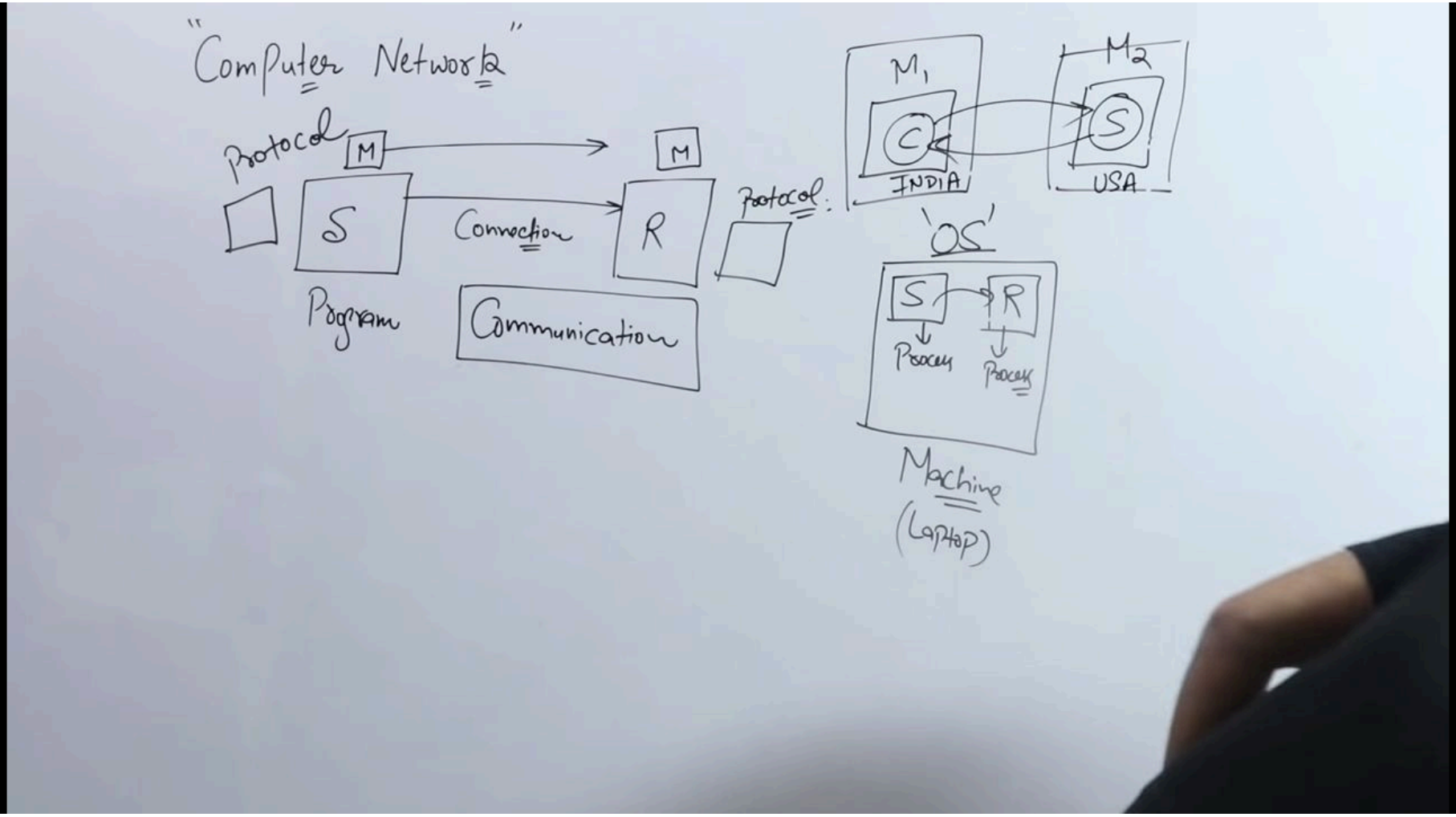
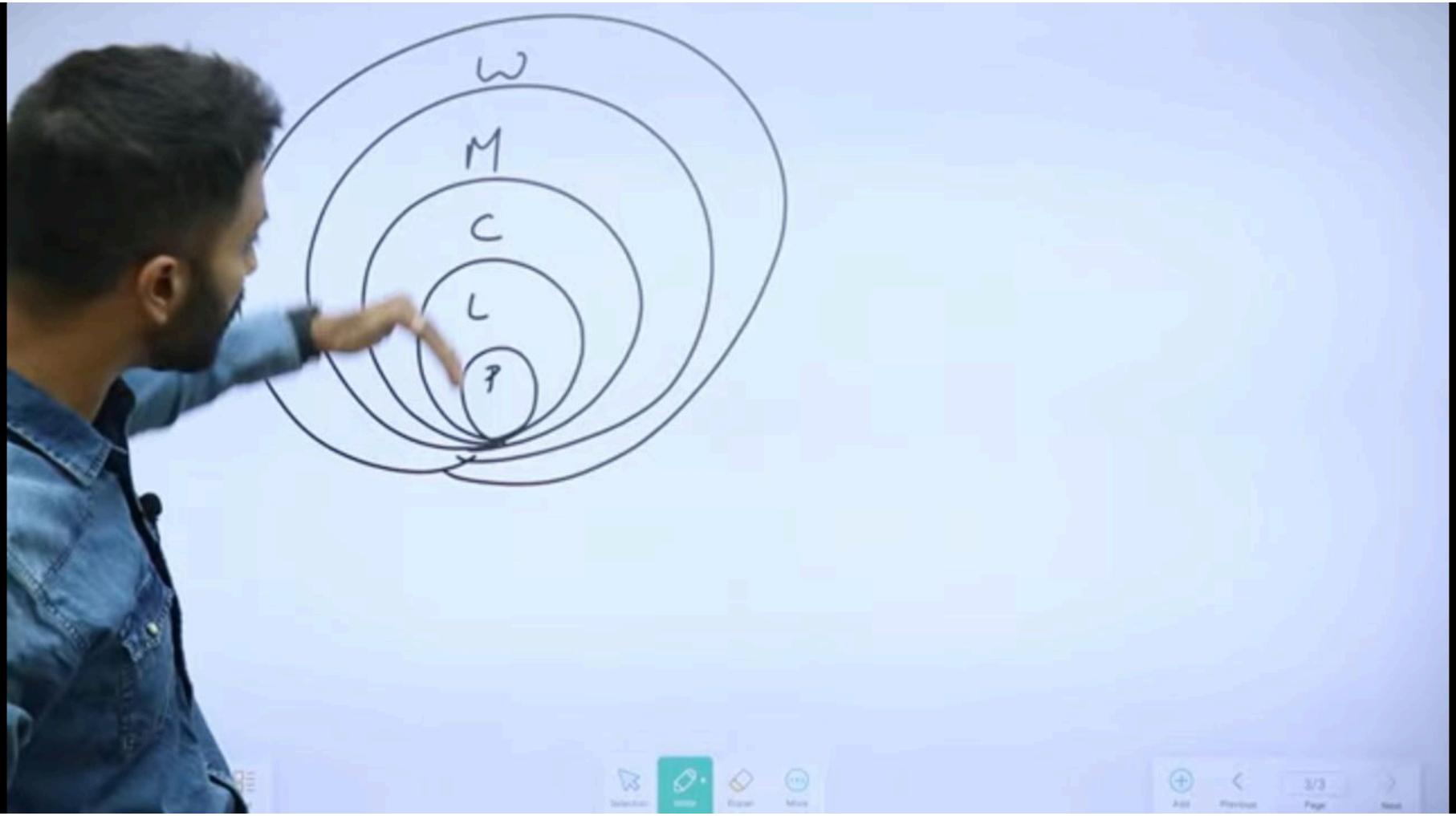
UGC NET Computer Networks Syllabus

1) Physical layer - Cables, Topology, Transmission modes, Encoding, LAN Devices, Modulation
2) Data link → Stop & wait, Go Back n and Selective Repeat, MAC Protocols, Switching Error Control, Ethernet frame format
3) Network → IP addressing, Routing Protocols, IPV_4 Header, IPV_6 Header
4) Transport - TCP, UDP, Headers
5) Session 6) Presentation
7) Application 8) Network Security

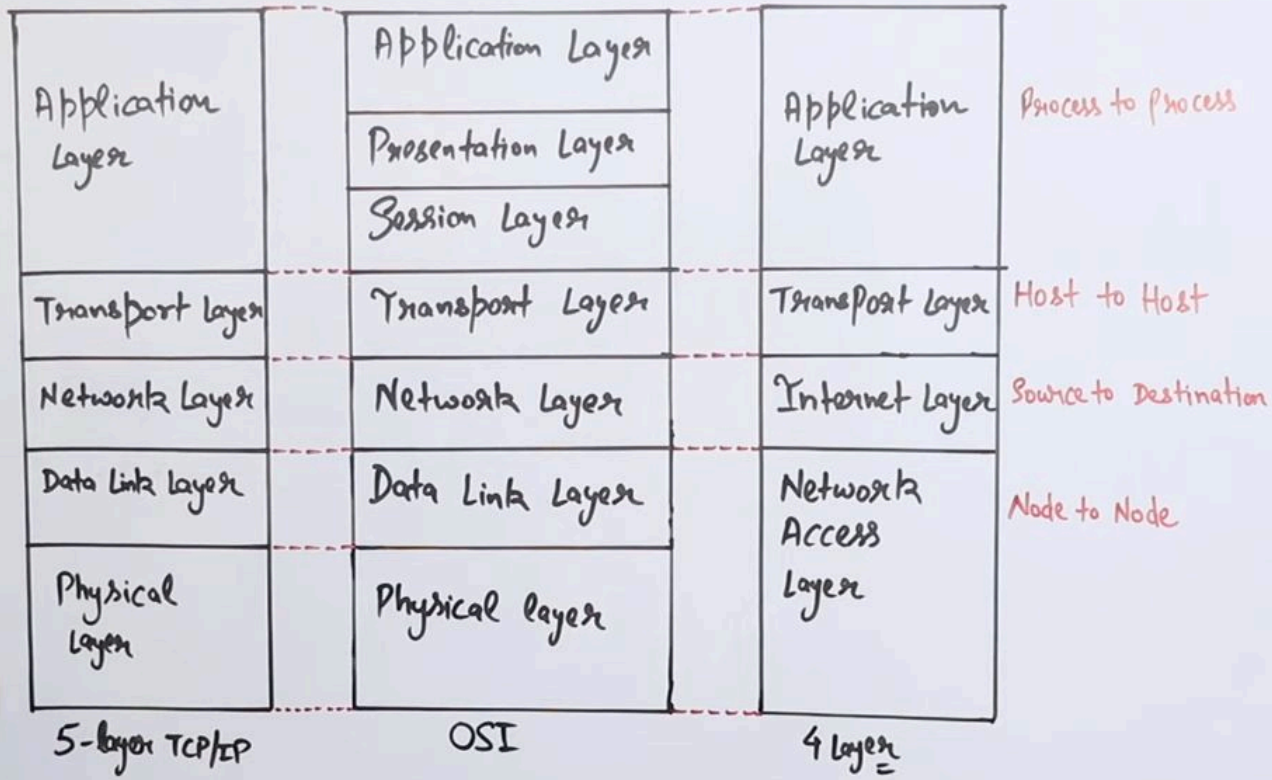

"Computer Network"
Protocol
M
S
Connection
M
R
Program
Communication
Protocol:
M1
C
INDIA
M2
S
USA
'OS'
S
R
Process
Process
Machine
(Laptop)
SUBSCRIBE

