

# **IP Flow Performance Measurement (IPFPM) Framework**

**draft-chen-ippm-coloring-based-ipfpm-framework-03**

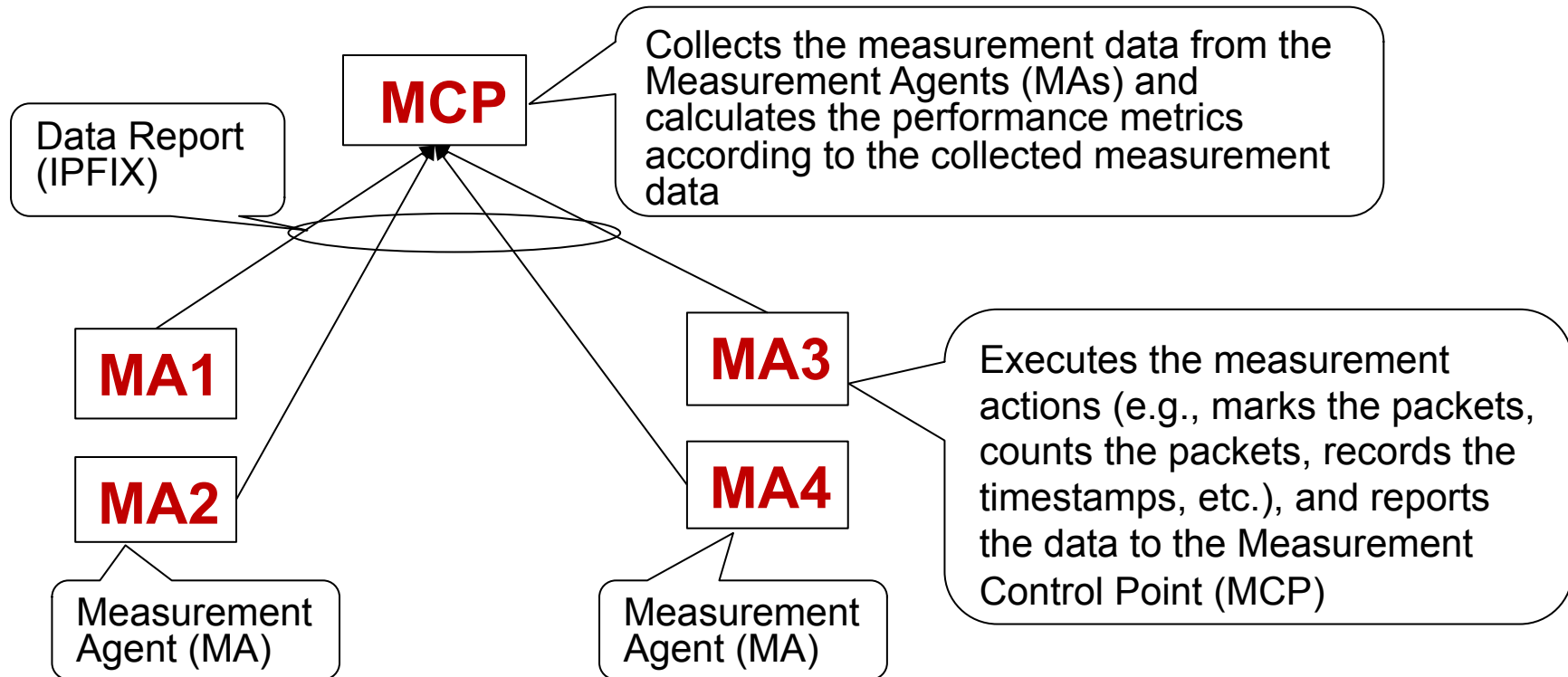
Dallas, Mar 2015, IETF 92

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# Motivation

- **Why IPFPM?**
  - ✓ Measurement rely on injected packets has limitations
  - ✓ Operators needs to know the performance of the real traffic running in their networks
- **What Can IPFPM Do?**
  - ✓ IP **Flow** Performance Measurement
  - ✓ Measure the **real** traffic
  - ✓ Support MP2MP flow measurement, with data correlation and re-order tolerant mechanism
  - ✓ Enable SLA verification, fault localization and fault delimitation

