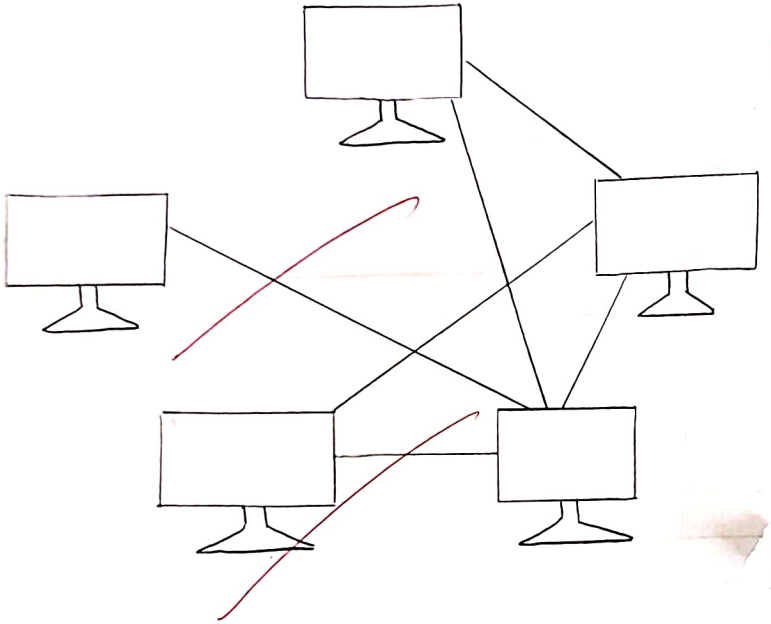
Experiment NO. 1

Aim: To study different physical equipment used for networking.



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Aim: To study different physical equipment used for networking.

Theory:

What is computer network?

=>computer network means an interconnected collection of autonomous computer. Two computers said to be connected if they are able to exchange information. The connection needs to not be via a copper wire, fiber optics, microwave and communication satellite can also be used.

Advantages of computer network.

Resource sharing.
High Reliability.
Saving Money.

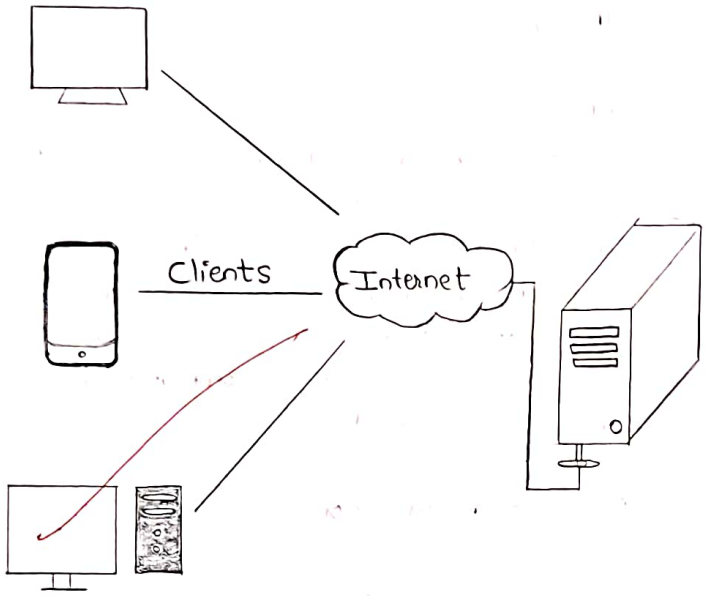

Fig. SERVER

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Server:

Concept of a server is based on one or more personal computers to perform specific tasks for a number of other PC's. The most common function is disk, file and print servers. A Disk server provides low-level support mechanism. Performing such function as lockout Point. dynamic allocation of space on disk. A file server is a higher level support mechanism, Performing such function as lockout and dynamic allocation of space on disk.

WORKSTATION:

A node or stand-alone PC that is connected with network is called workstation. A workstation is generally a client.

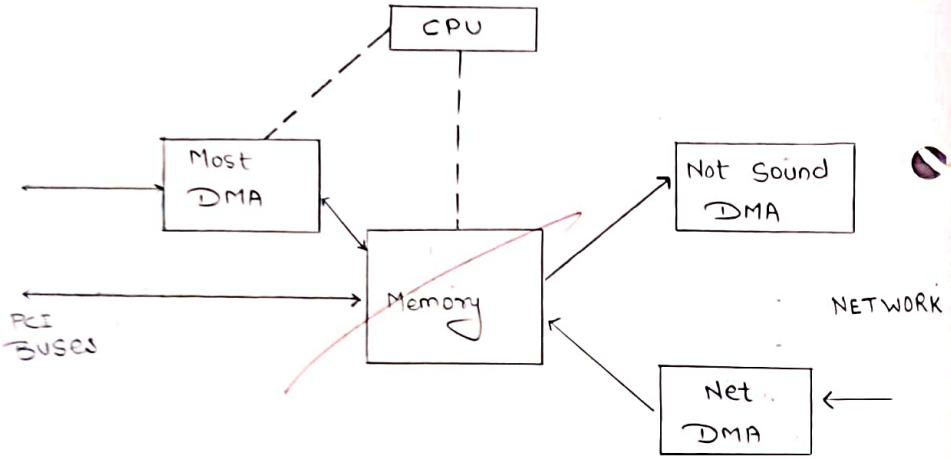

Fig: Network Interface card.

