

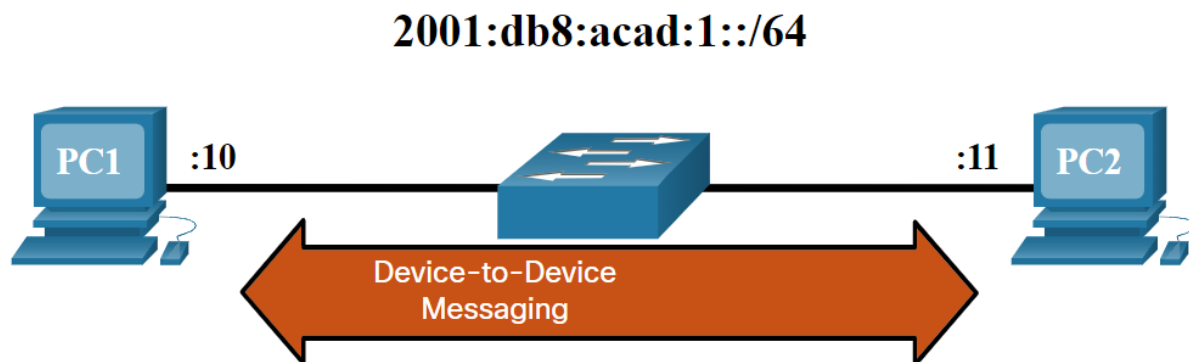
IPv6 Neighbor Discovery

If your network is using the IPv6 communications protocol, the Neighbor Discovery protocol, or ND, is what you need to match IPv6 addresses to MAC addresses. This topic explains how ND works.

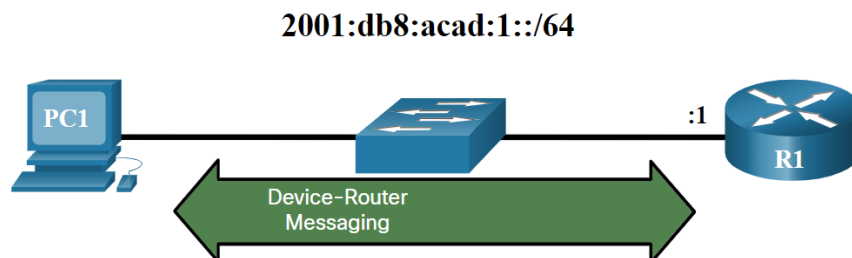
IPv6 Neighbor Discovery protocol is sometimes referred to as ND or NDP. In this course, we will refer to it as ND. ND provides address resolution, router discovery, and redirection services for IPv6 using ICMPv6. ICMPv6 ND uses five ICMPv6 messages to perform these services:

- Neighbor Solicitation messages
- Neighbor Advertisement messages
- Router Solicitation messages
- Router Advertisement messages
- Redirect Message

Neighbor Solicitation and Neighbor Advertisement messages are used for device-to-device messaging such as address resolution (similar to ARP for IPv4). Devices include both host computers and routers.



Router Solicitation and Router Advertisement messages are for messaging between devices and routers. Typically router discovery is used for **dynamic address allocation and stateless address autoconfiguration** (SLAAC).



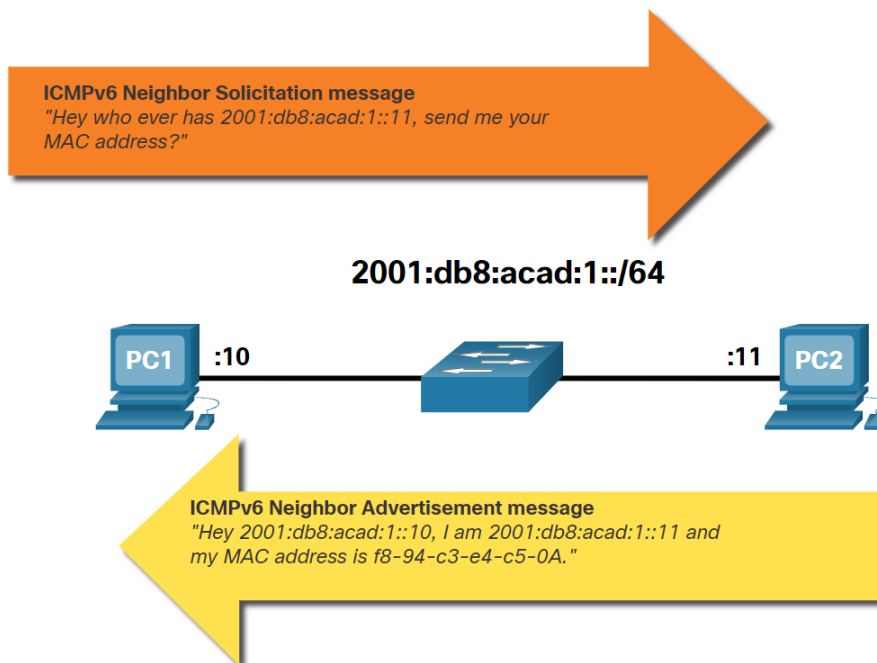
Note: The fifth ICMPv6 ND message is a redirect message which is used for better next-hop selection. This is beyond the scope of this course.

IPv6 ND is defined in the IETF RFC 4861.

IPv6 Neighbor Discovery - Address Resolution

Much like ARP for IPv4, IPv6 devices use IPv6 ND to determine the MAC address of a device that has a known IPv6 address.

ICMPv6 Neighbor Solicitation and Neighbor Advertisement messages are used for MAC address resolution. This is similar to ARP Requests and ARP Replies used by ARP for IPv4. For example, assume PC1 wants to ping PC2 at IPv6 address 2001:db8:acad::11. To determine the MAC address for the known IPv6 address, PC1 sends an ICMPv6 Neighbor Solicitation message as illustrated in the figure.



ICMPv6 Neighbor Solicitation messages are sent using special Ethernet and IPv6 multicast addresses. This allows the Ethernet NIC of the receiving device to determine whether the Neighbor Solicitation message is for itself without having to send it to the operating system for processing.

PC2 replies to the request with an ICMPv6 Neighbor Advertisement message which includes its MAC address.