

INTERNET PROTOCOL VERSION 6 - IPV6

IPV6 is the most modern version of Internet Protocol addressing and it is supposed to replace the existing Internet Protocol Version 4 addresses in the future. It is being developed by INTERNET ENGINEERING TASK FORCE (IETF).

- IP Version 6 addresses are 128 bit in length.
- It is the binary numbers represented in Hexadecimal format.
- It has been divided into 8 sections.
- Each section contains 16 bits.
- It has colon-hex notation.
- The addresses we get 3.4×10 to power 38.
- Approximately around 340 trillion trillion trillion addresses.

IPV6 Address -- 2001:0000:3238:DFE1:0063:0000:0000:FEFB

RULES for removing unnecessary sections from IPV6 Address.

- Remove 2 consecutive 0's on 32 bit first with ::,
2001:0000:3238:DFE1:0063::FEFB
- Remove the 16 bit section starts with 00.
2001:0000:3238:DFE1:63::FEFB
- Remove the next 16 bit which completely include 0's.
2001:3238:DFE1:63::FEFB

Advantages of using IPV6 :

- Large Address space.
- No dependency on NAT.
- 1999 June begins the successful test of IPV6.
- 60,000 Private IP's can be ported with one public IP (because of NAT).
- No concept of Broadcast.
- Multicast address being used, stateless concept is being used.

Identifying Network and Host in IPV6.

By default first 64 bit portion is known as Global prefix (eq=network address)

And last 64 bit portion is known as interface id (eq=host address)

CLASSIFICATION OF IPV6

- Unicast, multicast, anycast

1) Unicast has been classified in three different categories.

- Global Unicast - It is like Public IP addresses and starts with 2000::/3 (first 3 bits 001) assigned by IANA

- In it first 3 bits remain constant as per IANA 0010 = 2 and through which it begins with.

- Unique Local - It is like Private IP addresses and any ip address starts with FC::/7 and FD:: (first 7 bits constant)

F=1111, C=1100 and it would be something like this fc00::/7 and fd00::/8

- Link Local - It is a default IPV6 address for every IPV6 enabled interface and something like loopback address.

- Link local starts with FE80::/10 (first 10 bits are constant) and remaining portion will be MAC address of pc, which comes under stateless.

2) Multicast is like class D and starts with FF00::/8 (first 8 bits are constant).

3) Anycast - New thing in IPV6, address similar to multicast and it identifies multiple interfaces but sends it to particular one IPV6.

- It is used with the concept of server clustering and can use same ip on every server.

- starts with 2001::1.

- It forwards the packet to nearest destination ipv6.

- It has no concept of Broadcast.

IPV6 STATIC ROUTING

- Router(config)#ipv6 unicast-routing

- Router(config)#ipv6 route fd00::00/64 2000::B on first router

- Router(config)#ipv6 route fc00::00/64 2000::A on second router

IPV6 RIP ROUTING

- Router(config)#ipv6 unicast-routing

- Router(config)#ipv6 router rip abc

- Router(config)#interface fastethernet 0/0

- Router(config-if)#ipv6 rip abc enable

- Router(config)#interface serial 0/3/0

- Router(config-if)#ipv6 rip abc enable

IPV6 DHCP SERVER

- Router(config)#ipv6 unicast-routing

- Router(config)#ipv6 dhcp pool <pool name>

- Router(config)#prefix-delegation pool <pool name>

- Router(config)#dns-server <dns ipv6 address>

- Router(config)#domain-name appin.com

- Router(config)#exit

- Router(config)#int fa 0/0

- Router(config-if)#ipv6 dhcp server <pool name>

- Router(config)#exit

- Router(config)#ipv6 dhcp local pool <ipv6 address>/64 64

- EIGRP IPV6 routing

- Router(config)#ipv6 unicast-routing

- Router(config)#ipv6 router eigrp 100

- Router id 1.1.1.1

- No shutdown

- Interface fastethernet 0/0

- Ipv6 eigrp 100

- Interface serial 0/3/0

- Ipv6 eigrp 100

- On second router same router id will be different.

- IPV6 OSPF ROUTING

- Router(config)#ipv6 router ospf 50

- #router-id 2.2.2.2

- #area 5 stub no-summary

- #no shutdown

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- Router(config)#int fa 0/0
-                               #ipv6 ospf 50 area 5
- Same on interface serial 0/3/0
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<https://www.catchpoint.com/benefits-of-ipv6/ipv6-compression-rules>