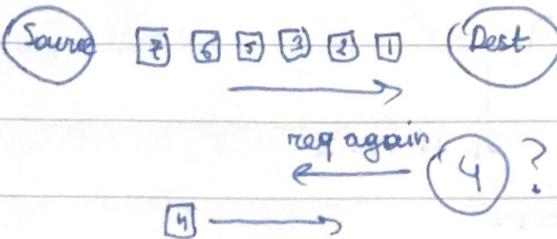


## TCP



port (0-65535)

well-known -(0-1023)

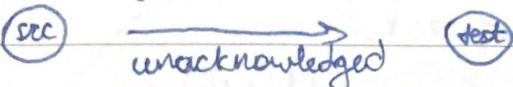
registered -(1024-49161)

dynamic/private  
(49152-65535)

used by computer

## UDP

connection-less



ICMP - diagnostics

ping

traceroute

IP - connectionless service

DNS - udp: 53 - client-server

tcp: 53 - inter-server

SMTP - tcp: 25

POP3 - tcp: 110

receiving email

IMAP - tcp: 143

manage email on server

Telnet - cleartext

tcp: 23

SSH - tcp: 22 → tunnel + FTP = SFTP

FTP - tcp: 21 (commands)

tcp: 20 (data transfer) ↑ data over commands

cleartext

TFTP - udp: 69 data transfer  
trivial

OrHOO

DHCP - IP address assignment  
dynamic host config

67  
68

HTTP : 80

HTTP + TLS = HTTPS : 443

RDP - remote desktop tcp:3389

LDAP - lightweight directory access tcp:389

LDAPS - tcp: 636

NTP port:123

VOIP:

SIP - session initiation [ 5060 , 5061 ]

H323 → 1720  
SMB - server message block ports: [ 445 ]

OSI Model

application functioning block

Application (hosts, NGFW) User applications  
FTP, POP3, SMTP, IMAP, HTTP, DNS

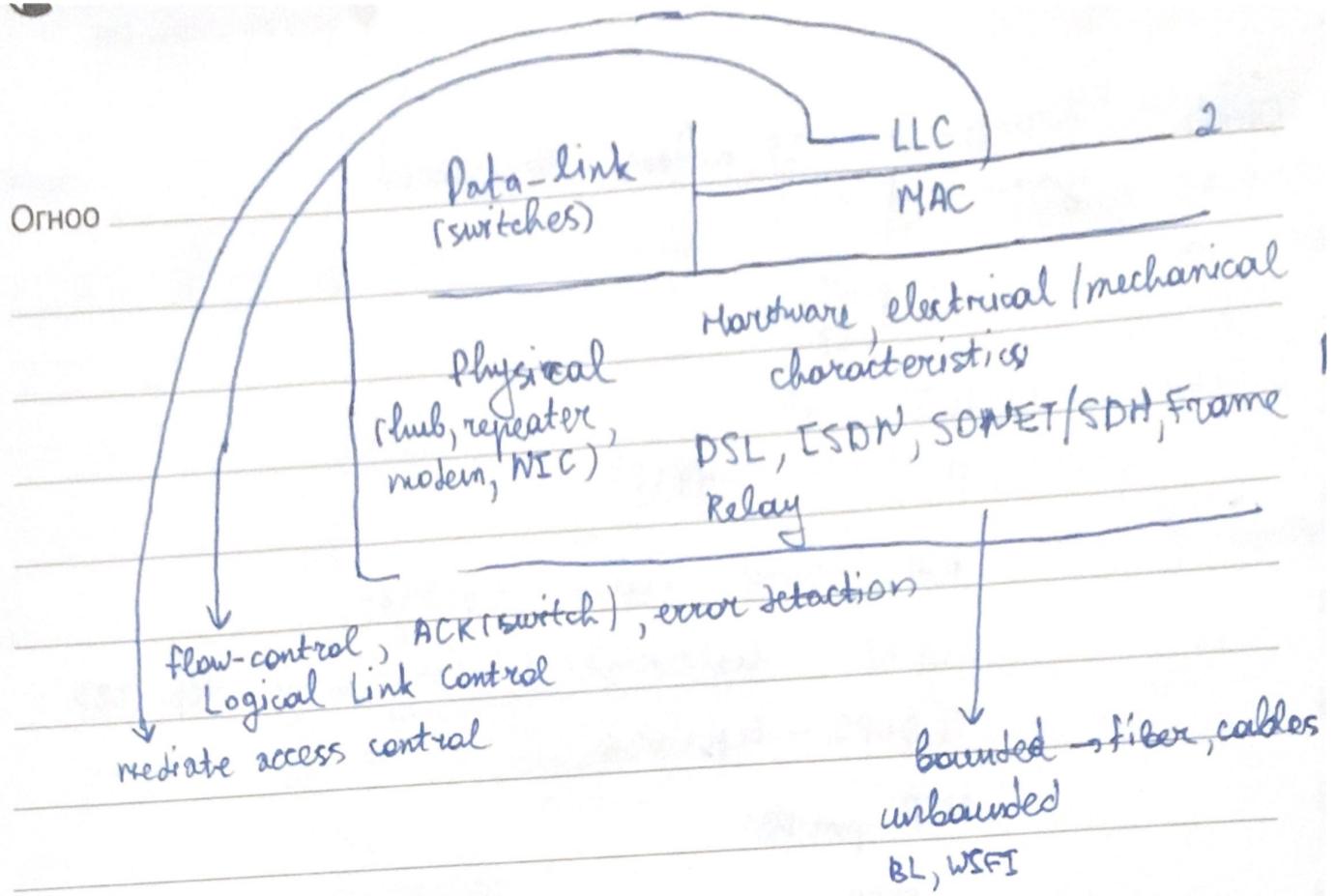
Presentation (NGFW) Formatting, Data encryption  
compression, Syntax