NIC (Network Interface card):

The Network Interface card is the interface network between the pc and physical network connection. In Ethernet system, the NIC connection to a segment of coaxial or UTP cable (fiber NIC's are available but not very common yet). As with any other type of adapter card NIC's come in ISA, PCMCIA, and PCI bus verities.

Function of NIC.

- Data Transfer
- Data Buffering.
- Frame Construction.
- Media Access control
- Parallel / Serial conversion.
- Data Encoding / Decoding.

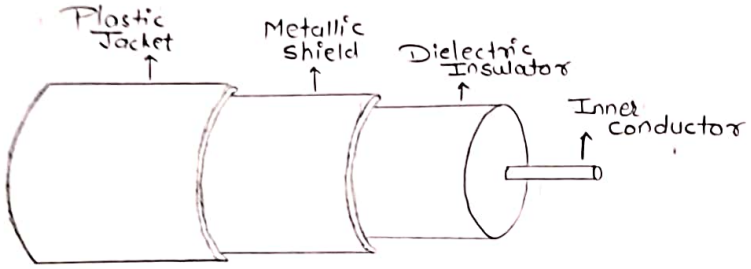

Fig: Thick coaxial Cables (thick net) (RG-1)

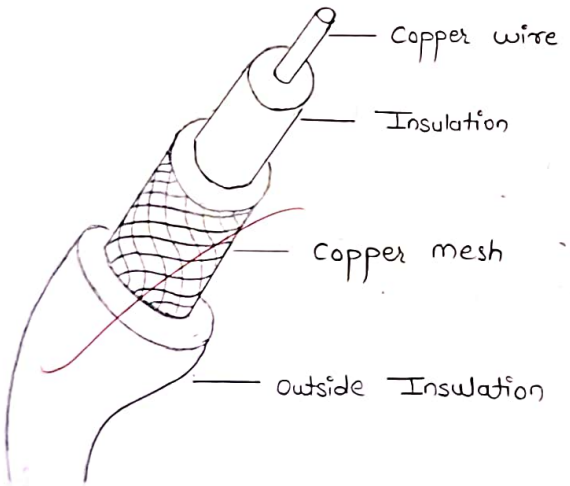

Fig: Thin Coaxial Cables (Thin net) (RG-58)

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CABLES:

1. Thick coaxial cables (thick net) (RG-1)

Thick coaxial cables or thick wire is known as the Ethernet standard RG-11. This cable is mostly used as backbone cable, distributing Ethernet signal through out a building, an office complex or other large installation.

2. Thin coaxial cable (thin net) (RG-58)

RG-58 is typically used for wiring laboratories and offices, or another small group of computers. The maximum segment is 185 meters, which is due to the nature of the CSMA/CD method of operation the cable attention and the speed at which signals propagate inside the coax.

Fig: Unshielded Twisted Pair.

3. Twisted Pair cables

Twisted pair is probably the most widely used cabling system in Ethernet in networks. Two copper wire twist around each other to form twisted pair cable.

Twisted pair is available in two basic types.

* Unshielded Twisted pair (UTP)

A twisted pair segment can't exceed 100 meters. This limitations is the only drawback to twisted pair. Twisted pair is used for 10/100 based Ethernet network.

UTP cables are wired as straight through or crossover cables

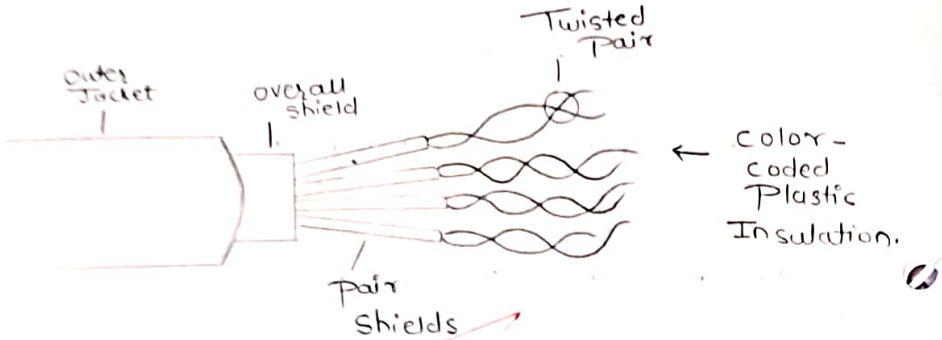

Fig: Sheild Twisted pair.

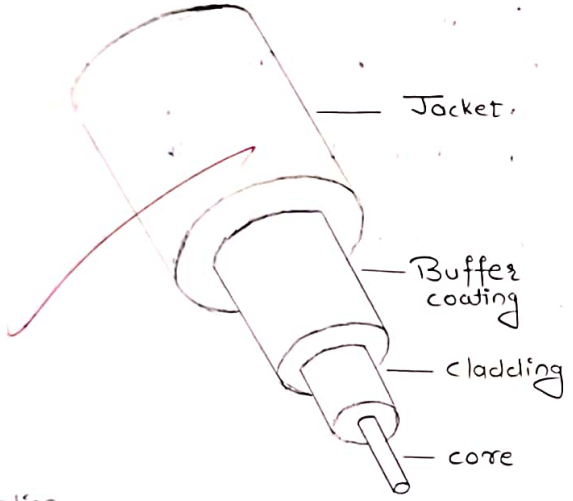

Fig: Fiber Optics

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* Shielded twisted pair.

It is 150Ω cable containing additional shielding that protects signals against electromagnetic Interference (EMI) produced by electric motors power lines etc. It is primarily used in Token Ring network & where UTP cable would provide insufficient protection against interface.

