IP Addressing

MAC address (layer 2)

IP address (layer 3)

IPv4. 32 bits → 2^{32} → NAT Network Addr Translation (to reuse IP addresses)

IPv6: 128 bits

8 bits . 8 . 8 . 8

write as decimal

Ex: 255.255.255.255 → all 1's → reserved for broadcast

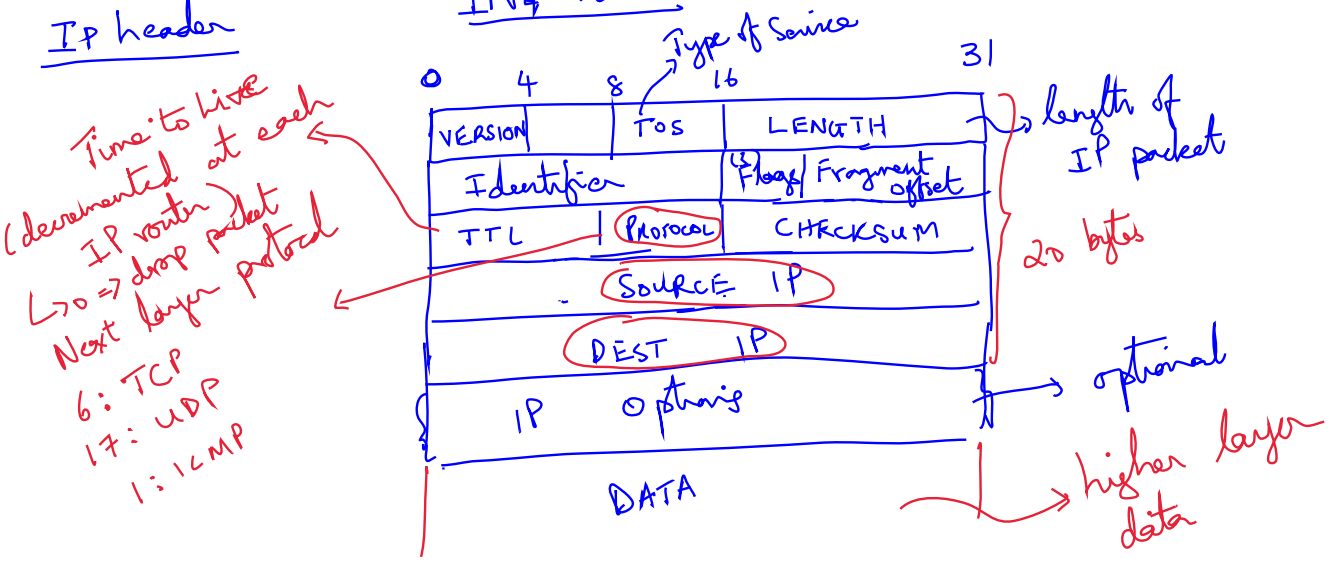
10. * . * . * → anything } private IP

192. * . * . *

public IP → should be unique in the internet → only one host must use that IP address

