Lab-1

Computer network

PC   PC

ethernet port

PC

modem   analog

(demodulation)
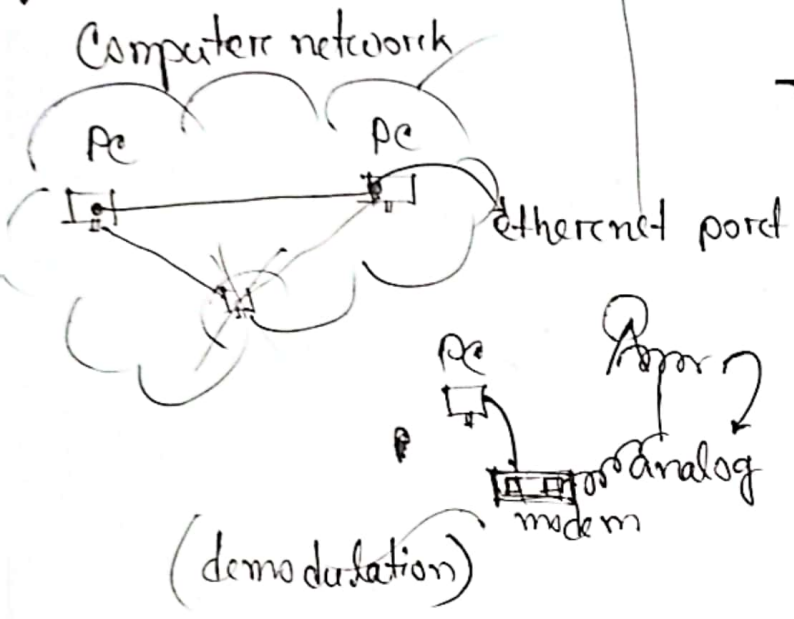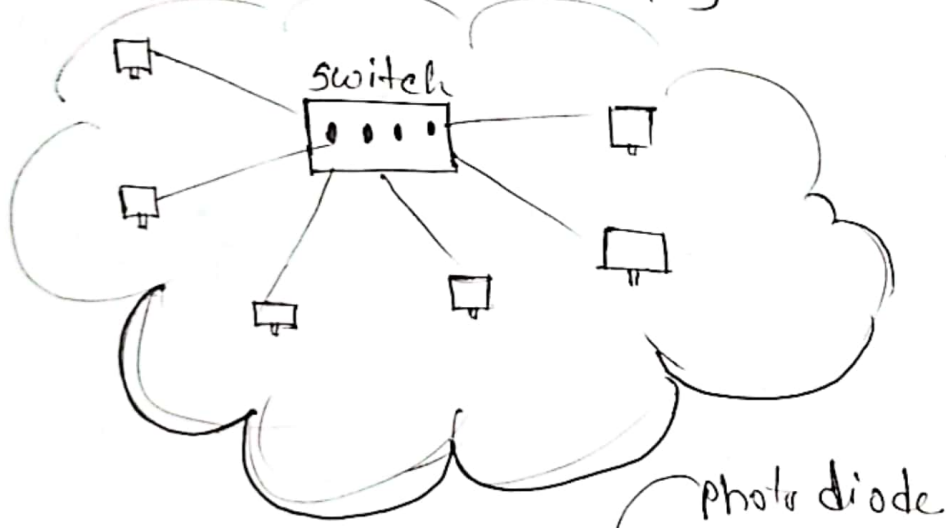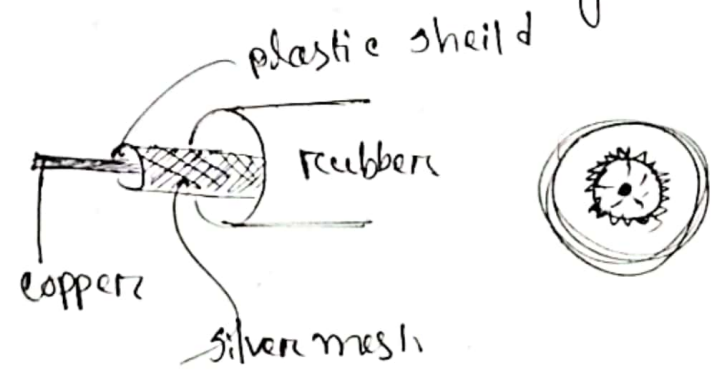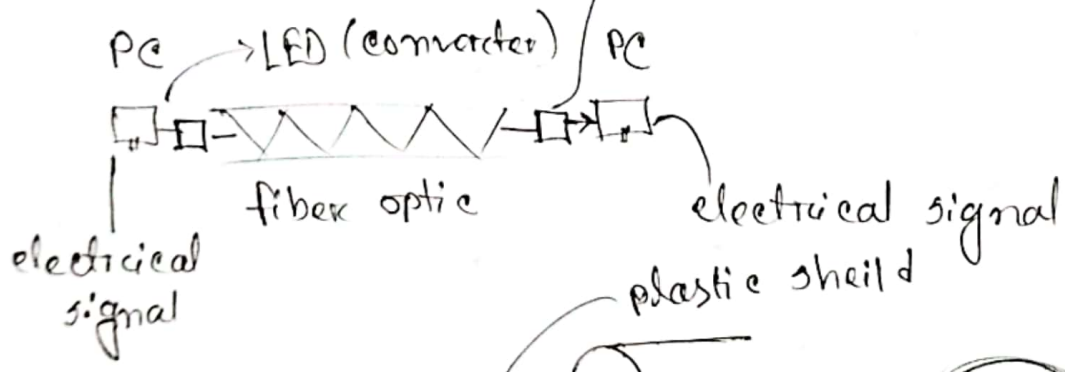
→ Computing Devices (PC)
→ (NIC network interface card)
→ Transmission medium
a) unguided (wireless) ✗
b) Guided
  — Fiber Optic
  — Coaxial (Dish TV signal)
  — Twisted pair cable

