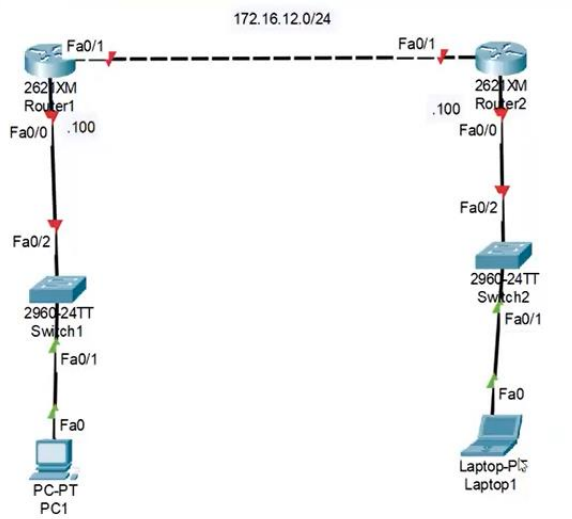
**** IP Summarization**

```
Enter configuration commands, one per line.  End with CNTL/Z.
R5(config)#
R5(config)#
R5(config)#int f0/0
R5(config-if)#ip summary-address eigrp 50 10.10.5.0 255.255.192.0
R5(config-if)#do
```

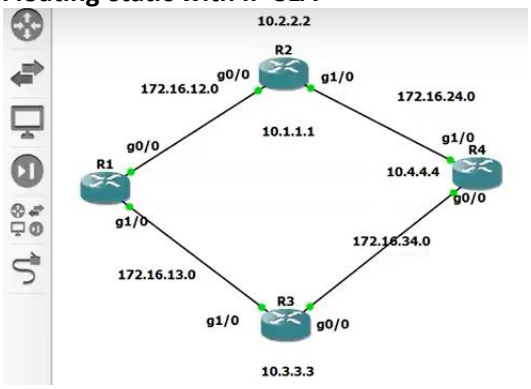
```
R5(config-if)#int loop 4
*Mar  1 00:12:36.095: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback4, changed state to
up
R5(config-if)#ip add 172.1.4.129 255.255.255.128
R5(config-if)#exit
R5(config)#do sh ip rou
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route

Gateway of last resort is not set

     172.1.0.0/16 is variably subnetted, 5 subnets, 2 masks
C       172.1.4.128/25 is directly connected, Loopback4
C       172.1.5.0/24 is directly connected, Loopback1
C       172.1.4.0/25 is directly connected, Loopback0
C       172.1.7.0/24 is directly connected, Loopback3
C       172.1.6.0/24 is directly connected, Loopback2
C    192.168.56.0/24 is directly connected, FastEthernet0/0
R5(config)#
```

**Config this loopback address in R5 and make it one ip address for R6 to access all ip address **(IP Summarization)**

IP Routing Process



**Floating-static with IP-SLA**



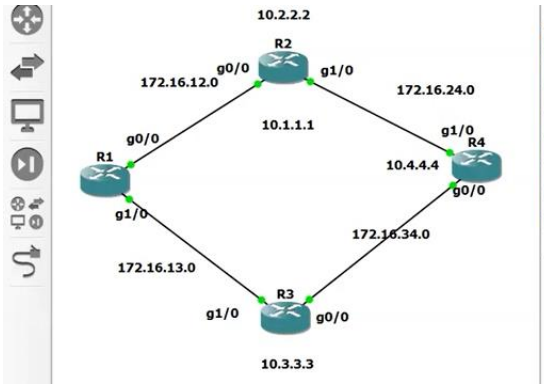

**R1**

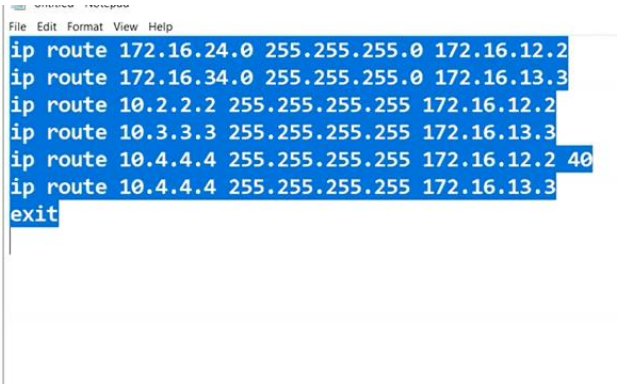
```
config t
int gig0/0
ip add 172.16.12.1 255.255.255.0
no shut
int gig1/0
ip add 172.16.13.1 255.255.255.0
no shut
int loop 1
ip add 10.1.1.1 255.255.255.255
exit
```

