IPv6 Support

Please note that N3048EP-ON and N3048ET-ON switches do not support IPv6.

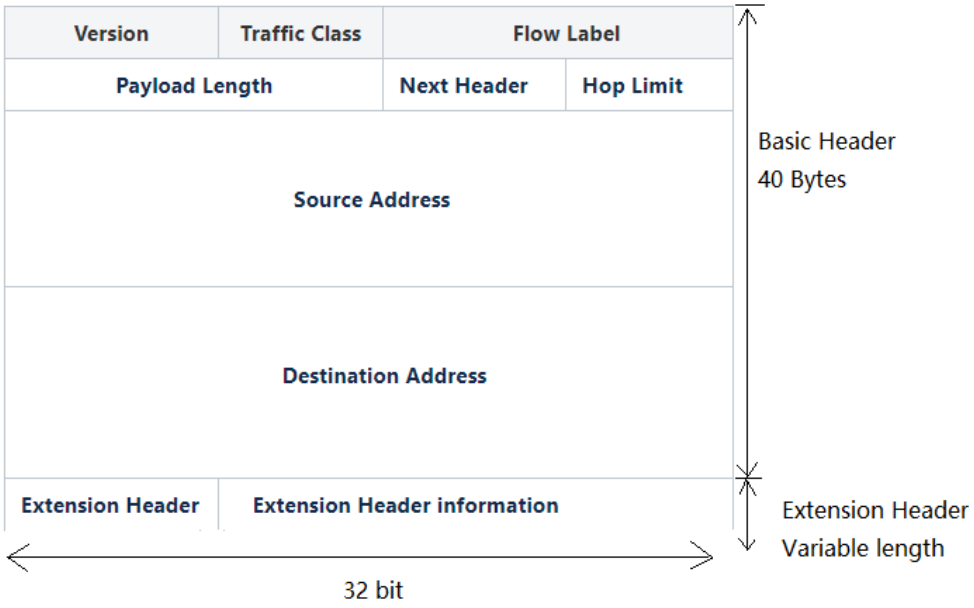
Also, the N22XX series switches do not support IPv6.

IPv6 Basics

Due to an increased demand for IP addresses across the globe with the introduction of technologies like Internet of Things (IOT), the number of available IP addresses in the IPv4 pool is quickly running out. IPv6 was developed as a replacement for IPv4. An IPv4 address is a 32 bit number where as IPv6 is 128 bits in length and hence has far larger capacity to generate enough IPv6 addresses to cater to the needs of modern IP based networking. In this section we'll discuss some basics of IPv6 addressing including its packet format.

IPv6 Header Format

The IPv6 header format is shown in Figure 1 below.



IPv6 Packet Header

Version is a 4-bit IP protocol version number and is equal to 6.

Traffic Class is an 8-bit field which specifies the traffic class of the IPv6 packet. It is an equivalent of TOS field in IPv4 packet and used in QoS.

Flow Label is 20-bit long and used to differentiate IPv6 traffic. A data flow cab be identified with a source IP and flow label. This field is used by intermediate network devices to differentiate flows.

Payload Length is a 16-bit long field that specifies the length of IPv6 payload following the header including any extension headers in bytes.

Next Header is an 8-bit field and identifies the type of the first extension header that follows the IPv6 basic header or the protocol type of the upper layer PDU.

Hop Limit is 8-bit long and specifies the number of hops the packets can pass. This value is decremented each time the packet passes through a hop and is discarded when the value becomes zero.

Source Address is 128-bit long and defines the source IPv6 address.

Destination Address is also 128-bit long and specifies the destination IPv6 address.

IPv6 uses extension headers between the IPv6 basic header and the upper layer PDU to enhance flexibility in processing IPv6 packets. These extension headers are similar to the Options field in IPv4 packets but unlike IPv4 Options, the header extensions are of variable length to facilitate packet processing. For more information on IPv6 extension headers click here to see IPv6 RFC.

Since version 4.1.0, PICOS fully supports IPv6.

IPv6 Neighbor Discovery Protocol

Neighbor Discovery Protocol (NDP) is part of the Internet Protocol Suite and is used for gathering various network related information. It operates at the link layer in the IP model of layered communication. NDP defines five ICMPv6 packet types for **Router Solicitation**, **Router Advertisement**, **Neighbor Solicitation**, **Neighbor Advertisement** and **Redirect**. NDP is similar in functionality to Address Resolution Protocol (ARP) but the major difference is that ARP is designed to work with IPv4 whereas NDP is designed for IPv6. These ICMPv6 packet types are further explained below.

1. **Router Solicitation--Type-133 (RS):** Router solicitation messages are used by IPv6 capable devices to try to acquire routers on the link. Routers on the link receiving these messages immediately reply with **Router Advertisement** messages. Normally routers periodically advertise themselves on the link but in the case of receiving an RS message the routers respond immediately with Router Advertisement message.
2. **Router Advertisement--Type-134 (RA):** Router advertisements are issued by routers on the link to periodically advertise their presence or these messages can be issued in response to a RS message.
3. **Neighbor Solicitation--Type-135 (NS):** Neighbor solicitation messages are issued by devices on the link to acquire the link layer address of a device or to verify that a neighbor is still alive on the link via cached link layer address.
4. **Neighbor Advertisement--Type-136 (NA):** Neighbor advertisement messages are issued in response to Neighbor Solicitation messages.
5. **Redirect--Type-137:** These messages are used by routers to inform hosts of a better first host router for a destination.

These messages provide the combined functionality listed below.

- **Router Discovery**
- **Prefix Discovery**
- **Parameter Discovery**
- **Address Autoconfiguration**
- **Address Resolution**
- **Next Hop Determination**
- **Neighbor Unreachability Detection**
- **Duplicate Address Detection**
- **DNS and Recursive DNS Search List Via RA Options**
- **Packet Redirection for better next hop**