4. Fiber Optics

Fiber optic relies on pulsed as light to carry information. Two types of plastic or glass with different physical properties are used to allow a beam of light to reflect off the boundary bet" the core and cladding.

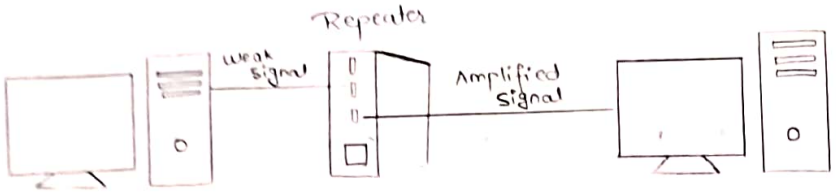

Fig: Repeater

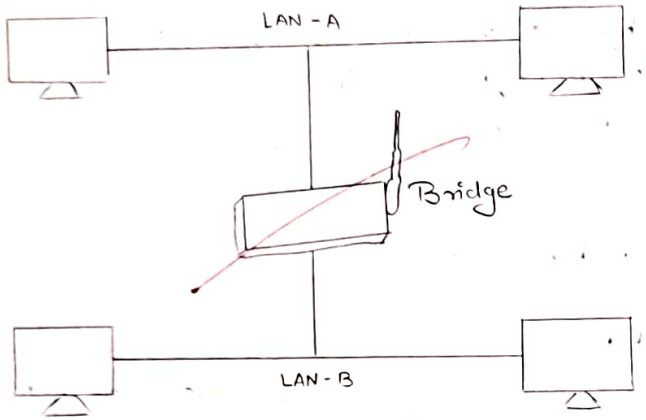

Fig: Bridges

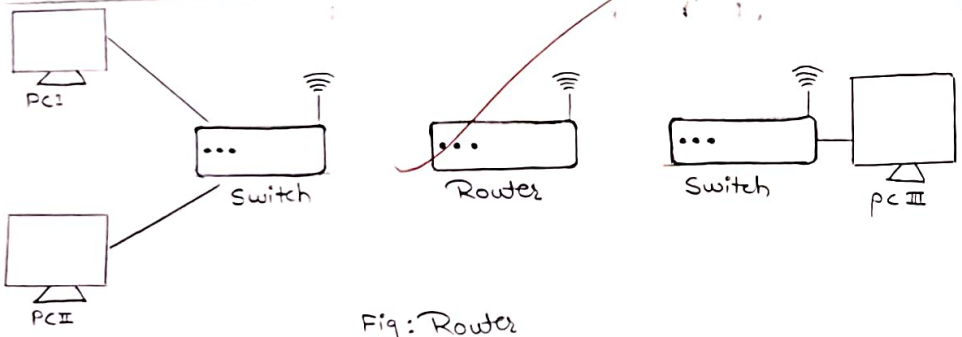

Fig: Router

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REPEATER:

A Repeater is a purely electrical device that extents maximum distance a LAN cable can span by Amplifying signals passing through it. A Repeater connects two segments and broadcast packets between them.

BRIDGES:

This networks bridge provids an inexpensive and easy way to connect Network segments A bridges provides amplifier function of a Repeater plus, ability to select Filter packet based on their address.

ROUTERS:

A router is a device that connect two LAN's together to form an internetwork. A router is the basic building block of the internet.

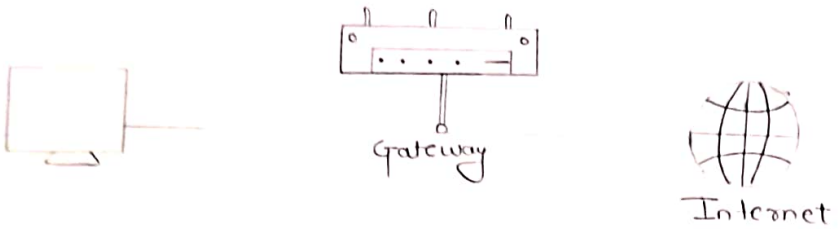

Fig: GATEWAYS

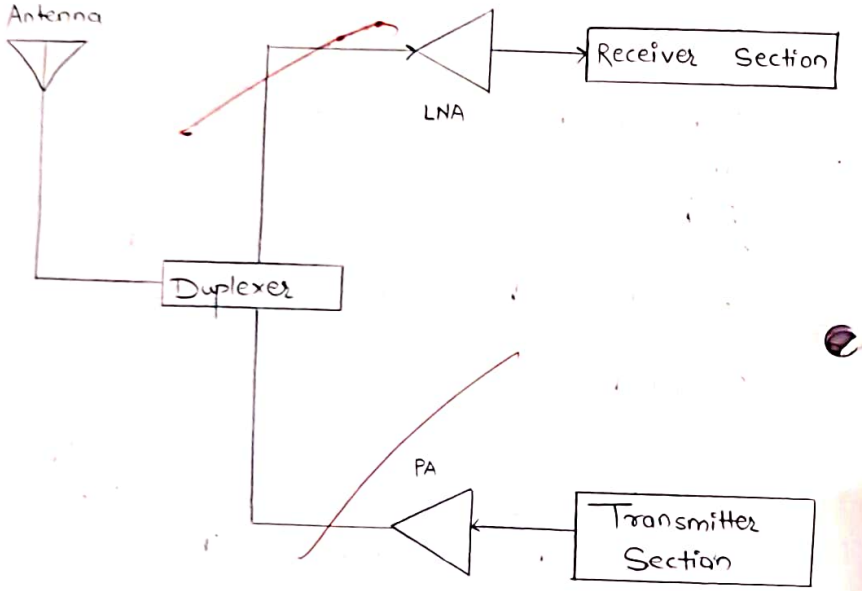

Fig: Tansceivers

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GATEWAYS:

A node on a network that serves as a entrance to another network. In enterprises, the gateway node often acts as a proxy server as a firewall. The gateway is also associated with both a switch, which provide the actual path for the packet in and out of the gateway.

