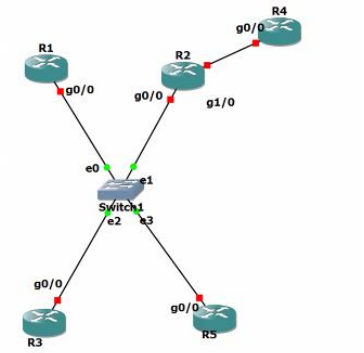
Advance Class-3

** IPV6 Auto-Config



**config the basic IPV6 address on each routers

#R1

```
R1(config)#ipv6 unicast-routing
R1(config)#int gig0/0
R1(config-if)#ipv6 add 2001:10:10:1::1/64
R1(config-if)#no shut
R1(config-if)#
*Sep 19 20:13:00.807: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed stat
e to up
*Sep 19 20:13:01.807: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEth
ernet0/0, changed state to up
R1(config-if)#
```

#R2

```
R2(config)#ipv6 uni
R2(config)#int gig0/0
R2(config-if)#ipv6 add 2001:10:10:1::2/64
R2(config-if)#ipv6 nd rou
R2(config-if)#ipv6 nd router-preference h
R2(config-if)#ipv6 nd router-preference high ?
  <cr>

R2(config-if)#ipv6 nd router-preference high
R2(config-if)#no shut
```

```
R2(config-if)#do sh ipv6 rou
IPv6 Routing Table - default - 3 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, R - RIP, H - NHRP, I1 - ISIS L1
       I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary, D - EIGRP
       EX - EIGRP external, ND - ND Default, NDp - ND Prefix, DCE - Destination
       NDr - Redirect, O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1
       OE2 - OSPF ext 2, ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, l - LISP
C   2001:10:10:1::/64 [0/0]
     via GigabitEthernet0/0, directly connected
L   2001:10:10:1::2/128 [0/0]
     via GigabitEthernet0/0, receive
L   FF00::/8 [0/0]
     via Null0, receive
R2(config-if)#int gig1/0
R2(config-if)#ipv6 add 2001:192:168:1::1/64
R2(config-if)#no shut
R2(config-if)#
```

#R3

```
R3#config t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#ipv6 uni
R3(config)#int gig0/0
R3(config-if)#ipv6 add au
R3(config-if)#ipv6 add autoconfig de
R3(config-if)#ipv6 add autoconfig default
R3(config-if)#no shut
R3(config-if)#
```

** same on R5 && R4

```
R3#sh ipv6 route
IPv6 Routing Table - default - 4 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, R - RIP, H - NHRP, I1 - ISIS L1
       I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary, D - EIGRP
       EX - EIGRP external, ND - ND Default, NDp - ND Prefix, DCE - Destination
       NDr - Redirect, O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1
       OE2 - OSPF ext 2, ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2, l - LISP
ND  ::/0 [2/0]
     via FE80::C802:AFF:FEF4:8, GigabitEthernet0/0
NDp 2001:10:10:1::/64 [2/0]
     via GigabitEthernet0/0, directly connected
L   2001:10:10:1:C803:2FFF:FE98:8/128 [0/0]
     via GigabitEthernet0/0, receive
L   FF00::/8 [0/0]
     via Null0, receive
R3#
```

If we want check from other router we use this addreess

****ND = neighbor Discovery**

#R2

```
R2#ping  2001:10:10:1:C805:33FF:FEF4:8
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:10:10:1:C805:33FF:FEF4:8, timeout is 2 se
conds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 24/40/84 ms
R2#ping  2001:10:10:1:C803:2FFF:FE98:8
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:10:10:1:C803:2FFF:FE98:8, timeout is 2 se
conds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 20/28/36 ms
R2#
```

**** we are ping using the mac address along with src ip address that is taken from the base routers**

Redistribution using IPV6

**** config the basic ipv6 address along with loopback address**

#R1

```
R1(config)#ipv6 uni
R1(config)#int gig0/0
R1(config-if)#ipv6 add 2001:172:16:12::1/64
R1(config-if)#no shut
R1(config-if)#int loop 1
R1(config-if)#o
*Sep 19 20:36:56.027: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to up
R1(config-if)#
*Sep 19 20:36:56.747: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to up
*Sep 19 20:36:57.027: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
R1(config-if)#ip add 10.1.1.1 255.255.255.255
R1(config-if)#ipv6 add 2001:10:1::1/128
R1(config-if)#exit
R1(config)#
```

#R2

```
R2(config-if)#int gig1/0
R2(config-if)#ipv6 add 2001:172:16:23::2/64
R2(config-if)#no shut
R2(config-if)#int loop 1
R2(config-if)#i
*Sep 19 20:38:22.975: %LINK-3-UPDOWN: Interface GigabitEthernet1/0, changed state to up
R2(config-if)#ipa dd
*Sep 19 20:38:23.503: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to up
*Sep 19 20:38:23.975: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0, changed state to up
R2(config-if)#ip add 10.2.2.2 255.255.255.255
R2(config-if)#ipv6 add 2001:10:2::2/128
R2(config-if)#ex
```