multiple PC connection এর জন্য switch use করতে হয়,

switch

a) CAT5 (সস্তা)
b) CAT6 (professional)
c)

4 pairs cable

PC →LED (converter) PC   photo diode

fiber optic   electrical signal

electrical
signal

plastic sheild

rubber

copper

silver mesh

CAT5   CAT6

per inch-এ twist
বেশি CAT6 এ

Twisted

- 4 solid colores [Green, blue, orange, brown]
- 4 Mixed with white [white - Brown
  - white - Green
  - white - Blue
  - white - Orange]

jack
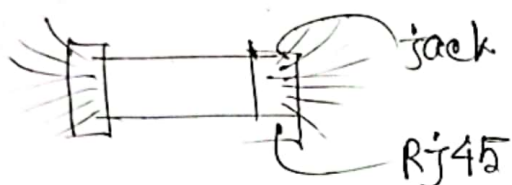
Rj45

Crimping tool

Next lab

CAT5 — 2m

Rj45 — 5/6 pcs

switch

PC₁

PC₂

straight through Cable

ethernet port

Tx (transmit)   PC   Rx (Receive)

Rx   Tx

Pe Switch

Switch PC
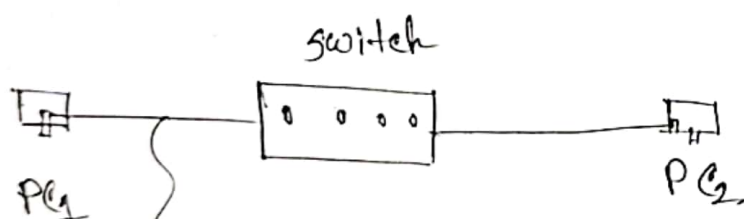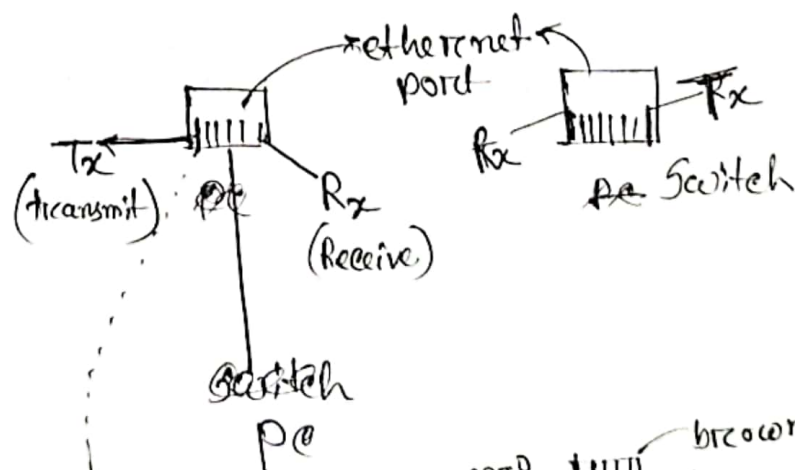
1 — white orange
2 — orange
3 — white green
4 — blue
5 — white blue
6 — Green
7 — white brown
8 — Brown