**R2**

```
config t
int gig0/0
ip add 172.16.12.2 255.255.255.0
no shut
int gig1/0
ip add 172.16.24.2 255.255.255.0
no shut
int loop 1
ip add 10.2.2.2 255.255.255.255
do ping 172.16.12.1
```

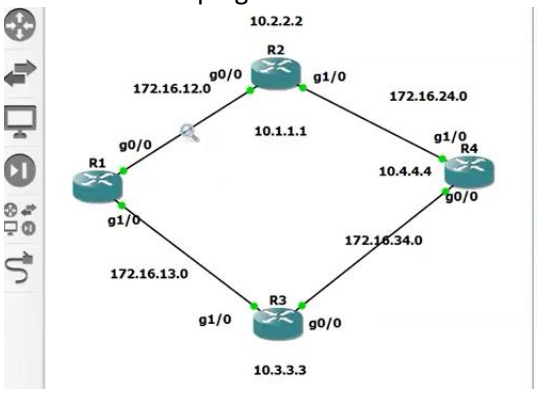
Config for R3 & R4

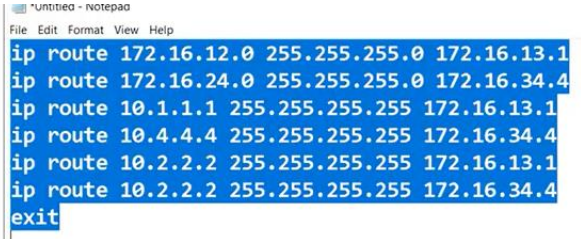



Configure the static route for all adjacent routers in Every Router and floating static for R4

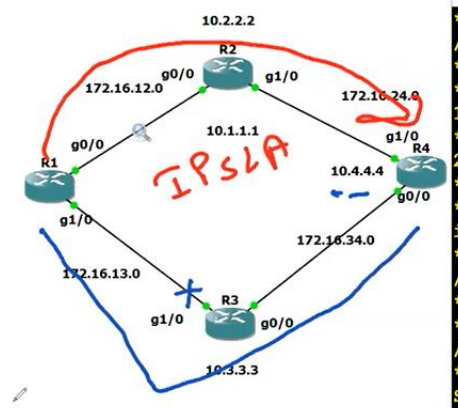
**If we want to ping for R4 it will show destination unreachable **bcz we Don't have route**




R4 (here we config with AD value ## what we are config 1st that will take route 1st )

##Show ip route 10.2.2.2




```
*Aug 21 21:08:05.807: IP: s=172.16.12.1 (local), d=172.16.24.4 (GigabitEtherne
/0), len 100, sending full packet
*Aug 21 21:08:05.807:     ICMP type=8, code=0.
*Aug 21 21:08:07.795: FIBipv4-packet-proc: route packet from (local) src 172.1
12.1 dst 172.16.24.4
*Aug 21 21:08:07.795: FIBfwd-proc: packet routed by adj to GigabitEthernet0/0
2.16.12.2
*Aug 21 21:08:07.795: FIBipv4-packet-proc: packet routing succeeded
*Aug 21 21:08:07.795: IP: tableid=0, s=172.16.12.1 (local), d=172.16.24.4 (Gig
itEthernet0/0), routed via FIB
*Aug 21 21:08:07.795: IP: s=172.16.12.1 (local), d=172.16.24.4 (GigabitEtherne
/0), len 100, sending
*Aug 21 21:08:07.795:     ICMP type=8, code=0
*Aug 21 21:08:07.795: IP: s=172.16.12.1 (local), d=172.16.24.4 (GigabitEtherne
/0), len 100, sending full packet
*Aug 21 21:08:07.795:     ICMP type=8, code=0.
Success rate is 0 percent (0/5)
R1#un all
All possible debugging has been turned off
R1#
R1#tr
R1#traceroute 10.4.4.4 source 10.1.1.1
Type escape sequence to abort.
Tracing the route to 10.4.4.4
VRF info: (vrf in name/id, vrf out name/id)
  1 172.16.13.3 20 msec 24 msec 28 msec
  2 172.16.34.4 44 msec 56 msec 40 msec
R1#
```

***** If we make R3 g1/0 down no msg will exchange bw R3 and R1 (In static routing) though we have alternate path we won't ping for 10.4.4.4 => IP_SLA (we required for info to change the path ) we don't need in Dynamic routing**

