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Traffic Selectors for Flow Bindings

Abstract

This document defines binary formats for IPv4 and IPv6 traffic selectors to be used in conjunction with flow bindings for Mobile IPv6.

Status of This Memo

This is an Internet Standards Track document.

This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Further information on Internet Standards is available in Section 2 of RFC 5741.

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at http://www.rfc-editor.org/info/rfc6088.

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1. Introduction

This document defines binary formats for IPv4 and IPv6 traffic selector sub-options, as defined in [RFC6089].

The binary traffic selector format defined here, allows for efficient identification of flow(s) based on well-known fields in IPv4 [RFC0791], IPv6 [RFC2460], and transport layer headers like TCP [RFC0793] and UDP [RFC0768].

2. Requirements Notation

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. Traffic Selector Sub-Options

[RFC6089] defines the format for the traffic selector sub-option.

The following values of the TS Format field are defined in this specification for binary traffic selectors.

TS Format:

1 IPv4 binary traffic selector

2 IPv6 binary traffic selector

3.1. IPv4 Binary Traffic Selector

If the TS Format field of the traffic selector sub-option indicates "IPv4 binary traffic selector", then the traffic selector is formatted as shown below.

The alignment requirement for this sub-option is:

4n if A, B, C, D, E, or F is set

2n if G, H, I, or J is set

n if K, L, M, or N is set

Figure 1: IPv4 binary traffic selector

Flags (A-N)

Each flag indicates whether the corresponding field is present in the message.

(A)Start Source Address

This field identifies the first source address, from the range of 32-bit IPv4 addresses to be matched, on data packets sent from a corresponding node to the mobile node as seen by the home agent. In other words, this is one of the addresses of the correspondent node.

(B)End Source Address

If more than one contiguous source address needs to be matched, then this field can be used to indicate the end value of a range starting from the value of the Start Source Address field. This field MUST NOT be included unless the Start Source Address field is included. When this field is included, the receiver will match all of the addresses between fields (A) and (B), inclusive of (A) and (B).

(C)Start Destination Address

This field identifies the first destination address, from the range of 32-bit IPv4 addresses to be matched, on data packets sent from a corresponding node to the mobile node as seen by the home agent. In other words, this is one of the registered home addresses of the mobile node.

(D)End Destination Address

If more than one contiguous destination address needs to be matched, then this field can be used to indicate the end value of a range starting from the value of the Start Destination Address field. This field MUST NOT be included unless the Start Destination Address field is included. When this field is included, the receiver will match all of the addresses between fields (C) and (D), inclusive of (C) and (D).

(E)Start IPsec SPI - Security Parameter Index

This field identifies the first 32-bit IPsec SPI value, from the range of SPI values to be matched, on data packets sent from a corresponding node to the mobile node as seen by the home agent. This field is defined in [RFC4303].

(F)End IPsec SPI - Security Parameter Index

If more than one contiguous SPI value needs to be matched, then this field can be used to indicate the end value of a range starting from the value of the Start IPsec SPI field. This field MUST NOT be included unless the Start IPsec SPI field is included. When this field is included, the receiver will match all of the SPI values between fields (E) and (F), inclusive of (E) and (F).

(G)Start Source Port

This field identifies the first 16-bit source port number, from the range of port numbers to be matched, on data packets sent from a corresponding node to the mobile node as seen by the home agent. This is from the range of port numbers defined by IANA (http://www.iana.org).

(H)End Source Port

If more than one contiguous source port number needs to be matched, then this field can be used to indicate the end value of a range starting from the value of the Start Source Port field. This field MUST NOT be included unless the Start Source Port field is included. When this field is included, the receiver will match all of the port numbers between fields (G) and (H), inclusive of (G) and (H).

(I)Start Destination Port

This field identifies the first 16-bit destination port number, from the range of port numbers to be matched, on data packets sent from a corresponding node to the mobile node as seen by the home agent.

(J)End Destination Port

If more than one contiguous destination port number needs to be matched, then this field can be used to indicate the end value of a range starting from the value of the Start Destination Port field. This field MUST NOT be included unless the Start Destination Port field is included. When this field is included, the receiver will match all of the port numbers between fields (I) and (J), inclusive of (I) and (J).

