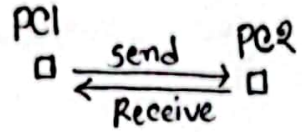
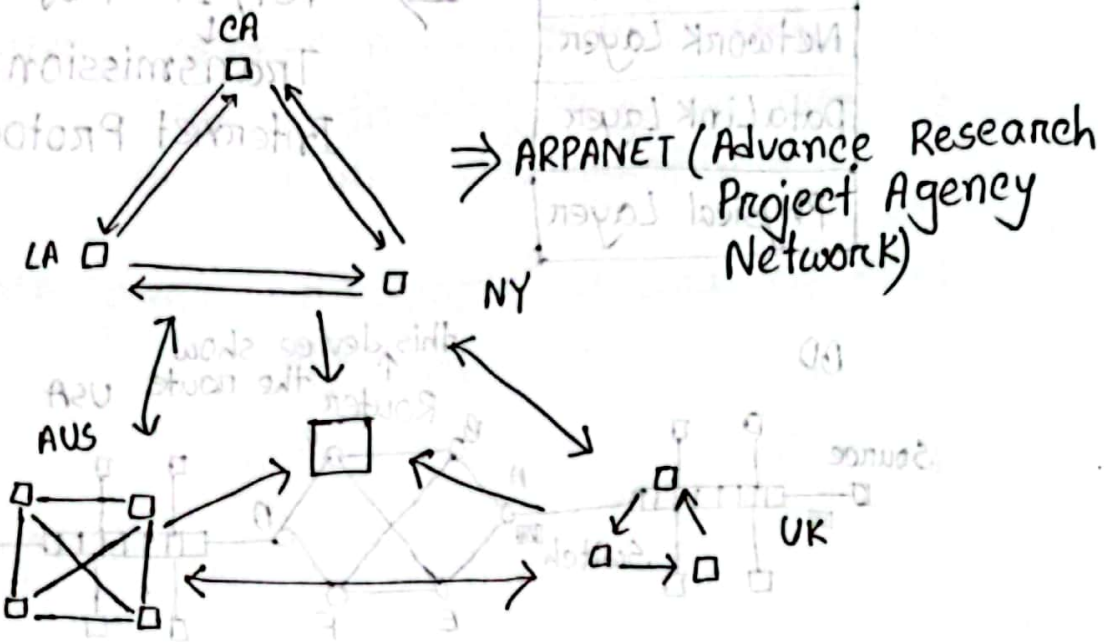
Class 1

CSE 405 (MID 1)

Computer Networks:

When two or more computers can communicate each other.





⇒ ARPANET (Advance Research Project Agency Network)

ISO → OSI Ref Model*

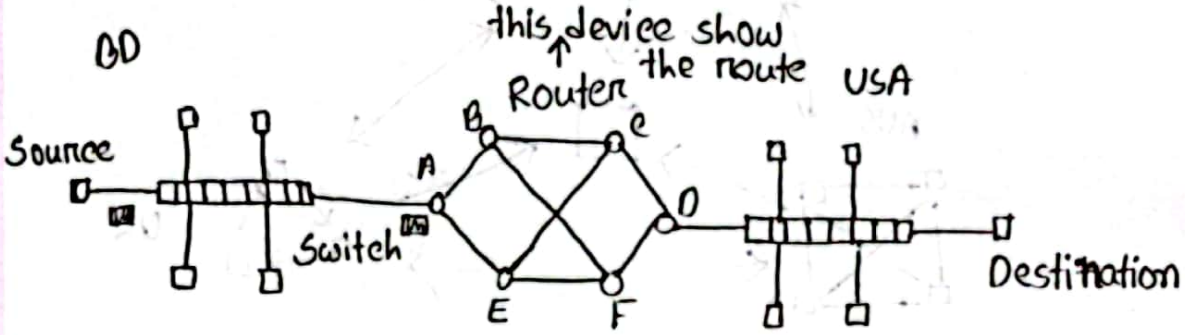
↓

(Open System Inter-connection)

OSI Reference Model:

Application Layer
Presentation Layer
Session Layer
Transport Layer
Network Layer
Data Link Layer
Physical Layer

⇒ TCP/IP Ref Model
↓
Transmission Control Protocol/
Internet Protocol



Physical devices: ⟶ physical layer (define করে) mechanis

Application Layer: Data generate করে, All software, protocol, OS থাকে এখানে

Data Link Layer: একটা device থেকে আরেকটা device এ কীভাবে Data পাঠানো যায়
two adjecent device এর মধ্যে error free communication করা

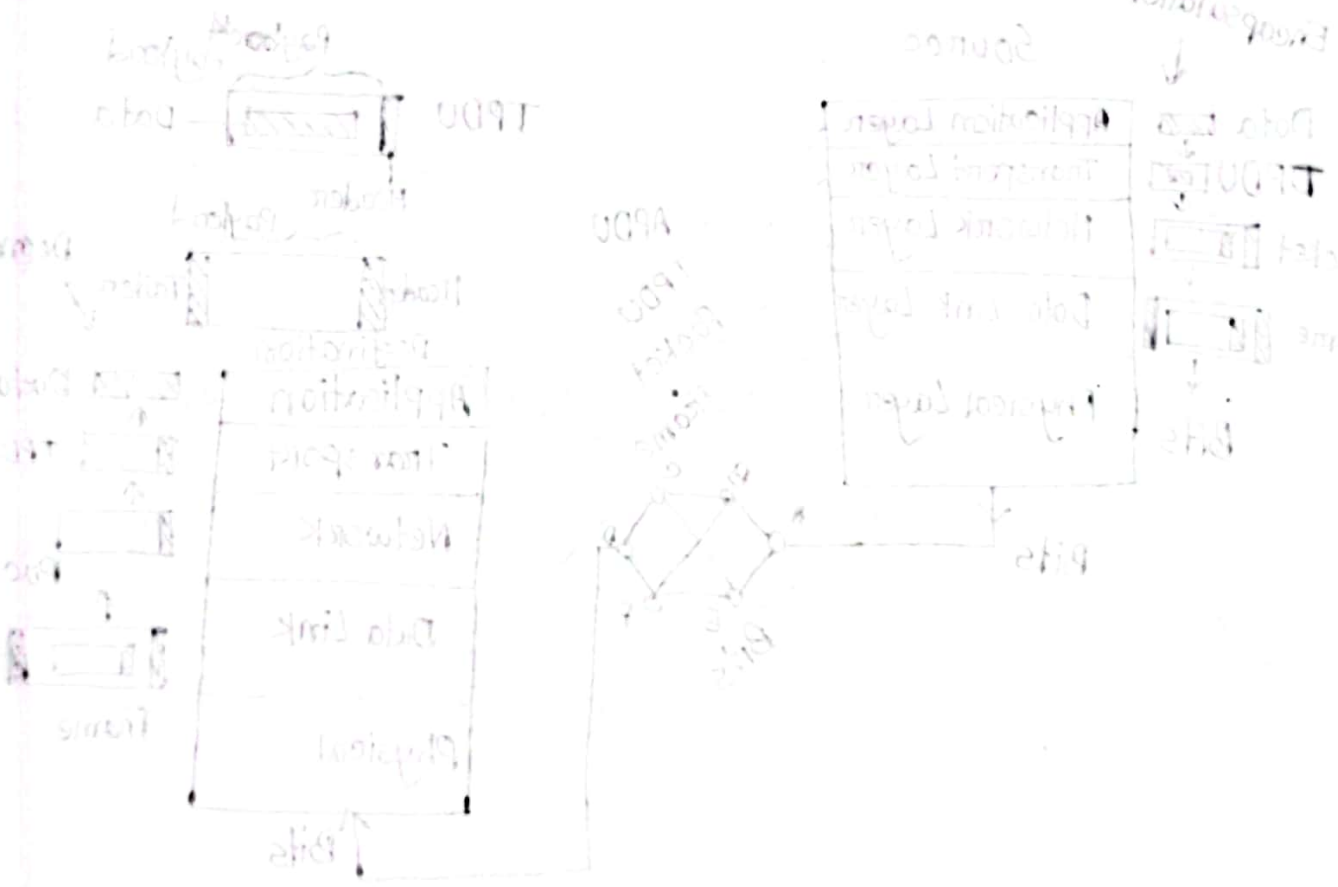
Network Layer: to show the path. network layer is responsible.

Router network layer এর device:

Transport Layer: Data generate থেকে destination এ reach করা পর্যন্ত transport layer supervise করে।

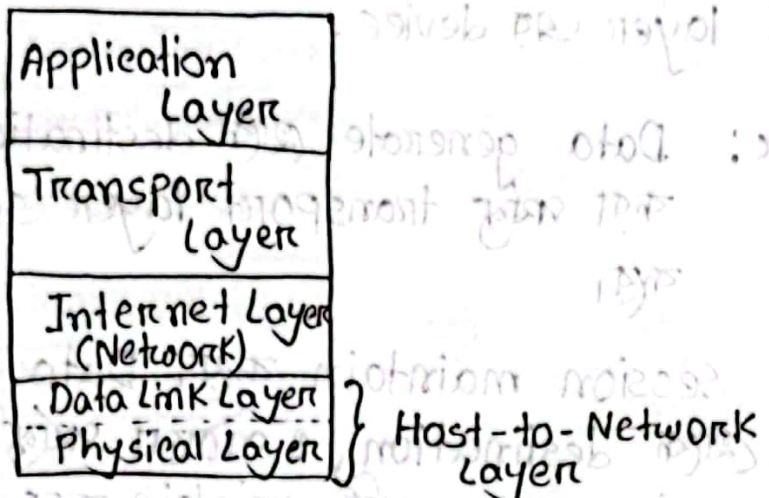
Session Layer: session maintain করে। Data source থেকে destination, এ পাঠানো পর্যন্ত কয়েকটা session আসে এটি maintain করে।

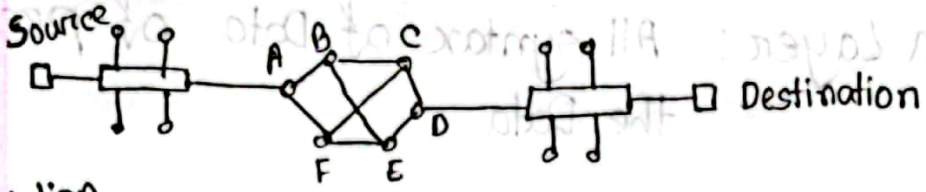
Presentation Layer: All syntax of Data of present the Data.

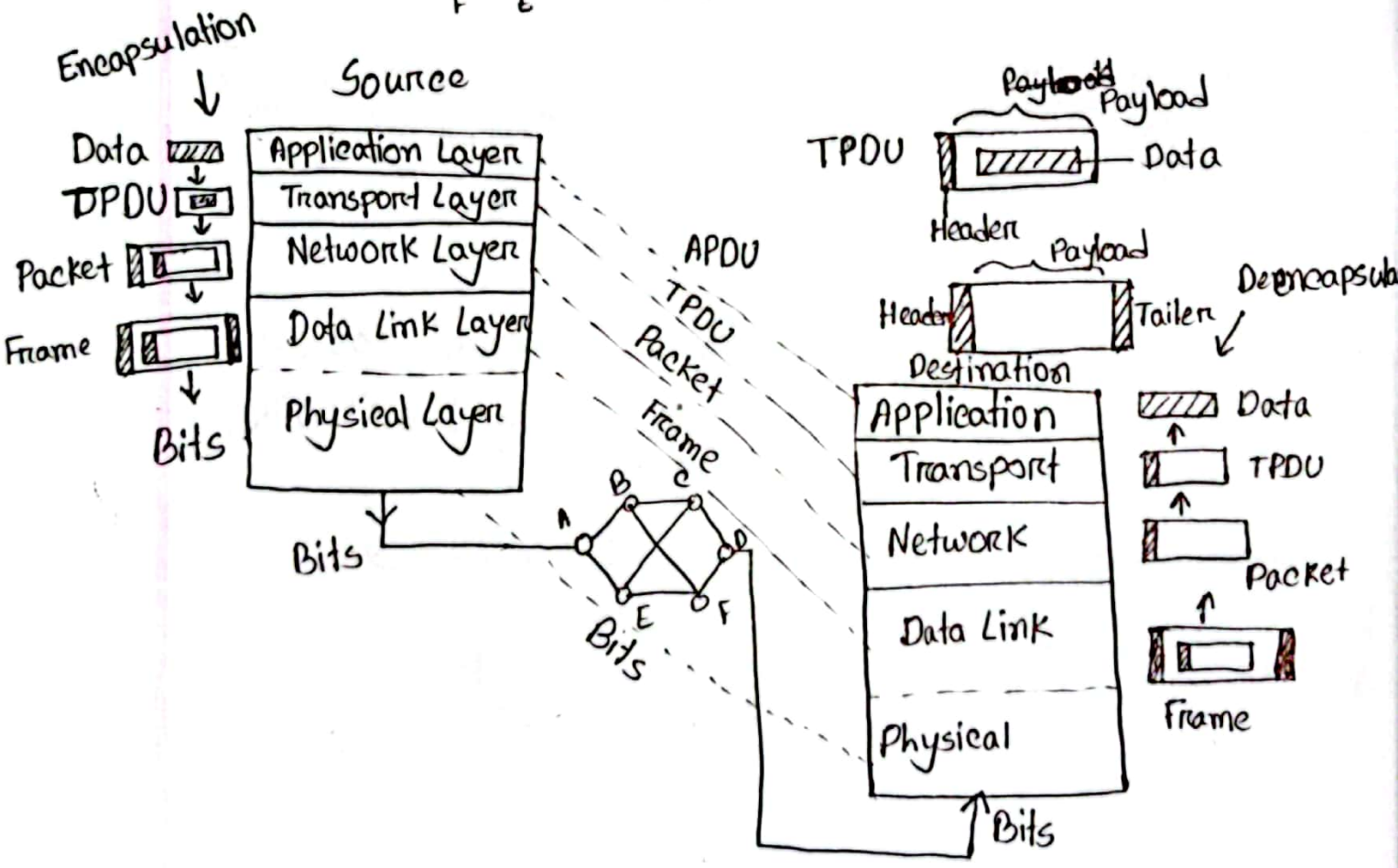


Class 3

TCP/IP Ref Model







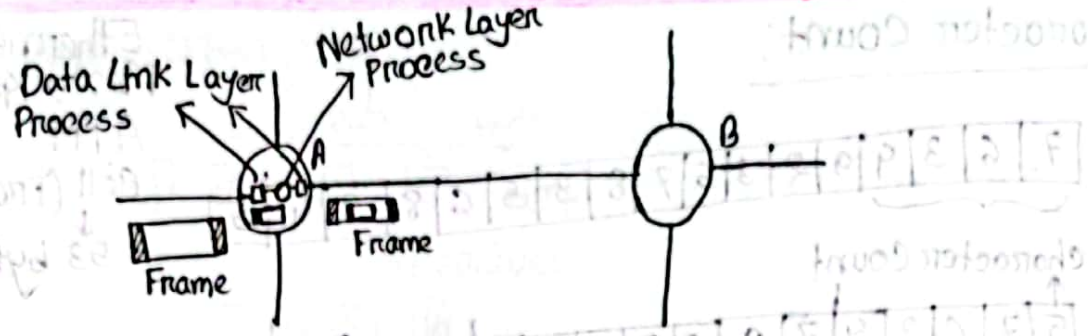
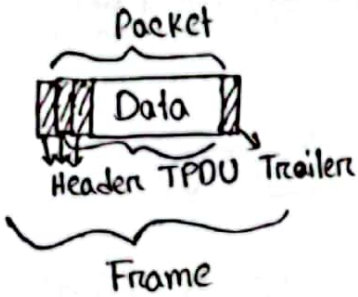


Fig: Environment of Data Link Layer

Packet এর Header এ Destination এর IP Address insert করে।

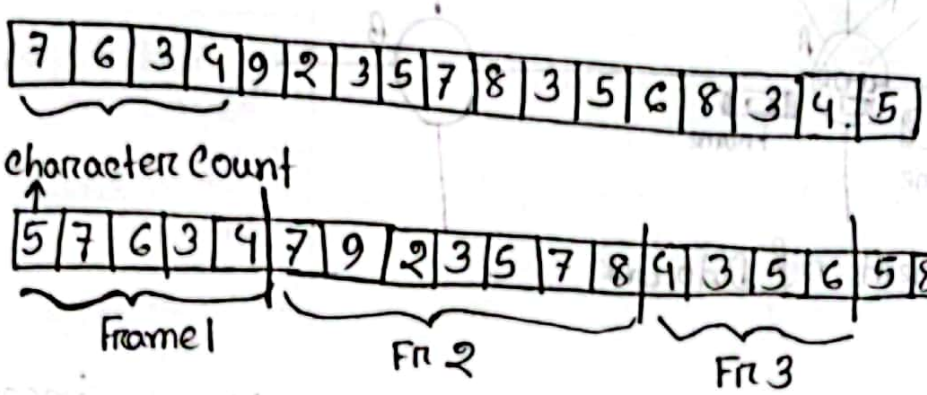


Framing

1) character Count
2) Byte stuffing
3) Bit stuffing
4) Physical Layer Coding Violation

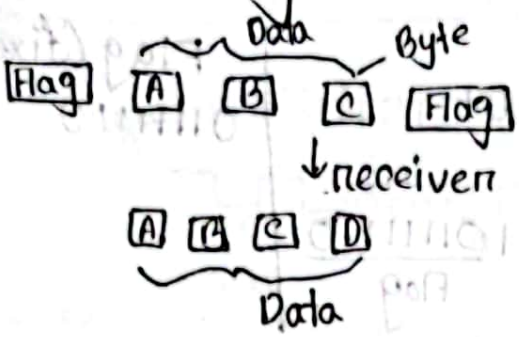
character count:

