

A packet based method for passive performance monitoring

draft-tempia-ippm-p3m-03

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Marking Method Recap

Packet Loss Measurement: OAM Packets vs Coloring

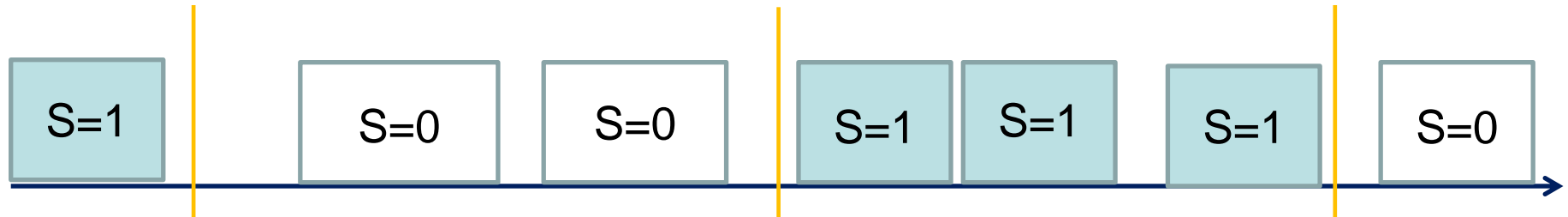
1. OAM Packets insertion (f.i. RFC6374) doesn't work if Out of Order packets.
2. OAM Packets have to be inserted in the right place (performing hardware).
3. Marking Method works in case of Out of Order (Equal Cost Multi-Path (ECMP) and also where there is no ECMP) with low computational load.
4. Marking Method permits to define a posteriori the monitored flow (for example 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 desired criteria)

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

1. Average delay (it needs single marking, it solves out of order issue, but doesn't give the distribution of the delay values)
2. Double marking methodology (between packets with the second marking there should be a security time gap to avoid out of order issues)

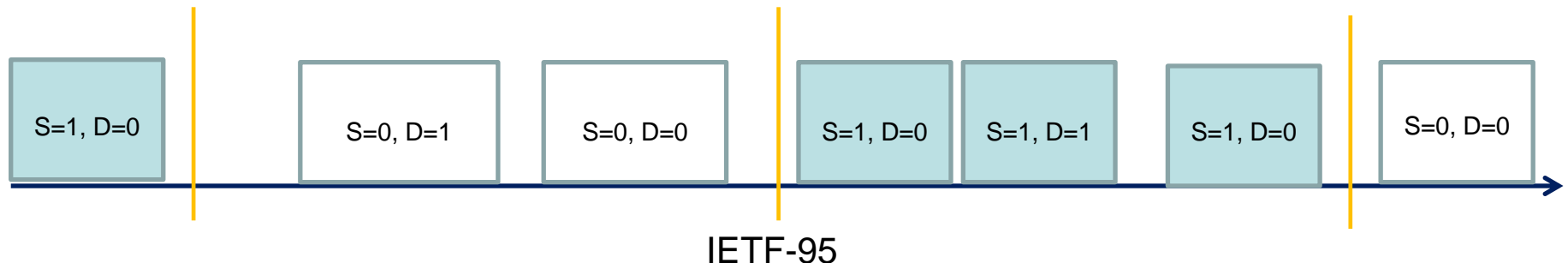
Single Mark Method

- Batching packets based on time interval to measure packet loss by switching value of the S flag. D flag MUST be set to 0 on transmit and ignored on receipt.
- First/Last Packet Delay calculation:
 - capture timestamp of when S flag value flips. Method is sensitive to packet loss and packet re-ordering
- Average Packet Delay calculation:
 - collect timestamps for each packet received within a single block. Average of the timestamp is the sum of all the timestamps divided by the total number of packets received. Hence minimally impacted by a packet loss and no impact if packets get re-ordered.



Double Mark Method

- Use S flag to create batch of packets as in Single Mark method
- Use D flag to create new set of marked packets that are fully identified over the BIER network
- Collect and compare timestamps on D-marked packets to calculate packet delay as well as the minimum and maximum delay values.



Document changes: -02 to -03

Important Modification:

Section “Detailed description of the method”

- General description of the alternate marking principle.