# IPFPM Components

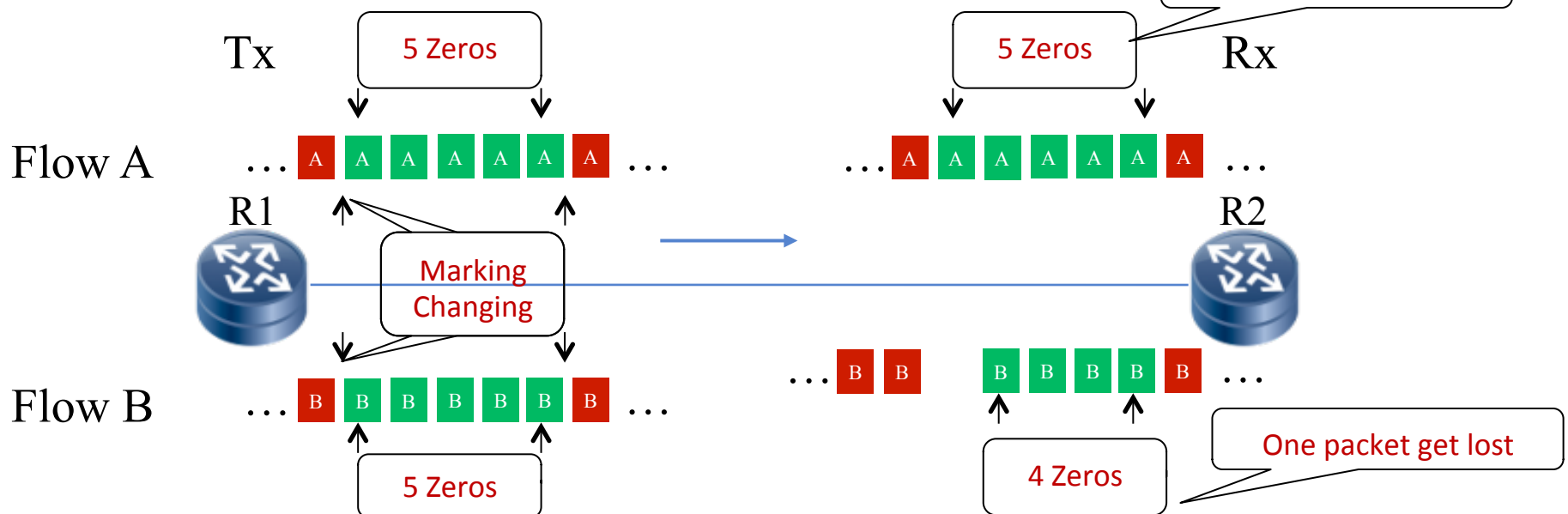


- **Period Number**
  - ✓ Data collected correlation

# Packet Loss Measurement

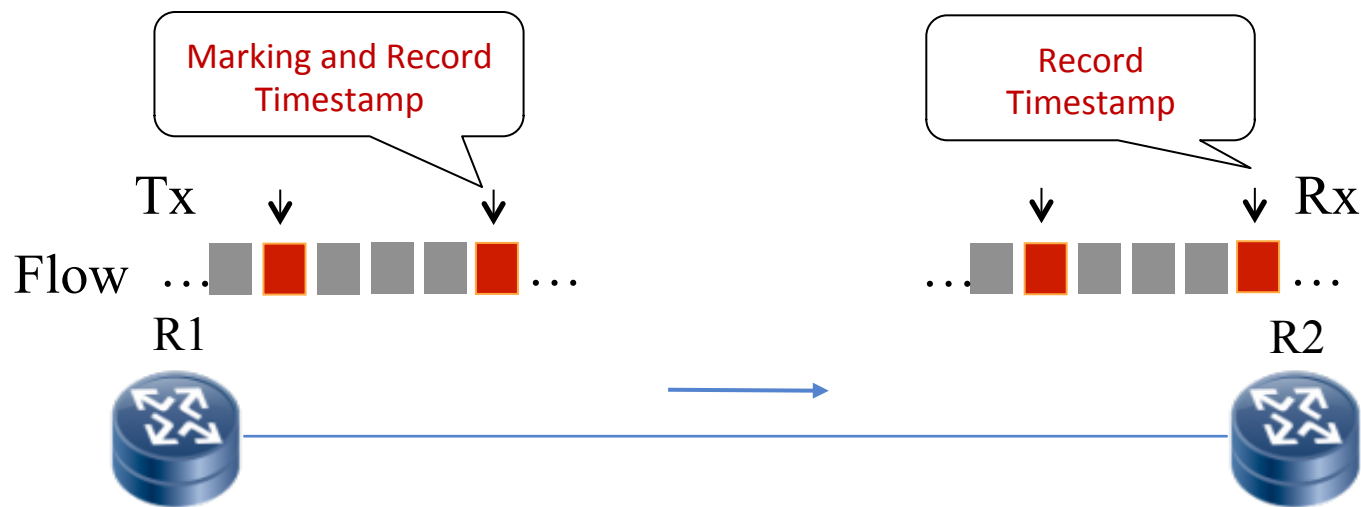
- Packet Loss

- ✓ Use one or more unused bits to mark the packets
- ✓ Different markings (“0”, “1”) divide the flows into different consecutive blocks
