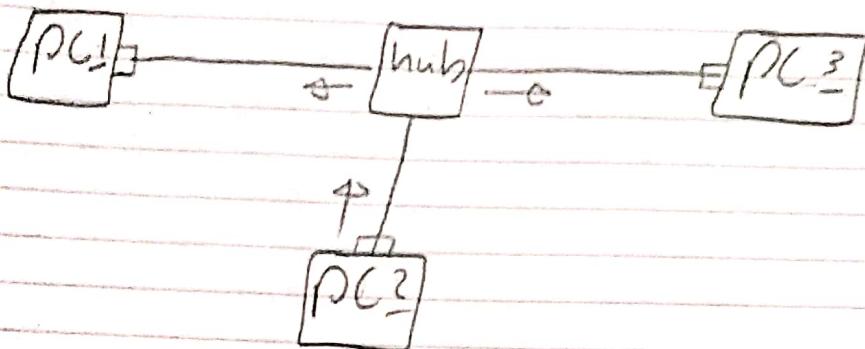


I.C.C. 1

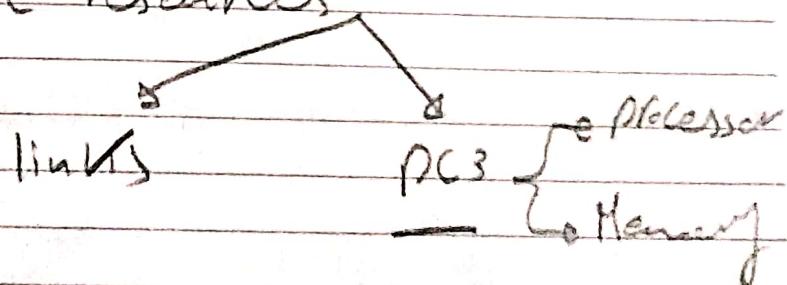
hub:-



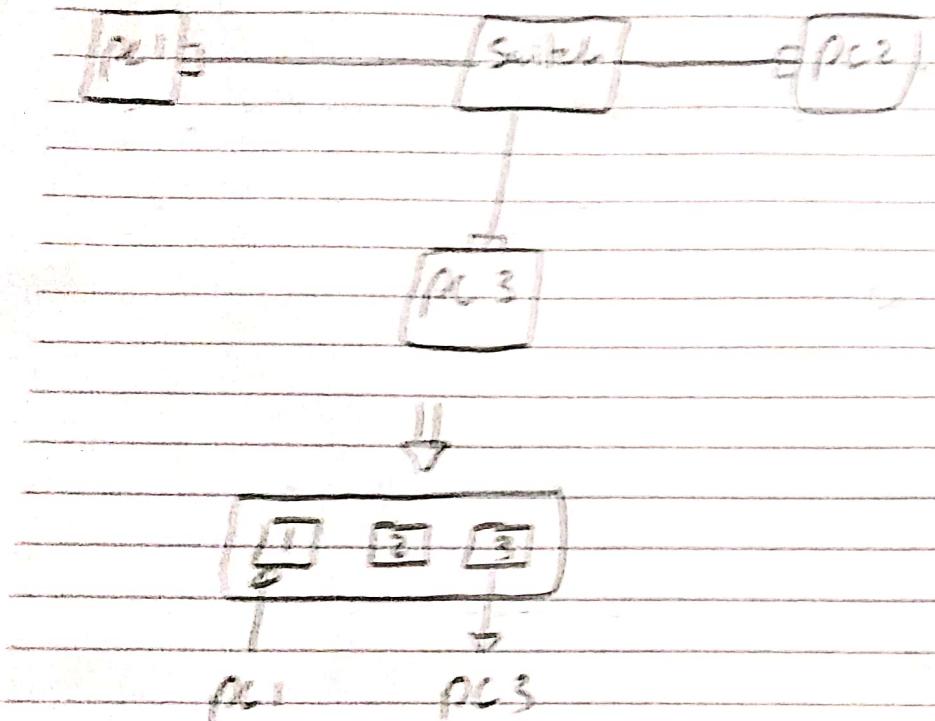
NIC; Network Interface card

disadvantages of hubs:-

1. Collisions.
2. Consumes the resources



switches

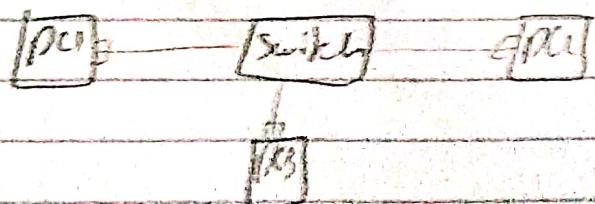


Collision domain



3 Collision Domains

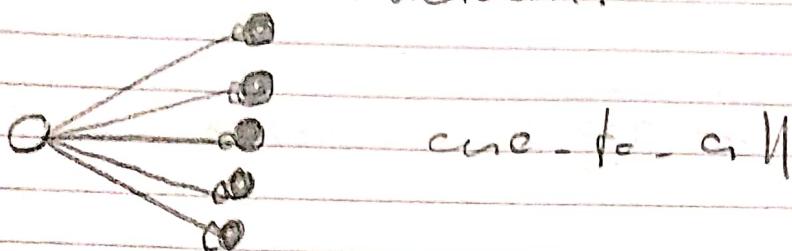
→ 1st of ports



Types of Communications

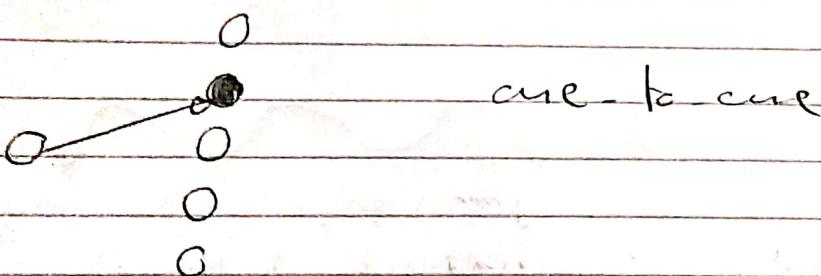