Rx
Tx

Rj45   brown

w/o

brown

w/o   Rj45

straight through cable

fig: 568 'B' standard

PC₁   PC₂

Cross over cable

Tx [1
     2

Rx [3
     4
     5
     6
     7
     8

Cross over
cable

Same type device
  PC - PC, switch - switch

→ cross over cable

Diff type of device — straight through cable

1 ———— w-green
5 ———— Green
2 ———— w-orange
3 ———— w-orange
4 ———— blue
5 ———— w-blue
6 ———— orange
7 ———— w-brown
8 ———— Brown

fig: 568 'A' Standard

Simulation

✓ CISCO packet Tracer (pre.defined আছে)
— OPNET
— OMNET
— simulink
— NS2 / NS3

Logical design

PC — end device = 6

2960 switch

(192.168.10.5) PC
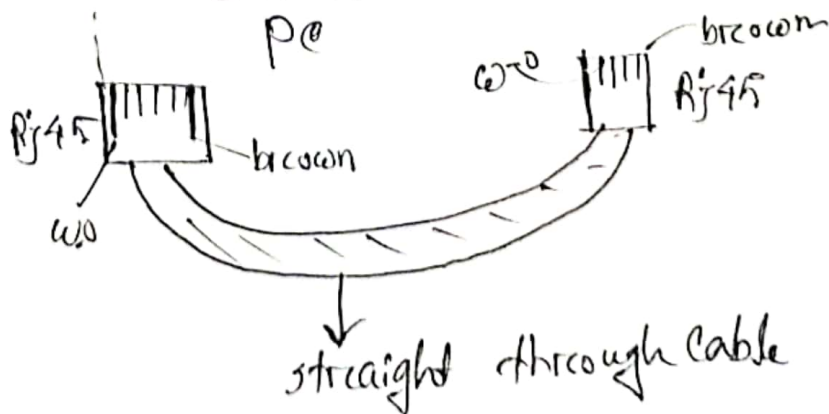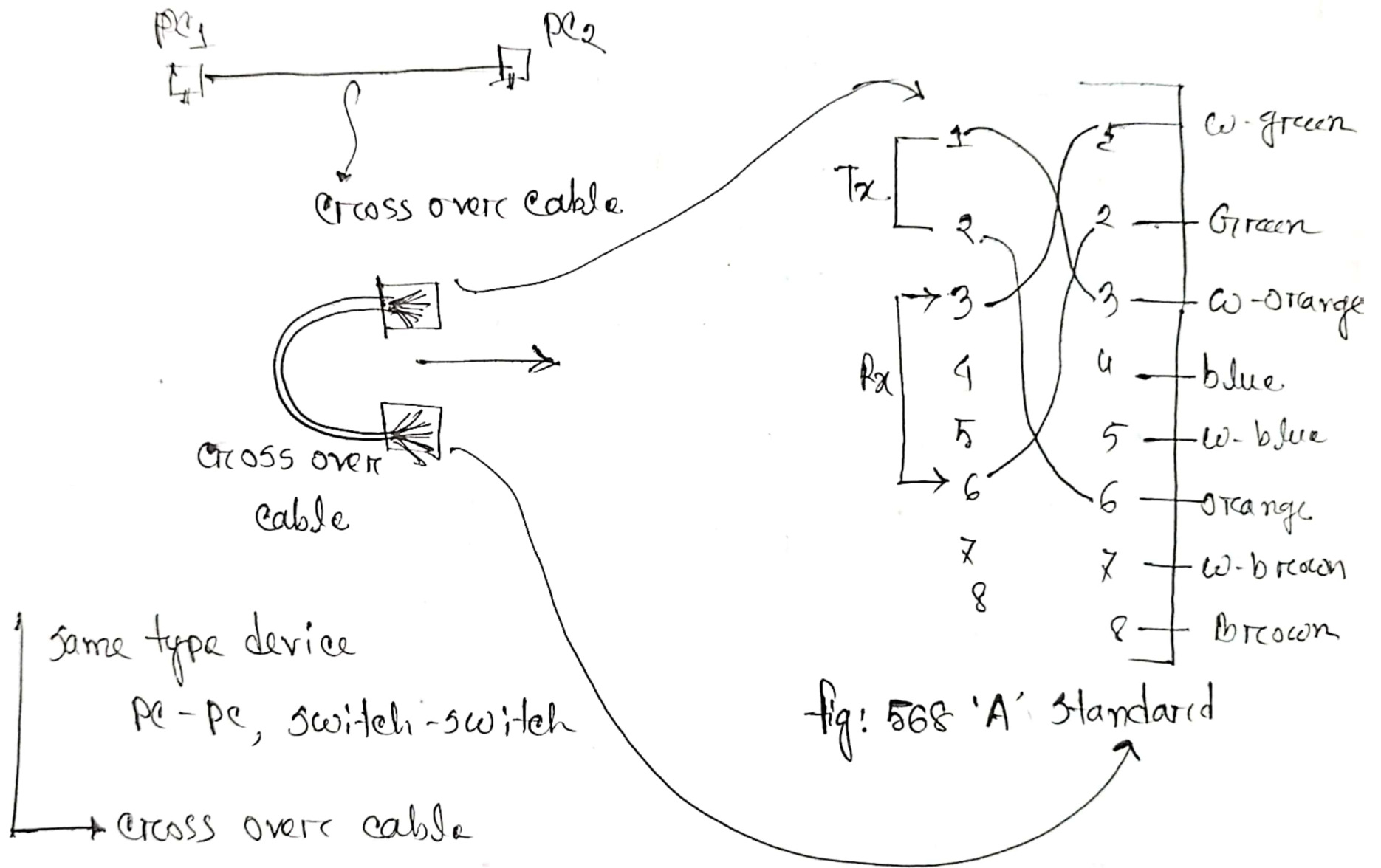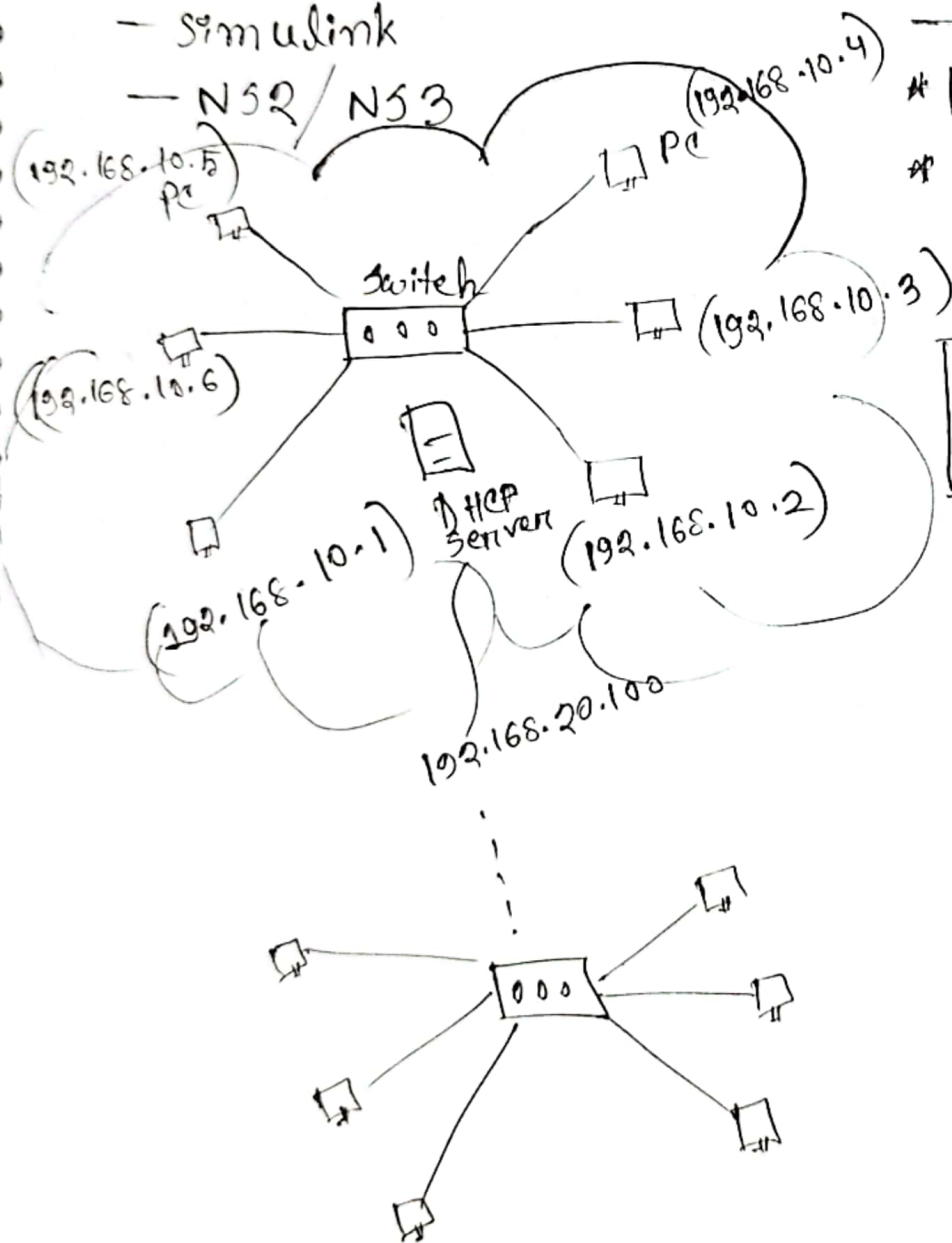
(192.168.10.4) PC