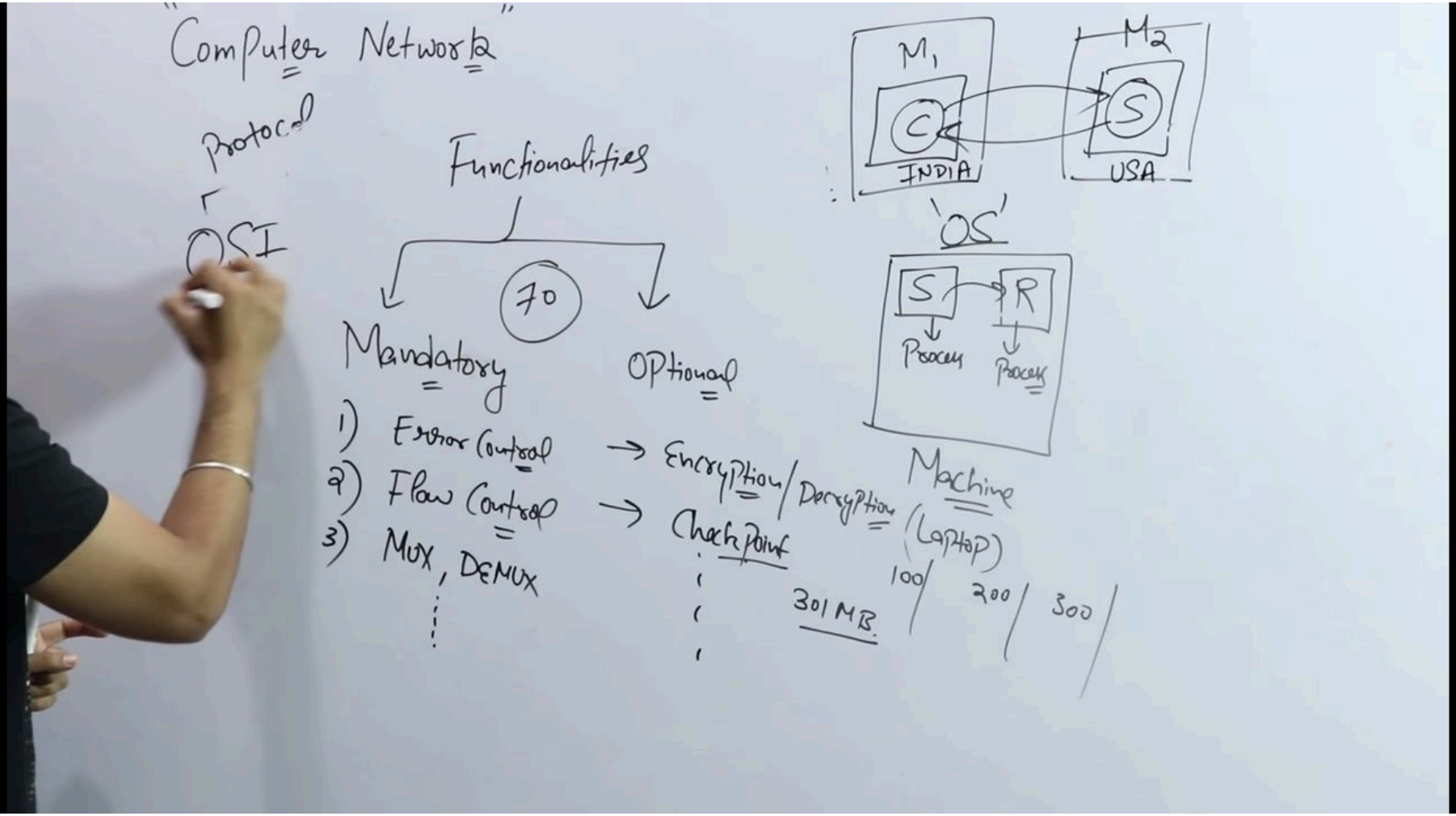

W
M
C
L
P
SUBSCRIBE

	PAN	LAN	CAN	MAN	WAN
Full Form	Personnel Area Network	Local Area Network	Campus Area Network	Metropolitan Area Network	Wide Area Network
Technology	Bluetooth, IrDA, Zigbee	Ethernet and Wi-Fi	Ethernet	FDDI, CDDI, ATM	Leased Line, Dial-Up
Range	1-100 Meter	Up to 2 KM	1-5 KM	5-50 KM	Above 50 KM
Transmission Speed	Very High	Very High	High	Average	Low
Area	Within a Room	Within office, building	Within University, Corporate offices	Within City like Mumbai	Within Countries
Ownership	Private	Private	Private	Private or Public	Private or Public
Maintenance	Very Easy	Easy	Moderate	Difficult	Very difficult
Error Rate & Cost	Very Low	Low	Moderate	High	Very High

TCP/IP Protocol
Suit OR
Internet Protocol

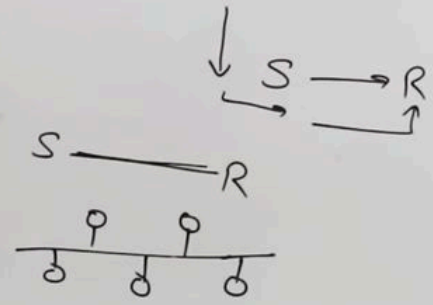
- Developed by ARPANET
- Support Client-Server and Peer to Peer

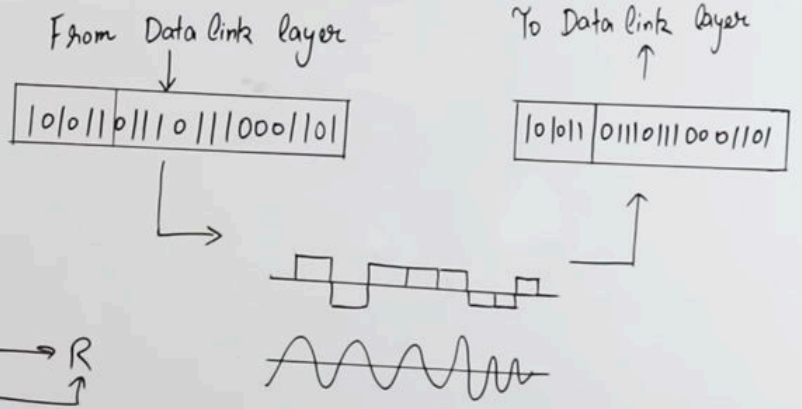


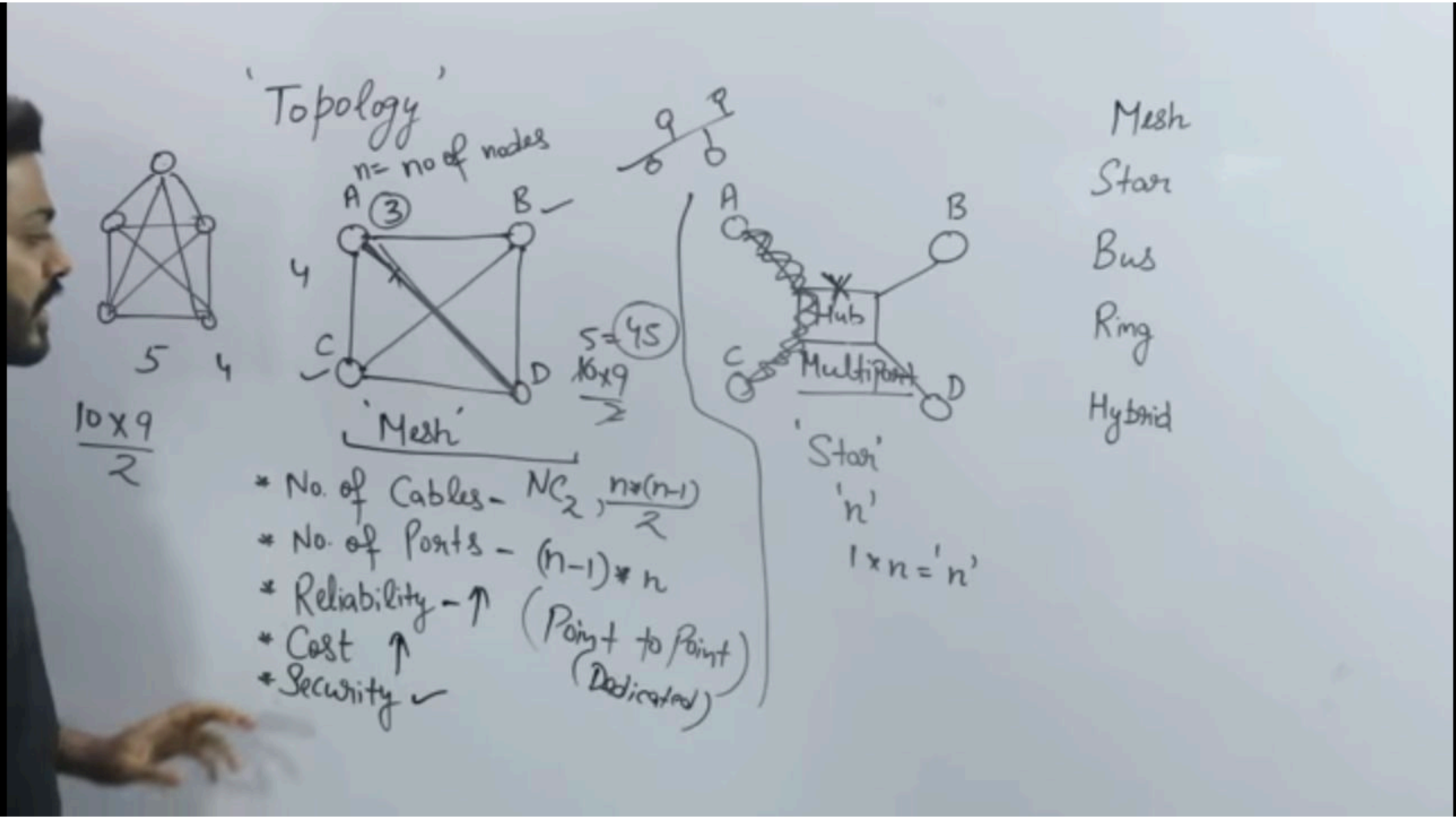

"Computer Networks"
Protocol
OSI
Functionalities
70
Mandatory
1) Error Control
2) Flow Control
3) MUX, DEMUX
Optional
Encryption/Decryption
Checkpoint
301 MB
M1
M2
C
S
INDIA
USA
'OS'
S
R
Process
Process
Machine
(Laptop)
100/ 200/ 300/
SUBSCRIBE