***** If R1 int gets down means it will take alternative path automatically**

**#CMD=> IP_SLA (config)**

```
R1(config)#ip sla 1
R1(config-ip-sla)#?
IP SLAs entry configuration commands:
  dhcp          DHCP Operation
  dns           DNS Query Operation
  ethernet      Ethernet Operations
  exit          Exit Operation Configuration
  ftp           FTP Operation
  http          HTTP Operation
  icmp-echo     ICMP Echo Operation
  mpls          MPLS Operation
  path-echo     Path Discovered ICMP Echo Operation
  path-jitter   Path Discovered ICMP Jitter Operation
  tcp-connect   TCP Connect Operation
  udp-echo      UDP Echo Operation
  udp-jitter    UDP Jitter Operation

R1(config-ip-sla)#icmp-echo ?
  Hostname or A.B.C.D  Destination IP address or hostname, broadcast disallowe

R1(config-ip-sla)#icmp-echo 172.16.13.3 source-int gig1/0 ?
  <cr>

R1(config-ip-sla)#icmp-echo 172.16.13.3 source-int gig1/0
R1(config-ip-sla-echo)#
```

```
R1(config-ip-sla-echo)#timeout 6000
R1(config-ip-sla-echo)#threshold 6
R1(config-ip-sla-echo)#frequency 6
R1(config-ip-sla-echo)#e
```

```
R1(config)#do sh ip sla summary
IPSLAs Latest Operation Summary
Codes: * active, ^ inactive, ~ pending

ID           Type        Destination       Stats       Return      Last
                                           (ms)        Code        Run
---------------------------------------------------------------------
^1           icmp-echo   172.16.13.3       -           Unknown     33 minutes,
                                                                   1 seconds a
```

**Inactive State**

***** we need to activate**

```
R1(config)#ip sla schedule 1 start-time now life f
R1(config)#ip sla schedule 1 start-time now life forever
R1(config)#
R1(config)#do sh ip sla summary
IPSLAs Latest Operation Summary
Codes: * active, ^ inactive, ~ pending

ID           Type        Destination       Stats       Return      Last
                                           (ms)        Code        Run
---------------------------------------------------------------------
*1           icmp-echo   172.16.13.3       RTT=19      Over thresh 4 seconds ag
                                                       old
```

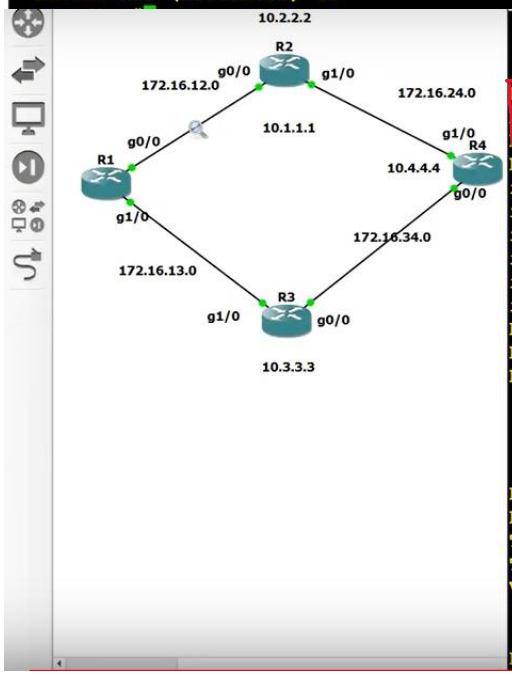
**Now Its active**

**##we need 2 IP_SLA (we have redundant path)**

```
R1(config)#ip sla 2
R1(config-ip-sla)#icmp-echo 172.16.12.2 source-int gig0/0
R1(config-ip-sla-echo)#threshold 6
R1(config-ip-sla-echo)# timeout 6000
R1(config-ip-sla-echo)# frequency 6
R1(config-ip-sla-echo)#exit
R1(config)#iip sla schedule 2 life forever start-time now
          ^
% Invalid input detected at '^' marker.

R1(config)#
R1(config)#ip sla schedule 2 life forever start-time now
R1(config)#
R1(config)#
```