Session (NGFW) Connection establishment  
communication parameters maintaining

Transport (gateways) Move data along the network  
segmenting, sequencing  
TCP, UDP

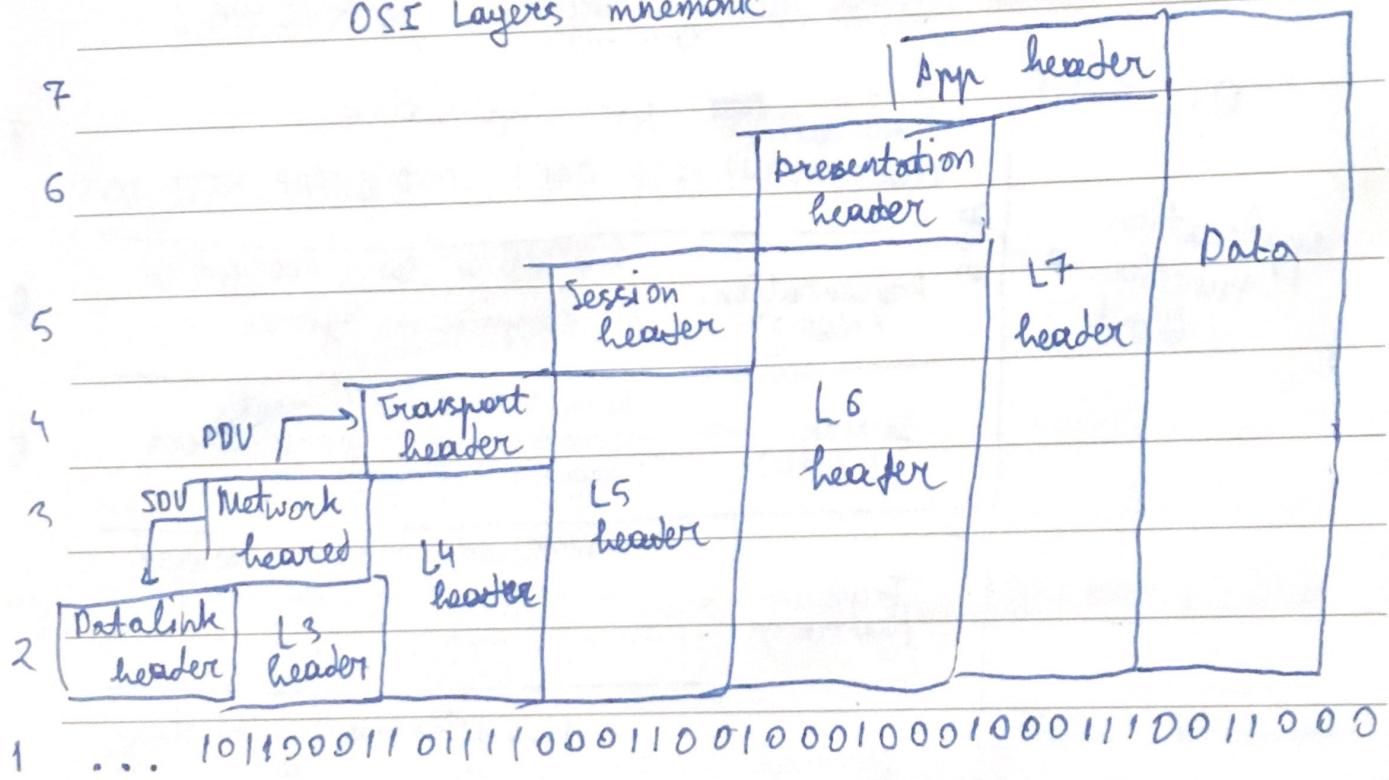
Network (routers, L3 switch) Packet forwarding, routing,  
addressing

IP, ICMP, OSPF, RIPv2, BGP



All people ~~not~~ seem to need data processing.

