



# Computer Science & IT

## COMPUTER NETWORKS (CN)

IP address Subnetting Supernetting

Lecture No. 10



By- Ravindra Sir

# Recap of Previous Lecture



Topic

IP add

Topic

Topic



# Topics to be Covered



Topic

IP add

Topic

Topic



## Extra Ordinary Individuals: Stories to Ignite Student Motivation


Dr. Anitha Krishnan joined ISRO after her M.Tech at IIT Madras, driven by a passion for satellite engineering. Despite limited computing power, she refined orbital dynamics simulations nightly, mentoring junior engineers to spot subtle anomalies. When unexpected data errors threatened mission timelines, she convened targeted review workshops, turning problems into breakthroughs. Her optimized models enhanced the accuracy of India's remote sensing satellites.

Lesson: Guiding teams through learning and analysis turns obstacles into precise achievements.





## Extra Ordinary Individuals: Stories to Ignite Student Motivation

The ISRO logo is located on the left side of the slide. It features a stylized orange and blue arrow pointing upwards and to the right, with the word 'इसरो' in orange and 'ISRO' in blue below it.

Dr. K. Suresh Kumar started at ISRO fascinated by launch-vehicle design. Faced with scarce test facilities at IIT Bombay, he led rapid prototyping marathons in makeshift labs. When aerodynamic instabilities emerged during wind-tunnel trials, he organized cross-discipline sprints, combining materials science and fluid mechanics expertise. His persistence yielded a lighter, more stable booster stage, lowering mission costs dramatically.

Lesson: Cross-disciplinary collaboration under resource constraints can propel breakthrough innovations.



## Extra Ordinary Individuals: Stories to Ignite Student Motivation



**Dr. Priya Menon** : As one of DRDO's first M.Tech graduates from IIT Delhi, tackled ruggedized electronics for battlefield communications. When prototypes failed under extreme heat, she instituted high-temperature endurance tests alongside seasoned technicians. Nightlong debug sessions revealed a subtle solder-joint flaw. Her swift redesign saved months of delays and ensured secure voice links for frontline units.

**Lesson:** Rigorous field testing paired with hands-on troubleshooting transforms fragile systems into dependable assets.



## Extra Ordinary Individuals: Stories to Ignite Student Motivation



**Samir V. Kulkarni** joined DRDO after earning his Ph.D. from IIT Bombay, driven to miniaturize radar electronics. Confronted with component shortages during sanctions, he reverse-engineered high-frequency modules in his home garage, then scaled them in lab-level runs. His mentor-mentee model accelerated training for new engineers. The result: India's first indigenously built compact radar, now deployed in remote border posts.