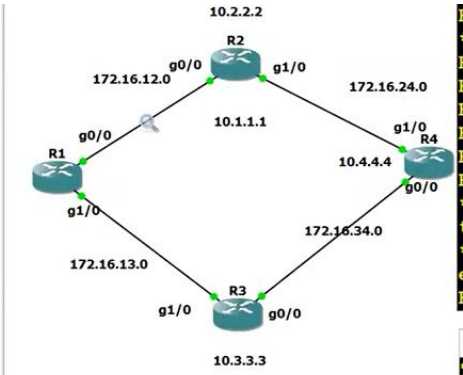
**## we need to define track**

```
R1(config)#track 25 ip sla 1 re
R1(config)#track 25 ip sla 1 reachability
R1(config-track)#exit
R1(config)#track 35 ip sla 2 reachability
R1(config-track)#
R1(config-track)#
R1(config-track)#exit
R1(config)#
R1(config)#
R1(config)#do sh track
Track 25
  IP SLA 1 reachability
  Reachability is Up
    1 change, last change 00:00:16
  Latest operation return code: Over threshold
  Latest RTT (millisecs) 47
Track 35
  IP SLA 2 reachability
  Reachability is Up
    1 change, last change 00:00:05
  Latest operation return code: Over threshold
  Latest RTT (millisecs) 43
```




```
  track       Install route depending on tracked item
  <cr>

R1(config)#ip route 10.4.4.4 255.255.255.255 172.16.12.2 70 track 35
R1(config)#ip route 10.4.4.4 255.255.255.255 172.16.13.3 50 track 25
R1(config)#
R1(config)#do sh run | sec route
ip route 10.4.4.4 255.255.255.255 172.16.13.3 50 track 25
ip route 10.4.4.4 255.255.255.255 172.16.12.2 70 track 35
ip route 10.2.2.2 255.255.255.255 172.16.12.2
ip route 10.3.3.3 255.255.255.255 172.16.13.3
ip route 172.16.24.0 255.255.255.0 172.16.12.2
ip route 172.16.34.0 255.255.255.0 172.16.13.3
R1(config)#
R1(config)#do sh ip rou 10.4.4.4
Routing entry for 10.4.4.4/32
  Known via "static", distance 50, metric 0
  Routing Descriptor Blocks:
  * 172.16.13.3
      Route metric is 0, traffic share count is 1
R1(config)#
R1(config)#do trace 10.4.4.4 source 10.1.1.1
Type escape sequence to abort.
Tracing the route to 10.4.4.4
VRF info: (vrf in name/id, vrf out name/id)
  1 172.16.13.3 32 msec 28 msec 28 msec
  2 172.16.34.4 24 msec 60 msec 88 msec
R1(config)#
```

**Result**




```
R3#
*Aug 21 21:36:42.799: %SYS-5-CONFIG_I: Configured from console by console
R3#config t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#
R3(config)#int gig1/0
R3(config-if)#shut
R3(config-if)#
*Aug 21 21:36:55.111: %LINK-5-CHANGED: Interface GigabitEthernet1/0, changed st
te to administratively down
*Aug 21 21:36:56.111: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitE
ernet1/0, changed state to down
R3(config-if)#
```

```
Type escape sequence to abort.
Tracing the route to 10.4.4.4
VRF info: (vrf in name/id, vrf out name/id)
  1 172.16.13.3 32 msec 28 msec 28 msec
  2 172.16.34.4 24 msec 60 msec 88 msec
R1(config)#
R1(config)#^Z
R1#
R1#
*Aug 21 21:36:08.115: %SYS-5-CONFIG_I: Configured from console by console
R1#
*Aug 21 21:37:10.471: %TRACKING-5-STATE: 25 ip sla 1 reachability Up->Down
R1#
```

**##Config**

**#R1**

```
en
conf t

int g0/0
ip add 172.16.12.1 255.255.255.0
no shut

int g1/0
ip add 172.16.13.1 255.255.255.0
no shut

int l1
ip add 10.1.1.1 255.255.255.255
exit

#IP_ROUTE
ip route 172.16.24.0 255.255.255.0 172.16.12.2
ip route 172.16.34.0 255.255.255.0 172.16.13.3
ip route 10.2.2.2 255.255.255.255 172.16.12.2
ip route 10.3.3.3 255.255.255.255 172.16.13.3
ip route 10.4.4.4 255.255.255.255 172.16.12.2
ip route 10.4.4.4 255.255.255.255 172.16.13.3
```

**IP_SLA**

**#R1**

```
        ip sla <no>
        icmp-echo 172.16.12.2 source-int g0/0
        timeout 6000
        thurshold 6
        frequency 6
#Start
        ip sla schadule 1 start-time now life forever

#track
        track 25 ip sla 1 reachability
#Route
        ip route 10.4.4.4 255.255.255.255 172.16.12.2 70 track 25
```

