

Alternate Marking method for passive performance monitoring

draft-ietf-ippm-alt-mark-01

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Alternate Marking in a glance

Packet Loss Measurement: OAM-Packets vs Alternate Marking:

- OAM Packets insertion (f.i. RFC6374) doesn't work if Out of Order packets.
- OAM Packets have to be inserted in the right place (powerful hardware).
- OAM Packets don't work with multipoint flows (packet batch boundaries disappear).
- Alternate Marking works in case of Out of Order (Equal Cost Multi-Path (ECMP) and also where there is no ECMP) with low computational load.
- Alternate Marking permits to define a posteriori the monitored flow (you can mark all the traffic at the starting point and then you can aggregate data at the intermediate and ending points by choosing the matching criteria).
- Alternate Marking works with multipoint flows (packet batch boundaries are still valid).

Delay/Jitter Measurement: the same strengths of Packet Loss Measurement

- ❖ Average Delay/Jitter, all packets measured (it needs single marking, it solves out of order issue, but doesn't give the distribution of the delay values)
- ❖ Double marking, single packets Delay/Jitter, only double marked packets are measured (between packets with the second marking there should be a security time gap to avoid out of order issues)

Document changes: -00 to -01

Important Modification:

- Merged some contents with draft-chen-ippm-coloring-based-ipfpm-framework
- New Section “Considerations”
 - Packet Re-ordering
 - Synchronization
 - Data Correlation
- Section “Implementation and deployment”: New Use Case
 - Marking Method as Passive PM for Overlay OAM DT
 - Reference to draft-ooamdt-rtgwg-ooam-requirement-01 and draft-ooamdt-rtgwg-oam-gap-analysis-02

Packet Re-ordering

Due to ECMP, packet re-ordering is very common in IP network and marking method can handle it.

How to choose the marking interval:

- If the interval is too small, packets with different marker could be mixed for the whole interval.
- If the interval is proper, packets with different marker are mixed only at the edge of adjacent blocks, so the issue is solved by taking the counter in the middle of the interval.

Synchronization

All network devices must be synchronized to the same clock reference with an accuracy of $\pm L/2$ time units (where L is the length of the measurement period).

This level of accuracy guarantees that all nodes consistently match the marked bit to the correct block.

- one-way delay between two network devices requires the two nodes to be synchronized.
- two-way delay measurement does not require the two nodes to be time synchronized.

Data Correlation

Data Correlation could be performed depending on the alternate marking application and use case.

- A possibility is to use a centralized solution using NMS to correlate data;
- Another possibility is to define a protocol based distributed solution, by defining a new protocol or by extending the existing protocols (e.g. RFC6374, TWAMP, OWAMP) in order to communicate the counters and timestamps between nodes.

A certain data correlation mechanism helps the nodes or NMS to tell whether any two or more packet counts are related to the same block of markers.

The BN (Block Number) could be calculated as the modulo of the local time (when the data are read) and the interval of the marking time period.

Marking Method as Passive PM for Overlay OAM DT

Performance measurement includes measuring of packet loss, delay, delay variation and could be performed by the marking method.

To make use of the marking method behave as passive OAM, as defined in RFC7799, the overlay network encapsulation should allocate the field, preferably two bits long, whose value does not affect how a packet is treated by the overlay network.

Candidate Passive PM in

- BIER (see draft-mirsky-bier-pmmm-oam)
- NVO3: VXLAN, GENEVE, GUE are just some examples
- SFP: SF, SFF, Classifier and NSH Proxy Agent are the elements that can incorporate the measurement agent functionality

OOAM Passive PM vs. RFC 7799

Section 3.4 and Section 3.5 of RFC 7799 provide the definitions for Active and Passive modes of Performance Measurement (PM) methods. OOAM DT interpretation of what Passive PM is

A measurement method that should not modify the actual data packet processing behavior on underlay and overlay network.

