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Assignment 2 - ECA-102: Data communications

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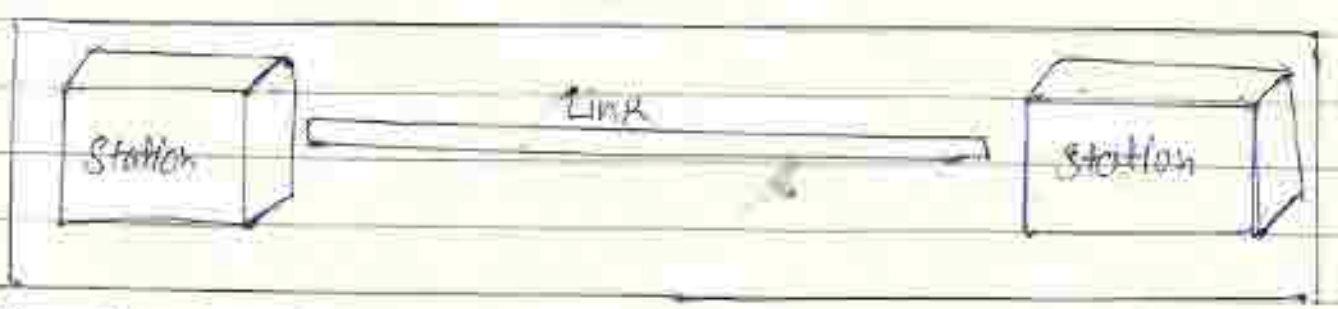
Q What are the different types of networks

A network is a set of devices (often referred to as nodes) connected by communication links to share the computing resources

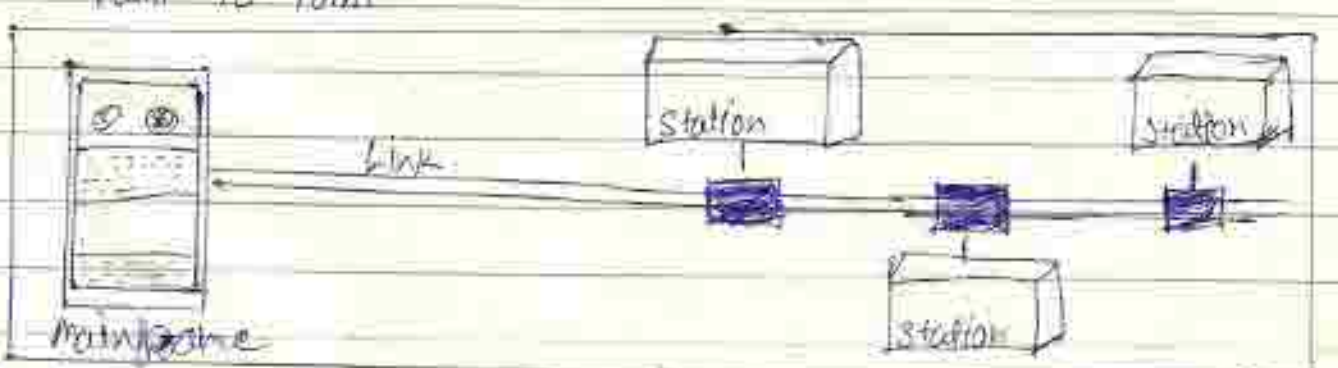
A node can be a computer, printer, smart phone, ~~refrigerator~~ refrigerator, car or any other device capable of sending and/or receiving data generated by other nodes on the network

