IP address range
First address
Last address

Term	Definition
Network address	The first address in a block of IP addresses
Broadcast address	The last address in a block of IP addresses

Class	IP Range	Default Subnet Mask	CIDR Notation (/number)	Number of Hosts
A	1.0.0.0 to 126.255.255.255	255.0.0.0	/8	16,777,214
B	128.0.0.0 to 191.255.255.255	255.255.0.0	/16	65,534
C	192.0.0.0 to 223.255.255.255	255.255.255.0	/24	254
D	224.0.0.0 to 239.255.255.255	Reserved for Multicast	N/A	N/A
E	240.0.0.0 to 255.255.255.255	Reserved for Experimental	N/A	N/A

Q1: 205.16.37.40/28

Given:

- IP: 205.16.37.40
- CIDR: `/28` (28 bits for the network)

Step 1: Find the Number of Addresses:

- The total number of addresses in this subnet:

$$2^{(32-28)} = 2^4 = 16$$

Step 2: Identify the First Address (Network Address):

- We need to find the starting address of the block. Each subnet starts at a multiple of the block size (16 in this case).
  - **205.16.37.40** falls within the range starting from **205.16.37.32** because:

$$205.16.37.32 + 16 = 205.16.37.48 \quad \text{(next subnet start)}$$

  - Therefore, the **first address** is **205.16.37.32**.

Step 3: Identify the Last Address (Broadcast Address):

- The last address is the address before the next subnet:

$$205.16.37.48 - 1 = 205.16.37.47$$

Summary:

- **First Address:** 205.16.37.32 (Network Address)
- **Last Address:** 205.16.37.47 (Broadcast Address)
- **Number of Addresses:** 16

Q2: 167.199.170.82/27

Given:

- IP: 167.199.170.82
- CIDR: `/27` (27 bits for the network)

Step 1: Find the Number of Addresses:

- Total addresses:

$$2^{(32-27)} = 2^5 = 32$$

Step 2: Identify the First Address:

- Each subnet block is of size **32**.
  - The nearest multiple of **32** lower than **82**:

$$167.199.170.64 \quad \text{(next block starts at 167.199.170.96)}$$

- Therefore, the **first address** is **167.199.170.64**.

Step 3: Identify the Last Address:

- The last address is one less than the next block:

$$167.199.170.96 - 1 = 167.199.170.95$$

Summary:

- **First Address:** 167.199.170.64
- **Last Address:** 167.199.170.95
- **Number of Addresses:** 32

Q3: 192.168.17.9 (Class C Network)

Given:

- IP: 192.168.17.9
- This is a **Class C** address, which by default has a subnet mask of **/24**.

Step 1: Find the Number of Addresses:

- A **Class C** network with **/24** means:

$$2^{(32-24)} = 2^8 = 256 \quad \text{(total addresses)}$$

Step 2: Identify the First Address:

- The first address (network address) is the first IP in the range:

$$192.168.17.0$$

Step 3: Identify the Last Address:

- The last address (broadcast address) is:

$$192.168.17.255$$

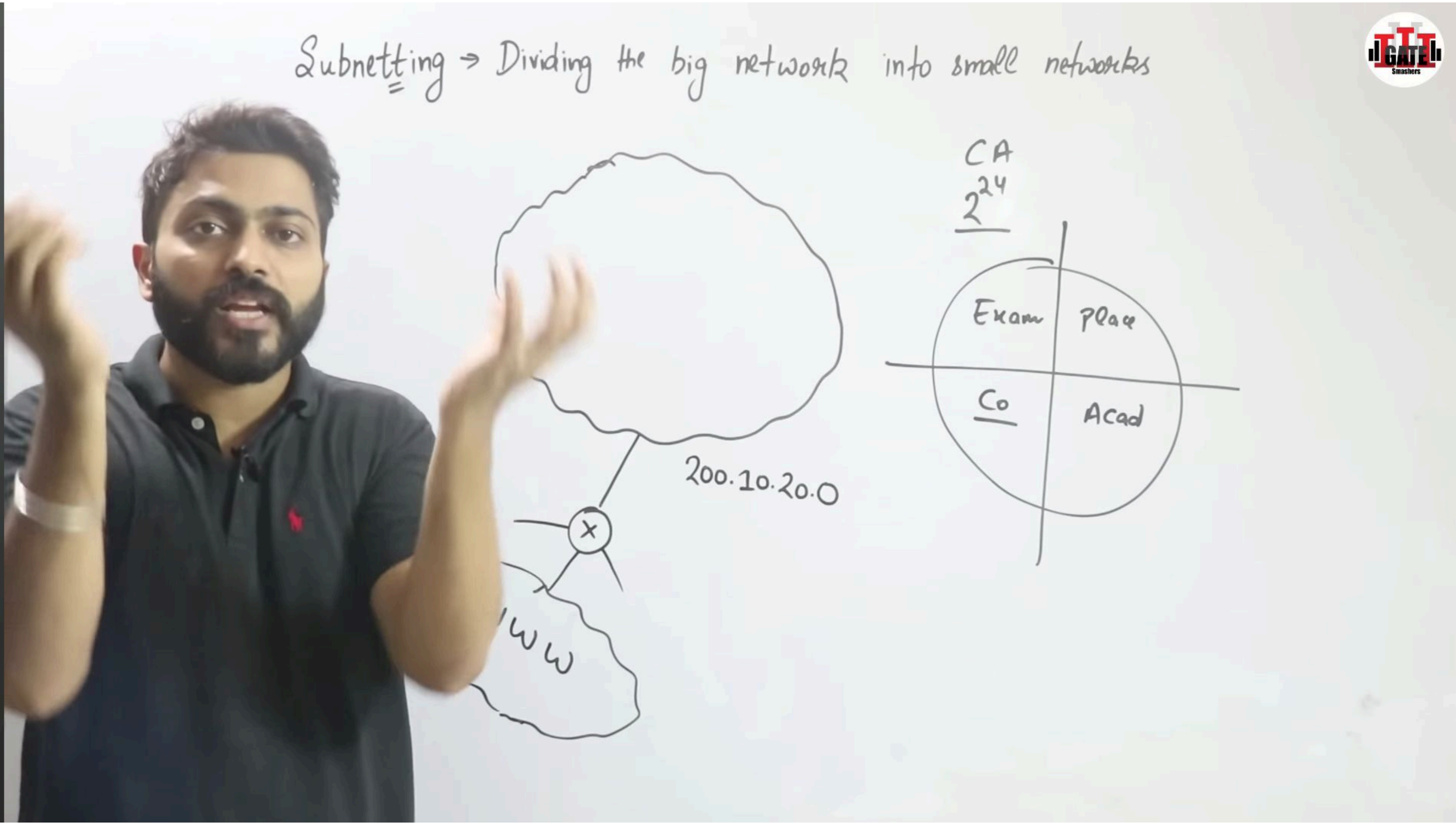
Summary:

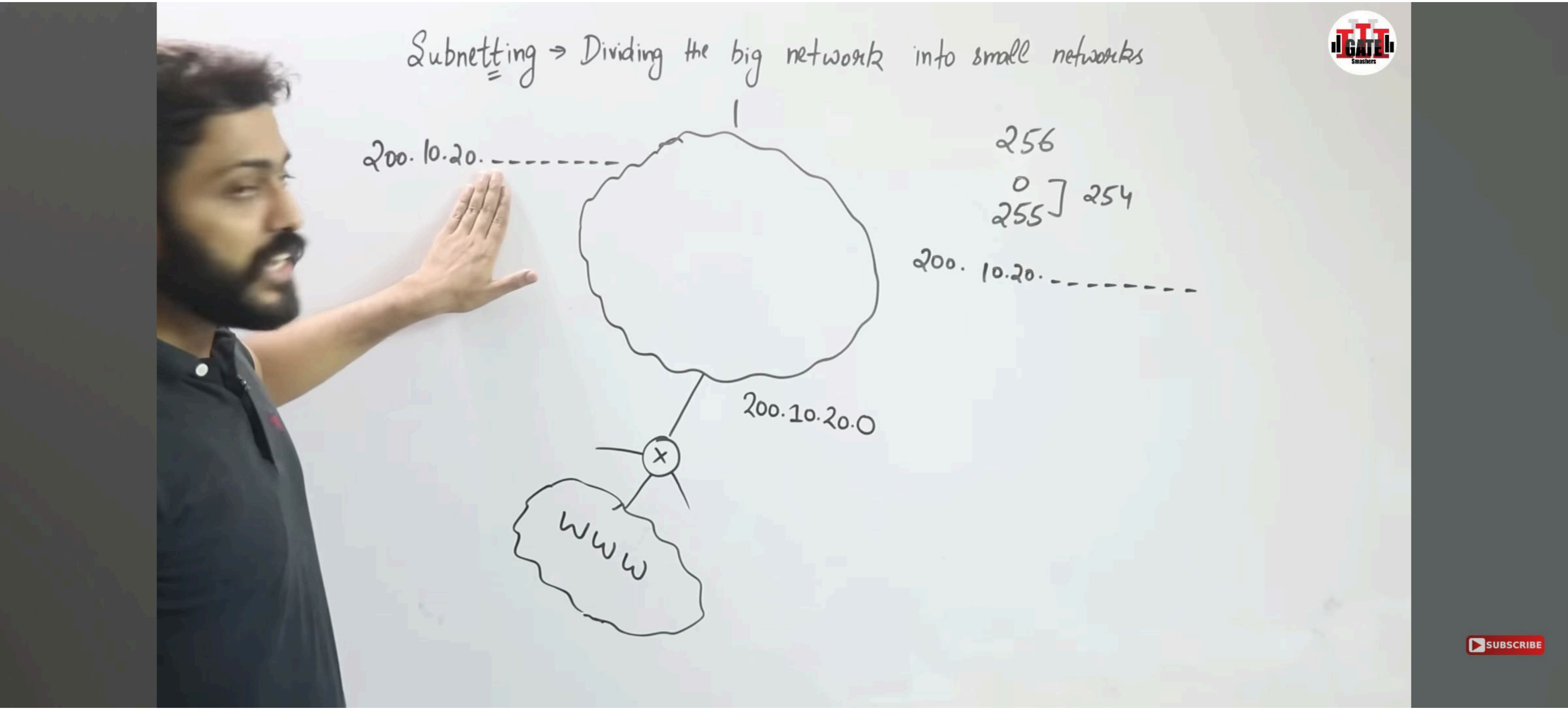
- **First Address:** 192.168.17.0 (Network Address)
- **Last Address:** 192.168.17.255 (Broadcast Address)
- **Number of Addresses:** 256