Section “Implementation and deployment”:

- Report on the operational experiment at Telecom Italia
- IP flow performance measurement IPFPM
- Performance Measurement Marking Method in BIER Domain
- RFC6374 Use Case
- Application to active performance measurement
- Marking Method as Passive PM for Overlay OAM DT (to be added)

Reviews, Comments, Support

Mirja Kühlewind:

- ✓ Made less Telecom Italia specific

Alex Clemm:

- ✓ Clarified the scope of the document: how marking and counting methodology work is in scope, while the exporting of records is out of scope and is in charge of the related documents
- ✓ Clarified some synchronization aspect

Greg Mirsky:

- ✓ Presentation of Marking Method in BIER working group

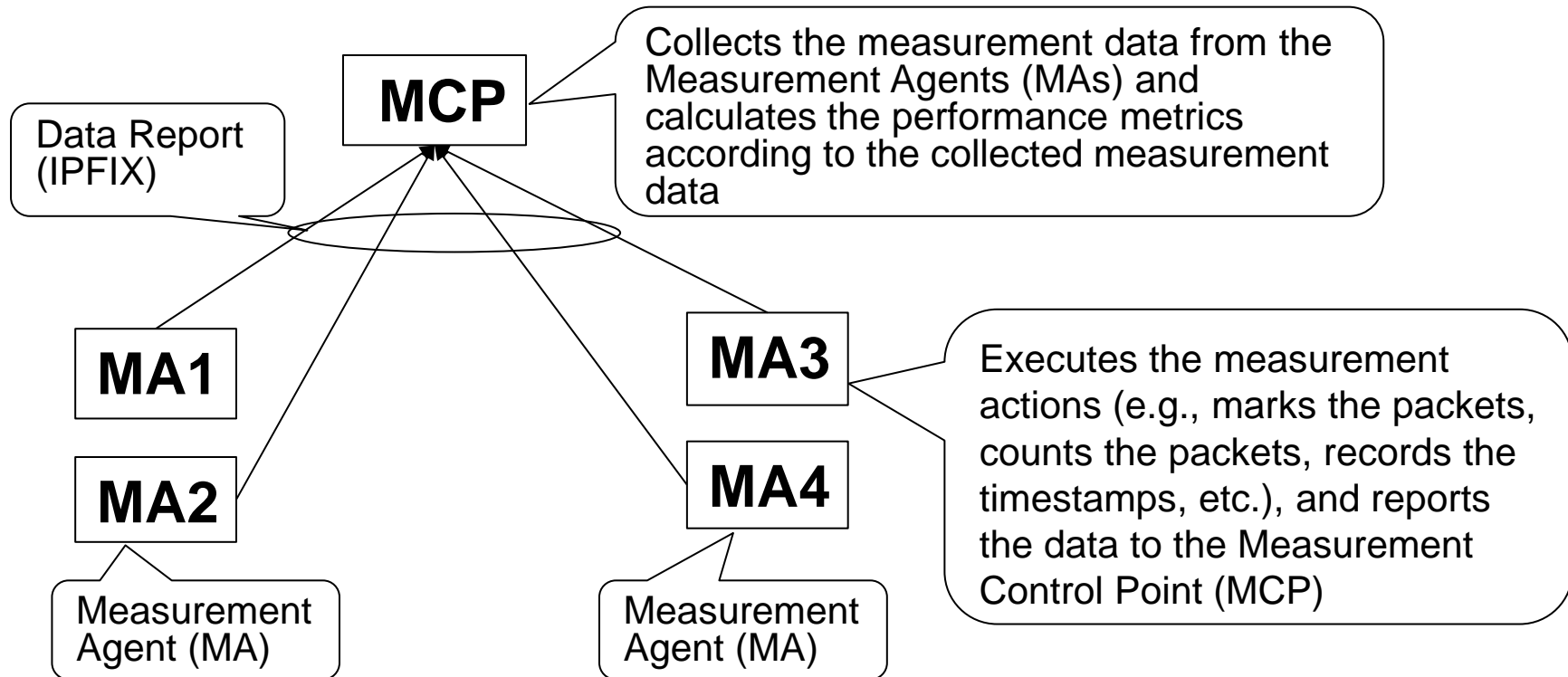
IP Flow Performance Measurement (IPFPM) Framework