**** config the IPV6 and loopback address on all routers**

#R3

```
R3(config-if)#no shut
R3(config-if)#int  loop 1
R3(config-if)#
*Sep 19 20:39:17.519: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to up
R3(config-if)#ip add
*Sep 19 20:39:17.711: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to up
*Sep 19 20:39:18.519: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
R3(config-if)#ip add 10.3.3.3 255.255.255.255
R3(config-if)#ipv6 add 2001:10:3::3/128
R3(config-if)#int loop 2
R3(config-if)#
*Sep 19 20:39:37.951: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback2, changed state to up
R3(config-if)#ipv6 add 2001:10:33::33/128
R3(config-if)#do ping ipv6 add 2001:172:16:23::2
```

#R6

```
R6(config)#int gig0/0
R6(config-if)#ipv6 add 2001:172:16:56::6/64
R6(config-if)#no shut
R6(config-if)#int
*Sep 19 20:43:01.055: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to up
*Sep 19 20:43:02.055: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
R6(config-if)#int gig1/0
R6(config-if)#ipv6 add 2001:172:16:67::6/64
R6(config-if)#no shut
R6(config-if)#int loop 1
R6(config-if)#
*Sep 19 20:43:24.607: %LINK-3-UPDOWN: Interface GigabitEthernet1/0, changed state to up
*Sep 19 20:43:25.607: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0, changed state to up
R6(config-if)#ip adede
*Sep 19 20:43:26.467: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to up
R6(config-if)#ip add 10.6.6.6 255.255.255.255
R6(config-if)#ipv6 add 2001:10:6::6/128
R6(config-if)#int loop 2
R6(config-if)#
*Sep 19 20:44:03.303: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback2, changed state to up
R6(config-if)#ip add 10.66.66.66 255.255.255.255
R6(config-if)#ipv6 add 2001:10:66::66/128
R6(config-if)#do ping 2001:172:16:56::5
```

**config the 2 loopback address on IPV4 and IPV6

##Dynamic Routing protocols Config

#R1

```
R1(config)#int range gig0/0 , loop 1
R1(config-if-range)#ipv6 rip NH enable
R1(config-if-range)#exit
R1(config)#
```

#R3

```
R3(config)#int range gig1/0 , loop 1
R3(config-if-range)#ipv6 rip NH enable
R3(config-if-range)#exit
R3(config)#
R3(config)#int range gig0/0 , loop 2
R3(config-if-range)#ipv6 ospf 1 area 0
R3(config-if-range)#exit
R3(config)#
R3(config)#
```

**config the Both RIPNG and OSPF

**config the OSPF on #R4

#R5

```
R5(config-if)#ip add 10.5.5.5 255.255.255.255
R5(config-if)#ipv6 add 2001:10:5::5/128
R5(config-if)#int loop 2
R5(config-if)#ipv6 add 2001:10:5::5/128
*Sep 19 20:42:23.791: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback2, changed state to up
R5(config-if)#ipv6 add 2001:10:55::55/128
R5(config-if)#do ping 2001:172:16:45::4
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:172:16:45::4, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 20/40/104 ms
R5(config-if)#exit
R5(config)#
R5(config)#int range gig1/0 , loop 1
R5(config-if-range)#ipv6 ospf 1 area 0
R5(config-if-range)#exi
*Sep 19 20:50:18.783: %OSPFv3-5-ADJCHG: Process 1, Nbr 10.4.4.4 on GigabitEthernet1/0 from LOADING to FULL, Loading Done
R5(config-if-range)#exit
R5(config)#int range gig0/0 , loop 2
R5(config-if-range)#ipv6 ospf 1 area 1
R5(config-if-range)#exit
R5(config)#
```

** for both area 0 and area 1

#R6

```
R6(config-if)#ip add 10.66.66.66 255.255.255.255
R6(config-if)#ipv6 add 2001:10:66::66/128
R6(config-if)#do ping 2001:172:16:56::5
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:172:16:56::5, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 24/49/136 ms
R6(config-if)#exit
R6(config)#
R6(config)#ipv6 router ospf 1
R6(config-rtr)#router-id 10.66.66.66
R6(config-rtr)#int range gig0/0 , loop 1
R6(config-if-range)#ipv6 ospf 1 area 1
R6(config-if-range)#exit
R6(config)#
*Sep 19 20:51:29.155: %OSPFv3-5-ADJCHG: Process 1, Nbr 10.5.5.5 on GigabitEthernet0/0 from LOADING to FULL, Loading Do
R6(config)#
R6(config)#ipv6 router eigrp 15
R6(config-rtr)#no shut
R6(config-rtr)#int range gig1/0 , loop 2
R6(config-if-range)#ipv6 eigrp 15
R6(config-if-range)#exit
```

