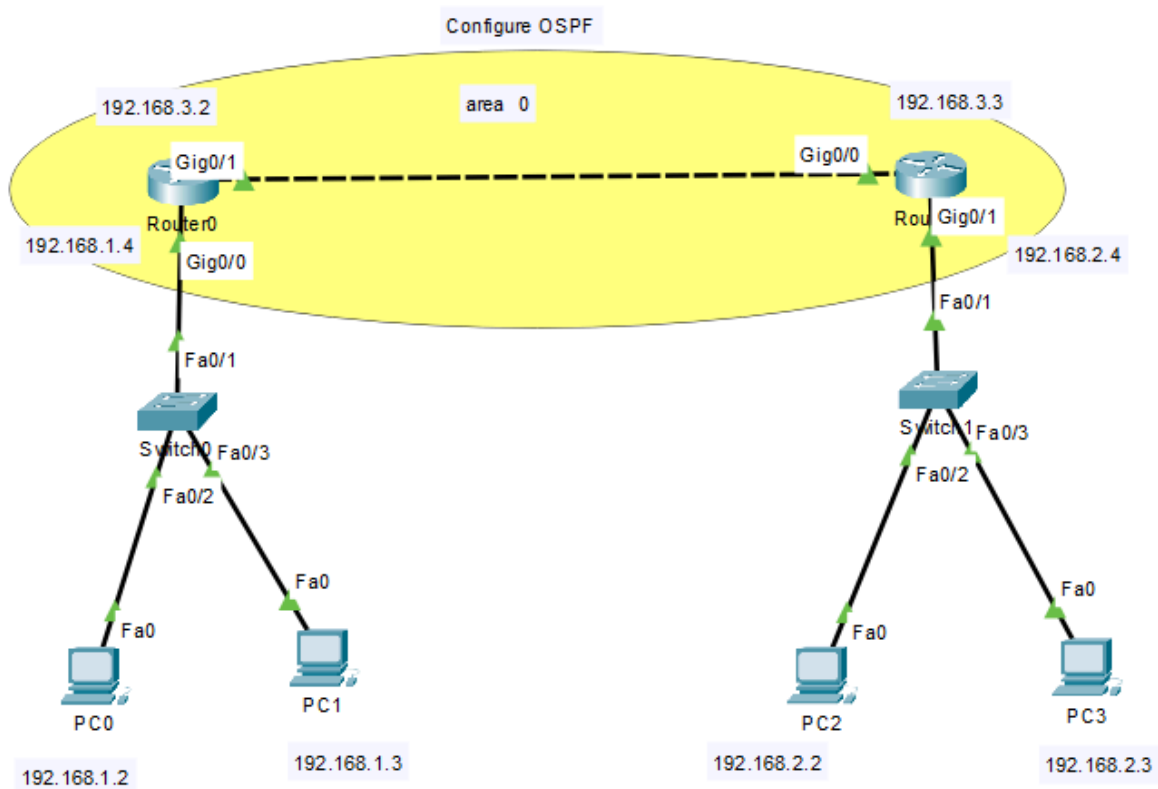# Routing Protocols

1.OSPF

- **Open shortest path first**
- **Network Design Overview**

We have 2 routers, each connected to 1 switch, and each switch connected to 2 PCs. Routers are connected via GigabitEthernet.

Devices and connections

STEP =1

1.Router0 ↔ Switch0 ↔ PC0 & PC1

2. Router1 ↔ Switch1 ↔ PC2 & PC3

3.Router0 ↔ Router1 (link for OSPF area 0)

Pc configuration

Ip address:

1. Pc0
   IP Address: 192.168.1.2 enter subnet mask aslo change automatically same as all pcs
       Default Gateway: 192.168.1.
2.pc1
       IP Address: 192.168.1.3
       Default Gateway: 192.16.1.4
 3.pc2
      IP Address: 192.168.2.2
      Default Gateway: 192.168.2.4
 4.pc3
      IP Address: 192.168.2.3
      Default Gateway: 192.168.2.4

 Two routers assigning ipv4 address

1.router0 : gig0/0=192.168.1.4
            gig0/1=192.168.3.2

   ● Open router0 config interface

- Assign gig0/0 ipv4=192.168.3.2 enter automatically subnet mask assigned=255.255.255.0
- Next same router in gig0/1 assign ipv4 =192.168.3.2 enter subnet mask will arranged automatically =255.255.255.0
- And you must switch on the port status both g0/0,g0/1 then only the ipv4 address will access

- Router1: g0/0=192.168.3.3
          g0/1=192.168.2.4
- Open router1 config aslo same as router 0

STEP =4

OSPF configurations:

In networking, IOS command line usually means the Command-Line Interface (CLI) of Cisco IOS.