**#R2**

```
en
conf t

int g0/0
ip add 172.16.12.2 255.255.255.0
no shut

int g1/0
ip add 172.16.24.2 255.255.255.0
no shut

int l2
ip add 10.2.2.2 255.255.255.255
exit

#IP_ROUTE
ip route 172.16.13.0 255.255.255.0 172.16.12.1
ip route 172.16.34.0 255.255.255.0 172.16.24.4
ip route 10.1.1.1 255.255.255.255 172.16.12.1
ip route 10.3.3.3 255.255.255.255 172.16.24.4
ip route 10.3.3.3 255.255.255.255 172.16.12.1
ip route 10.4.4.4 255.255.255.255 172.16.24.4
```

**#R3**

```
en
conf t

int g0/0
ip add 172.16.34.3 255.255.255.0
no shut

int g1/0
ip add 172.16.13.3 255.255.255.0
no shut

int l3
ip add 10.3.3.3 255.255.255.255
exit

#IP_ROUTE
ip route 172.16.12.0 255.255.255.0 172.16.13.1
ip route 172.16.24.0 255.255.255.0 172.16.34.4
ip route 10.1.1.1 255.255.255.255 172.16.13.1
ip route 10.2.2.2 255.255.255.255 172.16.34.4
ip route 10.2.2.2 255.255.255.255 172.16.13.1
ip route 10.4.4.4 255.255.255.255 172.16.34.4
```

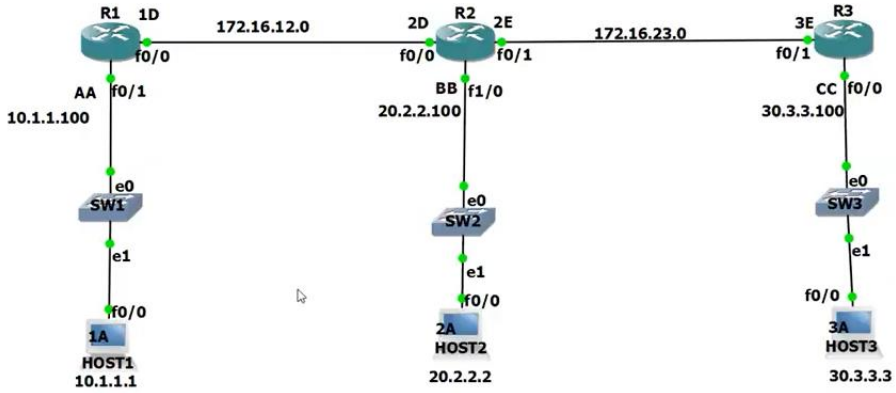
**#R4**

```
en
conf t

int f0/0
ip add 172.16.34.4 255.255.255.0
no shut

int f0/1
ip add 172.16.24.4 255.255.255.0
no shut
```

**int l4**
**ip add 10.4.4.4 255.255.255.255**
**exit**

**ip route 172.16.12.0 255.255.255.0 172.16.24.2**
**ip route 172.16.13.0 255.255.255.0 172.16.34.3**
**ip route 10.2.2.2 255.255.255.255 172.16.24.2**
**ip route 10.1.1.1 255.255.255.255 172.16.24.2**
**ip route 10.1.1.1 255.255.255.255 172.16.34.3**
**ip route 10.3.3.3 255.255.255.255 172.16.34.3**

****Static_ARP**




**IP ROUTE 20.2.2.0 255.255.255.0 172.16.12.2**

**IP ROUTE 30.3.3.0 255.255.255.0 F0/0**

**IP ROUTE 30.3.3.0 255.255.255.0 F0/0 172.16.12.2**

**172.16.12.0 10.1.1.100 10.1.1.1 172.16.23.0 20.2.2.100 20.2.2.2 30.3.3.100 30.3.3.3**

****make router to work as PC => make # no ip routing && # set a default-gateway**

```
HOST3(config)#no ip routing
HOST3(config)#int f0/0
HOST3(config-if)#ip add 30.3.3.3 255.255.255.0
HOST3(config-if)#no shut
HOST3(config-if)#exit
HOST3(config)#
*Mar  1 00:01:09.247: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state t
o up
*Mar  1 00:01:10.247: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthern
et0/0, changed state to up
HOST3(config)#ip def
```

**** Show the recursive**

```
R1#
R1#
R1#sh ip cef 20.2.2.2
20.2.2.0/24, version 14, epoch 0, cached adjacency 172.16.12.2
0 packets, 0 bytes
  via 172.16.12.2, 0 dependencies, recursive
    next hop 172.16.12.2, FastEthernet0/0 via 172.16.12.2/32
    valid cached adjacency
R1#
```