**Lesson:** Creative reverse engineering and mentorship can convert embargoes into opportunities for self-reliance.



classful X



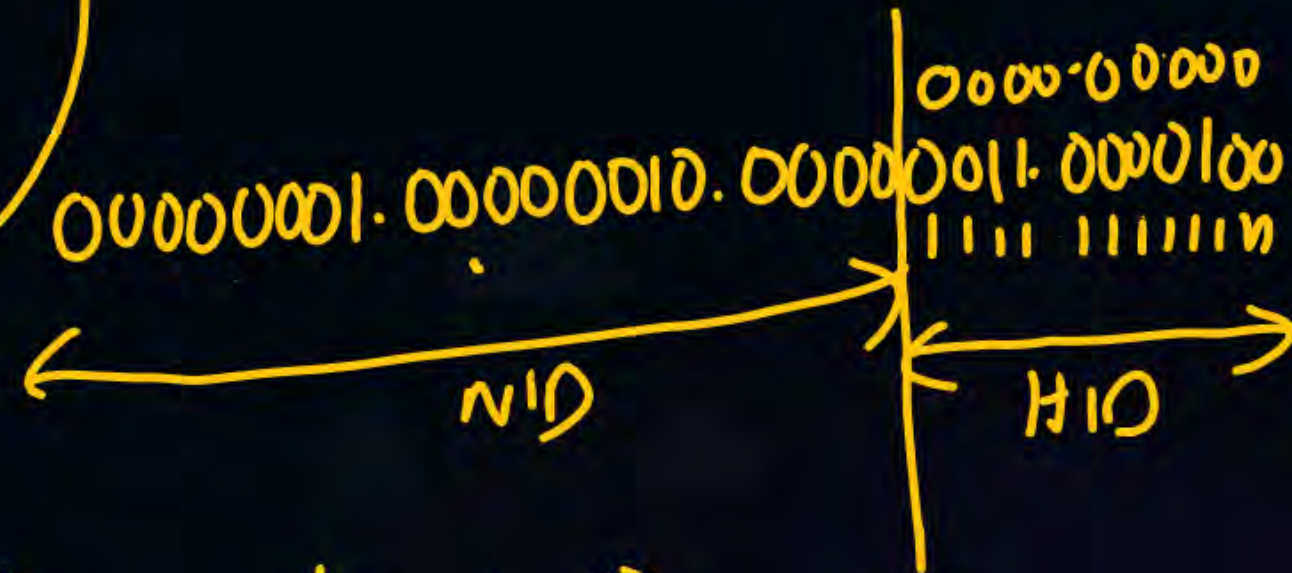
300

classless CIDR



- 1) conti
- 2)  $2^n$
- 3) I divide by  $2^n$

1.2.3.4 / 20 <sup>↑</sup>  $2^n$  ✓



12.0.0

1.2.15.255



# FLSM in CIDR

Fixed length Subnet marking

1. 2. 3. 4 / 20 → block

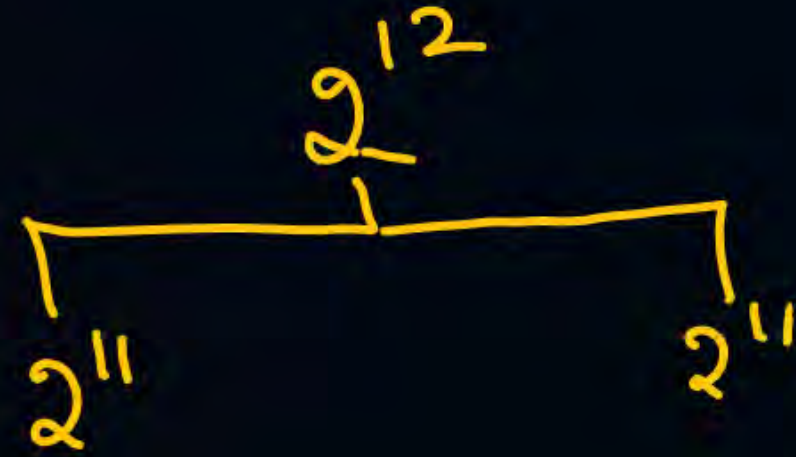
Size of block

$$BID = 20$$

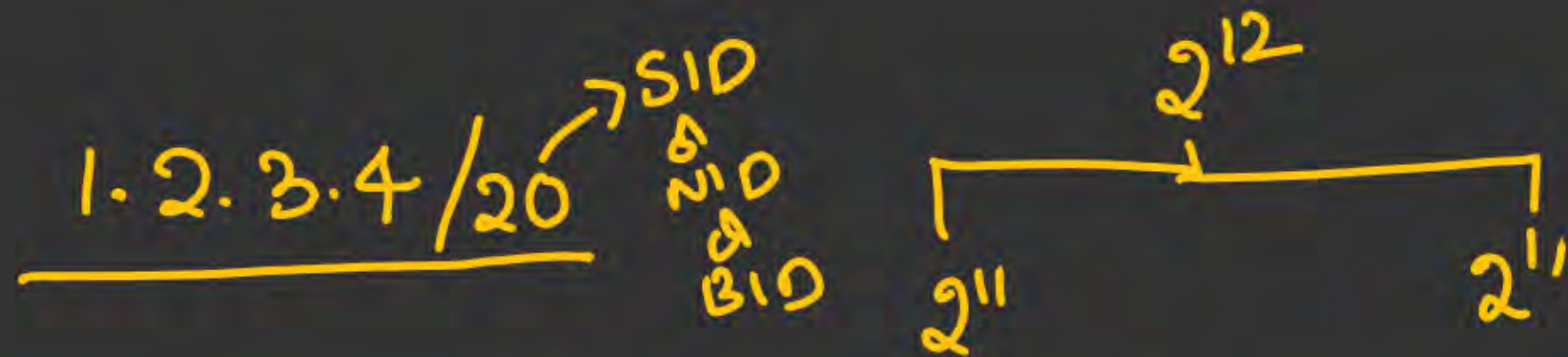
$$BID + HIO = 32$$

$$HIO = 12$$

$$\text{Size of the n/w} = 2^{12} \text{ ip addrs}$$







<u>00000001.00000010.0000</u>	<u>0011.00000100</u>	—	<u>1.2.3.0</u>	}
NID $\Delta$ HID $\Delta$ BID	<u>0000.00000000</u>			
1111.11111111	— <u>1.2.15.255</u>			



1.2.3.4/20  $\rightarrow$  NO  
BID  
SID

$$\begin{aligned} \text{NID} + \text{HID} &= 32 \\ 20 + \text{HID} &= 32 \\ \text{HID} &= 12 \end{aligned}$$

$$2^{12}$$

$$\begin{aligned} \text{HID} + \text{NID} &= 32 \\ 11 + \text{NID} &= 32 \\ \text{NID} &= 21 \end{aligned}$$

$$\begin{aligned} &2^{12} \\ &\swarrow \quad \searrow \\ &2^{11} \quad 2^{11} \end{aligned}$$

$$\begin{aligned} &2^{12} \\ &\swarrow \quad \searrow \\ &2^{11} \quad 2^{11} \end{aligned}$$