1) Broadcast:

Broadcast messages are sent to all stations in the network.



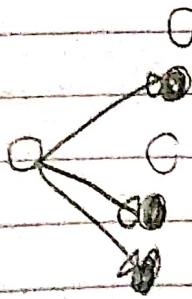
2) Unicast:

Unicast messages are only sent to one station in the network.



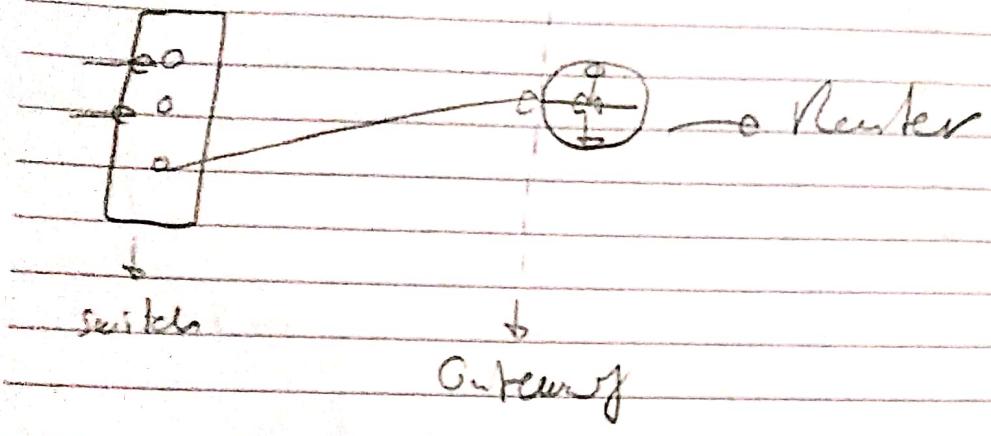
3) Multicast:

Multicast messages are sent to a group of stations.

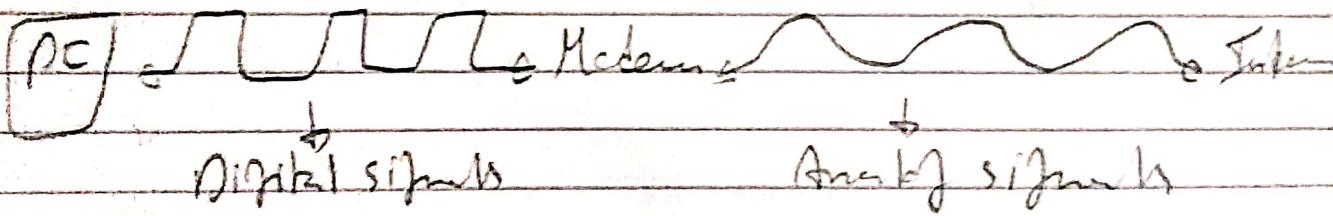


LAN (Local Area Network) → systems
to hub

WAN (Wide Area Network) → Router.