TANSCEIVERS:

A transceivers converts from one media type to another for example, a 10base 2 coaxial cable with a fiber optic cable. It is common to use more then one media type an installation, so many diff. kinds of transeviers are available.

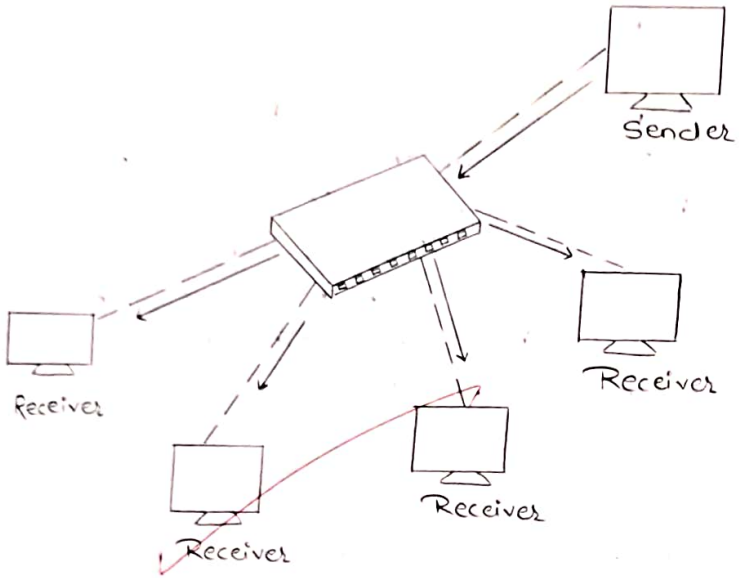

Fig: HUB

HUBS:

Hubs are also called as concentrators; expands one Ethernet connection into many. For example, a four-port HUB connects up to four machines via UTP cables.

There are three types of HUBS.

① Passive HUB:
The passive HUB do not process data signals with only one purpose to combine the signal form several network cable segments.

② Active HUB:
The active HUBS incorporate electronic components that amplify and clean up the signals, that flow betn devices on the network.

③ Intelligent HUB:
Intelligent HUBS are enhanced active hubs the following functions add intelligences to a HUB.

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HUB Management:

A HUB supports networks network management protocols that enable the hub to sends Packets to central network console.

Switching HUBS.

Switching Hubs include circuitary that quickly routes signal between Parts on the Hub.

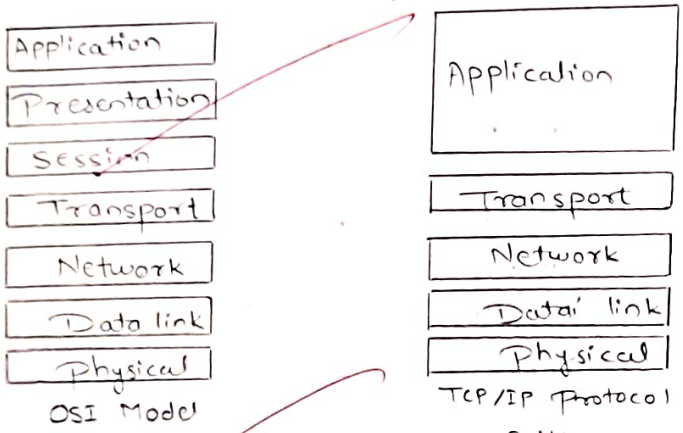
SWITCHES:

It is similar to a bridge; with some important enhancement. first, as with may have multiple ports, thus directing packets to several different segment furthur Partitioning and isolating network traffic in as way similar to router.

Conclusion: Thus we have studied different physical equipments used for networking.

Experiment NO: 02.

Aim: To study OSI reference model and TCP/IP Protocol Suite



Experiment NO: 02.

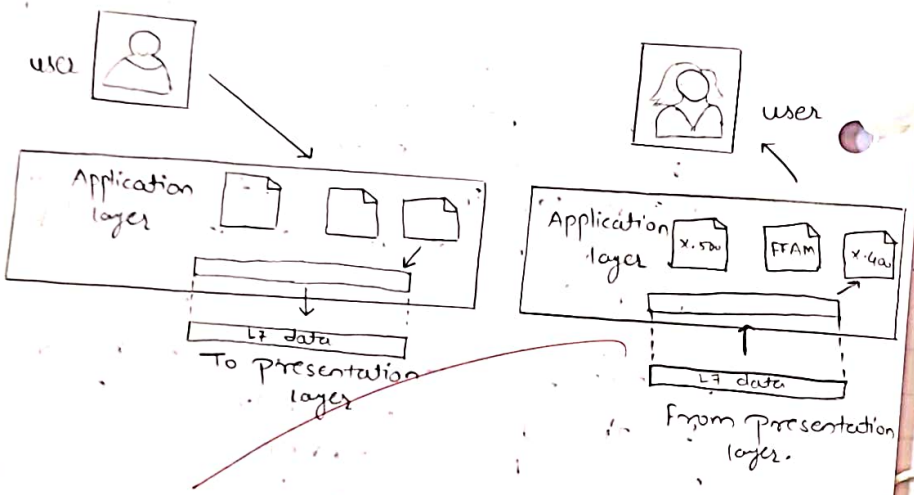
Aim: To study OSI reference model and TCP/IP Protocol suite.

