IPv6 Extension headers

draft-krishnan-ipv6-exthdr-03.txt

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Advantages of a standard format

- Allows packet analyzers to skip over unknown headers and continue to decode packets
  - Whether or not this is done is up to the policy settings
- Allows generic parsing routines for extension headers
- Reduces impact on the IP protocol numbers field

Changes since version -01

- Addressed comments raised during the last 6man meeting as well as on the ipv6 mailing list
- Addresses comments received from
  - Albert Manfredi, Bob Hinden, Brian Carpenter, Erik Nordmark, Hemant Singh, Lars Westberg, Markku Savela, Tatuya Jinmei, Thomas Narten, and Vishwas Manral (Thanks folks)

Issue #1

- ISSUE: Tries to reinterpret the fragment header
- RESOLUTION: No longer tries to reinterpret existing headers. Document only applicable to new extension headers

Issue #2

- ISSUE: Still cannot differentiate between new extension headers and new transport protocols
- RESOLUTION: Request a single extension header type that will be used by all future IPv6 extension headers. Anything but this is a new transport protocol.

Issue #3

- ISSUE: Text suggested that end nodes may skip over extension headers. This goes against RFC2460.
- RESOLUTION: Clarify that end nodes must still process the extension headers in order.

Issue #4

- ISSUE: Security issues with allowing packets with unknown extension headers not discussed.
- RESOLUTION: Added following text to Security Considerations

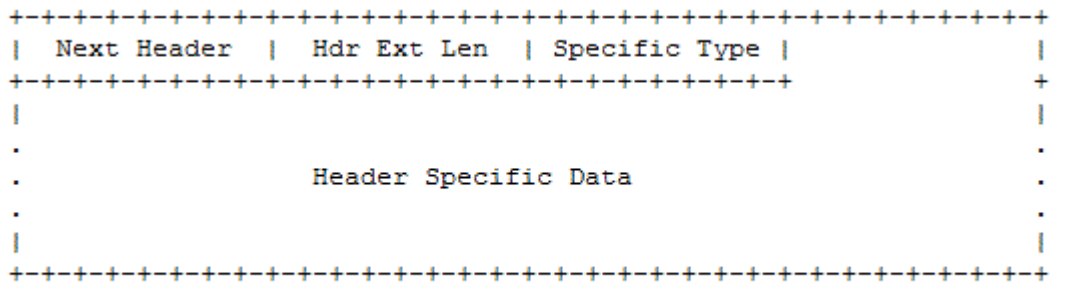
"Firewalls skipping over unknown headers might end up allowing the setup of a covert channel from the outside of the firewall to the inside using the data field(s) of the unknown extension headers"

Issue #5

- ISSUE: Possibility to reserve a range of protocol numbers for extension headers but this may be wasteful as there may not be too many extension headers created
- RESOLUTION: Request only a single protocol number allocation.

Proposed format

- For all new extension headers



Next Header	8-bit selector. Identifies the type of header immediately following the Extension header. Uses the same values as the IPv4 Protocol field.
Hdr Ext Len	8-bit unsigned integer. Length of the Extension header in 8-octet units, not including the first 8 octets.
Specific Type	8-bit unsigned integer. The actual IPv6 extension header type. This will be allocated from a new IANA registry.
Header Specific Data	Variable length. Fields specific to the extension header

Backward Compatibility

- Only applicable to new extension headers
- No longer tries to reinterpret the fragment header format
- Hence no backward compatibility issues

Open Issue

- **Extension headers may alter the processing of the payload itself, and hence the packet may not be processed properly without knowledge of said header**

Ways forward

1. Adopt this standard format for all future extension headers

(OR)

2. Recommend against creating new extension headers
   - Recommend using destination options instead

Thanks

Questions?

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BACKUP SLIDE: Extension headers

- The base IPv6 standard [RFC2460] defines extension headers
- An expansion mechanism to carry optional internet layer information.
- Extension headers, with the exception of the hop-by-hop options header, are not usually processed on intermediate nodes.
- Some software like packet analyzers may wish to look beyond the unknown headers to continue to decode the packet
- Some intermediate nodes such as firewalls, may need to look at the transport layer header fields in order to make a decision to allow or deny the packet.

BACKUP SLIDE:
Unknown extension headers

- If new extension headers are defined and the intermediate node is not aware of them, the intermediate node cannot proceed further in the header chain since it does not know where the unknown header ends and the next header begins.
- The main issue is that the extension header format is not standard and hence it is not possible to skip past the unknown header.
- This document defines a Generic IPv6 extension header that defines a standard format for IPv6 extension headers.