Ethernet
Max → 1960 Byte
ATM
Cell (Frame)
↓
53 byte



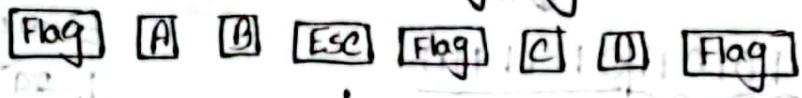
Class 9

Byte Stuffing:



receiver

A B | stopped thinking that this is the ending flag

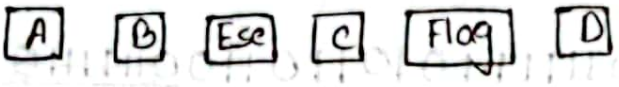


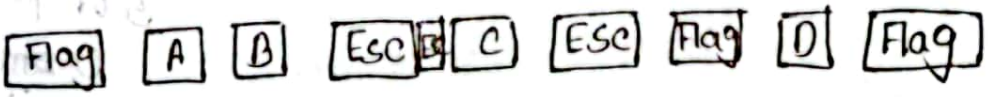
receiver

Esc character আসলে পরের character escape করবে and পরের char accept করবে

data

Esc/Flag, আসলে আগে একটা esc key push করবে।





receiver

Bit Stuffing:

Flag (fixed)
01111110

1010111 000101

01111110 1010111000101 01111110
Flag Flag

↓

1010111000101
data

01111110 0101101111110101101101 01111110

↓ receiver

1010111 01111110
data

Every 5 consecutive 1 এর পরে 0 বসাবে।

↓

01111110 1010110111110101011010 01111110
Flag ↓ receiver Flag

1010110111111010110110 01111110

5টি 1 পেলে তারপর 0 থাকলে 0কে Omit করতে হবে

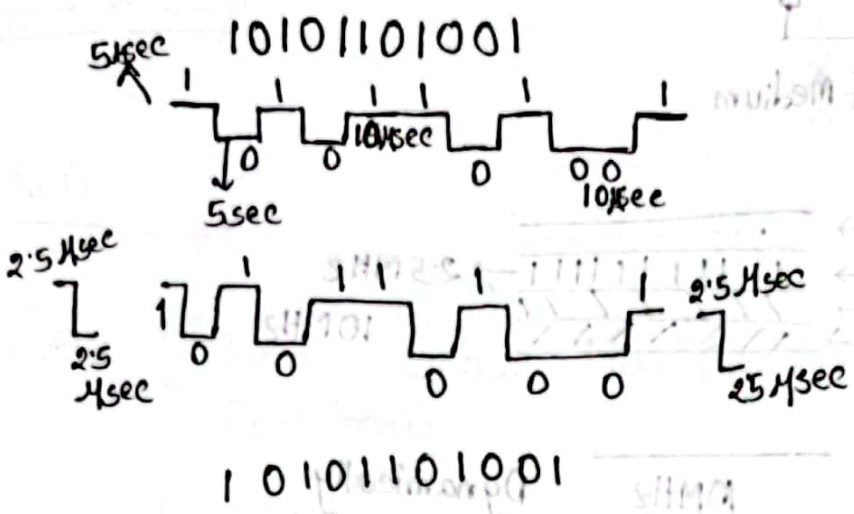
01111110101011011110011010 01111110

01111110101011011111000110110 01111110

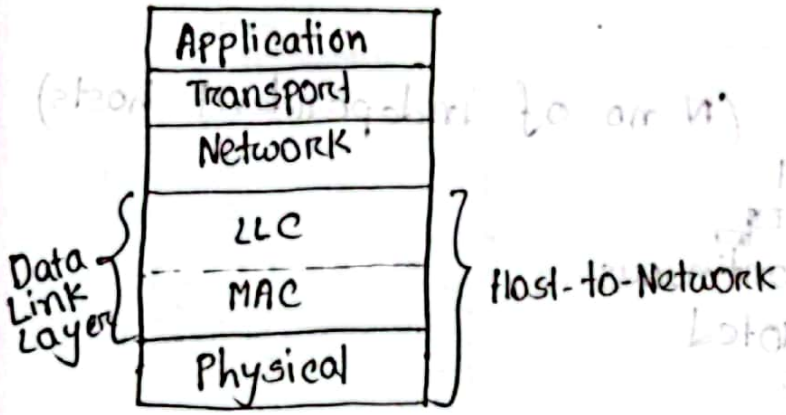
↓

10101101111100110110 01111110

Physical Layer Coding Violation:



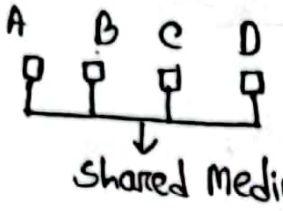
TCP Ref Model

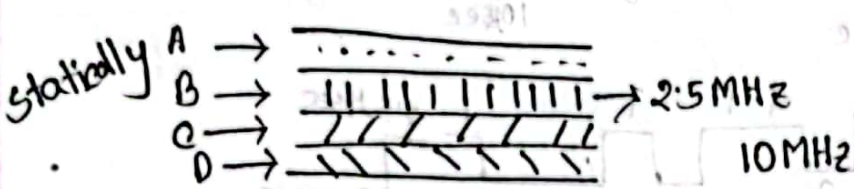


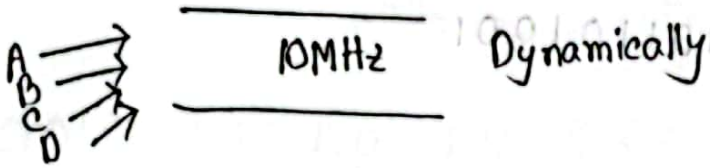
MAC : Medium Access Control Sublayer

LLC : Logical Link Control Sublayer

MAC (Medium Access Control)







Dynamically Allocation in LAN:

Assumptions:

1) Station Model (N no. of independent hosts)
2) Single Cannel
3) Collision
4) Time — Continuous / Sloted
5) Sense — Yes / No

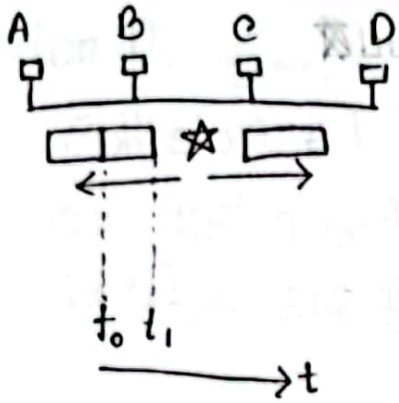
Protocol:

- Aloha: যার যখনর Data থাকবে সে তখনর generate করবে.
- Sloted Aloha: যার সে slot আসবে সে slot এ পাঠাবে.
- CSMA (Carrier Sense Multiple Access):

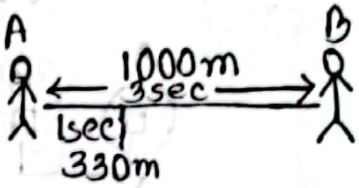
Sense — Idle → Transmit
Sense — Busy → Refrain — Persestenly Sense / Nonpersestenly Sense

It detects current / Voltage in carrier that means there the carrier is busy

Class 4

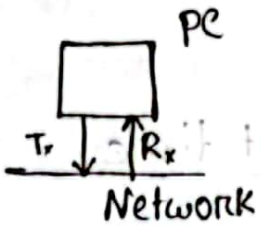


Acustic signal: 330 m/s



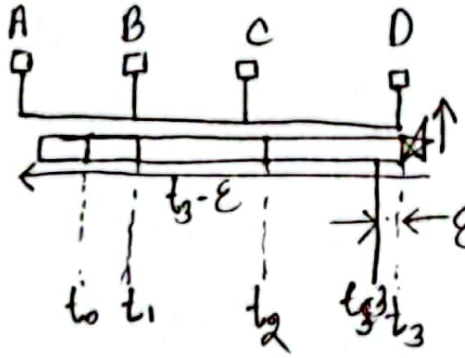
CSMA/CD (Carrier Sense Multiple Access with Collision Detection)

Collision detection:



Transmitted signal and Receive signal Compare করে।

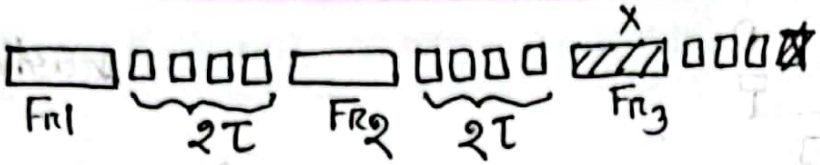
Same → No collision
Different → Collision

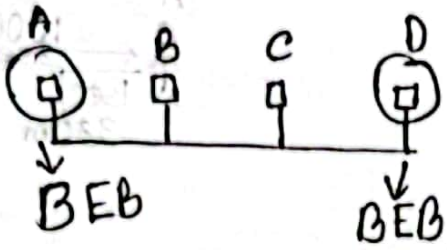


t_3 → (Propagation delay τ)

Total Time (A) $= (t_3-\varepsilon)+(t_3-\varepsilon)$
$= 2t_3 - 2\varepsilon$
$= 2t_3$
↳ Propagation delay (τ)

Contention Period $= 2\tau$





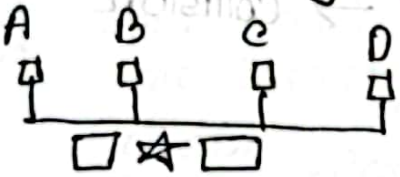
Binary Exponential Backoff Algorithm (BEB):

Set = $\{0, \ldots, 2^{n-1}\}$ n ≠ of collision

if n=1,
Set = {0,1}

if n=2
Set = {0,1,2,3}

Randomly Pick Number x 512 Bit time
= ? waiting time



For A
Collision #1
Set = {0,1}
0 x 512 = 0 time (waiting time)
1 x 512 = 512 bit time (waiting time)

For D,

Collision #1 set = {0,1}

0 x 512 = 0 Bit time (waiting time) 50%

1 x 512 = 512 Bit time (waiting time)

Collision #2

For A.

Set = {0, 1, 2, 3}

0/1/2/3 x 512 Bit time = waiting time 25%

For D,

Set = {0, 1, 2, 3}

0/1/2/3 x 512 Bit time = waiting time

Collision # 3

For A, D;

Set = {0, 1, 2, 3, 4, 5, 6, 7}

A ⟶ Collision #3

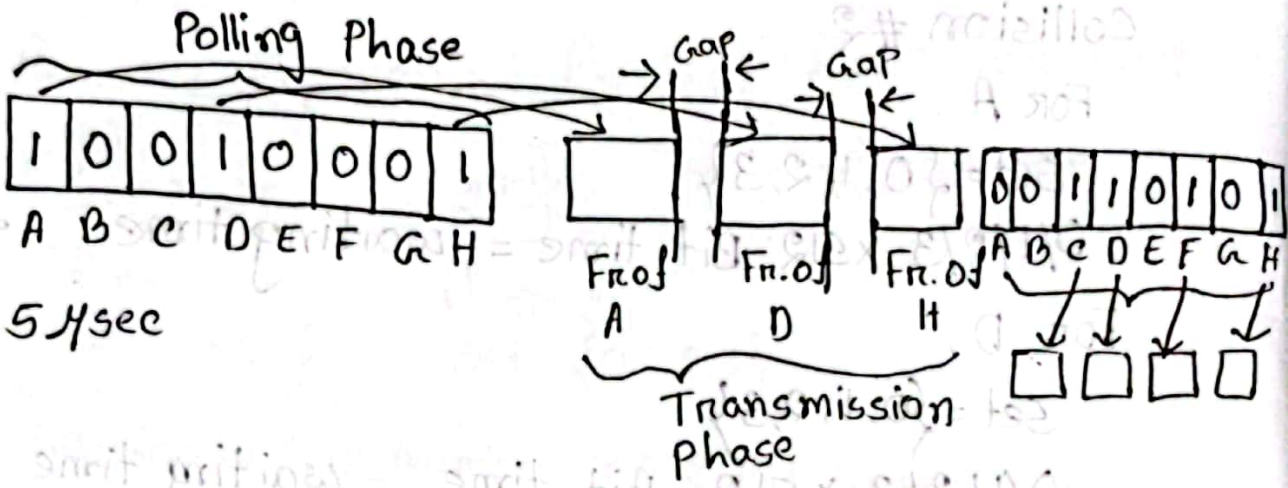
B ⟶ Collision #1

10th Collision

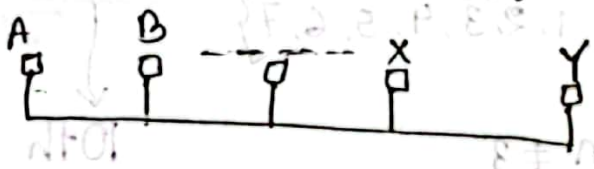
Set = {0, ..., $2^{10}-1$}

Collision free Protocol:

A Bit Map Protocol:

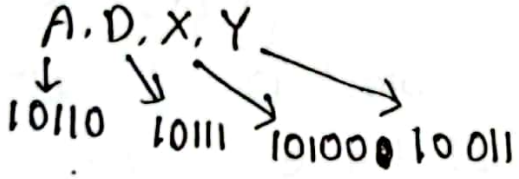


Binary Count-down Protocol:



Same bit length Address

30 Hosts
5 Bits = $2^5 = 32$



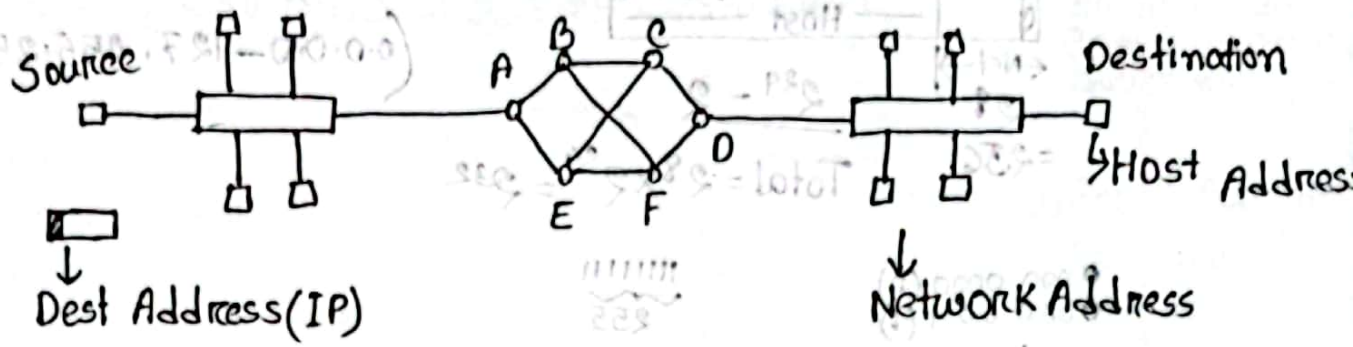
	0 Bit time	1 Bit time	2 Bit time	3 Bit time	4 Bit time
A(10110)	1	0	1	1	0
D(10111)	1	0	1	1	1
X(10100)	1	0	1	0	X
Y(10011)	1	0	0	X	X
OR	1	0	1	1	1

0 (Address)

Lower number → starvation

Mid 2

Class1



IPV4 → 32 Bits long

11100010 11110110 10000111 00010101

192.168.10.15

(Total → 2^{32})

Network	Host
2^{16}	2^{16}

Total = $2^{16} \times 2^{16} = 2^{32}$

$2^4 = 16$

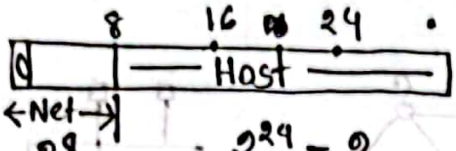
0000
0001
0010
⋮
1111

00|00
00|01
10
11
00
01
10
11

2^2

$2^2 \times 2^2 = 2^4 = 16$

Class A



Decimal Notation Range
(0.0.0.0 — 127.255.255.255)

$2^{24} - 2$

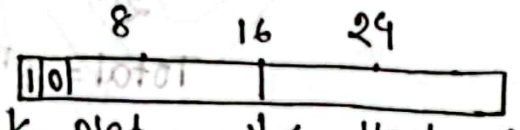
2^8
$= 256$

Total $= 2^8 \times 2^{24} = 2^{32}$

0 000 0000 (0)
0 000 0001 (1)
⋮
0 111 1111 (127)

1111 1111
255

Class B



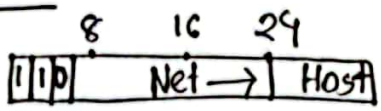
(128.0.0.0 — 191.255.255.255)

2^{14}

$2^{16} - 2$
$= 65536 - 2$

1000 0000 (128)
⋮
1011 1111 (191)

Class C



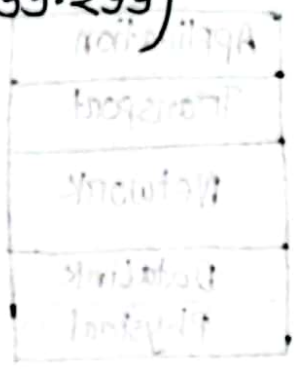
(192.000 — 223.255.255.255)

Host $= 2^8 - 2$
$= 256 - 2$

1100 0000 (192)
⋮
1101 1111 (223)

