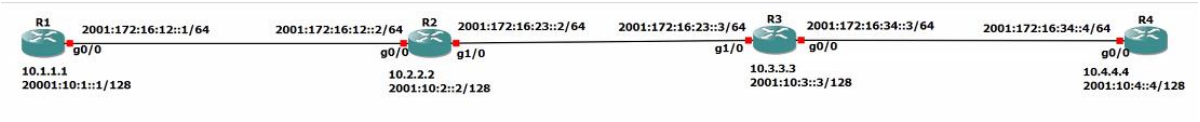
Advance Class-2



**** IPV6 (info)**

```
2001:0000:0000:001C:0000:0000:00B7:A8D4
_____________________ _____________________
      N                     H
2001::1C:0:0:B7:A8D4

172.16.12.1

2001:0172:0016:0012:0000:0000:0000:0001

2001:172:16:12::1
```

#R1

```
R1(config)#ipv6 unicast-routing
R1(config)#int gig0/0
R1(config-if)#ipv6 add 2001:172:16:12::1/64
R1(config-if)#no shut
R1(config-if)#
*Sep 18 20:25:33.619: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to up
*Sep 18 20:25:34.619: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
R1(config-if)#int loop 1
R1(config-if)#ip ad
*Sep 18 20:25:38.759: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, 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)#
```

**** IPV6 is disabled by default (we have to enable using ----)**

**** First work after assigning IPV6 address it will perform DAD(duplicate-address-detection)**

**** IPV6 route**

```
R1(config)#do 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
LC  2001:10:1::1/128 [0/0]
     via Loopback1, receive
C   2001:172:16:12::/64 [0/0]
     via GigabitEthernet0/0, directly connected
L   2001:172:16:12::1/128 [0/0]
     via GigabitEthernet0/0, receive
L   FF00::/8 [0/0]
     via Null0, receive
```

```
R1(config)#do sh ipv6 int brief
Ethernet0/0            [administratively down/down]
    unassigned
GigabitEthernet0/0     [up/up]
    FE80::C801:18FF:FE70:8
    2001:172:16:12::1
GigabitEthernet1/0     [administratively down/down]
    unassigned
GigabitEthernet2/0     [administratively down/down]
    unassigned
GigabitEthernet3/0     [administratively down/down]
    unassigned
GigabitEthernet4/0     [administratively down/down]
    unassigned
GigabitEthernet5/0     [administratively down/down]
    unassigned
GigabitEthernet6/0     [administratively down/down]
    unassigned
Loopback1              [up/up]
    FE80::C801:18FF:FE70:6
    2001:10:1::1
```

**** to view IPV6 int brief we use CMD**

****mac**

** to config the IPV6 default-route for Router we use

```
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#
R1(config)#ipv6 route ::/0 2001:172:16:12::2
R1(config)#
```

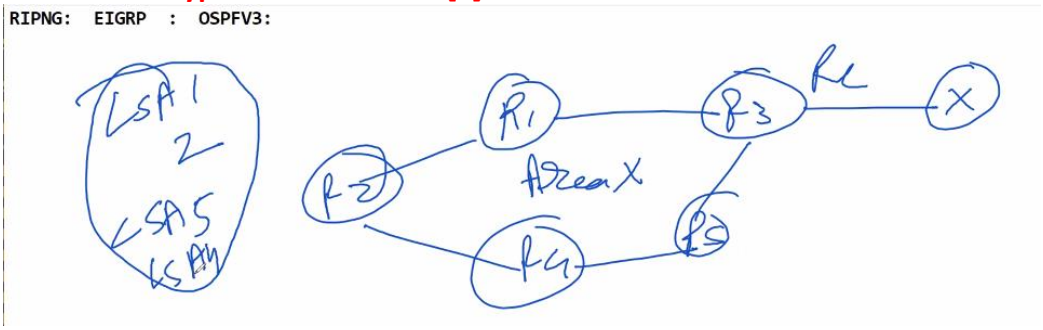
**Manually we are config Static-Route On R2

#R2

```
R2(config)#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)#ip a
*Sep 18 20:36:00.139: %LINK-3-UPDOWN: Interface GigabitEthernet1/0, changed state to up
R2(config-if)#ip add
*Sep 18 20:36:01.135: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to up
*Sep 18 20:36:01.191: %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)#exit
R2(config)#
R2(config)#ipv6 route 2001:172:16:34::0/64 2001:172:16:23::3
R2(config)#ipv6 route 2001:10:3::3/128 2001:172:16:23::3
R2(config)#ipv6 route 2001:10:4::4/128 2001:172:16:23::3
R2(config)#ipv6 route 2001:10:1::1/128 2001:172:16:12::1
```

** OSPF Lsa Types for Same Area [?]

RIPNG: EIGRP : OSPFV3:



** Remove all routes (static&default)

**Config the RIPNG on R1

```
R1(config)#do sh run | sec route
ipv6 route ::/0 2001:172:16:12::2
R1(config)#no ipv6 route ::/0 2001:172:16:12::2
R1(config)#
R1(config)#
R1(config)#int range gig0/0 , loop 1
R1(config-if-range)#ipv6 rip ?
  WORD  User selected string identifying this RIP process

R1(config-if-range)#ipv6 rip NH ?
  default-information  Configure handling of default route
  enable               Enable/disable RIP routing
  metric-offset        Adjust default metric increment
  summary-address      Configure address summarization

R1(config-if-range)#ipv6 rip NH enable
R1(config-if-range)#exit
R1(config)#
```

We use NH as Name for RIPNG

** on IPV6 we don't have Network for advertise

** we have to Config Routing-protocol Only on the Specific-Interfaces.

#R3

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

#R4 (we don't have any ip add [we have via through Link-local-adrress]

```
R4(config)#do sh ipv6 route rip
IPv6 Routing Table - default - 9 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
R   2001:10:1::1/128 [120/4]
     via FE80::C802:2AFF:FEB0:8, GigabitEthernet0/0
R   2001:10:2::2/128 [120/3]
     via FE80::C802:2AFF:FEB0:8, GigabitEthernet0/0
R   2001:10:3::3/128 [120/2]
     via FE80::C802:2AFF:FEB0:8, GigabitEthernet0/0
R   2001:172:16:12::/64 [120/3]
     via FE80::C802:2AFF:FEB0:8, GigabitEthernet0/0
R   2001:172:16:23::/64 [120/2]
     via FE80::C802:2AFF:FEB0:8, GigabitEthernet0/0
```

**** we can use ping for multicast-address**

```
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::9
    FF02::1:FF00:4
    FF02::1:FF88:8
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds (using 30000)
  ND advertised reachable time is 0 (unspecified)
  ND advertised retransmit interval is 0 (unspecified)
  ND router advertisements are sent every 200 seconds
  ND router advertisements live for 1800 seconds
  ND advertised default router preference is Medium
```

**** In IPV6 doesn't have network CMD Proof**

```
R4(config)#ipv6 router rip NH
R4(config-rtr)#?
  default          Set a command to its defaults
  distance         Administrative distance
  distribute-list  Filter networks in routing updates
  exit             Exit from IPv6 routing protocol configuration mode
  maximum-paths    Forward packets over multiple paths
  no               Negate a command or set its defaults
  poison-reverse   Poison reverse updates
  port             Port and multicast address
  redistribute     Redistribute IPv6 prefixes from another routing protocol
  split-horizon    Split horizon updates
  timers           Adjust routing timers
```

****RIPNG on R2**

```
R2(config)#int range gig0/0 , gig1/0 , loop 1
R2(config-if-range)#ipv6 rip A enable
R2(config-if-range)#exit
R2(config)#no ipv6 router rip A
R2(config)#
R2(config)#
```

**** Now config the OSPFV3 On R1(remove RIPNG First)**

**** in OSPF we don't have Network CMD**

```
R1(config)#int gig0/0
R1(config-if)#ipv6 ospf 1 area 0
R1(config-if)#
*Sep 18 21:18:06.795: %OSPFv3-4-NORTRID: Process OSPFv3-1-IPv6 could not pick a router-id, please configure manually
R1(config-if)#exit
R1(config)#int loop 1
R1(config-if)#ip add 10.1.1.1 255.255.255.255
R1(config-if)#exit
R1(config)#
R1(config)#int range gig0/0 ,loop 1
R1(config-if-range)#ipv6 ospf 1 area 0
R1(config-if-range)#exit
R1(config)#
```

##R2

```
R2(config)#int range gig0/0 , gig1/0 , loop 1
R2(config-if-range)#ipv6 ospf 1 area 0
R2(config-if-range)#exit
R2(config)#do sh ipv6 os nei

          OSPFv3 Router with ID (10.2.2.2) (Process ID 1)

Neighbor ID     Pri   State           Dead Time   Interface ID    Interface
10.1.1.1          1   2WAY/DROTHER    00:00:38    3               GigabitEthernet0/0
R2(config)#
*Sep 18 21:20:11.611: %OSPFv3-5-ADJCHG: Process 1, Nbr 10.1.1.1 on GigabitEthernet0/0 from LOADING to FULL, Loading Done
```

#R3

```
R3(config)#do sh ipv6 os int gig0/0
GigabitEthernet0/0 is up, line protocol is up
  Link Local Address FE80::C802:2AFF:FEB0:8, Interface ID 3
  Area 0, Process ID 1, Instance ID 0, Router ID 10.3.3.3
  Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State BDR, Priority 1
  Designated Router (ID) 10.4.4.4, local address FE80::C803:31FF:FE88:8
  Backup Designated router (ID) 10.3.3.3, local address FE80::C802:2AFF:FEB0:8
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
    Hello due in 00:00:08
  Graceful restart helper support enabled
  Index 1/1/1, flood queue length 0
  Next 0x0(0)/0x0(0)/0x0(0)
  Last flood scan length is 2, maximum is 2
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 10.4.4.4  (Designated Router)
  Suppress hello for 0 neighbor(s)
R3(config)#
```

