IPv6 Addressing

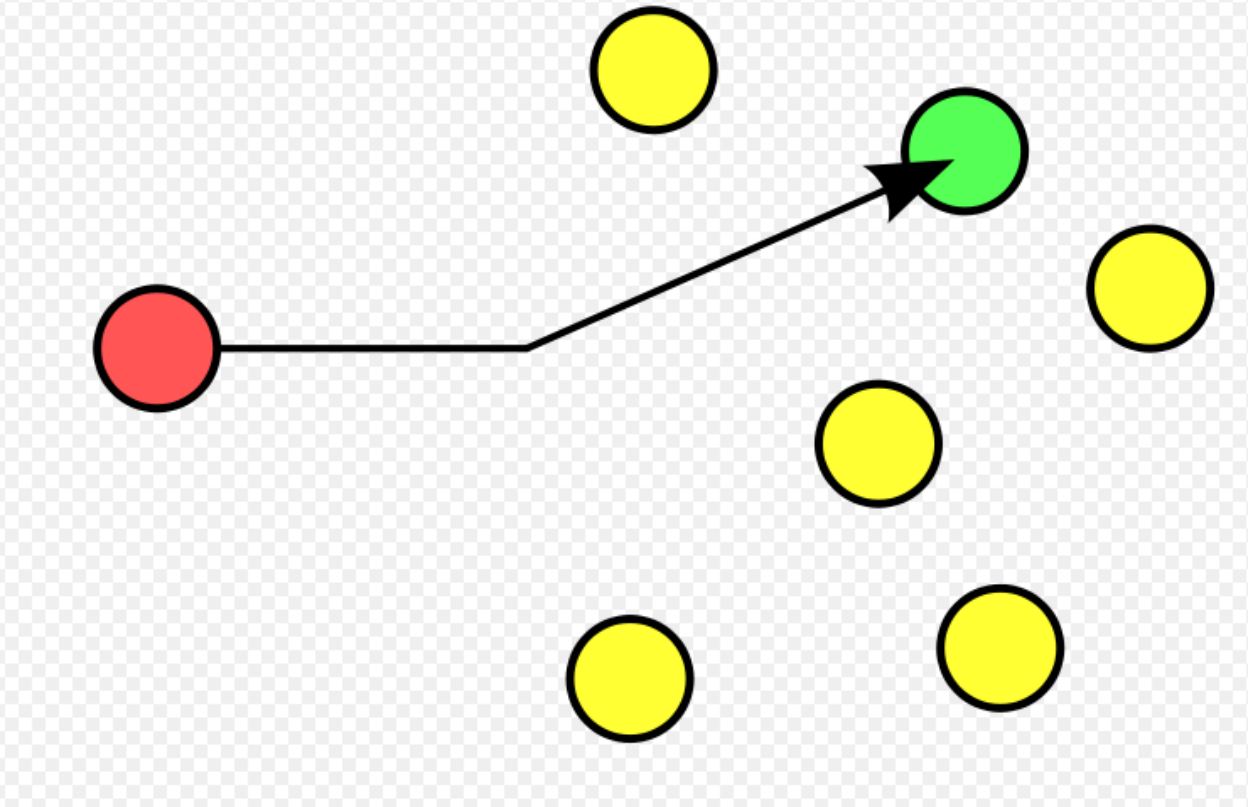
There are three types of IPV6 Addresses. Unicast:Multicast:Anycast

Unicast IPv6 addresses

A unicast address identifies a single interface within the scope of the type of unicast address. With the appropriate unicast routing topology, packets addressed to a unicast address are delivered to a single interface. The following types of addresses are unicast IPv6 addresses:

- Aggregatable global unicast addresses (equivalent to ipv4 publ add – globally routable)
- Link-local addresses (similar to Apipa 169.254.0.0/16)
  FP-FE80- IIII III0 I0 can only communicate with nodes in the same subnet)
- Site-local addresses (equivalent to ipv4 priv add – range 10.0.0.0/8; 172.16.0.0/12; 192.168.0.0/16 FEC0
- Special addresses (loopback - 127.0.0.1 ::1 or 0:0:0:0:0:0:0:1
- Unspecified addresses 0:0:0:0:0:0:0:0

Unicast addressing uses a *one-to-one* association between destination address and network endpoint: each destination address uniquely identifies a single receiver endpoint.