- ✓ Counting based on each block of marker, two counters, one for “0” block, the other for “1” block



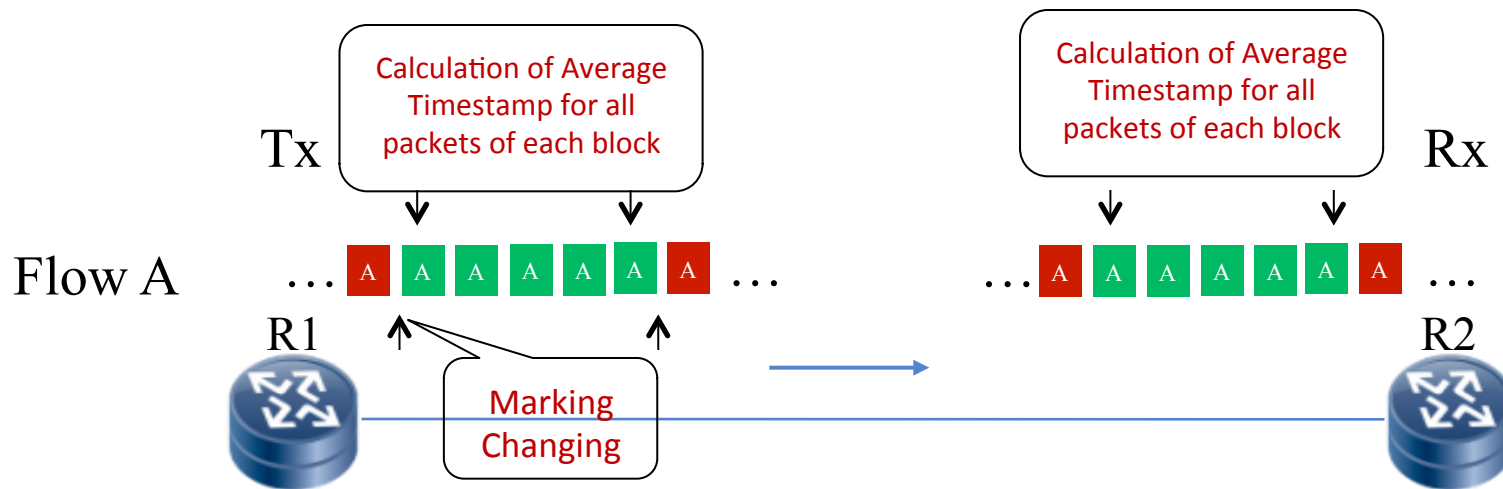
# Packet Delay Measurement

- Only marking **ONE** packet in a period,
- Measure the packet delay based on **THE** packet
- Time synchronization is required