- Command line interface:ios(internetwork Operating System)
- Router0:commands
- Enable
- Config t
- Router ospf 1
- Network 192.168.1.0 0.0.0.255 area 0
- Network 192.168.3.0 0.0.0.255 area 0
- Exit

- Router1: commands
- En
- Config t
- Config t
- Router ospf 2
- Network 192.168.1.0 0.0.0.255 area 0
- Network 192.168.3.0 0.0.0.255 area 0
- Exit

- The icmp (internet control message protocol)
- Sending to each pc to router and each pc to pc
- This the ospf protocol

RIP (protocol)

configure RIP

192.168.1.0
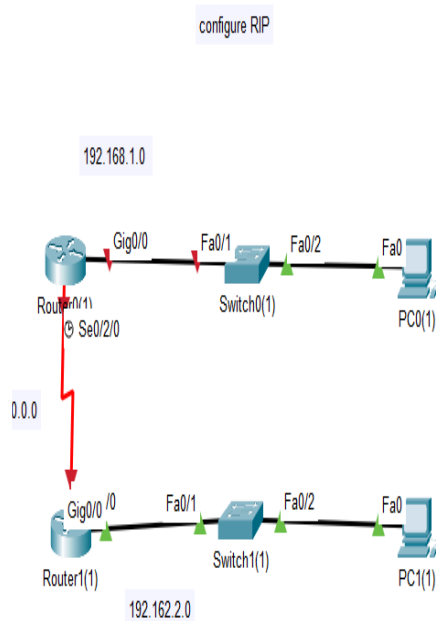
RIP (Routing Information Protocol) – *Distance-Vector Protocol*

- **Use**: Shares routes based on hop count.

- **Benefit**: Very simple to configure, good for small networks.

STEP=1

- Take Two routers two switches and two pcs
- Two routers connected with serial serial Dce
- Router to connect Switch cropper cross wire and same as pcs

<u>Step=2</u>

<u>Ip configurations:</u>

- Pco
- Ip address =192.168.1.2 enter then change subnetmask address, default gateway= 192.168.1.1 address
- Pc1
- Ip address =192.168.2.2 enter then change subnetmask address, default gateway=192.168.2.1

<u>STEP=3</u>

- <u>Router0 : g0/0</u>

- Configuration : interface g0/0
- Ip address = 192.168.1.1 enter subnet mask automatically change
- And switch on the prot status

- <u>Router1: g0/0</u>
- Ip address =192.168.2.1 enter subnetmask automatically change
- And switch on port status

  <u>STEP=4</u>

  - Router0: assign the address in serial2/0
  - First change clock rate= 64000
  - Next change the ip address =10.10.0.2 enter change the subnet mask

- Router1: assign the address in serial2/0
- First switch on the port status
- Second clock Rate = not set next
- Ip address 10.10.10.3 enter subnetmask automatically