Local-use unicast addresses

There are two types of local-use unicast addresses:

- Link-local addresses, which are used between on-link neighbors and for Neighbor Discovery processes. Link-local addresses always begin with FE80::/64
- Site-local addresses, which are used between nodes that communicate with other nodes in the same site. Site-local addresses always begin with FEC0::48

Link-local addresses

- Link-local addresses, identified by the FP of 1111 1110 10, are used by nodes when communicating with neighboring nodes on the same link.
- Link-local addresses always begin with FE80. The prefix for link-local addresses is always FE80::/64.

- An IPv6 router never forwards link-local traffic beyond the link.

- Link-local addresses are also defined as FE0::/10

Site-local addresses

- Site-local addresses are equivalent to the IPv4 private address space (10.0.0.0/8, 172.16.0.0/12, and 192.168.0.0/16). Site-local addresses, identified by the FP of 1111 1110 11.

- Site-local addresses are not reachable from other sites, and routers must not forward site-local traffic outside of the site.

- The scope of a site-local address is the site (the organization internetwork).

- Unlike link-local addresses, site-local addresses are not automatically configured and must be assigned either through stateless or stateful address configuration processes

Special addresses

The following are special IPv6 addresses:

- The unspecified address (0:0:0:0:0:0:0:0 or ::) is used only to indicate the absence of an address. It is equivalent to the IPv4 unspecified address of 0.0.0.0.

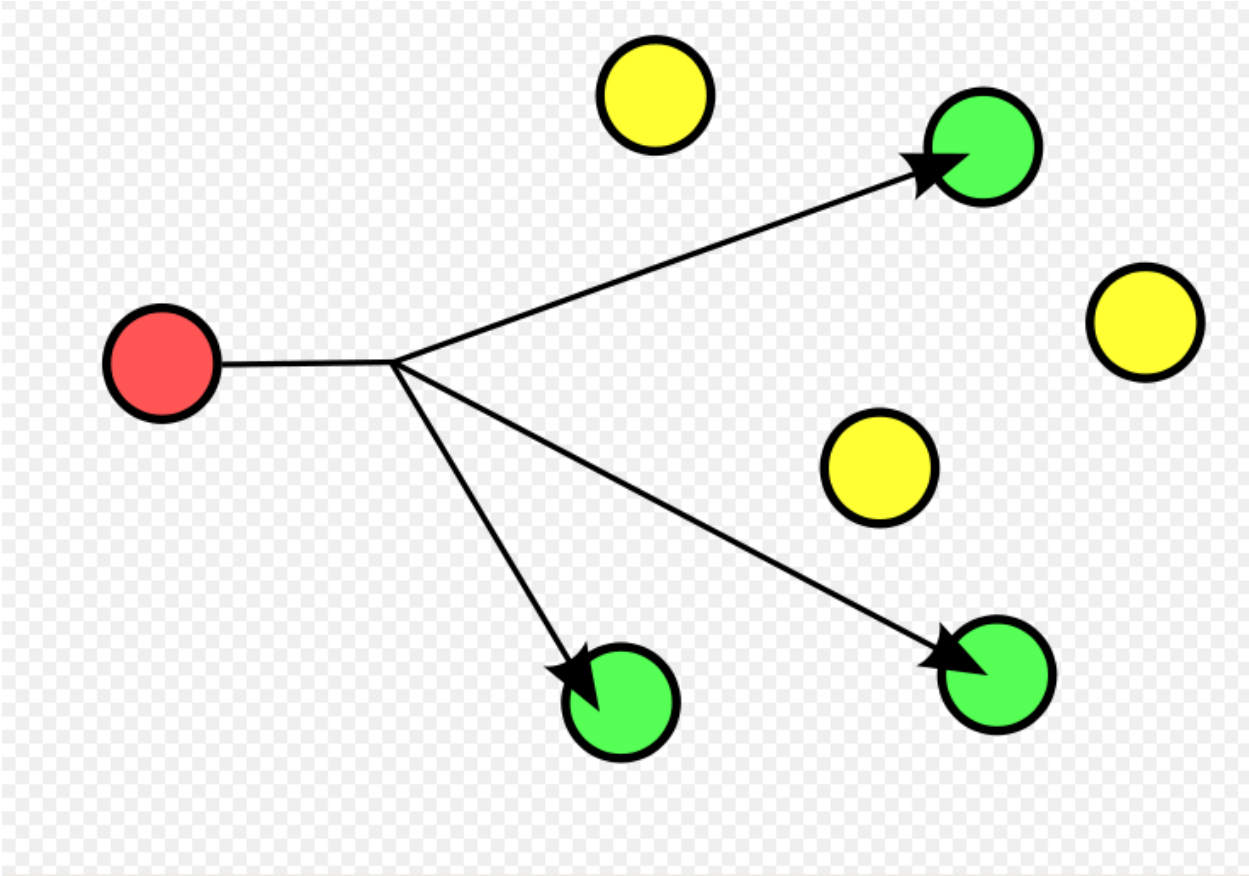
- The loopback address (0:0:0:0:0:0:0:1 or ::1) is used to identify a loopback interface, enabling a node to send packets to itself. Packets addressed to the loopback address are never sent on a link or forwarded by an IPv6 router.