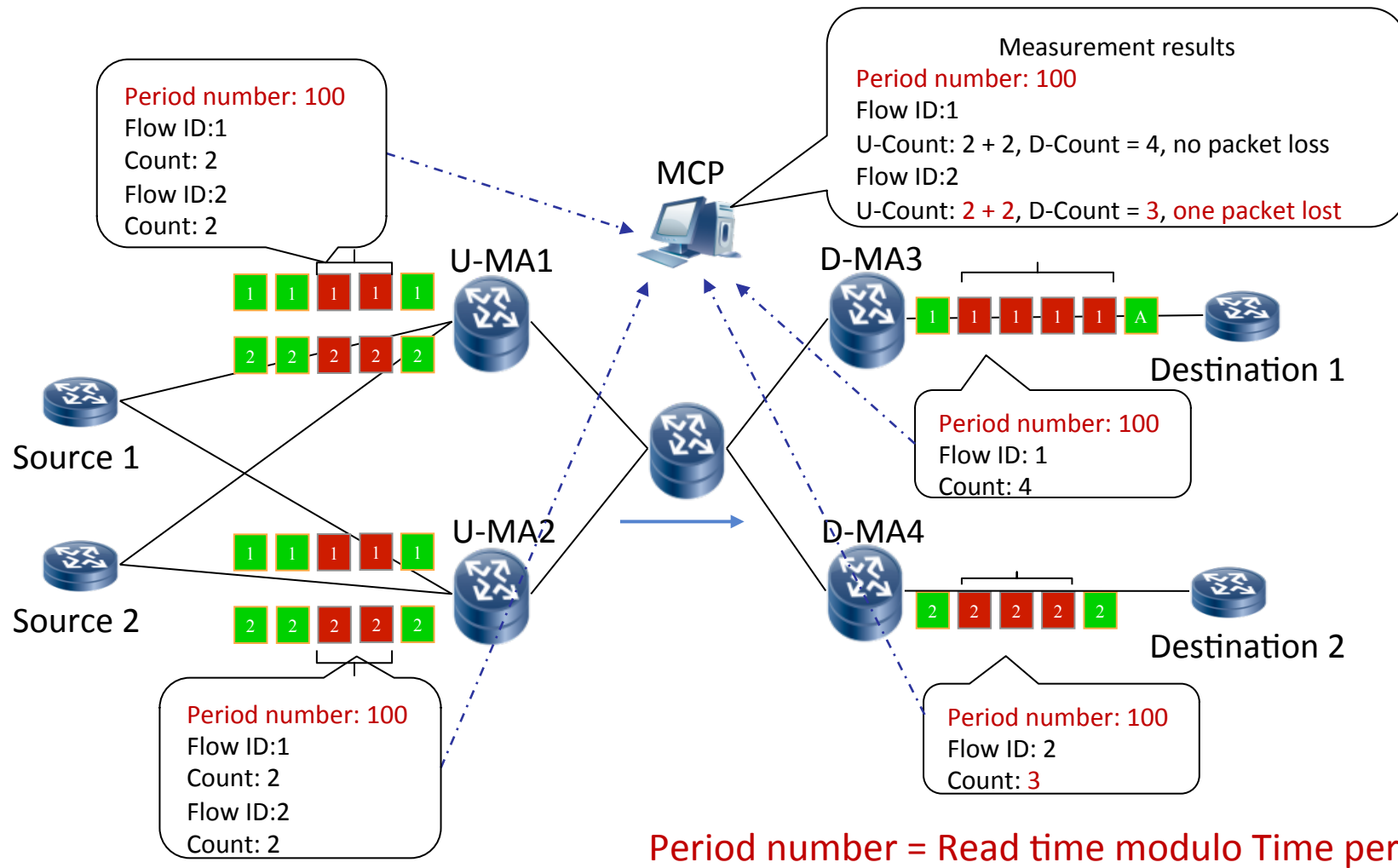
# Average Delay Measurement

- Marking **EVERY** packet of each block
- Calculation of average timestamp for each block (sum of all the timestamps divided by the total number of packets)
- The Average Delay between two nodes is calculated by subtracting the related average timestamps
- Reduce bias of sparse sampling
- One bit for both loss and delay



