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**Enhanced Alternate Marking Method**  
**draft-zhou-ippm-enhanced-alternate-marking-08**

Abstract

This document extends the IPv6 Alternate Marking Option, defined in IPv6 AltMark Option [[I-D.ietf-6man-ipv6-alt-mark](#)], to provide the enhanced capabilities and allow advanced functionalities.

Requirements Language

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 [RFC 2119](#) [[RFC2119](#)].

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**1. Introduction**

The Alternate Marking [[RFC8321](#)] and Multipoint Alternate Marking [[RFC8889](#)] define the Alternate Marking technique that is an hybrid performance measurement method, per [[RFC7799](#)] classification of measurement methods. This method is based on marking consecutive batches of packets and it can be used to measure packet loss, latency, and jitter on live traffic.

IPv6 AltMark Option [[I-D.ietf-6man-ipv6-alt-mark](#)] applies the Alternate Marking Method to the IPV6 protocol, and defines Extension Header Option to encode Alternate Marking Method for both Hop-by-Hop Options Header and Destination Options Header. Similarly, SRV6 AltMark [[I-D.fz-spring-srv6-alt-mark](#)] defines how Alternate Marking data is carried as SRH TLV.

While the AltMark Option implements the basic alternate marking method, this document defines the extended data fields for the AltMark Option and provides the enhanced capabilities.

It is worth mentioning that the enhanced capabilities are intended for further use and are optional.



## 2. Data Fields Format

The Data Fields format is represented in the next figure. An 8 bits NextHeader field is allocated from the Reserved field of IPv6 AltMark Option [[I-D.ietf-6man-ipv6-alt-mark](#)].

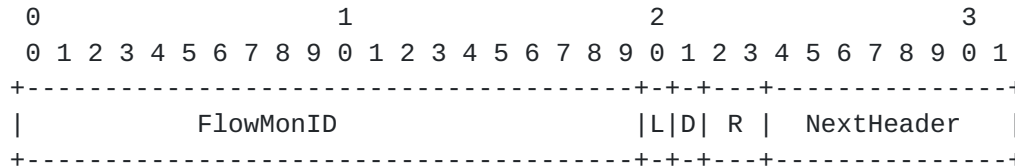


Fig. 1: Data fields indicator for enhanced capabilities

The NextHeader field is used to indicate the extended data fields which are used for enhanced capabilities. When the NextHeader is 0x00, there is no extended data field attached. Value 1-8 are reserved for private use.

The following figure shows the extended data fields format when the NextHeader value is 0x09.

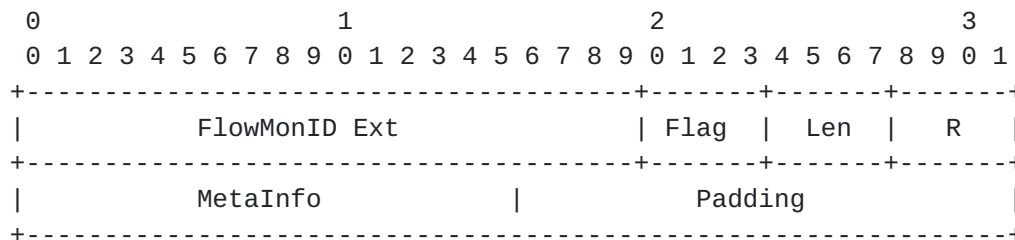


Fig. 2: Data fields extension for enhanced alternate marking

where:

- o FlowMonID Ext - 20 bits unsigned integer. This is used to extend the FlowMonID to reduce the conflict when random allocation is applied. The disambiguation of the FlowMonID field is discussed in IPv6 AltMark Option [[I-D.ietf-6man-ipv6-alt-mark](#)].
- o Flag - A 4 bits flag to indicate the special purpose usage.
- o Len - Length. It indicates the length of extension headers.
- o MetaInfo - A 16 bits Bitmap to indicate more meta data attached for the enhanced function.



- o R - Reserved for further use. These bits MUST be set to zero.
- o Padding - These bits MUST be set to zero when not being used.