Types of connection:
Point - to - Point
Point - to - multipoint

Point to Point vs Point - to - multipoint



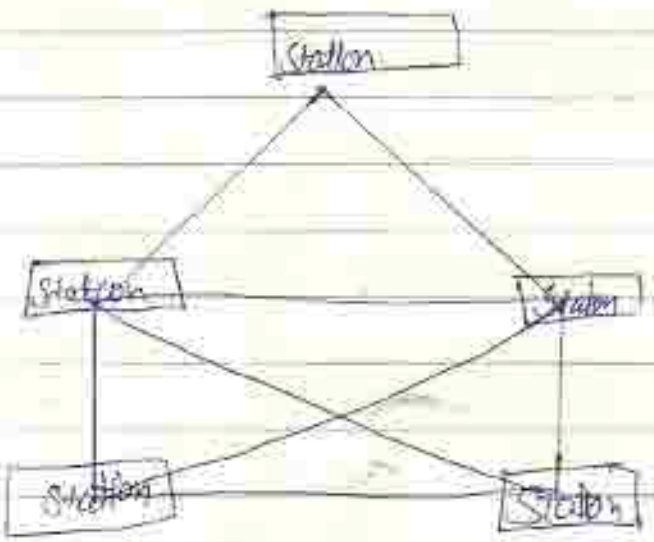
a. Point - to Point



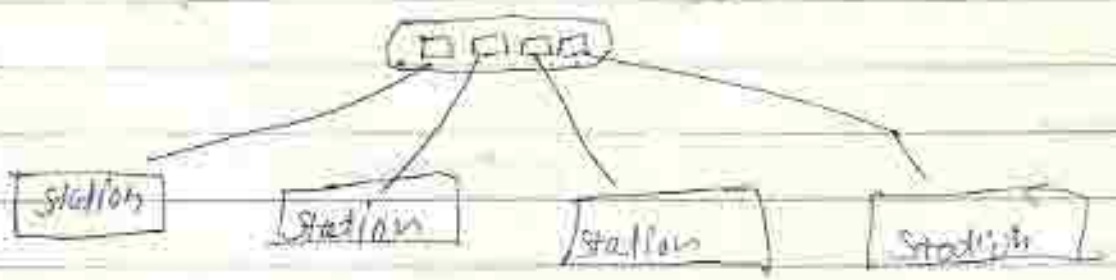
b. Multipoint

Types of Topologies

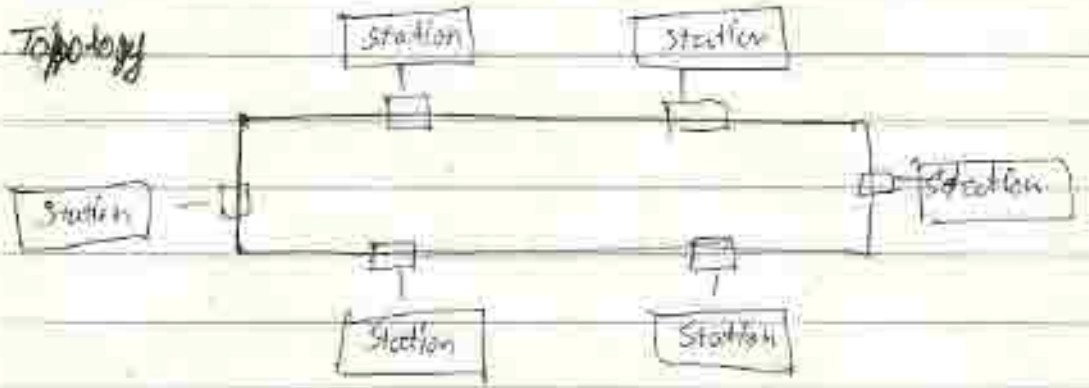
Mesh



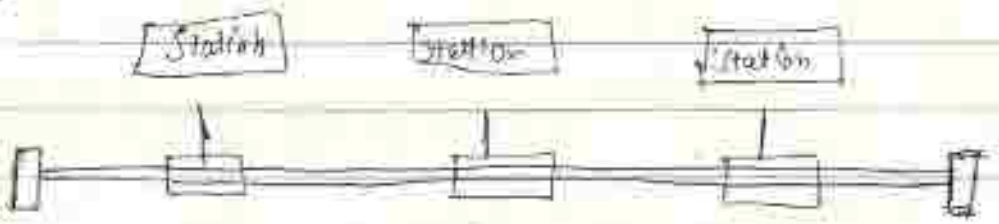
Star Topology



Ring Topology

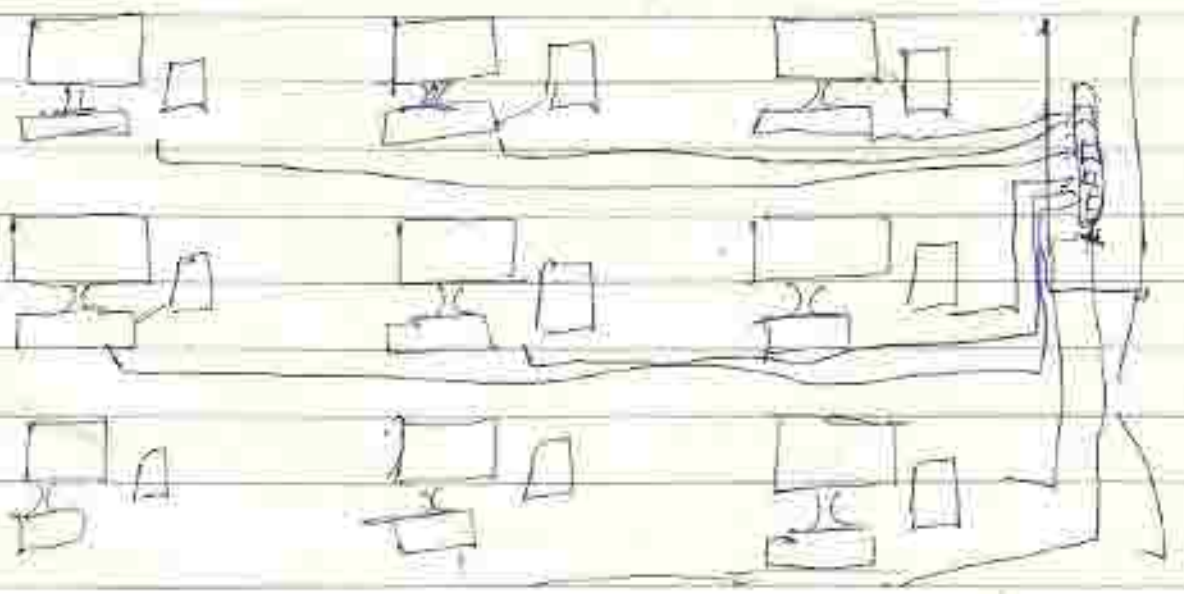


Bus Topology



- Lan :-

A local area network (LAN) is usually privately owned and links the devices in a single office, building, or campus as shown in figure given below



Lan cont...

Depending on the needs of an organisation and the type of technology used, a lan can be as simple as two PCs and a printer in someone's home office; or it can extend throughout a company and include audio and video peripherals.

Currently, lan size is limited to a few kms

lans are designed to allow resources to be shared between personal computers or workstations.

The resources to be shared can include hardware (e.g., printer), software, (e.g. e.g. an application program), or data

One of the computers may be given a large capacity disk drive, and may become a server to clients

Software can be stored on this central server and used as needed by the whole group.

In addition to size, lans are distinguished from other types of network by their transmission media and topology

WAN (Wide Area network)

A wide area network (WAN) Provides long-distance transmission of data, image, audio, and video information over large geographic areas that may comprise a country, a continent or even the whole world.