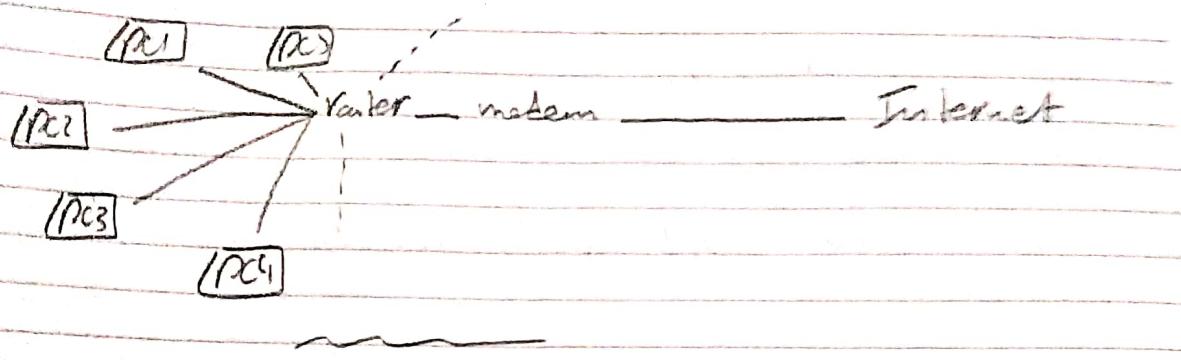


Modem vs. Router.



- A computer sends digital signals.
- The internet only sends analog signals.

The modem demodulates incoming analog signals into digital signals and vice versa.



The seven layers of Networks:- (OSI Model)

1) Physical layer:-

↳ hardware + electric signals (c's & l's)

2) Data Link Layer:-

↳ organizing communication b/w nodes.

3) Network Layer:-

↳ Logical Operations.

4) Transport Layer:-

↳ TCP \Rightarrow oriented Connection

↳ UDP \Rightarrow Connectionless.

5) Session layer:-

↳ Provides the mechanism for opening, closing and managing a session between end user applications processes.

6) Presentation Layer:

↳ GIF,

↳ compression & decompression.

↳ encryption.

7) Application Layer:-

The interaction between the user & the device.

Please

Physical layer

Do

Data link layer

Not

Network layer

Tell

Transport layer

secret

Sessions layer

Password

Presentation layer

Anyone

Application layer.

Protocols:-

1) TCP (Transmission Control Protocol):-

↳ Oriented Connection

↳ waits for the recipient to receive the packets.

↳ Not a one-way communication.

2) UDP (User datagram protocol):-

↳ Connection-less

↳ Doesn't wait for the recipient to receive the packets.

↳ One-way communication.

↳ Faster than TCP.

3) FTP (file transfer protocol):-

It's used to send/receive data from a remote computer using TCP connection.

4) T-FTP (Trivial file transfer protocol):-

Same as FTP except that it uses UDP instead of TCP.

5) HTTP (Hyper text transfer protocol) :-

Used to browse web pages.

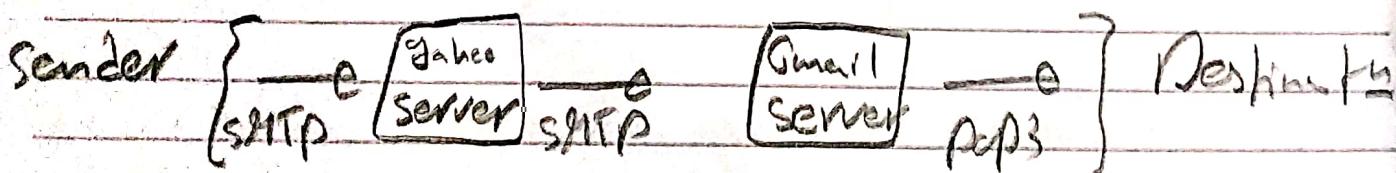
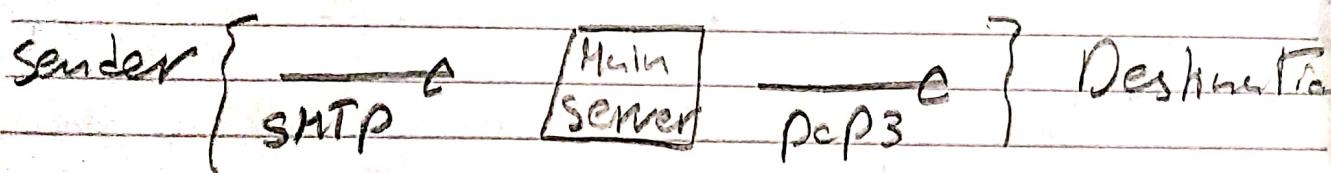
6) HTTPS (Hyper text transfer protocol secured) :-

Same as HTTP except that's secured.