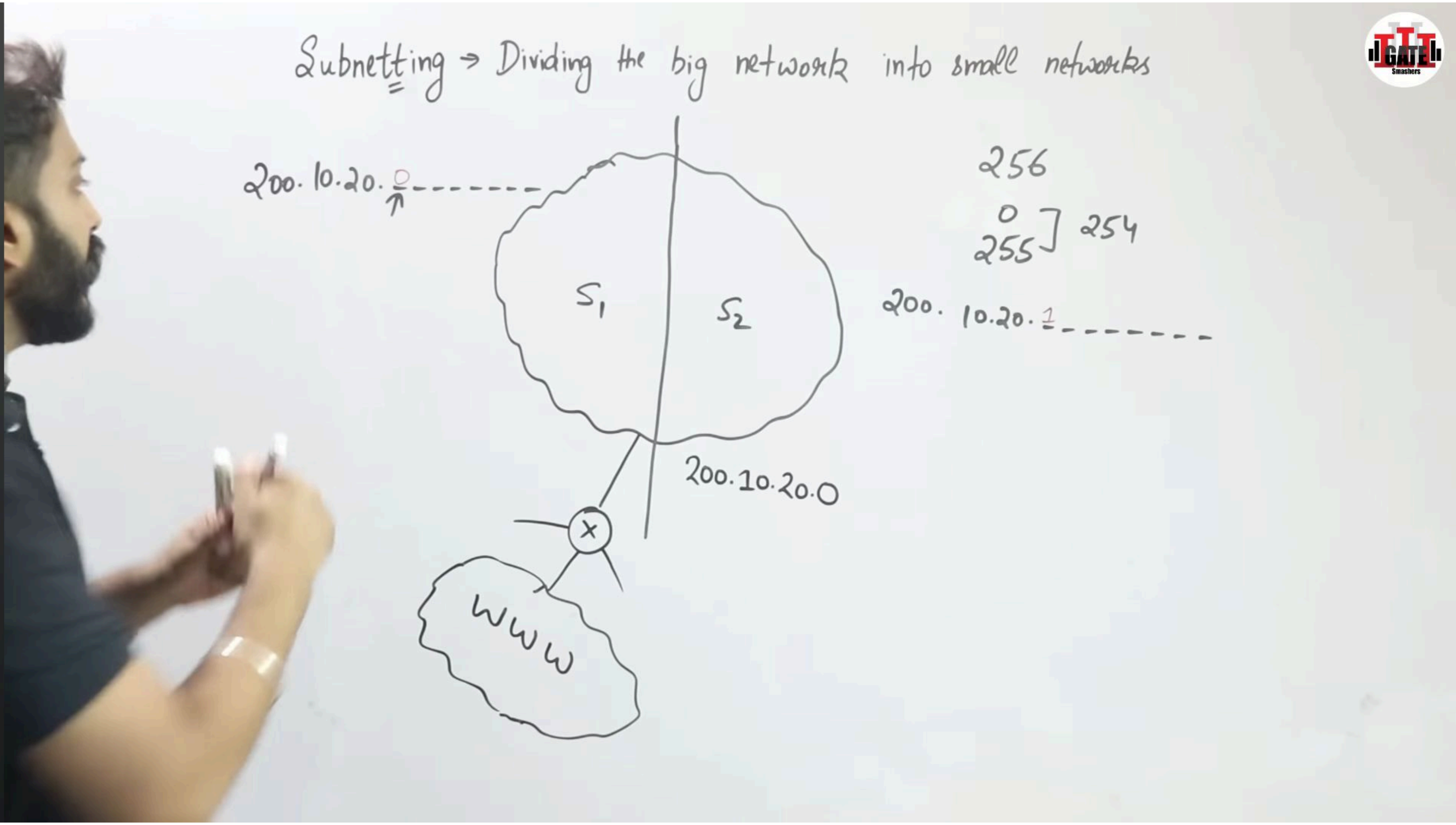
Subnetting

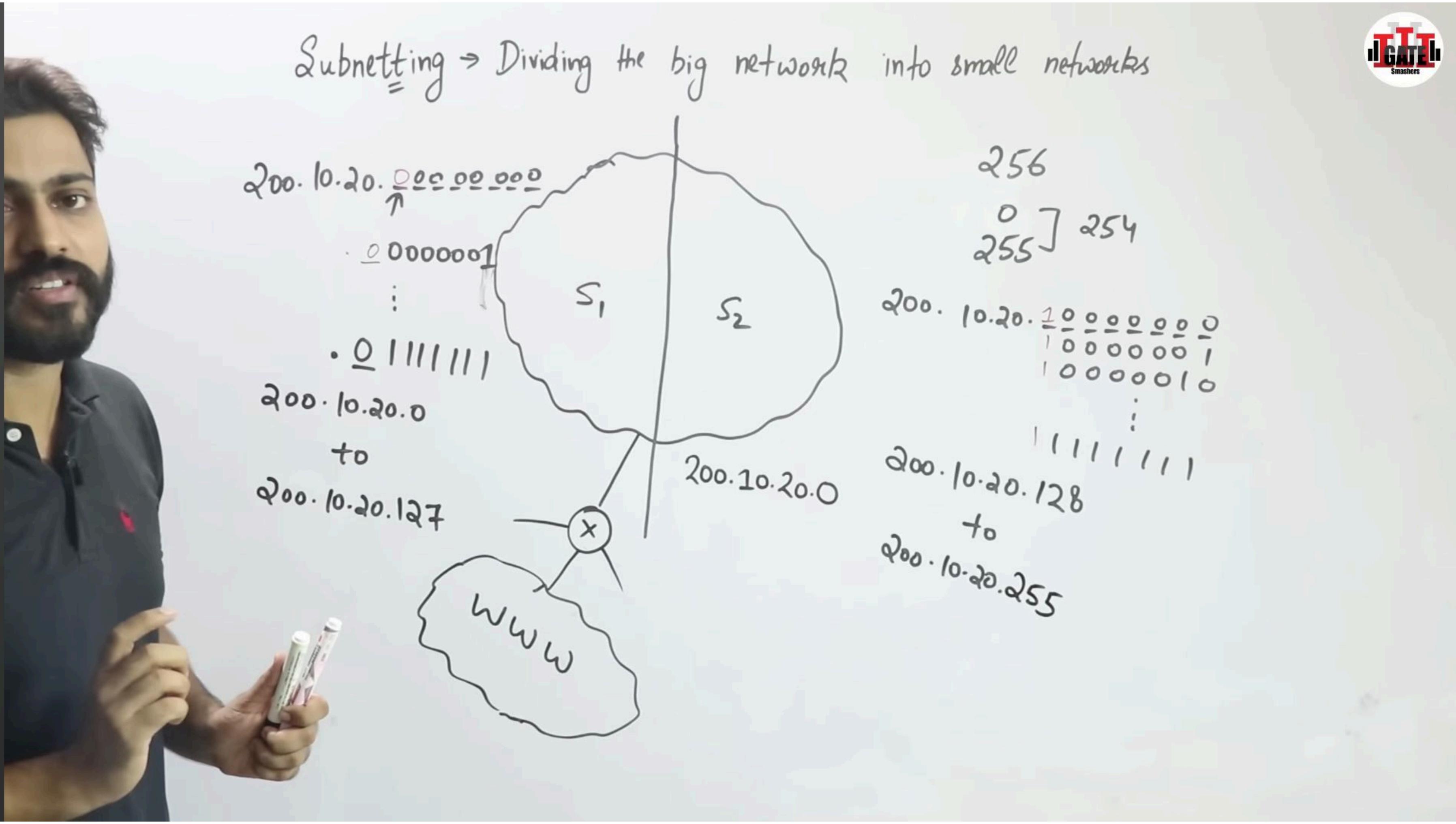
Shortcut Table (Common Subnets)

Prefix Length	Host Bits	Total Hosts $2^{\text{Host Bits}} - 2$
/32	0	0 (Single IP)
/30	2	2 (Point-to-Point Link)
/24	8	254
/16	16	$65,534$
/8	24	$16,777,214$


Subnetting ⇒ Dividing the big network into small networks
CA
2^24
Exam
Place
Co
Acad
200.10.20.0
GATE Smashers
SUBSCRIBE


