Lecture 18

22 October 2021 17:04

✓ Recap
- → Forwarding table (Longest prefix match)
- → Router architecture (Input port, output port, Switching types)
- → IP Header structure

✓ IPV4 addressing (Subnet etc, NAT)

✓ ICMP → Exchanging control signals b/w n/w devices

✓ IPV6 addressing

– Routing algorithms.

Recap

① 2^6 Longest prefix match.

IP Add.		o/p
100000	→	1

Prefix		O/P
100***	→	1

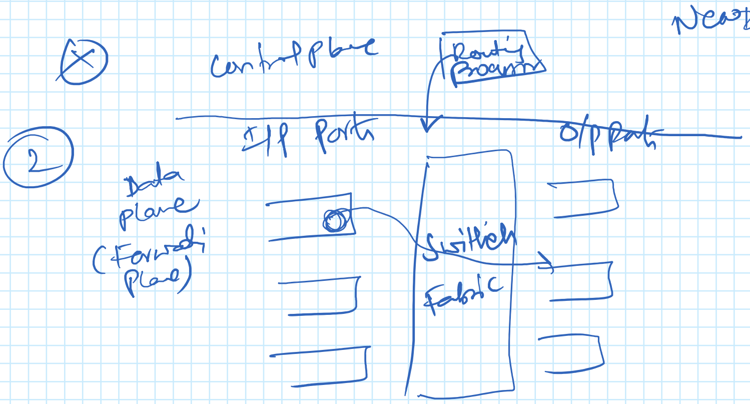
– variable size prefix
– overlapping prefixes

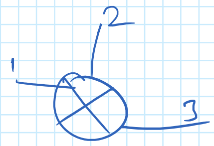
100***	→	1
1001**	→	2 ✓

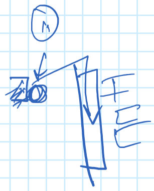
Nearest/ 100110

LPM.

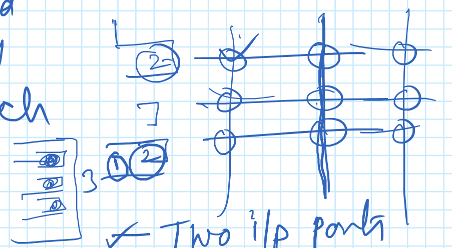
②







3 types of switching arch.
- ↳ Memory based
- → Common bus
- → Crossbar arch



✓ Two i/p ports can't transfer to same o/p port at a given time

– Head-of-line Blocking
↳ virtual output

↳ Blocking
virtual output queuing

— RED

③ IP Header

(i) TTL → Time-to-Live   (64)   10 → 9 → 8 → 0

(ii) Fragmentation   MTU

(iii) DNF = 1   ICMP → "too big"

IP ⊗ 1000 — Identifier
4000 — 1000, 1000, 1000, 1000 — Flag = 1/0
Offset → 0
1st → 1000
→ 2000