STEP=5

- Open Router0 and open config lo rip routing
- Next assign the router0 address=192.168.1.0 to enter rip routing address to note the network and add button enter
- Next another address 10.0.0.0
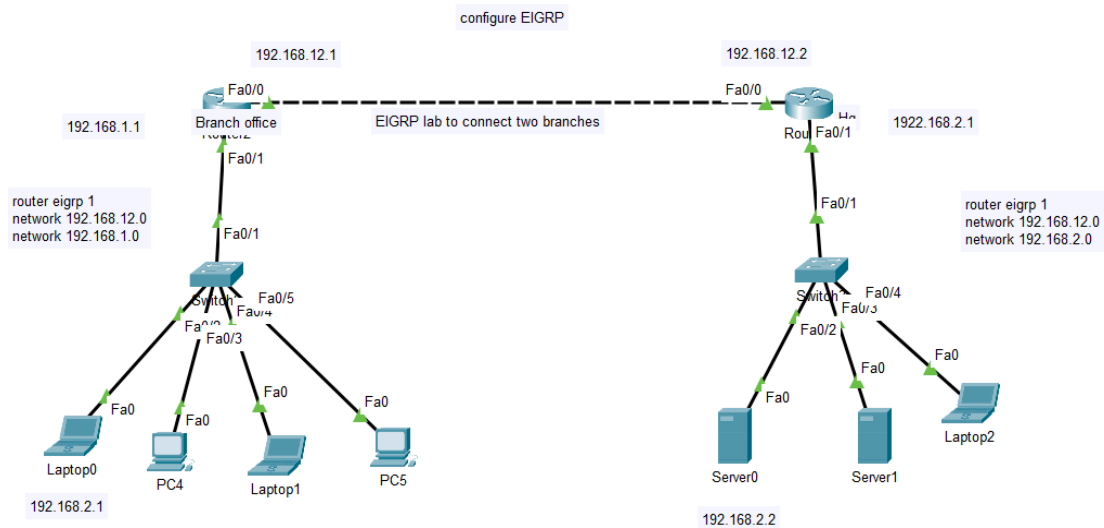- And go to settings click on the save button

STEP=6:

- Router1: command line interface
- Enable
- Config t
- Hostname config-if
- Router rip
- Network 192.168.2.0
- Network 10.0.0.0
- Exit
- Go config save the button
- Send to pcs icmp to routers
- Pc1=r1 successfully sended this is rip protocols

192. 168.12 .1 /24
N   N N H

EIGRP (Protocol)

configure EIGRP

192.168.12.1   192.168.12.2

Fa0/0   Fa0/0
192.168.1.1   Branch office   EIGRP lab to connect two branches   1922.168.2.1
                                                Rou Fa0/1
Fa0/1
                                                Fa0/1
router eigrp 1   router eigrp 1
network 192.168.12.0   Fa0/1   network 192.168.12.0
network 192.168.1.0   network 192.168.2.0

Switch   Fa0/5   Switch   Fa0/4
Fa   Fa0/4   Fa0/3
Fa0/3   Fa0/2

Fa0   Fa0   Fa0
Fa0   Fa0   Fa0
Fa0   Fa0
                                                                  Laptop2

Laptop0   Server0   Server1
         PC4   192.168.2.2
         Laptop1   PC5
192.168.2.1

3. EIGRP (Enhanced Interior Gateway Routing Protocol) – *Hybrid (Cisco Proprietary)*

- **Use**: Balances speed and efficiency for medium-to-large networks.

- **Benefit**: Fast updates, supports multiple network types, easier than OSPF in Cisco setups.

STEP:1

- Take two routers connect both to switches and two switches connect both   2 laptops and 2 pcs
- Another switch connected to two servers and one laptop
- And assigning ip address to the both routers
- Switch 1 pc5 connect fastethernet0/0
- R1 :
- f0/0 ip address=192.168.12.1
- f0/1 ip address=192.168.1.1
- R2

- f0/0 ip address=192.168.12.2
- f0/1 ip address=192.168.2.1

STEP=2:

- R1 ios command lins:
- En
- Config t
- Hostname Branch_office
- Int f0/0
- Ip address 192.168.12.1 255.255.255.0
- No sh
- Int f0/1
- Ip address 192.168.1.1 255.255.255.0
- No sh
- Exit
- Router
- Router eigrp ?
- Router eigrp 1
- Network192.168.12.0
- Network192.168.1.0

- R2 ios command lins:
- En
- Config t
- Hostname HQ(assign name to r2 replace name HQ)
- Int f0/0
- Ip address 192.168.12.2 255.255.255.0
- No sh
- Int f0/1
- Ip address 192.168.2.0 255.255.255.0
- No sh
- Exit

- Router eigrp 1
- Network 192.168.12.0
- Network 192.168.2.0
- ^z
- Sh ip route

STEP=3:
- Assigning   ip address server0, ki laptop0
- server0= 192.168.2.2
- Open server0 to the desktop ipv4 address assign enter automatically change subnetmask
- And assign default gateway address =192.168.2.1

- Laptop0:
- Assign ip address=192.168.1.2
- Open laptop to the desktop ipv4 address=192.168.1.2 enter
- Subnetmask automatically change
- Next assign default gateway address= 192.168.1.1

