E 25-05-2025 DAY:

Holistic Learning Model

Network

connectivity b/w devices.

info exchange

Resource ~~Exchange~~ e-Sharing.

Information → Voice, Video, Data.

* key Learning Objective

How to migrate on-premises Data to cloud?

* Cloud Administrator

What is Data center?

is just buildings filled with servers-

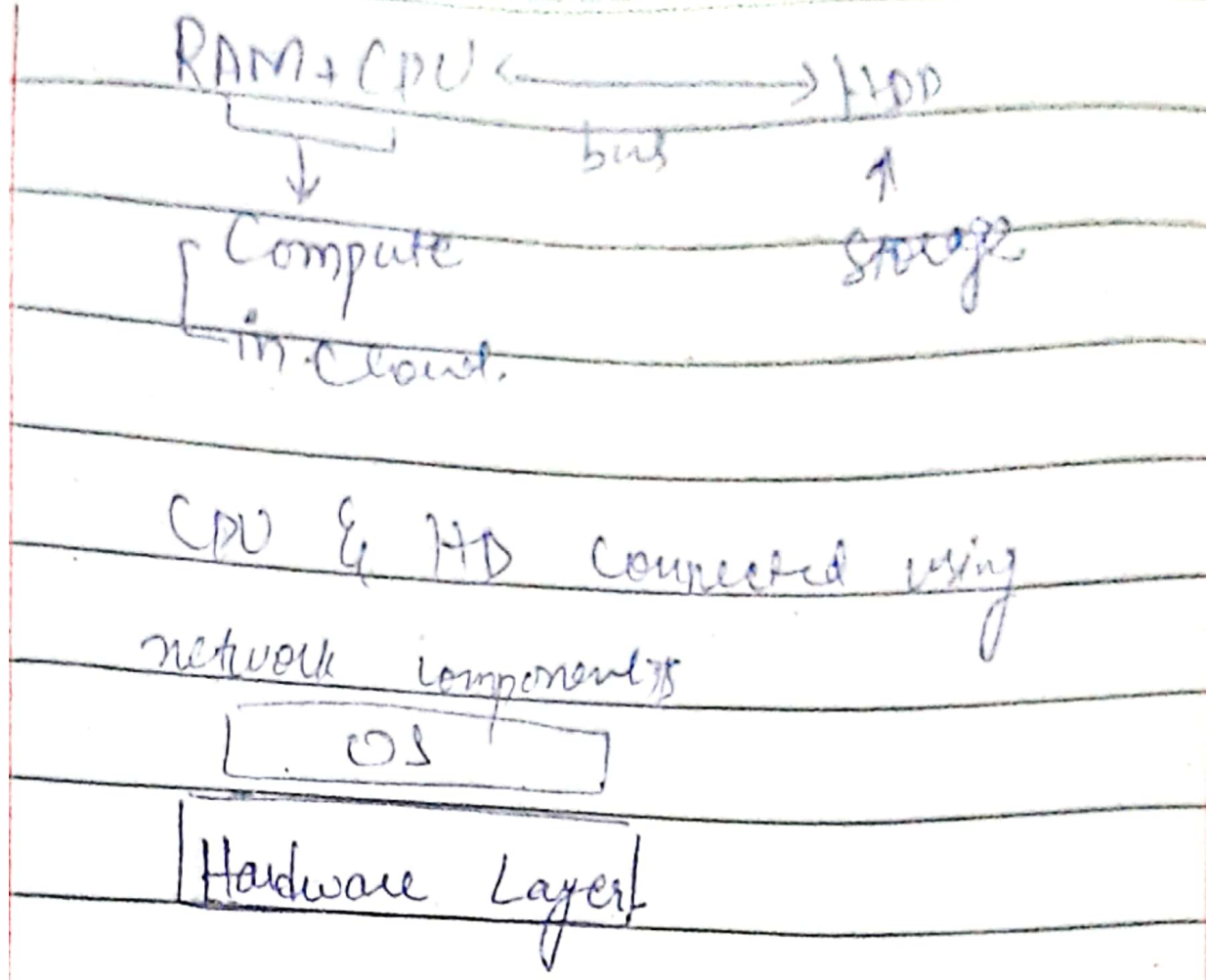
cold hot Hot

node:

Compute, Storage, Network

CPU ⟷ HD

Read/write.



CPU & HD connected using network components

OS

Hardware Layer

~~Application → web service (PP).~~

OS

HL

Jazz

↳ value edit Services.