OSI Layers mnemonic

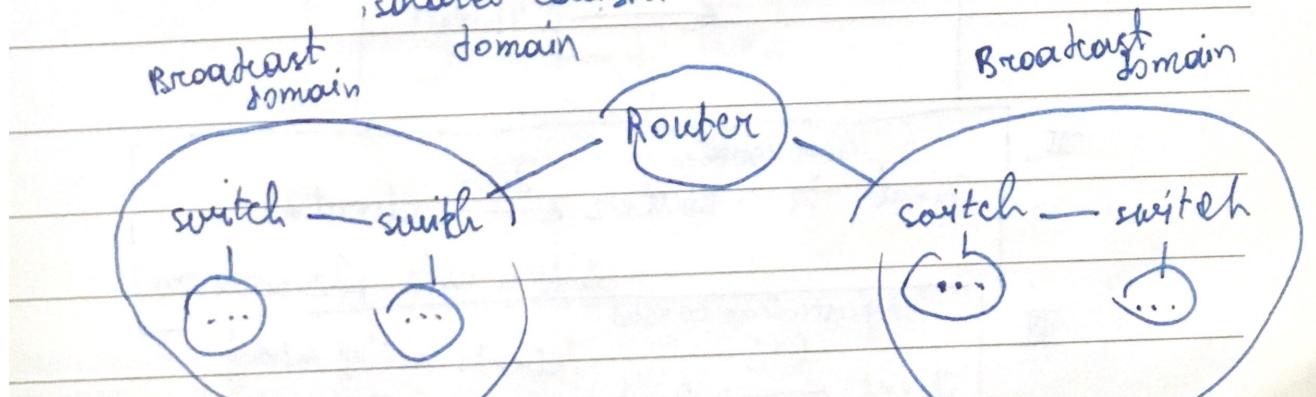
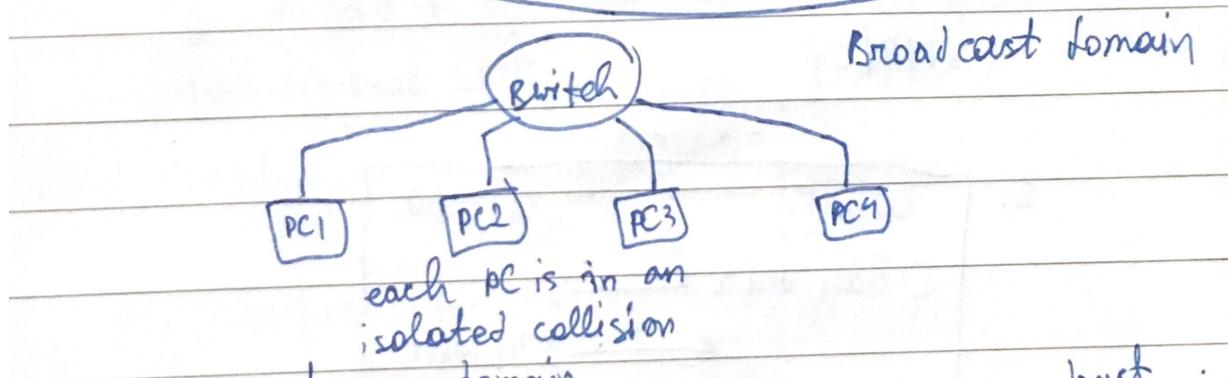
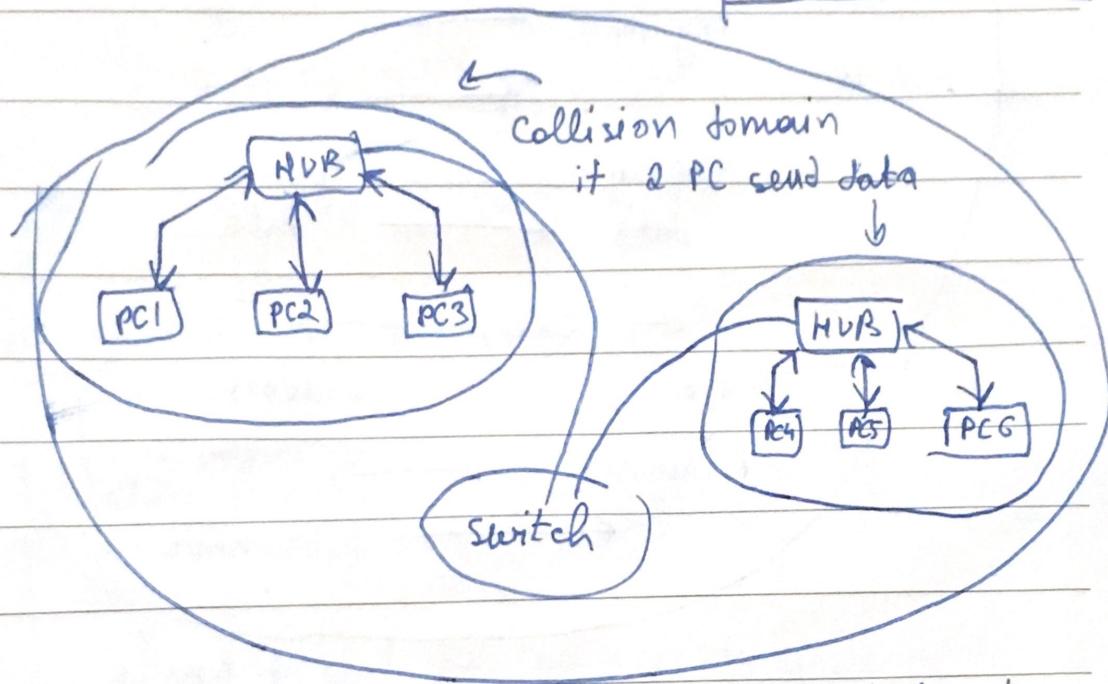