00000001.00000010.00000011.00000000 — 1.2.0.0  
SID & NID & BID  
0000.00000000 — 1.2.15.255

NID & BID & SID  
00000001.00000010.00000011.00000000 — 1.2.0.0  
2<sup>11</sup> 2<sup>11</sup>

1.2.0.0/21  
1.2.7.255/21

Subnets  
↓  
Borrow  
↓  
HID

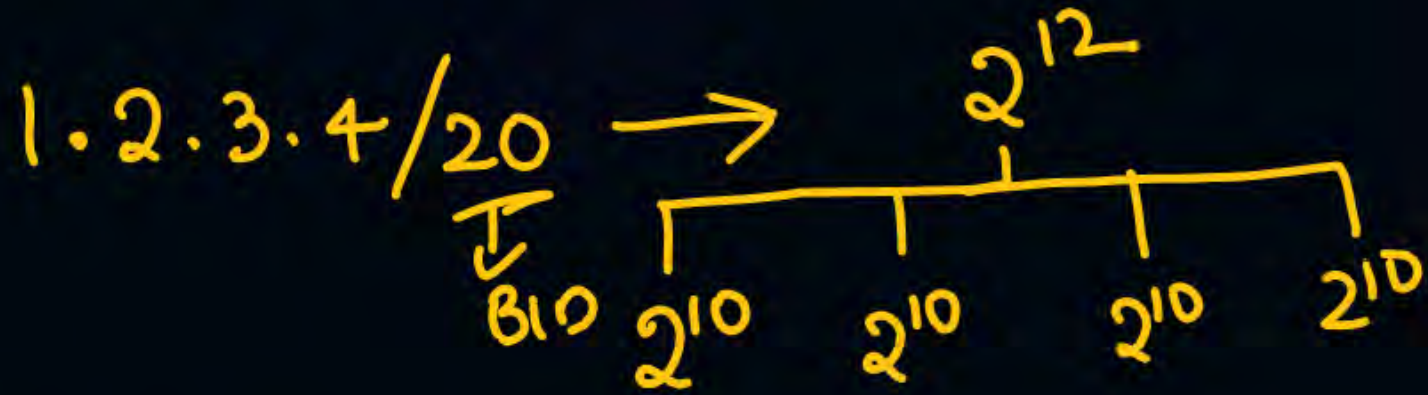
1.2.0.0/21  
1.2.8.0/21  
1.2.15.255/21

00000001.00000010.00000011.00000000  
HID  
0000.00000000  
0 1