A WAN can be as the telephones that connect that connects a home computer to the internet

We normally refer to the first as a switched WAN and to the second as a point to point WAN

- The switched WAN connects the end systems which usually comprise a router (Internet - working connecting device) that connects to another LAN or WAN

The Point-to-point WAN is normaly a line based from a telephone or cable TV Provider that connects a home computer or small lan to an internet service provider (ISP) This type of WAN is often used to provide internet access

Q: Explain the Shielded twisted pair (STP) an Unshielded twisted pair (UTP)

Ans: In our modern high tech world cables are more than just four pair of wires twisted together in a casing to connect electronic objects to each other, cables, in fact, are a necessity components that keep our planet connected. Most of today's connecting relies on shielded and Unshielded cable.

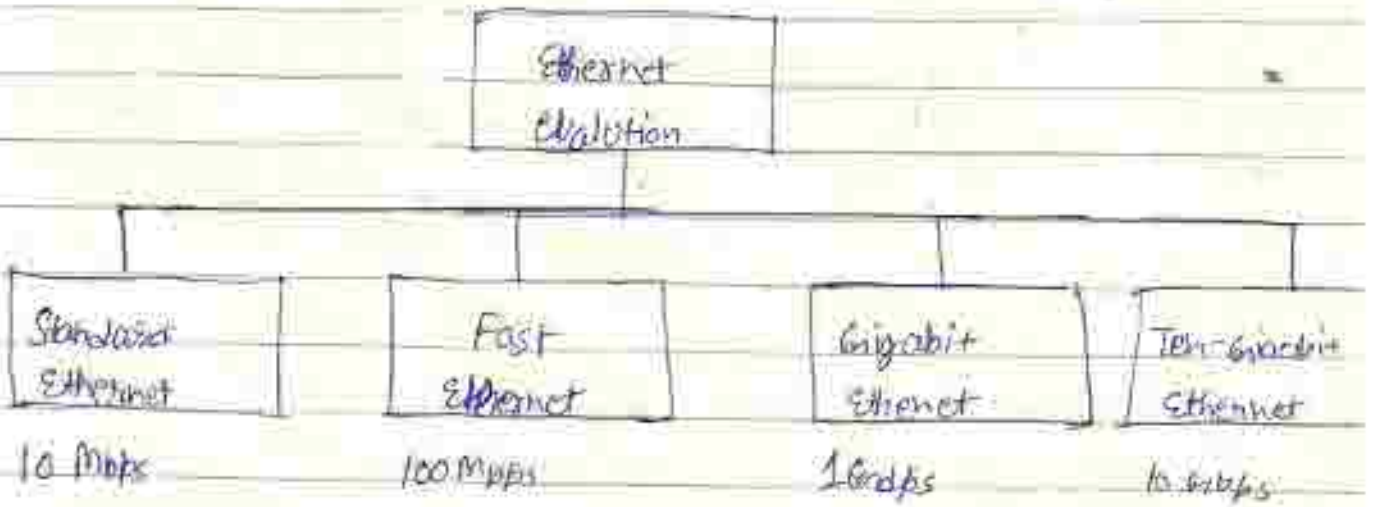
STP and UTP Cables

Shielded twisted pair cable (STP) has the individual pair of wires wrapped again for double protection. Unshielded twisted pair cable (UTP) has each pair of wires twisted together. Those wires are then wrapped in tubing without any other protection. UTP cables are less expensive and a more popular type of cabling.

Knowing which cable to use for a specific application depends on the protection needed from Power frequency (EMI). This is where shielded vs. Unshielded cable becomes important.

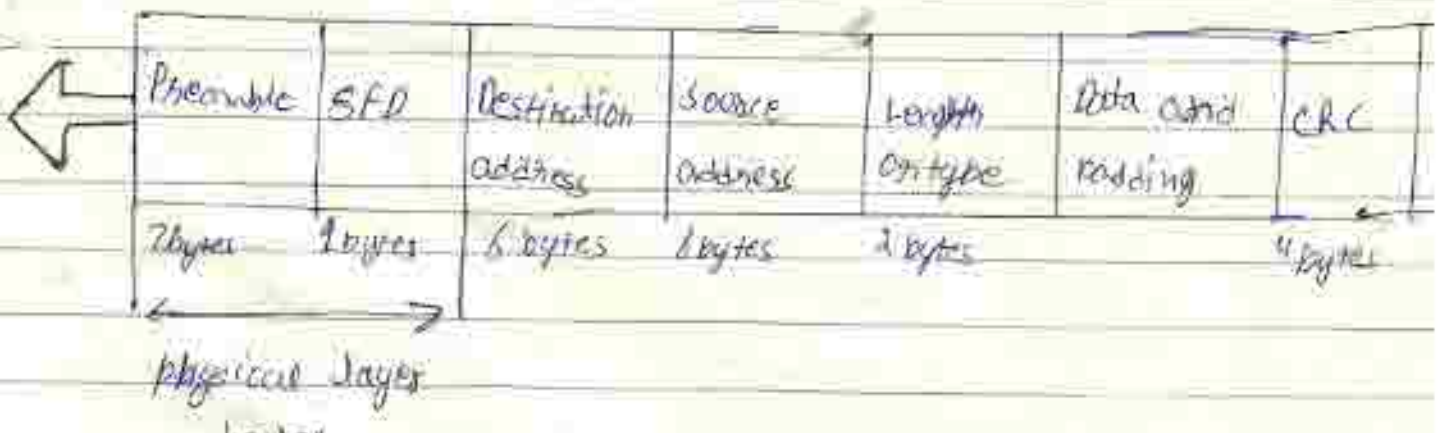
Ethernet (IEEE 802.3)