Multicast IPv6 addresses

A multicast address identifies multiple interfaces. With the appropriate multicast routing topology, packets addressed to a multicast address are delivered to all interfaces that are identified by the address.

IPv6 multicast addresses have the Format Prefix (FP) of 1111 1111. An IPv6 address is simple to classify as multicast because it always begins with FF. Multicast addresses cannot be used as source addresses.

multicast addressing uses a *one-to-many* association, datagrams are routed from a single sender to multiple endpoints simultaneously in a single transmission. The network automatically replicates datagrams as needed for all network segments (links) that contain an eligible receiver.

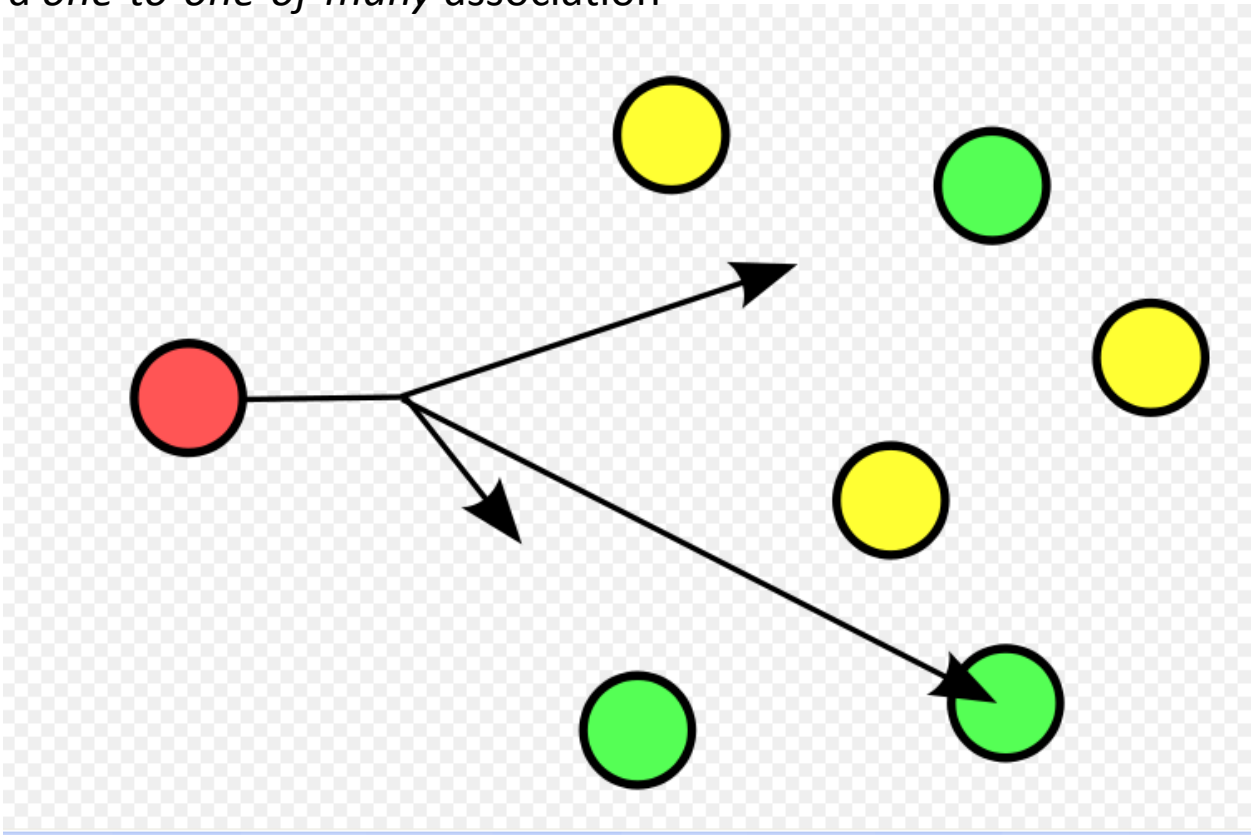


Anycast IPv6 addresses

An anycast address identifies multiple interfaces. With the appropriate routing topology, packets addressed to an anycast address are delivered to a single interface (the nearest interface that is identified by the address). The nearest interface is defined as being closest in terms of routing distance. A multicast address is used for one-to-many communication, with delivery to multiple interfaces. An anycast address is used for one-to-one-of-many communication, with delivery to a single interface.

In order to facilitate delivery to the nearest anycast group member, the routing infrastructure must be aware of the interfaces that are assigned anycast addresses and their distances in terms of routing metrics. At present, anycast addresses are used only as destination addresses and are assigned only to routers. Anycast addresses are assigned from the unicast address space. The scope of an anycast address is the scope of the type of unicast address from which the anycast address is assigned.

Anycast is a network addressing and routing methodology in which datagrams from a single sender are routed to the topologically nearest node in a group of potential receivers all identified by the same destination address.
