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IPv6 Address Types

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What Are The Types of IPv6 Addresses?

Like **IPv4**, there are different **IPv6 Address Types** also in **IPv6** world. Here, we will focus on these **IPv6 addresses** and we will learn the details of these **IPv6 address types**. Like IPv4, In IPv6 world, some of the concepts like reserved, public and private addresses will still remain. But with some differences. Let's see all these address types one by one.

Mainly, there are **four IPv6 Address Types**. These address types are given below:

- **Special IPv6 Addresses**
- **IPv6 Unicast Addresses**
- **IPv6 Multicast Addresses**
- **IPv6 Anycast Addresses**

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IPv6 Special Addresses are the addresses which are used for different purposes. We have such IP addresses for IPv4 too.

IPv6 Unicast Addresses are single node or single interface ip addresses. When we send a traffic to a unicast address, this traffic is se...

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is sent to that group.

IPv6 Anycast Addresses is the new additional ip address type in IPv6 world. When we send a traffic to an anycast address, this traffic is sent to the nearest interface which is configured with the same anycast ip address.

By the way, there is **no broadcast address** in IPv6 world. As you remember, we were using IPv4 broadcast addresses.

Now, let's explain these **IPv6 Address Types** detailly.

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Special IPv6 Addresses

Like IPv4, there are some special addresses in IPv6 world too. You will remember some of these **special IPv6 addresses** also from IPv4. So, what are these IPv6 special addresses? These addresses and their definitions are given below:

- **0:0:0:0:0:0:0:0/0**
- **0:0:0:0:0:0:0:0/128**
- **0:0:0:0:0:0:0:1/128**

0:0:0:0:0:0:0:0/0 : The abbreviation of this address is **::/0**. It is used to while defining a **Default Route**. The IPv4 equivalent of this special address is **0.0.0.0**.

0:0:0:0:0:0:0:0/128 : The abbreviation of this address is **::/128**. It is named as **Unspecified Address. And it is assigned to a host when it resolves its IPv6 link local address.**

0:0:0:0:0:0:0:1/128: The abbreviation of this address is **::1/128**. It is the **Loopback Address of local host.** The IPv4 equivalent of this special address is **127.0.0.1.**

Beside these special addresses, there are also some **reserved IPv6 addresses** by **IETF** and **IANA**. They are used for different purposes.

IPv6 Unicast Addresses

Like IPv4, IPv6 has also different **Unicast Addresses**. But in IPv4, we had two unicast address types. But here, in IPv6 world, we have **three IPv6 Unicast Addresses**. So, what are these **Unicast IPv6 Address Types**? These unicast addresses are given below:

- **IPv6 Global Unicast Address**
- **IPv6 Link-Local Address**
- **IPv6 Unique Local Address**

Now, let 's check all these **Unicast IPv6 address types** detailly.

Global Unicast IPv6 Address

IPv6 Global Unicast Addresses are the IPv6 addresses of Internet. This address type is like **IPv4 Public addresses**. They are **unique on internet** like IPv4 public addresses. They are routable and reachable on Internet.

IPv6 Global Unicast Addresses has a **wide range** which can covers all the ipv6 available devices on Internet. This is also important for the world of **Internet of Things (IoT).** These IPv6 addresses are assigned by IANA like other IP addresses.

- 0010.. (**2000::/3**)
- 0011.. (**3000::/3**)
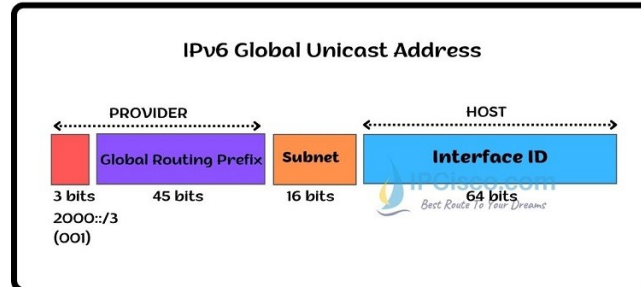
There are two main parts of an **IPv6 Global Unicast Address.** The first part is the **Network Part** and the other part is **Host Part (Interface ID)**.