1.2.0000 0011.00000100

B10

$2^3 2^2 2^1 2^0$  N10

0000.000000000 - 1.2.0.0/22

01✓

10✓

11✓

1111.11111111

1.2.12.0/22

a) Need one more example

b) Handover

N10  
IN/4

1.2.0.0/22

1.2.4.0/22

1.2.3.255/22

1.2.7.255/22

1.2.8.0/22

1.2.12.0/22

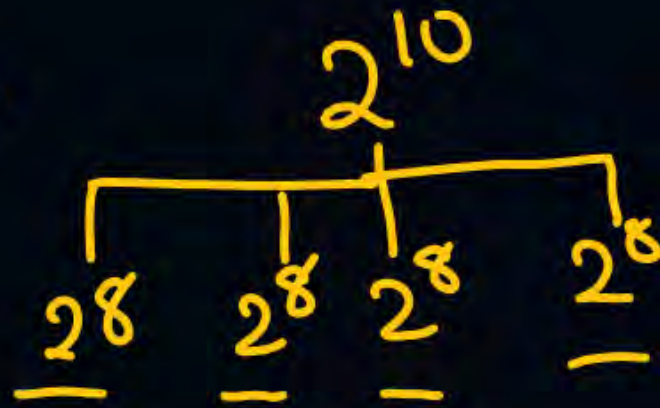
1.2.11.255/22

1.2.15.255/22



3min

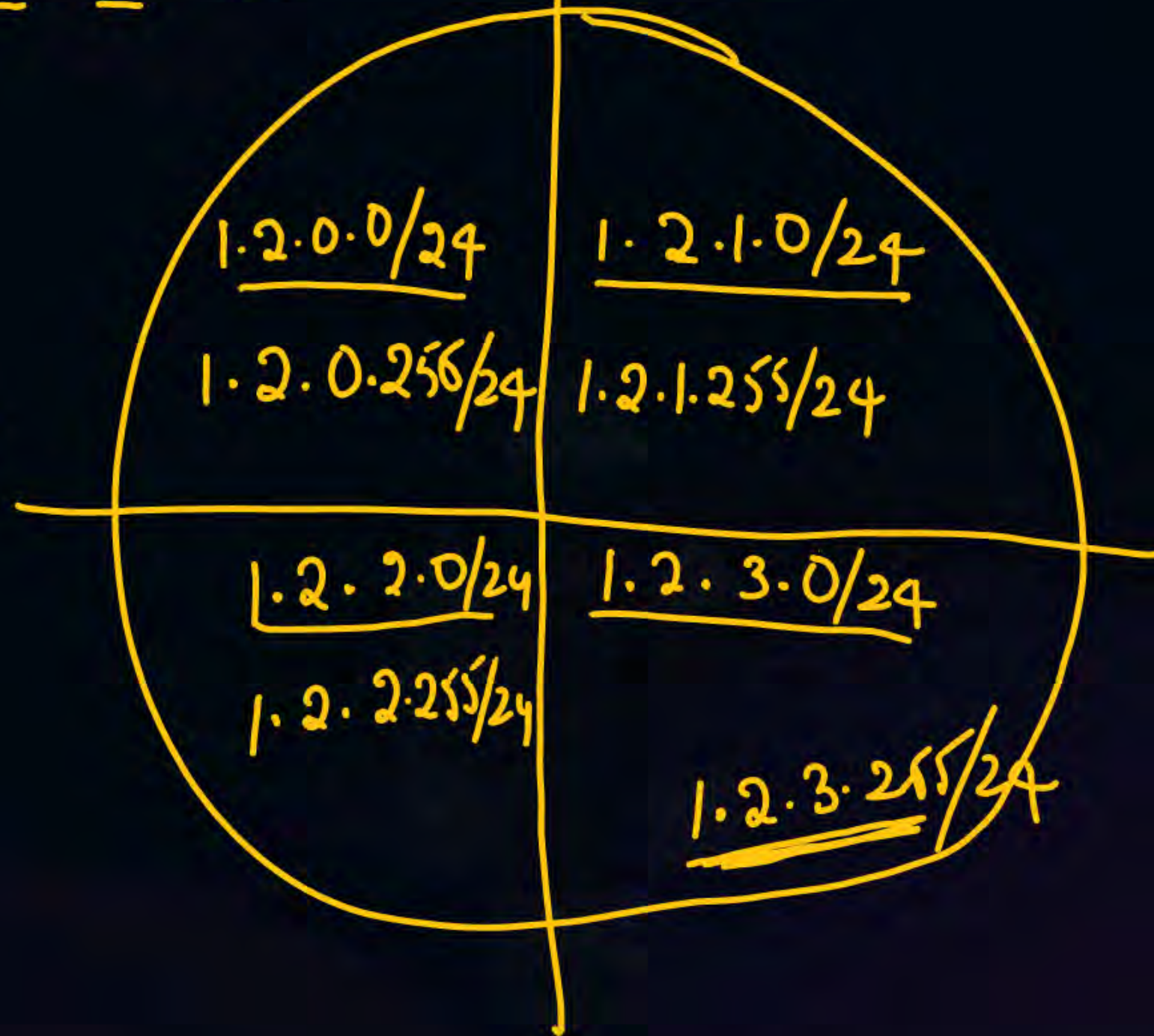
$$1.2.3.4 / 22 \rightarrow 2^{10}$$