IP header

IPv4 header

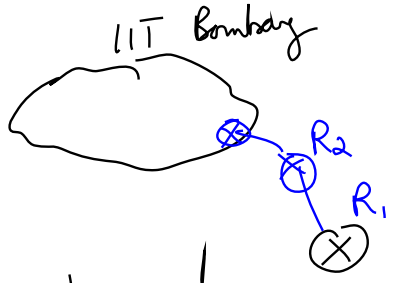


Routing table

Destination	Next hop
730.52.30.* (IP Prefix)	R_2

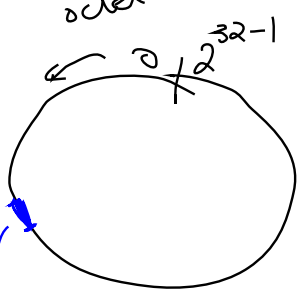
small in number

#IPv4 $\approx 2^{32}$



a.b.c.d

octet



730.52.30.* → vary from machine to machine

assign to IIT

prefix of all machines

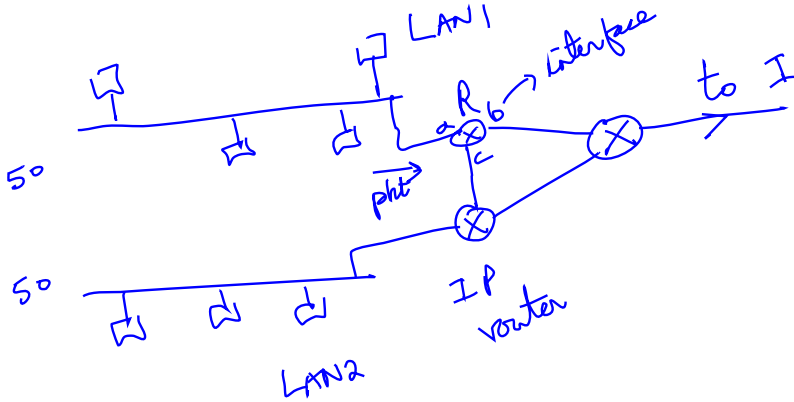
slice

Class A: 8 bits (Network common) | 24 bits (host) → $\approx 2^{24}$ hosts

B: 16 bits network | 16 bits host

C: 24 bits network | 8 bits

SUBNETTING: Given a slice of IP addresses how to divide among LANs, setup/config. internal router



class C: | 24 bits | 8 bits |

Ex. 730 . 52 . 30 .

(leading bit): indicate which LAN

0 ⇒ LAN1

1 ⇒ LAN2

SUBNET MASK: Says which bits in IP address to use to decide which LAN to route to

Ex 1111 . . . . 111 0000000

1st. 25 bits (1s), 7 bits (0s)

Subnet address: S_1 for LAN1 (M_1 is Mask)

S_2 for LAN2 (M_2 is mask for Lan2)

Router R: Suppose dest. IP is 'D' (pkt on interface 'a') [S_1 = 730.52.30.0]

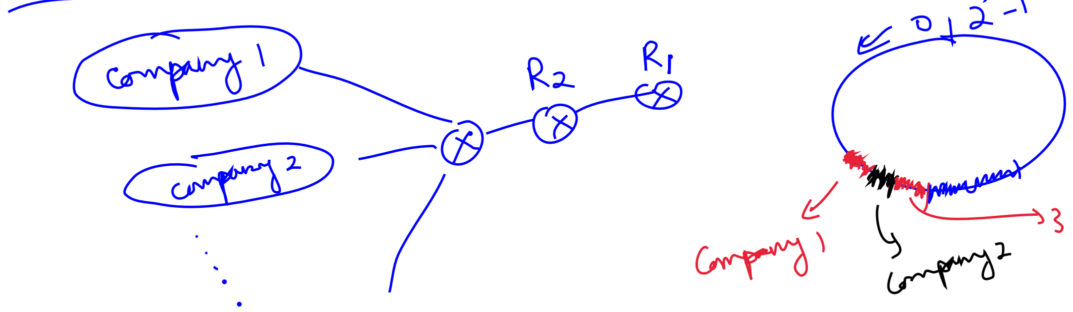
Is (D AND M_1) == S_1?