Ethernet (IEEE 802.3) is one example of LAN which has evolved over the years as follows:

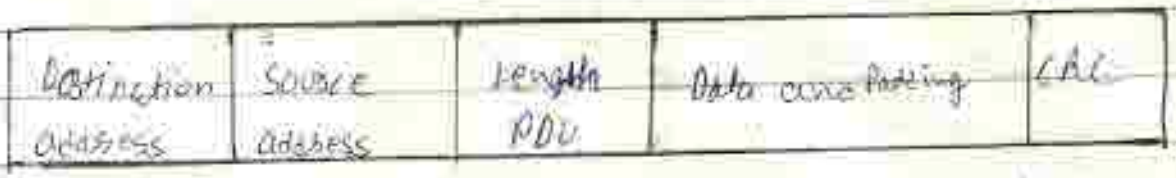


Frame format of Ethernet

Preamble: 56 bits of alternating 1s and 0s
SFD: Start frame delimiter, flag (10101011)



Frame length of Ethernet



Minimum Frame length 512 bits or 64 Bytes

Maximum Frame length 12,144 or 1518 bytes

WLAN (Wireless Ethernet IEEE 802.11)

∴ IEEE has defined the specification for a wireless LAN, called IEEE 802.11, which covers the physical and data link layers.

∴ A BSS without an AP is called an ad hoc network; a BSS with an AP is called an infrastructure network.

Preventing Electromagnetic Interference (EMI).

Electromagnetic interference (EMI), or radio frequency interference (RFI) as it's also referred to, is an electronic disturbance generated by external electronic or electrical sources such as electrostatic coupling, electromagnetic radiation, or electrical circuit noise. The truth is EMI/RFI is all around us. Just like the static you may hear during a phone call, the same is true for networking. If the EMI noise is strong enough it may interfere with the actual data traffic and prevent computers from hearing each other. When this happens, data is lost and the network has to resend the information a second time. The more often this process is repeated, the more often the network slows down. Thus, EMI disturbances can lower performance of a circuit or prevent it from functioning properly. Data paths can be interrupted ranging from an increase in error rate to a complete loss of information.

What are difference between baseband and broadband transmission?

Ans:- In a base band transmission, the bandwidth of the cable is consumed by a single signal. In broadband transmission, signals are sent on multiple frequencies, allowing multiple signals to be sent simultaneously.

Also

1) Uses digital signaling
2) No frequency division multiplexing
3) Bi-directional transmission
4) Signal travels over short distance

Broadband signaling:-

1) Uses analog signalling
2) Unidirectional transmission
3) Frequency-division multiplexing is possible
4) signal can travel over long distance before being attenuated.

Q:- What are the difference between a hub modem router and switch.

Ans:- In an Ethernet network, there are some networking devices that play their roles at various levels such as hubs, switches and routers. The function of the three devices are all quite different from one another even if sometimes they are all integrated into a single device due to that, many

People feel confused about the difference between the hub, Switch, and router. The following Part will focus on the Table "hub vs switch vs router", aiming to clarify difference among them.

Hub

Hub is commonly used to connect segments of a LAN (Local Area Network). A hub contains multiple ports. When a packet arrives at one port, it is copied to the other ports so that all segments of the LAN can see all packets. Hub acts as a common connection point for devices in a network.

