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Definition of Binary Filter Description
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Abstract

This document defines binary formats for IPv4 and IPv6 flow descriptors
to be used in conjuction with flow bindings for Mobile IPv6.

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1.   Requirements notation   TOC

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] (Bradner, S.,
"Key words for use in RFCs to Indicate Requirement Levels,"
March 1997.).

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2.   Introduction   TOC

This document defines binary formats for IPv4 and IPv6 flow description
sub-options as defined in [I-D.ietf-mext-flow-binding] (Soliman, H.,
Montavont, N., Fikouras, N., and K. Kuladinithi, "Flow Bindings in
Mobile IPv6 and Nemo Basic Support," February 2009.).
The binary flow descriptors defined here, allow efficient flow
identification based on well known field in IPv4, IPv6, and transport
layer headers, as well as flexible identification of random fields
based on pointers that can identify fields of varied length and
location in the IP packet. In that sense, although the format is
binary, and thus very efficient in terms of overhead, it is also very
flexible.

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3. Flow Description Sub-Options

[I-D.ietf-mext-flow-binding] (Soliman, H., Montavont, N., Fikouras, N., and K. Kuladinithi, "Flow Bindings in Mobile IPv6 and Nemo Basic Support," February 2009.) defines the format for the Flow description sub-option.
The following values of the sub-option Type field, are reserved in this specification for binary flow descriptions

> TBD IPv4 Binary Flow Description
>
> TBD IPv6 Binary Flow Description

3.1. IPv4 Binary Flow Description

If the Type field of the Flow Description sub-option indicates an IPv4 Flow then the Filter Descriptor is:

```
    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
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |A|B|C|D|E|F|G|H|I|K|L|R|  NxPs |   (A)TOS      | (B)Protocol   |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |                     (C)Source Address                        |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |                  (D)Destination Address                      |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |(E)S. PrefLeng |(F)D. PrefLeng |   (G)Source port - Low        |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |   (H)Source port - High       |      (I)Dst port - Low        |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |   (K)Dst port - High          |         (L)SPI                |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |          (L)SPI               |      N number of Pointers ... |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Figure 1: IPv4 Filter Descriptor

Flags (A-L)

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

(A)TOS - Type of Service

The TOS field in the data packet as seen by the home agent.

(B)Protocol

An 8-bit unsigned integer representing the value of the transport protocol number associated with the port numbers in data packets.

(C)Source Address

This field identifies the source address of data packets as seen by the home agent that is, the 32-bit IPv4 address of the correspondent node.

(D)Destination Address

This field identifies the destination address of data packets as seen by the home agent. When included this field must one of the registered home addresses of the mobile node. It is a 32-bit IPv4 address.

(E)Source Prefix Length

This field includes the prefix length for the source address. This field can only be included if the Source Address field is included.

(F)Destination Prefix Length

This field includes the prefix length for the destination address. If The Destination Address field is included then it refers to that field.

(G)Source Port - Low

This field identifies the lowest source port number within a range of port numbers that will be used in data packets, as seen by the home agent.

(H)Source Port - High

This field identifies the highest source port number within a range of port numbers that will be used in data packets, as seen by the home agent. If a single port is indicated then this field SHOULD NOT be included. If it is included it SHOULD be set to the value of the Source Port – Low field.

(I)Destination Port - Low

   This field identifies the lowest destination port number within a
   range of port numbers that will be used in data packets as seen by
   the home agent.

(K)Destination Port - High

   This field identifies the highest destination port number within a
   range of port numbers that will be used in data packets as seen by
   the home agent. If a single port is indicated then this field SHOULD
   NOT be included. If it is included it SHOULD be set to the value of
   the Dst Port – Low field.

(L)SPI - Security Parameter Index

   The SPI field in the data packet as seen by the home agent.

(R)Reserved

   Reserved for future use.

(NxPs) 'N' Number of Pointers

   This 3 bit field indicates an integer number identifying 'N' number
   of pointers included at the end of the flow descriptor. Each pointer
   has the format shown at Figure 2 (Pointer)

```
     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
                    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
                    |             Offset            |     Length    |
     +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
     |      Value ...
     +-+-+-+-+-+-+-+-+
```
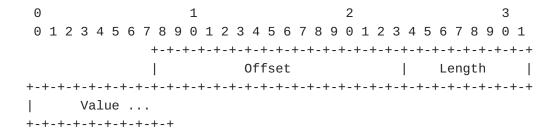
Figure 2: Pointer

Offset

   The Offset field identifies an integer number of bytes from the
   beginning of the IP header. It points to the beginning of the field
   of interest in the packet.

Length

The Length field identifies the total length of the Pointer
including the Offset, Length and Value fields.

Value

The variable length Value field identifies the value to be matched
at the point identified by this Pointer. The length if the Value
field is the length identified by the Length field minus 3 bytes
(for Offset and Length fields).

3.2. IPv6 Binary Flow Description

If the Type field of the Flow Identification extension indicates an
IPv6 Flow then the Filter Rule Descriptor is:

```
    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
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |A|B|C|D|E|F|G|H|I|K|L|M|  NxPs |   (A)CS       | (B)Protocol   |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |                                                               |
   +                                                               +
   |                                                               |
   +                    (C)Source Address                          +
   |                                                               |
   +                                                               +
   |                                                               |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |                                                               |
   +                                                               +
   |                                                               |
   +                 (D)Destination Address                        +
   |                                                               |
   +                                                               +
   |                                                               |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |(E)S. PrefLeng |(F)D. PrefLeng |   (G)Source port - Low        |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |   (H)Source port - High       |     (I)Dst port - Low         |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |   (K)Dst port - High          |          (L)SPI               |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |          (L)SPI               |      (M)Flow Label            |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   | (M)Flow Label |          'N' Number of Pointers ...           |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Figure 3: IPv6 Filter Rule Descriptor

Flags (A-M)

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

CS - Class of Service

   The CS field in the data packet as seen by the home agent.

(B)Protocol

   An 8-bit unsigned integer representing value of the transport
   protocol number associated with the port numbers in data packets.

(C)Source Address

This field identifies the source address of data packets as seen by
the home agent. That is, the address of the correspondent node and
it is a 128-bit IPv6 address.

(D)Destination Address

This field identifies the destination address of the data packet as
seen by the home agent. When included this field must be set to
either one of the registered home addresses of the mobile node or to
an address that falls under one of the mobile's home network
prefixes. The value of this fild is 128-bit IPv6 address.

(E)Source Prefix Length

This field includes the prefix for the source address. This field
can only be included if the Source Address field is included .

(F)Destination Prefix Length

This field includes the prefix for the destination address. If the
Destination Address field is included then it refers to that field.

(G)Source Port - Low

This field identifies the lowest source port number within a range
of port numbers that will be used in data packets, as seen by the
home agent.

(H)Source Port - High

This field identifies the highest source port number within a range
of port numbers that will be used in data packets, as seen by the
home agent. If a single port is indicated then this field SHOULD NOT
be included. If it is included it SHOULD be set to the value of the
Source Port – Low field.

(I)Destination Port - Low

This field identifies the lowest destination port number within a
range of port numbers that will be used in data packets as seen by
the home agent.

(K)Destination Port - High

This field identifies the highest destination port number within a
range of port numbers that will be used in data packets as seen by
the home agent. If a single port is indicated then this field SHOULD

> NOT be included. If it is included it SHOULD be set to the value of
> the Dst Port – Low field.

(L)SPI - Security Parameter Index

> The SPI field in the data packet as seen by the home agent.

(M)Flow Label

> The Flow Label field in the data packet as seen by the home agent.

(NxPs) 'N' Number of Pointers

> This 3 bit field indicates an integer number identifying 'N' number
> of pointers included at the end of the flow descriptor. Each pointer
> has the format shown at Figure 2 (Pointer)

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4. Security Considerations

This draft simply defines a format for a flow descriptor. This foramt
is to be used as part of a flow description sub-option defined in the
flow bindings [I-D.ietf-mext-flow-binding] (Soliman, H., Montavont, N.,
Fikouras, N., and K. Kuladinithi, "Flow Bindings in Mobile IPv6 and
Nemo Basic Support," February 2009.). The authors have not identified
any security concenrs pertaining to this draft beyond what is already
identified in [I-D.ietf-mext-flow-binding] (Soliman, H., Montavont, N.,
Fikouras, N., and K. Kuladinithi, "Flow Bindings in Mobile IPv6 and
Nemo Basic Support," February 2009.).

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5. IANA Considerations

TBD

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6. Aknowledgements

TBD

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7. Normative References

[I-D.ietf-mext-flow-binding]	Soliman, H., Montavont, N., Fikouras, N., and K. Kuladinithi, "Flow Bindings in Mobile IPv6 and Nemo Basic Support," draft-ietf-mext-flow-binding-01 (work in progress), February 2009 (TXT).
[RFC2119]	Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels," BCP 14, RFC 2119, March 1997 (TXT, HTML, XML).

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