Switch

(192.168.10.3)

(192.168.10.6)

↑ HCP server

(192.168.10.1)

(192.168.10.2)

192.168.20.100

TTL: Time to Leave live (সময়) বহুদূর device করতে পারবে (Hop count)

Lijenta

: lab

192.168.10.1

192.168.20.254
Router

192.168.20.254

→192.168.20.254 DNS server

* router টা হল network এর
entity হিসেবে কাজ করবে

192.168.10.2

fao/o   fao/1

192.168.20.1

192.168.20.2

192.168.10.3

192.168.20.3

gateway
হিসেবে কাজ করে

ip

DNS : (192.168.20.200)

192.168.10.0

192.168.20.0

২৫৫.২৫৫.২৫৫.২৪০
Subnet ?

web server
(192.168.20.100)

Router >enable

Router # ⟶ (privilege mode) config

Router (config)# fa Interface Δ fa 0/0

Router (config -if)#

ip Δ address Δ 192.168.10.২৫৪ Δ ২৫৫.২৫৫.২৫৫.0

Router (config-if)# noΔshut

Router (config-if)# doΔwr

Router (config-if)# exit

Router (config-if)# interface Δfa 0/1

Router (config-if)#

ip Δaddress Δ 192.168.20.২৫৪ Δ২৫৫.২৫.২৫৫.0

Router(config-if)# noΔshut

Router (config-if)# doΔwr

lab

R_1 (192.168.40.0) R_2 (192.168.50.0) R_3 (192.168.50.1) • Endtosicks are there

se 2/0 ⊕
(192.165.40.1)
node হিসাবে
fa0/0
(192.168.10.254)
(192.168.10.0)

192.168.10.1
192.168.10.0

(192.165.90.2)
DTE
fa0/0
(192.168.20.254)   se3/0
(192.168.50.2)
192.168.20.1
192.168.20.0