Migration:-

Shifting application from on-ground infrastructure to cloud infrastructure.

Networks

Hub is the mother device
(broadcast) works on physical layer.
LAN/WAN all cables on physical layer.
2nd intelligent.

Multi cast, Unicast, Broadcast, anycast.
1 to many. 1 to 1 one to all
1 to specific group. tough hacking.
near to source
near to destination
Servers distributed

Redirection -

CLI/version - Switch
first time broadcast
then unicast.
Router is → unicast.
MAC → hop to hop travel.
Layer 3 decides → packet mera hai k ni.
→ Switch works on Layer 2
→ Hub works on Layer 1.

Router works on Layer 3
→ always unicast device for data.

Date: Page:

1. Unicast / multicast for protocols jahan uska lagega data destination ni hai them broadcast ni karega kaga kega.

~~IPV4 - IPV4~~

Switch :

IP :

Sub :

Gateway :

LAN :

Ethernet

Fast

fiber 10gb.

WAN :

Serial ~~0/1~~ 150MB

↳ 1544kB by default capacity.

(Repeator)

---

* Routing :

IP → Routed → to carry data.

Routing → to find best path

bandwith ↑ delay ↓.

Date

IP Address

A unique identifier of node in network

192.168.1.11

Public.

IPV4 Address

↳ Decimal format

195.165.11.66

X.X.X.X → octat.

0
:
255

↳ har octat mai 256 no hotai hain.

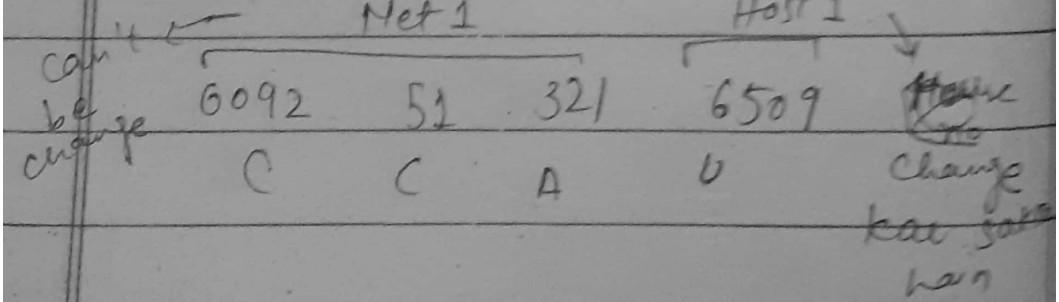
network Id → us range ki pehchan.
(Location)

Router perform routing on the basis of network id.

Last id is Broadcast Id.

195.1.1.0/24

1st & Last ip is not for use.



Format

Humans X . X . X . X

Machines 8 8 8 8

32 Bits

IPV6
Hexa decimal
Bits

Iana → built Table for IPV4 Address

PTCL × no public Id

private IP / Public IP.

nat → translate

Interview Table.

CCNA
CCNP

4 (X).X.X.X

DATE: 31-May-2025.

	Class	Range	1st Bit	Default /	Default Subnet Mask	Private Address
Commercial	A	0-127	0	/8	255.0.0.0	Class A 10.0.0.0/8 – 10.255.255.255.
	B	128-191	10	/16	255.255.0.0	B 172.16.0.0/12 – 172.31.255.255
	C	192-223	110	/24	255.255.255.0	C 192.168.0.0/16 – 192.168.255.255
Multicast	D	224-239	1110	X	X X	X
Test & Research	E	240-255	1111	X	X X	X

0 & 127 is not for sale.
0 → reserved
127 → loop back pinging

DAY:

On-premesis
↳ organizedo on network

OS:

OS arange resources/hardware to fulfill need

User req → Kernel

OS

Learn networking & protocols
Learn programming
Understand Database & cloud platforms.
Learns basics of cyber sec
Certification

OS

Problems with traditional IT approach.

↳ Pay rent for data center.
↳ Pay for power supply, cooling, maintenence. percision AC.
→ Adding and replacing hardware takes time.
→ Scaling is limited.
→ Hire 24/7 teams to monitor the infrastructure
→ How to deal with disasters? (earthquake, power shutdown, fire...)

DATE DAY

Can we externalize all this?

Cloud is nothing but like rent a car.

* Cloud Computing: computing provide access to shared resources e.g servers, storage, networks, applications, services etc.

Features of cloud include:
- On demand Self Service.
- Network Access.
- Resource Pooling.
- Elasticity (on click ↑ & ↓).
- Metered or measure service.

