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
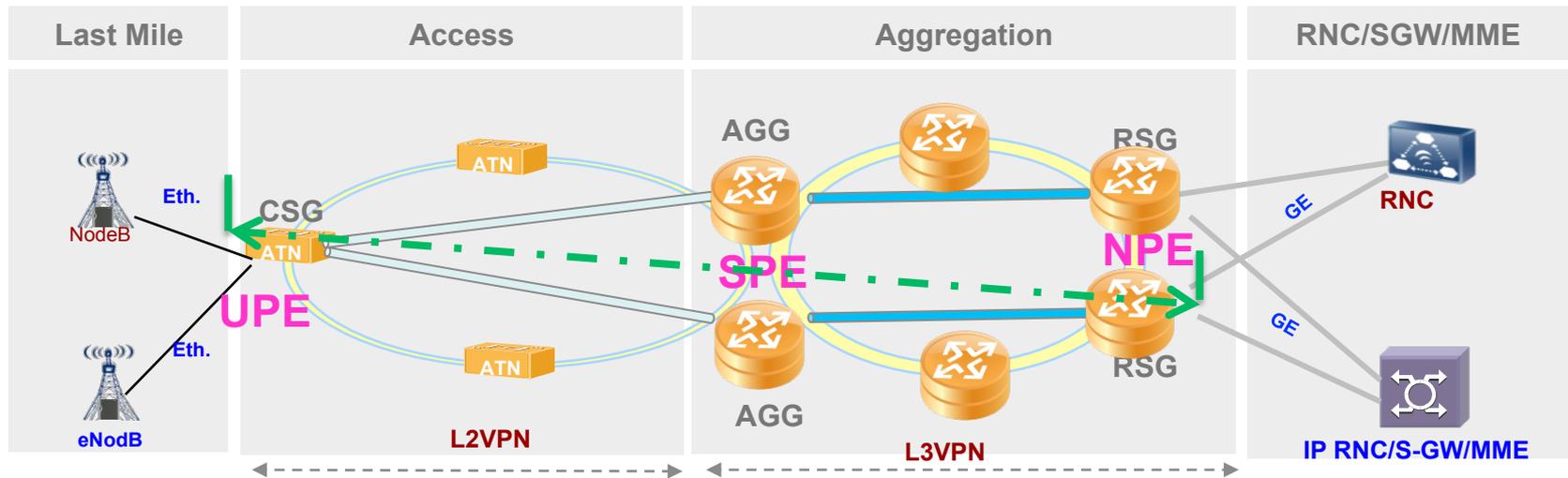
- Mobile Backhaul Network

  - 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)
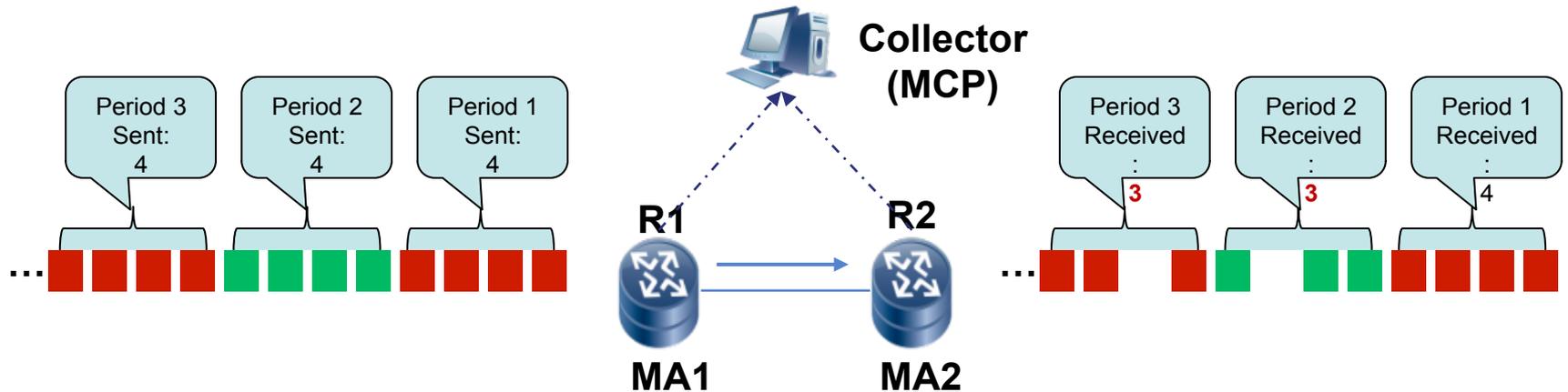
- Packet Loss