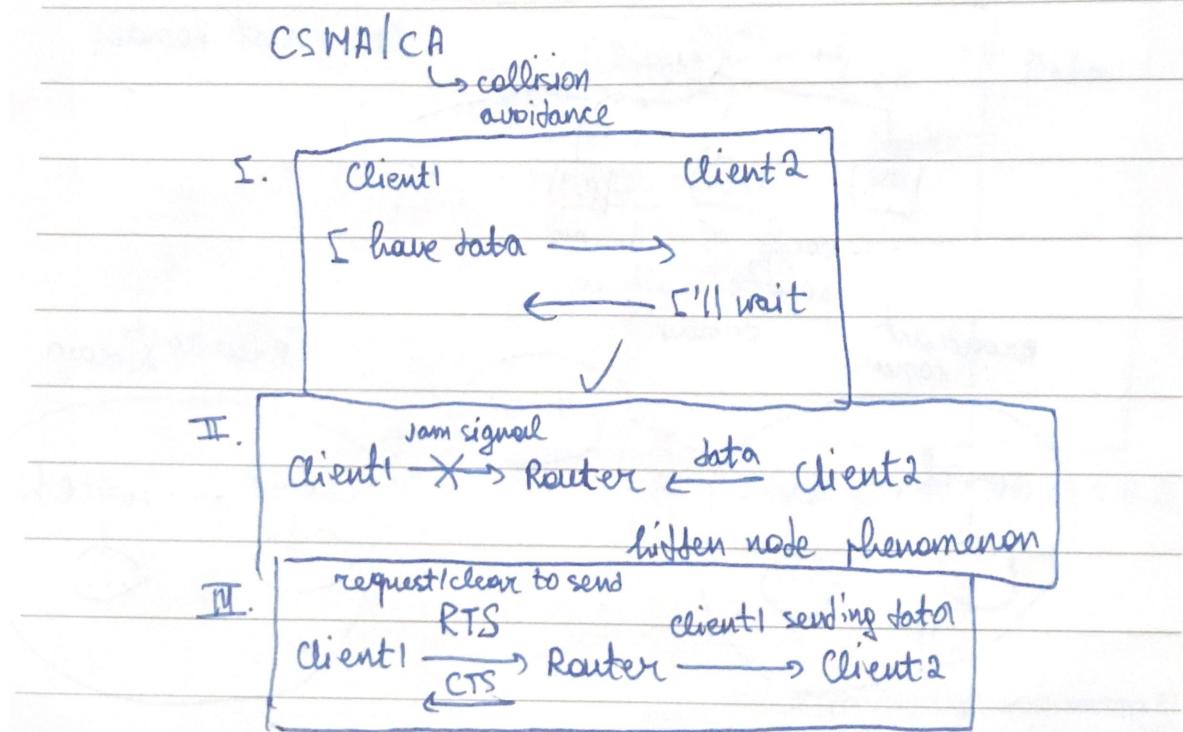
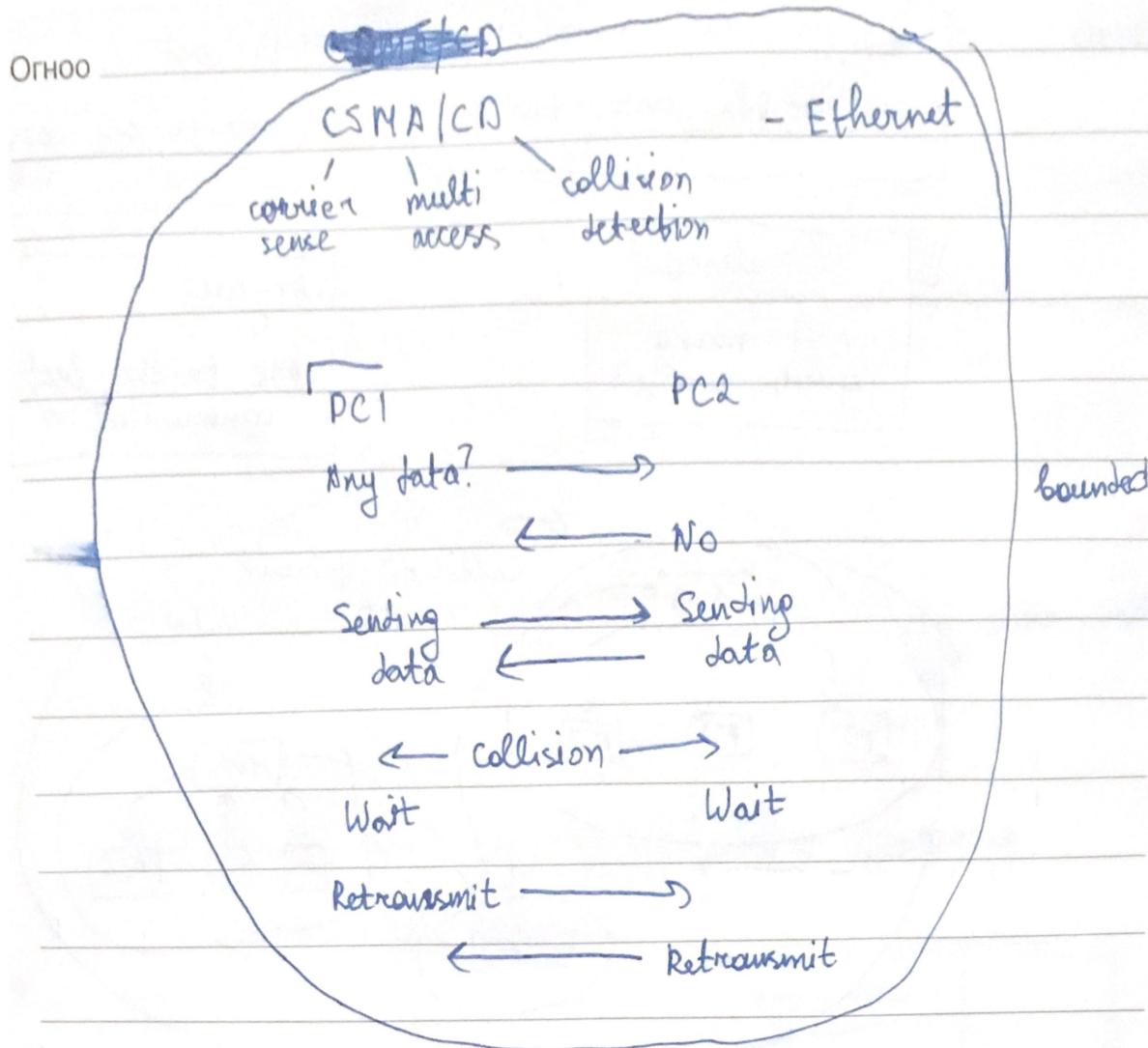
Broadcast  
one-to-all communication