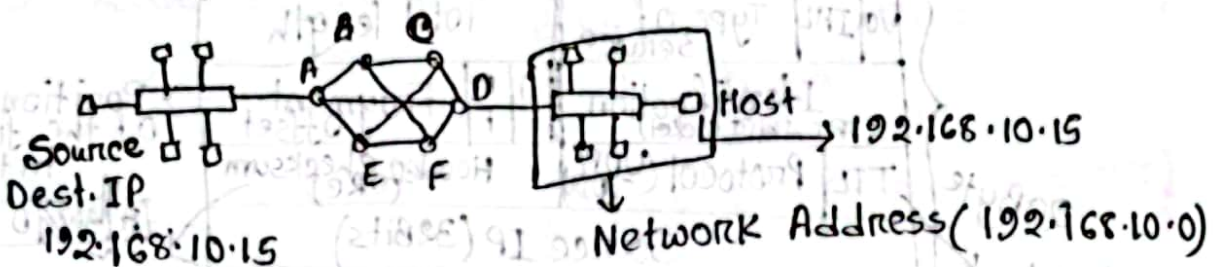
Class D (224.0.0.0 - 239.255.255.255) → Multicast (Mutliple people একসাথে যখন communicate করতে পারব)

Class E (240.0.00 – 255.255.255.255)



Unicast (একজনের সাথে যখন communicate করতে পারব)

Broadcast (সবার জন্য)



Class C

Network Address (IP)

Net → 24 → Host

192.168.10 : 15

Net | Host

0000 0000 → IIII IIII

Network Address 192.168.10.0

Broadcast Address 192.168.10.255

Subnet Mask / NetMask IP:

IIII IIII . IIII IIII . IIII IIII . 0000 0000

255.255.255.0

Host → 254 (256-2)

× Network 192.168.10.0

✓ 192.168.10.1 → Host

192.168.10.2

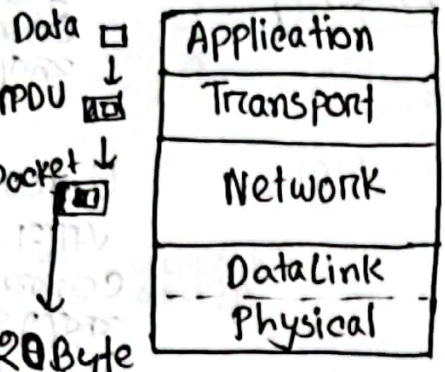
⋮

192.168.10.255 × Broadcast

} 256

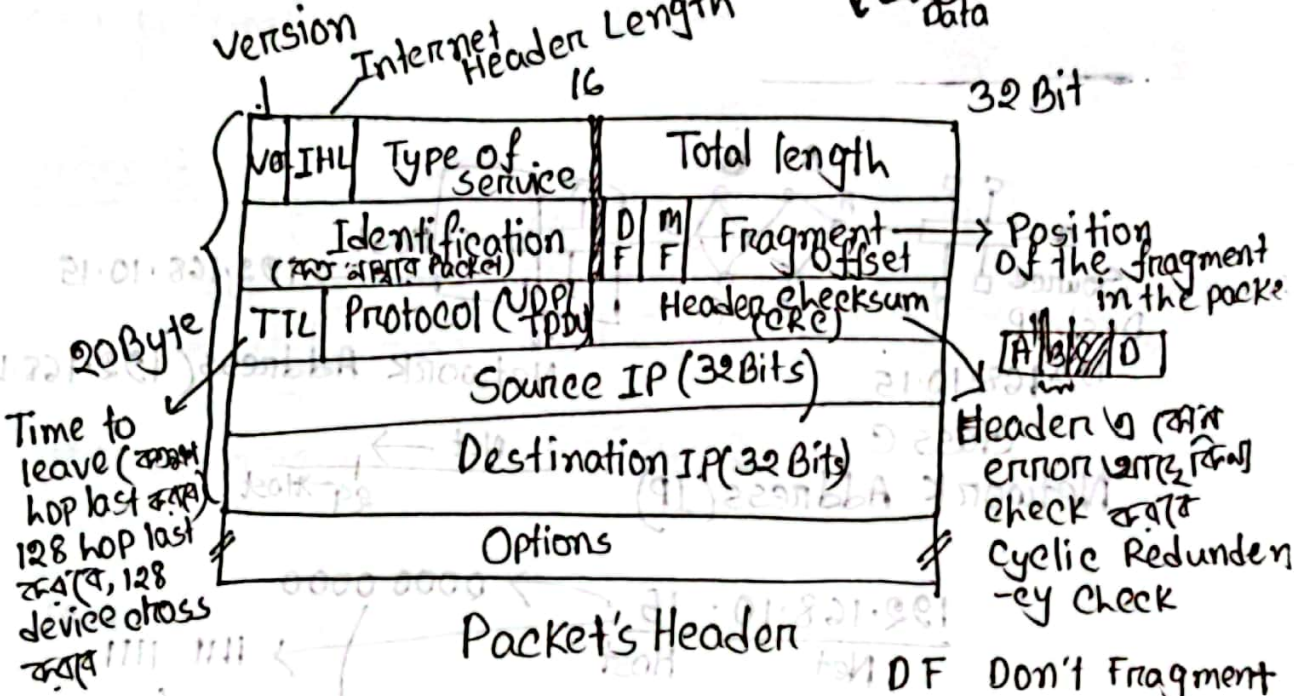
IP (Internet Protocol)

TCP/IP Ref Model

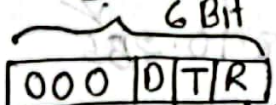


Packet Header → 20 Byte

Packet এর ভেতরে যে Protocol, আমরা যেকোন Protocol ডাটা করেছিলাম সেটাও এখানে লিখা থাকবে। UDP/TPDU



Type of Service



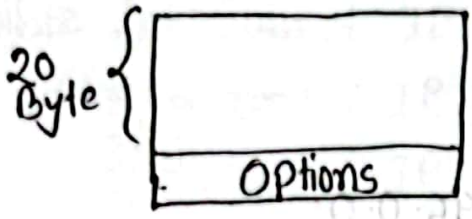
D (Delay) → 0/1

T (Through Put) → 0/1

R (Reliability) → 0/1

Priority
- 000 → Normal packet
- ⋮
- 111 → Controlling Packet

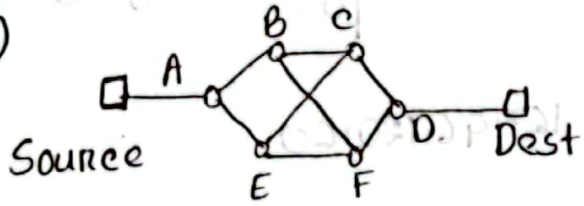
Class2



Options:

1) Security (How secret)
2) Strict Source Routing (tell you the path from source to dest) (A,B,F,D)
3) Loose " " (list of routers that can't be missed)
4) Record time (যখন এর মধ্যে দিয়ে কোন data যাবে time টা প্যাকেট Header এ insert করে দেওয়া হবে, B এর মধ্যে দিয়ে গেলে time টা বলে দিবে record করে নিবে)
5) Record Route

2)



(A,B,F,D পথে যেতে হবে)

3) C is the router that can't be missed. যেখানে যাই C হয়ে যাওয়া হবে।

5) Record route মানে যে source to dest যাচ্ছি এর মধ্যে যতগুলো router touch করেছি ততগুলো router এর ip address insert করে দিবে।

Ex: 163·96·10·24
Net Host

Class B

Network Address(IP): 163·96·0·0

Broadcast Address(IP): 163·96·255·255

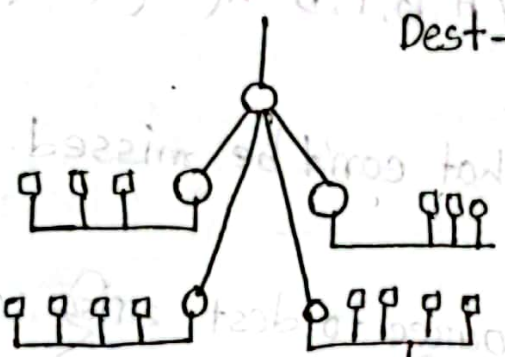
Subnet Mask IP: 255·255·0·0

11111111 11111111 00000000 0000000
← Net → ← Host →

Possible 1st Host IP: 163·96·0·1

2nd " " 163·96·0·2 00000000 00000000

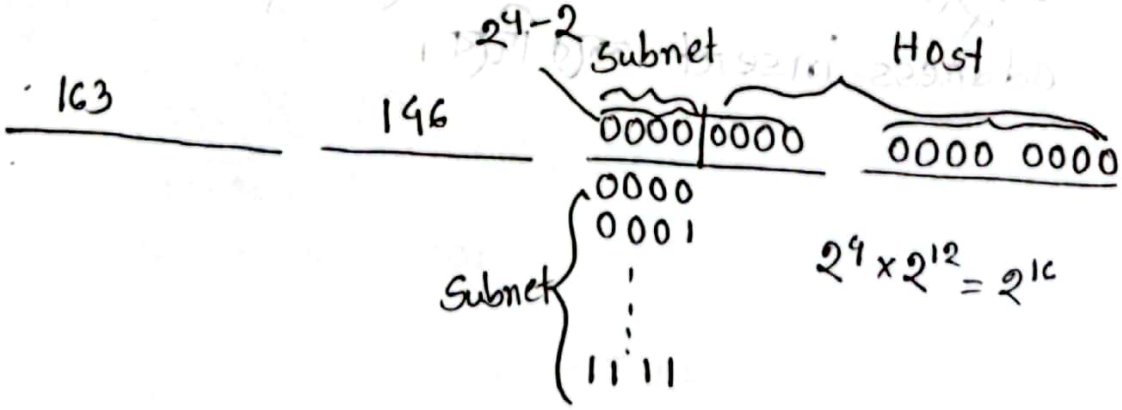
65534 possible IP 00000000 00000001
0 . . . . 0 0 1



Dest → 163·96·120·60

⇒ 163·96·0·0

Subnet



Possible 1st Subnet IP: 163.146.0.0 X (As it is Network Address)

" 2nd " IP: 163.146.16.0

" 3rd " IP: 163.146.32.0

163	146	0000 0000	0000 0000	
← Net →		0001 0000	0 0	→ 1st Subnet
		0001 0000	0 000 0000	→ 1st Host X
		0001 0000	0 000 0001	→ 1st Host
		0001 0000	0000 0010	→ 2nd Host
		0 001 1111	1111 1111	
		0001 1111	1111 1110	→ Last Host

Host number $2^{12}-2$

1st Subnet IP: 163.146.16.0

1st Subnet 1st Host IP: 163.146.16.0 X
163.146.16.1

" Possible 2nd Host IP: 163.146.16.2

" " Broadcast IP: 163.146.31.255
Last Host IP: 163.146.31.254

163	146	0000 | 0000	0000 0000
	2nd Subnet	0010 0000	0000 0000
	3rd Subnet	0010 0000	0000 0001
	Broadcast	0010 1111	1111 1111

2nd Subnet IP : 163.146.032.0

2nd Subnet 1st Host : 163.146.32.1

2nd Subnet BroadCast : 163.146.47.255

Dest IP :

203.140.176.30 (3 Bit Subnet)

✓ Net Host

203.140.176.255 (BroadCast)

203	140.	176	Subnet 000 | 00000
		3rd Subnet →	011 | 00000 → Subnet
			011 00001 → 1st Host
			011 11110 → Last Host
			011 11111 → BroadCast
		X last Subnet	111 00000
			111 11111
			Broad Cast

*** last Subnet 110

3rd Subnet IP : 203.140.176.96

" " 1st Host IP : 203.140.176.97

" " Last Host IP : 203.140.176.126

" " BroadCast IP : 203.140.176.127

Last Subnet IP : 203.140.176.224 ×

Last " BroadCast IP : 203.140.176.255 ×

Last Subnet IP: 203.140.176.192 (1100 0000)
" ∟ BroadCast : 203.140.176.223 (111 1111)

Minimum 2 Bit Subnet নিতে হবে। কারণ 2 Bit নিলে $2^2 - 2$ হবে। 2 টা number Host হিসাবে বাদ পাব Subnet এর মধ্যে। 1st and Last number.

163.96.120.60
Net Host

Network IP: 163.96.0.0
Subnet Mask IP: ~~163.96~~ 255.255.0.0

←Sub→ ← Host →

163 96 0000 0000 0000 0000

11--11 11--11 1111 0000 0000 00000 → Subnet Mask IP

255.255.240.0

203.140.176.30

203 140 176 000 0 0000

11---11 11--11 11--11 111 0 0000

255.255.255.224 (Subnet Mask IP)

Class 3

Subnet Mask

163.196.0.0
←Net→ ←Host→

Subnet Mask IP: 255.255.0.0

163	196	subnet → 0000 0000	Subnet Mask 0000 0000
←Net→			
11...11	11...11	1111 0000	0000 0000

Subnet Mask IP: 255.255.240.0 (decimal Notation)

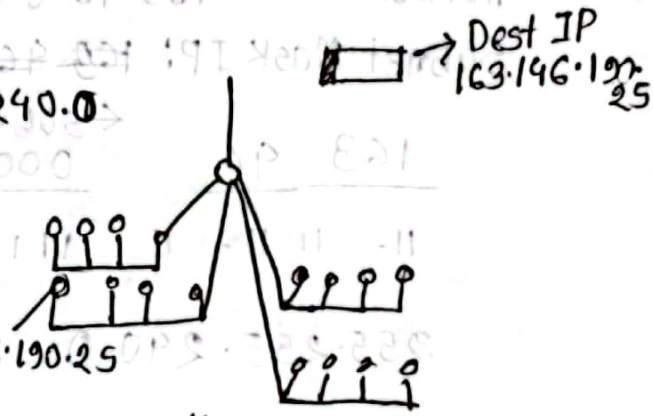
Subnet Mask IP (CIDR Notation): 163.196.0.0/20

163.196.120.60/20

163	196	0000 0000 → subnet	Subnet Mask 0000 0000

Subnet Mask IP: 255.255.240.0

Dest IP: 163.196.190.25



11111111 11111111 11110000 00000000
10100011 10010010 10111110 00011001

And: 10100011 10010010 1011 0000 0000 0000
subnet → Subnet mask

1111 subnet

163.146.00
Subnet IP for the dest

Subnet IP: 163.146.176.0

Special IP: (1.0.0.0 - 127.255.255.255) → Class A

00...00 (0.0.0.0) → This host (Booting)

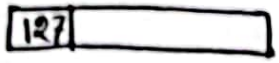
11...11 (255.255.255.255) → Broadcast on the local Network

8

0...0 ←Host→
←Net→

0.120.196.18

A host on this network (এই network এর যে এই network এর)



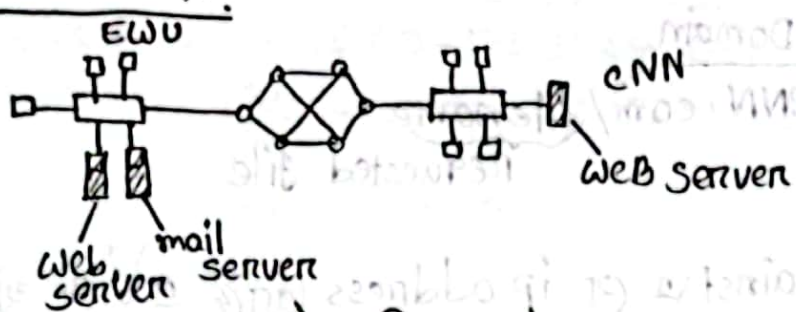
127.100.90 → loop back

Quick Fix?

IPV4 (32 Bits) → IPV6 (128 Bits)

2^{128}

Quick Fix?



Private IP: (এই IP দিয়ে বাইরে যেতে পারবা না)

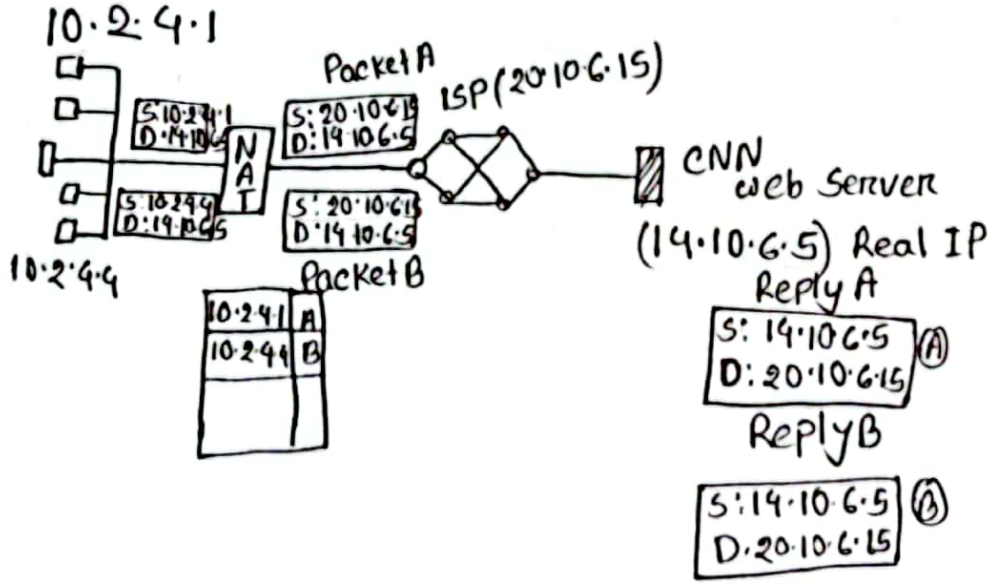
Class A : 10.0.0.0 — 10.255.255.255 ($>16\times10^6$)

class B : 172.16.0.0 — 172.31.255.255 ($>1\times10^6$)

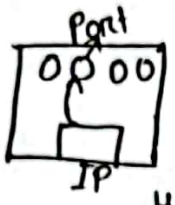
Class C : 192.168.00 — 192.168.255.255 (65×10^3)

Real IP (Public) : Rest of them

NAT (Network Address Translation):



Port Engineering:
↓
Specific Memory Location



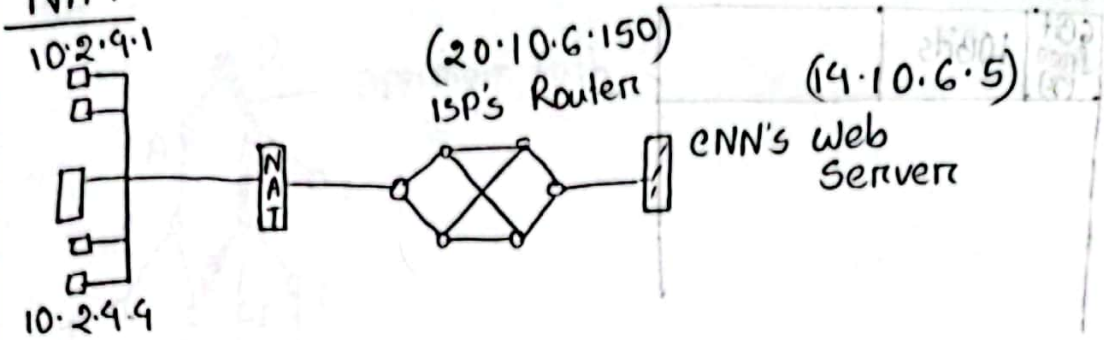
(IP)
Host name of that machine
Domain
https: // www CNN.com / filename
Protocol
requested file

DNS : নামের against যে ip address আছে তাকে খুঁজে বের করা।

http কে বলে দিয়েছি 80 port এ run করাবা.