7) Emails :-

1 - SMTP (Simple Mail Transfer Protocol).

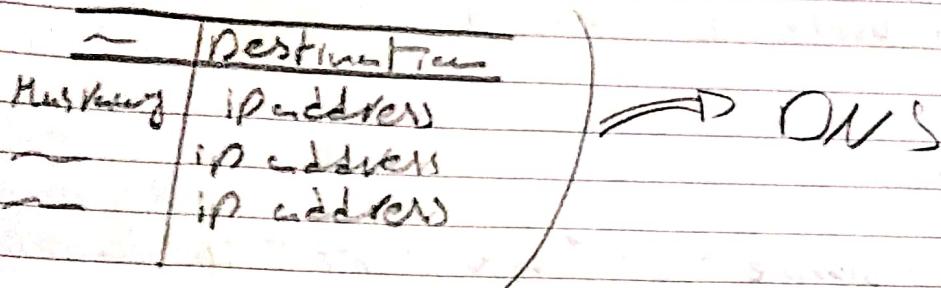
2 - POP3 (Post office protocol version 3).



DNS (Domain Name Server) :-

Connects the ip address.

www.Husky.com \Rightarrow CRL



DHCP (Dynamic Host Configuration Protocol) :-

Every Computer on a network has to have an IP address.

IP Address

Static

User Assignes an IP Address manually.

Dynamic

The Computer gets the IP address automatically from a DHCP Server.

DHCP settings

Scope,

Start IP Address:

End IP Address:

Important Note:

The DHCP server assigns the IP Address as a lease.

A lease is the amount of time an IP Address is assigned to a computer.

The lease is to help make sure the DHCP Server doesn't run out of IP Addresses.

IP Address:

- A numeric address.
- An identifier for a computer or a device on a network.
- Every device has to have an IP address for communication purposes.
- Consists of two parts:
 - 1- Network Address.
 - 2- Host Address.
- Two types of IP addresses:
 - 1- IPv4:
 - 32 bit numeric address written as four numbers separated by periods.
 - Number range is from 0 - 255
 - 4,294,967,296 (2^{32}) possible unique addresses.

66.99.239.13

11000010.1101101.11101101.00001101

2- IPv6:

- 128-bit hexadecimal address.
- 340,291,366,920,933,463,463,379,607,431,763,211,456 (2^{128})

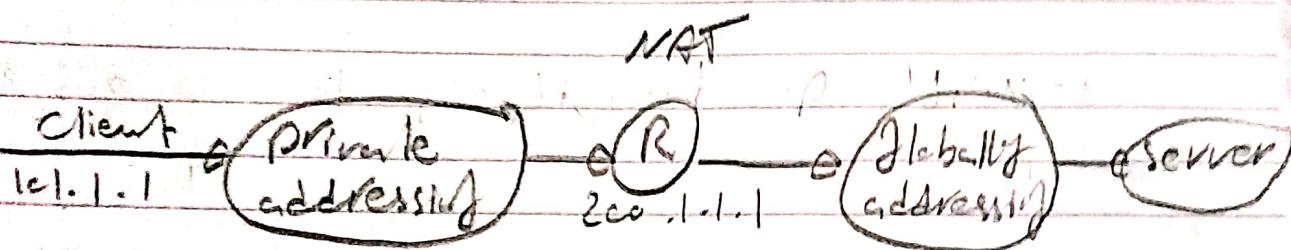
76DC:4F59:34CF:71C0:2D66:89CD:45D6:67A2

lec. 2

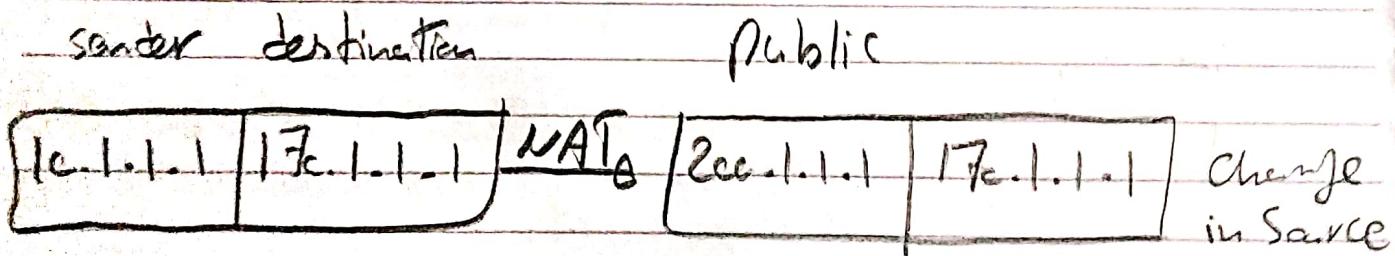
NAT (Network Address Translation)