Unicast  
one-to-one communication

Multicast  
one-to-many  
(specific group)

Anycast  
one-to-the-best  
communication





THOO

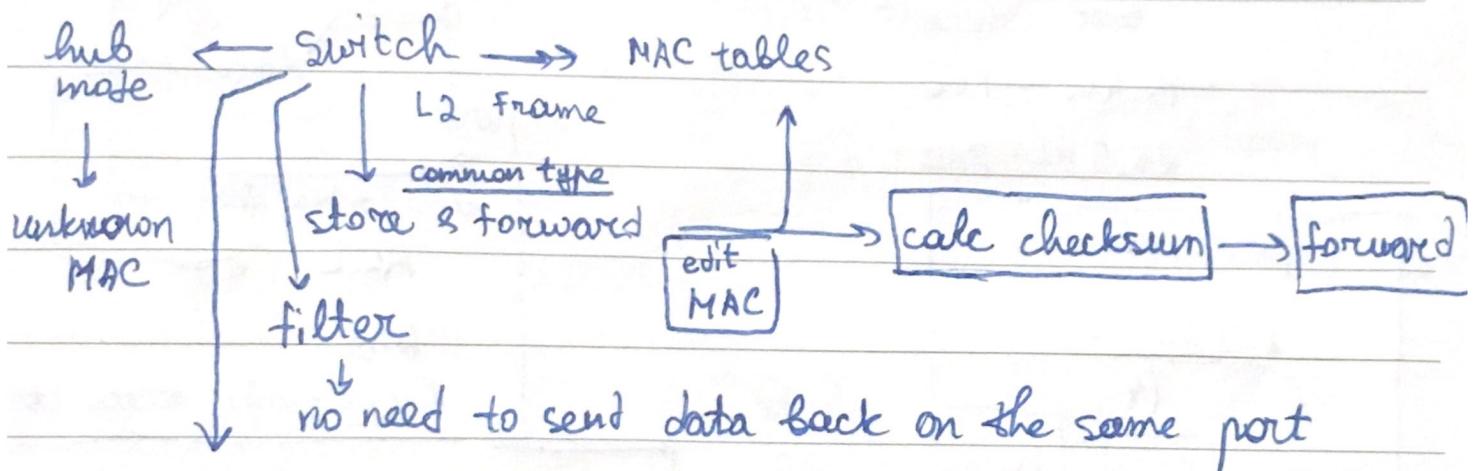
PDUs → protocol data unit (up)