The Flag is defined as follows:

- o bit 0 - Measurement mode, M bit. M=0, indicates that it is for hop-by-hop monitoring. M=1, indicates that it is for end-to-end monitoring.
- o bit 2 - Flow direction identification, F bit. This flag is used in the case backward direction flow monitoring is requested to set up automatically. F=1, indicates that the flow direction is forward. F=0, indicates the flow direction is backward.
- o others - Reserved.

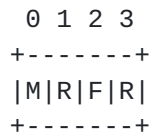


Fig. 3: Flag data field

The MetaInfo is defined as a bit map as follows:

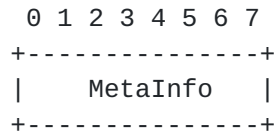


Fig. 4: MetaInfo data field

- o bit 0: indicates a 6 bytes Timestamp is attached after the MetaInfo. Timestamp(s) stands for the second part. It will overwrite the Padding after MetaInfo. Timestamp(ns) stands for the subsecond part with the unit of nano second. This Timestamp is filled by the encapsulation node, and is taken all the way to the decapsulation node. So that all the intermediate nodes could compare it with its local time, and measure the one way delay.



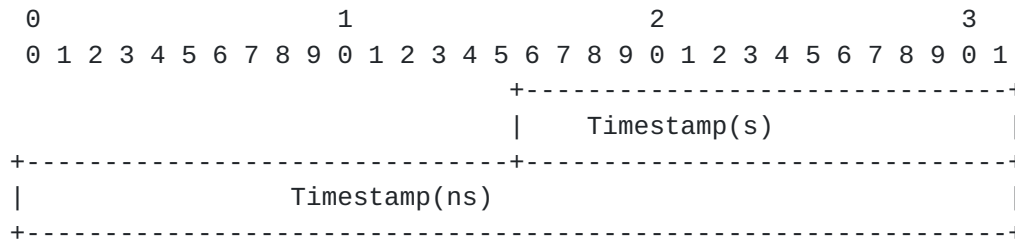


Fig. 5: Timestamp data field

o bit 1: indicates the control information with the following data format is attached

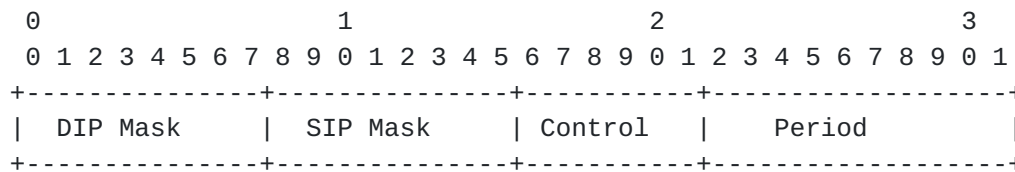


Fig. 6: Control words for backward direction flow monitoring

This is used to set up the backward direction flow monitoring. Where:

- \* DIP Mask: is the length of the destination IP prefix.
- \* SIP Mask: is the length of the source IP prefix.
- \* Control: indicates more match fields to set up the backward direction flow monitoring.
- \* Period: indicates the alternate marking period with the unit of second.

o bit 2: indicates a 4 bytes Sequence number with the following data format is attached after the MetaInfo

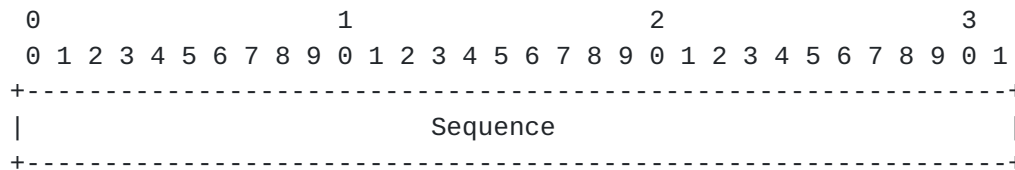


Fig. 7: Sequence number data field





### 3. Security Considerations

IPv6 AltMark Option [[I-D.ietf-6man-ipv6-alt-mark](#)] analyzes different security concerns and related solutions. These aspects are valid and applicable also to this document. In particular the fundamental security requirement is that Alternate Marking MUST be applied in a specific limited domain, as also mentioned in [[RFC8799](#)].

### 4. IANA Considerations

This document has no request to IANA.

### 5. References

#### 5.1. Normative References

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