Class 4

NAT

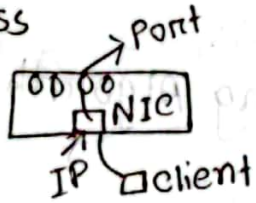


Class A: 10·000 - 10·255·255·255
class B : 172·16·00 - 172·31·255·255 } Private IP
class C : 192·168·0·0 - 192·168·255·255

Real IP : Rest of them

Port Engineering:

16 Bit Port Address
2^{16} ports
65,536 Ports

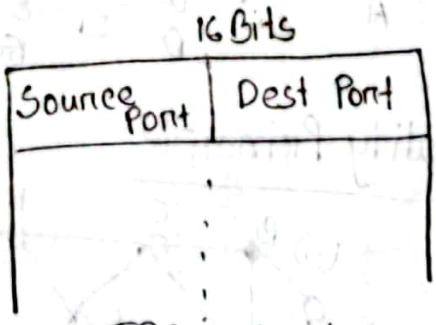


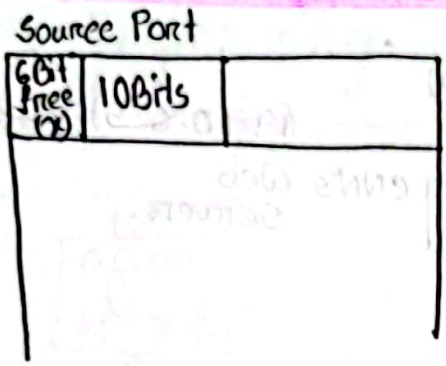
TPDU Header ↳ Port Address

http : // www. CNN . com / filename
Protocol — IP

0-1023 → Reserved Port (10 Bits) (2^{10} = 1024)

http : 80
FTP : 21
Telnet : 23
Pop3: 110





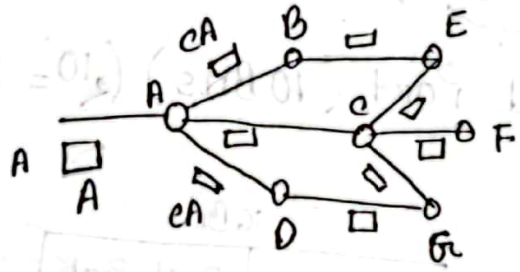
Routing Algorithm:

Types of Routing Algorithm:

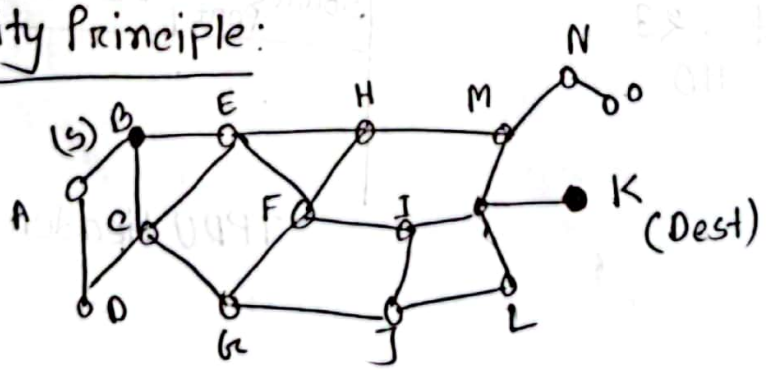
1) Static Routing Algorithm
   - Shortest Path Routing
   - Flooding - Selective Flooding
   - Optimality Principle

2) Dynamic Routing Algorithm

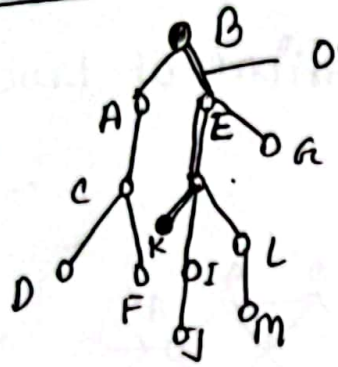
Flooding:



Optimality Principle:



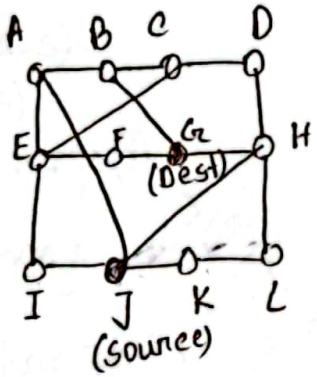
For B



Dynamic Routing Algorithm:

- Distance Vector Routing Algo
- Link-State Routing Algo

Distance Vector Routing Algo



J → G

- Router always exchange their routing infos.

J's neighbour

A, I, H, K

routing table

	A	I	H	K	J
A	0	6	2	5	8
B	7	7	5	6	
C	6	8	6	7	
D	7	10	7	3	
E	8	11	8	2	
F	3	12	9	10	9
G	10	3	10	11	7
H	2	10	0	2	6
I	9	0	3	3	
J	10	5	2	4	8
K	8	6	1	0	
L	7	8	5	5	

Echo packet (Lateney Packet) to know the busyness of other nodes.

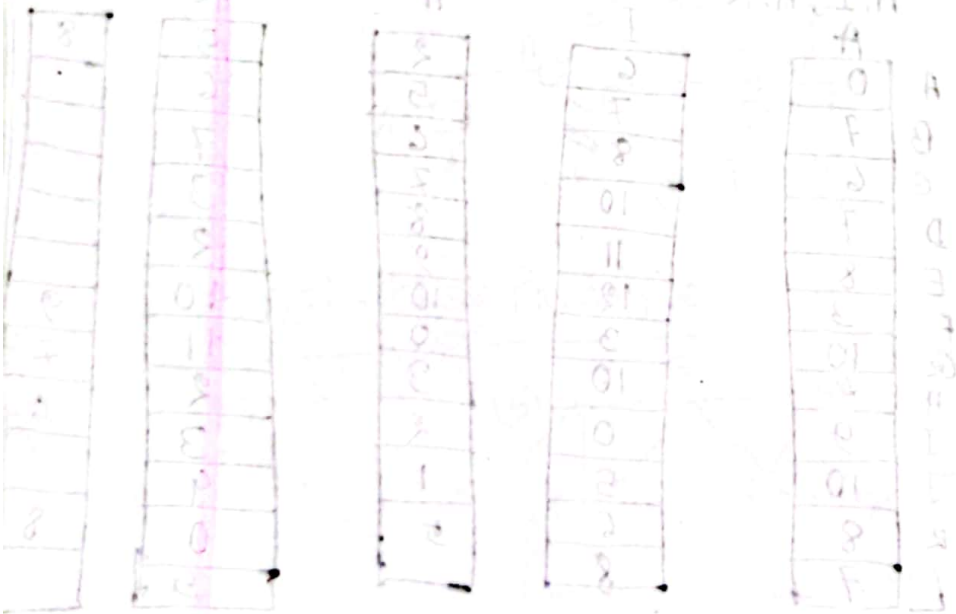
JA : 8 sec
JI : 6 sec
JH : 7 Sec
JK : 8 sec

JG : JA + AG ⟶ 8 + 10 = 18 sec

JG : JI + IG → 6 + 3 = 9 sec

JG : JH + HG → 7 + 10 = 17 sec

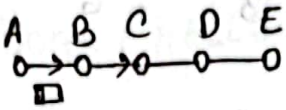
JG : JK + KG → 8 + 11 = 19 sec

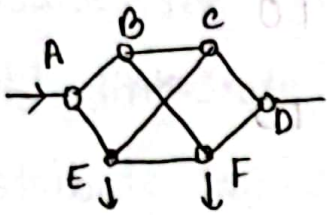


Class 5

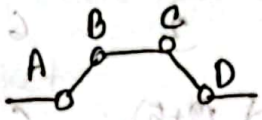
Problem in Distance Vector Routing Algorithm:

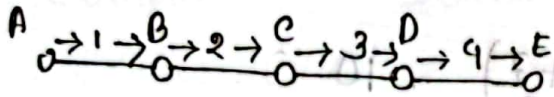
count-to-infinity Problem → exist করে যদি linear Subnet থাকে





Down





← Initially

(A যদি Down থাকে B cannot reach A)

Hello packet

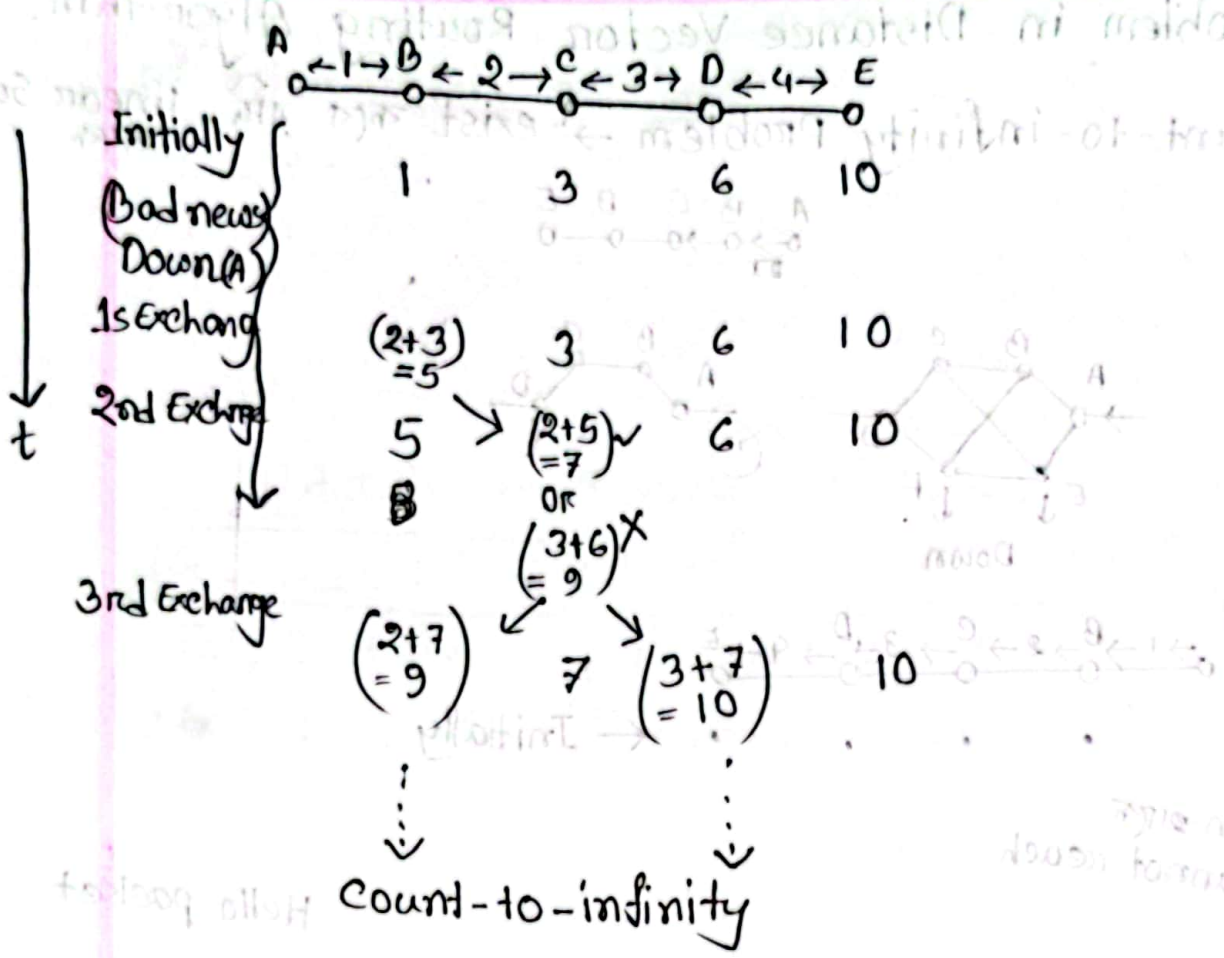
(Good News) UP(A)

1st Exchange (1)

2nd Exchange 1 (2+1) = 3

3rd Exchange 1 3 (3+3) = 6

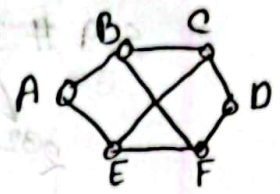
4th Exchange 1 3 6 (1+6) = 10


A
1
B
2
C
3
D
4
E
Initially
Bad news
Down(A)
1st Exchang
2nd Exchang
3rd Exchange
t
1
3
6
10
(2+3) =5
3
6
10
5
(2+5) =7
6
10
B
OR
(3+6) = 9
X
(2+7) = 9
7
(3+7) = 10
10
Count-to-infinity

Class1

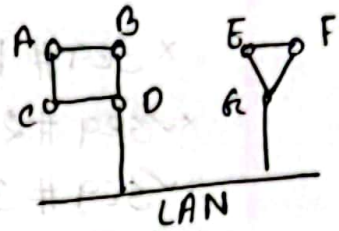
11.09.22

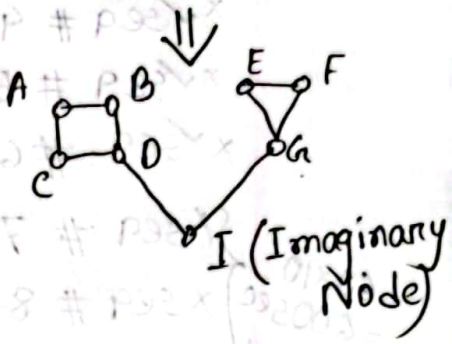
Link State Routing Algorithm:



steps:

1) Know your neighbors (HELLO Packet)
2) Measure the Delay (ECHO Packet)
3) Build link-state packet
4) Distribute link-state packet
5) Compute the shortest path





3)

B (IP)	
seq# x	(x+1)
Age (60 sec)	
A	2
C	4
F	5

Link-state Packet of Router B

sequence no. ফিল্ড থেকে latest Packet টা খুজে বের করবে।
↳ Buffer এ highest 60 sec থাকবে।

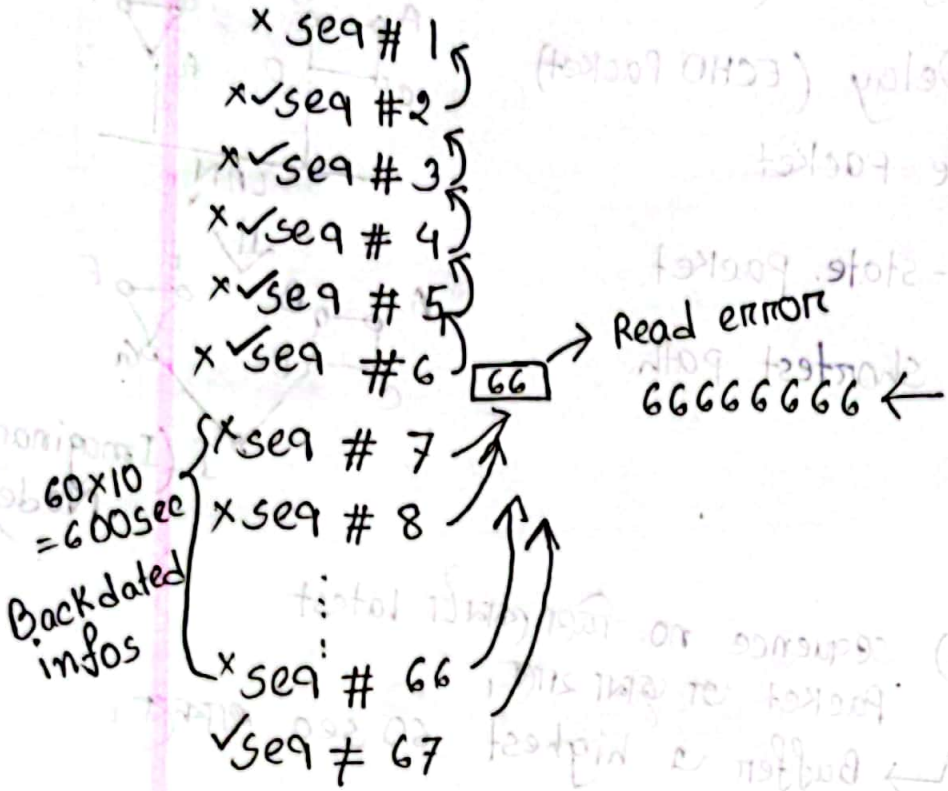
x seq# 1 ↖ 2 will be compared with 1 and 2 will stay as
x ✓ seq #2 ↖ it is latest
✓ seq #3 ↖ same as 2 and 3.