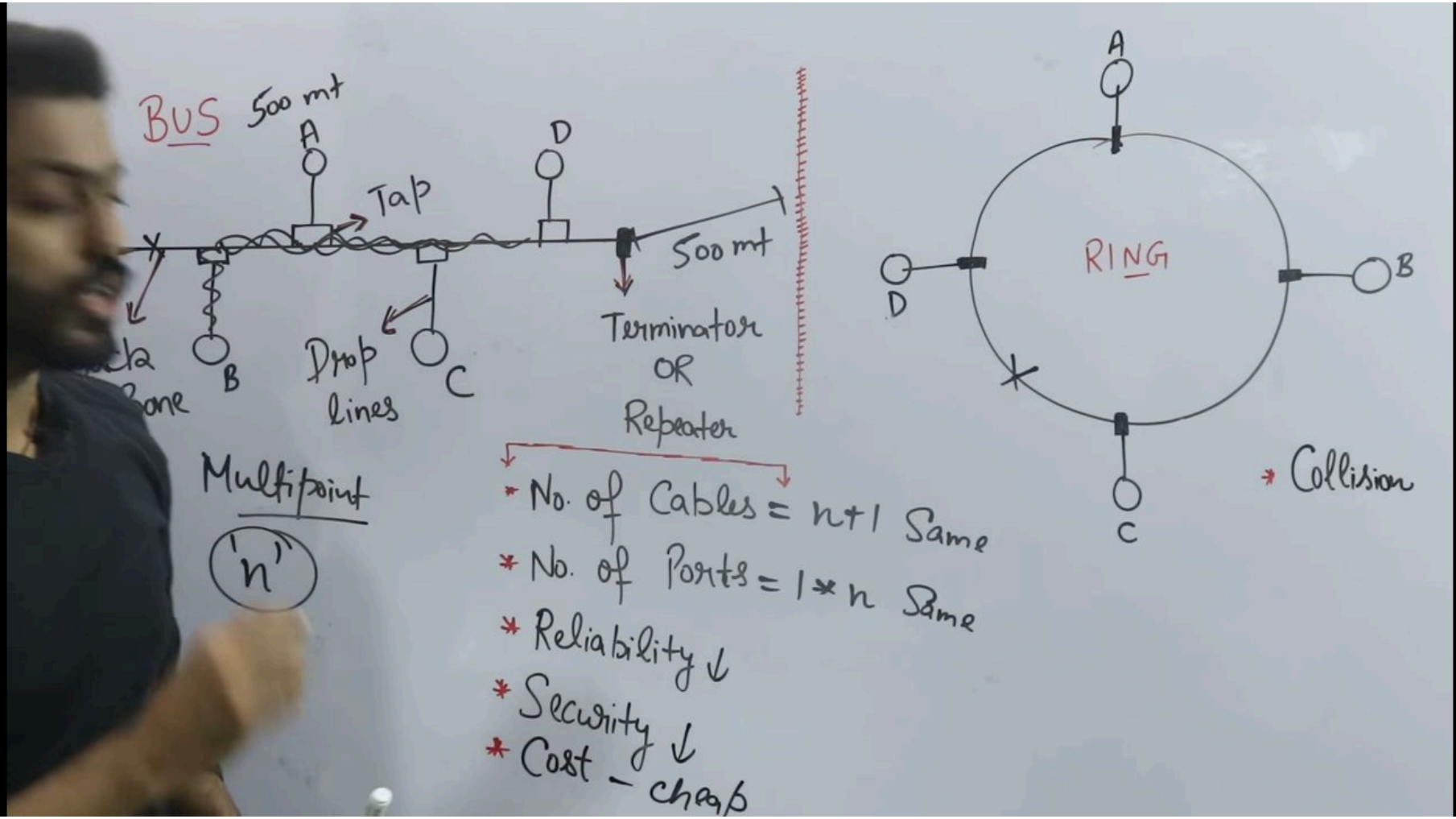
Physical layer and its functionalities:

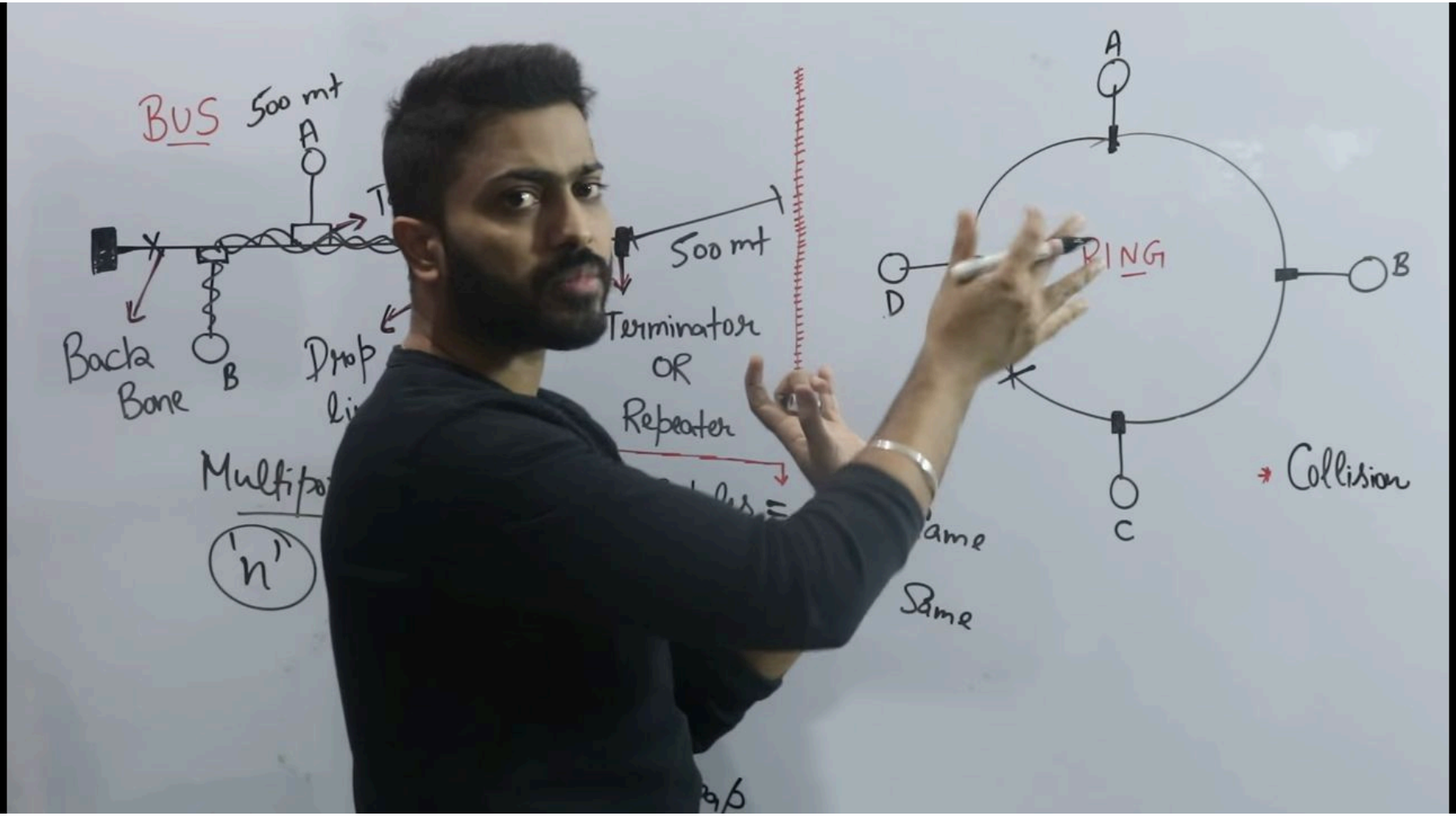
- Cables and Connectors
- Physical topology
- Hardwares (Repeaters, Hubs)
- Transmission mode
- Multi exin
- Enco