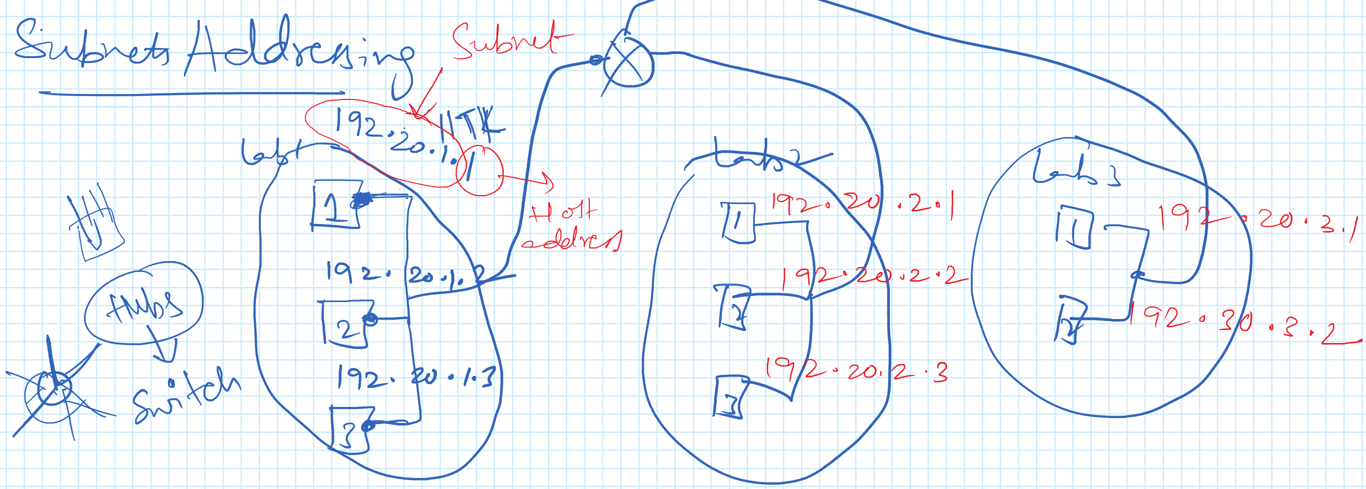
20 Bytes + optional header field

(iv) Length

(V) Src/Dest IP addr.

IP TCP
| 20 + 20 | appn |

Subnets Addressing



- Subnet → A set of n/w devices which are still connected if you remove routers.

- N/W Interface → Ethernet port
→ WiFi card
↳ Different I.P. Address for each interface

3 I.P Addresses

I.P. Address
/.

I.P. Address

↓

2 Components

- Subnet Address
- host address

10000000 10101000

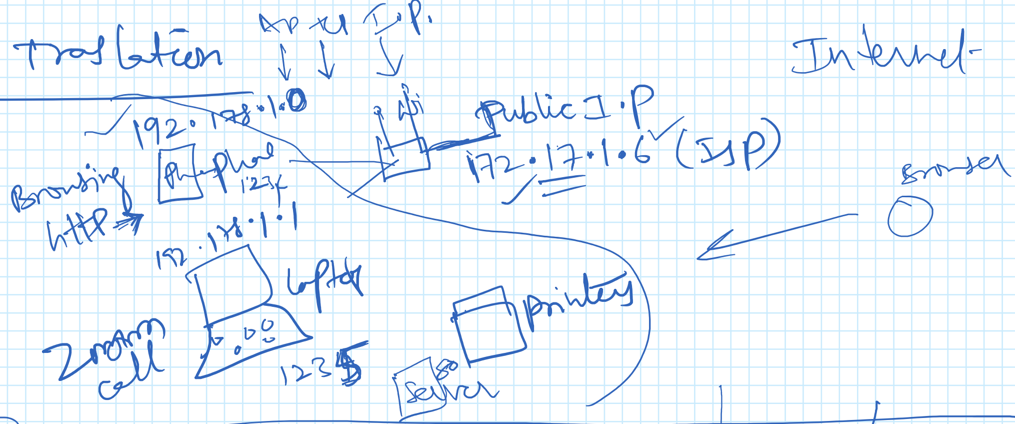
192.20.1.1 / 24

ISP → ICANN

172.17.0.0 / 16 ⇒ 2^{16}

org IIT LAN 172.17.1.0/24 ⇒ 2^{8}

N/w Address translation



NAT

Private (IP, port)	→	Public (IP, port)
(192.178.1.0, 1234)	→	(172.17.1.6, 0)
(192.178.1.1, 1234)	→	(172.17.1.6, 1)
(192.178.1.3), 80	→	(172.17.1.6, 1234)

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1. Static I/p
2. Dynamic (DHCP) server