  - 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
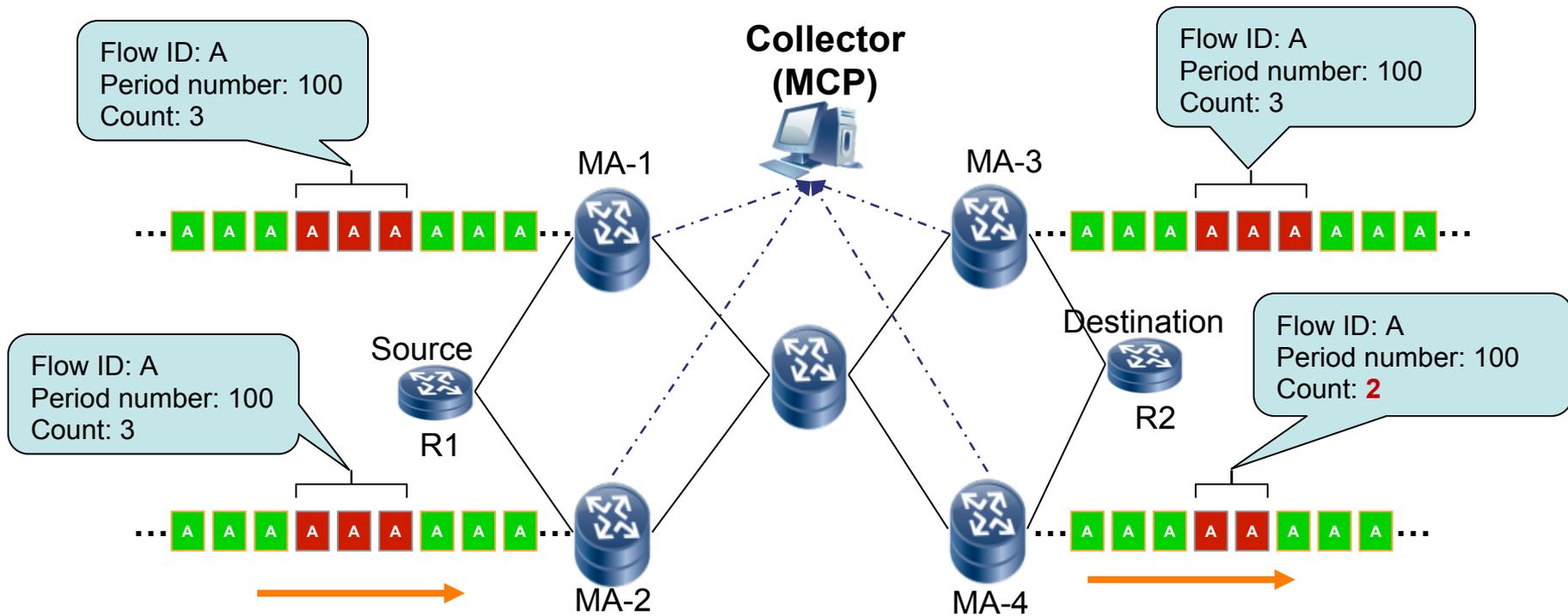
4