IPv4 \Rightarrow 32 bit IPv6 \Rightarrow 128 bit

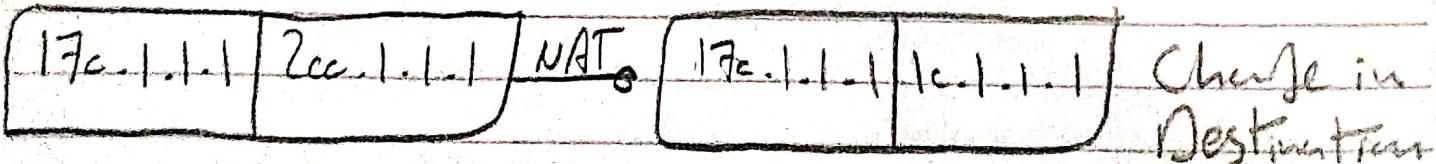
IPv4 \Rightarrow internet \Rightarrow exhaustif.



1- sending stage:

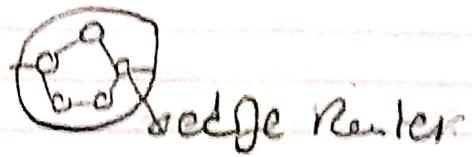
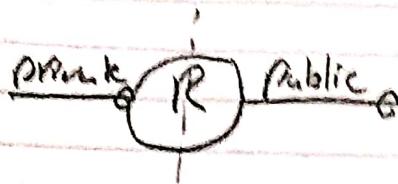


2- Reception Stage:



Private addressing: CAN = 10.1.1.1

Public addressing: Registered addressing



Timout Intervls.

The time limit in which the user connection will be canceled if exceeded without interact.

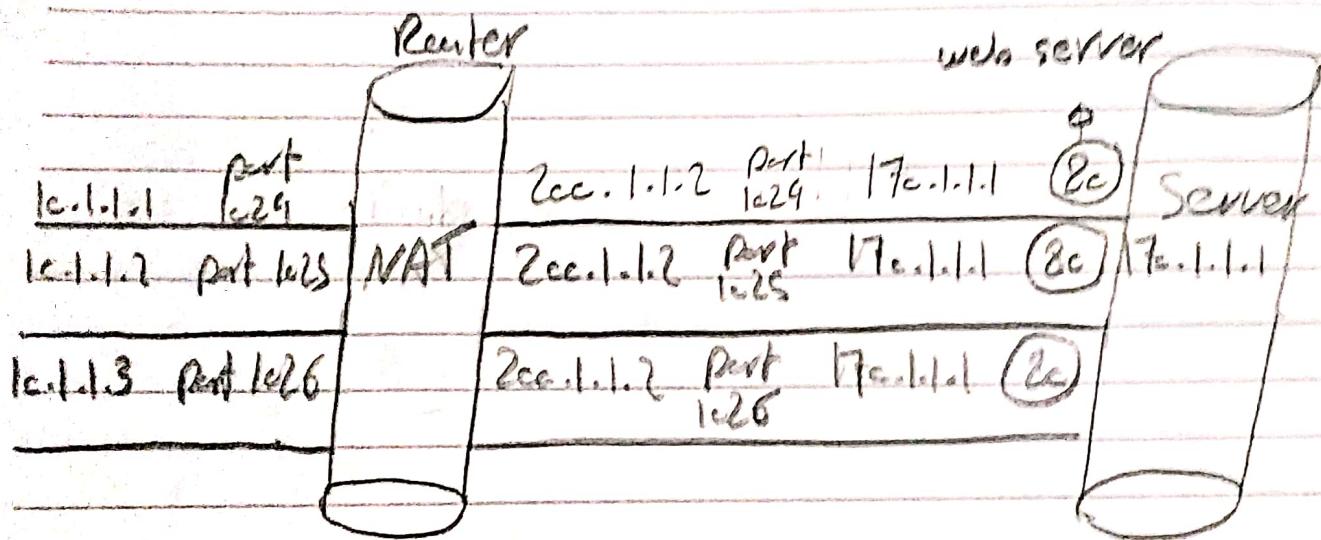
Transport Layers-

Determines what protocol you're dealing with.