(K)Start DS - Differential Services

This field identifies the first differential services value, from the range of differential services values to be matched, on data packets sent from a corresponding node to the mobile node as seen by the home agent. Note that this field is called a "Type of Service field" in [RFC0791]. [RFC3260] then clarified that the field has been redefined as a 6-bit DS field with 2 bits reserved, later claimed by Explicit Congestion Notification (ECN) [RFC3168]. For the purpose of this specification, the (K)Start DS field is 8 bits long, where the 6 most significant bits indicate the DS field to be matched and the 2 least significant bits' values MUST be ignored in any comparison.

(L)End DS - Differential Services

If more than one contiguous DS value needs to be matched, then this field can be used to indicate the end value of a range starting from the value of the Start DS field. This field MUST NOT be included unless the Start DS field is included. When this field is included, it MUST be coded the same way as defined for (K). When this field is included, the receiver will match all of the values between fields (K) and (L), inclusive of (K) and (L).

(M)Start Protocol

This field identifies the first 8-bit protocol value, from the range of protocol values to be matched, on data packets sent from a corresponding node to the mobile node as seen by the home agent.

(N)End Protocol

If more than one contiguous protocol value needs to be matched, then this field can be used to indicate the end value of a range starting from the value of the Start Protocol field. This field MUST NOT be included unless the Start Protocol field is included. When this field is included, the receiver will match all of the values between fields (M) and (N), inclusive of (M) and (N).

Reserved

Reserved for future use. These bits MUST be set to zero by the sender and ignored by the receiver.

3.2. IPv6 Binary Traffic Selector

If the TS Format field of the traffic selector sub-option indicates "IPv6 binary traffic selector", then the traffic selector is formatted as follows:

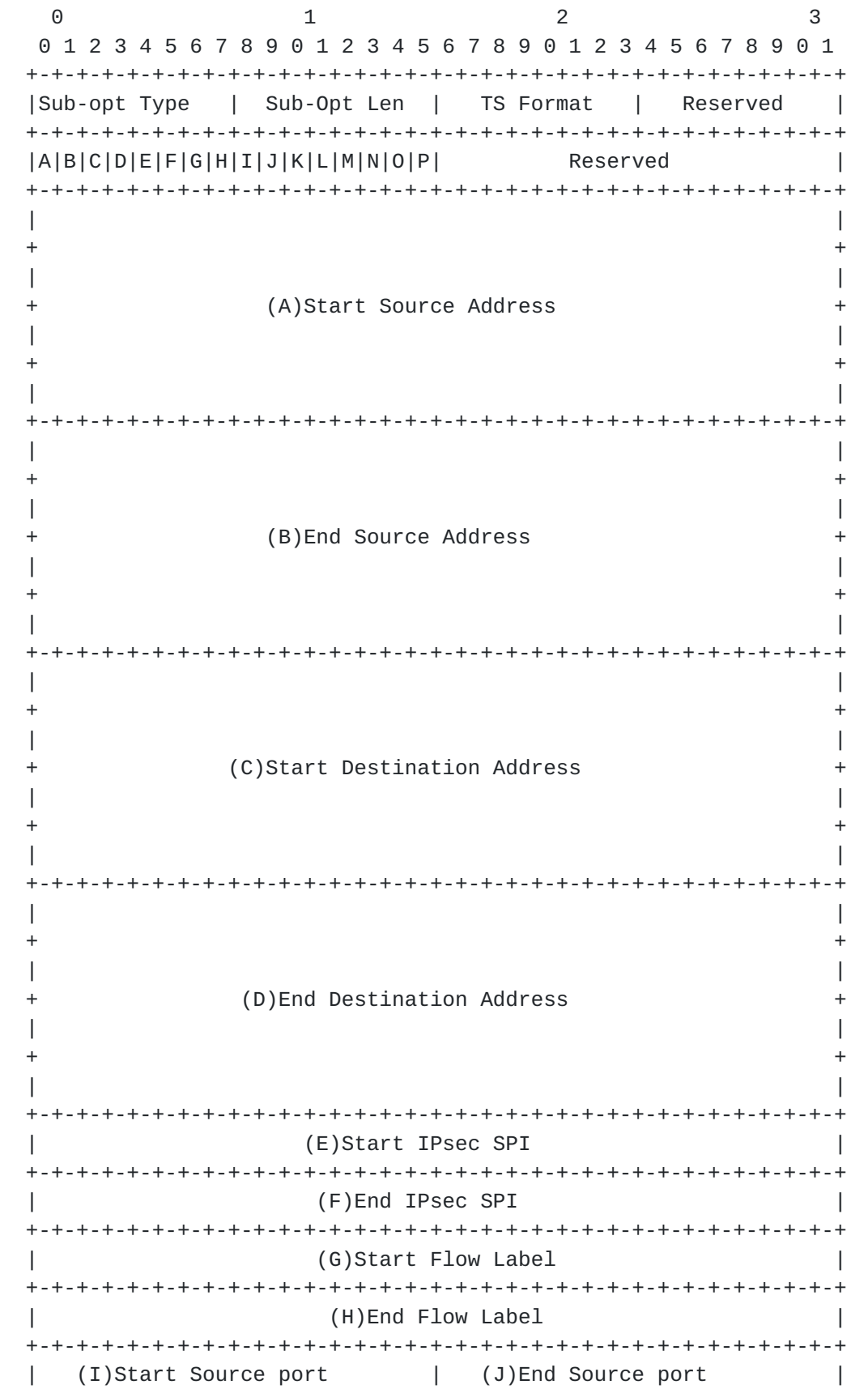
The alignment requirement for this sub-option is:

8n if A, B, C, or D is set

4n if E, F, G, or H is set

2n if I, J, K, or L is set

n if M, N, O, or P is set


0 1 2 3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
Sub-opt Type
Sub-Opt Len
TS Format
Reserved
A B C D E F G H I J K L M N O P
Reserved
(A)Start Source Address
(B)End Source Address
(C)Start Destination Address
(D)End Destination Address
(E)Start IPsec SPI
(F)End IPsec SPI
(G)Start Flow Label
(H)End Flow Label
(I)Start Source port
(J)End Source port

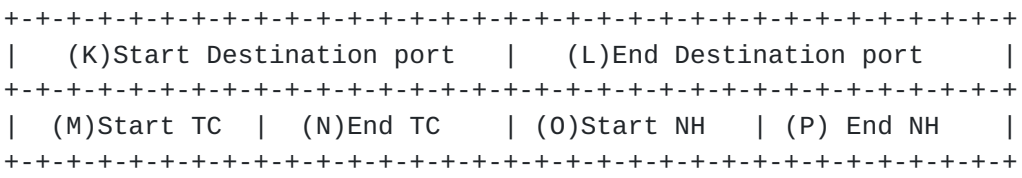


Figure 2: IPv6 binary traffic selector

Flags (A-P)

Each flag indicates whether the corresponding field is present in the message

(A)Start Source Address

This field identifies the first source address, from the range of 128-bit IPv6 addresses to be matched, on data packets sent from a corresponding node to the mobile node as seen by the home agent. In other words, this is one of the addresses of the correspondent node.

(B)End Source Address

If more than one contiguous source address needs to be matched, then this field can be used to indicate the end value of a range starting from the value of the Start Source Address field. This field MUST NOT be included unless the Start Source Address field is included. When this field is included, the receiver will match all of the addresses between fields (A) and (B), inclusive of (A) and (B).

(C)Start Destination Address

This field identifies the first destination address, from the range of 128-bit IPv6 addresses to be matched, on data packets sent from a corresponding node to the mobile node as seen by the home agent. In other words, this is one of the registered home addresses of the mobile node.

(D)End Destination Address

If more than one contiguous destination address needs to be matched, then this field can be used to indicate the end value of a range starting from the value of the Start Destination Address field. This field MUST NOT be included unless the Start Destination Address field is included. When this field is included, the receiver will match all of the addresses between fields (C) and (D), inclusive of (C) and (D).

(E)Start IPsec SPI - Security Parameter Index

This field identifies the first 32-bit IPsec SPI value, from the range of SPI values to be matched, on data packets sent from a corresponding node to the mobile node as seen by the home agent. This field is defined in [RFC4303].