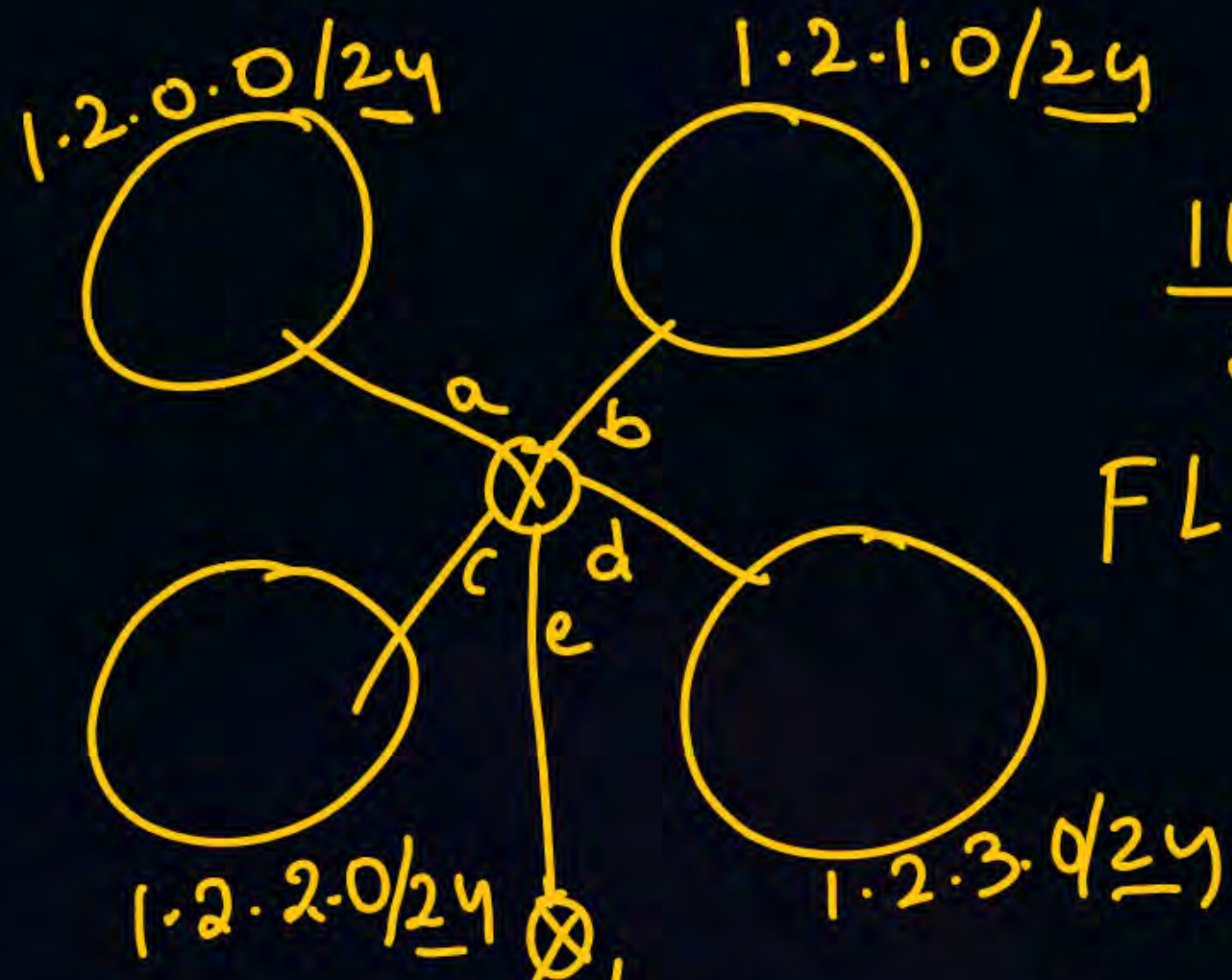
a) 3min Gek  
b) Handwork

$$\begin{array}{r}
 \boxed{1.2.000000} \quad 1.00000100 \\
 00.00000000 - 1.2.0.0 \\
 \vdots \\
 11.11111111 - 1.2.3.255
 \end{array}$$

$$\begin{array}{r}
 \boxed{1.2.000000} \quad \begin{array}{l} 2^1 \quad 2^0 \quad 6- \\ 00-0 \\ 01-1 \\ 10-2 \\ 11-3 \end{array} \quad \text{-----} \\
 \text{NID}
 \end{array}$$