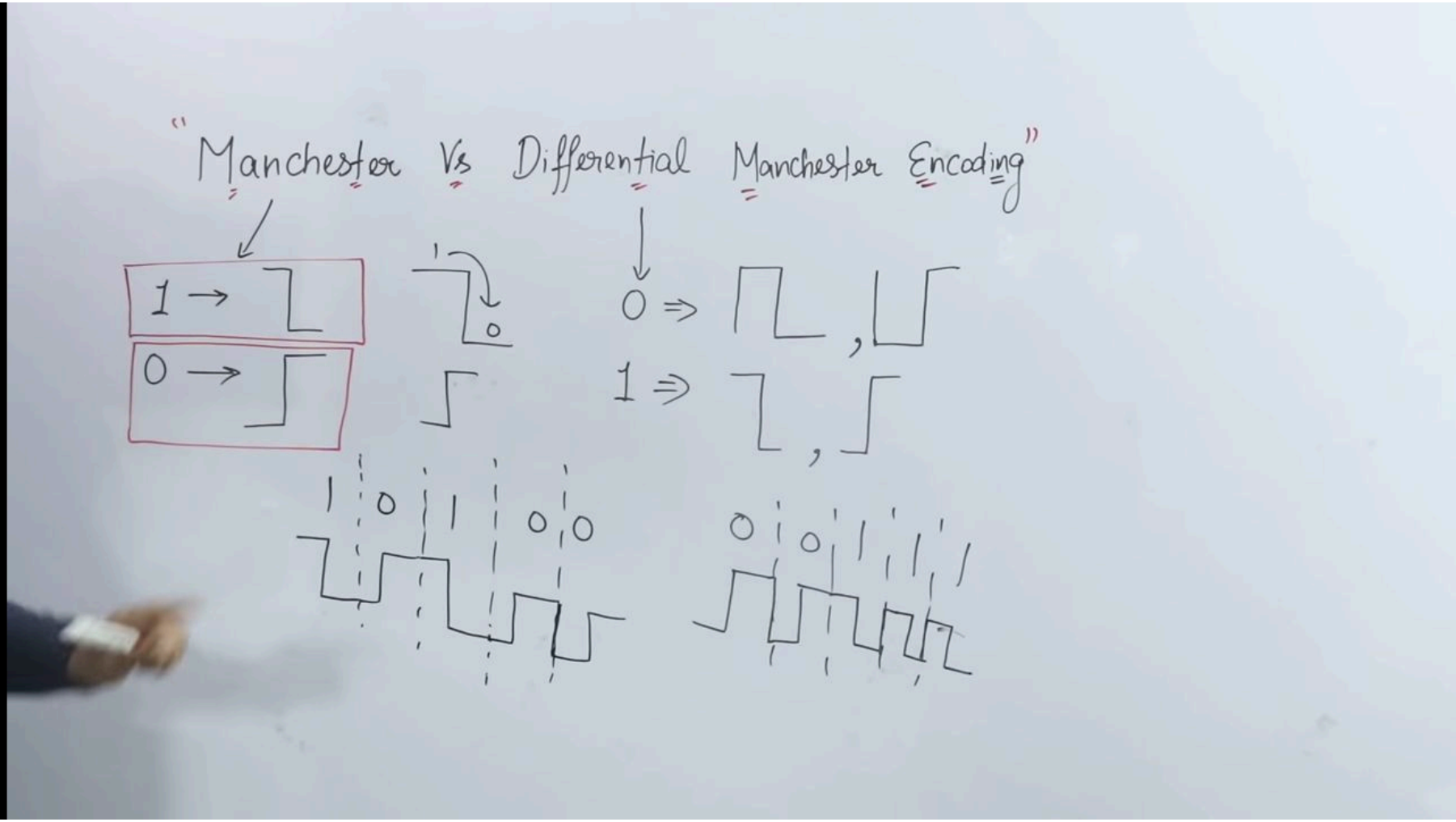


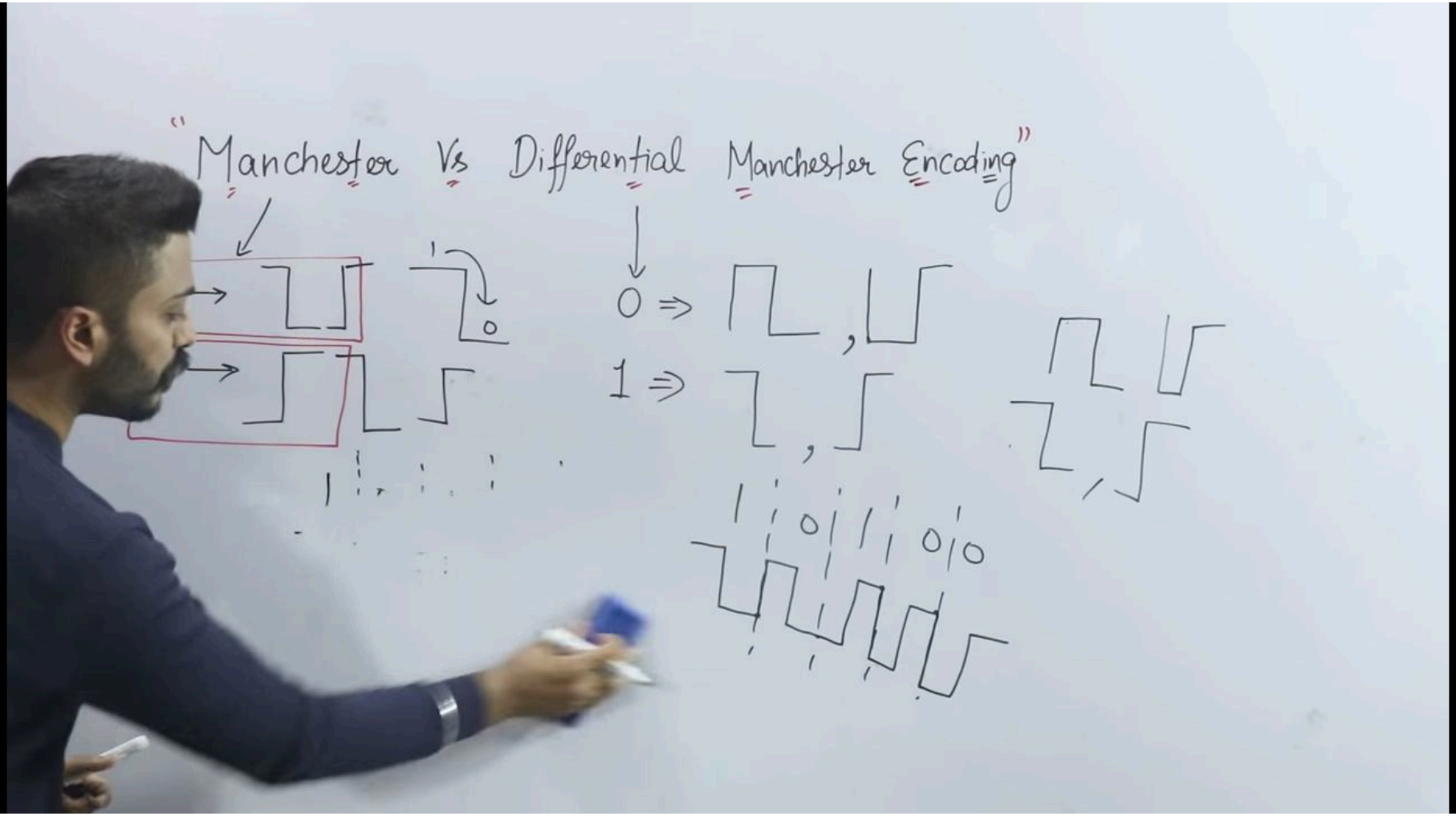


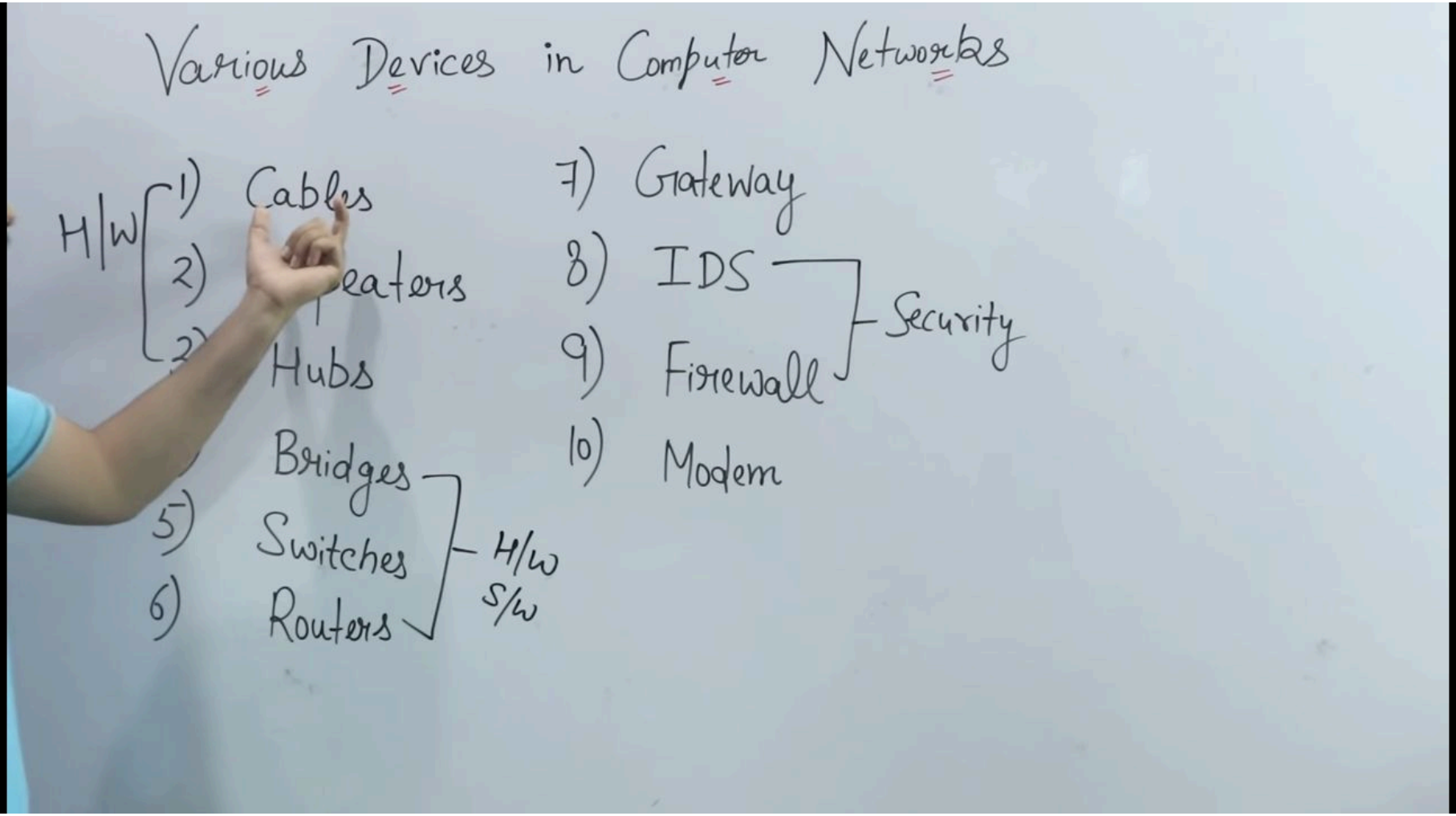

'Topology'
n= no of nodes
A
B
C
D
3
4
4
5
4
5=45
10x9/2
'Mesh'
* No. of Cables - NC2, n*(n-1)/2
* No. of Ports - (n-1)*n
* Reliability - ↑
* Cost ↑
* Security ✓
(Point to Point)
(Dedicated)
Hub
Multiport
'Star'
'n'
1*n='n'
Mesh
Star
Bus
Ring
Hybrid
SUBSCRIBE

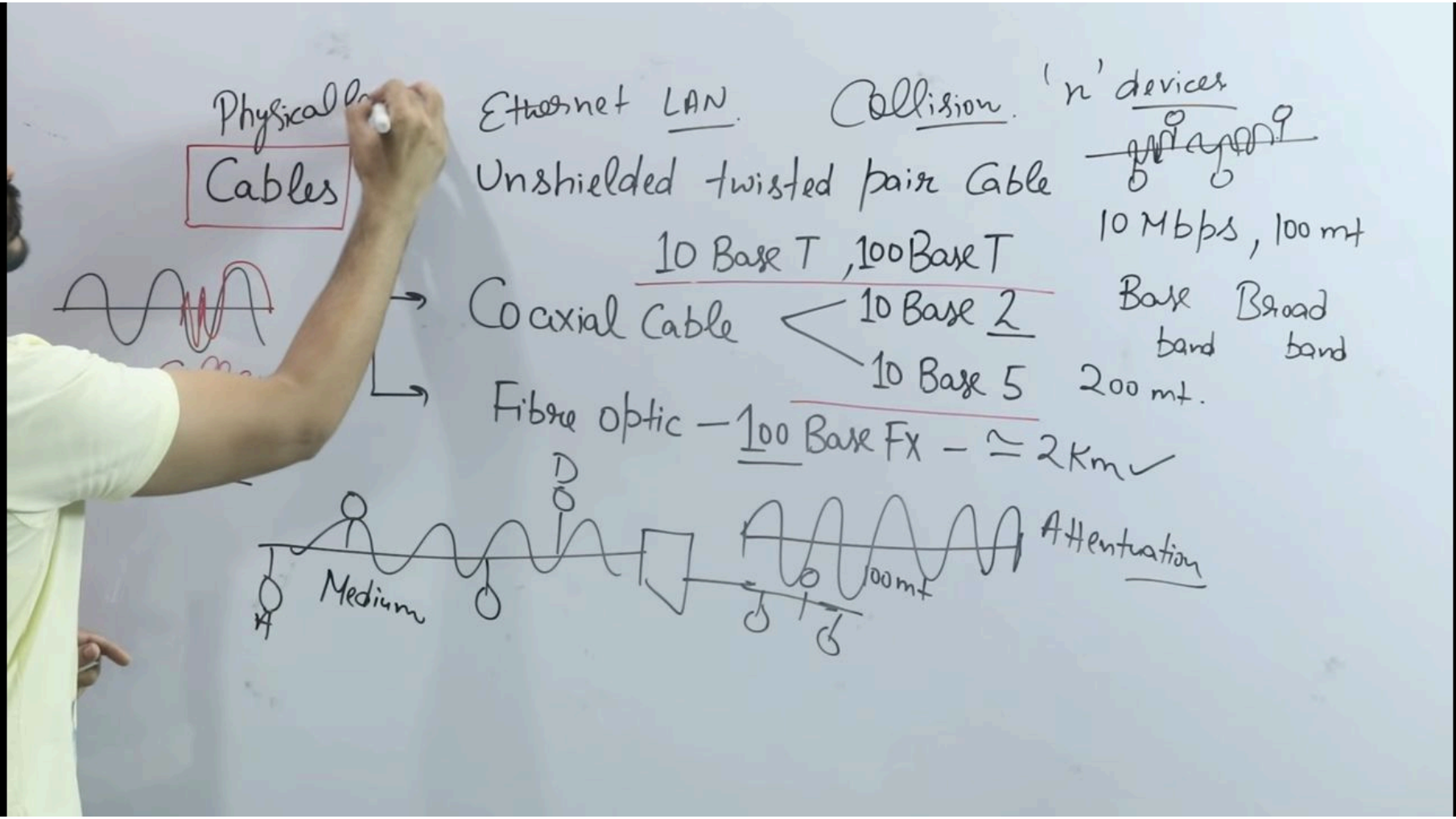

BUS
500 mt
A
D
Tap
500 mt
Terminator
OR
Repeater
B
Drop
lines
C
Multipoint
'n'
RING
A
B
C
D
* No. of Cables = n+1 Same
* No. of Ports = 1*n Same
* Reliability ↓
* Security ↓
* Cost - cheap
* Collision
SUBSCRIBE