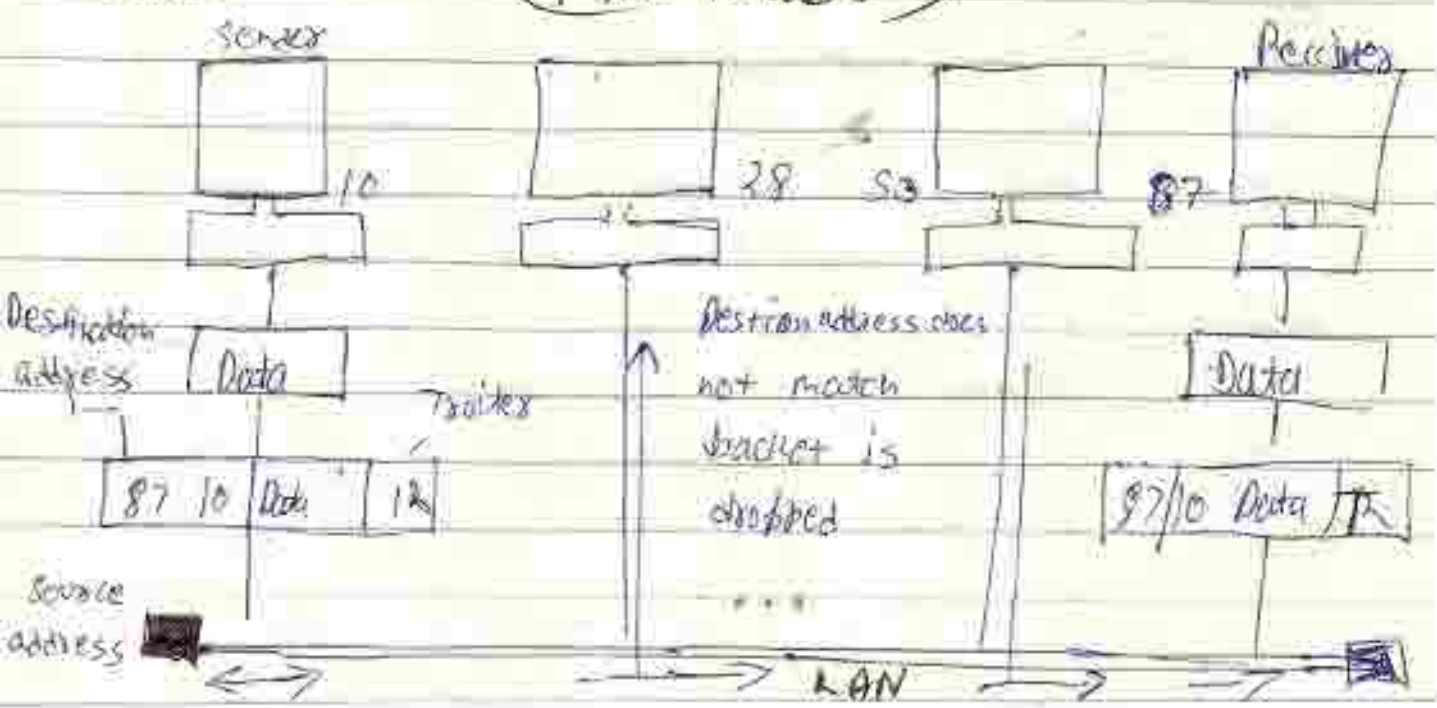
Switch

A Switch operates at data link (layer 2) and sometimes the network layer (layer 3) of the OSI (Open System Interconnection) Reference Model and therefore supports any packet protocol. LANs that use switches to join segments are called switched LANs or in the case of Ethernet networks, switched Ethernet LANs. In a network, the switch is the device that filters and forwards packets between network LAN segments.

Router

A router is connected to at least two networks, commonly two LANs and WANs (Wide Area Networks) or LAN and its ISP's (Internet service provider) network. The routers whose two or more networks connect using headers and forwarding tables, routers determine the next path to forward the packets. In addition router uses protocols such as ICMP (Internet Control message Protocol) to communicate with each other and configures the best route between any two hosts. In a word, routers forwards data packets among networks.

15 When you move the NIC card the PC to another the MAC address gets transferred as well. (MAC Address)



1. When troubleshooting computer network problems, what common hardware related problems can occur?

Ans:> A large percentage of a network is made up of hardware problems in these areas can range from malfunctioning hard drives, broken NICs and even hardware startup. Incorrectly hardware configuration is also one of those cobrits to look into.

2. In a network that contains two servers and twenty workstations, where is the best place to install an Anti-virus program?

Ans:> The best solution is to install anti-virus on all the computers in the network. This will protect each device from the other in case some malicious user tries to insert a virus into the servers or legitimate users.

3. Define static IP and dynamic IP? Discuss the difference between IPV4 and IPV6.

Ans:> When a device is assigned a static IP address the address does not change most devices use dynamic IP addresses which are assigned by the network when they connect

are change over time

Static IPs address

Most users don't need static IP addresses ~~that~~ static ~~IP at~~ Static IP addresses devices or websites matter more when external devices or websites need to remember your IP address one example is VPN or other remote access solutions that trust (whitelists) certain IPs for security purpose A static IP address is not required if you are hosting a server although it can simplify the setup process Google ~~Fiber~~ Fiber provides two options

dynamic IP address

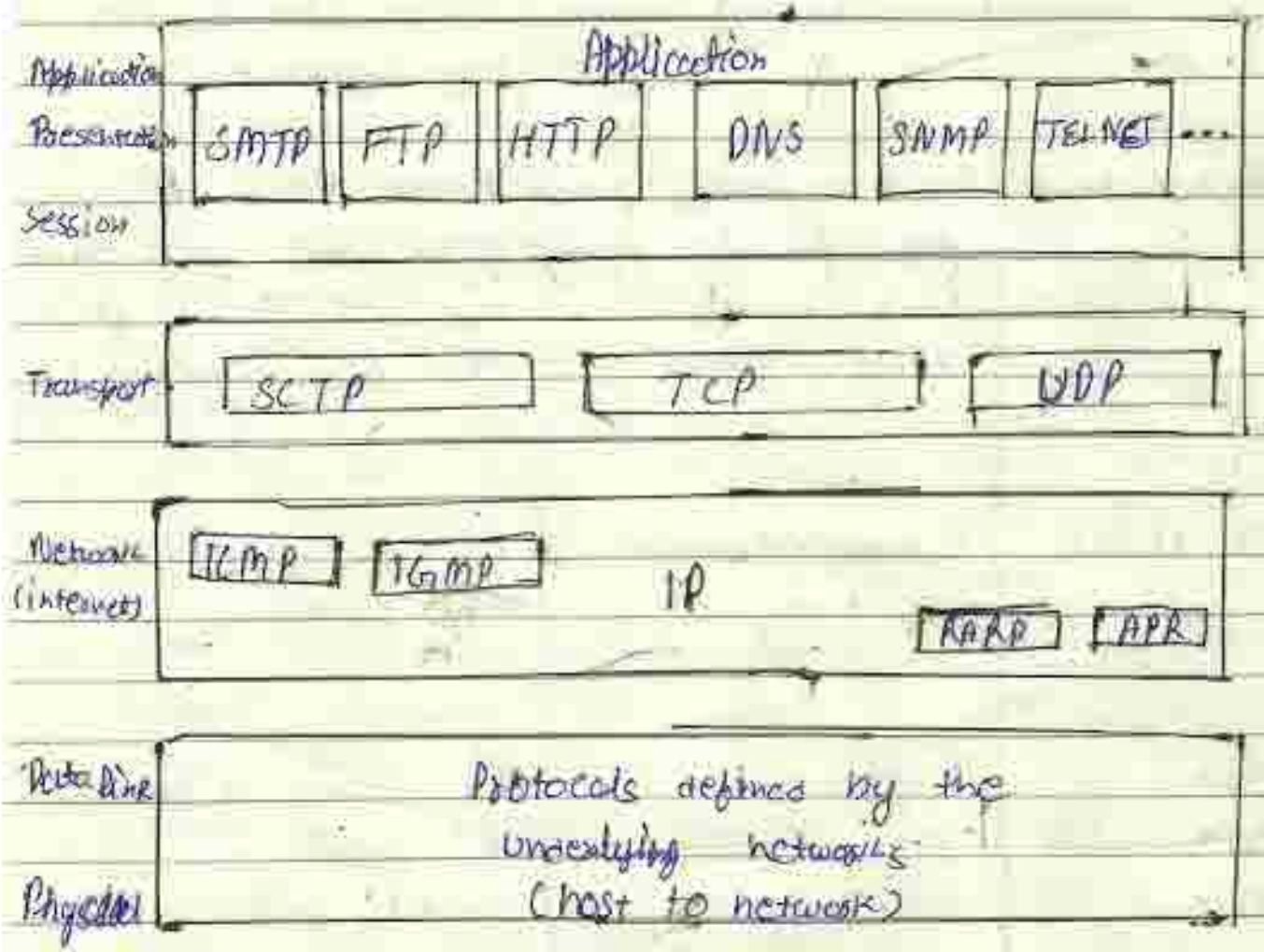
Use advanced settings for your network to configure dynamic DNS when your IP address changes the DNS entry for your server is automatically updated with its new IP addresses so outside users can use the same domain name. you can choose the Dynamic DNS provider and don't have to install additional software on your computer.