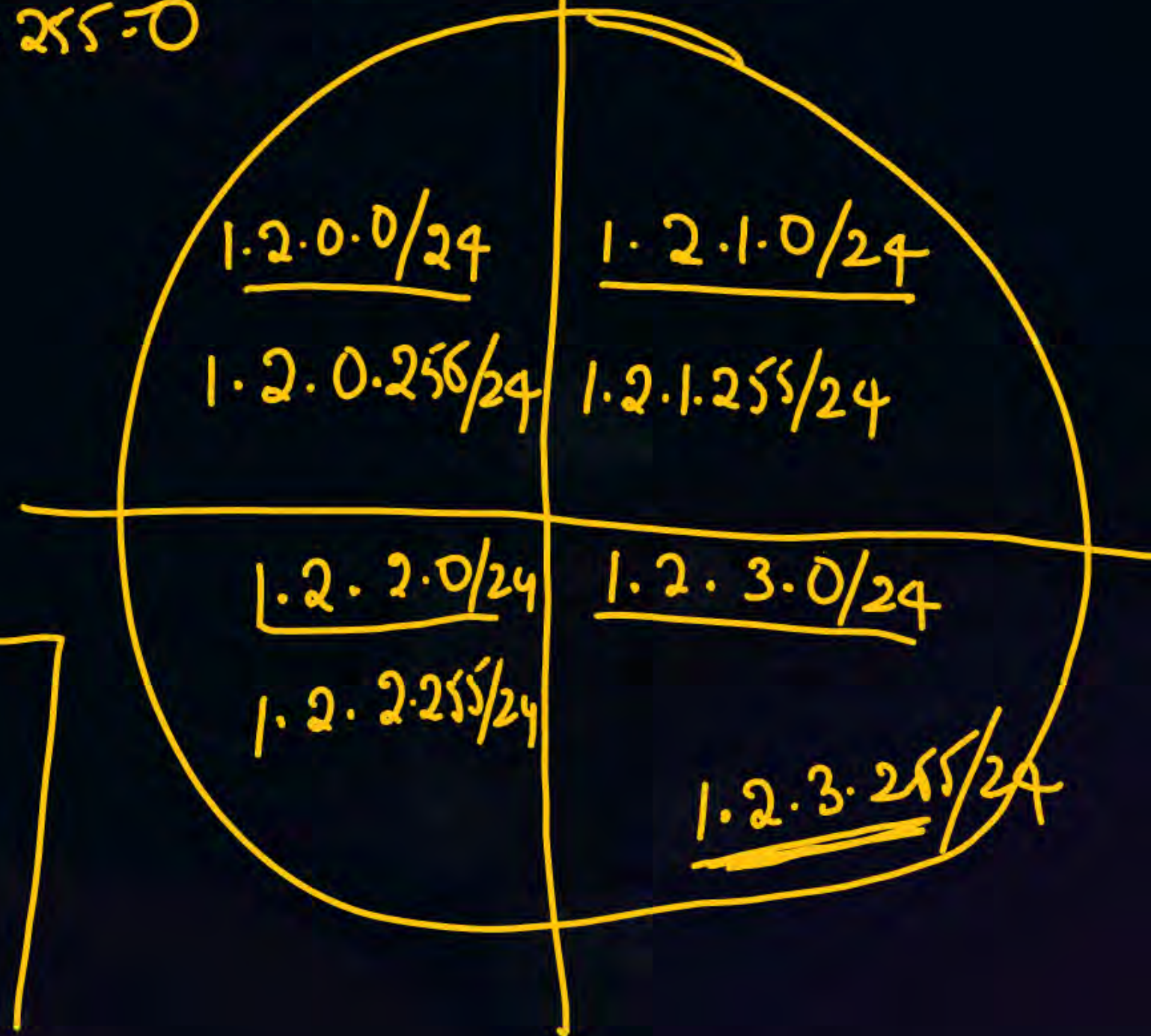




$\frac{11111111.11111111.11111111.00000000}{255.255.255.0}$

FLSM

a) 3 min Work Handover



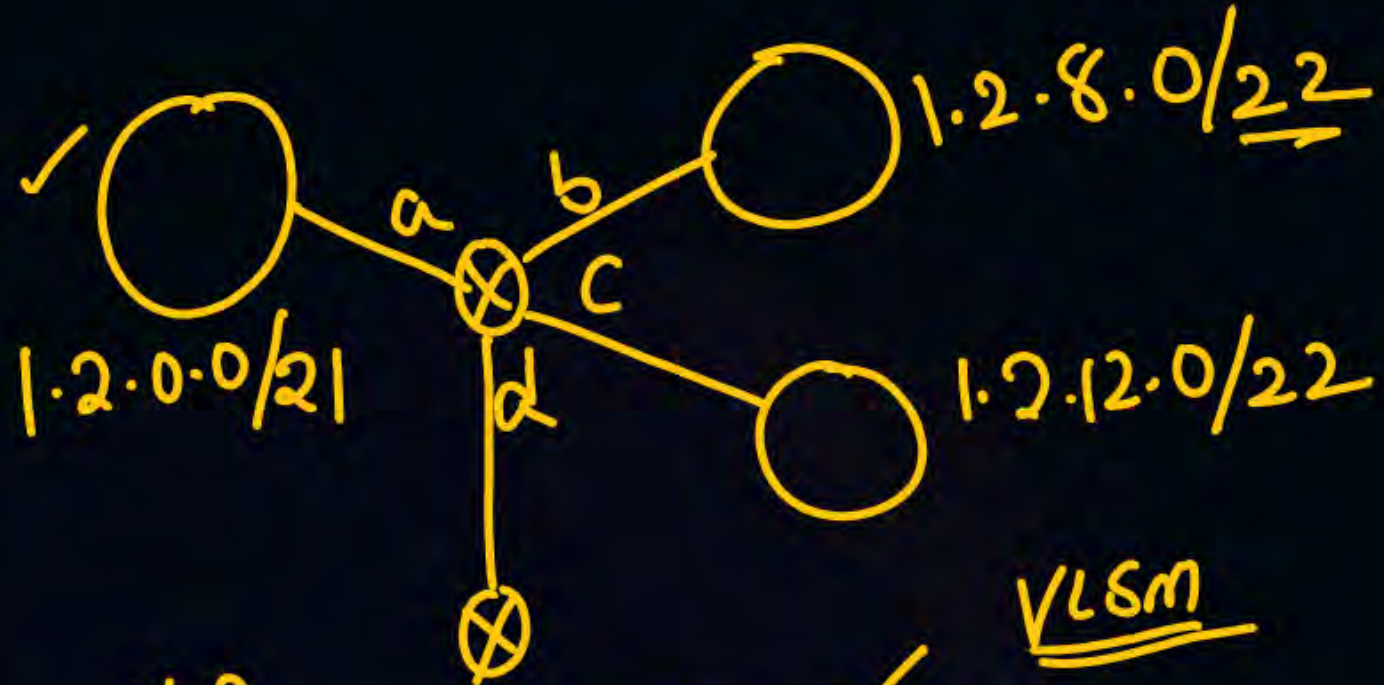
NID	SM	Interface
1.2.0.0	255.255.255.0	a
1.2.1.0	255.255.255.0	b
1.2.2.0	255.255.255.0	c
1.2.3.0	255.255.255.0	d
0.0.0.0	0.0.0.0	e