draft-chen-ippm-coloring-based-ipfpm-framework-06

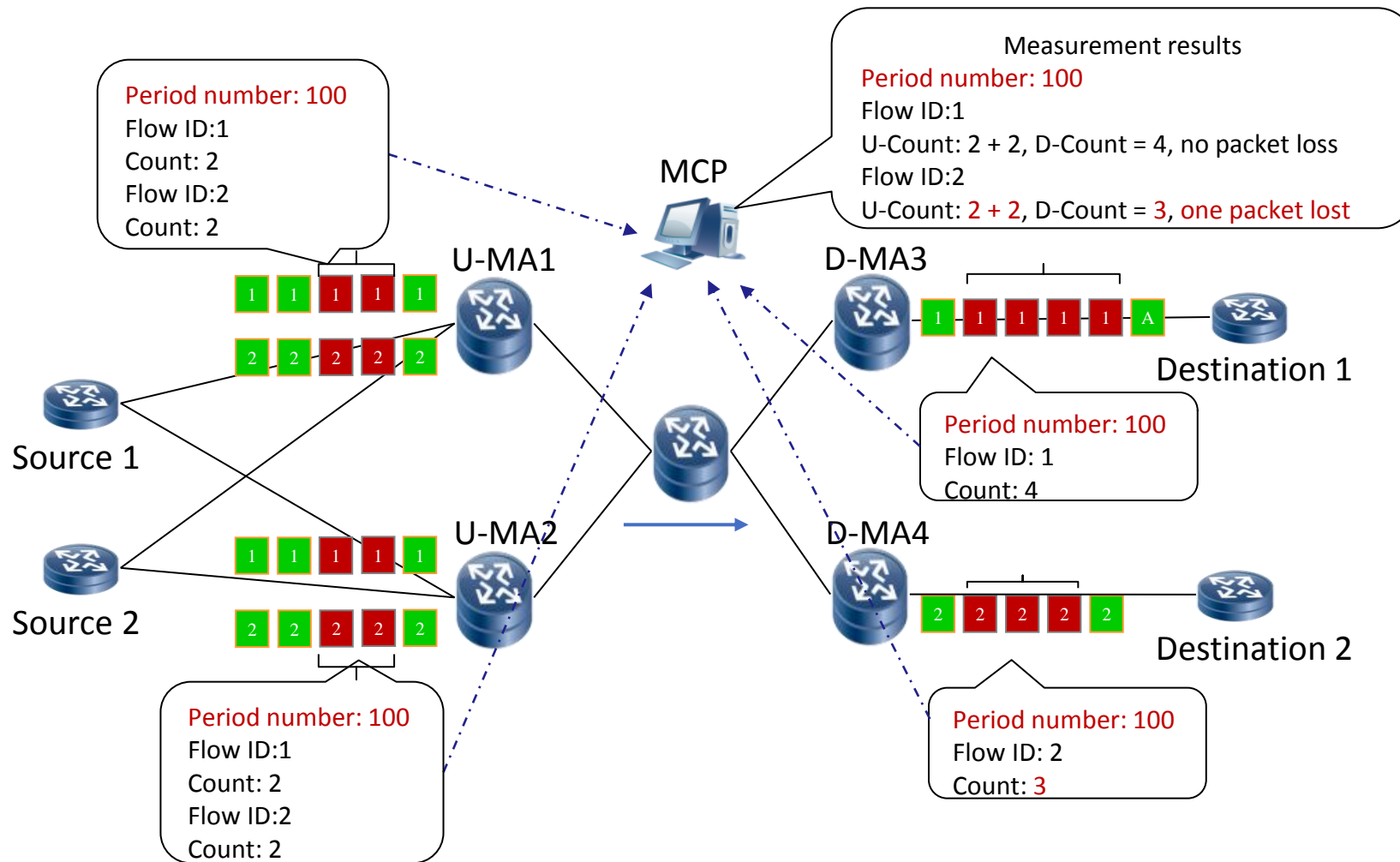
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IPFPM Components



MP2MP Flow Measurement



- The counts and timestamps from distributed MAs are indexed by **period number** and **flow ID**

Reviews, Comments, Support

J. Ignacio Alvarez-Hamelin:

- ✓ Average Delay
- ✓ NTP and PTP synchronization methods

Tal Mizrahi:

- ✓ Synchronization Aspects (next slide for detail)
- ✓ Security Considerations

Synchronization Detail

New Section by Tal Mizrahi (new author):

- all MAs 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 MAs consistently match the color bit to the correct block.
- one-way delay between two MAs requires the two MAs to be synchronized.
- two-way delay measurement does not require the two MAs to be time synchronized.

