

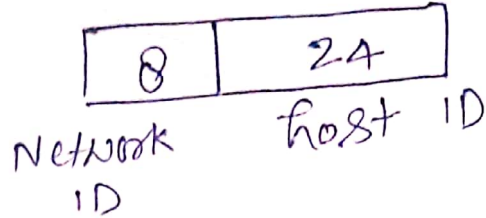
# IP V4 addressing :

→ Classful (A, B, C, D, E) , Classless (subnetting)

\* IP address is a 32 bit number.

Till 1980 - ~~Arpanet~~

max  $2^8 = 256$   
networks.



\* As there were only few n/w available in world.

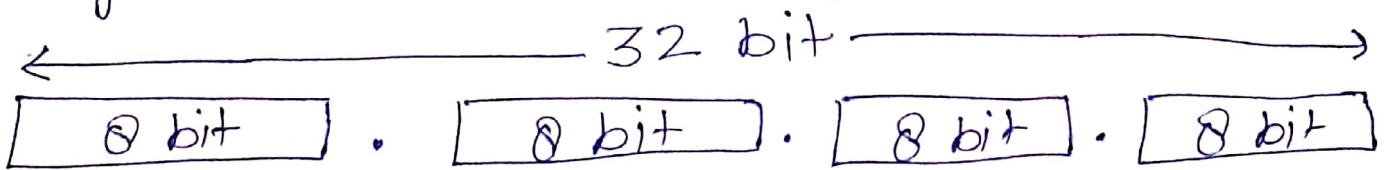
\* Arpanet ID → 10. x. x. x

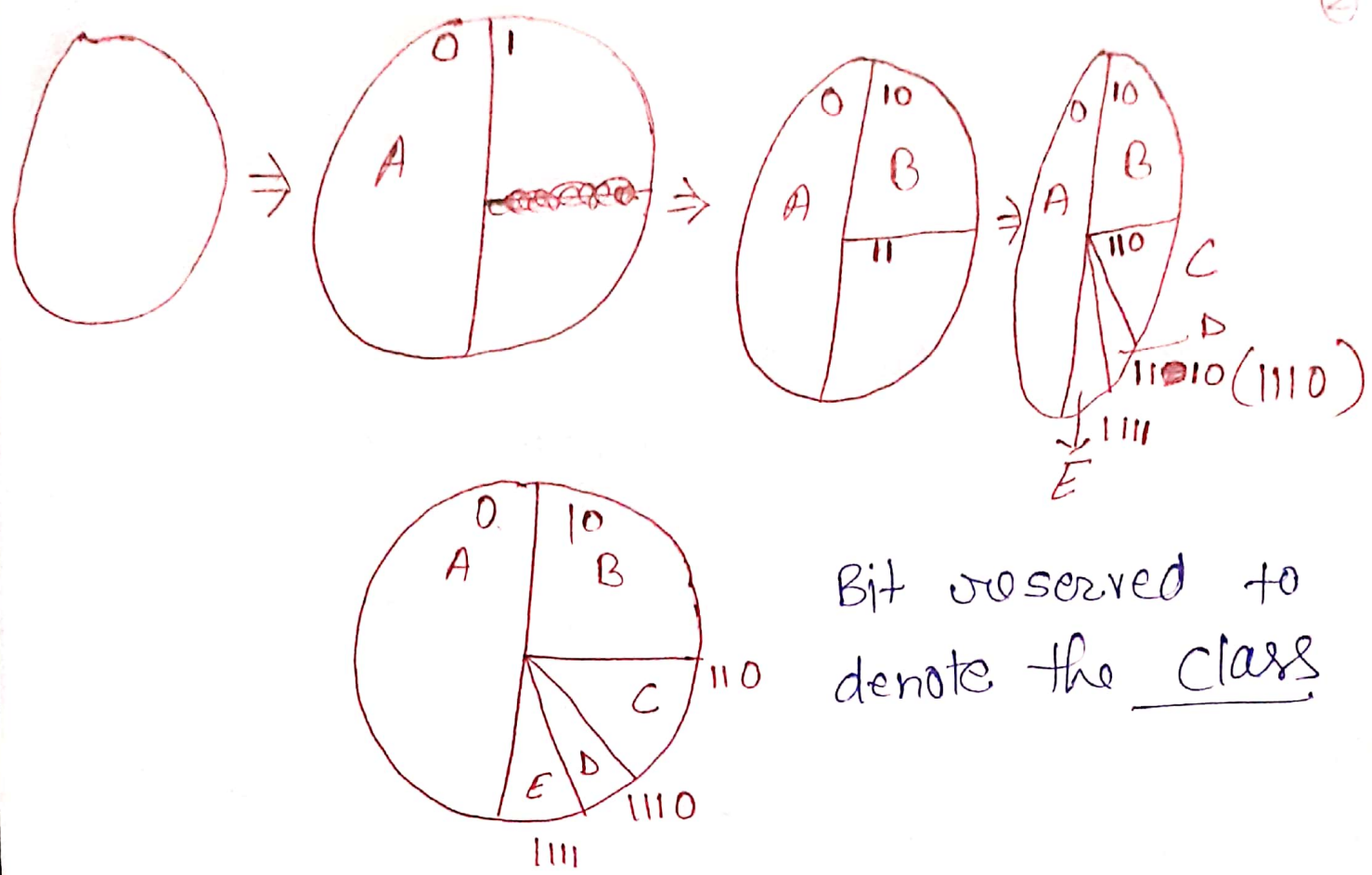
\* As internet becomes popular we need more IPs →