Anycast addressing routes datagrams to a single member of a group of potential receivers that are all identified by the same destination address.
This is a *one-to-one-of-many* association



Compatibility addresses

To aid in the migration from IPv4 to IPv6 and facilitate the coexistence of both types of hosts, the following addresses are defined:

IPv4-compatible address

The IPv4-compatible address, 0:0:0:0:0:0:*w.x.y.z* or ::*w.x.y.z* (where *w.x.y.z* is the dotted decimal representation of a public IPv4 address), is used by dual-stack nodes that are communicating with IPv6 over an IPv4 infrastructure. Dual-stack nodes are nodes with both IPv4 and IPv6 protocols.

Teredo is a transition technology that gives full IPv6 connectivity for IPv6-capable hosts which are on the IPv4 Internet but which have no direct native connection to an IPv6 network. Compared to other similar protocols its distinguishing feature is that it is able to perform its function even from behind network address translation (NAT) devices such as home routers. Teredo prefix 2001::/32

ISATAP Intrasite Automatic Tunneling protocol

Used to communicate between two nodes on
an IPV4 Intranet.

Can incorporate either public or private IP Addresses

6to4 tunneling allows IPV6 sites to communicate with
Each other via IPV4 network without using explicit
Tunnels, and to communicate with native OPV6 domains
Via relay routers

Ftp	Use to communicate with remote computers.
Ipconfig	Display current TCP/IP and IPv6 network configuration values, update or release Dynamic Host Configuration Protocol (DHCP) allocated leases, and display, register, or flush Domain Name System (DNS) names.
Netsh	Command line tool for network configuration
Netstat	Display statistics for current TCP/IP connections.
Pathping	Trace a path to a remote system and report packet losses at each router along the way.
Ping	Send Internet Control Message Protocol (ICMP) Echo Requests to verify that TCP/IP is configured correctly and that a remote TCP/IP computer is available.

Route	Display the IP routing table, and add or delete IPv6 routes.
Tracert	Trace a path to a remote system