256

DHCP application

Req. IP add

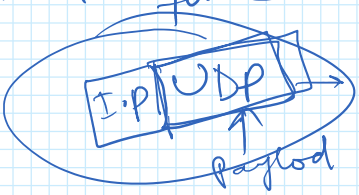
free

ICMP

API TCP

— Signalling/control information exchange

ICMP
↑
IP layer

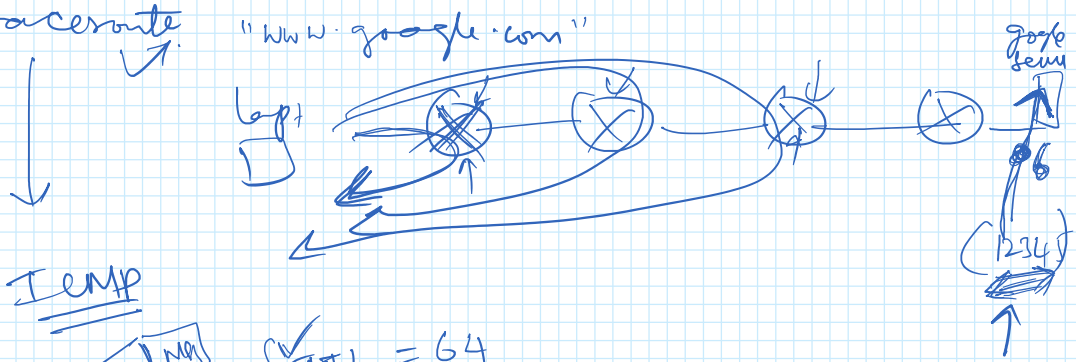


"Upper-layer Protocol"
UDP
IP

"Too big"
Type Code

— "Ping" uses ICMP

— Traceroute



ICMP

TTL = 64
= 1

UDP packet

ICMP

TTL = (1) (2) (3) (4) (5) ...

IPV6 addressing

— IPV4 — 32 bits ≃ 4 billion IP addresses

7 billion population

NAT ↓

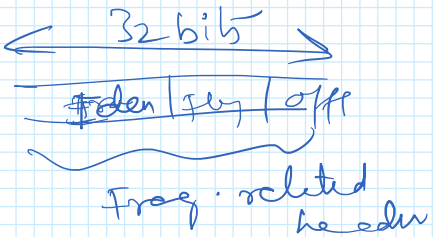
— IPV6 → 128 bit IP addrs.

2^{95} ip addrs / person.

Changes Compared to IPV4

1. - No Fragmentation is allowed
   - Maintain min 1280 byte of MTU
   - ✓ Path MTU discovery.

2. 20 bytes + optional fields
   40 byte length header.

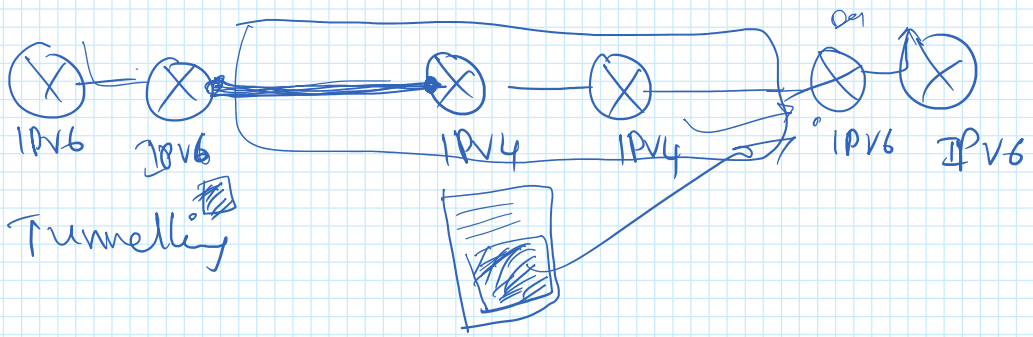


3. 16 byte Src I.P
   16 byte Dest I.P.

3. → version
   → "TTL" → "Hop Count"
   → "upper layer protocol" → "Next Header"
   → "Flow" → voice / data packets
   →

→ IPV4 → IPV6

- Co-exist



Routing algorithms → next class.