Thus in 1980 they divide in 5 classes.

→ We use A, B, C only ~~more~~ in common use

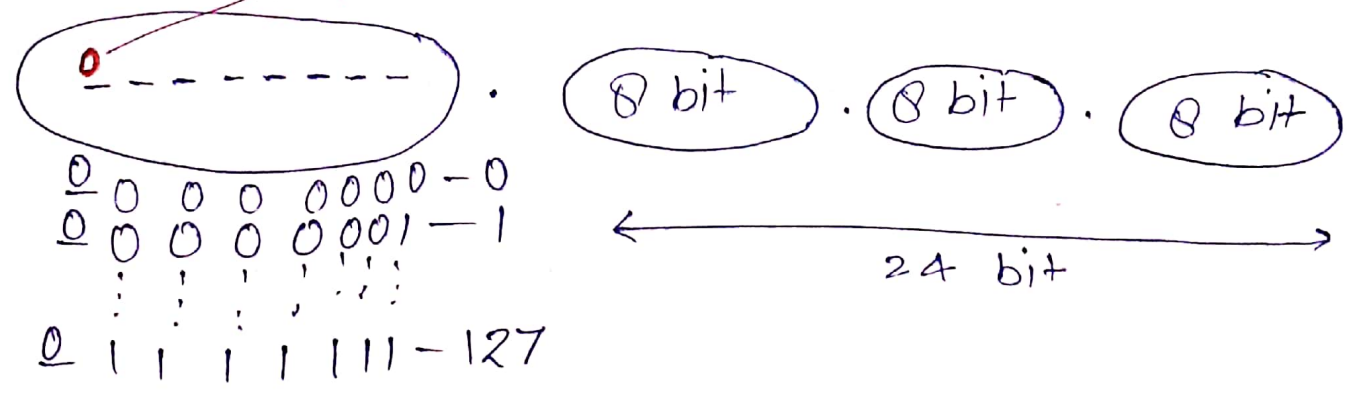
→ D for multicasting & E for research & defence





Bit reserved to denote the class

Class A :- Fixed to denote class A



⇒ Total IP address in Class A →  $2^{32-1} = 2^{31}$

⇒ Total NO of N/W in class A →  $2^7 = 128$

total no. of valid N/W in class A →  $2^7 - 2 = 126$

- 1<sup>st</sup> address → 0.0.0.0 → internet add.

Last add → 127.0.0.1 → loop back address

Total valid IP address  $\rightarrow 1. x. x. x$   
 $\Downarrow$   
 $126. x. x. x$

(3)

Total no of host in each N/W =  $2^{32-8} = 2^{24}$  IP

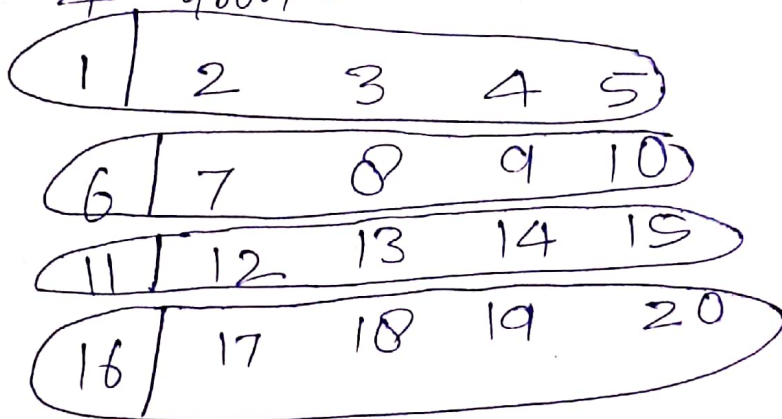
$x. 0. 0. 0 \rightarrow x. 255. 255. 255$