Subnetting ⇒ Dividing the big network into small networks
200.10.20.
256
0
255
254
200.10.20.
200.10.20.0
WWW
GATE Smashers
SUBSCRIBE


Subnetting ⇒ Dividing the big network into small networks
200.10.20.0
S1
S2
256
0
255
254
200.10.20.1
200.10.20.0
x
WWW
SUBSCRIBE



Subnetting ⇒ Dividing the big network into small networks
200.10.20.00000000
.00000001
.01111111
200.10.20.0
to
200.10.20.127
S1
S2
200.10.20.0
WWW
256
0
255
254
200.10.20.10000000
10000001
10000010
11111111
200.10.20.128
to
200.10.20.255
GATE Smashers
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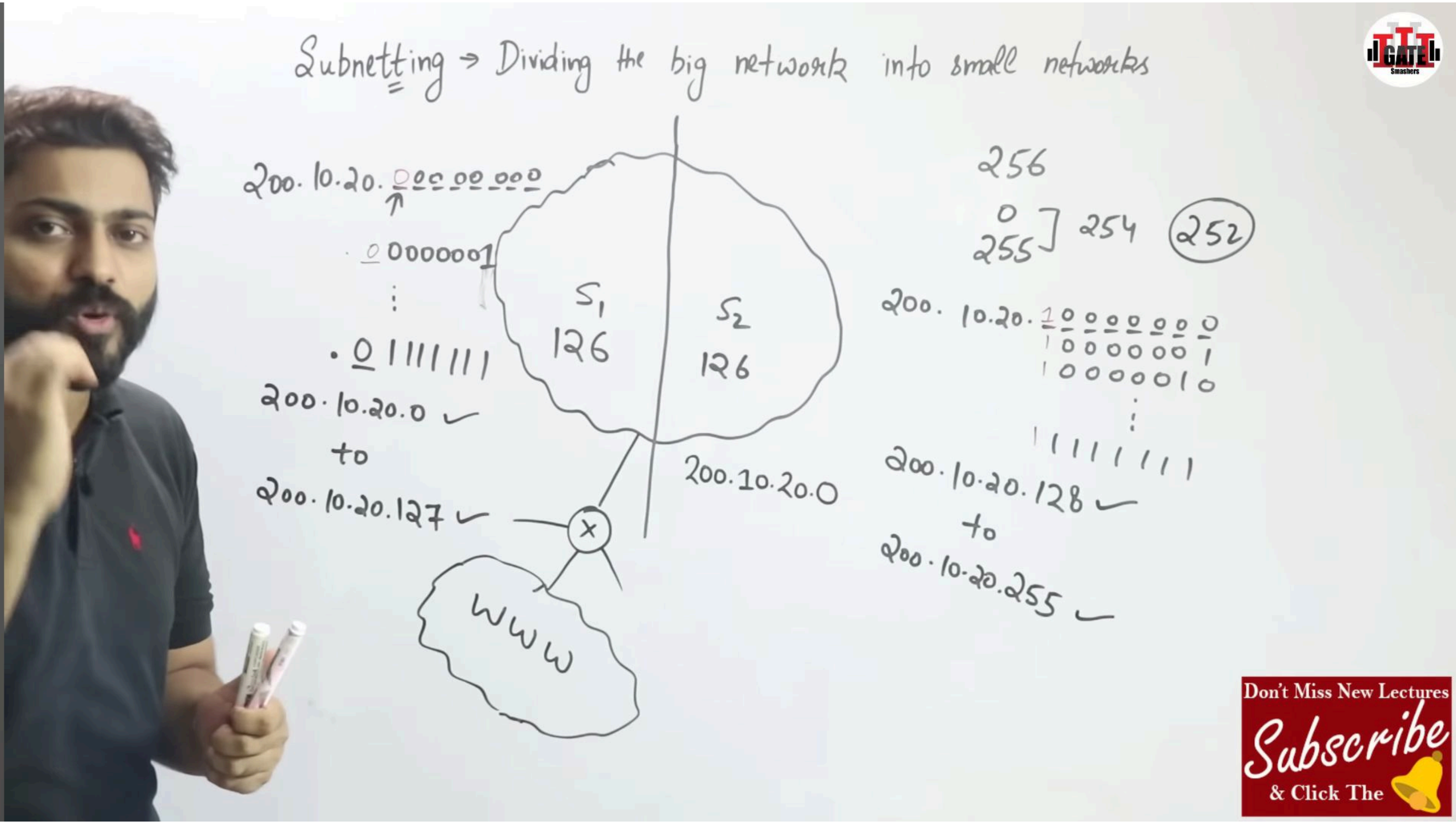
Subnetting ⇒ Dividing the big network into small networks
200.10.20.0 0000000
.0 0000001
.0 1111111
200.10.20.0
to
200.10.20.127
S1
126
S2
126
200.10.20.0
WWW
256
0
255
254
252
200.10.20.1 0000000
1 0000001
1 0000010
1 1111111
200.10.20.128
to
200.10.20.255
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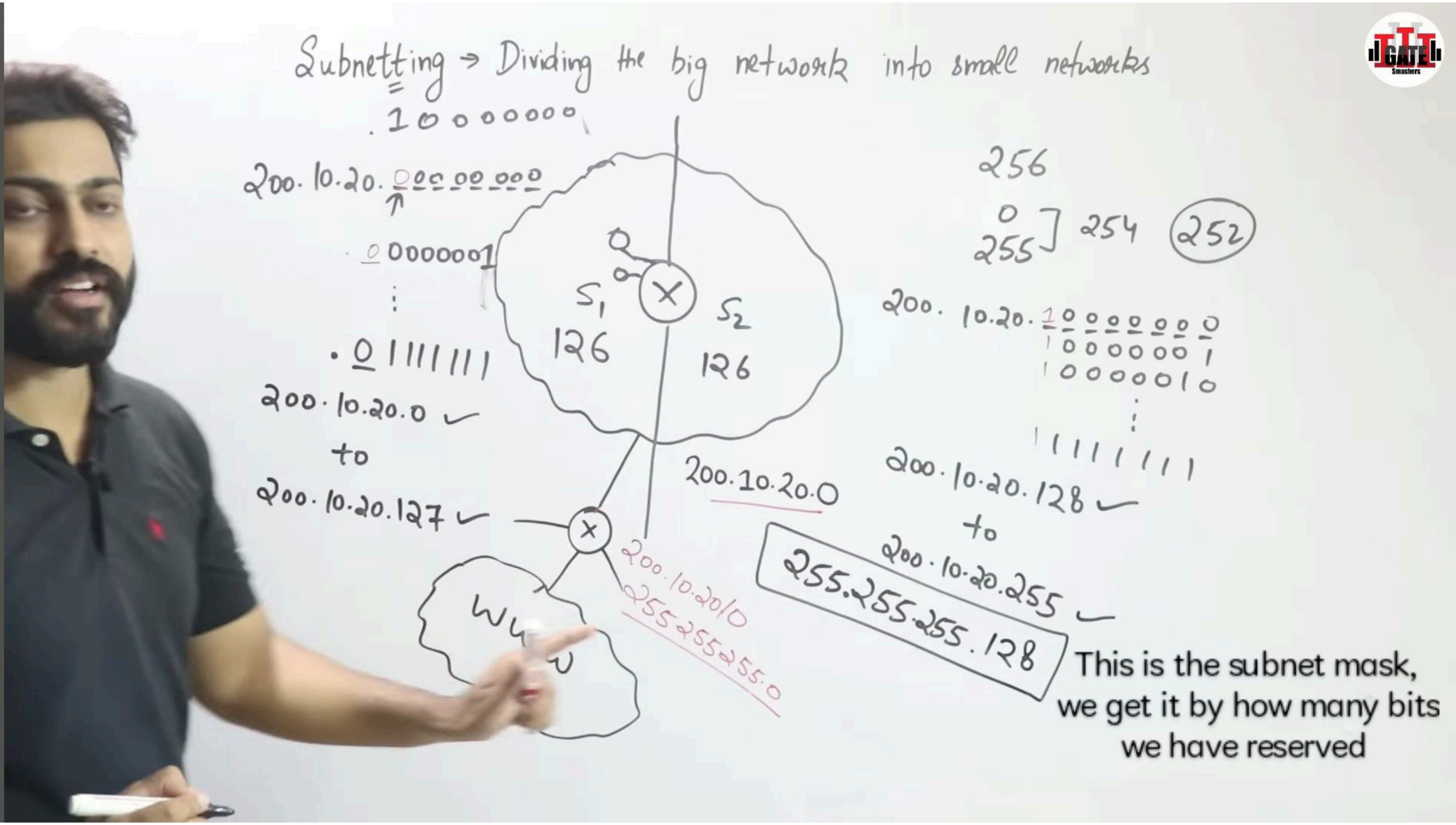