→ Difference between IPv4 and IPv6

	Difference	IPv4	IPv6
1	Security	Security is deep ended on applications - IPv4 was not designed with security in mind	IPSec (Internet Protocol security) is built into the IPv6 Protocol usable with a proper key infrastructure
2	Packet header	Does not identify packet flow for QOS handling which includes Checksum options	Packet head contains flow Label field that specifies packet flow for QOS handling
3	DNS records	Address (A) records, maps hostnames	Address (AAAA) records, maps hostnames
4	Compatibility with mobile device	IPv4 address uses the dot-decimal notation that's why it is not suitable for mobile networks	IPv6 address is represented in hexadecimal colon separate notation IPv6 is better suited to mobile network
5	Mapping	Uses ARP (Address Resolution Protocol) to map to MAC address	Uses NDP (Neighbour Discovery Protocol) to map to MAC address

Q Discuss TCP/IP model in detail:

Ans :) The figure given below shows the comparison of TCP/IP network model



Q What is a web browser (browser) ? Give some example of browser

Ans A web browser or simply browser is an application used to access and view websites (common web browsers include Microsoft Edge Internet

Explorer, Google Chrome, Mozilla Firefox and Apple Safari. The primary function of a web browser is to render HTML, the code used to design or 'mark up' webpages.

Q What is search engine? Give example.

Ans A search engine is a web-based tool that enables users to locate information on the World Wide Web. Popular example of search engines are Google, Yahoo!, and MSN Search. Search engine utilize automated software applications (referred to as robots, bots, or spiders) that travel along the Web, following links from page to page, site to site. The information gathered by the spiders is used to create a searchable index of the Web.

Q 2 What is the Internet & www? What are the uses of Internet in our daily life?

Ans The Internet is a global network of networks connecting millions of users worldwide via many computer networks using a simple standard common addressing system and basic communication protocol called TCP/IP.

This allows messages sent over the internet to be broken into small pieces called packets which travel over many different routes between source and destination computers.

WWW (world wide web)

WWW stand for (world wide web). Tim Berners Lee invented the world wide web in 1989 while working at CERN. He wrote the code for WWW using a NeXT computer, to share documents among researchers across the world using hyperlinks.

* Technically the world wide web can be defined as "all the resources and users on the internet that are using the Hypertext Transfer Protocol (HTTP)"

* The world wide web, or simply web is a way of accessing information over the medium of the Internet