fa0/0
(192.168.30.254)
192.168.30.1
192.168.30.0
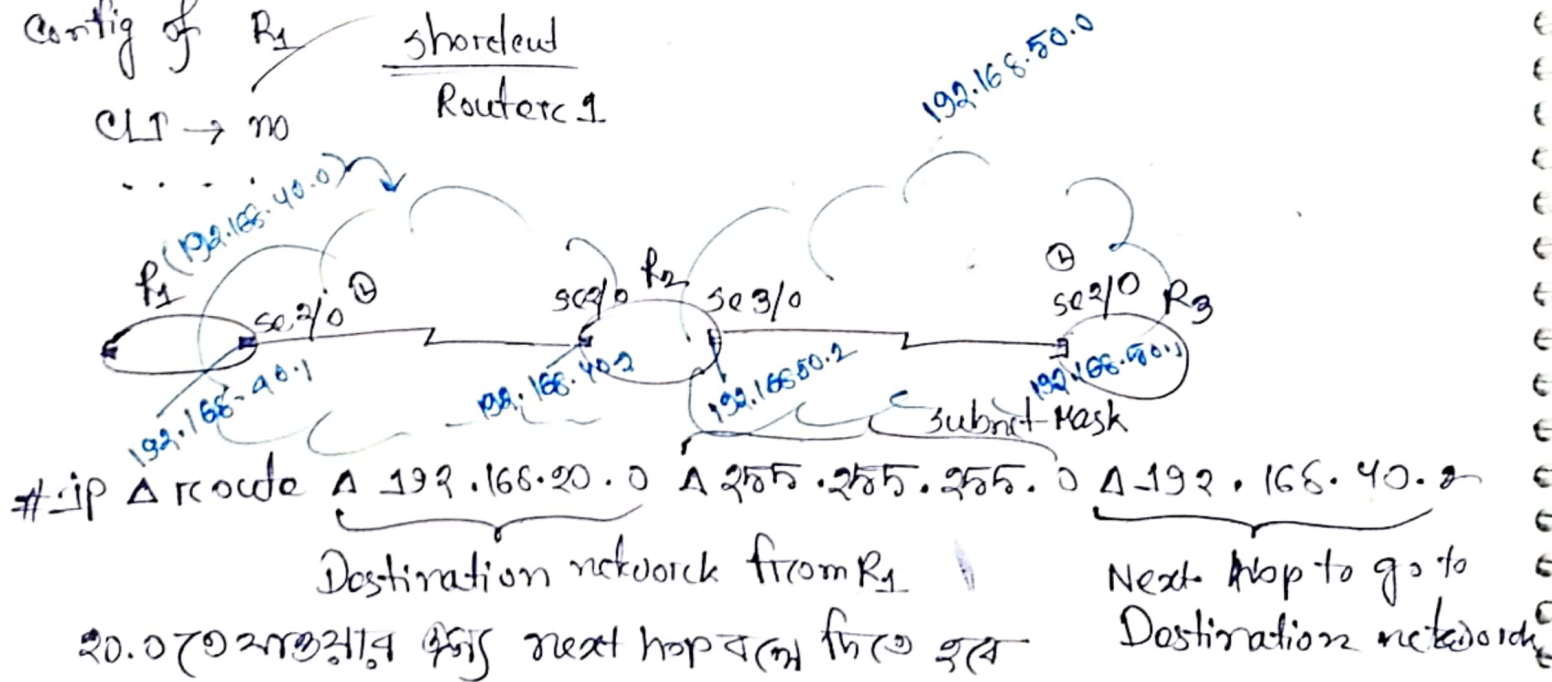
Router to Router — serial connection (much faster)
— different port&