**** In this CMD we have all info**

##OSPFV3 LSA Types

```
 10.1.1.1        184         0x80000002  0           1           None
 10.2.2.2        151         0x80000003  0           2           None
 10.3.3.3        71          0x80000002  0           2           None
 10.4.4.4        72          0x80000002  0           1           None

               Net Link States (Area 0)

ADV Router      Age         Seq#        Link ID     Rtr count
 10.2.2.2        184         0x80000001  3           2
 10.2.2.2        151         0x80000001  4           2
 10.4.4.4        72          0x80000001  3           2

               Link (Type-8) Link States (Area 0)

ADV Router      Age         Seq#        Link ID     Interface
 10.2.2.2        224         0x80000001  4           Gi1/0
 10.3.3.3        150         0x80000001  4           Gi1/0
 10.3.3.3        150         0x80000001  3           Gi0/0
 10.4.4.4        113         0x80000001  3           Gi0/0

              Intra Area Prefix Link States (Area 0)

ADV Router      Age         Seq#        Link ID     Ref-lstype  Ref-LSID
 10.1.1.1        184         0x80000003  0           0x2001      0
 10.2.2.2        151         0x80000003  0           0x2001      0
 10.2.2.2        184         0x80000001  3072        0x2002      3
 10.2.2.2        151         0x80000001  4096        0x2002      4
 10.3.3.3        71          0x80000002  0           0x2001      0
 10.4.4.4        72          0x80000002  0           0x2001      0
 10.4.4.4        72          0x80000001  3072        0x2002      3
```

****Type-1, Type-2, Type-8**

** Ping Using a Multicast-address

```
R2(config)#do sh ip int bri
Interface              IP-Address      OK? Method Status                Protocol
Ethernet0/0            unassigned      YES unset  administratively down down
GigabitEthernet0/0     unassigned      YES unset  up                    up
GigabitEthernet1/0     unassigned      YES unset  up                    up
GigabitEthernet2/0     unassigned      YES unset  administratively down down
GigabitEthernet3/0     unassigned      YES unset  administratively down down
GigabitEthernet4/0     unassigned      YES unset  administratively down down
GigabitEthernet5/0     unassigned      YES unset  administratively down down
GigabitEthernet6/0     unassigned      YES unset  administratively down down
Loopback1              10.2.2.2        YES manual up                    up
R2(config)#do ping  FF02::5
Output Interface: GigabitEthernet0/0
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to FF02::5, timeout is 2 seconds:
Packet sent with a source address of FE80::C804:46FF:FE2C:8%GigabitEthernet0/0

Reply to request 0 received from FE80::C801:18FF:FE70:8, 36 ms
Reply to request 1 received from FE80::C801:18FF:FE70:8, 40 ms
```

**Config the EIGRP (remove OSPF)

```
R1(config)#ipv6 router eigrp ?
  <1-65535>  Autonomous system number

R1(config)#ipv6 router eigrp 15
R1(config-rtr)#no shut
R1(config-rtr)#exit
R1(config)#int range gig0/0 , loop 1
R1(config-if-range)#ipv6 eigrp 15
R1(config-if-range)#
```

** in IPV6 EIGRP remains shutdown default [we have to enable using a no shut CMD on router-config mode]

** Show IP-Protocol CMD of EIGRP on IPV6

```
R4#sh ipv6 pro
IPv6 Routing Protocol is "connected"
IPv6 Routing Protocol is "ND"
IPv6 Routing Protocol is "static"
IPv6 Routing Protocol is "eigrp 15"
EIGRP-IPv6 Protocol for AS(15)
  Metric weight K1=1, K2=0, K3=1, K4=0, K5=0
  NSF-aware route hold timer is 240
  Router-ID: 10.4.4.4
  Topology : 0 (base)
    Active Timer: 3 min
    Distance: internal 90 external 170
    Maximum path: 16
    Maximum hopcount 100
    Maximum metric variance 1

  Interfaces:
    GigabitEthernet0/0
    Loopback1
  Redistribution:
    None
```

** create a another IPV6 loopback on R4 and [perform routing filtering using a access-list in IPV6]

```
R4(config-if)#i
*Sep 18 21:45:05.487: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback2, changed state to up
R4(config-if)#ipv6 add 2001:4::4/128
R4(config-if)#ipv6
```

##route-filtering

```
R2(config)#ipv6 access-list NH ?
  <cr>

R2(config)#ipv6 access-list NH
R2(config-ipv6-acl)#deny icmp host 2001:10:1::1 host 2001:4::4
R2(config-ipv6-acl)#permip ip any any
                    ^
% Invalid input detected at '^' marker.

R2(config-ipv6-acl)#per
R2(config-ipv6-acl)#permit ip any nay
                           ^
% Invalid input detected at '^' marker.

R2(config-ipv6-acl)#permit ip any any
R2(config-ipv6-acl)#do sh run | sec ipv6 access-list
ipv6 access-list NH
 deny icmp host 2001:10:1::1 host 2001:4::4
 permit ipv6 any any
R2(config-ipv6-acl)#
```

** perform filtering using a traffic-filter CMD

```
R2(config)#
R2(config)#int gig0/0
R2(config-if)#ipv6 tr
R2(config-if)#ipv6 traffic-filter NH in
R2(config-if)#
```