Network Part is **64 bits** long and it has some sub parts. These sub parts are given below:

- **Fixed part (001)**
- **Global Prefix**
- **SLA (Site Level Aggregator)**
- **LAN ID**

Here, **SLA** is the part assigned by your service provider. **LAN ID** part is the part which is determined by you (customer) to divide addresses into different networks (**IPv6 Subnetting**).

Host Part (Interface ID) is also **64 bits** long. They are generally created by **IPv6 EUI-64 Format**.
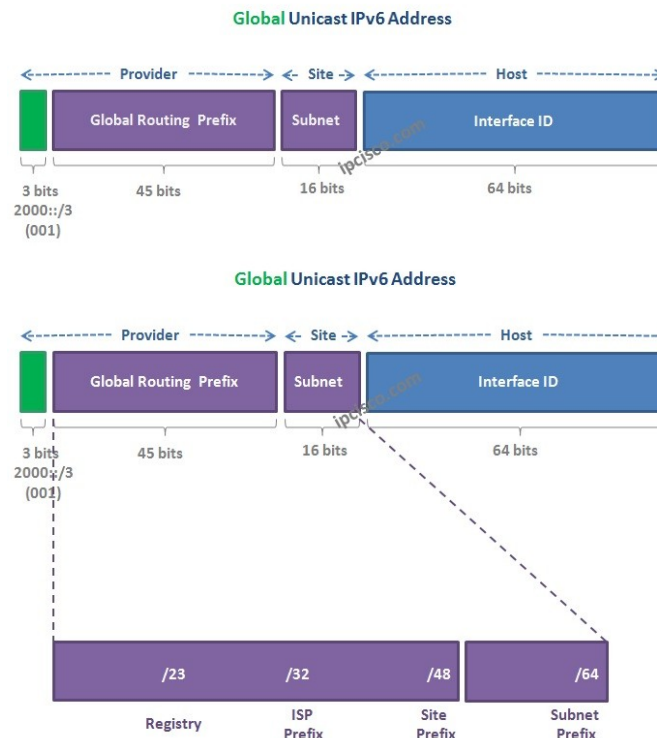
Addresses are only used on the **same link**. These addresses are not routable on Internet. They are only used for **neighbor discovery** and **next hop configuration**.

The prefix of **IPv6 Link-Local Address** is **FE80::/10**. Its high level 10 bits are fixed as **1111 1110 10**. The remaining **54 bits** of network part is full of **0s**.
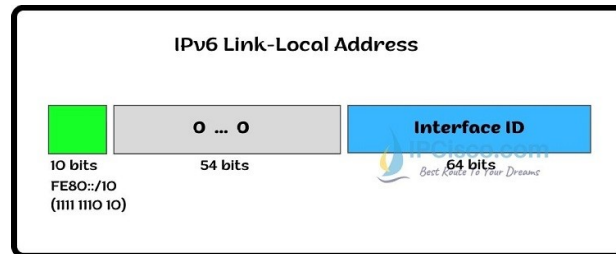
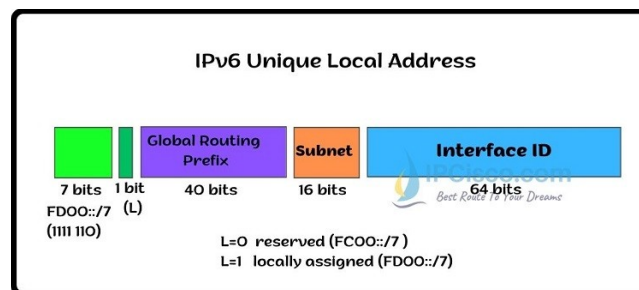Here, **Interface ID** is created with **IPv6 EUI-64 format.**

Unique Local IPv6 Address

IPv6 Unique Local Addresses are like **IPv4 Private addresses**. They are used on **local networks**. They are not routable addresses on Interent. But with IPv6 NAT you can use Unique Local IPv6 Address on Internet.

The prefix of **IPv6 Unique Local Address** is **FC00::/7**. Its high level 7 bits are fixed as **1111 110**. This means that, a **IPv6 Unique Local Address** can start with hex digit **FC** or **FD** according to the value of the eight, **L** bit.

- **FC00::/7 ->** L=**0** Reserved
- **FD00::/7 ->** L=**1** Locally assigned

Now, the used one is **FD00::/7.**

Here, subnet id is determined by the administrator of local network. **Interface ID** is created with **EUI-64 Format**.