Two Networking Model: Open systems Inter-connection [OSI] and transport control Protocol / Internet protocol [TCP/IP]

- The OSI and TCP/IP models were developed at parallel times by different organization
- The OSI model was developed by the International Organization of standardization [ISO].
- TCP/IP begin development with the developed by the US Defense Advanced Research Projects Agency. [DARPA]
- The TCP/IP model is considered less rigid.

- Layer 7 - Application Layer.

- "closest to the end user".
- It receives information directly from user and displays incoming data to the user.
- It is responsible for providing services to the user.



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- Network virtual terminal
- File transfer, access, and management
- Mail services
- Directory services.

Layer 6 - Presentation layer.

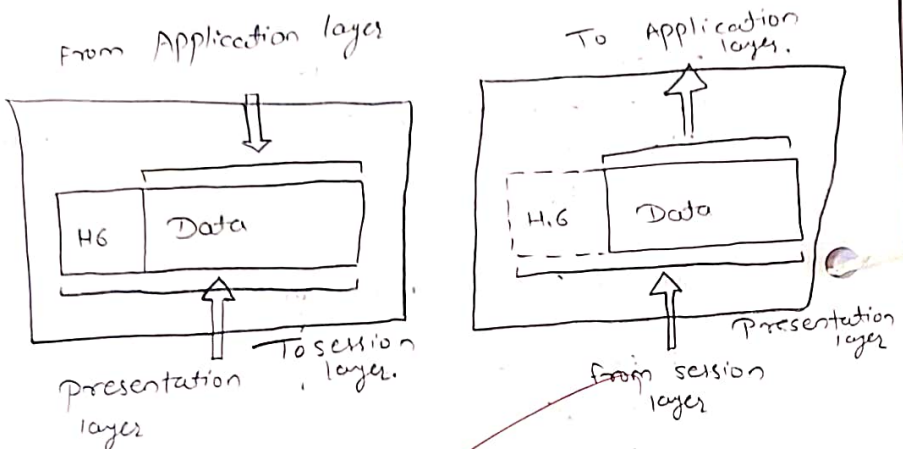
It is responsible for
- translation
- compression
- encryption.

Layer 5 - Session layer.

It is responsible for dialog control and synchronization.

The session layer is used to establish, maintain and synchronizes the interaction between communicating devices.

Functions of session layer.



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- session Establishment: The session layer acts as a dialog controller.
- It creates a dialog between two process.
- i.e, it allows the communication between two Processes which can be either half duplex or full-duplex.

layer 4 - Transport layer.

- The main responsibility is to transfer the data completely.
- It recieves the data from the uppar layer and converts them into smaller units known as segment.

Function of transport layer.

- Host to host delivery.
- main function is to transfer network packets from the source to the destination
- Involves both.

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Layer 3 - Network layer.

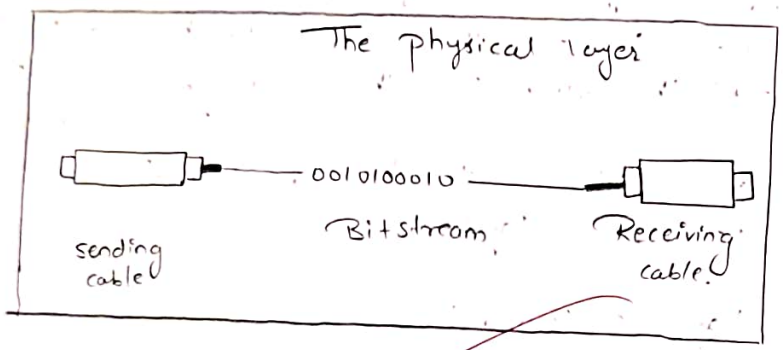
- Host to host delivery.
- main function is to transfer network packets from the source to the destination
- At the destination, the datagram is decap-sulated, and the correspond is extremed and delivered to the corresponding transport layer.

Layer 2 - Data link layer.

- Takes the responsibility to deliver the data to the very next hop / Node.
- Very similar to the network layer, except the data link layer facilitas data between two devices on the same network.

Layer 1 - Physical layer.

- The main functionality of the physical layer is to transmit the individuals bits from one node to another node.
- It is the lowest layer of the OSI model.



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TCP/IP Protocol Suite.

- TCP/IP begin development with the US defense Advanced research Projects Agency (DARPA)
- The TCP/IP model was developed prior to the OSI model.

Application layer (TCP Protocol suite)

- An application layer is the topmost layer in the TCP/IP model.
- It allows the user to interact with the application.
- It forwards its data to the transport layer.
- Protocol of Application layer: HTTP, SMTP, FTP, DNS, SNMP etc.

Transport layer :

- Example ; TCP and UDP are two transport layer protocols.
- PDU : segment.
- Services provided by transport layer.

