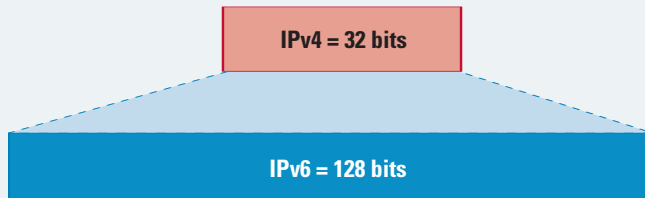


### RFC 3513

One of the key advantages IPv6 brings is the exponentially larger address space. The following will outline the basic address architecture of IPv6.

**Figure 1**



#### 128-bit-long addresses

Represented in hexadecimal format:

- Uses CIDR principles: prefix/prefix length
- x:x:x:x:x:x:x, where x is a 16-bit hex field
- The last 64 bits are used for the interface ID

2001:0DB8:C003:0001:0000:0000:0000:FOOD

- Can be represented in shorter format by removing leading zeros

2001:DB8:C003:1:0:0:0:FOOD

- Further reduction by removing consecutive fields of zeros using the double-colon :: option
- Note the double-colon can be used only once

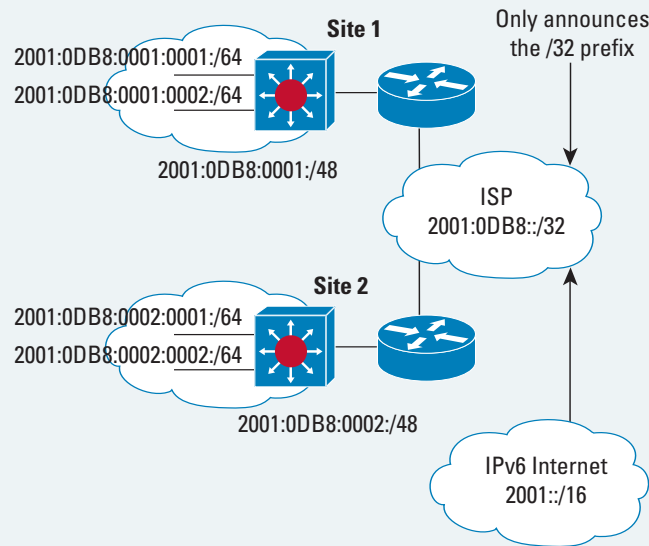
2001:DB8:C003:1::FOOD

Address types are:

- Unicast: one-to-one (global, link local, unique local, compatible)
- Anycast: one-to-nearest (allocated from Unicast)
- Multicast: one-to-many (also replaces broadcast addresses)

Type	Binary	Hex
Aggregatable Global Unicast	0010 0001	2001::/16
Link-Local Unicast	1111 1110 10	FE80::/10
Unique Local Unicast	1111 1100	FC00::/8
	1111 1101	FD00::/8
Multicast	1111 1111	FF00::/16

**Figure 2.** IPv6 Provides for a Hierarchical Address and Aggregation Model



Internet Assigned Numbers Authority (IANA) allocates address space to each regional registry:

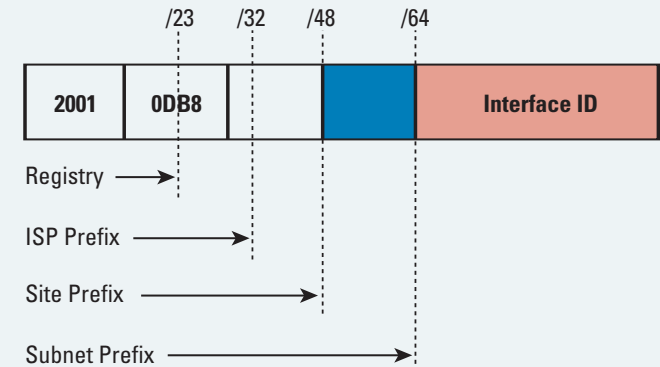
- RIPE NCC (EMEA)
- APNIC (Asia Pacific)
- ARIN (North America)
- LACNIC (Latin America)

<http://www.iana.org/assignments/ipv6-tla-assignments>

Service providers are assigned IPv6 prefixes from their regional registry (prefix length may vary).

Enterprise/consumer customers are assigned IPv6 address space from their service provider (prefix length may vary).

**Figure 3.** Address Allocation Follows a Generally Accepted Assignment Policy



A single interface may be assigned multiple addresses of any type (unicast, anycast, multicast).

Every IPv6-enabled interface must contain at least one loop-back and one link-local address.

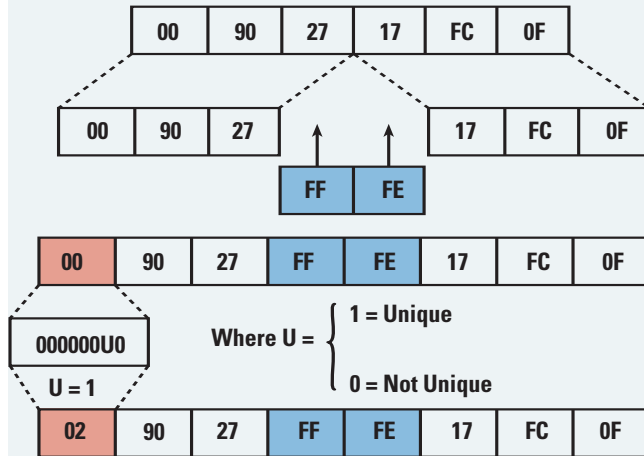
Optionally, every interface can have multiple unique local and global addresses.

IPv6 host addresses can be assigned in multiple ways:

- Static configuration
- Stateless autoconfiguration
- DHCPv6

When IPv6 is used over Ethernet networks, the Ethernet MAC address can be used to generate the 64-bit interface ID for the host. This is called the EUI-64 address. Since MAC addresses use 48 bits, additional bits must be inserted to fill the 64 bits required.

Figure 4.



EUI-64 address inserts “FFFE” in middle.  
 Invert “U” bit to identify uniqueness of MAC.