Coloring based IP Flow Performance Measurement Framework

draft-chen-ippm-coloring-based-ipfpm-framework-01

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Problem Statement

• The IPPM WG focuses on active measurement in past
  – Set of useful specifications defined and used in the field.

• Some limitation of active measurement
  – Extra injected packets to evaluate the performance of path
  – The accuracy of the results depends on the rate, numbers and interval of the injected packets
  – Injected packets have to follow the same path as the real traffic
  – May not suitable for the scenarios that are sensitive to the accuracy of the results
# Scenario of Passive Measurement

## Mobile Backhaul Network

- Require to monitor and measure the performance of the path between a specific NodeB and RSG, for:
  - SLA verification
  - Fault localization
  - Fault delimitation
Rationale of Coloring based PM (Packet Loss)

- Packet Loss
  - Use one unused bit of the IP header to “color” the packets
  - Periodically change color to divide the flows into different consecutive blocks ("RED" and "GREEN")
  - Counting based on each color block, two counters, one for RED, the other for GREEN
  - MAs periodically read the counters and report (e.g., using IPFIX) to the MCP (Collector) for calculation
R-Timer Consideration

- Each MA maintains two timers (C-Timer and R-Timer with the same interval)
  - C-Timer for changing color, when expired, change to the other color
  - R-Timer for reading count and timestamp, in order to allow for a certain degree of packets re-ordering
    - R-Timer should be started later than delta-T after C-Timer started
    - \( t_1 < (R\text{-}T\text{imer} + \text{delta}\text{-}T) < t_2 \)
Rationale of Coloring based PM (Packet Delay)

- Packet Delay
  - Time synchronization required
  - Only "color" **ONE** packet in each period
  - MAs periodically read the timestamps and report (e.g., through IPFIX) to the Collector for calculation
MP2MP Reference Model

- The same flow can be monitored at multiple ingress and/or egress MAs
  - MA-1 and MA-2: the ingress measurement points
  - MA-3 and MA-4: the egress measurement points
  - The counts and timestamps, from distributed MAs are indexed by period number and flow ID, be reported to the Collector for calculation.
Color bits Considerations

• Color bits selection
  • For IPv4, there is only one bit (the last reserved bit of the Flag field in the IPv4 header) that can be used for coloring.

  • For IPv6, it can leverage the IPv6 extension header for coloring, for example, adding a new option to the Hop-by-Hop Options header for coloring.
Next Steps

• Would like to solicit comments and opinions of the WG

• Update the draft