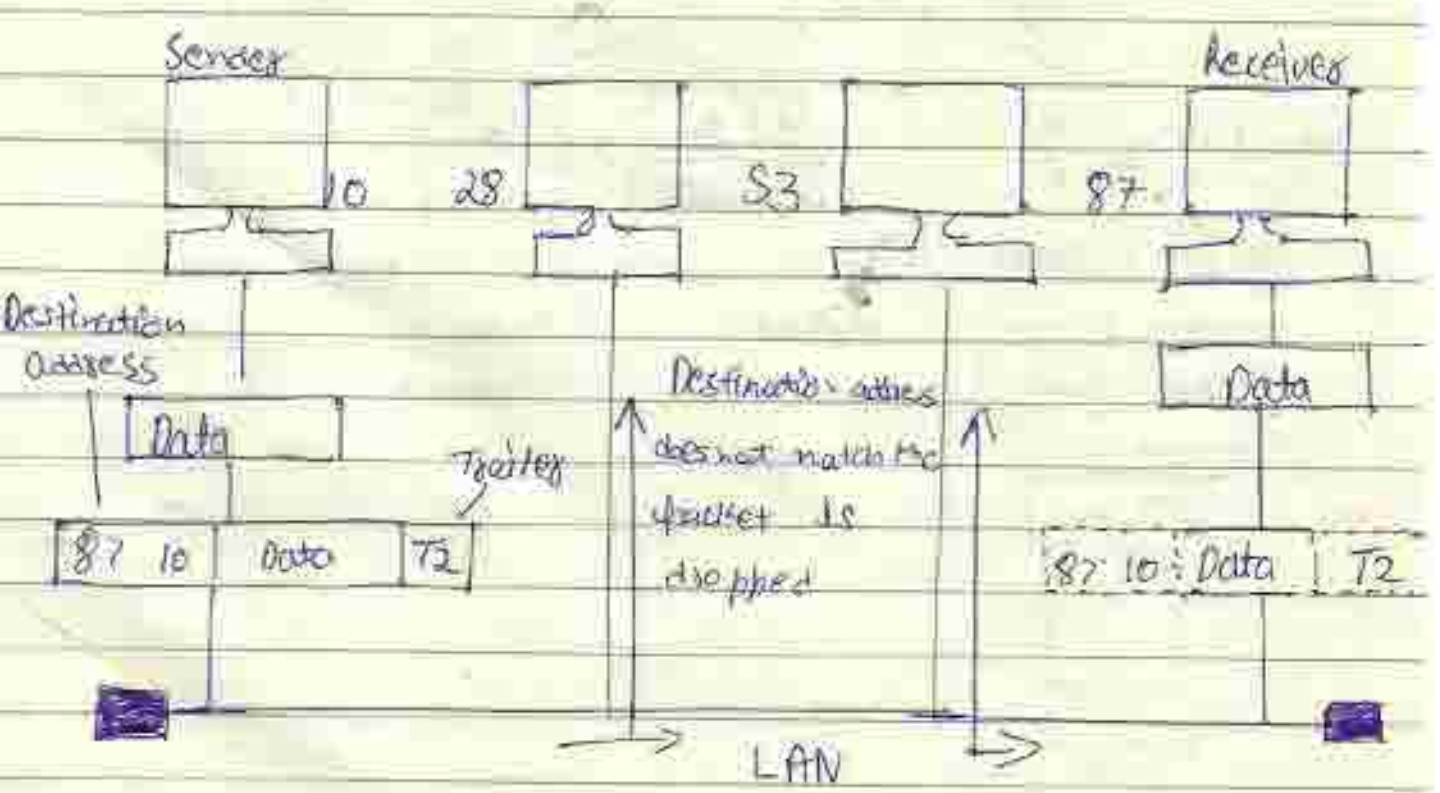
* The world wide web is the universe of network-accessible information

Q What is an internet service provider? give some example of ISP in India.

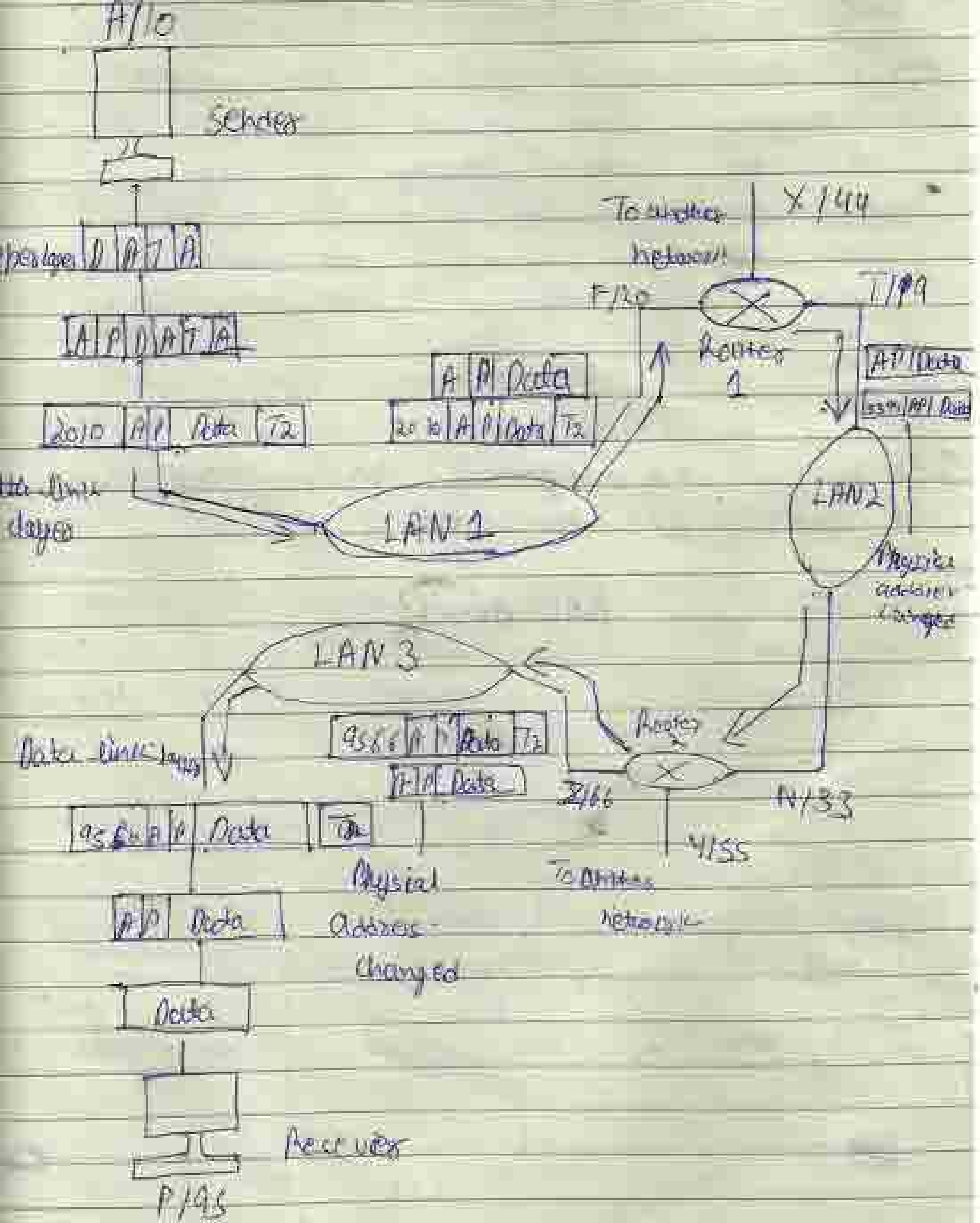
Ans:- An internet service provider (ISP) is a company that provides you with access to the internet, usually for fee. The most common ways to connect to an ISP are by using a phone line (dialup) or broadband connection (cable or DSL)