R-Timer Consideration
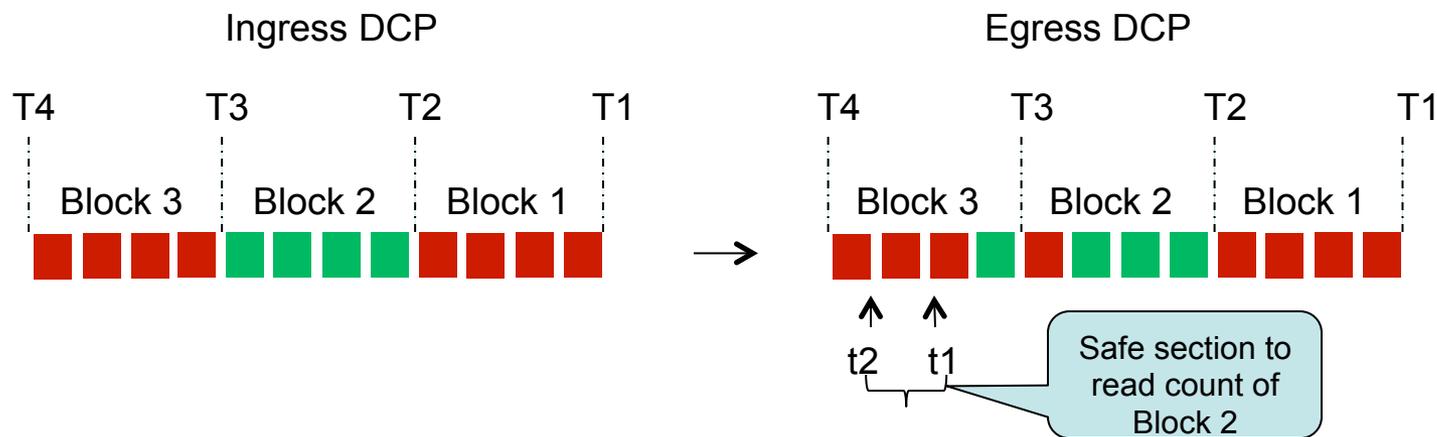
- Each MA maintains two timers (C-Timer and R-Timer with the same interval)

  - 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

    - t1 < (R-Timer + delta-T) < t2

Rationale of Coloring based PM (Packet Delay)
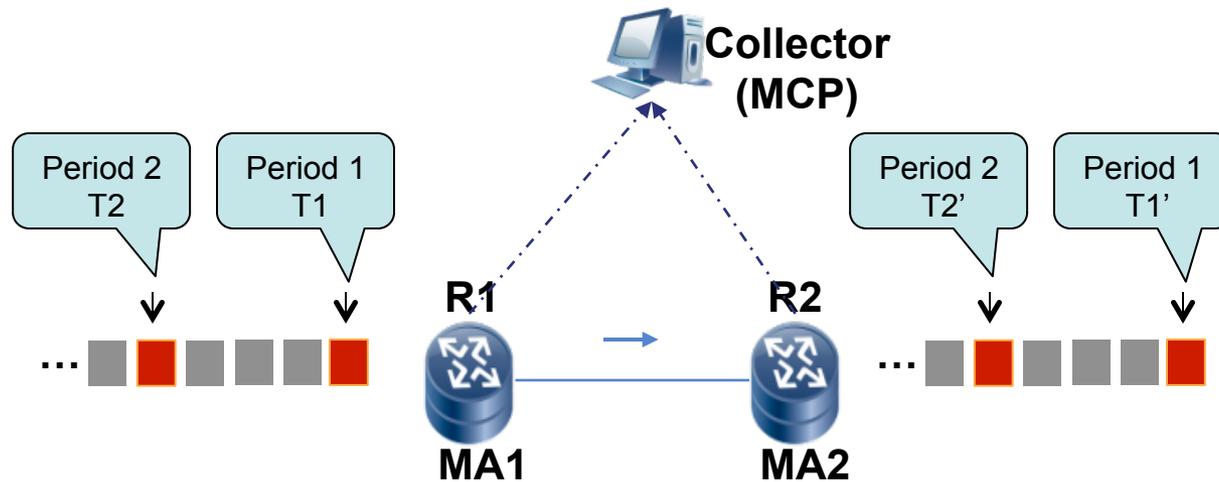
- Packet Delay

    - 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

Flow ID: A
Period number: 100
Count: 3

Collector (MCP)

Flow ID: A
Period number: 100
Count: 3

MA-1

MA-3

Flow ID: A
Period number: 100
Count: 3

Source

Destination

Flow ID: A
Period number: 100
Count: **2**

R1

R2

MA-2

MA-4

- 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