SDUs → service data unit (down)

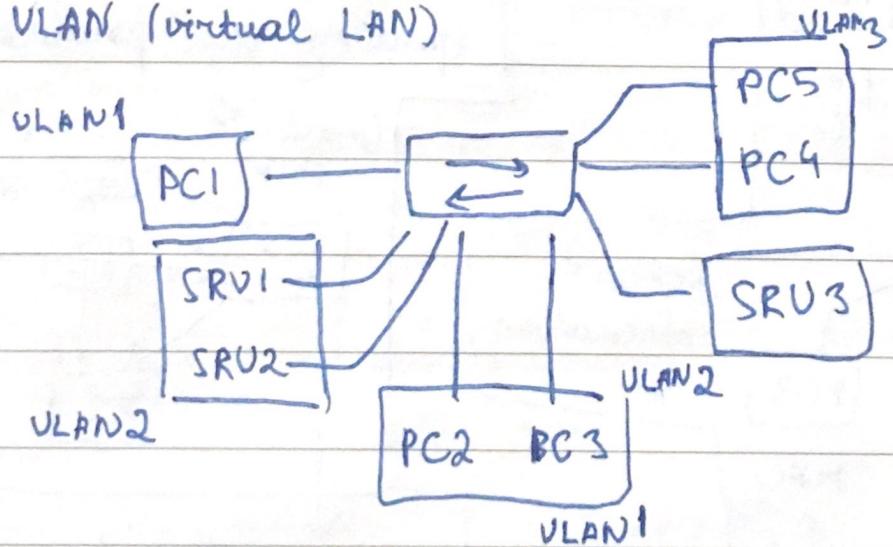
OSI model

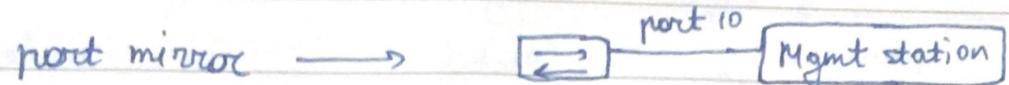
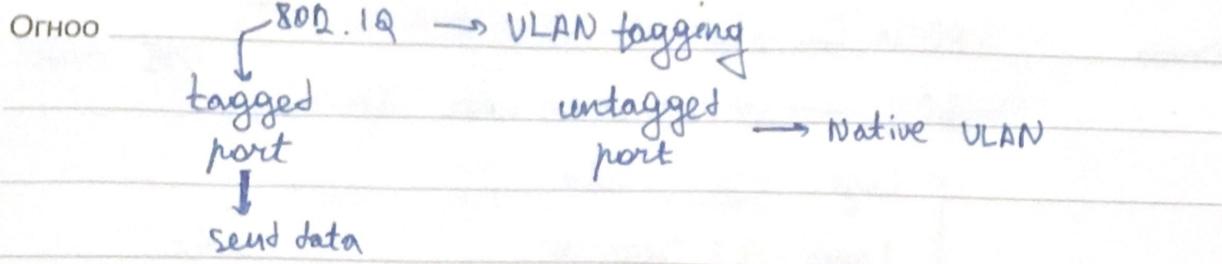
PDUs	Layer 5-7 = Data	
	Layer 4 = Segment	Some
	Layer 3 = Packet	People
	Layer 2 = Frame	Face
	Layer 1 = Bit	Birthday

MTU - maximum transmission unit  
(def: 1500 bytes)



VLAN (virtual LAN)