STEP=4

- Again open command prompt (commands)
- Ping 192.168.2.2 (open some matter)
- Next open web browser
- Type url box 192.168.2.2 click go button
- Open cisco packet tracer
- Given some of links click a small page
- Open all links

STEP=5

- Again open R0 ios command line interface
- Sh run | sec eigrp enter

- router eigrp 1
- network 192.168.12.0
- network 192.168.1.0
- Copy and paste router0 side

- Next open R1 ios
- Sec
- Section eig
- Giving some commands copy and paste it r1 side

- router eigrp 1
- network 192.168.12.0
- network 192.168.2.0

- This the eigrp protocol

STEP=1:

IGRP – Interior Gateway Routing Protocol

- **Type / State**: **Distance-Vector** (Old Cisco proprietary)

- **Working**:

  - Calculates routes using **bandwidth, delay, reliability, load**.

  - Updates every 90 seconds.

- **Where used**: Replaced by EIGRP, rarely used today.

- **Practical Points**:

    - Good for older, large Cisco networks.

    - Poor scalability compared to modern protocols.
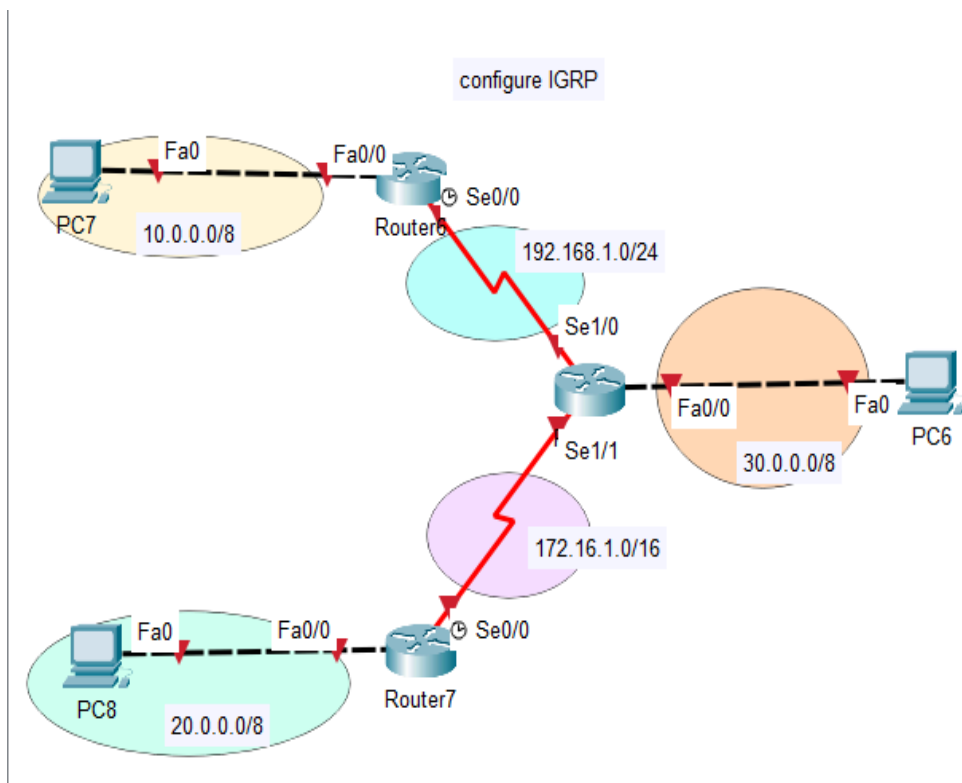
STEP=2:
- Open main Router se1/1:
- Physics device view
- Arrange before switch off
- Set a NM-4A/S to the place op it
- After arrange it switch on the button

- Open router5 :
- Physics device view
- 1.Click WIC-IT   before switch off
- Then arranged first wic-it to the console side
- Next arranged it after switch on

- Open Router7:
- Physics device view
- 1.Click WIC-IT   before switch off
- Then arranged first wic-it to the console side
- Next arranged it after switch on

STEP=3

- Pc7 fasterethernet0 connect to R5 fasterethernet0
- Same as all except R7- main R connected serial 0/0- serial 0/1
  And connected wire serial DCE
- Arranged color all wires