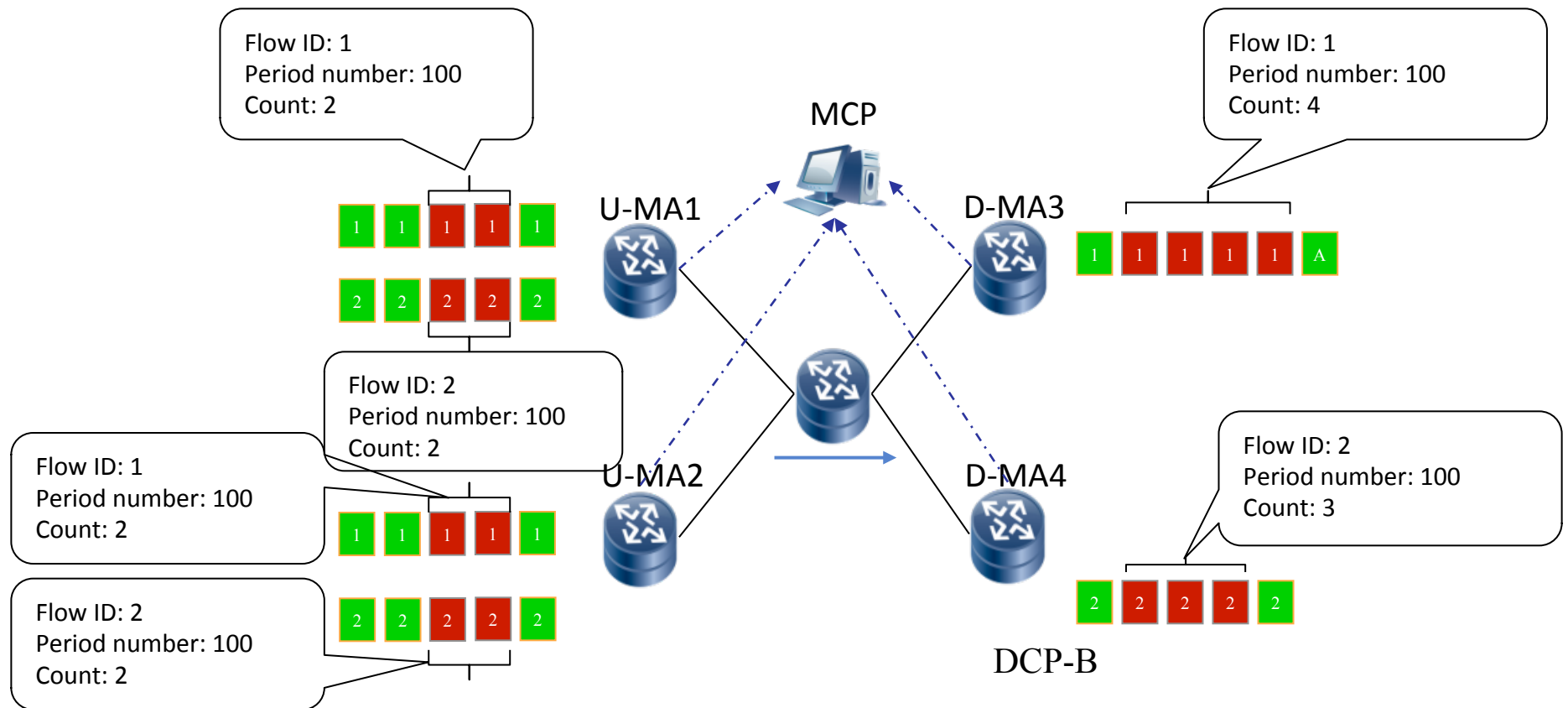
Note: draft-tempia-ippm-p3m-00 as reference