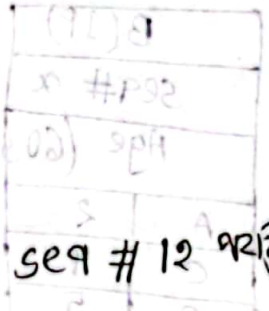
Bit length of sequence : 4 Bits long.

x 0000
x ✓ 0001
✓ 0010
:
x ✓ 1110
✓ 1111

seq # 32 Bits long

2^{32}





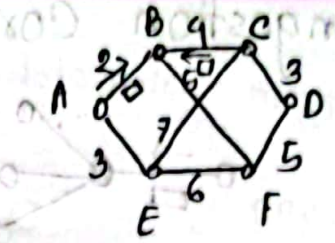
seq # 7 থেকে 10 sec করে থাকে থাকে seq # 12 পর্যন্ত 60 sec থাকবে এরপর বড় সংখ্যা Read error 66666666 buffer থেকে delete করে দিবে, এরপর seq # 13 আসবে কারণ buffer ফাঁকা বড় সংখ্যা যাওয়ার কারণে।

age কমায়ে দিলে buffer তাড়াতাড়ি blank হয়ে যাবে তাই খুব কমও দিবনা age.

সাধারণত age বাধা 5-6 টি Packet কে ignore/handle করার মত।

4)

For B;



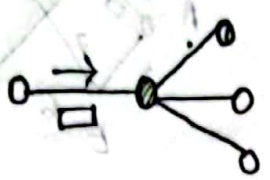
Owner	source	seq#	Age	Packet Sent			Ack Sent		
				A	C	F	A	C	F
A	A	36	60	0	1	1	1	0	0
C	C	59	60	1	0	1	0	1	0
A	F	40	60	0	1	0	1	0	1
A	C	30	60						

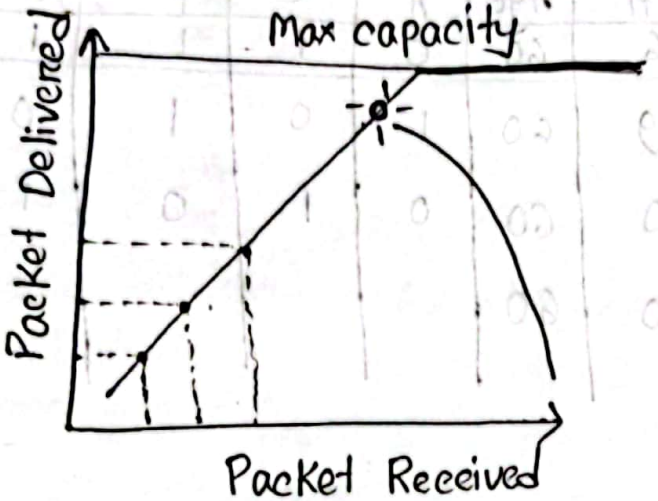
(Won't accept as seq is back dated) ✗

5)

Class 2

Congestion Control:

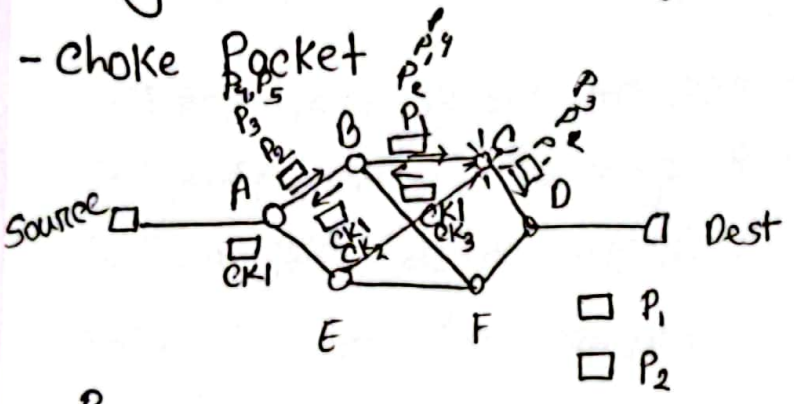




Congestion Control in Network Layer:

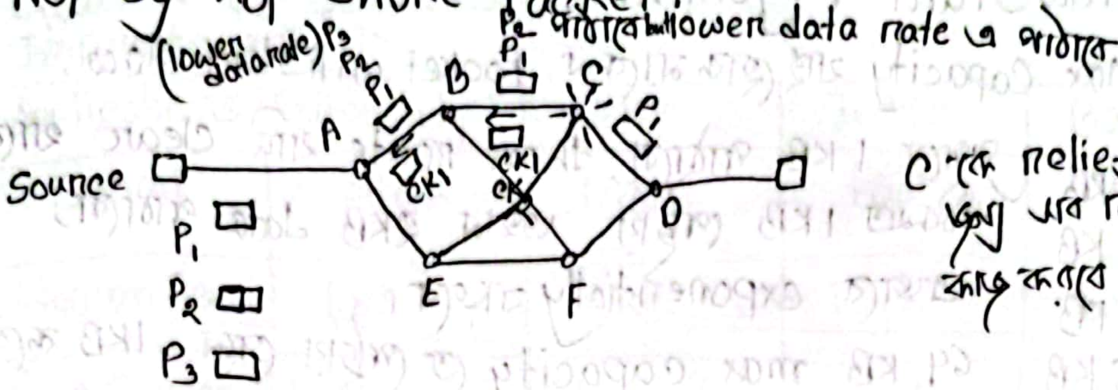
Congestion Control Algorithm:

- Choke Packet



P_1
P_2
P_3
P_4
P_5

✓Hop-by-hop Choke Packet:

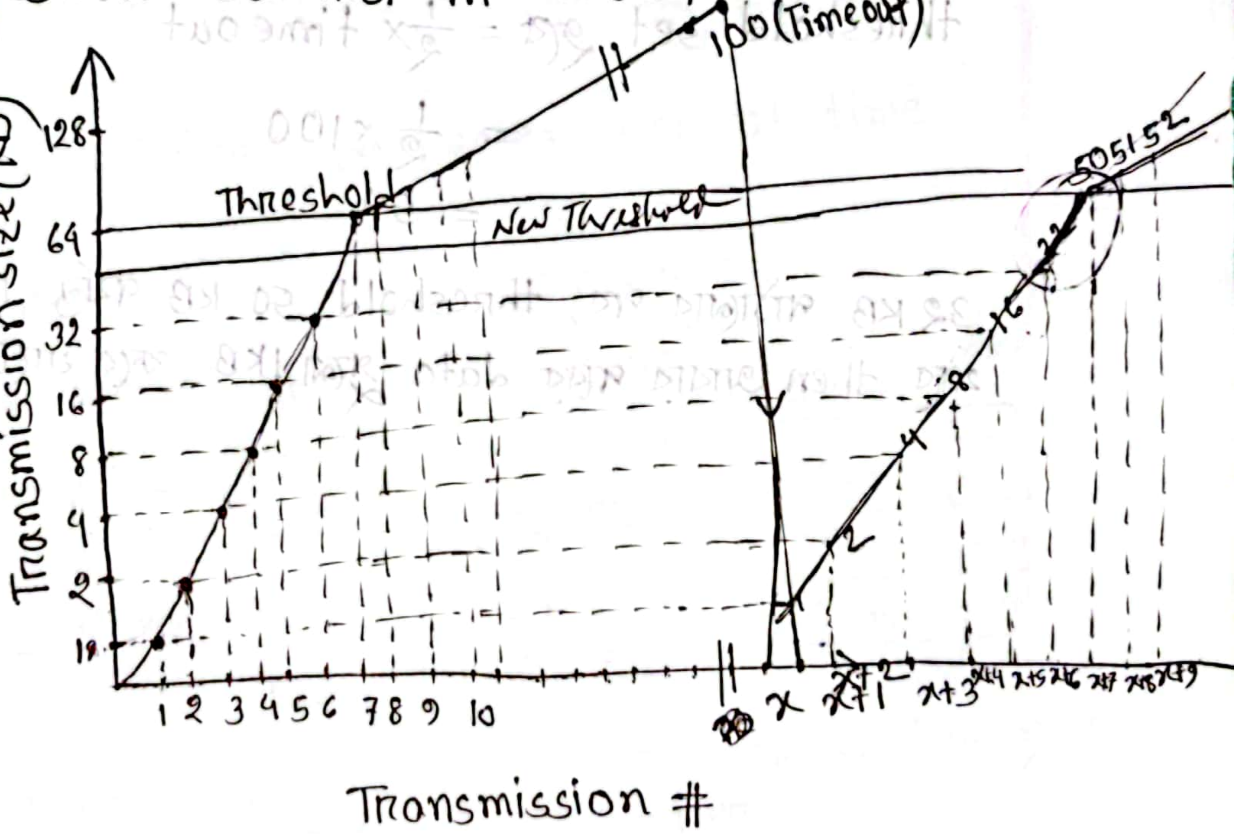


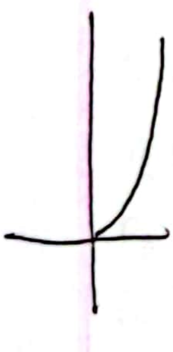
C কে relief দেওয়ার জন্য সব router কাজ করবে।

Load-shedding:

- Milk Technique (Fresh is Good) (old packet delete)
- Wine Technique (Old is good) (fresh packet delete)

Congestion Control in Transport Layer:





Slow Start Algorithm:

Max capacity যাই হোক না কেন, Packet will start slow.

1 KB
2 KB
4 KB
8 KB
↓

প্রথমে 1 KB পাঠাবো, then route যদি clear থাকে ঠিকমত 1 KB পৌঁছায় তখন 2KB data পাঠাবো, এভাবে exponentially বাড়বে। 64 KB max capacity তে পৌঁছায় গেলে 1KB করে বাড়বে per transmission এবং linearly বাড়বে।

time set করে দেওয়া হয়, এই time এর মধ্যে acknowledge করতে না পারলে same data re-transmit করতে হবে।

x transmission এ timeout হলে, x+1 আবার 1KB থেকে start হবে, (x+2) 2KB and new threshold set হবে = $\frac{1}{2}$ x timeout

$= \frac{1}{2} \times 100$

$= 50$

32 KB পাঠানোর পর, threshold 50 KB পর্যন্ত linearly/expo যাবে then আবার পরের data গুলো 1KB করে যাবে।

Class3

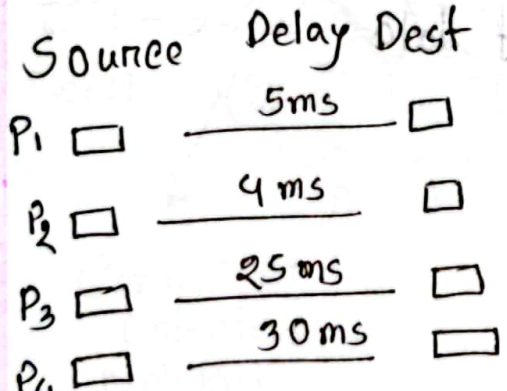
Quality of Services:

Importance Table:

Applications	Reliability	Delay	Jitter	Bandwidth
E-mail	High	low	low	low
Video on Demand	low	low	high	high
Video Conferencing	low/medium	high	high	high

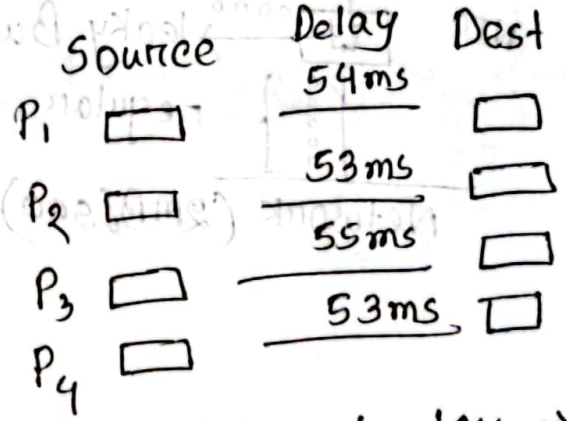
Jitter: Variations in packets' arrival time

Scenario1:

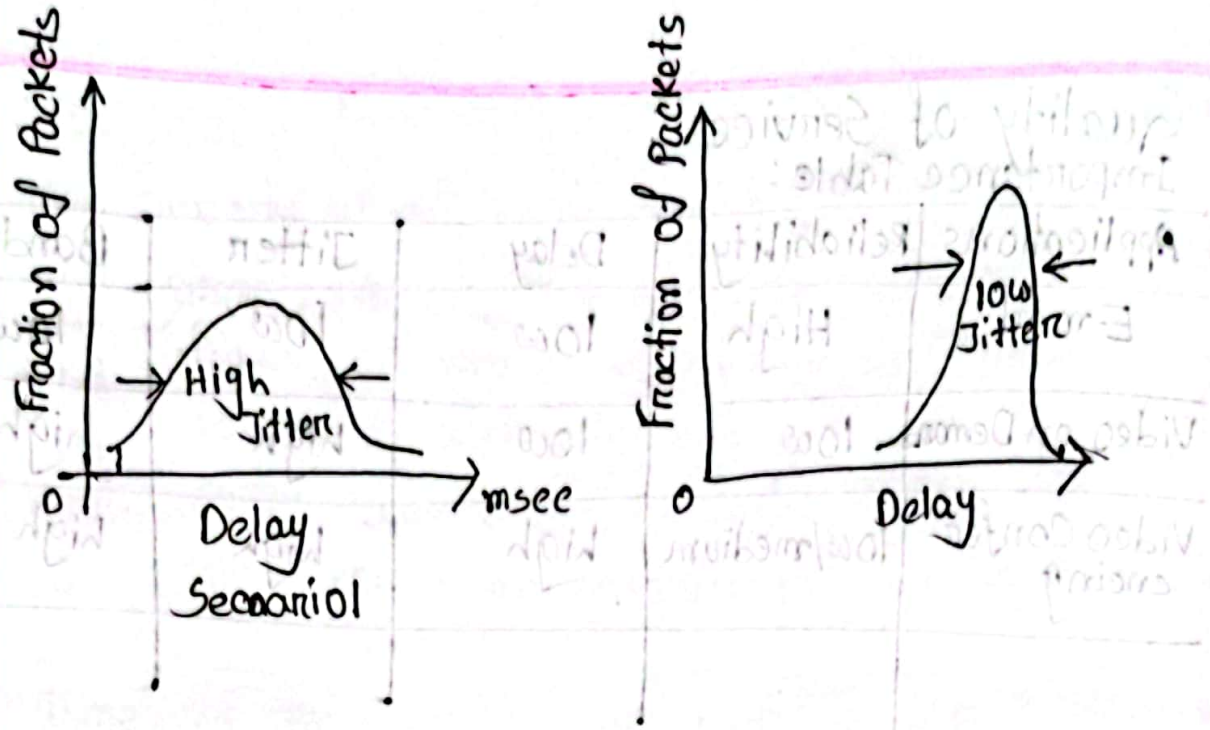


Variation is high ⇒ high Jitter

Scenario2:

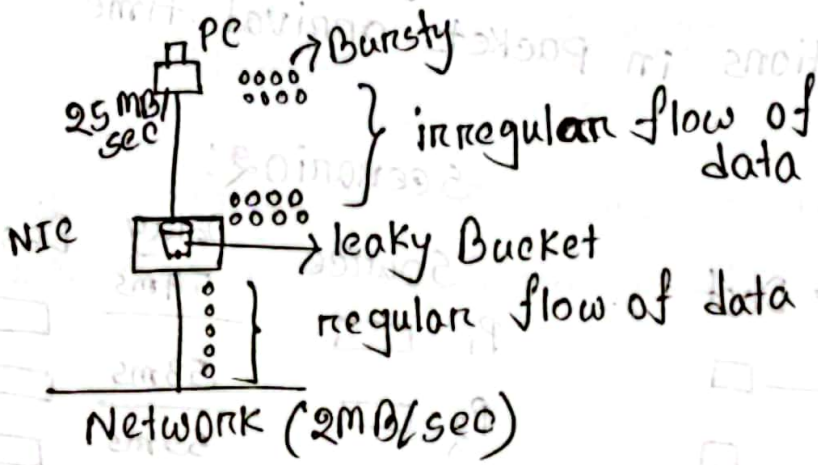


Variation is low ⇒ low Jitter



Techniques to acheive QoS:

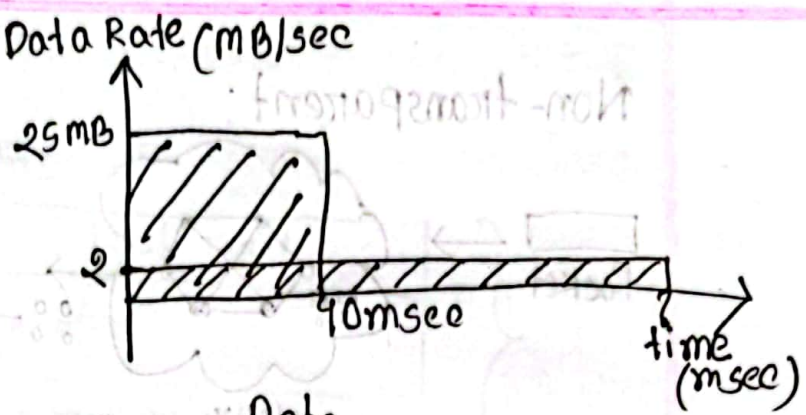
- Over provisioning (যা দরকার না তার থেকে বাড়ি দেওয়া)
- Traffic Shaping
  - Leaky Bucket Algorithm