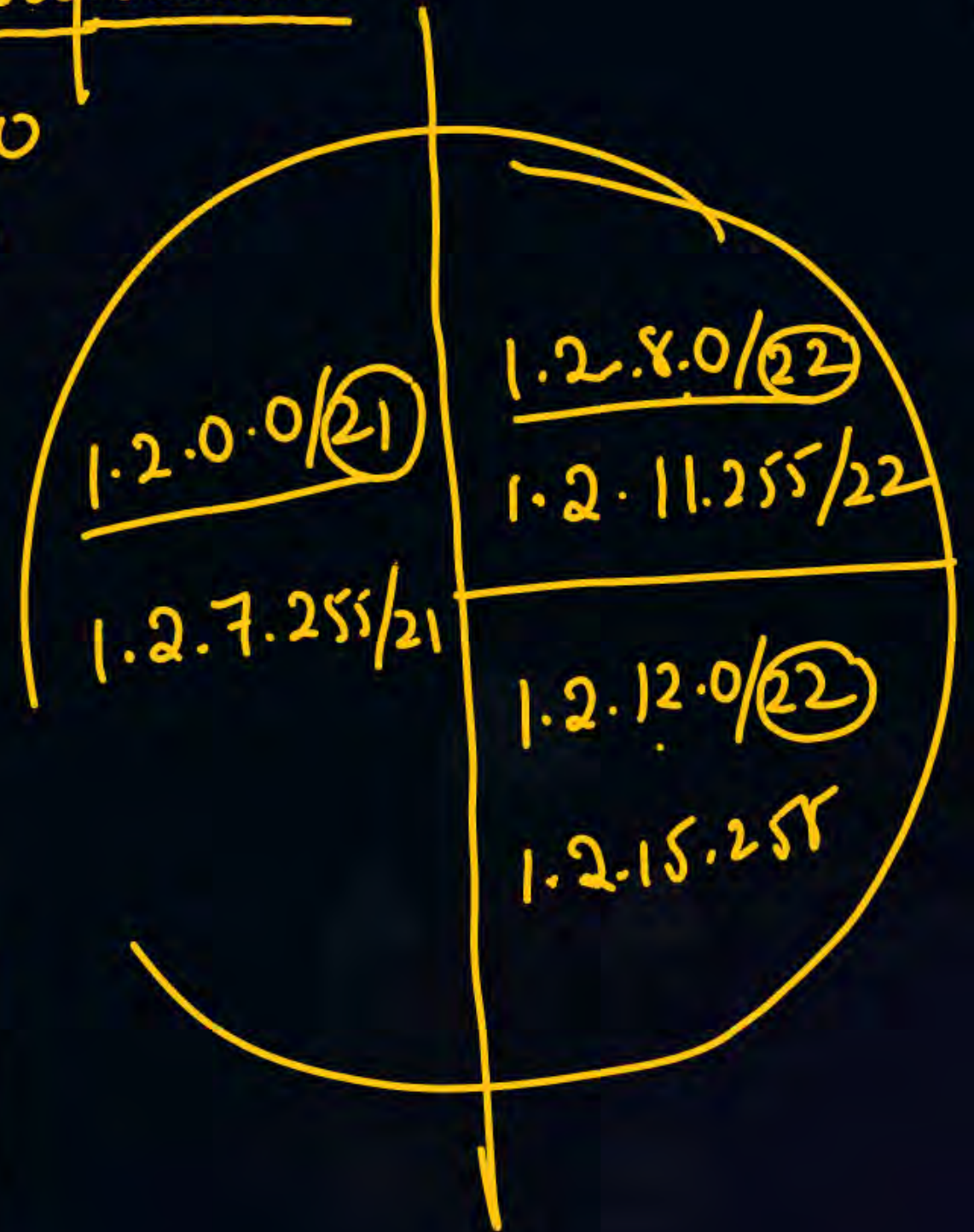
# VLSM in CIDR

1.2.3.4/20

11111111 | 11111111 | 1111000000000000  
 255.255.248.0  
 255.255.252.0



32  
 21  
 11

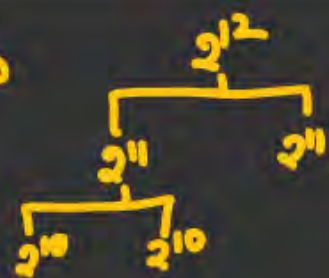


## VLSM

NID		
1.2.0.0	255.255.248.0	a
1.2.8.0	255.255.252.0	b
1.2.12.0	256.255.252.0	c
0.0.0.0	0.0.0.0	d