8 | 24

Total valid NO. of host in each N/W  $\rightarrow$

- 
- 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,  
 11, 12, 13, 14, 15, 16, 17, 18, 19, 20

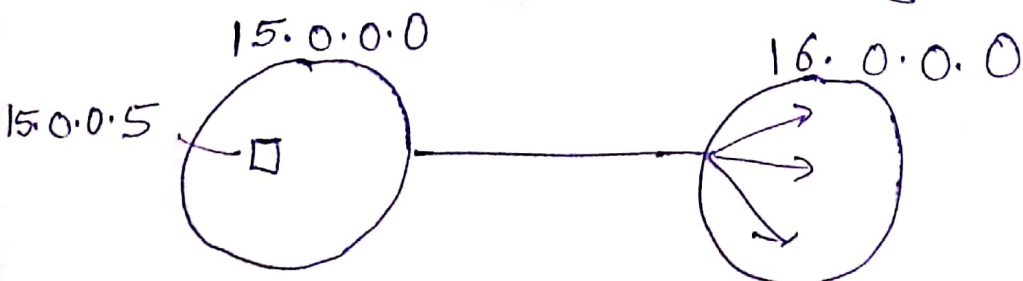
Let's say we have to arrange these 20 numbers in 4 groups



Now to identify these groups we need a number for.

Thus, 1, 6, 11, 16 can be used to identify the groups. Hence can not be used as set element.

Broad casting  $\rightarrow$  Limited (within the network)  
 $\rightarrow$  Directed (in another network)



SA	DA
15.0.0.5	16.255.255.255

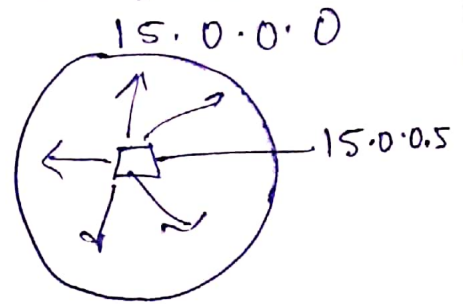
\* Hence last address is useful for broadcasting

⇒ Total useful address in a N/W →  
 $2^{24} - 2$  (Network add & broadcast add.)

Ex →  $15.0.0.0$  ⇒  $15.0.0.1$   
 $\downarrow$  ⇒  $\downarrow$   
 $15.255.255.255$  ⇒  $15.255.255.254$   
 Total host IP ⇒ Total valid IP

\* the IP address for limited broadcasting is

Default Subnet mask →  $255.255.255.255$   
 $255.0.0.0$



Class B

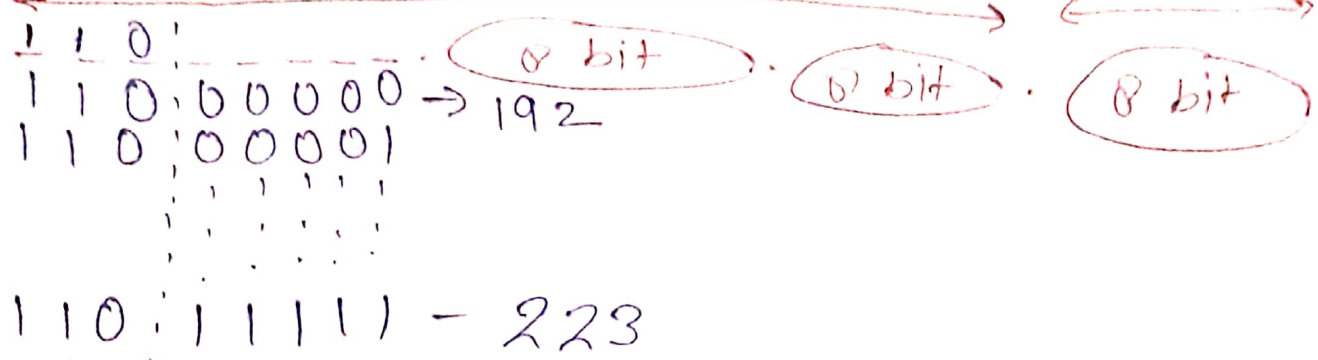
$\frac{1}{1} \frac{0}{0}$  ..... 8 bit ..... 8 bit  
 $\frac{1}{1} \frac{0}{0} 000000 \rightarrow 128$   
 $\frac{1}{1} \frac{0}{0} 000000$   
 $\frac{1}{1} \frac{0}{0} 111111 \rightarrow 191$   
 $2^{14} = 16384$