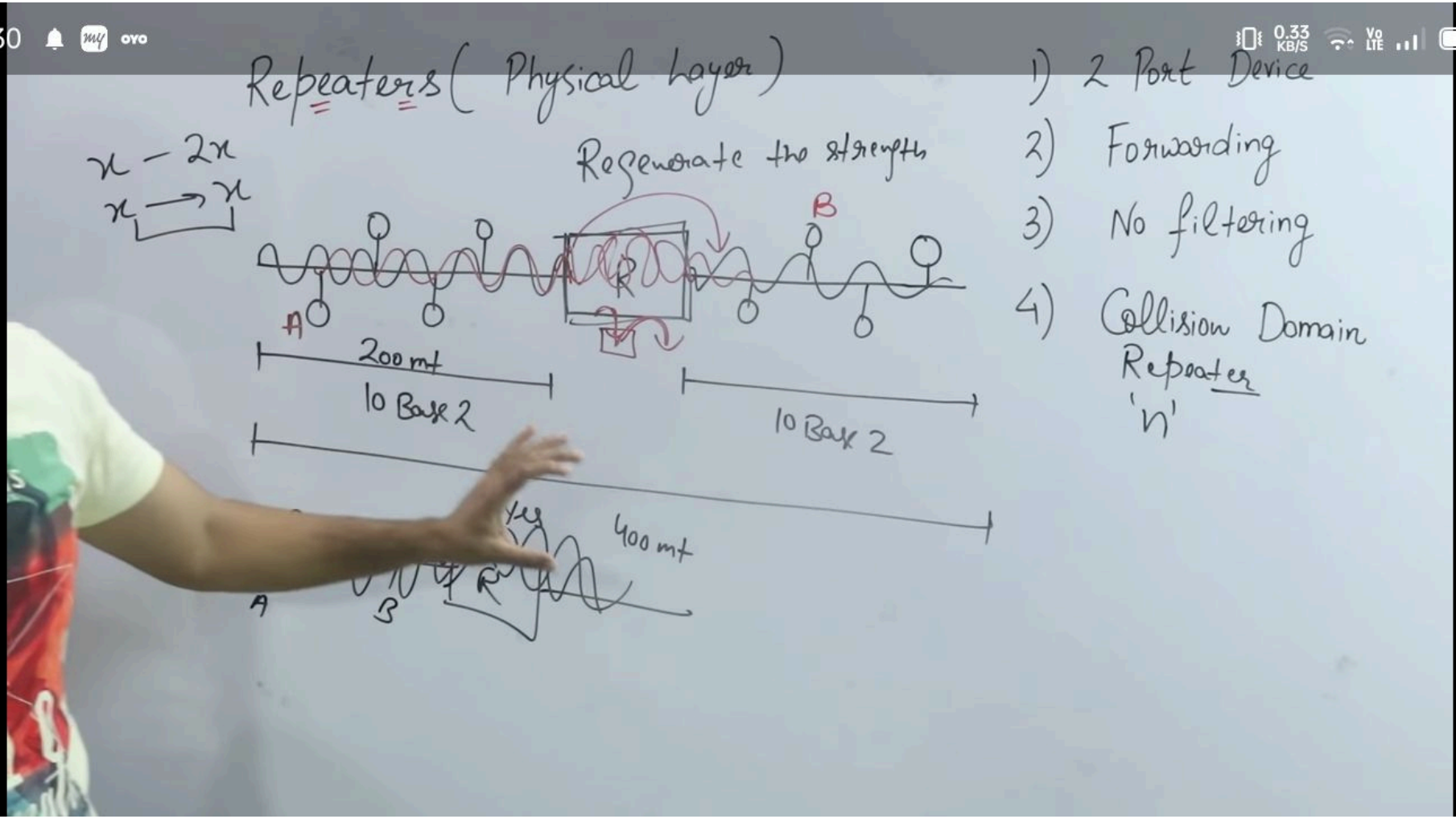

BUS
500 mt
A
Backbone
B
Drop
Terminator
OR
Repeater
500 mt
Same
Same
'n'
RING
A
B
C
D
Collision
SUBSCRIBE

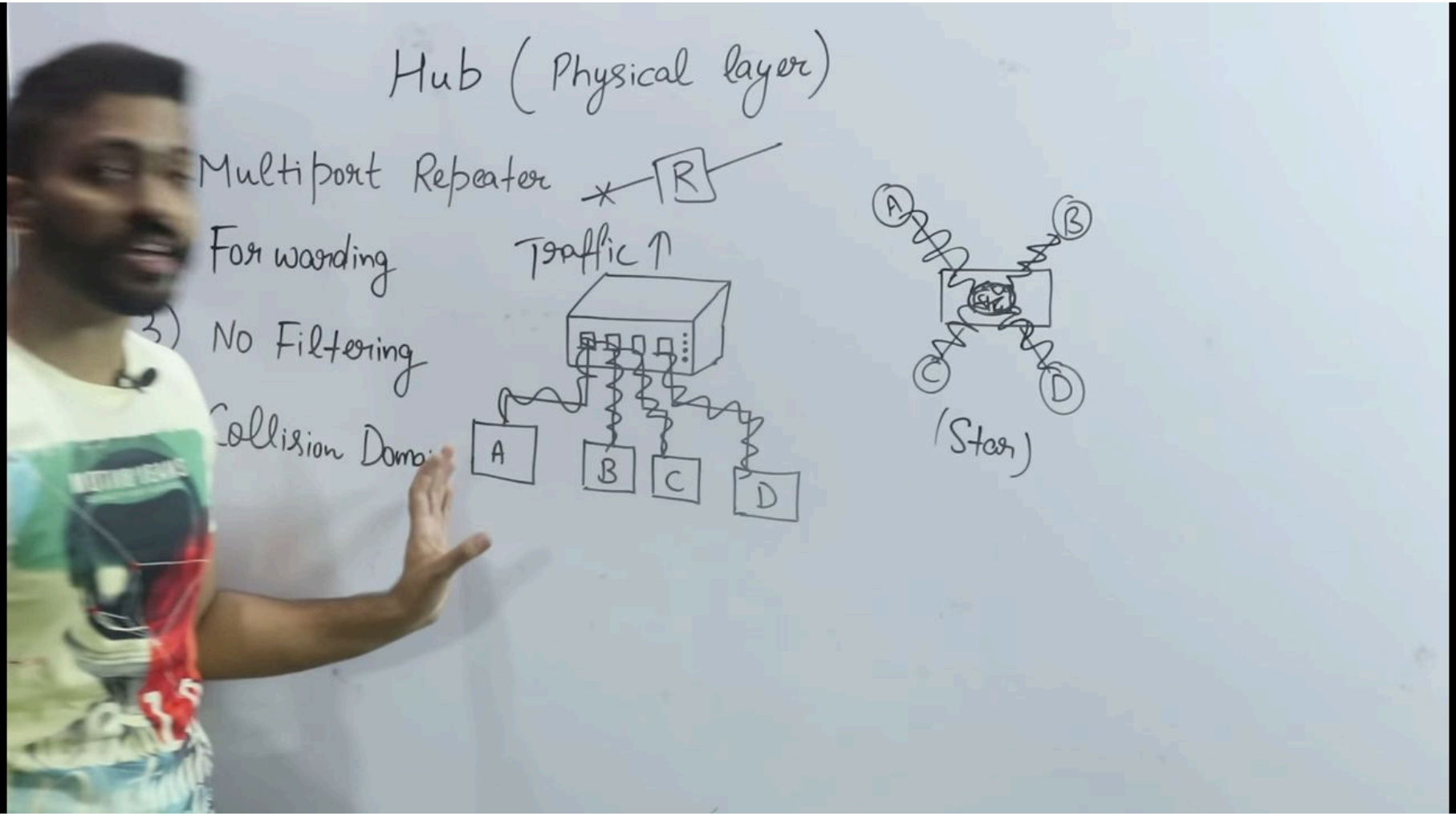

"Manchester Vs Differential Manchester Encoding"
1 →
0 →
1
0
0 ⇒
1 ⇒
1 0 1 0 0
0 0 1 1 1


"Manchester Vs Differential Manchester Encoding"
1
0
0 ⇒
1 ⇒
SUBSCRIBE


Various Devices in Computer Networks
H/W
1) Cables
2) Repeaters
3) Hubs
4) Bridges
5) Switches
6) Routers
H/W
S/W
7) Gateway
8) IDS
9) Firewall
Security
10) Modem
SUBSCRIBE


Physical
Cables
Ethernet LAN
Collision
'n' devices
Unshielded twisted pair Cable
10 Mbps, 100 mt
10 Base T, 100 Base T
Coaxial Cable
10 Base 2
10 Base 5
Base band
Broad band
200 mt.
Fibre optic – 100 Base Fx – ≃ 2 Km
D
Medium
100 mt
Attentuation

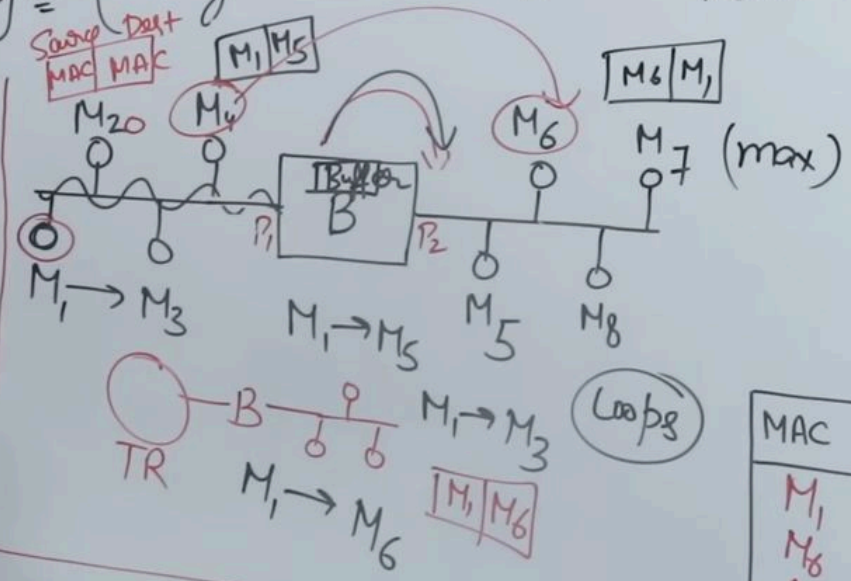

Repeaters (Physical Layer)
x − 2x
x → x
Regenerate the strength
A
R
B
200 mt
10 Base 2
10 Base 2
400 mt
A
B
R
1) 2 Port Device
2) Forwarding
3) No filtering
4) Collision Domain
Repeater
'n'


