connecting device which transfers Data packets between different Computer Networks.

→ Repeaters:- A repeater receives signal and regenerates it before re-transmitting so that it can travel longer

→ Hubs:- A Hub is a multi-port repeater

→ Bridge:- A Bridge connects two separate Ethernet network

→ Gateways:- A gateway connects entirely different networks that work upon completely different protocols.

# Network Software

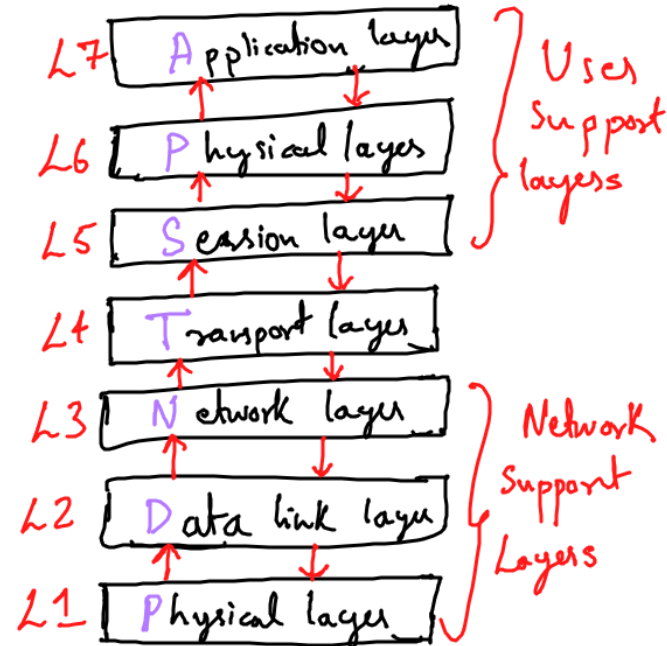
- Network Software comprises a broad range of software used for design, implementation, operation and monitoring of Computer Networks.

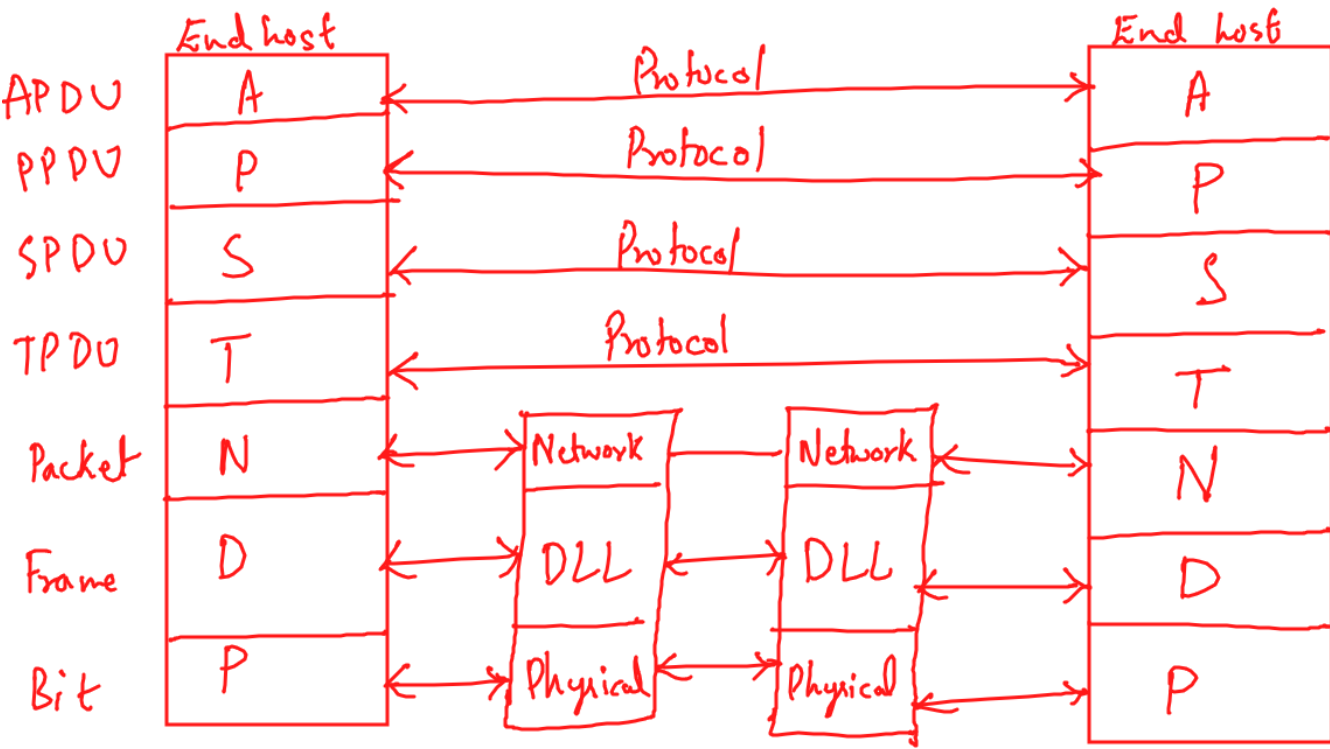
OSI:- • OSI stands for Open Standard Interconnection