Interface: interface which follows cloud.

Cloud Model: play as you go model.

DATE: DAY:

Cloud computing Services

IaaS, PaaS, SaaS

↳ email, facebook

IaaS : Infrastructure as a service.

XAAS → everything as a service.

Cloud Deployment Models-

According to the definition of the National institute of Standards & Technology there 4 Dep mod.

public cloud Service Provider

Public cloud - → Resources are being acquired by → Access? → Anyone can access.

Private " - → ownership of resources from company (e.g Jazz) → Access: open to only company's people.

Community "

Hybrid "

↳ cloud infrastructure should be massively scalable.

Private cloud

protocol

Openstack is used to build this layer

Wateen users

very imp skill

orchestration Layer

Resources

* autoscaling

Hybrid cloud
Pub + Pri cloud.
workload Dynamic
1st Private full
then workload shift to public.

Community cloud.
Group of people having mission objectives are common.
↳ use case of Blood → Hospital.

*agility:
you can create & release of resources by click of mouse.

* AWS Global Infrastructure.
• free tier acc search

DATE: 15 June 2025 DAY:

Cyber is anything on the internet with Ip address.

[Region
[Availability zone = Data Center (provide services) Latency?

migration from "on premises" to "cloud"

aws pricing calculator.

What are the factors for region selection?

1- Latency.
2- Governence → Rule data geographical boundaries
Isi bahir ni jayega e.g Saudia.
3- Cost.

aws pricing calculator. EC2 virtual machine on cloud.

Create

Compute → CPU + RAM (Memory)

Asia Pacific (Hyderabad) Mumbai.

1,022.00 USD.

Date _____ Day _____

Local hop → danger.

Latency

Subnetting → chunks main hoti.

Host part mai sai required portion network ko dena.

195.1.1.0 | 24

↓ Subnetting?

195.1.1.0 | 24

Netw | Host

195.1.1. 00 | 000000

01

195.1.1.128 | 126 → 195.1.1.0

195.1.1.192 | 126

128
64
192

$2^1 = 2$

195.1.1.0 | 24

users

B.4 → 14

B.1 → 120

B.2 → 58

B.3 → 28

B-5 → 12.

B-1 → 128.

127

0

127.

Subnetting ki subnetting karo-

-2 → usable Ips, uses -3-

Interface → for comm Line

Ports console

Layer 3 - Serial → L3 1544KB Aux.

Layer 2 - Ethernet → 10 MB

Fast 100 MB

Gig Ethernet 1000

10 Gig. 10,000.

Router — CLI Based

GUI Based.

putty, hyperterminal → Software

level 1 User mode.

Router> → ~~password~~

Some show commands only

↳ You can't configure anything

" " modify "

" " delete "

" " use. "

Router> show privilege

2-14

Level 15

Router> enable.

Router# all show commands
routers clock.

Router# configure terminal.

Router(config)# globals configuration
mode.

Router> User mode L-1

Router# Enable mode L-15.

Router(config)# GCM. Everything

con? → will tell how many
words starting from

Clock
↳ time base policy banana k liye.
↳ clock set ?
↓
space
will tell format.

telnet → remotely kisi device ko
config ~~xxxx~~ karna.

Date: two mem RAM/ROM Day:

Router(config)#hostname your choice.

See RAM in Router

Router# show running-config.

ROM in Router

Router# Show startup-config.

Router# Write

↓ means save to ROM.

NTP network time protocol.

Router interfaces Status

R# show ip interface brief

↓ to configure ip address.

R1(config-if)# interface fastEthernet 0/0.

ip address 195.1.1.1 2555

no Shutdown

↳ administratively updown.

[ip must be diff.
network should be same

Show ip route → To chk routing table.

↓

Ki base pe data transfer hota hai

DATE _____ DAY: _____

R-1# ping 195.1.1.1

R-2# ping 195.1.1.2-

gate

mac Exchange → first packet zaya hoga

How to configure console password?

R-1> enable-

R-1(config)# line console

<0-0> first line number.

R-1(config-line)# password 123

Space b pass mai shamil hoga

login

activate pass

How to configure enable password?

R## enable password 456

↳ no need to activate it.

R-1# config terminal.