Alternate Marking Extension to RFC6812

draft-fioccola-ippm-rfc6812-alt-mark-ext-00

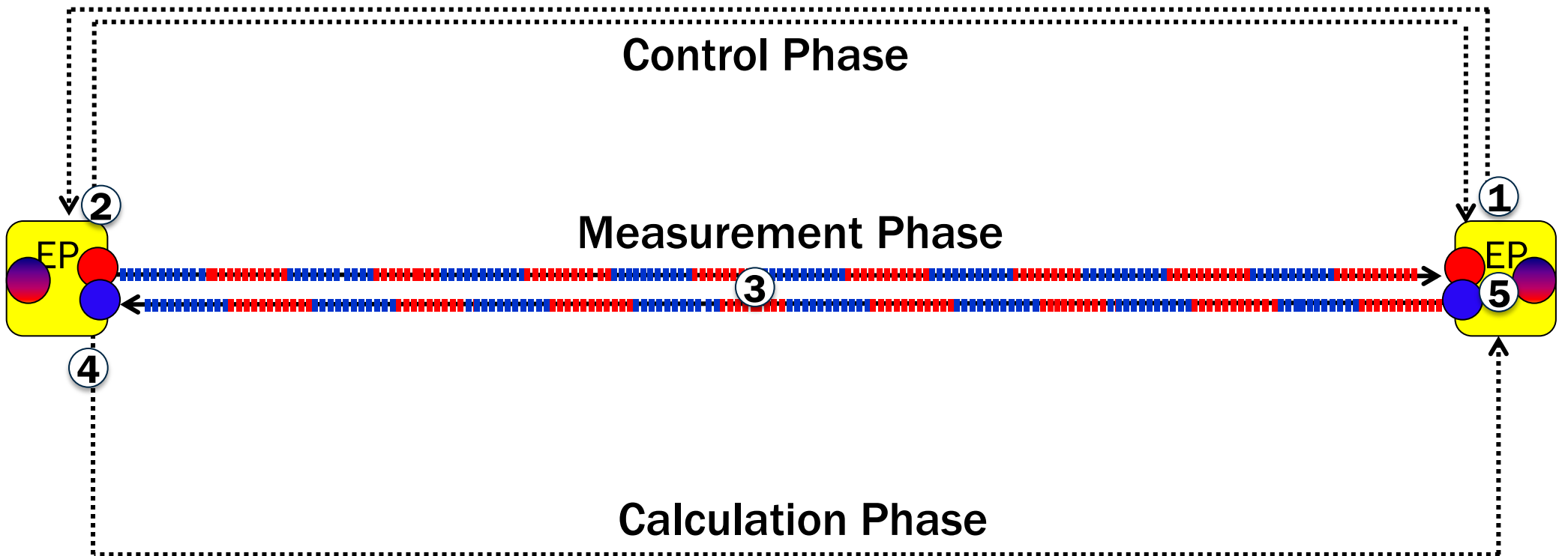
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

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High level view

- Cisco's Service-Level Assurance Protocol [RFC6812] is a widely deployed Performance Measurement protocol.
- An extension is presented in order to implement alternate marking methodology detailed in [I-D.tempia-ippm-p3m].
- Two end points (Sender and Responder) exchange two equal alternate marking data flows:
 - Measurements: Packet Loss, Delay for each packet or Average Delay

