IPV6 address formats explained

Note; Ipv6 addresses are case insensitive.

1. Link Local addresses

-Not routable
-Used for neighbor discovery ("arp for Ipv6") and, stateless autoconfiguration, router soliciations and DHCP.
-Provides Local communication only. (can not be routed)
-Can be the next – hop Ipv6 router IP address
-Can utilize EUI-64 for the host-address or a randomized ("temporary") host address (Windows)
-Is auto configured and necessary on ANY Ipv6 enabled interface
-Resembles the Windows "APIPA" address 169.254.0.0/16 [RFC3927] for local communication only.
-In case of multiple Link Local Addresses, the OutGoing interface needs to be specified!
Example in UNIX:
```
$ ping6 fe80::4e8d:79ff:fedc:e236%en1
```

Format:
FE80::/10 till FECF:FFFF....

Range: FE80::/10 – FEBF:FFFF..../10

2. Unique Local addresses

-Are routable within an organization
-Not used on the internet
-Serve the same purpose as the "Private Address Family ranges" in Ipv4 (10, 172.16-31 and 192.168)
-Are endorsed to be used within individual organizations.

Format:
FC00::/7 till FDFF:FFFF....

Note: FC00::/8 has not been defined yet, FD00::/8 is.

Note: Unique Local addresses replace the former "site local" addresses which are now considered obsolete.

3. Global Unicast addresses

-Are governed by IANA and the RIR's. (Arin, Ripe, AFNIC, etc.)
-Not all blocks are currently allocated, Ipv6 addresses on the Internet start at 2100::/3

Format:
2000::/3 till 3FFF:FFFF...

Range: 2000 3FFF:FFF....
IANA has reserved 2000::/3 – 2000:FFFFF... so this first range is not found on the Internet.

4. Multicast Addresses

-Are used not only for plain multicasting but also as a replacement for broadcast addresses in Ipv4.

-Start with "FF" where the next two digits define the multicast scope.

Format:

FF<scope>::/16

5. Anycast addresses

-Are indistinguishable from Global Unicast addresses

-Are taken from the same range as Global Unicast addresses

-A routable as the "one-to-nearest" address

-Coincide with a deployed service like DNS, running on that address.

-Work in the same fashion as Ipv4 Anycast addresses.

6. Broadcast Addresses

Are NO longer used in Ipv6.

7. The loopback / localhost address

-Has the same functionality as the 127.x.y.z address range in Ipv4.

Format:

::1

8. The Unspecified Address

-Has the same functionality as the "all zeroes" address 0.0.0.0 in UNIX

Format:

::

9. IOS methods to assign Ipv6 addresses

```
(config) # ipv6 unicast-routing
(config-if)# ipv6 address <ipv6>/64
```

```
(config-if)# ipv6 address <ipv6>/64  eui-64
(config-if)# ipv6 address autoconfig
(config-if)# ipv6 address dhcp
```

10. M/O flags in Stateless Autoconfiguration (SAC)

Managed Flag   :   M

Other Configuration Flag   :   O

	M flag	O Flag	
Stateless AC. Without DHCP	0	0	
Stateless AC. With eg DNS via DHCP	0	1	("DHCP6 lite" / Stateless DHCP6)
StateFULL DHCP	1	x	

11. 6to4 Address

-Used for tunneling IPv6 in an IPv4 datagram.

-The Protocol type in the IPv4 header is set to "41" which corresponds to an IPv6 encapsulated datagram as payload for an IPv4 datagram.

Format:

 2002:<32 bit IPv4 source address in hex>::/48

Here 2002 signifies that 6to4 tunneling is used. This leaves 16 bits to form (sub)nets for a /64 prefix.

Example:

2002:c000:0204::/48 for IPv4 address 192.0.2.4. (0xc0 = 192)