Hub (Physical layer)
Multiport Repeater
R
For warding
Traffic ↑
3) No Filtering
Collision Domain
A
B
C
D
A
B
C
D
(Star)
SUBSCRIBE

Bridges (Physical and Data Link layer)

(Store and forward)

- Connect two different LANs
- Forwarding
- Filtering
- Collision Domain
- Bridge Data Unit Protocol



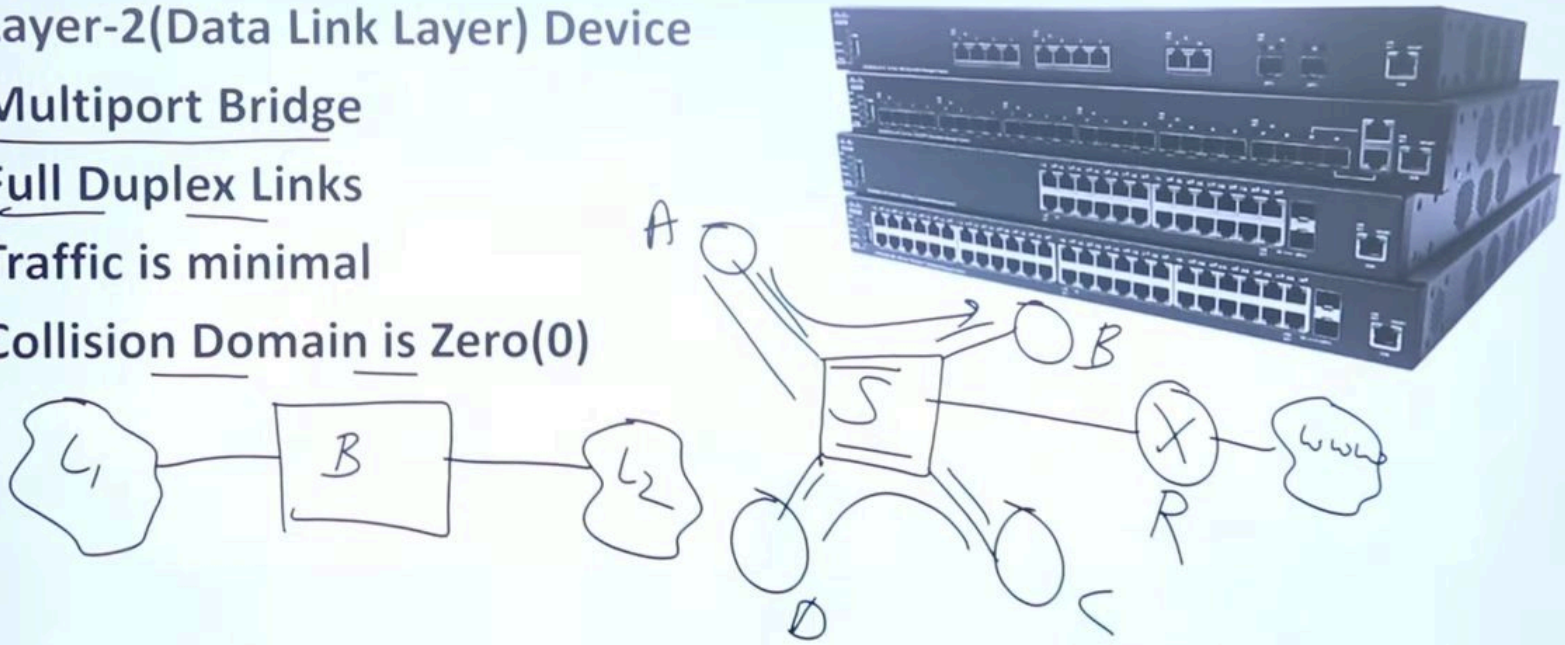
Types

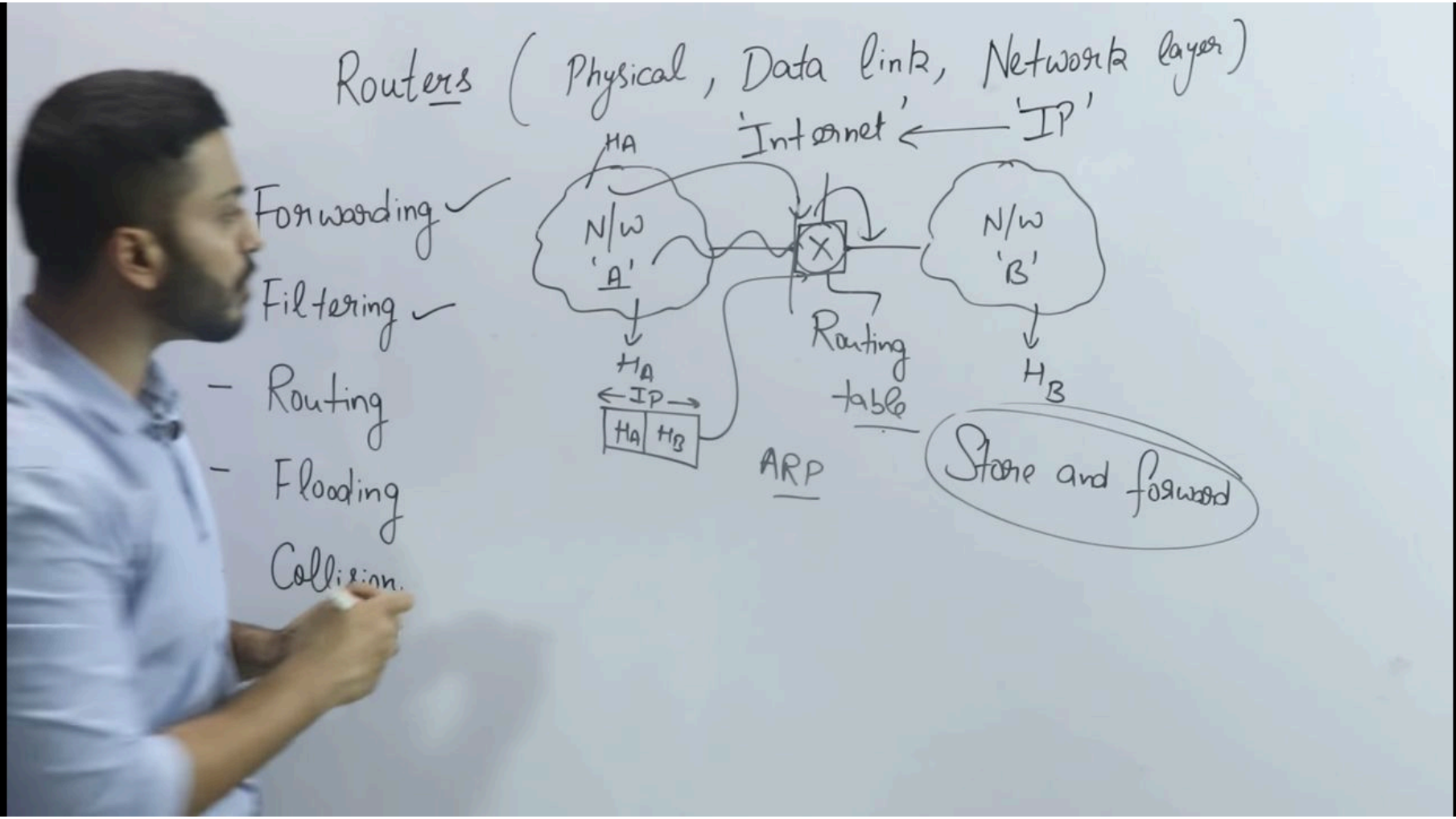
- Static
- Dynamic OR (Transparent)

MAC	Port
M1	P1
M6	P2
M7	P2
M4	P1

Switch

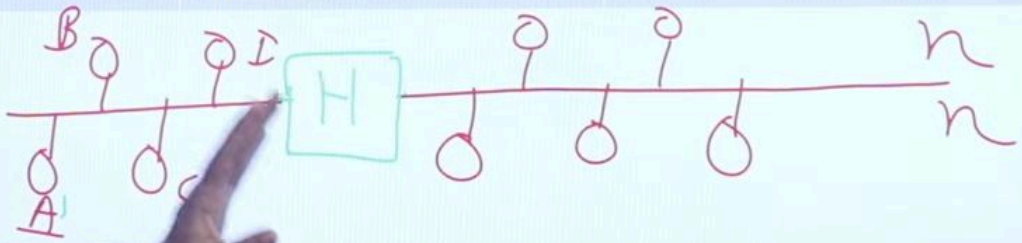
- Layer-2(Data Link Layer) Device
- Multiport Bridge
- Full Duplex Links
- Traffic is minimal
- Collision Domain is Zero(0)




Routers (Physical , Data link, Network layer)
'Internet' ← 'IP'
HA
N/W 'A'
X
N/W 'B'
Routing table
HB
HA
← IP →
HA HB
ARP
Store and forward
Forwarding
Filtering
- Routing
- Flooding
Collision.
SUBSCRIBE

Collision Domain vs Broadcast Domain

	Device Name	Collision Domain	Broadcast Domain
	Repeater	No Change	No Change
	Hub	No Change	No Change
	Bridge	Reduce	No Change
	Switch	Reduce	No Change
	Router	Reduce	Reduce



