

CS348 Notes

IP Addressing

Video Numbers: 18

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I have prepared these notes by watching the videos from [Networks Playlist](#). The following notes may be asynchronous and irrelevant to what Prof. Vinay teaches in class (cuz I do not pay attention during lectures lol). Further, these notes might not cover *everything* as explained in the video lectures. Consider these to be a supplemental read :). If you find any errors, do notify me so they can be edited.

IP Addressing

MAC address @ layer 2 and IP address @ layer 3.

IPv4: 32 bits \approx 4 billion devices (less). IPv6 uses 128 bits.

4 [↓] 8 bit chunks. Write each chunk as a decimal no. Separate chunks with '.'. eg: 10.132.64.35.

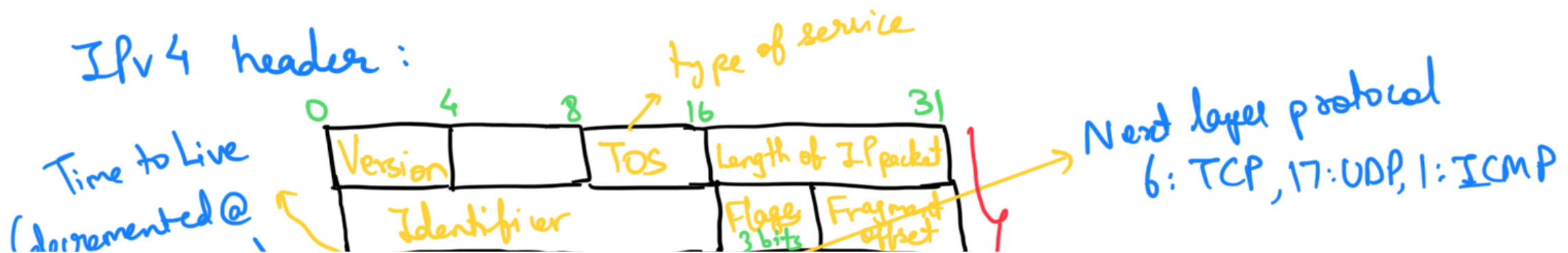
255.255.255.255 \Rightarrow reserved for broadcast.

10. * . * . * } private IP (* is the regex star).
192. * . * . *

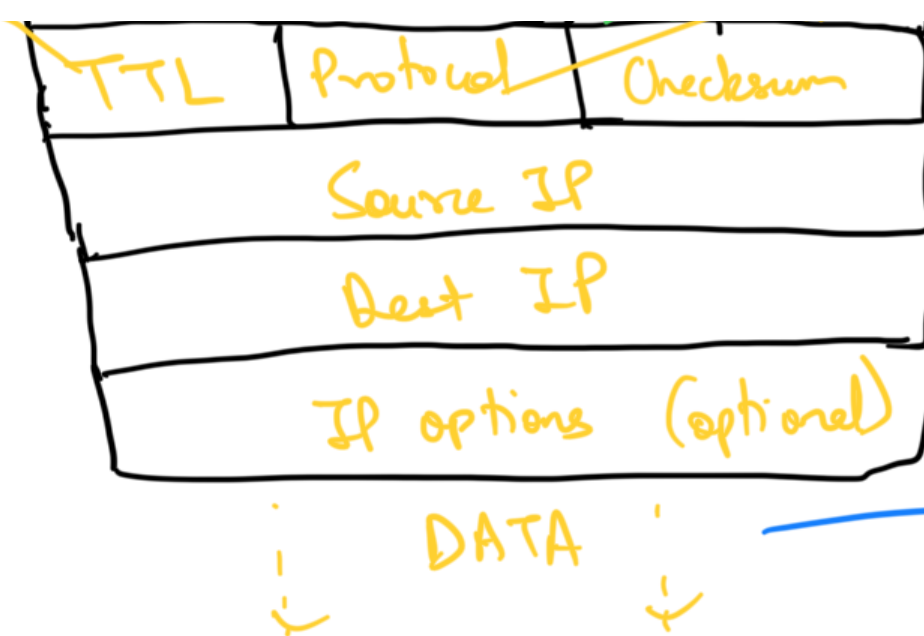
public IP should be unique in the internet & only one host must use it.

IP header:

IPv4 header:



each IP router)
If $TTL \leq 0$; discard packet



→ 20 byte header

→ higher layer data.

Routing Table:

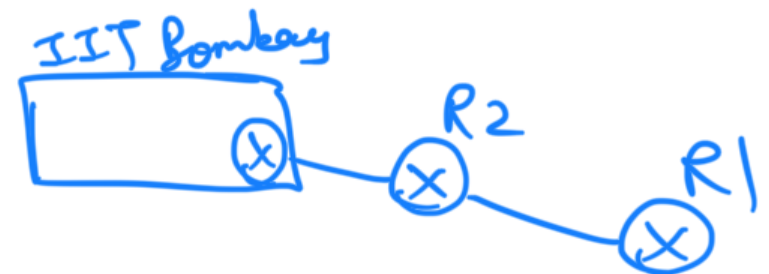
We don't want 2^{32} diff entries in the table.

Say we assign $730.52.30.*$ to IIT Bombay.

This means $730.52.30.$ will be the prefix for all machines @ IIT Bombay and the last chunk no. varies.

Thus:

Dest ⁿ	Next hop
$730.52.30.*$	R2



This reduces table size.

What should be the prefix size?? Divided into classes. Assign class acc. to network size.