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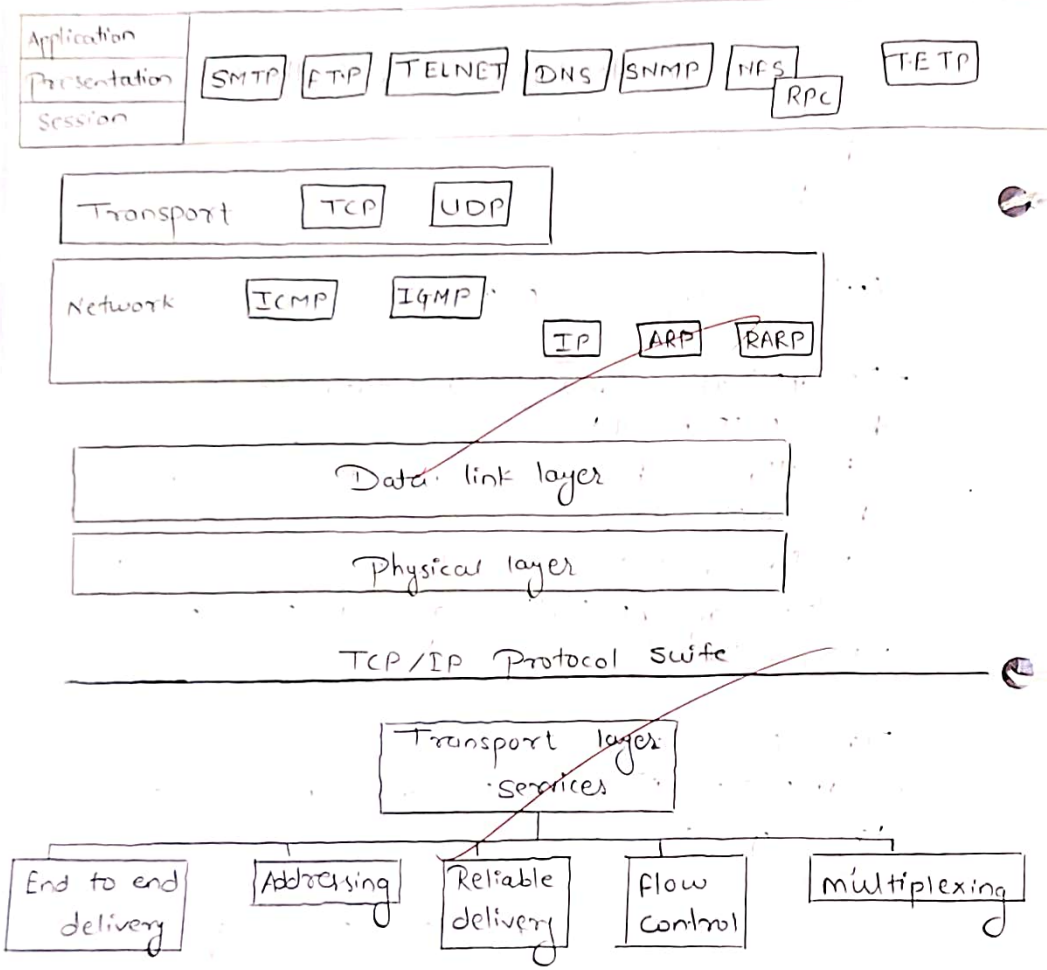

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Network layer:

- Provides host to host delivery.
- main function is to transfer network packets from the source to the destination.
- network layer protocols include IP, the ICMP, the IGMP and the IPSes.
- layer so that it can further be sent to the receiver.

Data link layer.

- Takes the responsibility to delives the data to the very next hop/node.
- PDU: frame
- Data link layer Protocols are Ethernet taken ring; FDDI and PPP.

Physical layer.

- The main functionality of the Physical layer is to transmit the individuals bits from one node to another node.
- It is the lowest layer of the TCP/IP suite.

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Services of data link layer

→ Framing, link access

→ Reliable delivery

→ Flow control

→ Error detection

→ Error correction

→ Half-Duplex & Full-duplex

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Functions of a physical layer.

- Line configuration.
- Data Transmission: Topology.
- signals.

Conclusion: Thus we studied OSI reference model and TCP/IP Protocol suite.

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Experiment NO:03

Aim: Study to creating on Ethernet cable.

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Experiment NO:03.

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Aim: Study to creating on Ethernet cable.

Theory:

Materials Needed:

- Ethernet cable (cat 5, cat5e, cat6, etc)
- RJ-45 connectors (8P8C modular plugs)
- Cable crimper tool.
- Wire stripper or scissors.
- Ethernet cable tester.

Steps:

1. Cut the cable:
   cut the cable to your length using scissors or a wire cutter.

2. Strip the outer sheath:
   Strip about 1-1.5 inches of the outer insulation from both ends of the cable, exposing the colored wires inside.

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3: Untwist and arrange the wires.

Untwist the four pairs of wires. Arrange them in the following color-coded standards:

- T568B: Orange/white, Orange, Green/white, Blue, Blu/white, Green, Brown/white, brown.
- Ensure both ends follow the same standard for a straight-through cable, or different standard for a crossover cable.

4. Trim the wires:

Using scissors or a wire cutter, cut the wire to an even length (about 0.5 inches from where the outer sheath removed).

5. Insert wires into RJ-45 connector:

Carefully insert the arranged wires into the RJ-45 confector. Ensure each wire reaches its slot, and the sheath is slightly inside the connector for support.

6. Crimp the connector:

Use a crimping tool to press down on the RJ-45 connector. This secures the wires in place and completes the connects.

Teacher's Signature

Conclusion: Thus we have studied creating an Ethernet cable.

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7: Test the cable:

Test the cable using an Ethernet cable tester to ensure all connections are working.

Note:

Be careful while stripping and arranging the wires ~~to avoid~~ damaging them.

Choose the appropriate color standard based ~~on~~ the compatibility you need.

Conclusion: Thus we have studied creating an Ethernet cable.