Collision Domain vs Broadcast Domain

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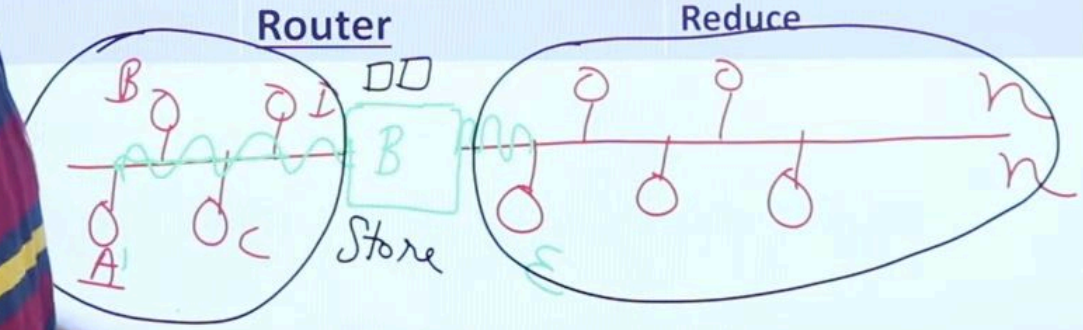
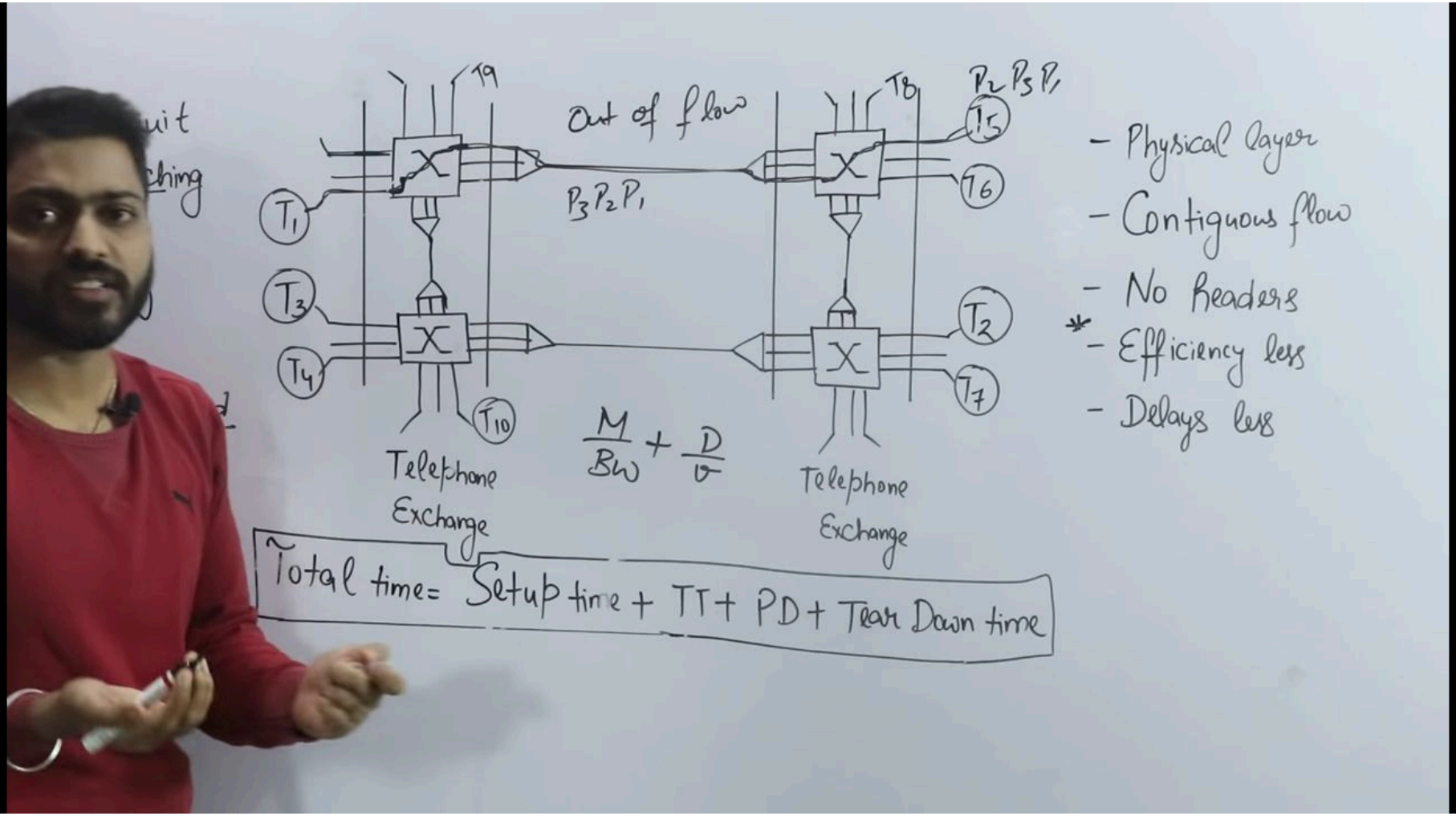
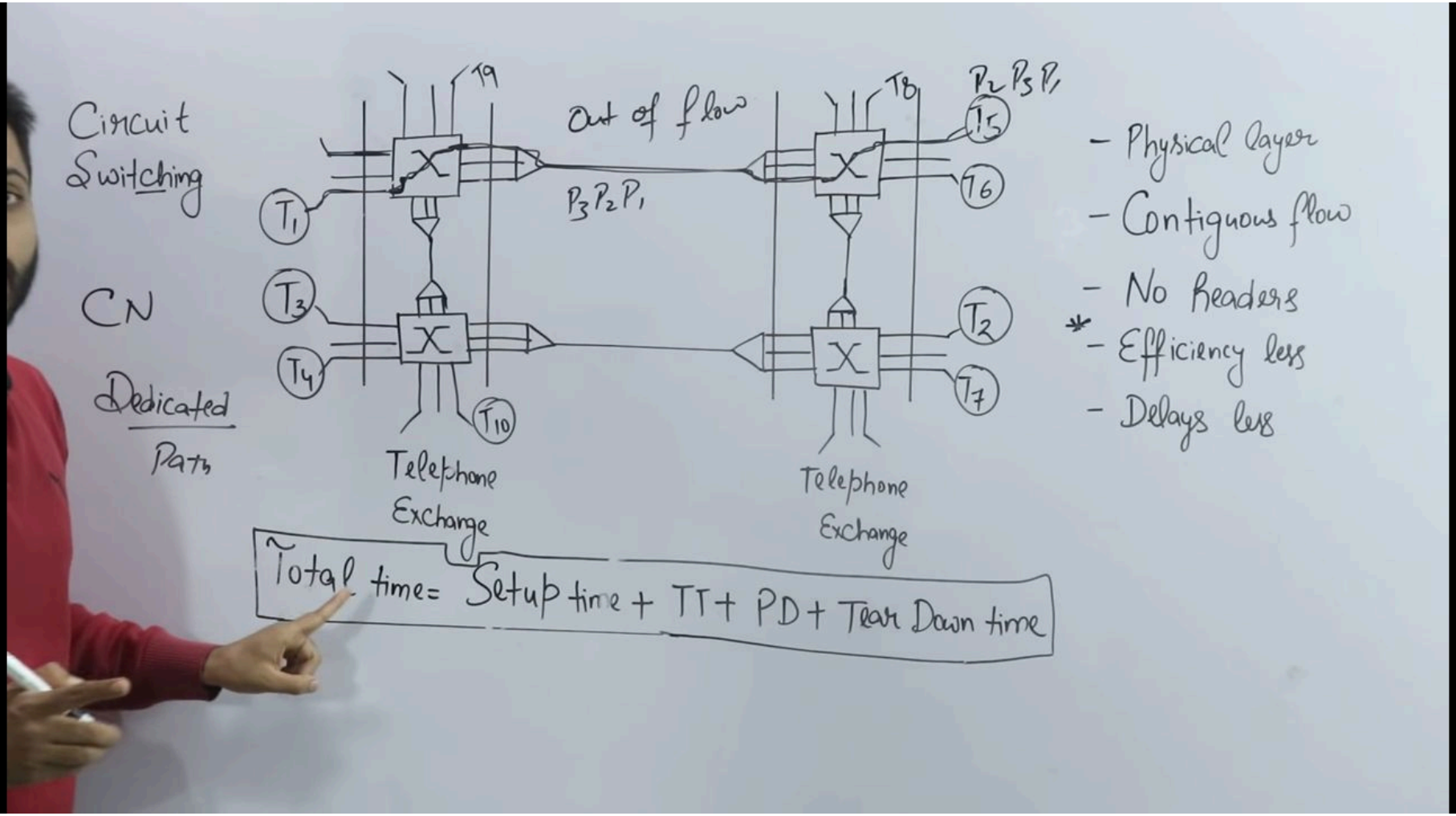
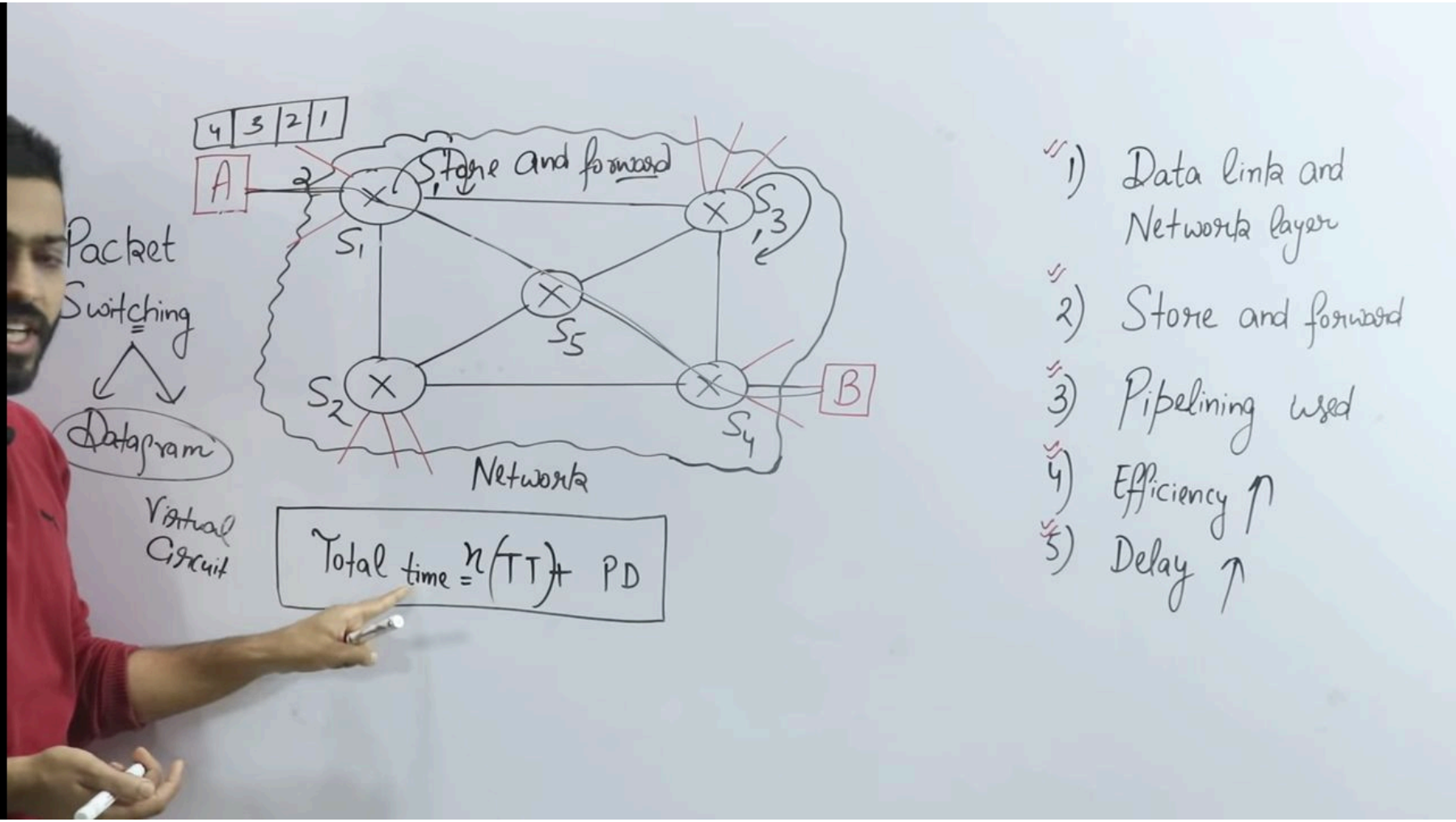
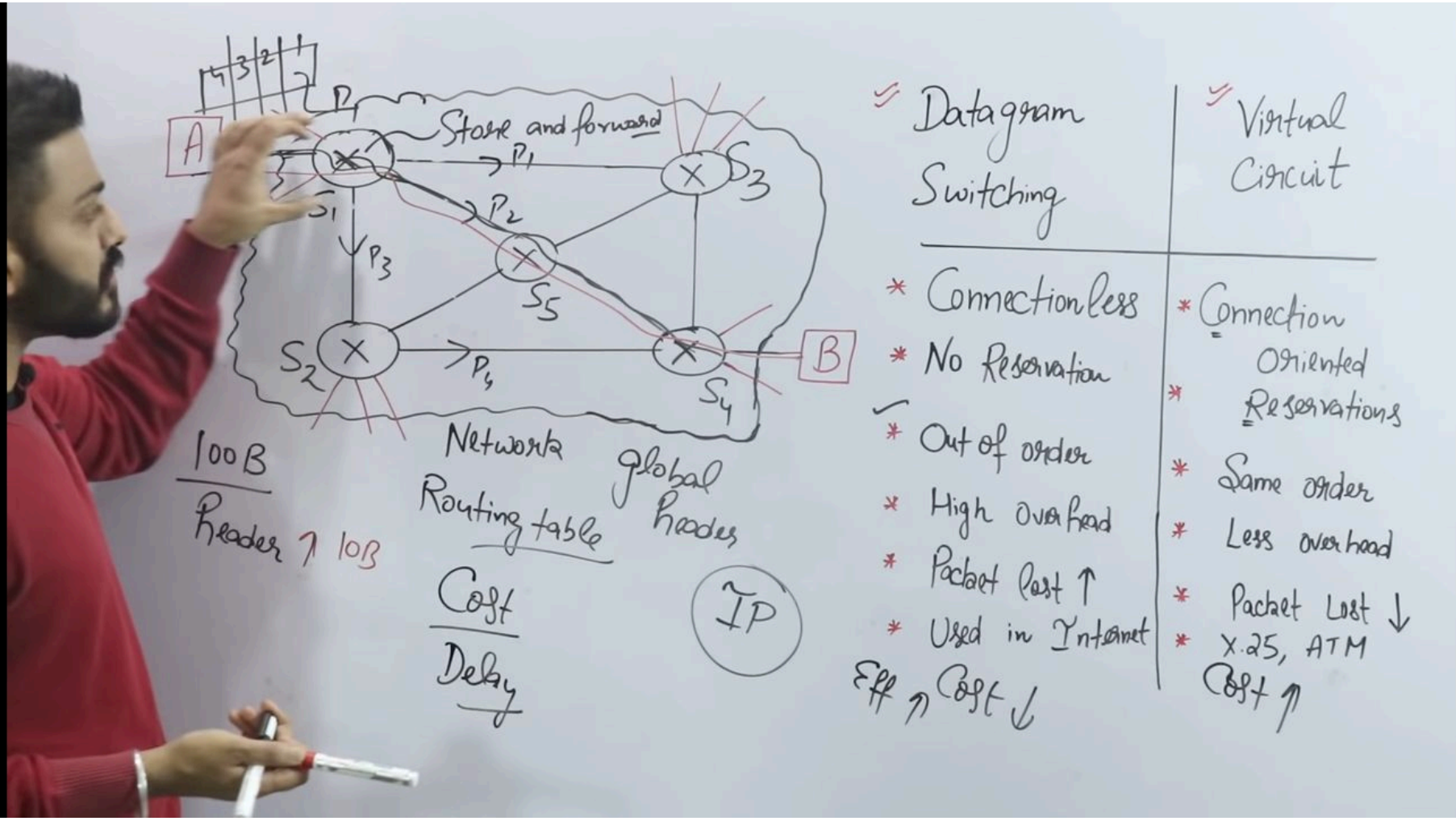
	Router	Reduce	Reduce




