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An uniform format for IPv6 extension headers
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Abstract

In IPv6, optional internet-layer information is encoded in separate headers that may be placed between the IPv6 header and the transport layer header. There are a small number of such extension headers currently defined. This document defines a format for defining new IPv6 extension headers.

Status of this Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on September 15, 2011.

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1. Introduction

The base IPv6 standard [RFC2460] defines extension headers as 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. However, 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. 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 standardized and hence it is not possible to skip past the unknown header. This document intends to define a standard format for IPv6 extension headers.

2. Conventions used in this document

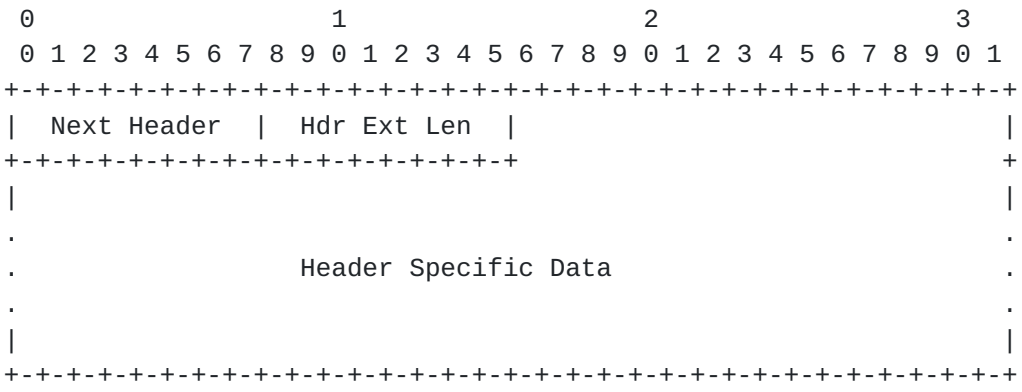
The key words "MUST", "MUST NOT", "REQUIRED", "SHALL","SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

3. Applicability

The base IPv6 standard [RFC2460] allows the use of both extension headers and destination options in order to encode optional destination information in an IPv6 packet. The use of destination options to encode this information, provides more flexible handling characteristics and better backward compatibility than using extension headers. Because of this, implementations SHOULD use destination options as the preferred mechanism for encoding optional destination information, and use a new extension header only if destination options do not satisfy their needs. The request for creation of a new IPv6 extension header MUST be accompanied by an specific explanation of why destination options could not be used to convey this information.

4. Proposed IPv6 Extension Header format

This document proposes that all IPv6 extension headers be encoded in a consistent TLV format so that it is possible for nodes to skip over unknown extension headers and continue to further process the header chain.



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.
Header Specific Data	Variable length. Fields specific to the extension header

Figure 1: Extension header layout

5. Backward Compatibility

The scheme proposed in this document is not intended to be backward compatible with all the currently defined IPv6 extension headers. It applies only to newly defined extension headers. Specifically, the fragment header predates this document and does not follow the format proposed in this document.

6. Future work

This document proposes one step in easing the inspection of extension headers by middleboxes. There is further work required in this area. Some issues that are left unresolved beyond this document include

- There can be an arbitrary number of extension headers.
- Extension headers must be processed in the order they appear.
- Extension headers may alter the processing of the payload itself, and hence the packet may not be processed properly without knowledge of said header.

7. IANA Considerations

This document does not require any IANA actions.

8. Security Considerations

This document proposes a standard format for the IPv6 extension headers so that intermediate nodes that do not understand the contents of these headers can look past them. Intermediate nodes, such as 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.

9. Acknowledgements

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10. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC2460] Deering, S. and R. Hinden, "Internet Protocol, Version 6 (IPv6) Specification", RFC 2460, December 1998.

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