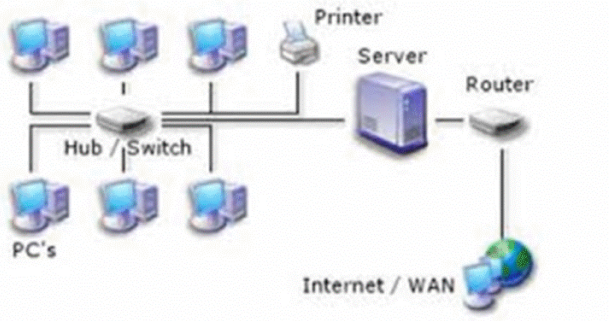
IPV6

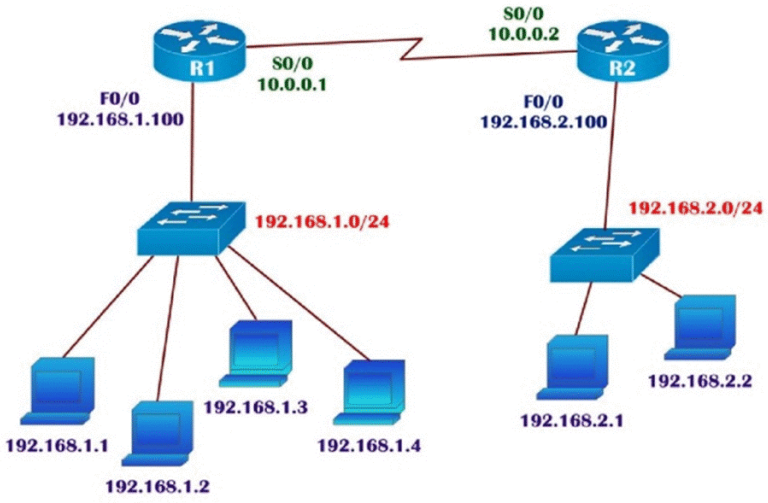
TCP/IP addressing

- IP Address is Logical Address given to each and every device in the network.
- IP address used to identify specific device in the network.

Two Versions of IP:

- IP version 4 (32 bit)
- IP version 6 (128 bit)





Techniques to reduce address shortage in IPv4

- Subnetting
- Network Address Translation (NAT)

IPv6

- IPv6 next version of addressing using TCP/IP protocols
- Introduced to overcome the shortage of address in IPv4
- Supported large address space (128 bit).

IPV6 Addressing

- 128 bit address
- Hexadecimal format

64 bit Global Prefix				64 bit Interface ID			
2001:	0db8:	0000:	0000:	1234:	0000:	0000:	3c4d

2001:

Each portion = 16 bits

8 portions = 128 bits

Each digit = 4 bits

2001:	0db8:	0000:	0000:	1234:	0000:	0000:	3c4d

2001:	db8 :	0 :	0 :	1234 :	0 :	0 :	3c4d

2001:	db8	: :	1234	: :	3c4d

2001:	db8	: :	1234	0 :	0 :	3c4d

IPV6 address Types

- Unicast
- Multicast
- Any cast

Unicast Address

1) Global unicast

- like public IP (routable)
- starts with 2000::/3 (the first three bits 001) assigned by IANA
- Starts with 2 or 3

2) unique local

- like private ip (routable)
- FC00::/7
- Starts wth either FC or FD in the first two numbers.
- Not recognized on internet (with the same organization LAN/WAN)

Unicast Address

3)link local

- default IPV6 address on every ipv6 enabled interface(non routable)
- Routers do not forward packets with link-local addresses.

FE80::/10

Multicast

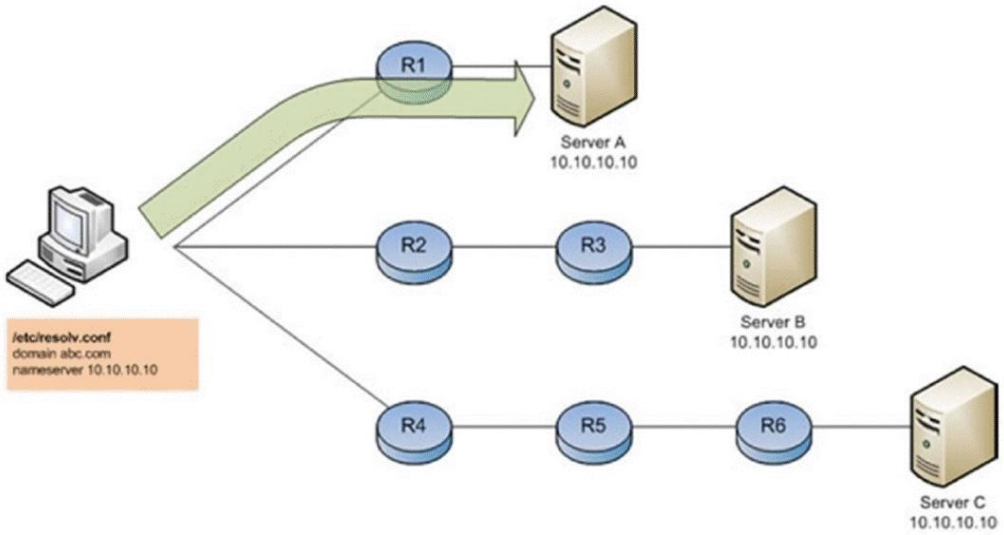
- In IPV6 multicast address will be starting with FF (FF00::/8)

Any cast

- similar to multicast , identify multiple interfaces but sends to only one whichever it finds first.
- unique local and Global unicast addresses can be used as anycast.