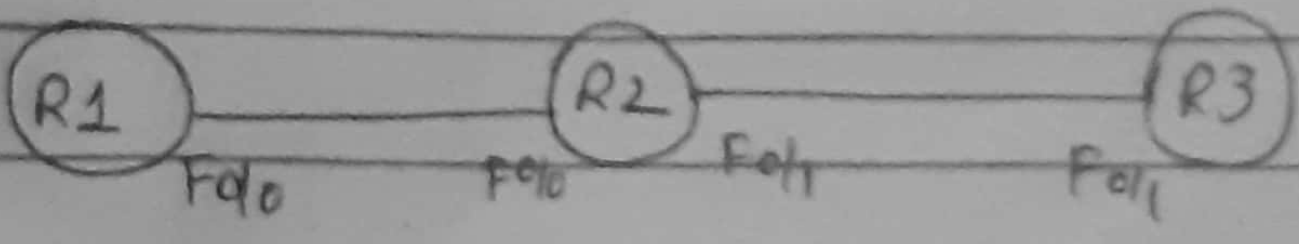
enable secret. 789.

bahir jana ka rasta gate

Static Routing → manually.

Dynamic " → using protocols

gateway is directly connected interface.



Instance Type.

DAY.

Create, manage, monitor → docker.

Linux, OS configuration.

Agility → easy & clickable

Ease of patching.

Elastic Compute Route (EC2).

CPU + RAM
HDD
Interface
OS
→ VM.

Integrate Circuit.

Single

Hyperthreading -

[if enable

one single physical CPU = 2 logical processor

8 Octa → 2x8 = 16

2 processors = 2x16 = 32.

key pair (login)
↳ public / private -
↓ encryption Algo
↓ decryption Algo.

Name, OS → t2, key pair, gp (2)

MobaXterm -
Session
SSH → IP -

Specify name: — ec2-username
private key.

---

1) Router as DHCP server
2) WLC
3) ACL
4) Nat
5) Dyn Rout

DHCP → IP address banta hai -
server ↳ auto IP - add allocation -
Router ko ap as DHCP server bana sakte ho.

DATE 28-6-2025 DAY. Saturday

Google by default ip: 8.8.8.8
excluded address how to hide.

2- Wireless Lan controller (WLC)
Lan controller, AP
↓
signal generates
((•)) → 2504, LAP-PI
WLC-

Management pc ko kuch assign
kekai IP-

Mania123
MMM12345

→ Telnet
remotely kisi b device access
kekai usko config karna

telnet 1.1.1.2.
line vty → ~~used to have~~
live IP → unique.

R-2(config)# line vty ?
<0-15> First live number.

<0-15> means position

0-4 -> means 4 users can config

router at the same time.

R-2(config)# line vty 0 4

#password 123

login

exit.

>telnet 1.1.1.2

-> important.

3- ACL (Access control list)

↳ permit Someone -> (IP & network).

↳ Deny Someone

↳ Match Someone

<- low qualities.

↑ har qism ki traffic block

ACL -> Standard -> 1-99 range

ACL -> Extended -> 100-199

↓ osi qualities

source, dest, protocol,

traffi -> Block

Subnet mask: network portion host portion alag karo

↳ Wild card Mask same as subnet Mask

ACL, policy, Protocol lagaya jata

hai tab use krtai WCM

DAY:

SM	WCM
255.0.0.0	0.255.255.255
255.255.0.0	0.0.255.255
255.255.255.0	0.0.0.255
255.255.255.255	0.0.0.0

10 deny host 195.1.1.5

↓

line no

R-2(config)# access-list 1 deny 195.1.1.5 0.0.0.0 (WCM)

(config)# interface fastEthernet 0/1

" " ip access group 1 in

" " exit

R-2# show access-lists

Standard IP access list 1

10 deny host 195.1.1.5

20 permit any.

any any

↓

any source to any destination.

Day.

ping work under icmp-

telnet " " tcp-

R-2(config)# access-list 105 deny tcp 195.1.1.6 0.0.0.0 any eq 23 (telnet).

(Config)# access-list 105 permit ip any any.

" # interface fastEthernet 0/1

" # ip access-group 105 in

" # exit.

Launching Amazon EC2 instance with apache Server.

↳ powerful machine.

Application layer → services

PC V/S Server.

limited resources.

Web server → will allows hosting websites.

Web client → browser.

Sudo su → switch user.

publickey attached to EC2

Apache → Security group → allow Http traffic.. from internet

Launching Amazon EC2 instance with user Data

user Data script-

its feature automat

bash cell → root user.

Assessment rename →
required snapshot add.

DNSP

enable
config → merge.