- The OSI model does not specify the communication standard or protocols to be used to perform networking tasks
- It defines point of interconnection for the exchange of information between system.
- It has 7 interconnected layers
- The 7 layer are:- Application layer  
Presentation layer  
Session layer  
Transport layer

→ Network layer  
Data link layer  
Physical layer.

## OSI Reference Model





1. Physical layer :- It is the Lowest layer in OSI Reference Model

- Its function is to transmit individual bits from one node to another over a physical medium.

2. Data link layer :- It transforms the physical layer to a reliable link making it an error free link to upper layer.

3. Network layer :- It is responsible for the delivery of packets from the source to the destination

4. Transport layer :- It is responsible for delivery of the entire message from the source node to destination node

5. Session layer :- It establishes sessions between users and offers services like dialog control & synchronization.

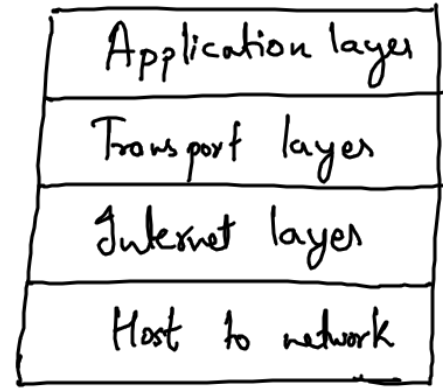
6. Presentation layer: It deals with Syntax & Semantics of the information being exchanged

7. Application layer: It is responsible for accessing the network by user. It provides User Interfaces and other supporting services like email, file transfer & sharing database.

TCP/IP: It stands for Transmission Control protocol / Internet protocol.

• TCP/IP reference model is a set of protocols that allow communication across Multiple diverse networks.

• There are four layers in TCP/IP Reference model



1. Application layer: It is a Combination of Session, presentation, application layer of the OSI reference model

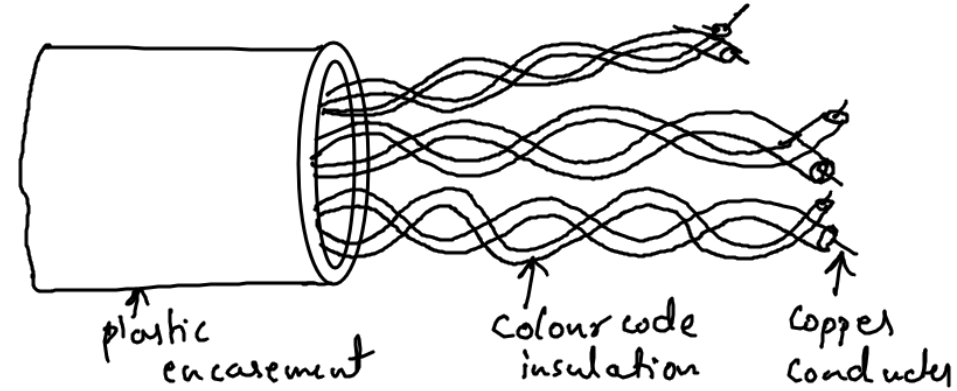
2. Transport layer: TCP/IP defines two protocols at Transport layer :- TCP & UDP  
• User Datagram protocol is connection less protocol