switch এর সাথে Router — Ethernet

⊕ DCE : Data communication Equipment
DTE : Data Terminal Equipment

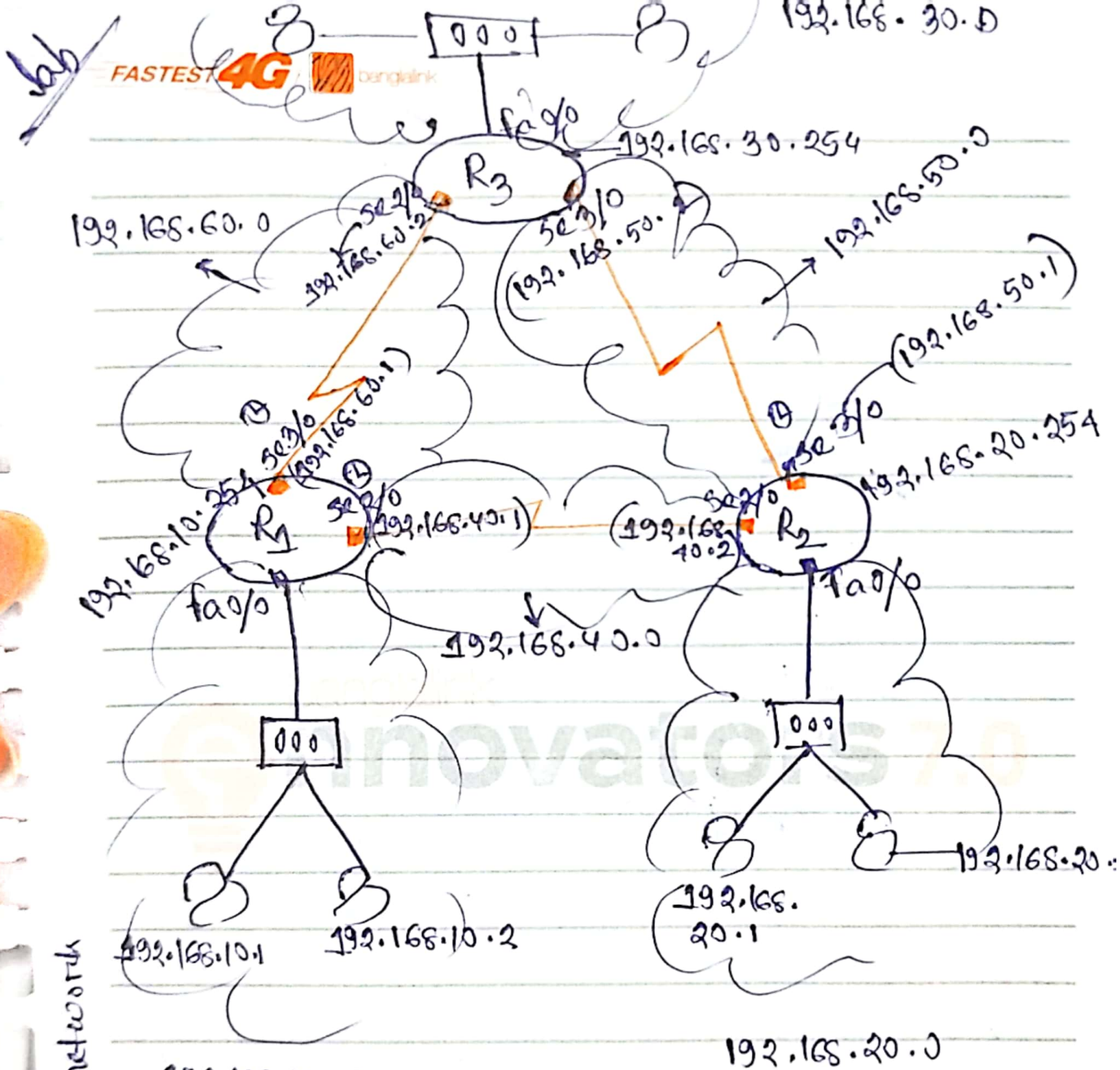Config of R_1 shortcut
                    Router 1
CLI → no

192.168.50.0

R_1 (192.165.40.0)
se 2/0 ⊕
192.168.40.1
se2/0 R_2 se 3/0
192.168.40.2   192.168.50.2
⊕
se2/0 R_3
192.168.50.1
Subnet Mask

#ip route △ 192.168.20.0 △ 255.255.255.0 △ 192.168.40.2

Destination network from R_1 Next hop to go to
                                       Destination network

20.0 তে যাওয়ার জন্য next hop কে দিতে হবে

lab

192.168.30.0

fe% 0 → 192.168.30.254

R3

192.168.60.0

se 2/0
192.168.60.2

se 3/0
(192.168.50.2)

192.168.50.0

→ 192.168.50.0
(192.168.50.1)

192.168.10.254   se 3/0
(192.168.60.1)

①

192.168.20.254

se 2/0
(192.168.20.1)

192.168.10.254 se 3/0
(192.168.60.1)

④ se 2/0
(192.168.40.1)

R1

①

se 2/0
(192.168.40.2)

R2

192.168.40.0

fa0/0

192.168.40.0

fa0/0

000

000

192.168.20.1

192.168.20 :

192.168.10.1   192.168.10.2

192.168.20.0

192.168.10.0

(dynamic) এটা network

Dynamic

Link-State Routing algo

OSPF (open shortest path first)
                    Process ID

#router △ OSPF △ 1

255.255.255.255
(-) 255.255.255.0 (subnet mask)
_____
0.0.0.255

wild card Mask IP

3/4টা.
ques   open book,
                        (notes নেয়া যাবে)
TTL কী?   Design
subnet mask?
straight through cable
straight?

→ real packet capture করে দেখা যায়
(Network protocol [Wire Shark] (sniffing tool) গাড়ি এর ভিতর
 analyzer)   কি কি আছে?