T9
Out of flow
T8
P2 P3 P1
T5
T6
T1
P3 P2 P1
T3
T4
T2
T7
T10
M/BW + D/v
Telephone Exchange
Telephone Exchange
Total time = Setup time + TT + PD + Tear Down time
- Physical layer
- Contiguous flow
- No Headers
- Efficiency less
- Delays less
SUBSCRIBE


Circuit Switching
CN
Dedicated Path
T9
T8
Out of flow
P2 P3 P1
P3 P2 P1
T1
T3
T4
T10
T5
T6
T2
T7
Telephone Exchange
Telephone Exchange
- Physical layer
- Contiguous flow
- No Headers
- Efficiency less
- Delays less
Total time = Setup time + TT + PD + Tear Down time
SUBSCRIBE


4 3 2 1
A
Store and forward
S1
S2
S3
S4
S5
B
Network
Packet Switching
Datagram
Virtual Circuit
Total time = n(TT) + PD
1) Data link and Network layer
2) Store and forward
3) Pipelining used
4) Efficiency ↑
5) Delay ↑
SUBSCRIBE


4 3 2 1
P1
A
Store and forward
P1
S3
P2
S1
P3
S5
S2
P4
S4
B
Network
global
Routing table
Headers
100 B
Header ↑ 10B
Cost
Delay
IP
Datagram Switching
Virtual Circuit
* Connectionless
* No Reservation
* Out of order
* High overhead
* Packet lost ↑
* Used in Internet
Eff ↑ Cost ↓
* Connection Oriented
* Reservations
* Same order
* Less overhead
* Packet Lost ↓
* X.25, ATM
Cost ↑
SUBSCRIBE

"Message Switching"

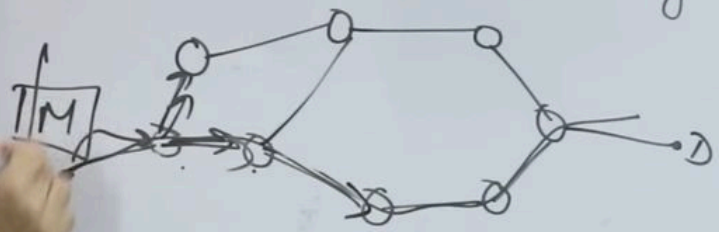
→ Predecessor of Packet Switching

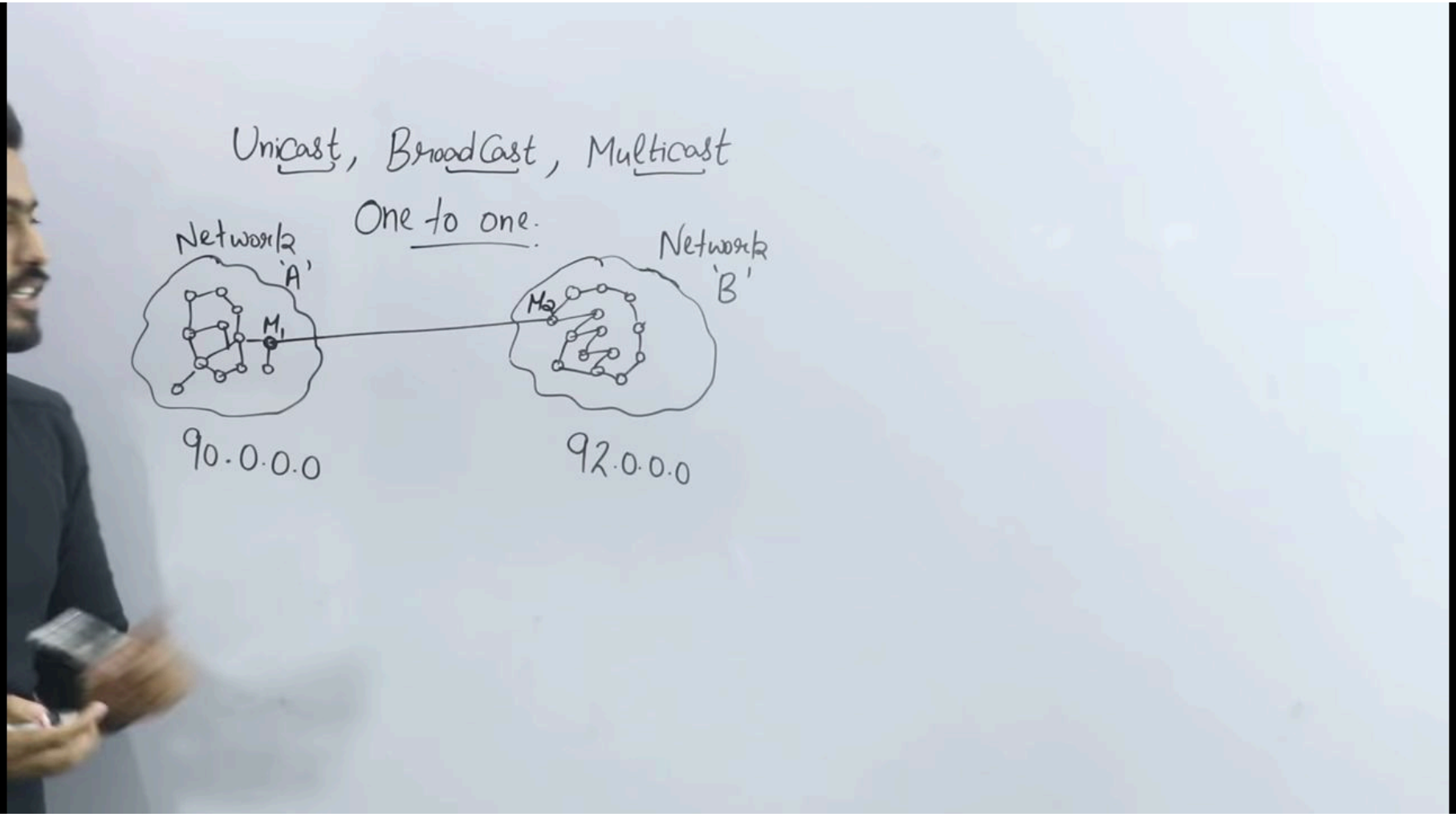
→ Store and forward

→ Hop by Hop delivery

Hard disk

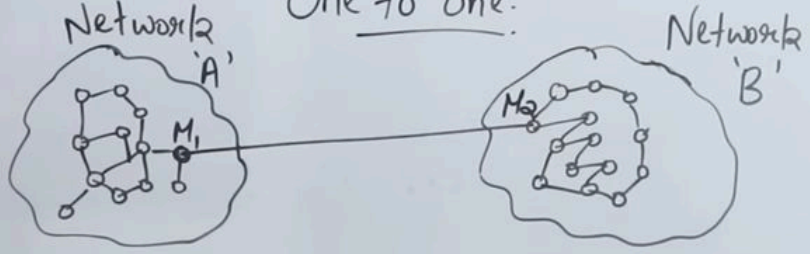
CS
↓
MS - 1960
↓
PS




Unicast, BroadCast, Multicast
One to one.
Network 'A'
Network 'B'
M1
M2
90.0.0.0
92.0.0.0
SUBSCRIBE

Unicast, BroadCast, Multicast

One to one.



90.0.0.0

92.0.0.0

255.255.255.255

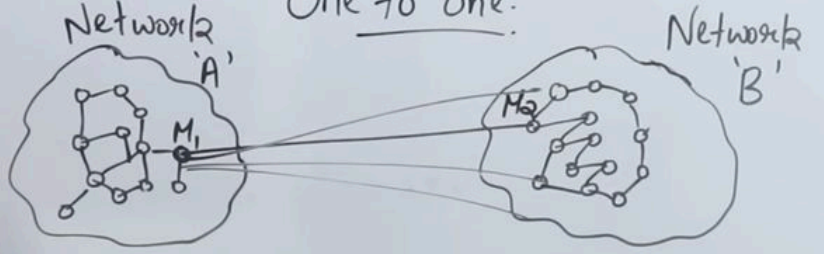
11111...

Limited

Direct broadcast

Unicast, BroadCast, Multicast

One to one.



90.0.0.0

255.255.255.255

11111111

92.0.0.0

92.255.255.255

Limited

Direct broadcast