802.3af  
PoE → power over ethernet

PoE+ 802.3at

send electrical current over Ethernet

15.4W - PoE

25.5W - PoE+

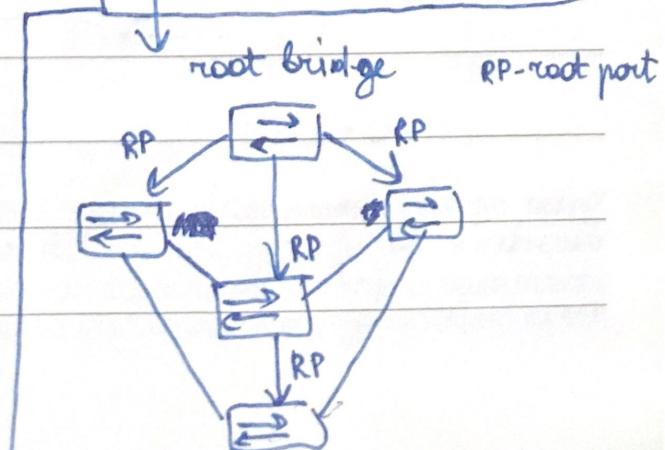
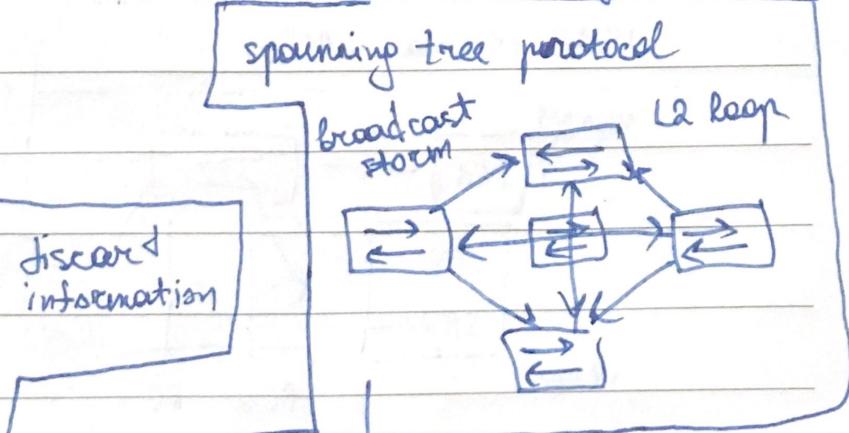
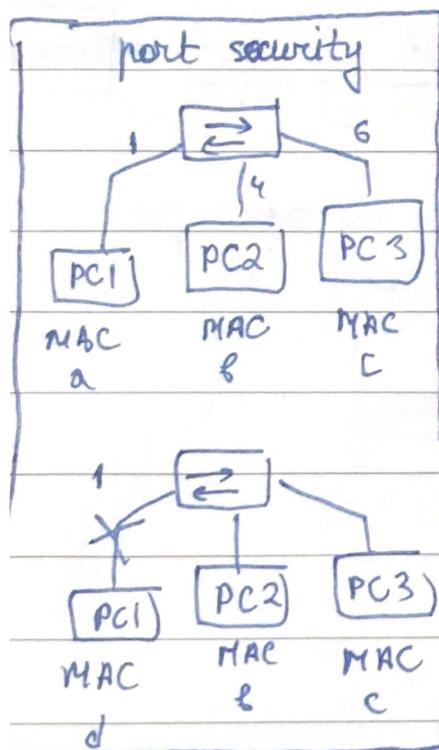
port 2 + mirror to port 10  
other

