IPv6 HEADERS
AT–A–GLANCE

RFC 2460
There are several changes to the header format with IPv6. The diagrams below give a high-level view of the basic comparison between the IPv4 and IPv6 headers.

Figure 1
IPv4 Header
- Version
- IHL
- Type of Service
- Total Length
- Identification
- Flags
- Fragment Offset
- Time to Live
- Protocol
- Header Checksum
- Source Address
- Destination Address
- Options
- Padding

IPv6 Header
- Version
- Traffic Class
- Flow Label
- Payload Length
- Next Header
- Hop Limit
- Source Address
- Destination Address

Streamlined
- Fragmentation fields moved out of base header
- IP options moved out of base header
- Header checksum eliminated
- Header length field eliminated
- Length field excludes IPv6 header
- Alignment changed from 32 to 64 bits

Revised
- Time to live -> hop limit
- Protocol -> next header
- Precedence and TOS -> traffic class
- Addresses increased 32 bits -> 128 bits

Extended
- Flow label field added

Figure 2
IPv6 Header Options
- IPv6 Header Next Header = TCP
- TCP Header + Data
- IPv6 Header Next Header = Routing
- Routing Header Next Header = TCP
- TCP Header + Data
- IPv6 Header Next Header = Routing
- Routing Header Next Header = Fragment
- Fragment Header Next Header = TCP
- Fragment of TCP Header + Data

Header options processed only by node are identified in the IPv6 destination address field, except the hop-by-hop option. Eliminates the IPv4 40-octet limit on options. In IPv6, the limit is the total packet size or max valued from the path MTU. Headers are linked together by populating the next header (8-bit) field.

Figure 3
When more than one extension header is used in the same packet, it is recommended that those headers appear in the following order:
- IPv6 header
- Hop-by-hop options header
- Destination options header (routing header associations)
- Routing header
- Fragment header
- Authentication header
- Encapsulating security payload header
- Destination options header (options processed by final destination)
- Upper-layer header
### Table 1. Summary of Header Types and Values

<table>
<thead>
<tr>
<th>Header Type</th>
<th>Next Header Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hop-by-Hop Options Header</td>
<td>0</td>
</tr>
<tr>
<td>Destination Option Header</td>
<td>60</td>
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<tr>
<td>Routing Header</td>
<td>43</td>
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<tr>
<td>Fragment Header</td>
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<tr>
<td>Authentication Header (RFC 1826) and ESP Header (RFC 1827)</td>
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<tr>
<td>Upper-Layer Header (TCP)</td>
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<tr>
<td>Mobility Header</td>
<td>135</td>
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</tbody>
</table>