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Enhanced Alternate Marking Method
draft-zhou-ippm-enhanced-alternate-marking-03

Abstract

This document defines data fields for the alternate marking with enough space. More information can be considered within the alternate marking field to facilitate the efficiency and ease the deployment.

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].

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 January 3, 2020.

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1. Introduction

The Alternate Marking [RFC8321] technique is an hybrid performance measurement method, per [RFC7799] classification of measurement methods. Because this method is based on marking consecutive batches of packets. It can be used to measure packet loss, latency, and jitter on live traffic.

For the basic Alternate Marking method, bits are needed to record the mark. However, in some protocols, no additional bit can be used, which blocks the wide deployment of the alternate marking technique. And the basic Alternate Marking method is limited with the scalability for further extension, i.e, more measurements in addition to existing use.

This document defines data fields for the alternate marking with enough space. More information can be considered within the

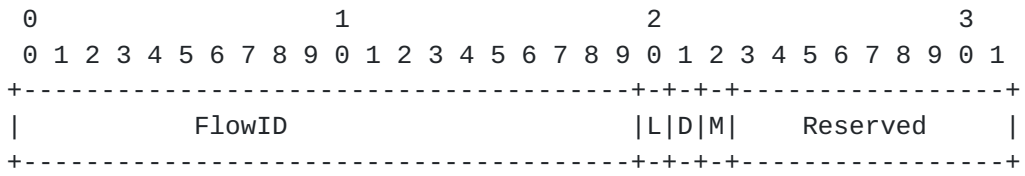
alternate marking field to facilitate the efficiency and ease the deployment.

Specifically, the flow identifier is applied as an enhancement for the basic Alternate Marking when determining packet loss and packet delay measurement. The flow identifier helps the data plane to identify the specific flow, hence to do the processing with respect to the Alternate Marking. It also simplifies the export by directly being encapsulated as the index for the associated metrics.

PBT-M [I-D.song-ippm-postcard-based-telemetry] is an variation of Postcard-based Telemetry (PBT) with packet Marking. One marking bit is set in the user packet at the path head node, if its path-associated data need to be collected. At each PBT-aware node, if the mark is detected, a postcard (i.e., the dedicated telemetry packet triggered by a marked user packet) is generated and sent to a collector. The postcard contains the data requested by the management plane. As an example, the requested data can be configured by the management plane through data set templates (as in IPFIX [RFC7011]). This alternate marking bit can choose user packet on demand, e.g., periodically or triggered by condition meet, for telemetry.

2. Data Fields Format

The following figure shows the data fields format for enhanced alternate marking. This data is expected to be encapuslated to specific transports.



where:

- FlowID - 20 bits unsigned integer. Flow identifier field is to uniquely identify a monitored flow within the measurement domain. The field is set at the engress node. The FlowID can be uniformly assigned by the central controller or algorithmically generated by the engress node. The latter approach cannot guarantee the uniqueness of FlowID, yet the conflict probability is small due to the large FlowID space.

- L - Loss flag as defined in [RFC8321];

- D - Delay flag as defined in [RFC8321];

- M - Marking bit as defined in PBT-M [I-D.song-ippm-postcard-based-telemetry];

- Reserved - is reserved for further use. These bits MUST be set to zero.

3. Implementing Multipoint Alternate Marking

There are some considerations to do on how to manage the general Multipoint Alternate Marking application in order to get more adaptable performance measurement.

[I-D.ietf-ippm-multipoint-alt-mark] introduces the network clustering approach for Alternate Marking: the network clusters partition can be done at different levels to perform the needed degree of detail. The Network Management can use an intelligent strategy: it can start without examining in depth, and, in case of problems (i.e. measured packet loss or too high delay), various filtering criteria can be specified in order to perform a detailed analysis by using different combination of clusters or, at the limit, a per-flow measurement.

3.1. PBT vs IOAM

In theory, both IOAM ([I-D.ietf-ippm-ioam-data]) and PBT ([I-D.song-ippm-postcard-based-telemetry]) could include the base Alternate Marking method. In practice, PBT-M supports one bit to encode the alternate marking method. But the more general implementation of Multipoint Alternate Marking, described in [I-D.ietf-ippm-multipoint-alt-mark], needs a centralized Data Collector and Network Management to allow the intelligent and flexible Alternate Marking algorithm. For this purpose, the PostCard based Telemetry Header can really be useful.

[I-D.song-ippm-postcard-based-telemetry] introduces the architecture to directly export the telemetry data from network nodes to a collector through separated OAM packets called postcards.

The overall architecture of PBT and the closed loop between Nodes, Telemetry Data Collector and Network Management enables exactly the application of the network clustering approach for Alternate Marking.

4. Implementation Status

[Note: This entire section should be removed by RFC Editor before the RFC publication.]

This section records the status of known implementations of the protocol defined by this specification at the time of posting of this

Internet-Draft, and is based on a proposal described in [RFC7942]. The description of implementations in this section is intended to assist the IETF in its decision processes in progressing drafts to RFCs. Please note that the listing of any individual implementation here does not imply endorsement by the IETF. Furthermore, no effort has been spent to verify the information presented here that was supplied by IETF contributors. This is not intended as, and must not be construed to be, a catalog of available implementations or their features. Readers are advised to note that other implementations may exist. According to RFC 7942, "this will allow reviewers and working groups to assign due consideration to documents that have the benefit of running code, which may serve as evidence of valuable experimentation and feedback that have made the implemented protocols more mature. It is up to the individual working groups to use this information as they see fit".

Huawei implemented the proposal described in this document based on the NE40E router. The device can process the data fields in the network processor in the fast path. Together with Huawei NCE controller, the solution can provide very high precision per hop packet loss detection and delay measurement. The product is ready for MPLS based network and tested with LG U+, China Mobile and China Unicom in mobile backhaul. The IPv6 and SRv6 based demonstration is also implemented. Please contact Tianran Zhou (zhoutianran@huawei.com) for the details.

5. Security Considerations

TBD

6. IANA Considerations

This document has no request to IANA.

7. Acknowledgements

The authors of this document would like to thank Haoyu Song for the PBT-M contribution.

8. References

8.1. Normative References

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8.2. Informative References

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