Network (common)

host

No. of devices hosted

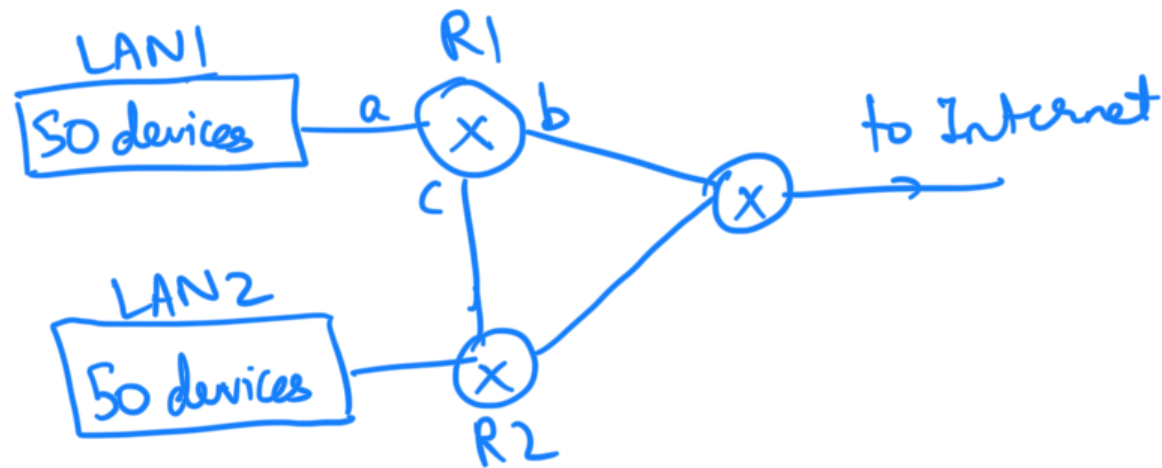
network size.

Class A :	8	24	2^{24}
Class B :	16	16	2^{16}
Class C :	24	8	2^8

Subnetting:

Given an IP address slice, how to divide among LANs, setup/configure internal routers??

eg:- R1 & R2 are routers. a, b, c are interfaces.



We will use class C here. ($2^8 = 256$ sufficient)

eg: 730.52.64. 8 bits

indicate which LAN.

0: LAN1

1: LAN2

Subnet Mask: tells us which bits in an IP address to use to decide which LAN to route to. eg: $\underbrace{1111...}_{25 \text{ bits}}$ $\underbrace{0000}_{7 \text{ bits}}$ means use first 25 bits.

M_1 for LAN1
 M_2 for LAN2

Subnet Address: S_1 for LAN1, S_2 for LAN2.

Note that $S_1 = 730.52.30.0$ \rightarrow 8 bits of zeros.

$S_2 = 730.52.30.128$ \rightarrow 1 in the leading bit

Questionable. Will have to confirm.

When Router R1 gets a packet & its dest IP address is 'D'. Let us say it receives the packet on interface A.

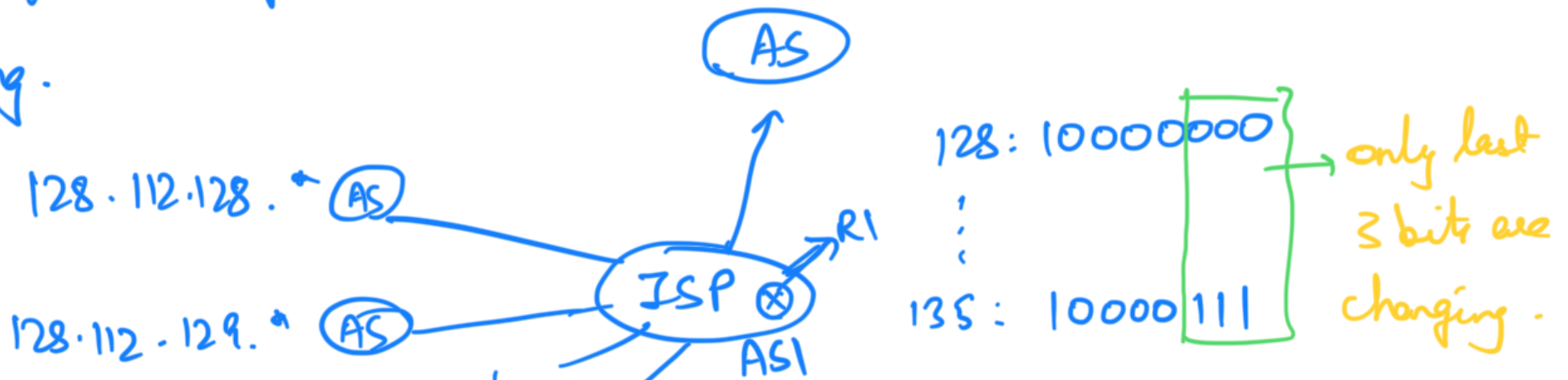
if $(D \text{ AND } M_1) == S_1$ $\xrightarrow{\text{YES}}$ do nothing
 $\xrightarrow{\text{NO}}$

if $(D \text{ AND } M_2) == S_2$ $\xrightarrow{\text{YES}}$ fwd to interface C.
 $\xrightarrow{\text{NO}}$ fwd to interface B

Supernetting:

It might happen that multiple consecutive chunks of IP addresses (of diff. companies) if combined together form a common prefix. This merge is called supernetting.

eg:-



If given dest. IP address is D;
and first N bits of D match with first N bits of a.b.c.d; the D belongs to that prefix.

CIDR: Classless Inter Domain Routing.

↳ specify any prefix length N.

∴ Dest. Next Hop

128.112.128.0/21 R1