#R7

```
R7(config-if)#ip add 10.7.7.7 255.255.255.255
R7(config-if)#ipv6 add 2001:10:7::7/128
R7(config-if)#exit
R7(config)#do ping 2001:172:16:67::6
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2001:172:16:67::6, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 20/43/112 ms
R7(config)#
R7(config)#ipv6 router eigrp 15
R7(config-rtr)#no shut
R7(config-rtr)#int range gig0/0 , gig1/0 , loop 1
R7(config-if-range)#ipv6 eigrp 15
R7(config-if-range)#exit
R7(config)#
*Sep 19 20:53:21.023: %DUAL-5-NBRCHANGE: EIGRP-IPv6 15: Neighbor FE80::C806:17FF:FEDC:1C (GigabitEthernet1/0) is up: new a
djacency
```

** check the routing table on all routers for conformation.

** we will get varios LSA types based on Routing.

** Redistribution

```
R3(config)#ipv6 router rip NH
R3(config-rtr)#redistribute ospf 1 metric 5 incl
R3(config-rtr)#redistribute ospf 1 metric 5 include-connected
R3(config-rtr)#ipv6 router ospf 1
R3(config-rtr)#redistribute rip NH include-connected
R3(config-rtr)#exit
R3(config)#
R3(config)#
```

#R6

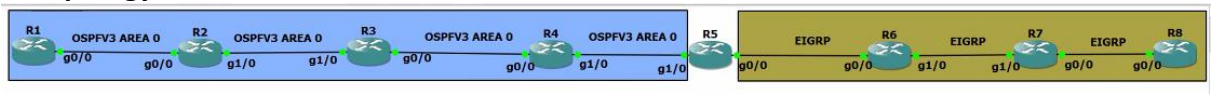
```
R6(config)#ipv6 router eigrp 15
R6(config-rtr)#redistribute ospf 1 metric 1 1 1 1 1 include-connected
R6(config-rtr)#ipv6 router ospf 1
R6(config-rtr)#redistribute eigrp 15 include-connected
R6(config-rtr)#
```

** After redistribution we have Externals routes

```
            Link (Type-8) Link States (Area 1)

ADV Router      Age         Seq#       Link ID    Interface
 10.5.5.5       820         0x80000001 3          Gi0/0
 10.66.66.66    768         0x80000001 3          Gi0/0

            Intra Area Prefix Link States (Area 1)

ADV Router      Age         Seq#       Link ID    Ref-lstype  Ref-LSID
 10.5.5.5       766         0x80000002 0          0x2001      0
 10.5.5.5       766         0x80000001 3072       0x2002      3
 10.66.66.66    767         0x80000001 0          0x2001      0

            Type-5 AS External Link States

ADV Router      Age         Seq#       Prefix
 10.3.3.3       348         0x80000001 2001:10:1::1/128
 10.3.3.3       348         0x80000001 2001:10:2::2/128
 10.3.3.3       348         0x80000001 2001:10:3::3/128
 10.3.3.3       348         0x80000001 2001:172:16:12::/64
 10.3.3.3       348         0x80000001 2001:172:16:23::/64
 10.66.66.66    282         0x80000001 2001:10:7::7/128
 10.66.66.66    282         0x80000001 2001:10:8::8/128
 10.66.66.66    282         0x80000001 2001:10:66::66/128
 10.66.66.66    282         0x80000001 2001:172:16:67::/64
 10.66.66.66    282         0x80000001 2001:172:16:78::/64
R5(config)#
```

##Config Of the Both IPV6 and IPV4 at same Time and OSPFV6 And redistribution (but IPV6 redistribution is not possible)

##Topology



**** config the basic IPV6 and IPV4 address along with Loopback address**
****Remove all routing from all routers**

#R1

```
R1(config)#no ipv6 router rip NH
R1(config)#
R1(config)#int gig0/0
R1(config-if)#ip add 192.168.12.1 255.255.255.0
R1(config-if)#exit
```

#R5

```
R5(config)#do sh run int loop 2
Building configuration...

Current configuration : 75 bytes
!
interface Loopback2
 no ip address
 ipv6 address 2001:10:55::55/128
end

R5(config)#int loop 2
R5(config-if)#ip add 10.55.55.55 255.255.255.255
R5(config-if)#exit
R5(config)#do sh ip ro
```

**** add one-more loopback.**

##OSPFV6 config

```
R1(config)#router ospfv3 1
R1(config-router)#router-id 192.168.1.1
R1(config-router)#exit


R1(config)#interface FastEthernet0/0
R1(config-if)#ospfv3 1 ipv6 area 0
R1(config-if)#interface loopback0
R1(config-if)#ospfv3 1 ipv6 area 0
```