3. Internet layer:- It is also called Network layer
- Internet layer handles communication from one machine to the other.
  - Routing of packets takes place in this layer
4. Host to network:- This layer is responsible for accepting and transmitting IP datagrams

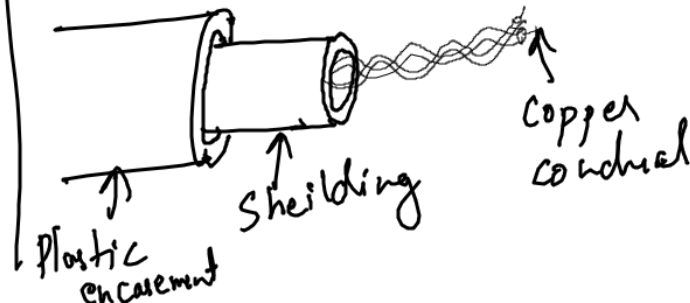
### Guided Transmission media

1. Twisted pair Cable:- Twisted pair cable is least expensive & most widely used.
- It consists of two insulated copper wires arranged in a regular spiral pattern
  - TP
    - ↳ UTP: Unshielded twisted pair
    - ↳ STP: Shielded twisted pair

UTP: It is a set of twisted pairs within a plastic sheet

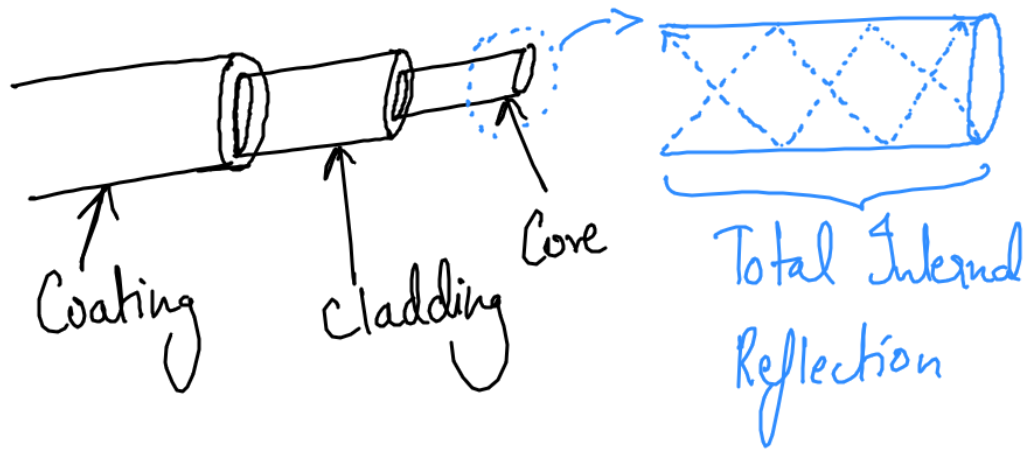


STP: It provides a protective sheathing around the copper wire

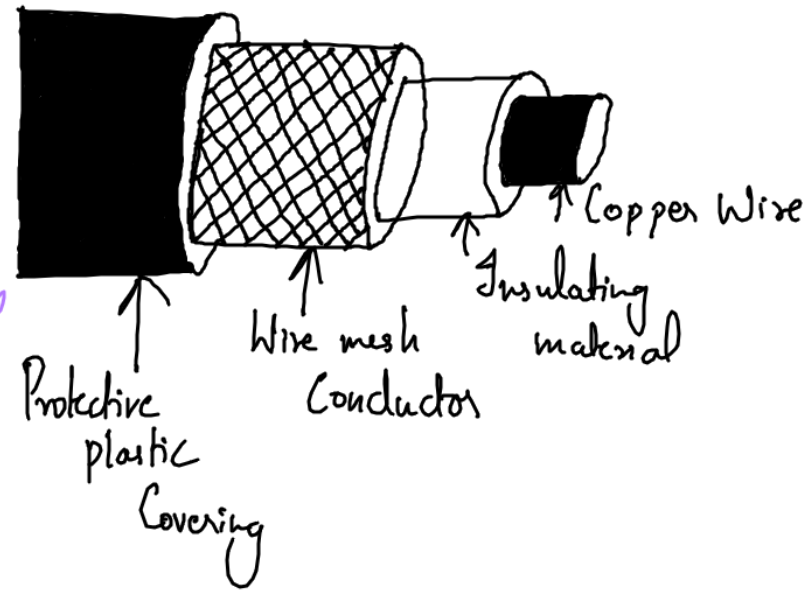


## Fibre Optic Cable:-

- A fibre optic cable is a light pipe which is used to carry a light beam from one place to another.
- Fibre optic cable works on the principle of Total internal Reflection.



Coaxial Cable:- • A Coaxial Cable is made up of two conductors that share the common axis.

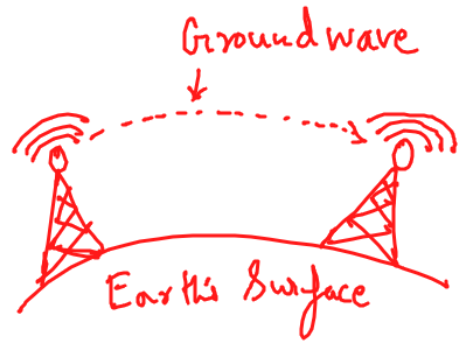


Co-axial Cable	Twisted Pair Cable	Fibre Optic Cable
<ul style="list-style-type: none"> <li>• It uses electrical signal for transmission</li> <li>• Less affected by EMI</li> <li>• Bandwidth is moderately High (350 MHz)</li> <li>• Support moderately high rates (500 Mbps)</li> <li>• Moderately