↓

system-view

↓

change
name : Sysname Name of Router

[R-1] Sysname R-1

(R-1) qv - exit

<R-1> Sysview
(R-1) → enable and config mode
(R-1) display ip interface brief | show ip int brief
(R-1) display ip routing-table | show ip route
[R-1] display current-configuration | show run-config
[R-1] display saved-config | show startup-config

DATE _____ DAY _____

[R-1] interface ethernet 0/0/1

[R-1-Ethernet 0/0/1] ip address 150.1.1.1 16

[R-1-Ethernet 0/0/1] qv

[R-1] interface ethernet 0/0/0

[R-1-Ethernet 0/0/0] ip address 1.1.1.1 255.0.0.0

[R-1-Ethernet 0/0/0] shutdown

[R-1-Ethernet 0/0/0] undo shutdown

[R-1] — qv

[R-1] save | write

<R-1> save

do same on R2

added

[R-1] ip route-static

[R-1] ip route-static 200.1.1.0

255.255.255.0 1.1.1.2

DATE _____ Day _____

network ID → Gateway

(R-2) IP Route static 150.1.0.0 16 1.1.1.1

Subnet mask

NAT

Static Dynamic

one-to-one many-to-one

show ip nat translation

Interface status

R-1(c-) ip nat outside → public

(R-1 config) interface FastEthernet 0/1

config-if-# ip nat inside

Dynamic Nat.

ACL Pool → 1 to 2 IP.

ip nat pool Test

preload

Dynamic Nat

Steps:

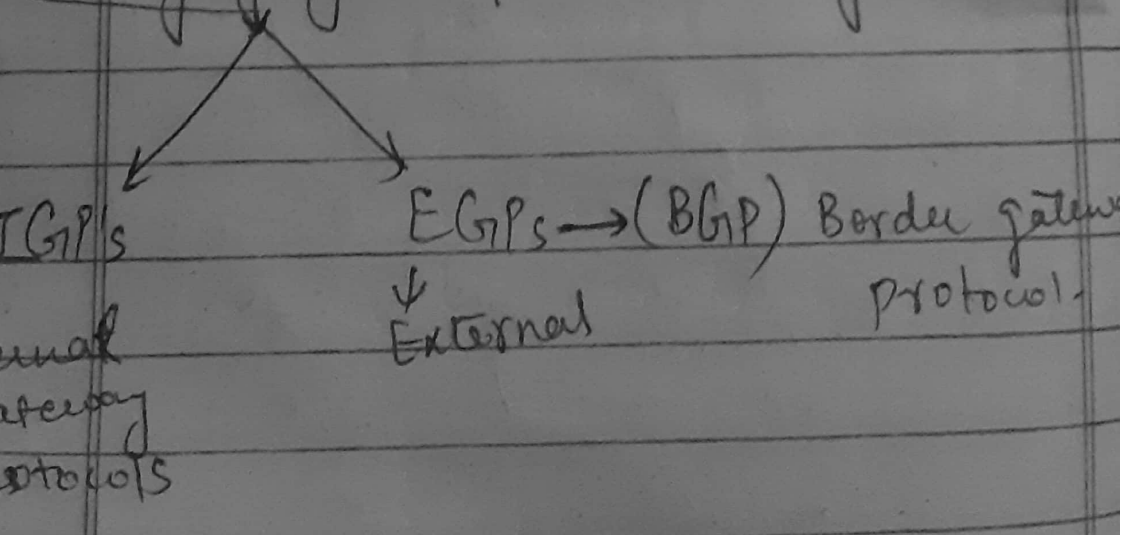
- List private IP.
- ACL private network call
- public IP call in pool.
- Setup IP routing traffic for nat

Three ways of nat (doing)

1). Static nat
2). Dynamic nat
3). port nat

Dynamic Routing Using protocols-

- Routing Protocols → which shows you the best path- e.g google Map
- Routed Protocols → which carries your data e.g IP.



IGP's

IGP's

Distance Vector Protocols

1- RIP
(Routing info protocol)

2- IGRP
Interiorgateway routing protocol-

Link State protocol-

1- OSPF
open shortest path first.

2- IS-IS
intermediate system to IS.

EIGRP → hybrid
Enhance interior gateway routing protocol

RIP properties -

property used to select best path.

Metric

devices dekhta nai.

Source to destination main kitni devices aare hai-

Hope - count-

RIP → bandwidth ni dekhta.

jispe zada hoga cost kam hoga.

band ↓ cost ↑.

RIP-

Metric — Hope Count.