Teacher's Signature

Teacher's Signature

Experiment NO:04

Aim: Study to create star topologies in laboratories.

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Experiment NO: 04.

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Aim: Study to create star topologies in laboratories.

Theory:

Materials Needed:

- Network switch or hub.
- Ethernet cables (one for each device)
- Computers or devices to connect.
- Power supply for the switch or hub.

STEPS:

1: Position the switch or Hub:
Place the network switch or hub in a location to make connection devices easier.

2: Connect the power supply:
Plug the switch or hub into a power source and turn it on.

3: Connect Ethernet Cables to the switch/Hub:
Take the Ethernet cable and plug one end into one of the ports on the switch or Hub.

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Conclusion: Thus we have study to create star topology in laboir.

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4: Connect Devices:

Connect the other end of each Ethernet cable to the network port of the devices (e.g; computers, printers) you want to include in the topology.

5: Test Connections:

- Check the indicators light on the switch or hub to ensure port is active.
- Verify network connectivity on all devices to ensure they are communicating with each other.
- To check the communication use following command.
- Ping ip address of other connect computers.
- Eg: ping 192.168.1.2.

Conclusion: Thus we have study to create star topology in laboir.

Teacher's Signature

Experiment NO: 06

Aim: To study Network configuration and troubleshooting commands in Linux.

Experiment NO: 06

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Name of Practical

Aim: To study Network configuration and troubleshooting commands in Linux.

Theory: Computers are often connected to each other on a network. They send requests to each other in the form of packets that travel from the host to the desination. Linux provides various commands from network configuration and troubleshooting.

COMMANDS:

1. Ping (packet Internet Groper)

Once the packets are received by the destined computer, it starts sending the packet back. This command keeps excuting uniti'l it is irrupted.

Ping command Provides details such as.

- the number of packets transmitted.
- the number of Packets received.
- time is taken by the packet to return.

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Ping command is generally used for the following purposes.

- measuring the time taken by the packets to return to determine the speed of the connection.
- to make sure that the network connection between the host and the destined computer can be established

2. nslookup command:

nslookup command queries the DNS in order to fetch the IP address or the domain name DNS records.

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3: traceroute:

This command is used to get the route of a packet travels. It also returns the number of hops taken by the packet to reach the destination.

4. host:

Host command is used to find a domain name associated with the IP address or find an IP address associated with the domain name. The returned IP address is either IPv4 or IPV6.

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5. ARP:

ARP (address Resolution Protocol) command is used to display and modify ARP cache, which contains the mapping of IP address to MAC address. The system's TCP/IP stack uses ARP in order to determine the MAC address associated with an IP address.

6. ifconfig:

ifconfig (Interface configuration) is a utility in an operating system that is used to set or display the IP address and netmask of a network interface. It also provides commands to enable or disable an interface.

Teacher's Signature

Conclusion: Thus we have studied network configuration and troublshooting command in linux.

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7. Hostname:

This command is used to display the current hostname of the system.

Conclusion: Thus we have studied network configuration and troubleshooting command in linux.

Teacher's Signature

Experiment No:07

Aim: To study the installation of cisco packet tracer

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Experiment No:07.

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Aim: To study the installation of cisco packet tracer.

Theory: Cisco packet tracer is a network simulation tool developed by cisco, enabling user to design, configure, an troubleshoot network topologies in a virtual environment. It's particularly beneficial for those pursuing cisco certifications or anyone interested in networking.

Network installation steps.

1. Account Registration:
- visit the cisco networking Academy website.
- Click on "sign up" and complete the register form.
- After registering, log in to your account.

2. Download packet tracer:
- Once logged in, Navigate to the packet tracer download page.
- Select the version computable with your OS.
- Download the installer file.

Teacher's Signature

Conclusion: Thus we studied the installation of Cisco Packet tracer.

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3: Installation:
- locate the download installer and run it.
- Follow the on-screen prompts:
- Accept the license agreement.
- choose the installation location or proceed with defaul
- Click "install" to begin the installation process.
- Once completed, click "finish" to exit the installer.

4: First Launch:
- open cisco packet tracer.
- on the initial launch, you'll be promoted to log in:
- Use your cisco Networking Academy.

Credentials:
- Alternatively, click "Guest login" for limited access without an account.

Conclusion: Thus we studied the installation of cisco Packet tracer.

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Experiment NO: 08

Name of Practical

Aim: Study to create peer to peer topologies in Cisco Packet Tracer.

Theory:

STEPS TO CONNECT TWO PCs (peer-to-peer) IN CISCO PACKET TRACER.

1. Add two PC's ~~to~~ the workspace.
   - ~~Go to~~ End Devices in the bottom device-type list.
   - Drag two PC's (eg. PC0 and PC1) onto the workspace.

2. Connect the PC's with a copper cross-over cable.
   - Click the connections icon (lightning bolt).
   - Click on PC0, choose FastEthernet0.
   - Click ~~on~~ PC1, choose FastEthernet0.

3. Assign IP addresses.
   - Click on PC0 > Desktop > IP configuration.
     - IP Address: 192.168.1.1
     - Subnet Mask: 255.255.255.0

Teacher's Signature

Conclusion : Thus we studied to create Peer to Peer topologies in cisco packet tracer.

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- Click on PC1 > Desktop > IP Configuration.
  - IP Address : 192.168.1.2
  - Subnet Mask : 255.255.255.0

4. Test the connection:
- On PC0, go to Command Prompt, type:
Ping 192.168.1.2

Conclusion: Thus we studied to create peer to peer topologies in cisco packet tracer.