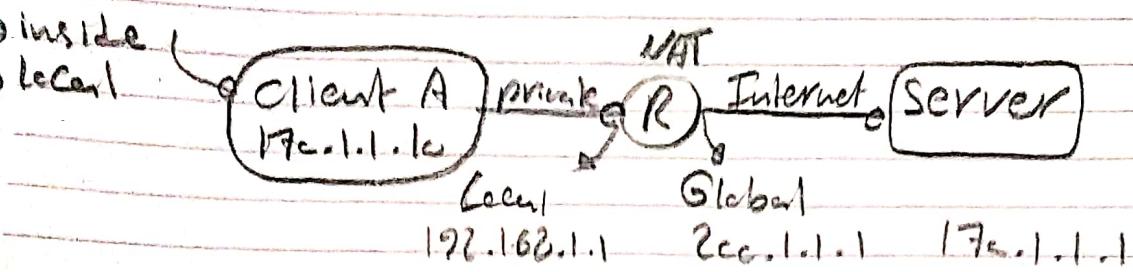
PAT:

Network Address Translation with Port Address Translation.

- Scaling Many private IP addresses to few public IP addresses.



Translating overlapping addresses :-



Source Destination

172.1.1.1	192.168.1.1
-----------	-------------

Source Destination

200.1.1.1	172.1.1.1
-----------	-----------

172.1.1.1	200.1.1.1
-----------	-----------

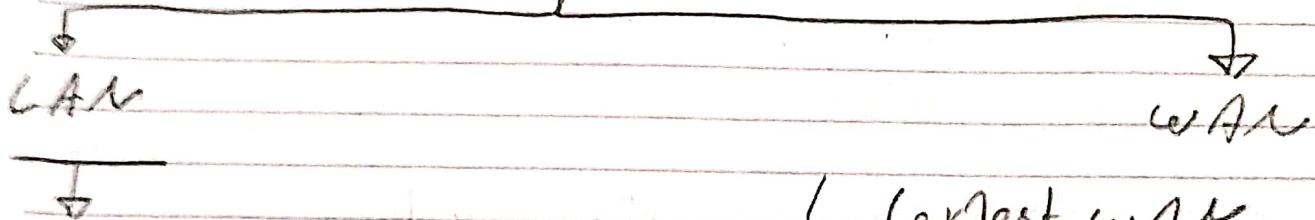
192.168.1.1	172.1.1.1
-------------	-----------

Note that the Router can't convert from public to public.

lec. 3

Ethernet:

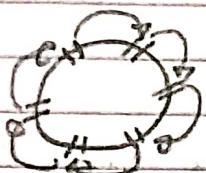
Size



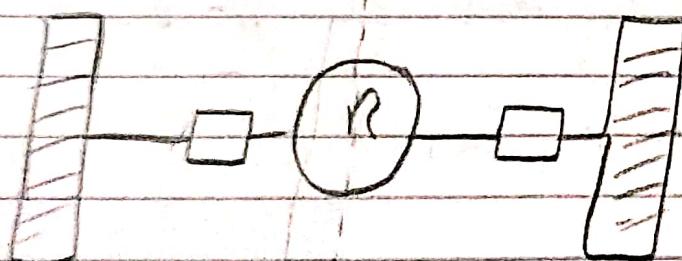
↳ Largest w/ LAN
↳ Internet.

Ethernet

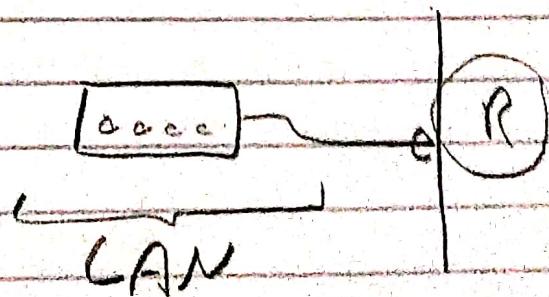
Token Ring



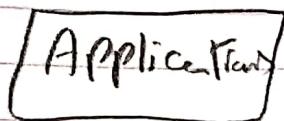
Ethernet: The most famous protocol used in LAN.



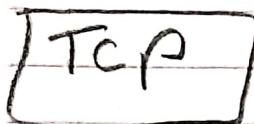
Broadcast Domains



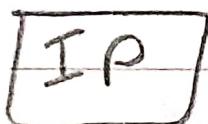
TCP/IP (Transmission Control protocol / Internet protocol).



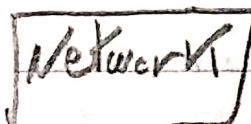
Application Layer Header.