Subnetting ⇒ Dividing the big network into small networks
.10000000
200.10.20.00000000
.00000001
.01111111
200.10.20.0
to
200.10.20.127
S1
126
S2
126
200.10.20.0
200.10.20/0
255255255.0
256
0
255
254
252
200.10.20.10000000
10000001
10000010
11111111
200.10.20.128
to
200.10.20.255
255.255.255.128
This is the subnet mask,
we get it by how many bits
we have reserved
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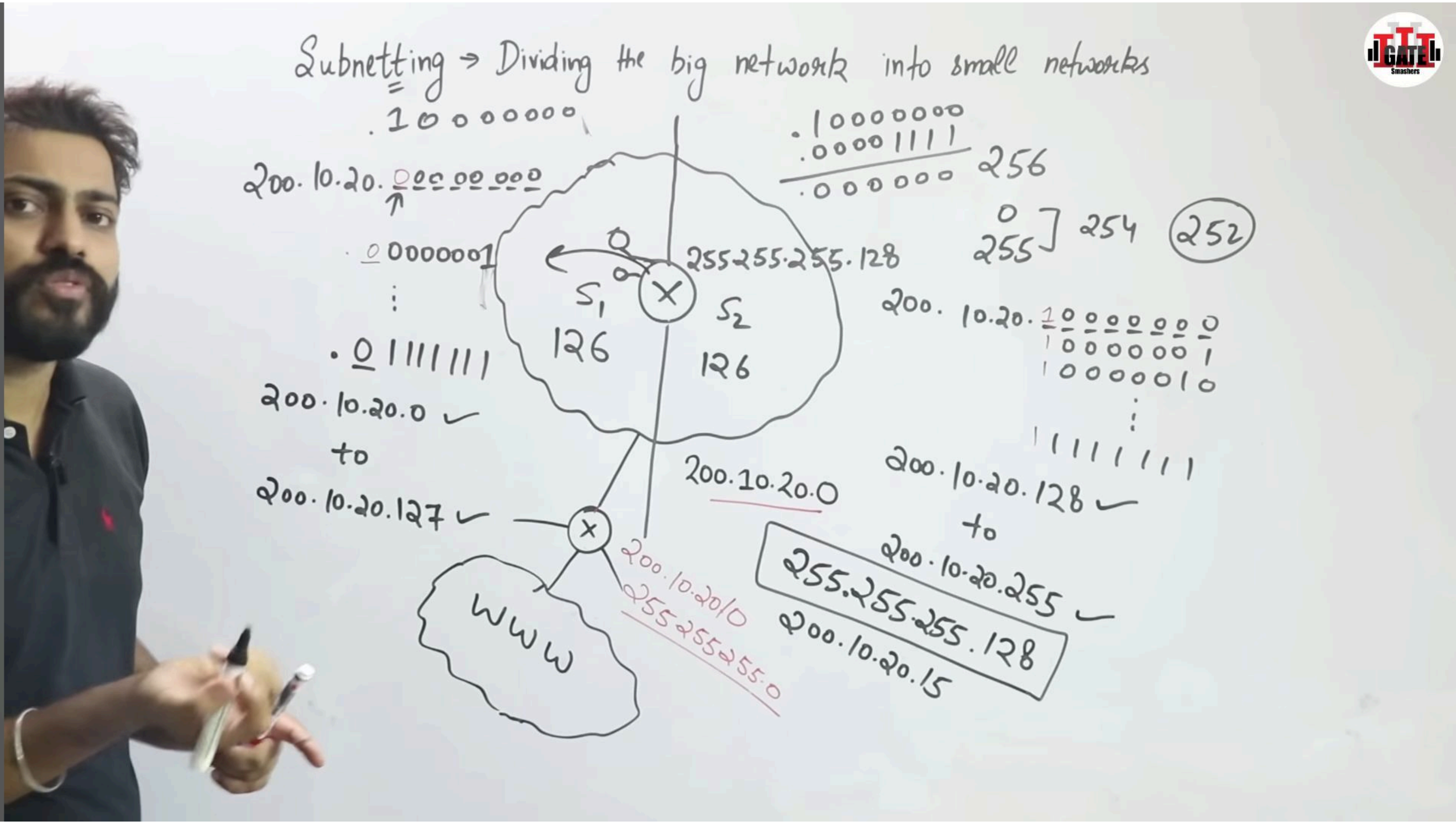
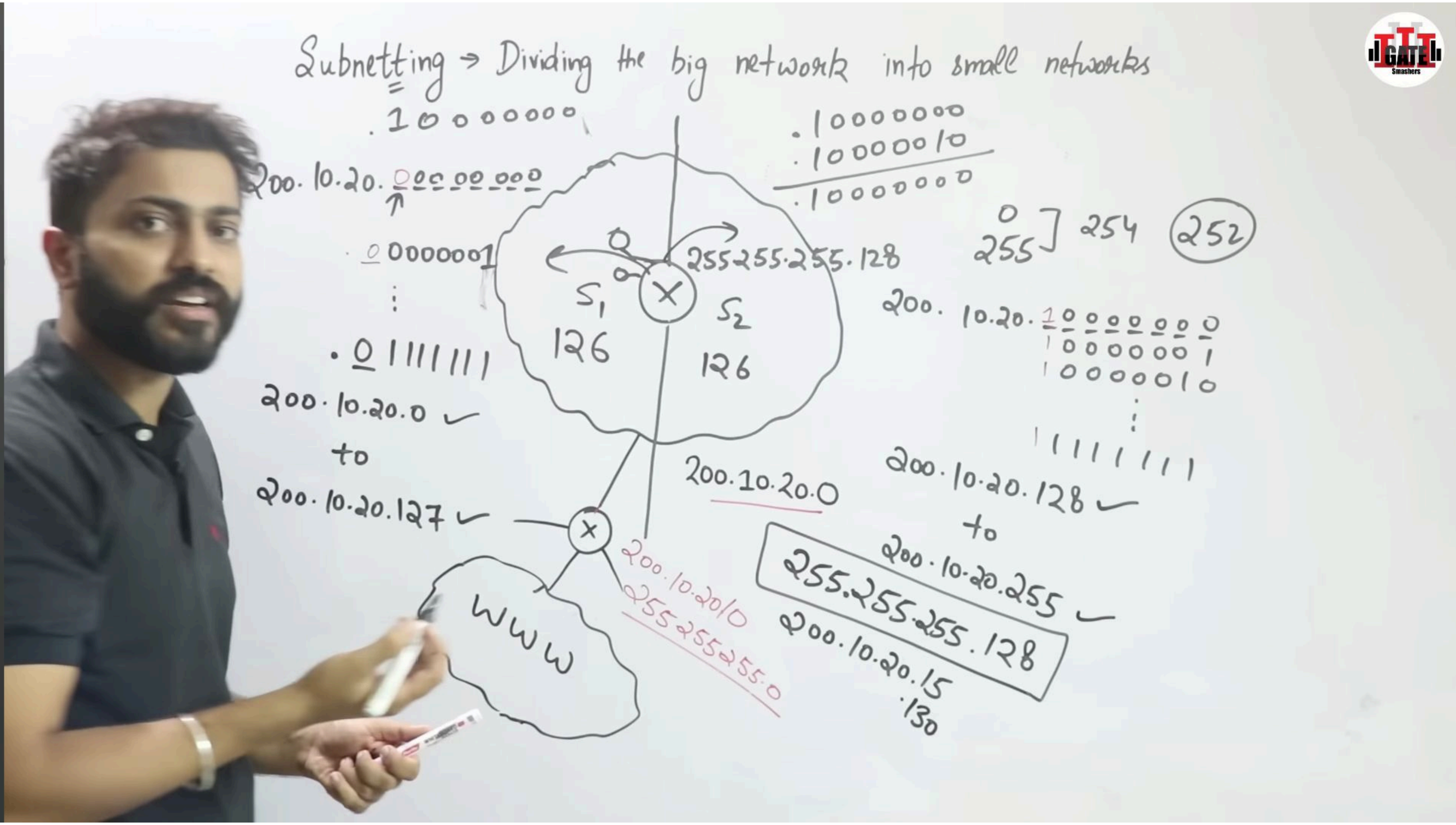