# MP2MP Flow Measurement



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

# MP2MP Flow Measurement



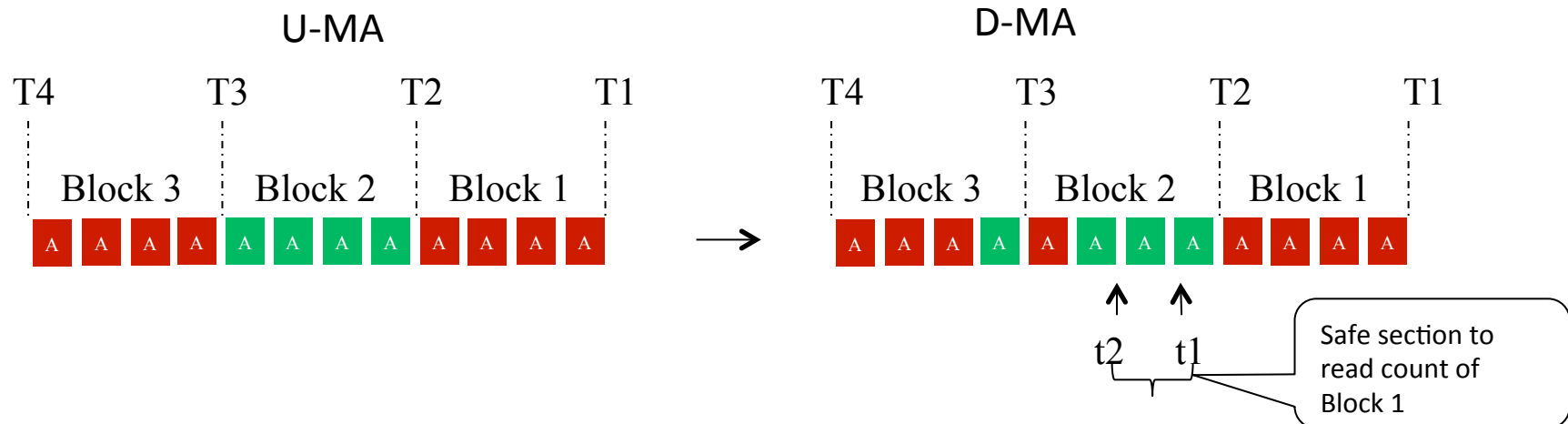
Period number = Read time modulo Time period

- A flow can be monitored at multiple upstream and/or downstream MAs
  - ✓ Flow 1 and Flow 2 are monitored at U-MA1 and U-MA2
  - ✓ Flow 1's destination is D-MA3, flow 2's destination is D-MA4



# Re-ordering Tolerance

- Each MA maintains two timers (C-Timer and R-Timer with the same interval)
  - ✓ C-Timer for changing 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
  - ✓  $t1 < (R\text{-Timer} + \text{delta-T}) < t2$



# Progress

- Was draft-chen-coloring-based-ipfpm-framework
- Became draft-chen-**ippm**-coloring-based-ipfpm-framework-00 at IETF 87 Berlin, after IPPM re-charter
  - ✓ -00 new author from Vodafone and CNNIC
  - ✓ -01 new author from China Telecom
- -02 Split into two documents at IETF 90 Toronto
  - ✓ IPFPM Framework (method, reference model, etc)
  - ✓ IPFPM Report (IPFIX information elements, templates and optional templates, etc)
  - ✓ Structure change, terminology Change
  - ✓ New author from Ericsson

# Update Since Last Version

- New author:
  - ✓ Giuseppe Fioccola (Editor), Telecom Italia
- Reference Model:
  - ✓ Refer to LMAP Reference Model
- Delay measurement:
  - ✓ Adding Average Measurement
- Editorial Changes

# Summary

- Stable document, 03 revision
- Straightforward mechanism, flexible measurement
- A whole system, fault tolerant, data correlation
- Favored by multiple operators
- Running code, real implementation

# Next Steps

- WG adoption
- Reviews and comments always welcome