TCP Application Layer Header

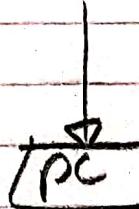


IP TCP Application Layer Header



Network IP TCP Application Layer Header

Ethernet packet

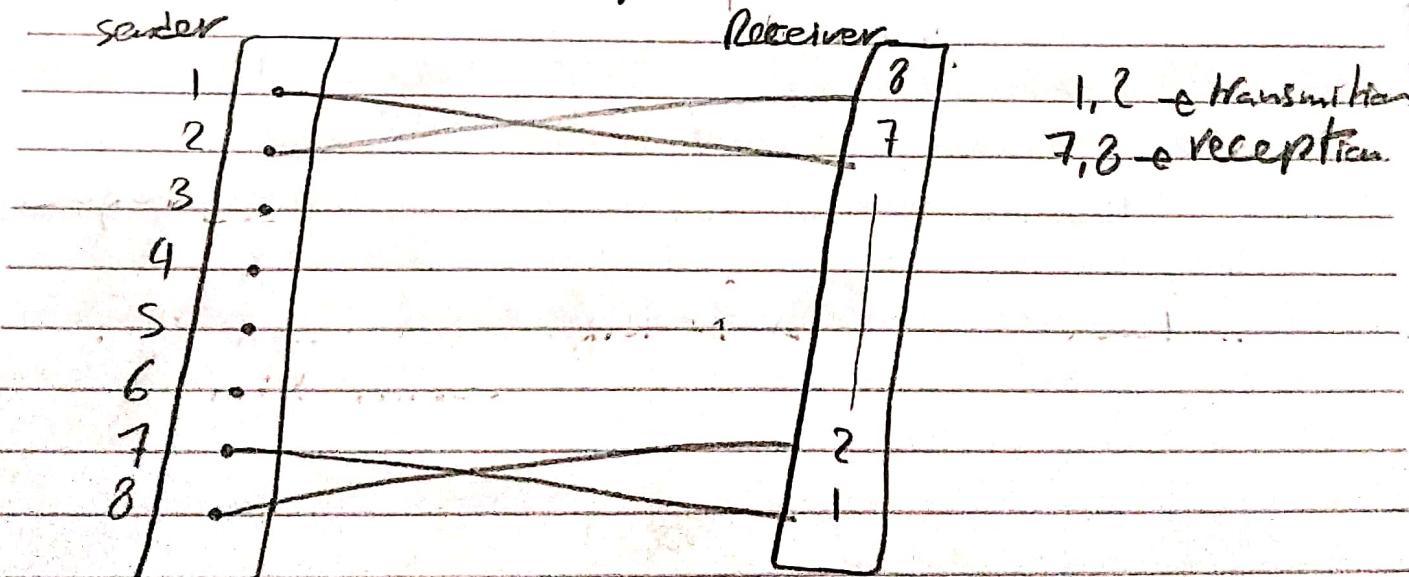


Layer 1 :-

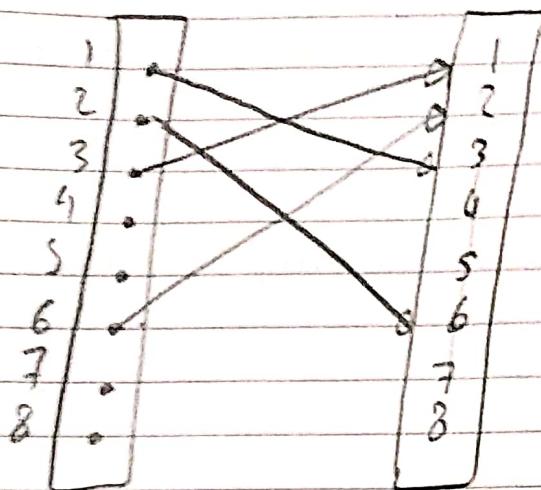
Cable UTP (unshielded twisted pair) & Connector RJ45.

1) UTP:-

- Straight throw cable.
- Consists of 4 pairs of color coded wires twisted around each other.
- The wires are twisted to prevent electromagnetic interference (crosstalk).