Network ID Range →  $128.0.0.0$   
 $\downarrow$   
 $191.255.0.0$

host in each N/W →  $\frac{2^{16} - 2}{}$

Default subnet mask  $255.255.0.0$

### Class C :-



Total IP address in Class C =  $2^{32-3} = 2^{29}$

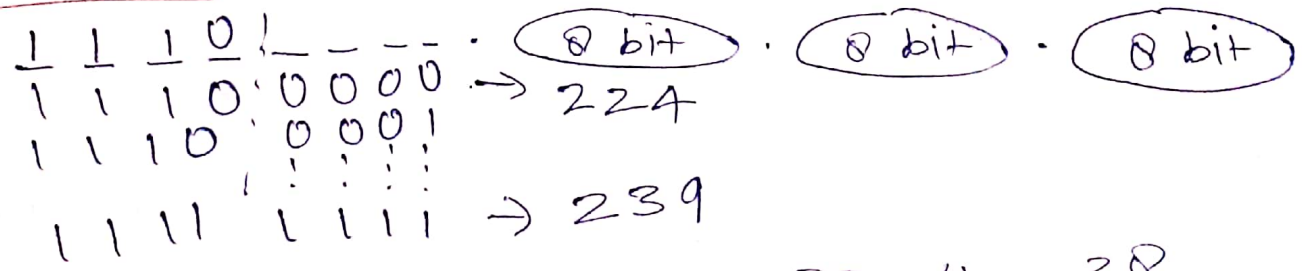
Total N/w address  $\rightarrow 2^{24-3} = 2^{21}$

Network Range  $\rightarrow 192.0.0.0$  to  $223.255.255.0$

Usable Host in each N/w  $\rightarrow 2^8 - 2 = 254$  Host

Default subnet mask  $255.255.255.0$

### Class D :-

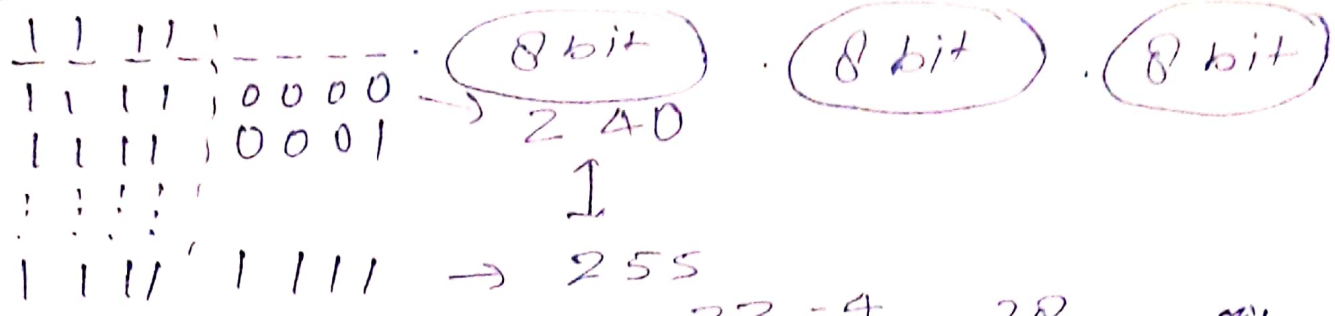


Total IP add in class D  $\rightarrow 2^{32-4} = 2^{28}$

N/w addresses  $\rightarrow 224$  to  $239.255.255.255$

\* NO Host  $\rightarrow$  whole IP range is reserved for Research multicasting  $\leftarrow$  Group Email.

# Class E :-



e: Total IP in class E  $2^{32-4} = 2^{28}$

- \* NO host ID.
- \* All are reserved for Research & military use.

\* Classful addressing is good at beginning  
 \* huge waste of IP in now days.

Q => Let a given IP address - 201.20.30.40  
 subnet mask - 255.255.255.0

Now the network ID - 201.20.30.0  
 5<sup>th</sup> host ID  $\rightarrow 201.20.30.5$   
 1<sup>st</sup> host ID  $\rightarrow 201.20.30.1$   
 last host ID  $\rightarrow 201.20.30.254$

=> for network ID  $\rightarrow$  DO AND OP in IP & subnet

201.20.30.40	201.20.30.1
255.255.255.0	2
	3
	4
	5

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201.20.30.0

Broad cast ID  $\rightarrow 201.20.30.255$