#R1

```
R1(config)#
R1(config)#router ospfv3 1
R1(config-router)#router-id 1.1.1.1
R1(config-router)#exit
R1(config)#int range gig0/-0 , loop 1
                           ^
% Invalid input detected at '^' marker.

R1(config)#int range gig0/0 , loop 1
R1(config-if-range)#ospfv3 1 ipv6 area 0
R1(config-if-range)#ip ospf 1 area 0
R1(config-if-range)#
```

**** OSPF config for IPV4**

#R2

```
R2(config)#router ospfv3 1
R2(config-router)#router-id 2.2.2.2
R2(config-router)#exit
R2(config)#int range gig0/0 , gig1/0 , loop 1
R2(config-if-range)#ospfv3 1 ipv6 area 0
R2(config-if-range)#
*Sep 19 21:24:43.207: %OSPFv3-5-ADJCHG: Process 1, IPv6, Nbr 1.1.1.1 on GigabitEthernet0/0 from LOADING to FULL, Loading
Done
R2(config-if-range)#ip ospf 1 area 0
R2(config-if-range)#exit
*Sep 19 21:24:53.643: %OSPF-5-ADJCHG: Process 1, Nbr 10.1.1.1 on GigabitEthernet0/0 from LOADING to FULL, Loading Done
R2(config-if-range)#exit
```

#R3

```
R3(config)#router ospfv3 1
R3(config-router)#router-id 3.3.3.3
R3(config-router)#exit
R3(config)#int range gig0/0 , gig1/0 , loop 1
R3(config-if-range)#ospfv3 1 ipv6 area 0
R3(config-if-range)#
*Sep 19 21:25:49.599: %OSPFv3-5-ADJCHG: Process 1, IPv6, Nbr 2.2.2.2 on GigabitEthernet1/0 from LOADING to FULL, Loading D
one
R3(config-if-range)#ip ospf 1 area 0
R3(config-if-range)#
```

#R5

```
R5(config)#router eigrp NH
R5(config-router)#address-family ipv6 unicast autonomous-system 50
R5(config-router-af)#af-int gig0/0
R5(config-router-af-interface)#af-int loop 2
R5(config-router-af-interface)#exit
R5(config-router-af)#exit
R5(config-router)#address-family ipv4 unicast autonomous-system 50
R5(config-router-af)#net 192.168.56.0
R5(config-router-af)#net 10.55.55.55 0.0.0.0
R5(config-router-af)#exit
R5(config-router)#
```

For IPV6

For IPV4

**** config both Named Eigrp and OSPFV3**

#R6

```
R6(config)#router eigrp ?
  <1-65535>  Autonomous System
  WORD       EIGRP Virtual-Instance Name

R6(config)#router eigrp NH
R6(config-router)#address-family ipv6 unicast autonomous-system 50
R6(config-router-af)#
*Sep 19 21:30:58.115: %DUAL-5-NBRCHANGE: EIGRP-IPv6 50: Neighbor FE80::C805:33FF:FED0:8 (GigabitEthernet0/0) is up: new a
djacency
R6(config-router-af)#af-int gig0/0
R6(config-router-af-interface)#af-int gig1/0
R6(config-router-af-interface)#af-int loop 1
R6(config-router-af-interface)#exit
R6(config-router-af)#exit
R6(config-router)#
R6(config-router)#address-family ipv4 unicast autonomous-system 50
R6(config-router-af)#net 0.0.0.0 0.0.0.0
R6(config-router-af)#
*Sep 19 21:31:49.447: %DUAL-5-NBRCHANGE: EIGRP-IPv4 50: Neighbor 192.168.56.5 (GigabitEthernet0/0) is up: new adjacency
R6(config-router-af)#
```

Redistribution tried but not forming redistribution

#R5

```
R5(config)#
R5(config)#router eigrp NH
R5(config-router)#address-family ipv6 unicast autonomous-system 50
R5(config-router-af)#topology base
R5(config-router-af-topology)#?
Address Family Topology configuration commands:
  default           Set a command to its defaults
  default-metric    Set metric of redistributed routes
  distance          Define an administrative distance
  distribute-list   Filter networks in routing updates
  eigrp             EIGRP specific commands
  exit-af-topology  Exit from Address Family Topology configuration mode
  maximum-paths     Forward packets over multiple paths
  metric            Modify metrics and parameters for advertisement
  no                Negate a command or set its defaults
  redistribute      Redistribute IPv6 prefixes from another routing protocol
  summary-metric    Specify summary to apply metric/filtering
  timers            Adjust topology specific timers
  traffic-share     How to compute traffic share over alternate paths
  variance          Control load balancing variance

R5(config-router-af-topology)# redistribute
```

****using the topology based CMD**