

Multipoint Alternate Marking method for passive and hybrid performance monitoring

draft-ietf-ippm-multipoint-alt-mark-01

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Multipoint Alternate Marking

Point-to point flows monitoring

Using previous performance monitoring methods only «Point to point paths» can be monitored.

We can use Alternate Marking to monitor unicast point-to-point flows or multicast flows (**RFC 8321**).

E.g. To have an IP (TCP/UDP) flow that follows a «Point to point single path» we have to define, with a specific value, 5 identification fields (IP Source, IP Destination, Transport Protocol, Source Port, Destination Port).



Multipoint Alternate Marking

We can monitor a multipoint flow selected by identification fields without any constrain.

If we select all traffic («match all rule») we can monitor all the network traffic as a single flow

NB. We can use multiple marking points for the same monitored flow.

Where is the impairment? Network clustering!

“Packet loss property”:

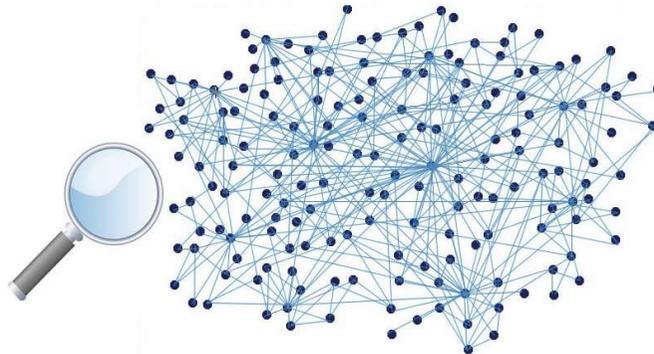
In a packet network, the number of lost packets is the number of input packets minus the number of output packets.

The monitoring network can be considered as a whole or can be split in Clusters

Clusters are the smallest subnetworks (in general group-to-group segments), maintaining the “packet loss property” for each subnetwork

They can also be combined in new connected subnetworks at different levels depending on the detail we want to achieve.

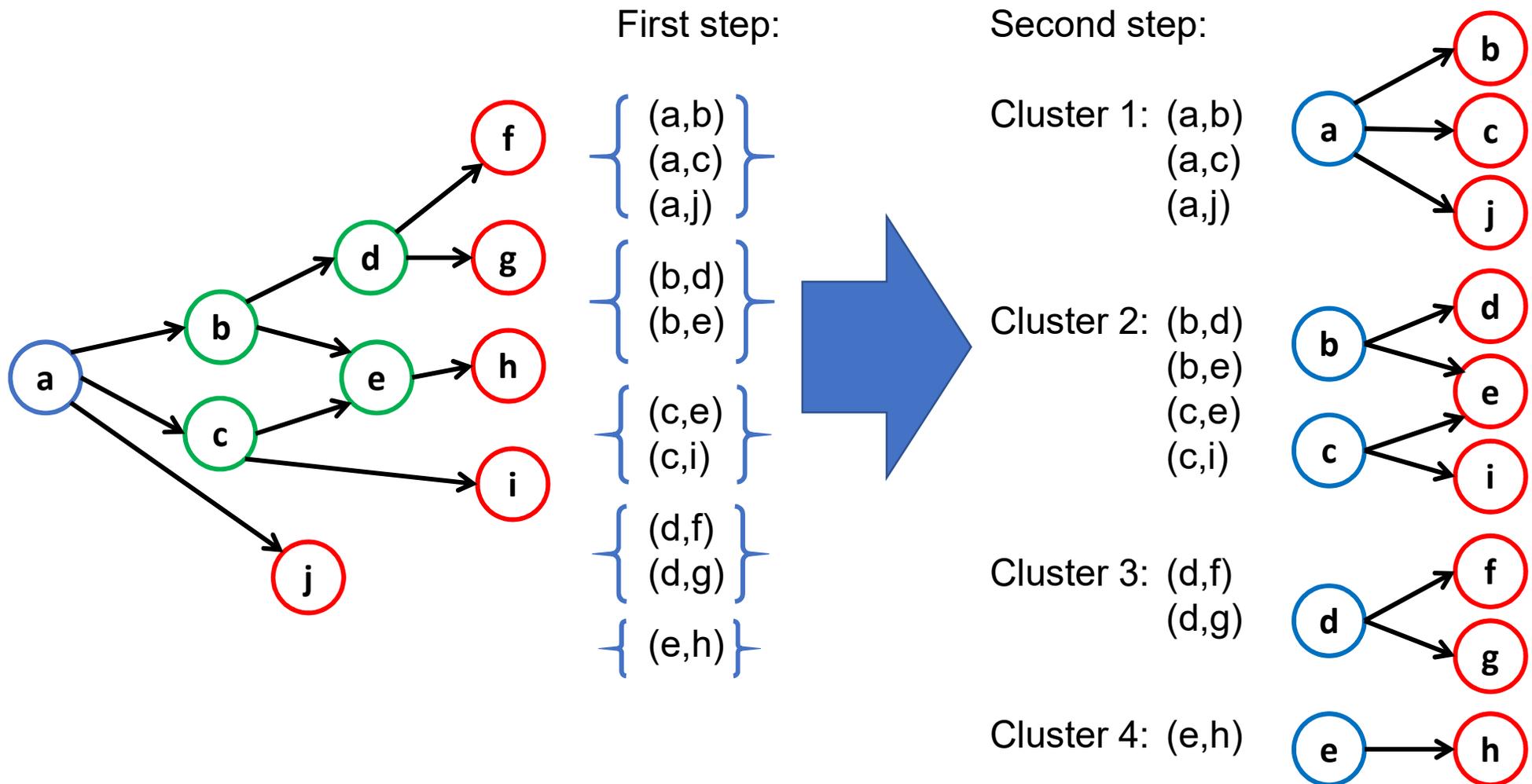
- ***Without network clustering***, it is possible to apply alternate marking only for all the network or per single flow.
- ***With network clustering***, it is possible to use the network clusters partition at different levels to perform the needed degree of detail.