Device(config)# interface f0/0

Device(config-if)# IPv6 address ipv6-prefix/prefix-length anycast

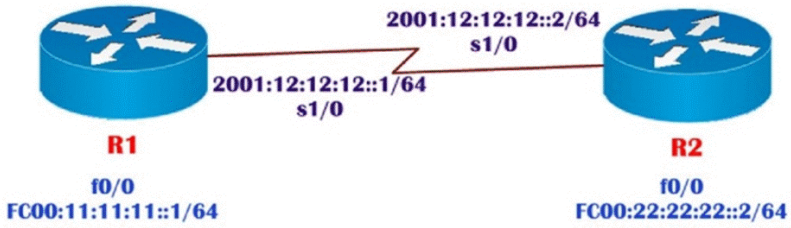


Assigning the IPV6 address on cisco routers

R-1(config)#interface s1/0

R-1(config-if)#ipv6 address 2001:12:12:12::1/64

R-1(config-if)#no shutdown



R-1(config)#interface fastethernet 0/0

R-1(config-if)#ipv6 address fc00:11:11:11::1/64

R-1(config-if)#no shutdown

IPV6 ROUTING

IPv6 uses the same types of routing protocols as IPv4
with some slight modifications to account for specific requirements of IPv6.

IPv6 ROUTING TYPES

- Static/ default
- RIPng
- OSPFv3
- EIGRP for IPv6

IPv6 routing has to be enabled before using any routing process as by default IPV6 routing is disabled for IPv6.

To enable ipv6 routing on both routers

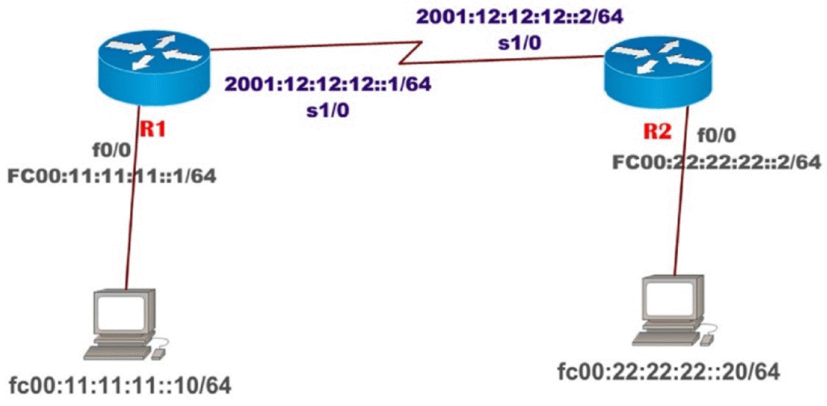
Rx(config)#ipv6 unicast-routing

Static Routing

Syntax for writing static and default routing is similar in IPV6 when compared with IPV4

R-1(config)#**ipv6 route** fc00:22:22:22::/64 2001:12:12:12::2

R-2(config)#**ipv6 route** fc00:11:11:11::/64 2001:12:12:12::1

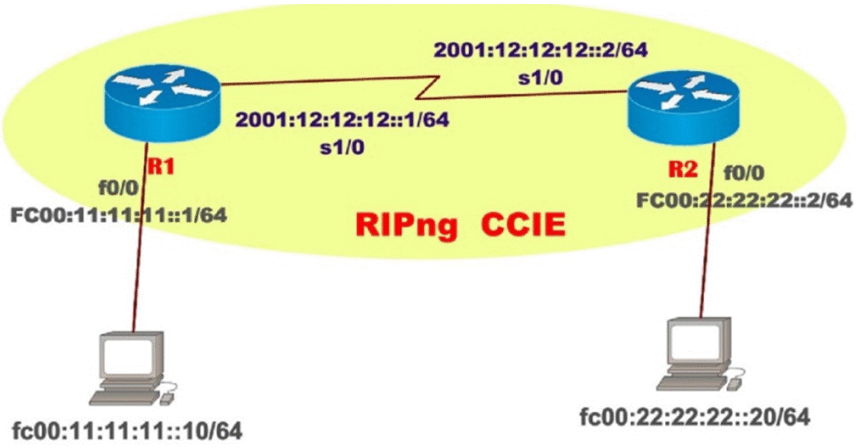


RIPng

R-1(config)#**ipv6 router rip CCIE**
R-1(config-rtr)#**exit**

R-1(config)#**int f0/0**
R-1(config-if)#**ipv6 rip CCIE enable**
R-1(config-if)#**exit**