STEP=4

- IP configurations:pc7
- Open desktop ip configurations
- Assign ipv4 address=10.0.0.2 enter subnet mask change

- Open Router5:ios commands
- En
- Config t

- Hostname remote-site-1
- Int f0/0
- Ip address 10.0.0.1 255.0.0.0
- No sh
- Do ping 10.0.0.2

- IP configurations:pc8
- Open desktop ip configurations
- Assign ipv4 address=20.0.0.2 enter subnet mask change

- Next open R7: ios commands
- En
- Config t
- Hostname Remote-site-2
- Int f0/0
- Ip address 20.0.0.2 255.0.0.0
- No sh
- Enter
- Do ping 20.0.0.2
- Do wr
- Close

STEP=5

- IP configurations:pc6
- Open desktop ip configurations
- Assign ipv4 address=30.0.0.2 enter subnet mask change

- Open main Router: ios commands
- En
- Config t
- Hostname main-site
- Int f0/0
- Ip address 30.0.0.1 255.0.0.0
- No sh

- Enter
- Do ping 30.0.0.1
- Do wr
- Close -

- Assigning each connection address

STEP=6

- Again open main R ios commands
- Exit
- Int serial 0/0
- Ip address 192.168.1.1 255.255.255.0
- Clock rate 64000
- No sh
- Do wr
- Exit
- Int serial 1/0
- Ip address 192.168.1.2 255.255.255.0
- No sh
- Do wr
- Do ping 192.168.1.1
- Close -

- R7 again open ios:
- En
- Config t
- Int serial 0/0
- Ip address 172.168.1.1 255.255.255.0
- Clock rate 64000
- No sh
- Do wr

- Again open main R
- Exit
- Int serial 1/1
- Ip address 172.16.1.2 255.255.0.0
- No sh
- Do
- Do wr
- Do ping 172.16.1.2
- Exit
- Sh ip route
- Enter
- Config t
- Router igrp
- Eigrp
- Router eigrp
- #?
- Exit
- Mkdir   ashad
- Dir
- rmdir ashad
- Dir
- Trace route 192.168.1.1

STEP=7

- Open command prompt (browser)
- Tracert yahoo .com
- 30 hops
- Same as enter ping google.com

```
Command Prompt                    ×    +    ∨

Microsoft Windows [Version 10.0.26100.4770]
(c) Microsoft Corporation. All rights reserved.

C:\Users\jyoti>tracert yahoo.com

Tracing route to yahoo.com [2001:4998:44:3507::8001]
over a maximum of 30 hops:

  1    30 ms     4 ms     6 ms  2401:4900:4e2f:85b3::d3
  2     *         *         *    Request timed out.
  3    48 ms    48 ms    35 ms  2401:4900:d0:4001::1245
  4    46 ms    33 ms    45 ms  2401:4900:d0:4001::1456
  5    68 ms    36 ms    44 ms  2401:4900:0:6f8::1
  6   130 ms    41 ms    45 ms  2404:a800:3a00:2::2bd
  7   247 ms   261 ms   269 ms  2001:550:2:23::f
  8   302 ms   267 ms   267 ms  v6-de-cix.pat1.nyc.yahoo.com [2001:504:36::2846:0:1]
  9   456 ms   412 ms   356 ms  ae-22.pat2.dcz.yahoo.com [2001:4998:f00b:212::]
 10   648 ms   538 ms   533 ms  ae-15.pat2.che.yahoo.com [2001:4998:f00d:207::]
 11   331 ms   357 ms   291 ms  ae-0.pat2.nez.yahoo.com [2001:4998:f000:200::]
 12   309 ms   309 ms   280 ms  et-19-1-1.msr1.ne1.yahoo.com [2001:4998:f000:209::1]
 13   302 ms   344 ms   328 ms  2001:4998:47:5::1
 14   343 ms   319 ms   379 ms  2001:4998:47:29::1
 15   384 ms   325 ms   316 ms  et27.usw1-1-lbd.ne1.yahoo.com [2001:4998:44:c426::1]
 16   385 ms   315 ms   358 ms  media-router-fp74.prod.media.vip.ne1.yahoo.com [2001:4998:44:3507::8001]

Trace complete.

C:\Users\jyoti>
```

- This is igrp protocols