Accordingly, it should be supported by the Overlay nodes.

from: Overlay OAM Design Team Report

Alternate Marking Extension to Active Measurement Protocol

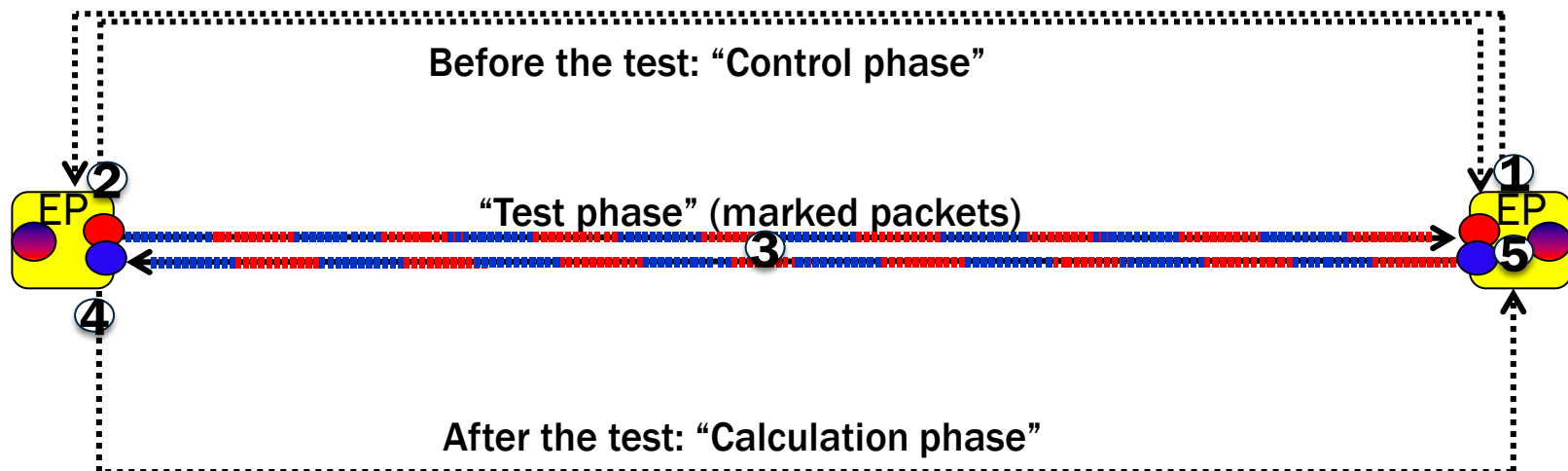
draft-fioccola-ippm-alt-mark-active-00

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High level view

- An extension to TWAMP/OWAMP is presented in order to implement alternate marking methodology detailed in draft-ietf-ippm-alt-mark.
- This proposal defines a simplified mechanism with benefits to the metric precision and computational load. Hybrid measurements are also enabled.
- Two end points (Sender and Reflector) exchange two equal alternate marking data flows:
 - Measurements: Packet Loss, Delay for each packet or Average Delay



Benefits

Instead of time stamping test traffic, test traffic is marked.

There are some key aspects of this mechanism:

- Improve metric precision: the packet timestamp can be taken in a more efficient way because it is not inserted within the Test packet.
- Reduce computational load: no sequence numbers and no timestamps within the Test packets.
- Enable hybrid measurements thanks to the Alternate Marking.
 - In the intermediate points artificial traffic is managed in the same way as production traffic and measured as specified for passive methodology.

The Alternate Marking extension to TWAMP/OWAMP

- **Control Phase** needs few additions
- **Test Phase**, where Sender and Reflector generate test traffic in both directions and apply marking, no traffic is reflected and no timestamp is added to packets.
- **Calculation Phase** is introduced "ad hoc"

Summary and Next Steps

- **draft-ietf-ippm-alt-mark-01:**
general description of the methodology and reference for other solutions
(transport agnostic)
TO BE CONSOLIDATED
- **draft-fioccola-ippm-alt-mark-active-00:**
general active and hybrid measurement application
Extension of TWAMP/OWAMP TO BE COMPLETED
- **draft-chen-ippm-coloring-based-ipfpm-framework-06**
framework for IP performance measurement
Next Steps for the whole system framework TO BE AGREED

Reviews and Comments always welcome