2. Crossbar - (STP)



(1,2) → transmission

(3,6) → Reception

PC → PC

Router → Router

Switch → Switch

PC → Router

Frames:

Layer 3

Layer 2

Layer 2

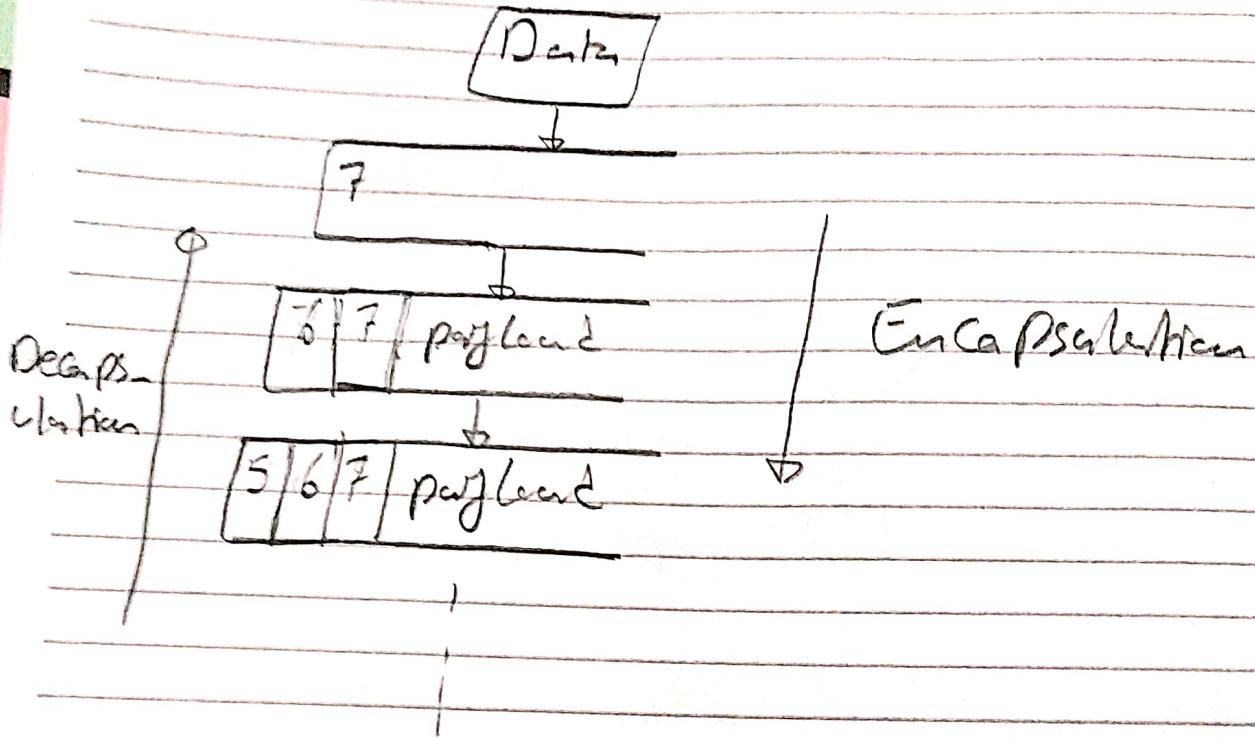
2 3 4 5 6 7 data

Layer 1

Layer 1

electrical
signals

frame



Note that the Router only has Layer 1, 2 & 3.

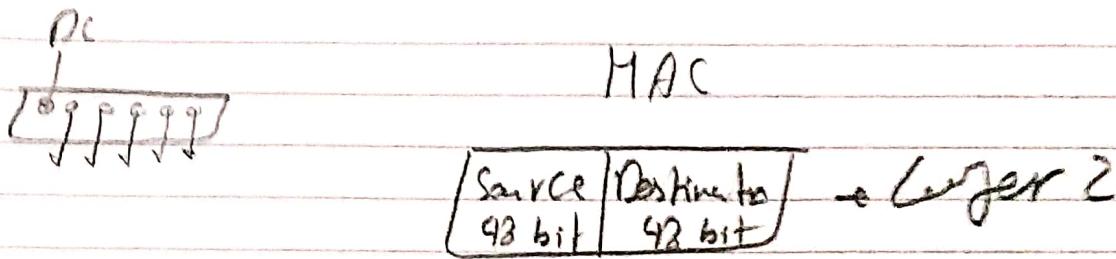
Layer 2.

The Maximum Length of the ethernet frame is 1526 bytes.

- Layer 4 → segments
- Layer 3 → packets
- Layer 2 → frames
- Layer 1 → bits

The ethernet MAC (Media Access Control) Address is
48 bit hexa:

Ex: 00-1B-DE-C7-F3-FB



FF-FF-FF-FF-FF-FF \Rightarrow for broadcast

01-00-5E-xx-xx-xx \Rightarrow for Multicast

00-1B-DE-C7-F3-F8

↓ ↓ ↓

OUT NIC

\Rightarrow Cisco