**Unique-Local** Unicast IPv6 Address

7 bits	1 bit	40 bits	16 bits	64 bits
FC00::/7	(L)			
(1111 110)				

Anycast Addresses

IPv6 Anycast addresses are new address type in IPv6 world. This address is assigned to a set of interfaces that typically belong to the different nodes. Then, when a packet is sent to the anycast address, the packet is delivered to the **closest node**.

There is **no specific IP range** for IPv6 **Anycast Addresses**.

The only fixed part is on host part of the address. The host ID part of **IPv6 Anycast Addresses** is full of **0s**.
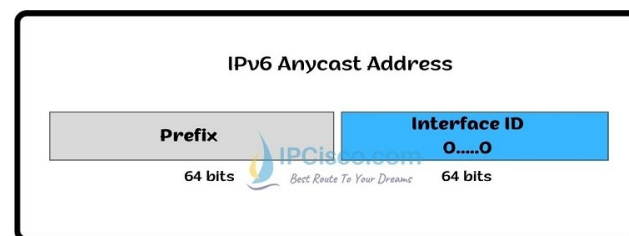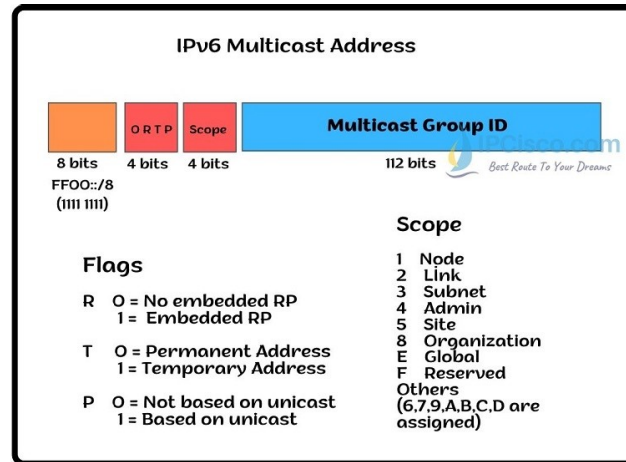

IPv6 Multicast Addresses

Like IPv4, there are also multicast addresses in IPv6. As you know, a multicast address represents a group of interfaces or devices. When a traffic sent to an **IPv6 Multicast Address**, multiple devices and interfaces in the same group receive the same traffic.

The prefix of **IPv6 Multicast Address** is **FF00::./8**.Here, the first octet is full of **1s as 1111 1111**. And the second octet consists of **flags** and **scope** values. It determines lifetime and scope of IPv6 Multicast Address.

If the **lifetime** is **"0"** then the multicast address is **permanent**, if it is "**1**", then the multicast address is **temporary**.

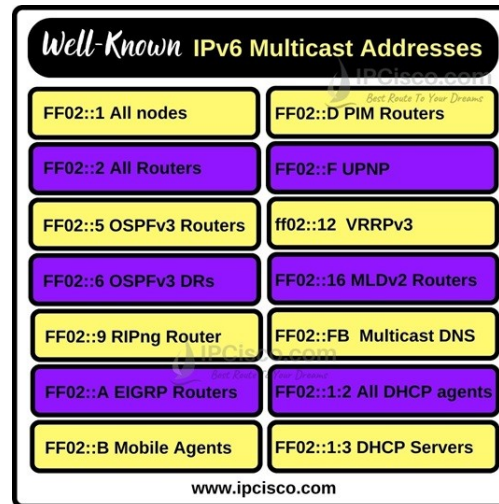You can find the **IPv6 Multicast Address** diagram below:
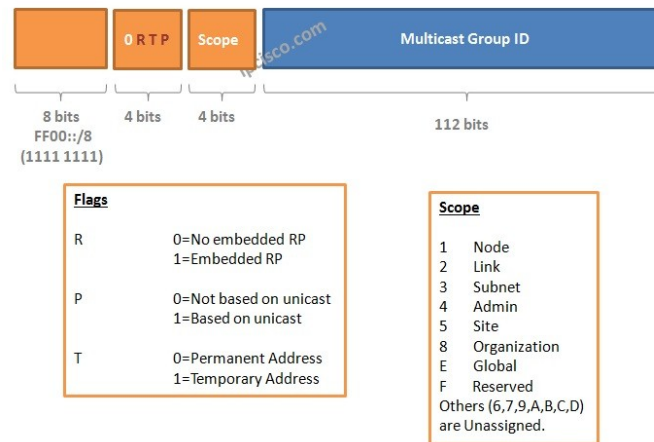
Multicast Address Scopes shows how far the packet should be forwarded. Below, you can find these Multicast Address Scopes:

- **Interface-Local (FF01)** -> Remains in local device
- **Link-Local (FF02)** -> Remains in local subnet
- **Site-Local (FF05)** -> Limited for a location
- **Organization-Local (FF08)** -> Limited for a company
- **Global (FF0E)** -> Maybe over Internet

Let 's write some examples of one of these scopes, **Link-Local Scope Addresses**. Below, you can find some well-known **IPv6 Link-Local Scope Addresses:**

- **FF02::1 All nodes**
- **FF02::2 All Routers**
- **FF02::5 OSPFv3 Routers**
- **FF02::6 OSPFv3 DRs**
- **FF02::9 RIPng Router**
- **FF02::A EIGRP Routers**
- **FF02::B Mobile Agents**
- **FF02::D PIM Routers**

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- **FF02::1:2 All DHCP agents**
- **FF02::1:3 DHCP Servers**

As you can see, there are different **IPv6 Link-Local Scope Multicast Addresses** above. Each of these addresses are belong to a specific group, protocol etc.

In IPv6 Multicast, there is also a specific multicast addresses named **IPv6 Solicited-Node Multicast Address.** These addresses are used by IPv6 NDP for efficient IPv6 Neighbor discovery. Instead of **IPv4** ARP, this mechanism is used for **IPV6**.

The **first 104 bits** of **IPv6 Solicited-Node Multicast Addresses** are fixed. To produce this multicast address, **low order 24 bits** of IPv6 address are taken and added to fixed **FF02:0:0:0:0:1:FF00::/104. Solicited-Node** multicast addresses are automatically produced.

Below, you can find a shape of **IPv6 Solicited-Node Multicast Addresses**.
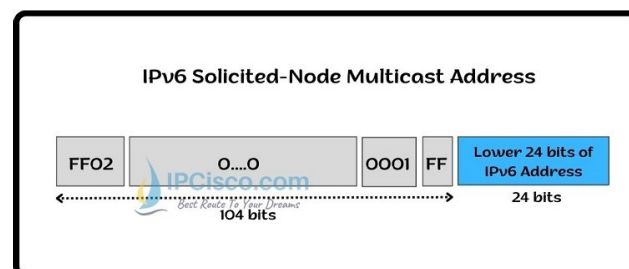
IPv6 Solicited-Node Multicast Address

104 bits (Fixed)   24 bits

You can also test your IPv6 Knowledge on IPv6 Questions Page.

IPv6 Address Practice

IPv6 Addressing Questions

Question 1: **What is IPv6 Loopback Address of local host?**

a) ::0/128

b) ::1/128

c) ::/128

d) ::1/127

e) ::0/127

Question 2: **How many bits are there in an IPv6 Global Unicast Addresses Interface ID ?**

a) 12 bits

b) 20 bits

c) 32 bits

d) 64 bits

e) 128 bits

Question 3: **Which one si the reserved block of IPv6 Unique Local Addresses?**

a) FC00::/7

b) FD00::/7

c) FE80::/10

d) 2000::/3

e) FF00::./8

Question 5: **What is the prefix of IPv6 Link-Local Address range?**

a) 2000::/3

b) FE80::/10

c) FD00::/7

d) FF00::./8

e) FC00::/7

Answers: 1)**b**   2)**d**   3)**a**   4)**e**   5)**b**

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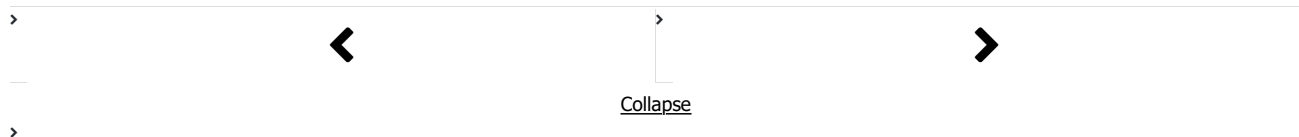**POST COMMENT**

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