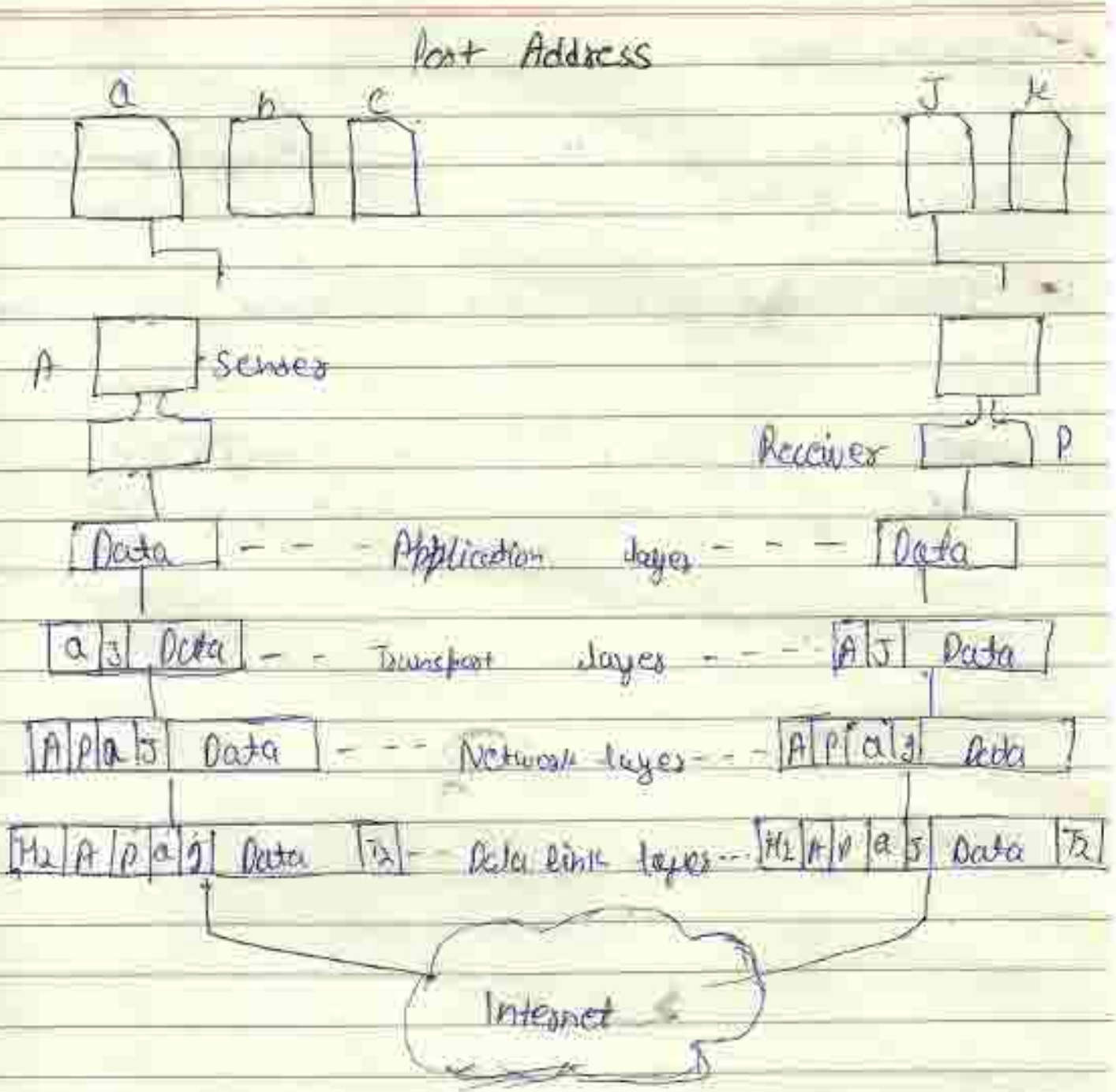
Q.→ Discuss the difference between MAC address, IP address and Port address

MAC Address



IP Address


A/10
Sender
Data
LAN 1
Router 1
LAN 2
LAN 3
Router
X/44
To another network
F/20
T/99
Physical address changed
Data link layer
N/33
Z/66
Y/55
To another network
Receiver
P/95



Q How do we view my internet browser's history ?

Ans :- Open the History menu using the keyboard shortcut ctrl+H. You can also access this menu with the

following steps

① click the Hob button in the upper right-hand corner of the window

② click the history icon to open the History menu

This menu allows you to view the pages you've visited in chronological order.