port forwarding

forward  
based  
on  
access control list  
ACL

DAC

discretionary access ctrl



ОГНОО

distributed switching - SDN - software-defined networking

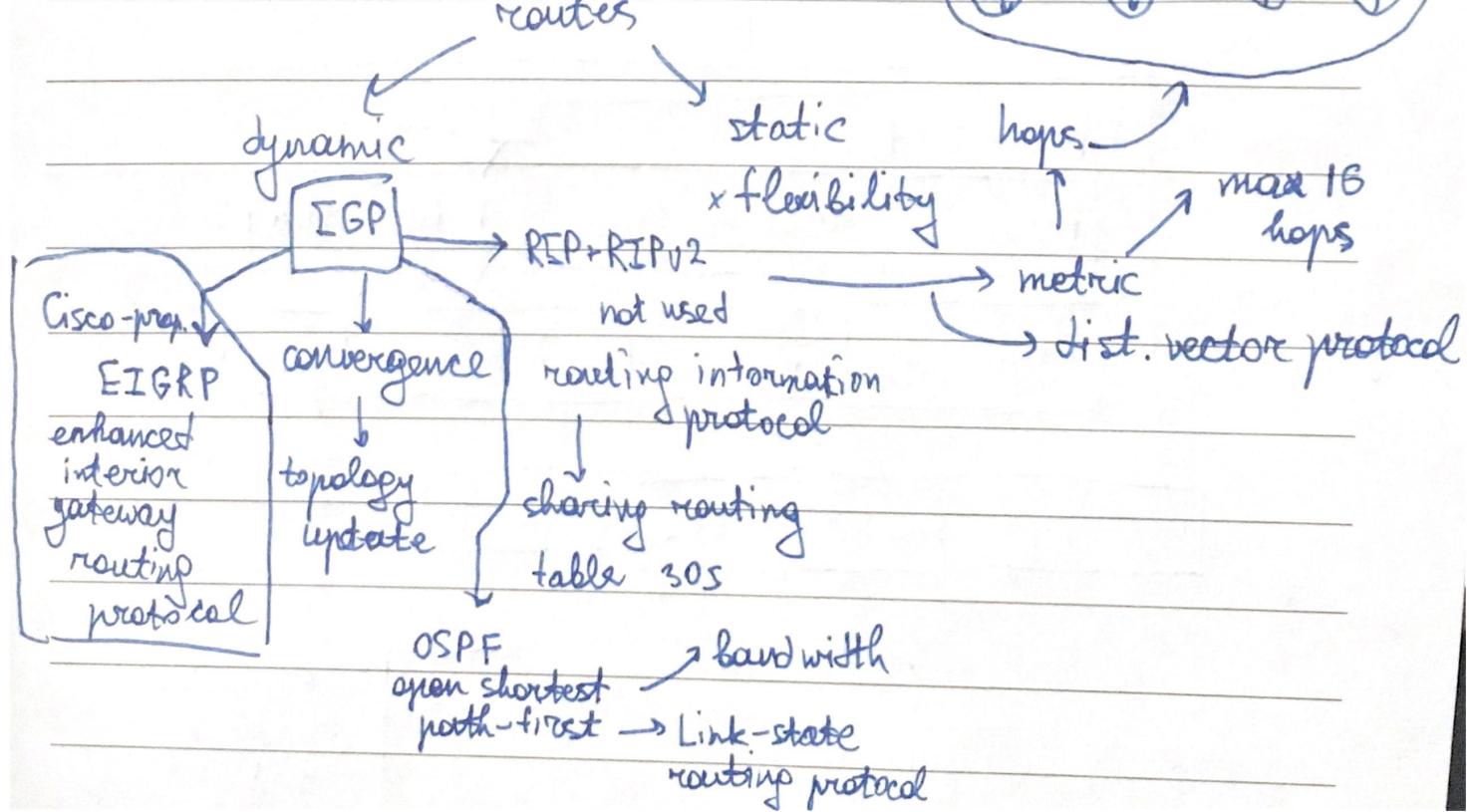
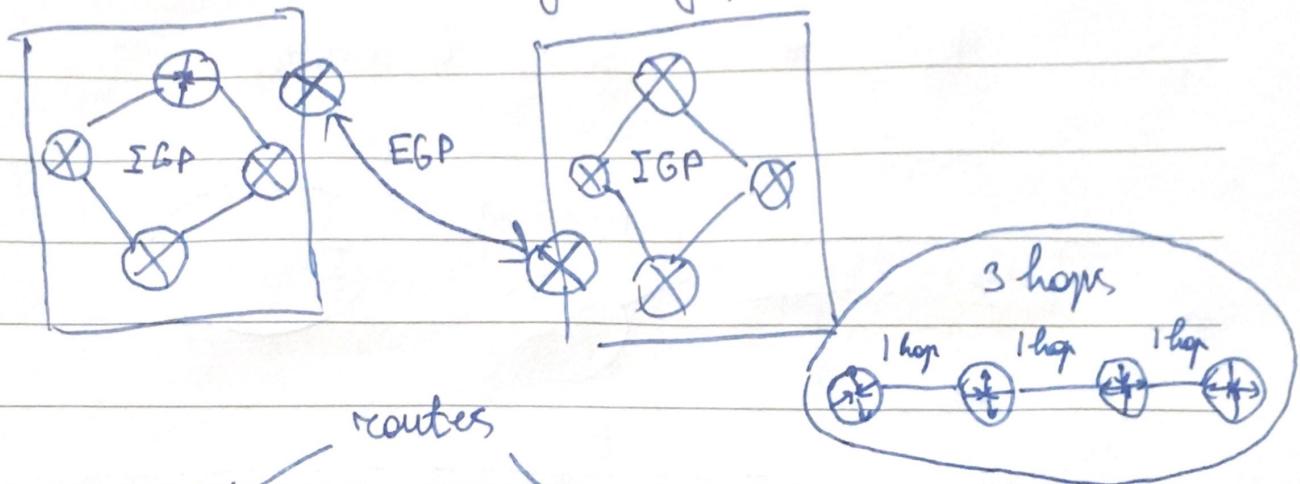
access layer → access

distribution layer → routing / switching

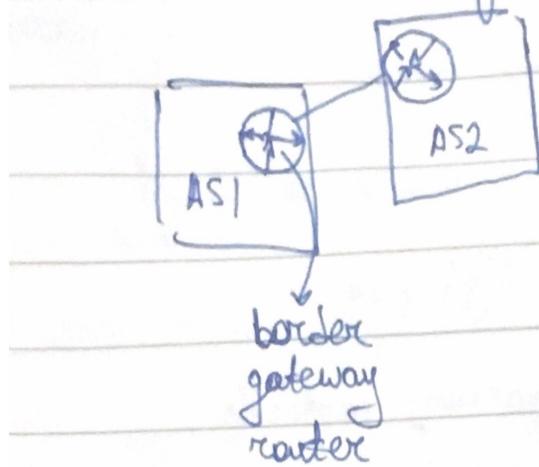
core layer → high speed

IGP - interior gateway protocols

EGP - exterior gateway protocols



# BGP - border gateway protocol



NAT → munging IP header