R-1(config)#**int s1/0**
R-1(config-if)#**ipv6 rip CCIE enable**
R-1(config-if)#**end**



Process ID must be same on both routers to exchange routes

R-2(config)#**ipv6 router rip CCIE**
R-2(config-rtr)#**exit**

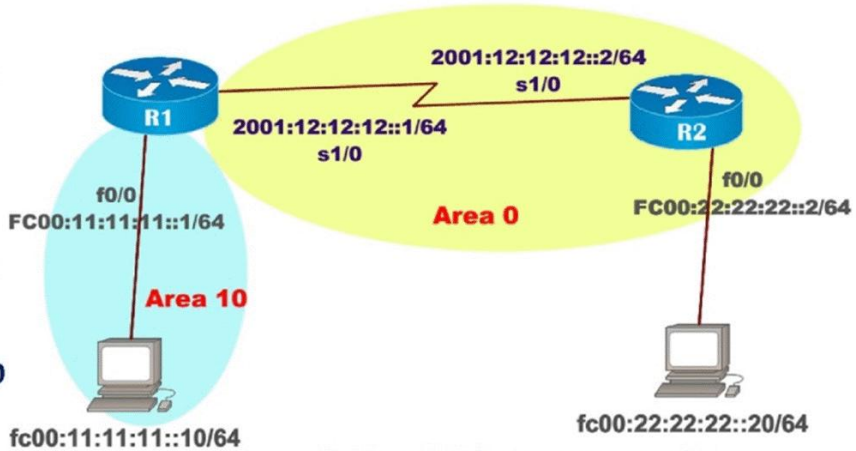
R-2(config)#**int f0/0**
R-2(config-if)#**ipv6 rip CCIE enable**
R-2(config-if)#**exit**

R-2(config)#**int s1/0**
R-2(config-if)#**ipv6 rip CCIE enable**
R-2(config-if)#**end**

OSPFv3

R-1(config)#**ipv6 router ospf 1**
R-1(config-rtr)#**router-id 11.1.1.1**
R-1(config-rtr)#**exit**

R-1(config)#**int s1/0**
R-1(config-if)#**ipv6 ospf 1 area 0**
R-1(config-if)#**int f0/0**
R-1(config-if)#**ipv6 ospf 1 area 10**
R-1(config-if)#**exit**



R-2(config)#**ipv6 router ospf 1**
R-2(config-rtr)#**router-id 22.2.2.2**
R-2(config-rtr)#**exit**

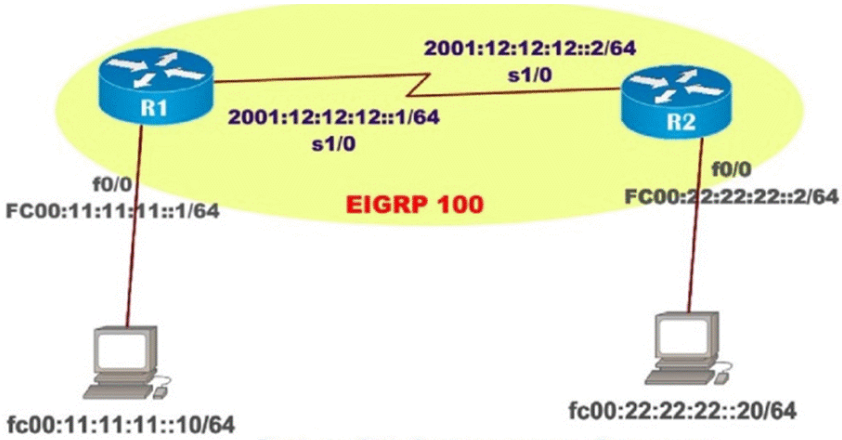
R-2(config)#**int s1/0**
R-2(config-if)#**ipv6 ospf 1 are 0**
R-2(config-if)#**int f0/0**
R-2(config-if)#**ipv6 ospf 1 are 0**

EIGRPv6

R1(config)#**ipv6 router eigrp 100**
R-1(config-rtr)#**eigrp router-id 11.1.1.1**
R-1(config-rtr)#**no shutdown**
R-1(config-rtr)#**exit**

R-1(config)#**interface s1/0**
R-1(config-if)#**ipv6 eigrp 100**

R-1(config-if)#**int f0/0**
R-1(config-if)#**ipv6 eigrp 100**
R-1(config-if)#**end**



R2(config)#**ipv6 router eigrp 100**
R-2config-rtr)#**router-id 22.2.2.2**
R-2(config-rtr)#**no shutdown**
R-2config-rtr)#**exit**

R-2(config)#**int s1/0**
R-2(config-if)#**ipv6 eigrp 100**

R-2(config-if)#**int f0/0**
R-2(config-if)#**ipv6 eigrp 100**