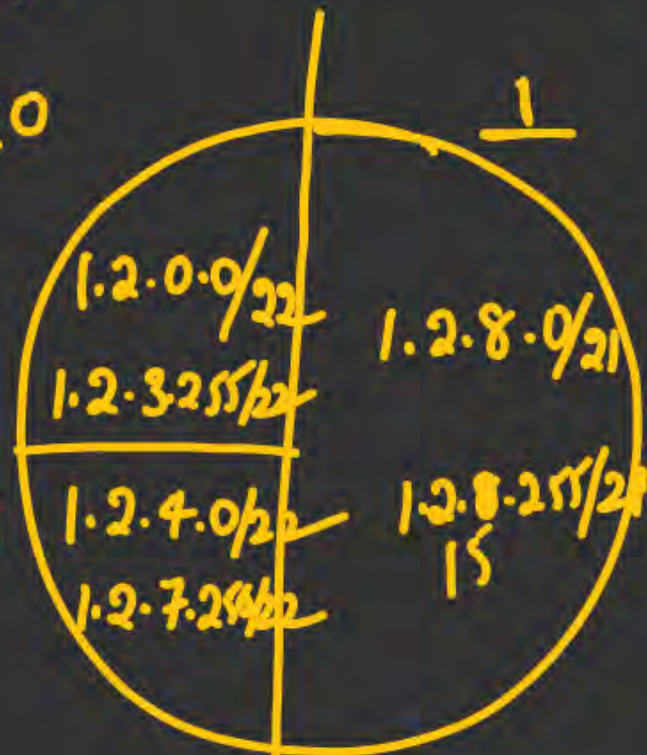


1.2.3.4/20



100

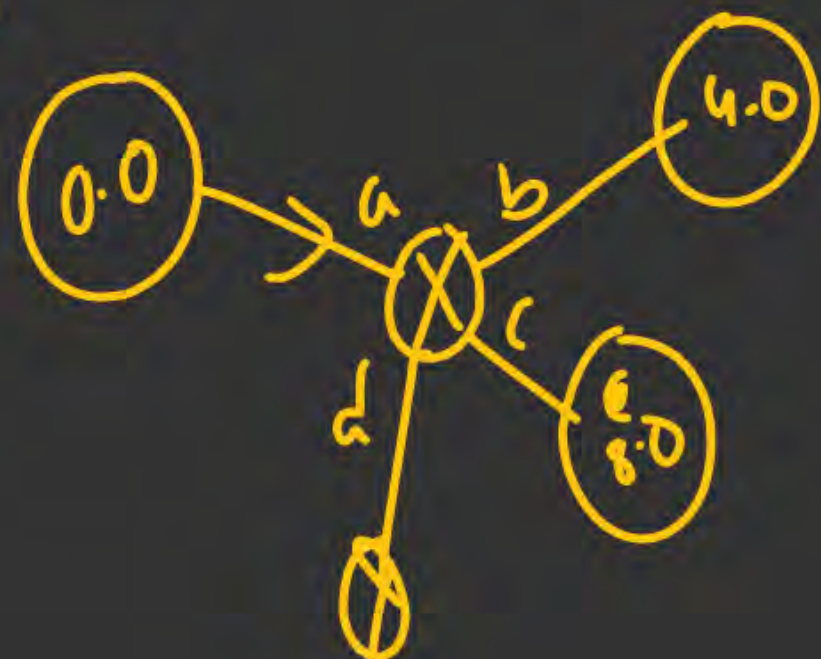
01



1.2.0000 | 0011.00000100  
 NID      0000.00000000  
           2222°  
           00 —  
           01 —  
           1111.11111111

NID	SM	Interface
1.2.0.0	/22	a
1.2.4.0	/22	b
1.2.8.0	/21	c
0.0.0.0	.0.0.0.0	d

(4.0)





**THANK - YOU**