                                         (ARP = Address resolution
                    → packet's header   protocol)

                                         (Ethernet = 1460 Bytes)
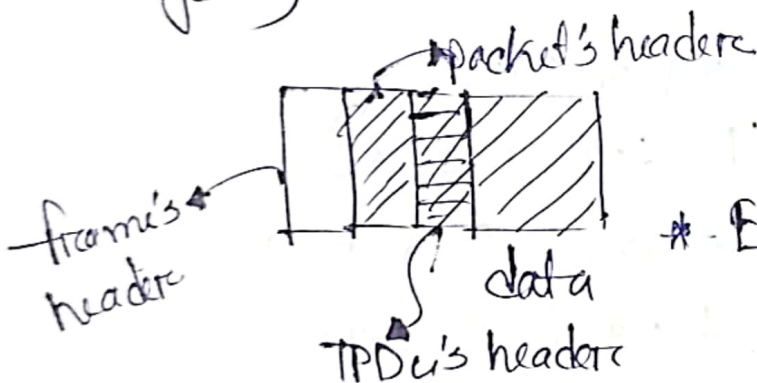
frame's   * Epoch time = second wise
header   data   specifically সময়ে

              TPDU's header

                            company   serial #
Ethernet II   01 - 00 - 5e - 00 - 00 - fb

                    48 Bits (MAC) — physical address

My PC (MAC) : 40-8D-5c-78-35-7c

My PC (IPV4): 193.168.15.52   My Gateway: 192.168.15.250
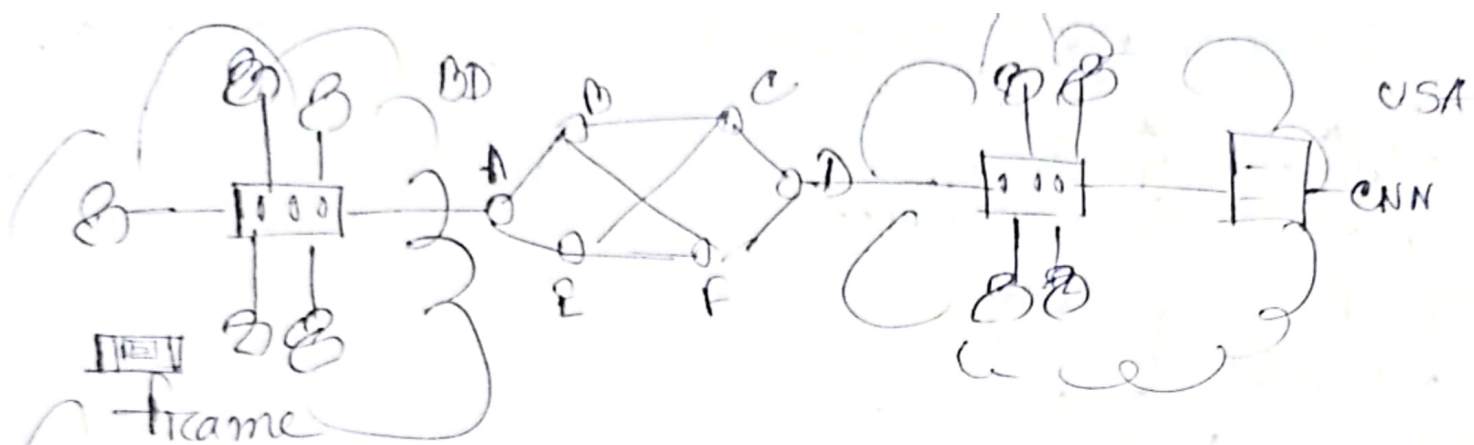
your PC (MAC): 1c-1B-0D-DD-5D-E6

your IP : 192.168.15.30

MAC address দিয়ে source to Dest
         communicate করে

frame

— packet header-এর শুধু MAC add দেওয়া আছে

— adjacent device এর সাথে error free communication পাঠানোর জন্য datalink layer-এ

— পরবর্তী device এ গেলে MAC এর পরিবর্তন (physical address)

— frame-এর MAC always change হবে কিন্তু

— packet " শুধুমাত্র Dest এর জন্য হবে

icmp = internet control massage protocol

$IPV4 = 45$ ⟶ [4 bit দিয়ে 20 byte যেহেতু তাই 8 bit দিয়ে ৫৫]

$IHL = 60 bytes$ ⟶ ৩২ এর জন্য ৫

Total length = 16 bit

frame = 74 bytes, packet = 60 bytes

identification =

DM = 0

MF = 0

fragment offset (16 byte) : 0

TTL : 128

protocol : ICMP(1)

header checksum

Source add : Maruf Mp
        192.168.15.50

dest : Maruf
        192.168.চ.52

$$00\ 3C ⟶ 12 \times 1 = 12$$
$$3 \times 16 ⟶ 60\ bytes$$
$$248$$