Test Execution



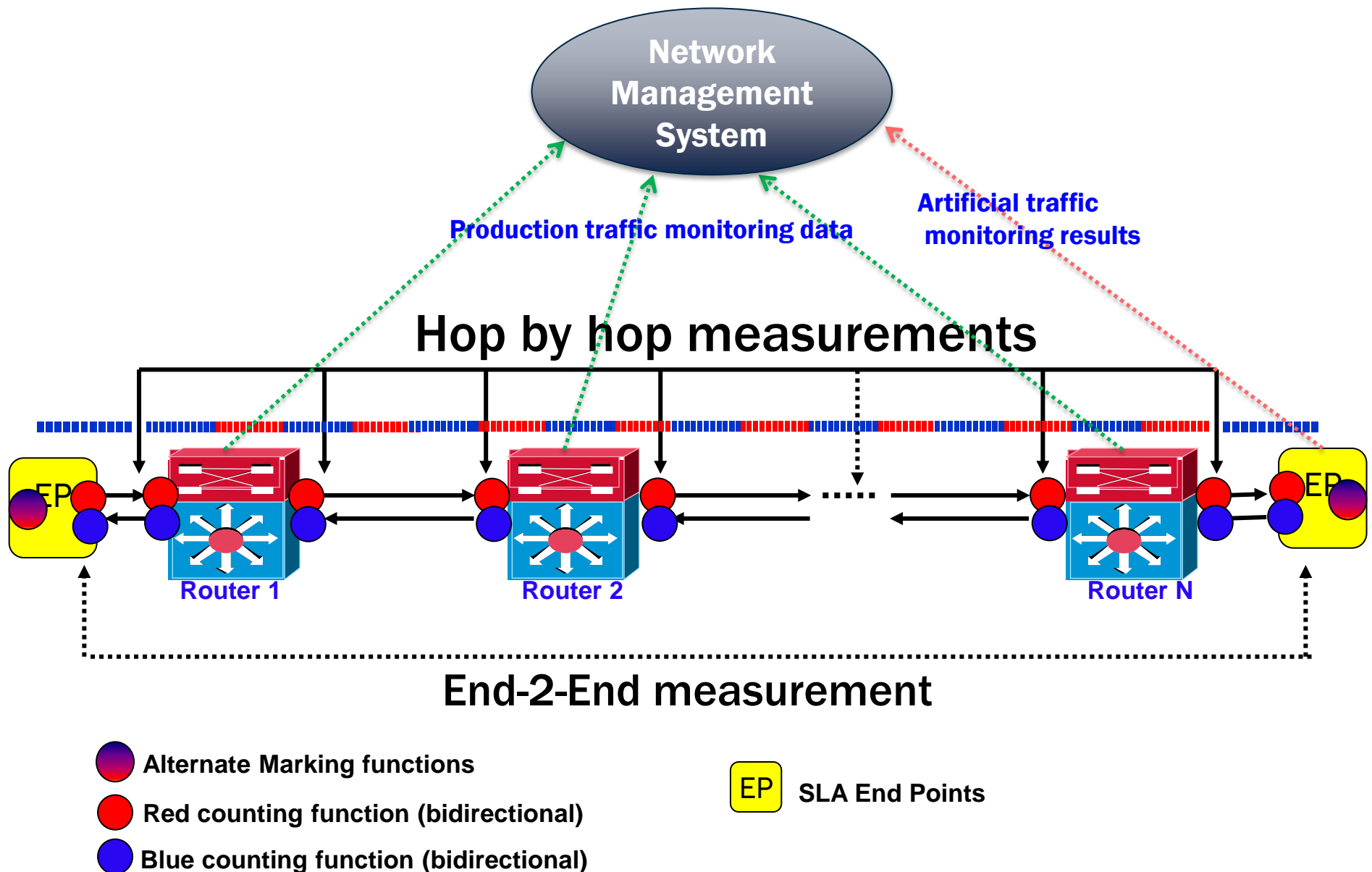
-  Alternate Marking functions
-  Red counting function (bidirectional)
-  Blue counting function (bidirectional)
-  SLA End Points

- ①** Test request
- ②** Test accepted (or refused, or no answer)
- ③** Test execution
- ④** Test data sending
- ⑤** Test results computation

Protocol Extension Benefits

- To utilize RFC6812 only some extensions are needed:
 - Most protocol specifications are the same described in RFC 6812
 - New fields have been added to RFC 6812 Control Protocol
 - The measurement messages is simplified in comparison to RFC 6812
- Improve time precision (It takes the packet timestamp at the transmission instant, not when packet is created).
- Reduce computational load (no sequence numbers and no timestamps into the measurement packets).
- Enable intermediate measurement points (“Hybrid” measurements) thanks to the Alternate Marking.
 - In the intermediate points artificial traffic is managed in the same way as real traffic and measured as specified for passive methodology.

Hybrid Measurement



Reviews, Comments, Support

Esteban Carisimo,
J. Ignacio Alvarez-Hamelin,
Al Morton:

- ✓ Clarified the discussion about average and median delay
- ✓ Reference to RFC6703

Summary

- Three documents covering different aspects:
 - **draft-tempia-ippm-p3m-03:**
general description of the methodology and reference for other solutions (transport agnostic)
 - **draft-chen-ippm-coloring-based-ipfpm-framework-06:**
framework for IP performance measurement (whole system, data correlation,...)
 - **draft-fioccola-ippm-rfc6812-alt-mark-ext-00:**
active and hybrid measurement application
- Straightforward mechanism, Flexible measurements
- Increasing Use Cases and Applications

Reviews and comments always welcome
WG adoption?