Subnetting ⇒ Dividing the big network into small networks
.10000000
200.10.20.00000000
.00000001
.01111111
200.10.20.0
to
200.10.20.127
S1
126
S2
126
255.255.255.128
.10000000
.00001111
.0000000
256
0
255
254
252
200.10.20.10000000
10000001
10000010
11111111
200.10.20.128
to
200.10.20.255
200.10.20.0
255.255.255.128
200.10.20.15
200.10.20.0
255.255.255.0
www
SUBSCRIBE


Subnetting ⇒ Dividing the big network into small networks
.10000000
200.10.20.00000000
.00000001
.01111111
200.10.20.0
to
200.10.20.127
S1
126
S2
126
255.255.255.128
.10000000
.10000010
.10000000
0
255
254
252
200.10.20.10000000
10000001
10000010
11111111
200.10.20.128
to
200.10.20.255
200.10.20.0
255.255.255.128
200.10.20.15
.130
200.10.20.0
255.255.255.0
WWW
GATE Smashers
SUBSCRIBE

Routing table

(4)

* Routing table ⇒ netid, cost, next hop.

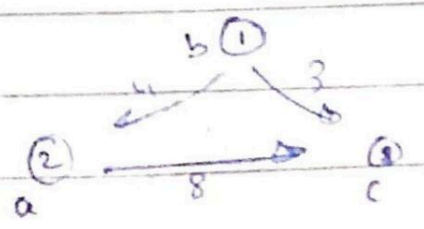
netid → final destination

cost → no. of hops

next hop → next router

∴ all these data is stored in all routers, and that basis the distance vector is seen and data is transmitted to closer

* after each transmission, we update data



1 → 2 = 4
2 → 3 = 8
1 → 3 = 3

table.

1 → 3 = 3
3 → 2 = 8.