A simple Algorithm for Cluster partition of a graph

A possible algorithm for Cluster partition is a two-step algorithm:

1. Group the links where there is the same starting node;
2. Join the grouped links with at least one ending node in common.



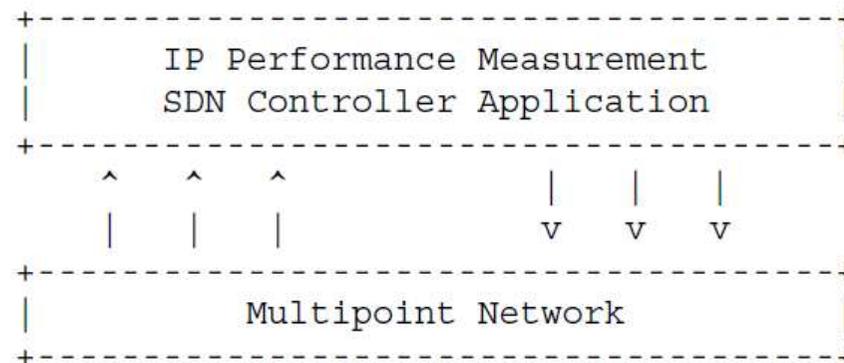
Delay Measurement: multipoint paths basis and single packet basis

This classification has been introduced to distinguish between the two possible ways of measurement

- **multipoint path basis measurement:** the delay value is representative of an entire multipoint path (e.g. whole multipoint network, a cluster or a combination of clusters).
 - **mean delay:** The average latency can be measured as the difference between the mean timestamps of the sets of output and input nodes
- **single packet basis measurement:** the multipoint path is used just to easily couple packets between inputs and output nodes of a multipoint path:
 - **Hashing+AM** is a more general solution: [RFC 5475](#) + [RFC 8321](#) (clusters simplify the coupling of the samples from a topological point of view, as well as marking method anchor the samples to a specific period and facilitates their correlation)

Use Case: Multipoint Alternate Marking in an SDN scenario

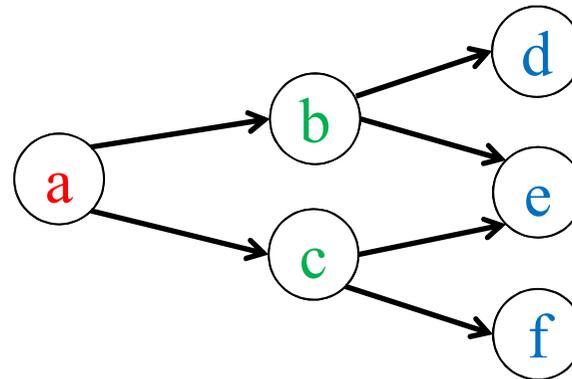
- The IP Performance Measurement SDN Controller Application can orchestrate and calibrate the level of detail in network monitoring data by configuring measurement points roughly or meticulously to allow an optimized monitoring.
- Two ways to calibrate: Flow Filtering and Cluster Zooming
- Using Network Clustering approach it is possible to monitor a Multipoint Network. We can start without examining in depth, and in case there is packet loss or the delay is too high, the filtering criteria and clusters partition can be specified in different ways to perform a more detailed analysis.
- A FSM (Finite State Machine) can be programmed such that each state represents a composition of clusters (see [draft-sambo-netmod-yang-fsm](#)).



Changes from 00 version

- ✓ Anycast flows are considered, not only unicast
- ✓ Multipoint works in case of anycast flows:

One to many flow:



Next steps

Working group adoption just before Bangkok IETF meeting.

Beginning the path to become RFC.

Inputs and Comments always welcome