Ex:

Rate: 25 MB/sec

Time: 40 msec



Data = Rate x Time

$= \frac{25MB}{1000} \times 40$

$= 1MB$

Time = $\frac{Data}{Rate}$

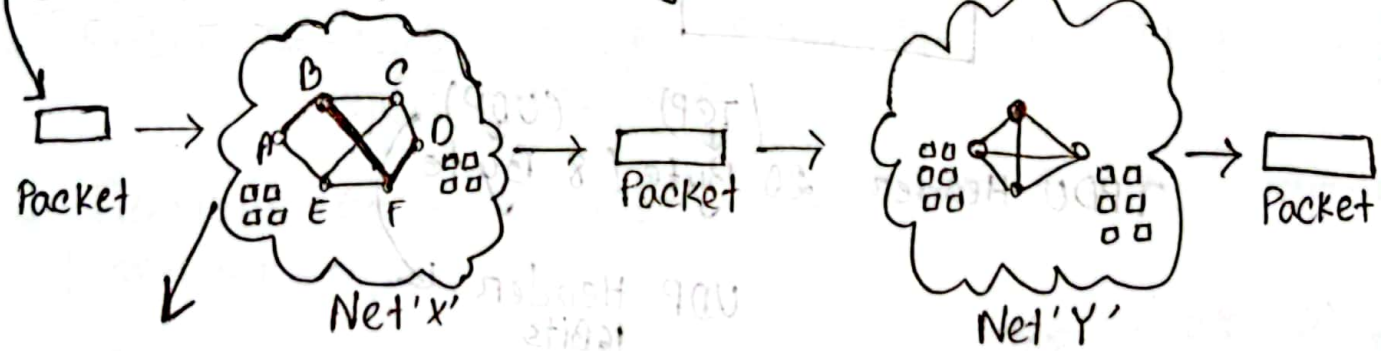
$= \frac{1MB}{2MB/sec}$

$= \frac{1MB \times 1000msec}{2MB}$

$= 500msec$

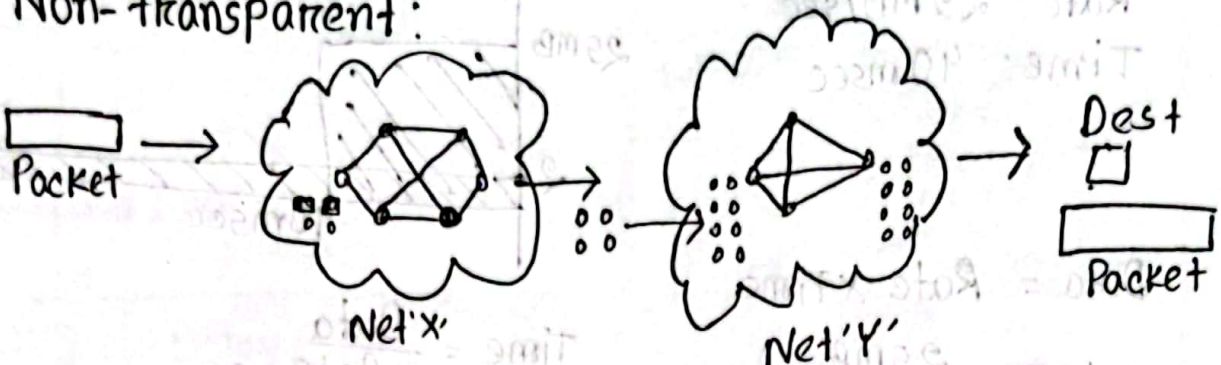
Fragmentation:

- Transparent Fragmentation
- Non-transparent fragmentation



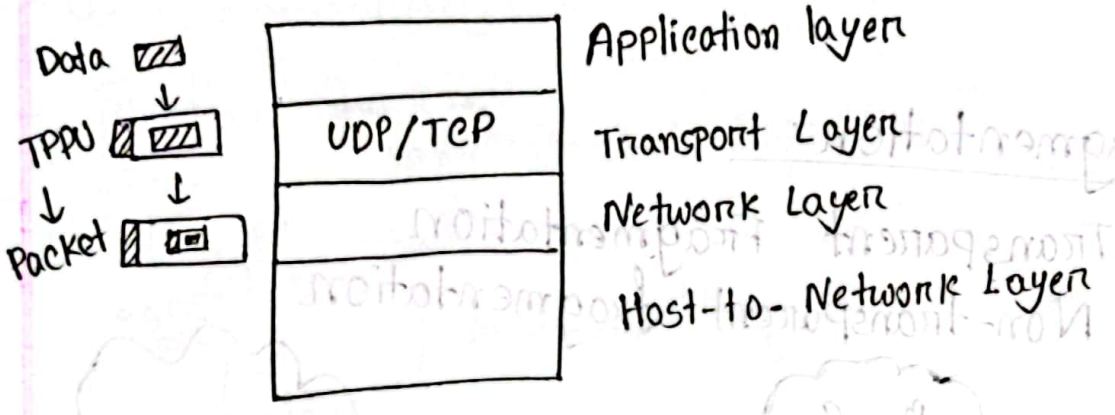
Connection Oriented Network

Non-transparent:



প্রত্যেকটা fragment কে header নিতে হবে Packet এর মতো নিজে Dest এ পৌঁছাতে পারে।

TCP/IP Ref Model:

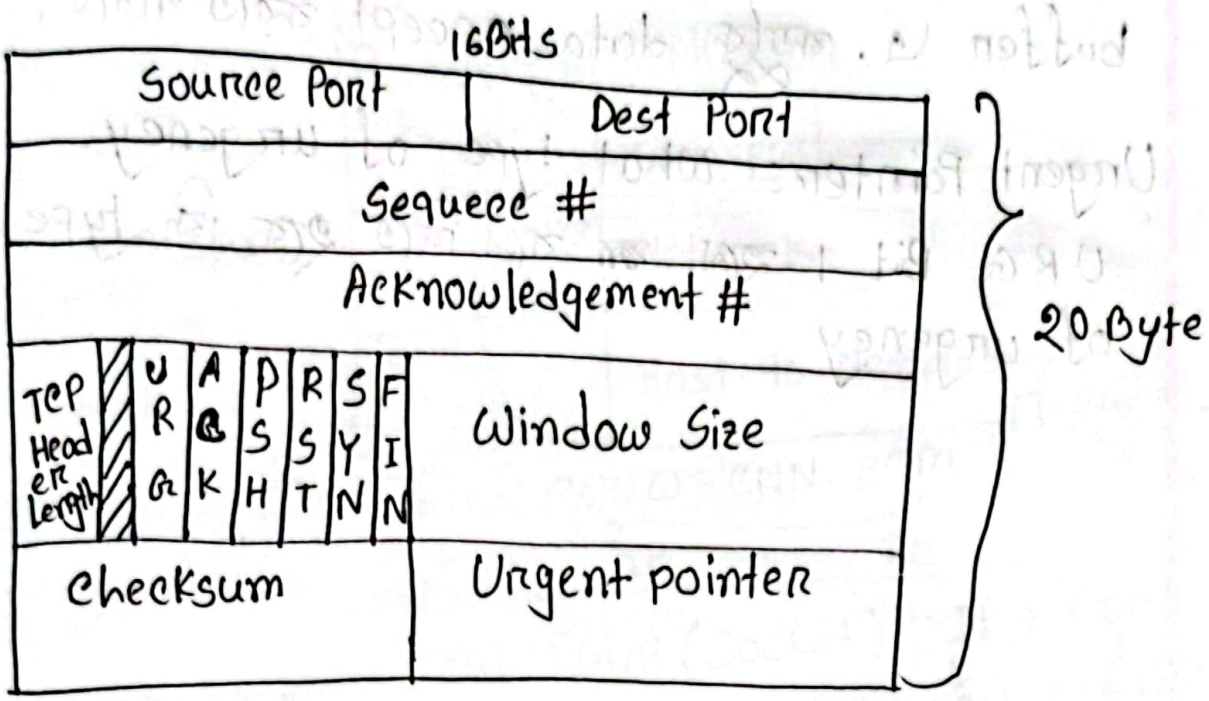


(TCP) (UDP)
TPDU Header 20 Byte / 8 Byte

UDP Header:
16 Bits

8 Byte	Source Port	Dest Port
	UDP length	Checksum (CRC)

TCP Header (20 Byte)



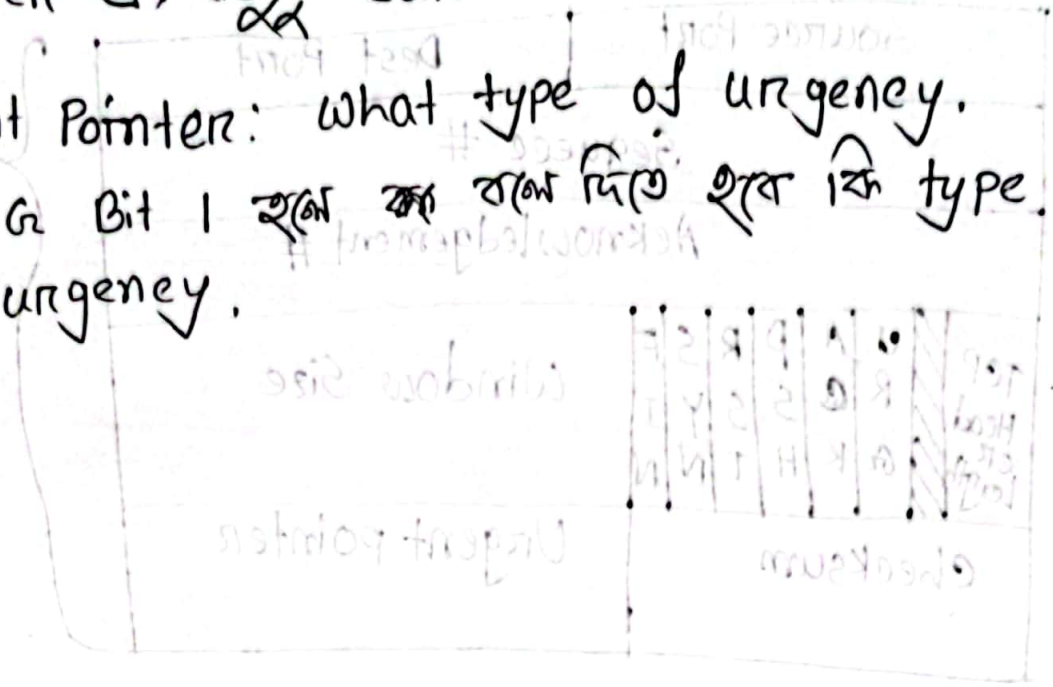
TPDU Header

TPDU

- Urgent হলে URG 1 হতে হবে
- Acknowledgement number পেওয়া হলে ACK 1 করে দিতে হবে।
- Packet কে Push করতে হলে PSH Bit 1 হবে। (তাড়াতাড়ি পাঠানো জন্য)
- Previous connection কে reset করার জন্য RST Bit কে 1 করা হয়
- Connection করতে চাইলে SYN Bit কে 1 করতে হবে,
- Connection finish করতে চাইলে FIN Bit কে 1 করতে হবে।

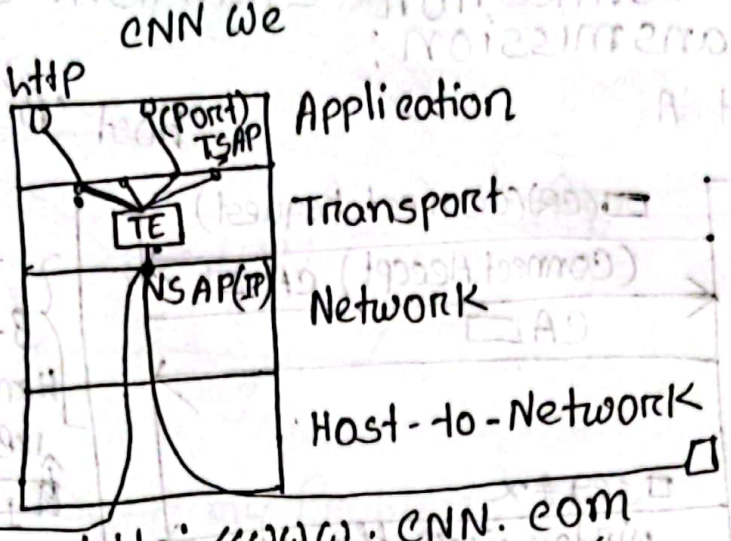
Window Size: বলে দিতে হবে কতটুকু ফাঁকা আছে buffer এ, কতটুকু data accept করতে পারবে.

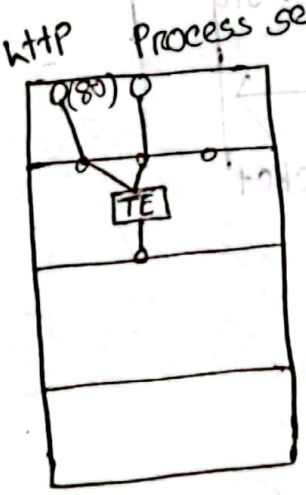
Urgent Pointer: what type of urgency.
URG Bit 1 হলে কী বলে দিতে হবে কি type of urgency.



Class 9

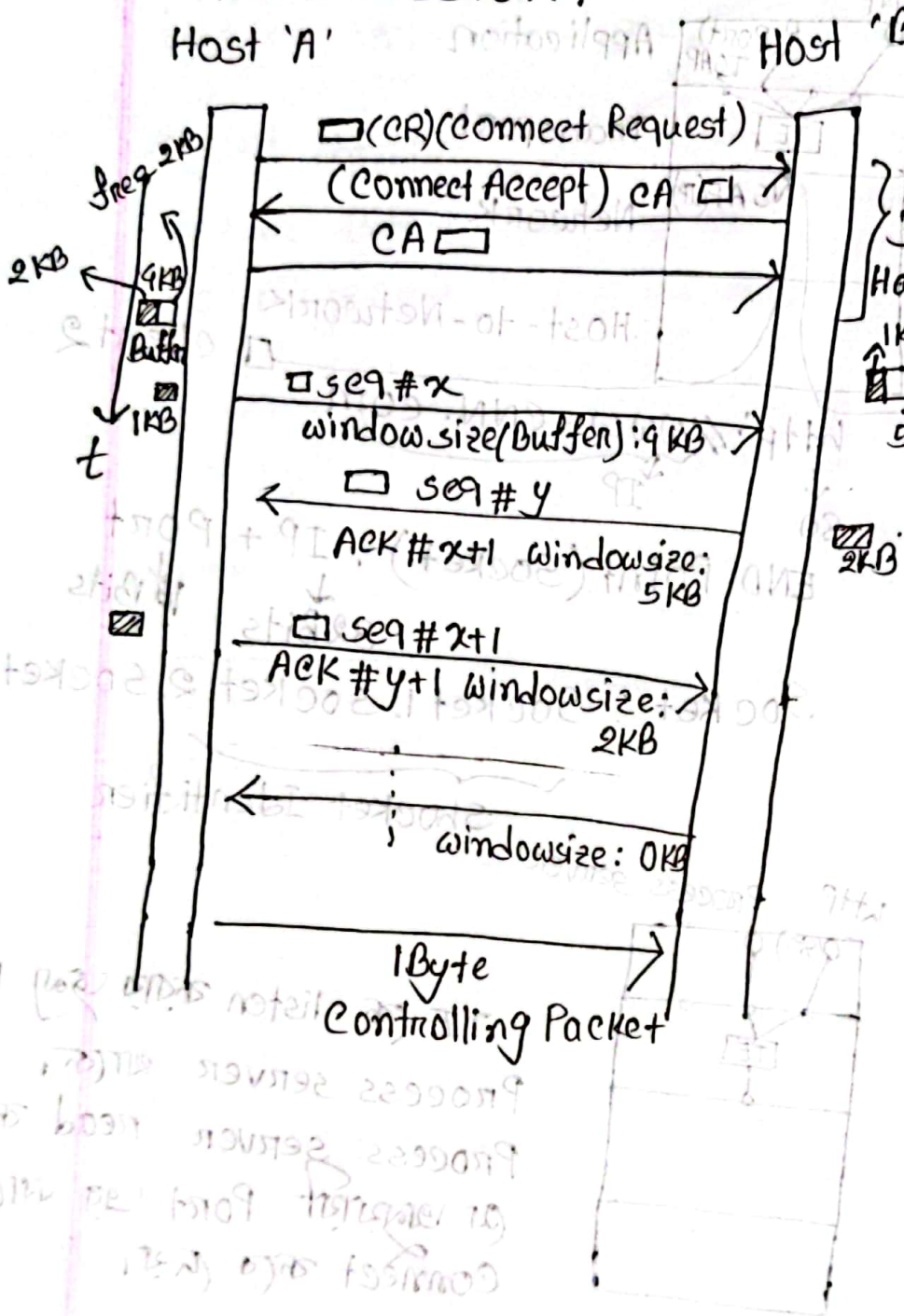
TCP/IP Ref Model:





TE কে listen করার জন্য 1টি Process server থাকে। Process server request করে যে অপারেটিং Port এর সাথে connect করে দেয়।

TCP connection Establishment + Data Transmission:

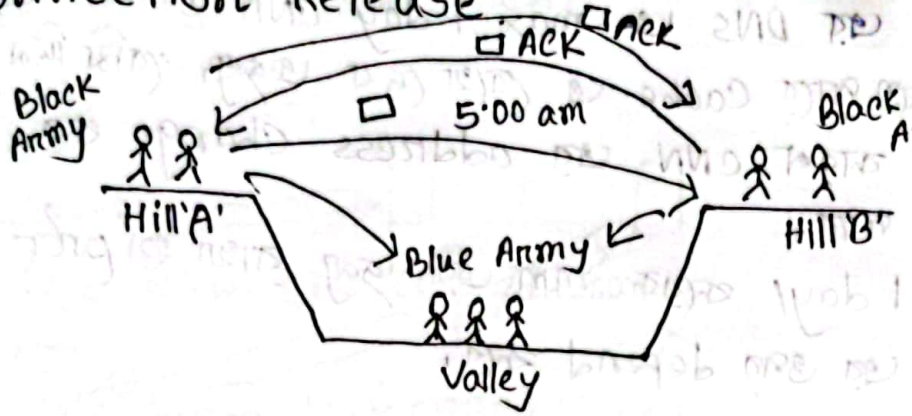


Host 'A' নিজের infos দিয়ে CR -Packet পাঠায়. Host 'B' যেহেতু জেগে নিজের info দিয়ে CA Packet পাঠায় এবং Host 'A' কেও CA Packet পাঠায়

Buffer full হয়ে গেলে data আর পাঠাতে পারবেনা

1 Byte এর Controlling প্যাকেট পাঠাবে just to say clean the buffer, I'm waiting

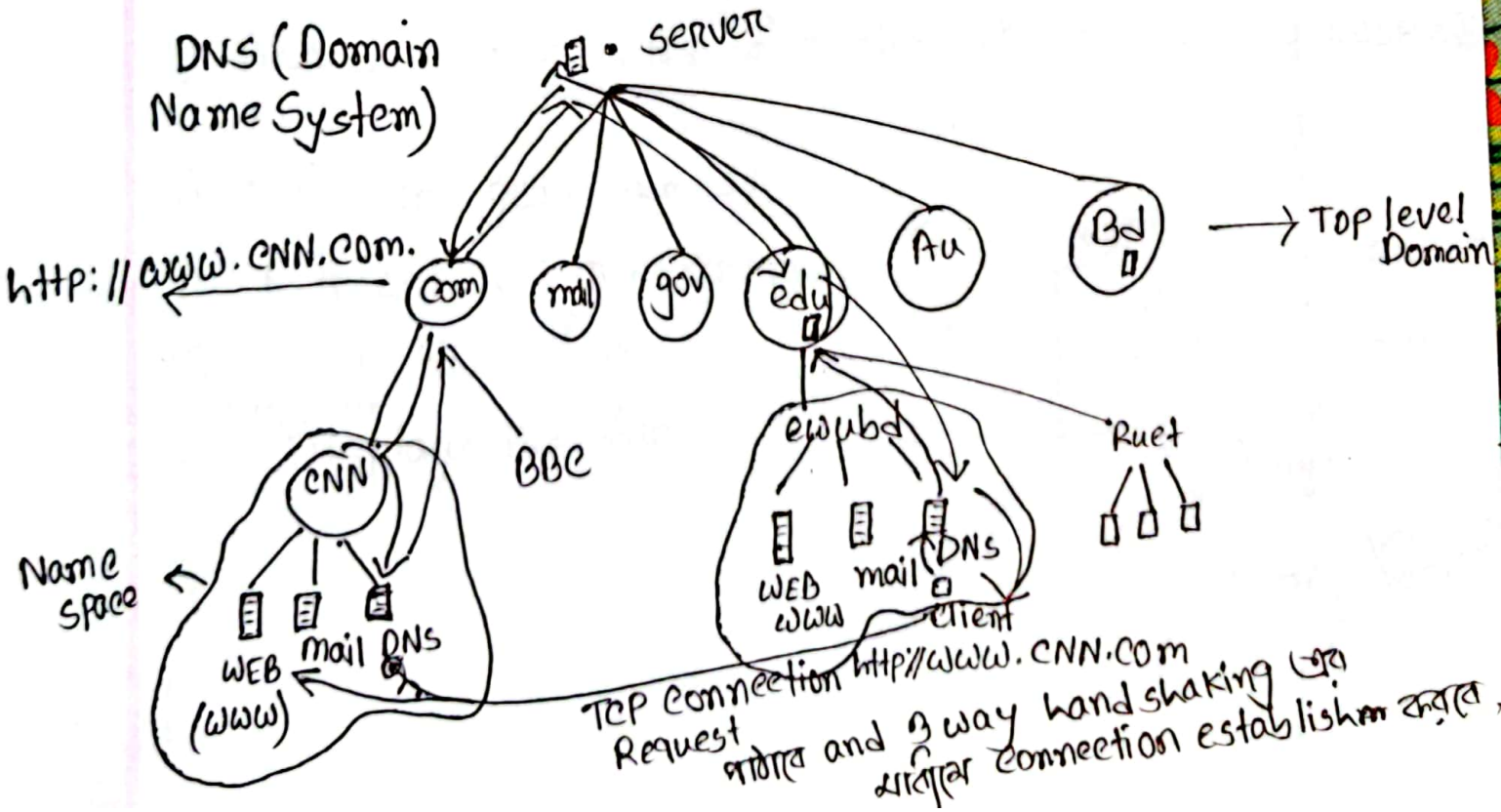
Connection Release:



Two-Army Problem

A Release Packet B কে পাঠায়. B ACK Packet পাঠায়. এভাবে A to B; B to A ACK Packet 3-4 বার পাঠানোর পর connection Release করে দেয়।

Application Layer:

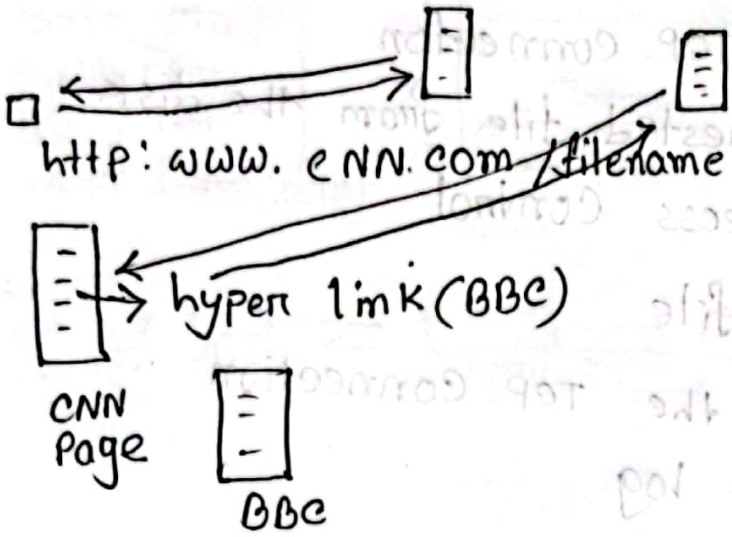


ewubd এর DNS এ max 1 day CNN server এর info দিতে পারে cache এ রেখে দেয় এজন্য, বেশি দিন রাখানা কারণ CNN এর address change করে ফেলতে পারে।
max 1 day/ কয়েক min এর জন্য রাখা হয় সেটা server এর ওপর depend করে।

Resource Record

Class 5

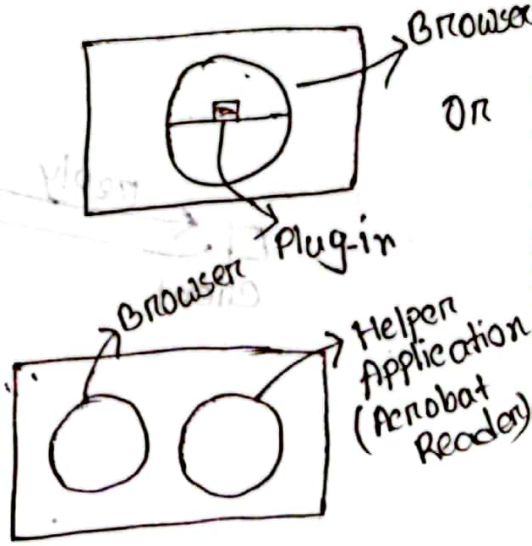
www (World wide web):



Client Side:

Steps:

1) Browser determines the URL
2) Browser ask DNS for the IP of the Corresponding URL
3) Browser gets the IP
4) Request a TCP connection
5) Gets the file
6) Browser Displays the file

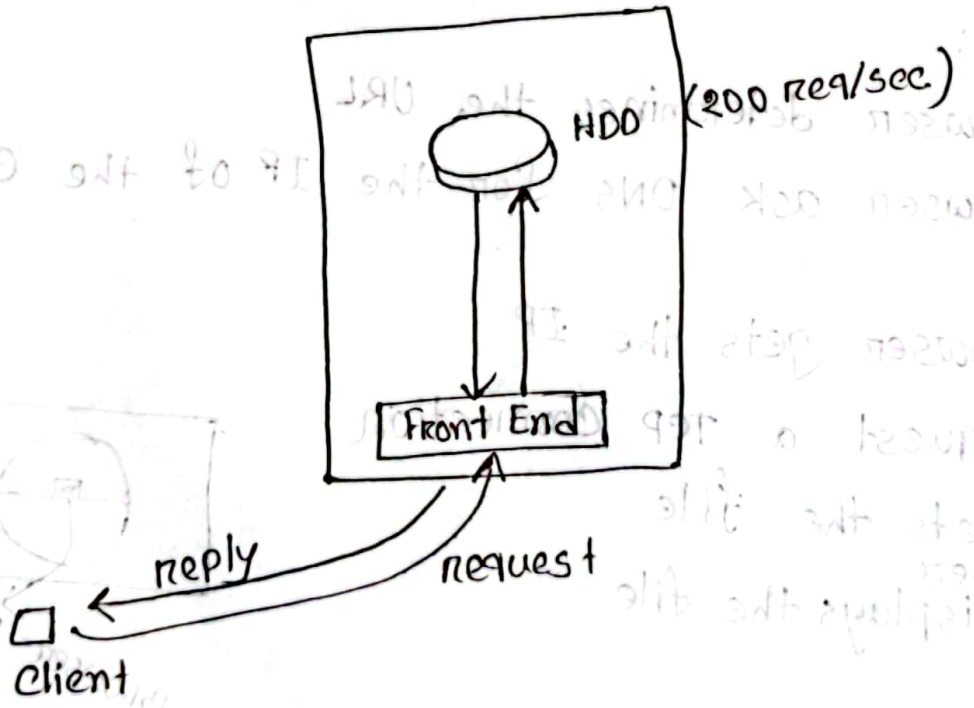


Server Side :

Steps :

1) Accepts the TCP connection
2) Gets the requested file from the disk
3) Performs access control
4) Send the file
5) Disconnect the TCP connection
6) Entry in the log

Web Server :

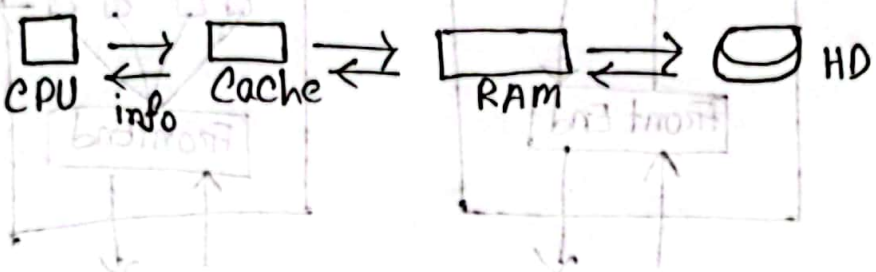


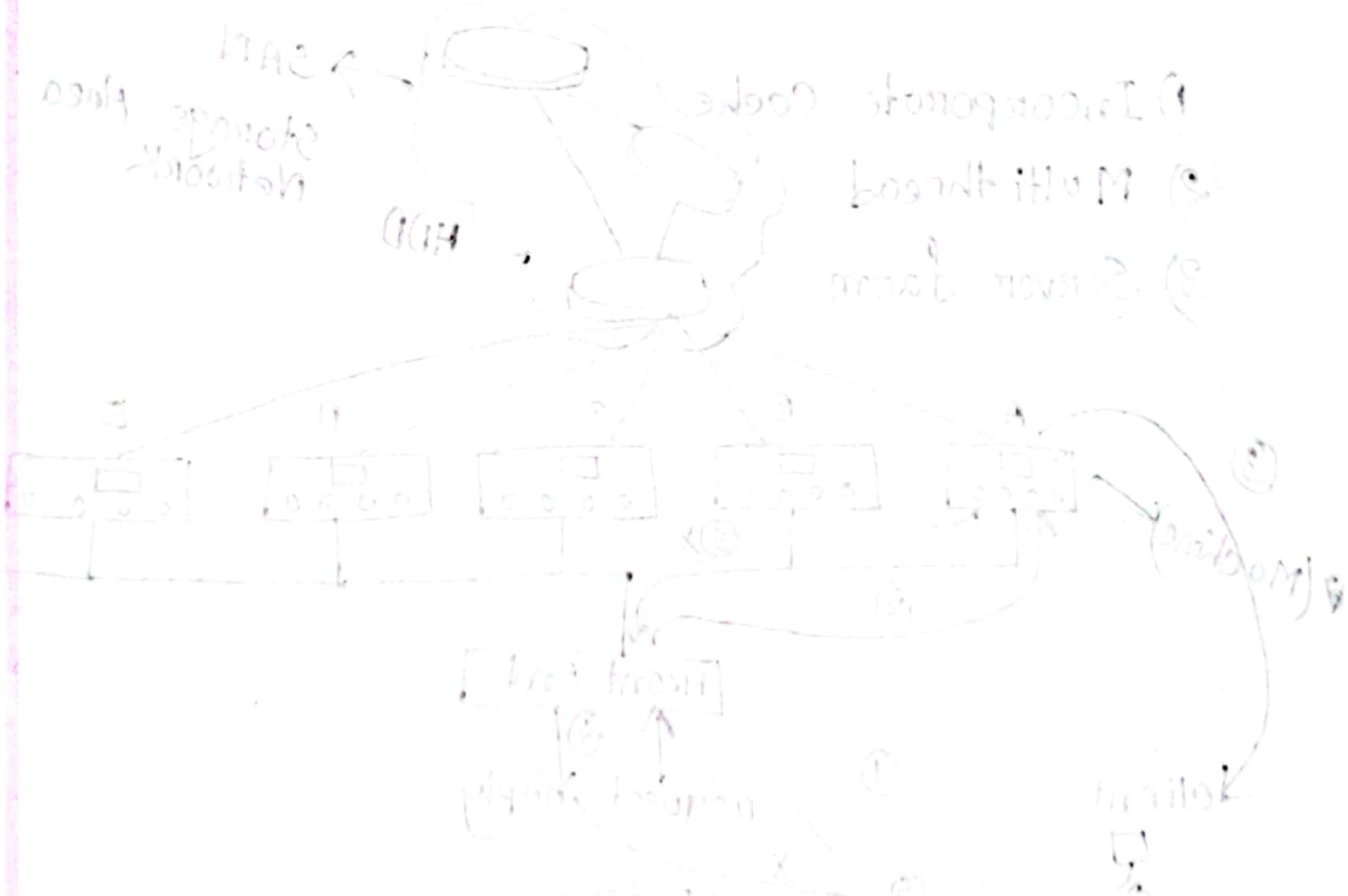
Memory Hierarchy:

- Register (B)
- Cache (MB)
- RAM (GB)
- HD (TB)
- Tape drive (100TB)

speed ↑

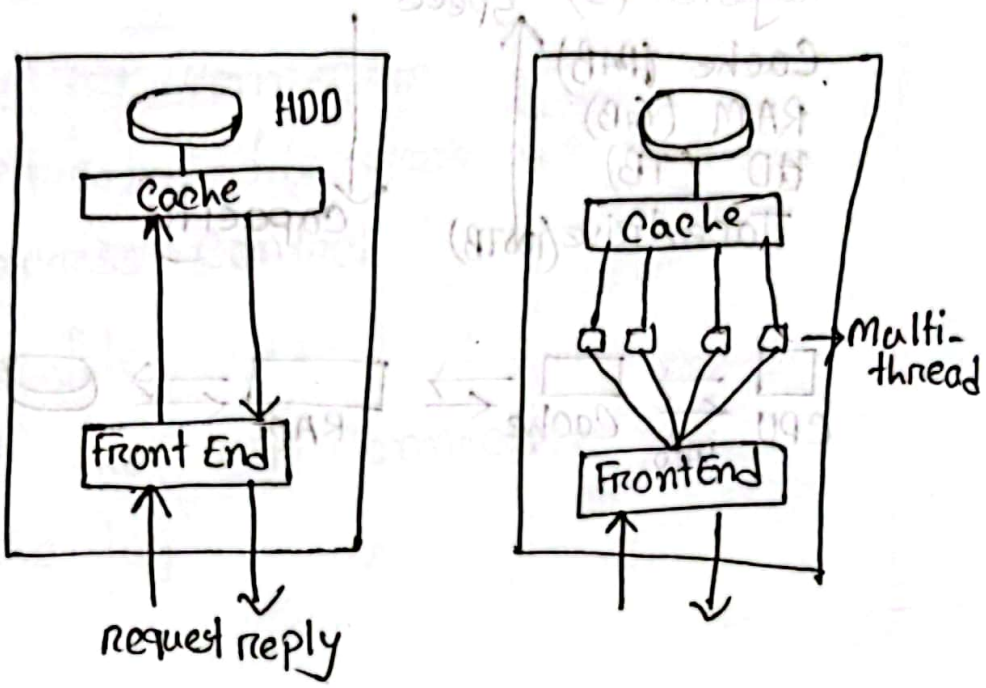
capacity ↓



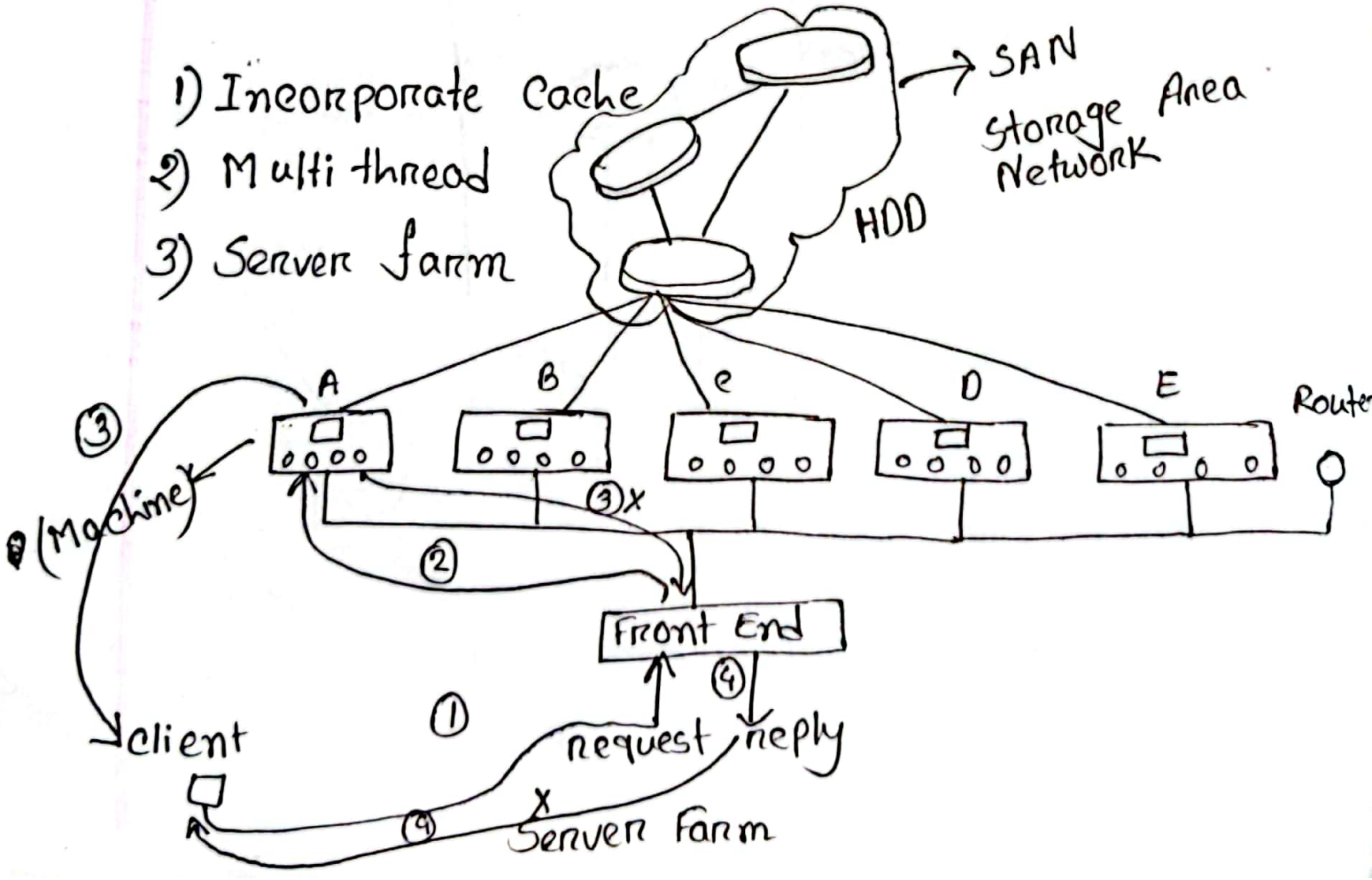


Class 6

Optimization of Web Server:

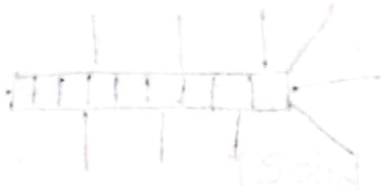


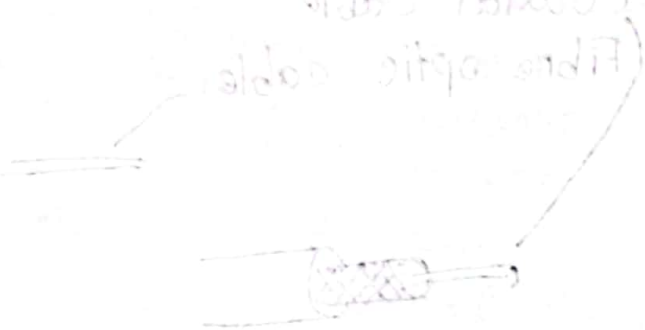
1) Incorporate Cache
2) Multi thread
3) Server farm



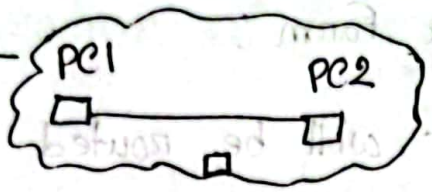
Optimization of Server Farm:

1) Same type of request will be routed to a specific node
2) TCP Handoff

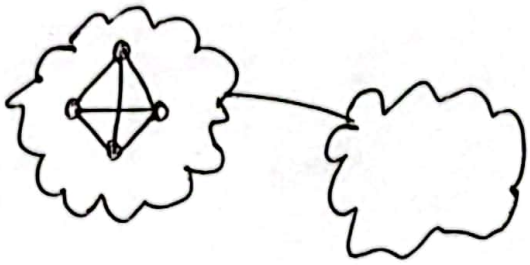


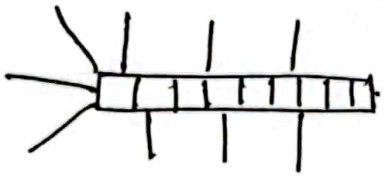


Lab 1



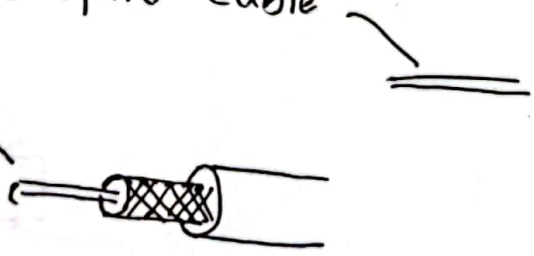
- PC
- NIC
- Transmission Media
- Switch

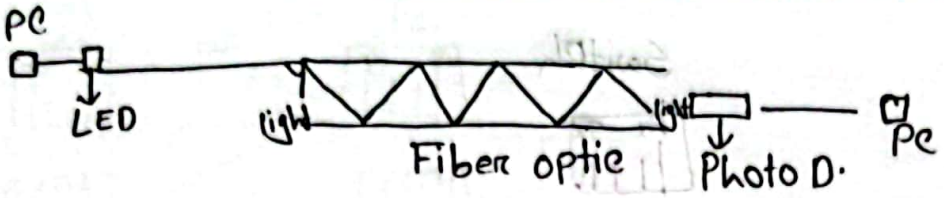




Transmission Media:

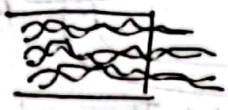
- Twisted Pair Cable
- Coaxial Cable
- Fibre optic cable



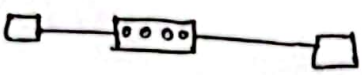


Twisted Pair Cable:

- CAT5
- CAT6

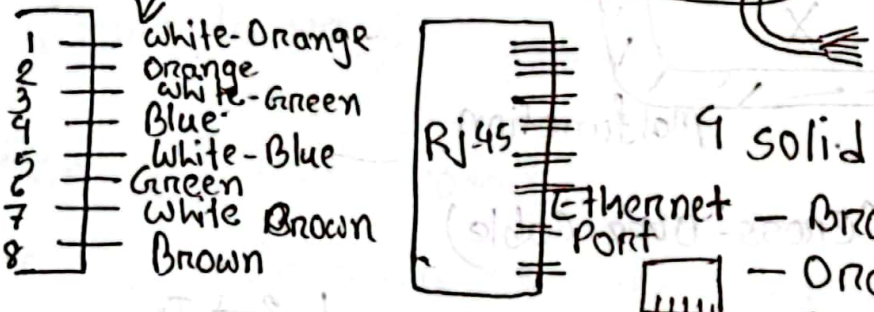


LaB-2



Straight-Through Cable: (CAT5)

4 Solid color
4 mix color



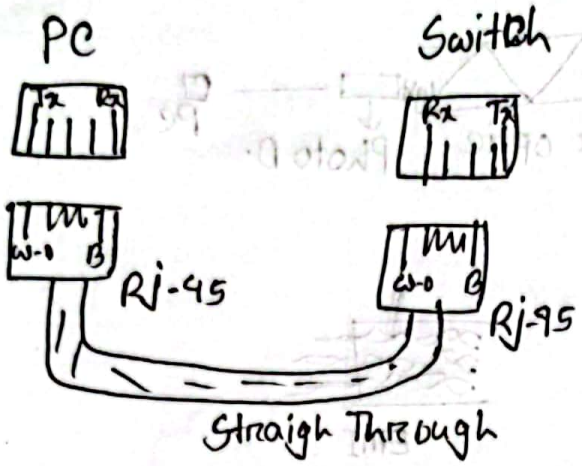
4 solid colors:
- Brown
- Orange
- Green
- Blue

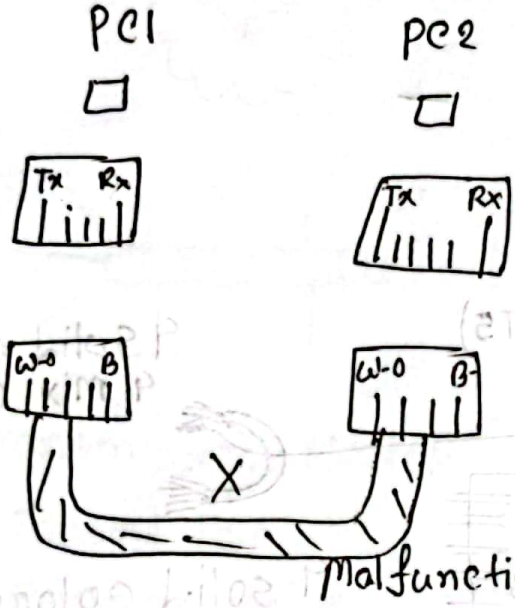
4 Mix Colors:
- White-Brown
- White- Orang
- White- Green
- White- Blue

568B Standard.

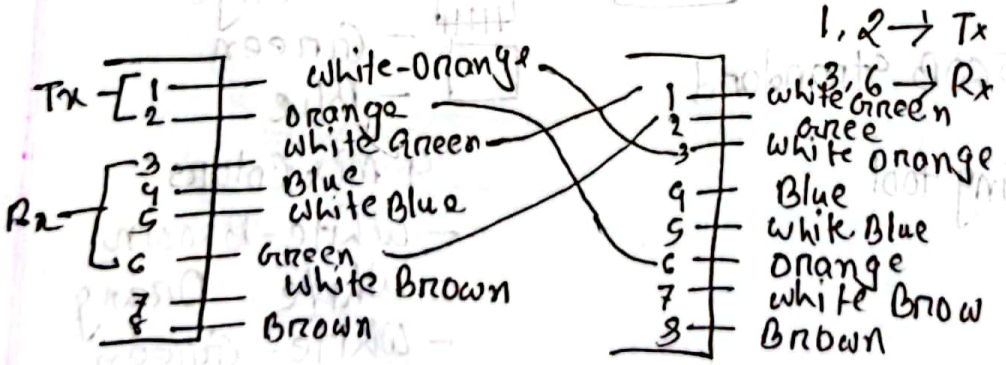
~~Grip~~

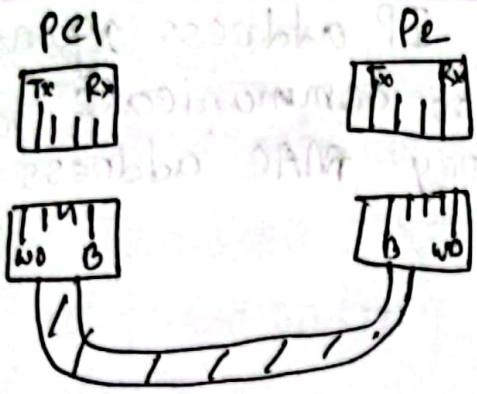
- Crimping tool

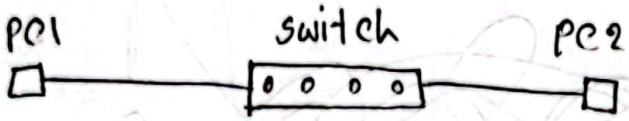




PC-PC (Cross-Over Cable)







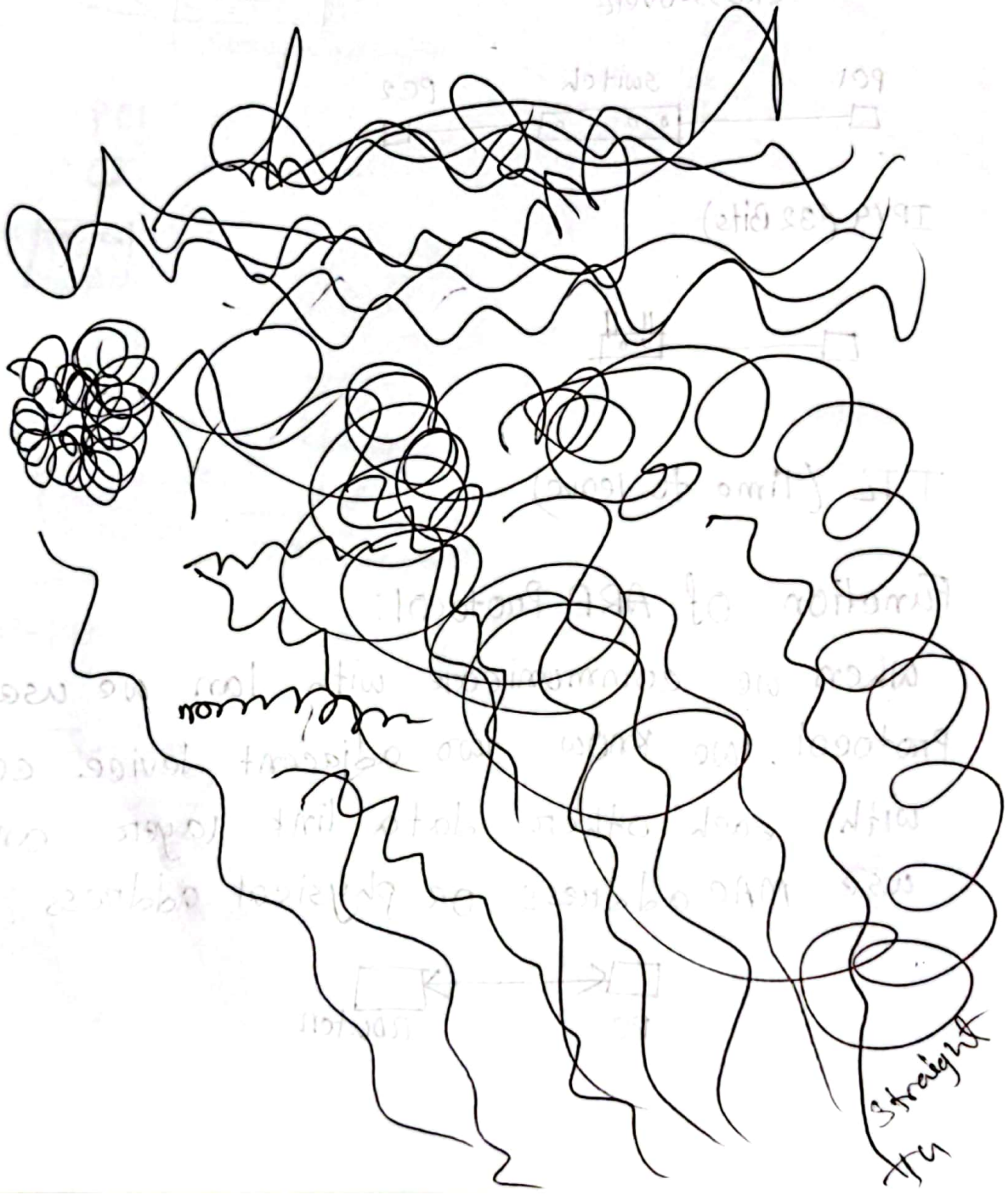
IPV4 (32 Bits)

TTL (Time to leave)

Function of ARP Protocol:

When we communicate with lan we use ARP Protocol, we know two adjecent device communicate with each other data link layer and the use MAC address or physical address.

ARP used for find out IP address against MAC address. MAC address communicate with frame where header carry MAC address



Straight Through Table!

Straight Thr

Client Side:

1) Browser determines the URL
2) Browser ask DNS for IP of the corresponding URL
3) Gets the IP
4) Request for a TCP connection
5) Gets the file
6) Browser displays the file

Server Side:

1) Accept TCP connection
2) Fetch the requested file from the HDD
3) Performs access control
4) Send the file
5) Disconneet the TCP connectio.
6) Entry into the Log

	Owner	source	seq	age	Packet sent P	R	U	T	ack sent P	R	U	T
	P	T	118	60	0	1	1	0	1	0	0	1
	T	R	98	60	1	0	1	0	0	1	0	1
X	P	U	116	60								

3.

D