AD — 120.

used to give preference b/w protocols

Max Hops — 16. → for OSPF unlimited

devices

VLSM

Variable Length Subnet Mask.

Authentication — Yes-

Interface loop back-

↳ virtual interface that doesn't exists.

↳ never goes down.

use for testing

for neighbourship.

→ Router ka apna koi ip ni hota

EIGRP

DATE _____ EIGRP. DAY: _____

Enhanced interior gateway router protocol.

→ by default on.

↓

B ↑ ↓

Metric (Bandwidth, delay, MTU, Reliability, Loading)

AD internal routes 90 external routes 170,

↳ (D) sai show hotai hain (DEX)

Max-hops ↳ by default. 100

↓

can extend to 250

VLSM. YES

Authentication YES

Updates Multicast 224.0.0.10.

AS no

↓

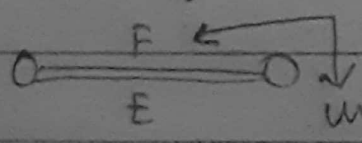
Autonomous System.

quality → unequal Load balancing.

O ——— O

↓

AS no same then create neighbourship and exchange routing table.

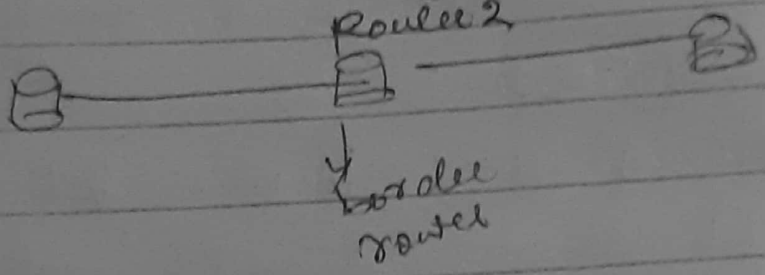


DATE DAY

eigrp → Summary.
↳ no autosummary.

How to check eigrp topology table
R# show ip eigrp topology.

Redistribution:
Two different protocols ki communication:
Routes exchange kuvana.
↳ border routers par hoti hai.



R2(config)# router rip
R2(config-router)# redistribute eigrp 1 metric 1
" " # exit.

Eigrp authentication.
md5
↳ message digest 5.

Same configration on other side
6|5 value.

DATE: _______ DAY: 26-07-2025

Unequal load Balancing.

single Ip par b chal skta hai

OSPF → wild card mask k binori challo.

AD	110
Metric	Link Cost
Max Hops	Unlimited
Process ID	Yes
Neighborship	Yes
VLSM	100 Yes
Auth	Yes
OSPF Table	yes

Area <0 – 4294967295>

↓ 0 is a backbone

non-back ⟷ non back area
× no communication.

Stub area, totally Stub –

mere router par load b na ai aur

Communication b chaly.

OSPF → choose neighbour id.

OSPF → neighbourship based on

higher Ip

neighbour ship dead.

26.07.2025 Day: Saturday

Use loopback for OSPF neighbourship

OSPF preference → loopback as router ID.

1 router par multiple OSPF hogai then loopback multiple hogai.

R1# Show ip ospf neighbor.

R1# Show ip ospf database → To check table

- R1# Show ip ospf interface fastEthernet 0/0
  → to see cost of FastEthernet

ABR → 2 diff areas ko milai communication kwai-

R2# Show ip ospf-

Area 0 is responsible for communication b/w two non back area-

OIA → ospf inter area-

Virtual, gre tunnel-

↓

Area 0.

DATE DAY

Aisa router jo diff protocols ko milai aur unki comm kaunsi.

ASBR → Autonomus System boundary router

OE2 → Ospf external type 2.
Redistribute krnai k bad cost 20. → 20 hi rahegi - in case of OE 2

OE 1 → k case mein link ki cost add hoti hai. 20+~~10~~+1

Fast → 1.

Serial → 64

Ethernet → 10

route-map -

↓ is a box where you make policies.

apni marzi kai number dete ho.

routemap DD permit 10

area

Stub ↑, totally stub, nssa, totaly nssa

↓ external routes ruk jaingai

OE1, OE2

not so stubby area.
↑

Totally stub → kch na ai. Sab routes ruk jai.
but aik default route hoga.

R2#(config-router)# area 1 stub no-summ
→ no neighbourship
R1# same.

area 1 stub ← only stub.

..., TS
routing table
light hogata
hai

NSSA:

DAY

area 1 nssa no summary

↓

External + internal X close routes.
into area.