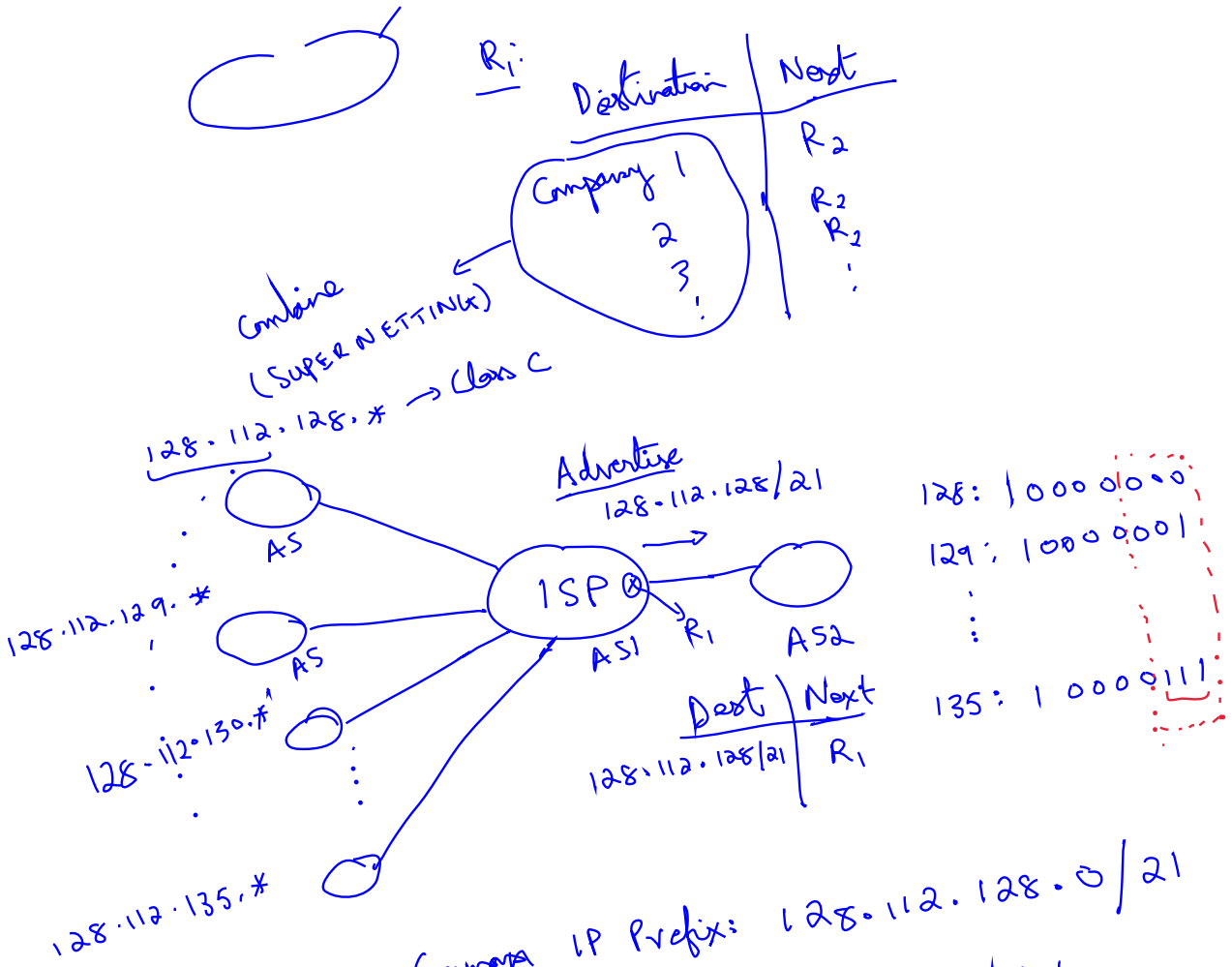
- YES → do nothing [Ex: $M_1 = M_2$]
- NO ↓

Is (D AND M_2) == S_2? [S_2 = 730.52.30.128] ← 1 in the leading bit

- YES → FWD To interface 'c'
- NO ↓

send to 'b'





Common IP Prefix: 128.112.128.0/21

a.b.c.d/N → consider N leading bits to get the IP prefix

If given dest. IP address 'D'

If first N bits of D match with the first N bits of a.b.c.d, the D belongs to that prefix

CIDR: Classless Inter Domain Routing

↳ specify any prefix length (N)