(F)End IPsec SPI - Security Parameter Index

If more than one contiguous SPI value needs to be matched, then this field can be used to indicate the end value of a range starting from the value of the Start IPsec SPI field. This field MUST NOT be included unless the Start IPsec SPI field is included. When this field is included, the receiver will match all of the SPI values between fields (E) and (F), inclusive of (E) and (F).

(G)Start Flow Label

This field identifies the first flow label value, from the range of flow label values to be matched, on data packets sent from a corresponding node to the mobile node as seen by the home agent. According to [RFC2460], the flow label is 24 bits long. For the purpose of this specification, the sender of this option MUST prefix the flow label value with 8 bits of "0" before inserting it in the (G)Start Flow Label field. The receiver SHOULD ignore the first 8 bits of this field before using it in comparisons with flow labels in packets.

(H)End Flow Label

If more than one contiguous flow label value needs to be matched, then this field can be used to indicate the end value of a range starting from the value of the Start Flow Label field. This field MUST NOT be included unless the Start Flow Label field is included. When this field is included, the receiver will match all of the flow label values between fields (G) and (H), inclusive of (G) and (H). When this field is included, it MUST be coded the same way as defined for (G).

(I)Start Source Port

This field identifies the first 16-bit source port number, from the range of port numbers to be matched, on data packets sent from a corresponding node to the mobile node as seen by the home agent.

(J)End Source Port

If more than one contiguous source port number needs to be matched, then this field can be used to indicate the end value of a range starting from the value of the Start Source Port field. This field MUST NOT be included unless the Start Source Port field is included. When this field is included, the receiver will match all of the port numbers between fields (I) and (J), inclusive of (I) and (J).

(K)Start Destination Port

This field identifies the first 16-bit destination port number, from the range of port numbers to be matched, on data packets sent from a corresponding node to the mobile node as seen by the home agent.

(L)End Destination Port

If more than one contiguous destination port number needs to be matched, then this field can be used to indicate the end value of a range starting from the value of the Start Destination Port field. This field MUST NOT be included unless the Start Destination Port field is included. When this field is included, the receiver will match all of the port numbers between fields (K) and (L), inclusive of (K) and (L).

(M)Start TC - Traffic Class

This field identifies the first traffic class value, from the range of traffic class values to be matched, on data packets sent from a corresponding node to the mobile node as seen by the home agent. This field is equivalent to the Start DS field in the IPv4 traffic selector in Figure 1. As per [RFC3260], the field is defined as a 6-bit DS field with 2 bits reserved, later claimed by Explicit Congestion Notification (ECN) [RFC3168]. For the purpose of this specification, the (M)Start TC field is 8 bits long, where the 6 most significant bits indicate the DS field to be matched and the 2 least significant bits' values MUST be ignored in any comparison.

(N)End TC - Traffic Class

If more than one contiguous TC value needs to be matched, then this field can be used to indicate the end value of a range starting from the value of the Start TC field. This field MUST NOT be included unless the Start TC field is included. When this

field is included, it MUST be coded the same way as defined for (M). When this field is included, the receiver will match all of the values between fields (M) and (N), inclusive of (M) and (N).

(O)Start NH - Next Header

This field identifies the first 8-bit next header value, from the range of next header values to be matched, on data packets sent from a corresponding node to the mobile node as seen by the home agent.

(P)End NH - Next Header

If more than one contiguous next header value needs to be matched, then this field can be used to indicate the end value of a range starting from the value of the Start NH field. This field MUST NOT be included unless the Start next header field is included. When this field is included, the receiver will match all of the values between fields (O) and (P), inclusive of (O) and (P).

Reserved

Reserved for future use. These bits MUST be set to zero by the sender and ignored by the receiver.

4. Security Considerations

This document defines the format of the traffic selector field of a sub-option defined for flow bindings [RFC6089]. The authors have not identified any security concerns pertaining to this document beyond what is already identified in [RFC6089].

5. IANA Considerations

The following new TS format values have been assigned from the "Traffic Selector Format" namespace for the traffic selector sub-option defined in [RFC6089].

1 IPv4 Binary Traffic Selector

2 IPv6 Binary Traffic Selector

6. Acknowledgements

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7. References

7.1. Normative References

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7.2. Informative References

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