costly</li> <li>• Repeater spacing is 1-10 KM</li> <li>• It supports all radio frequencies</li> <li>• Low attenuation</li> </ul>	<ul style="list-style-type: none"> <li>• It uses electrical signal for transmission</li> <li>• Affected by EMI</li> <li>• Bandwidth is Low (3 MHz)</li> <li>• Support Low data rates (4 Mbps)</li> <li>• Cheapest</li> <li>• Repeater Spacing is 2-10 KM</li> <li>• Supports all radio frequencies</li> <li>• High attenuation</li> </ul>	<ul style="list-style-type: none"> <li>• Uses Optical form of signal over a glass fibre</li> <li>• Not affected by EMI</li> <li>• Bandwidth is very High (2 GHz)</li> <li>• Data rates are very High (2 Gbps)</li> <li>• Costly</li> <li>• Repeater Spacing is 10-100 KM</li> <li>• Frequency range is 902 MHz to 928 MHz</li> <li>• Very low attenuation.</li> </ul>

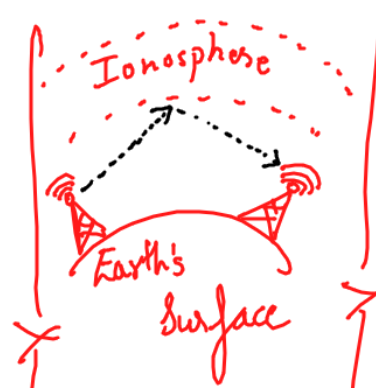


# Wireless Transmission :-

- Unguided signals are transmitted in several ways:-
  - Ground propagation
  - Sky propagation
  - line-of-sight propagation



Ground



SKY



Line-of-sight

## Wireless transmission

Radio Waves    Microwaves    Infrared Waves

1. Radio Waves :- These waves are electromagnetic waves that are transmitted in free space

- Range is 3Khz to 1Khz
- Alignment of antenna is not required
- Example :- FM radio.

P . T . O

2. Micro Waves } Micro Waves are of two types:-

1. Terrestrial micro wave

2. Satellite Microwave Communication