Teacher's Signature

Experiment No: 09.

Aim: Star Topology in cisco Packet Tracer (with transfer).

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Aim: Star Topology in cisco packet Tracer (with transfer).

Theory: In a Star topology, all devices (PCs) are connected to a central device (usually a switch) communication happens through the central switch.

DEVICES NEEDED

- 1 x Switch (eg. 2960)
- 4 x PC's (PC0, PC1, PC2, PC3)
- 4 x Copper ~~straight-through~~ cables.

STEP-By-STEP setup

1. Add Devices:
   - From End Devices, drag 4PC's onto the workspace
   - From Switches ~~drag~~ 1 switch (eg, switch 0).

2. Connect Devices:
   - Use copper straight-through cable:
     - PC0 → switch (FastEthernet0/1)
     - PC1 → switch (FastEthernet0/2)
     - PC2 → switch (FastEthernet0/3)

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- PC3 → switch (FastEthernet 0/4)

3. Assign IP address:

Go to each PC:

- Click PC > Desktop > IP configuration, assign:

PC	IP address	Subnet Mask.
PC0	192.168.1.1	255.255.255.0
PC1	192.168.1.2	255.255.255.0
PC2	192.168.1.3	255.255.255.0
PC3	192.168.1.4	255.255.255.0

SEND A MESSAGE (using simulation Mode)

1. Switch to simulation Mode:
- Click the simulation tab at the bottom (beside Realtime)

2. Create a Message.
- Click the envelope icon (Add simple PDU)

Teacher's Signature

Conclusion: Thus we studied star Topology in cisco Packet Tracer (with transfer)

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- Click PC0 (source), then PC2 (destination).
- You'll see a message packet appear in the simulation events.

3. Run Simulation:
- Click "Play" (▷) to watch the message travel through the switch to PC2 you can test from other PCs as well (eg. PC1 → PC3)

Conclusion: Thus we studied star Topology in cisco packet Tracer (with transfer.)

Teacher's Signature

Experiment No:10

Aim: Study of client Server Architecture.

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Aim: Study of Client Server Architecture.

CLIENT SERVER ARCHITECTURE:

Client/server Architechture the client/server architechture significantly decreased network traffic by providing a query response rather than total file tranfer. It allows multi-user updating through a GUI front end to a shared database. Remote procedure calls (RPCs) or standard query language (SQL) statements are typically used to communicate between the client and server.

The following are the examples of client/server architechtures.

1. Two tier architecture: A two-tier architechture is where a client talks directly to a server, with no intervening server. It is typically used in small environments (less than 50 users).
2. Three tier architechtures: The three tier architechture is introduced to overcome the drawbacks of the two tier server environment.

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The basic characteristics of client/server architechtures are:

1: Combination of a client or front-end portion that interreacts with the user, and a server or back-end portion that interacts with the shared resource. The client process contains solution specific logic and provides the interface The server process acts as a software engine that manages shared resources such as database printers, modems, or high powered processors.

2: The front-end task and back-end task have fundamentally different requirements for computing resource such as processor speeds, memory ~~disk and capacities~~, and input/output devices.

3: The environment is typically heterogeneous and multivendor. The hardware platform and operating system of client and server are not usually the same. Client and server processes communicate through a well-defined set of

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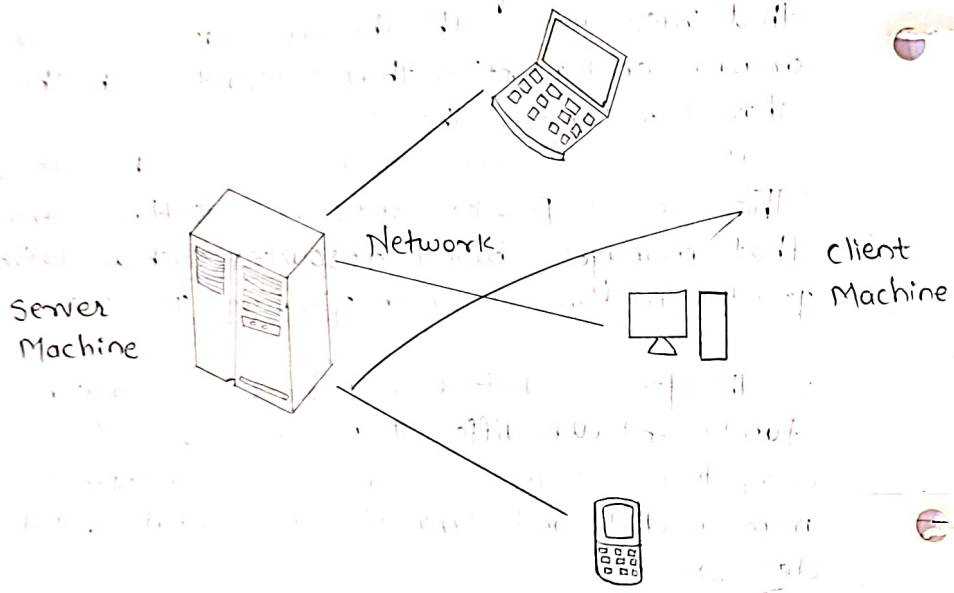

Block Diagram of client server Architechture

Conclusion: Thus we have studied client server architecture.

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4: An important characteristic of client-server systems is scalability. They can be scaled horizontally or vertically. Horizontal scaling means adding or removing client workstations with only a slight performance impact. Vertical scaling means migrating to a larger and faster server machine or multi server.

Conclusion: Thus we have studied client server architecture.

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