

# Flow Measurement in IPv6 Network

draft-wang-ippm-ipv6-flow-measurement-07

draft-wang-ippm-ipv6-distributed-flow-measurement-05

draft-weng-ippm-srpm-path-consistency-over-srv6-07

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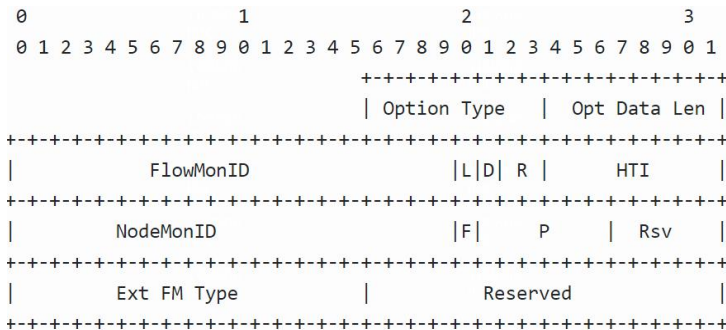
# Overview(1/3)

This draft introduces the method of deploying on-path flow performance measurement in IPv6 networks.

It defines **Flow Monitor Option** to carry the marking bits and other information required for flow measurement.

- End-to-End measurement: Encapsulated in IPv6 Destination Options Header.
- Hop-by-Hop measurement: Encapsulated in IPv6 Hop-by-Hop Options Header.

Where:



- FlowMonID: Identifier of flow
- L : Lost Flag, a marking bit of packet loss measurement
- D : Delay Flag, a marking bit of packet delay measurement
- HTI: Header Type Indication
- NodeMonID: Identifier of node in the measurement domain.
- F: The marking bit of two-way flow measurement
- P: Measurement period
- Ext FM Type: Extendable Flow Measurement type

Now on-path flow measurement (i.e. in-band network telemetry) is going to research and deploy in China Mobile. From the test results in our lab, it is better for flexible deployments on condition that a Node ID and a steerable measurement period can be enabled in data plane.

- **This draft has been presented at IETF-115 and IETF-118 in IPPM WG.**

- **Lab Interop-test Status**

Hardware devices and software implementations which have passed IPv6 flow measurement tests hosted by China Mobile and China Telecom in 2021 ~ 2023.

- China Unitech's Unified Controller
- Huawei NE40E and NE5000E
- H3C CR16010H-FA and CR19000-8
- ZTE M6000-8S Plus and M6000-3S

- **Deployment Status**

Trials of IPv6 flow measurement in 2021 ~ 2023.

- China Mobile Zhejiang Branch network

# Motivation(2/3)

- **High requirements for SLA**

Network devices report measurement data to the controller. The controller collects data and calculates the quality of the forwarding path. The controller optimizes the path and issues a new path to the ingress node.

The processing process is lengthy and difficult to guarantee the SLA requirements.

- **Reduce the complexity of interaction between controllers**

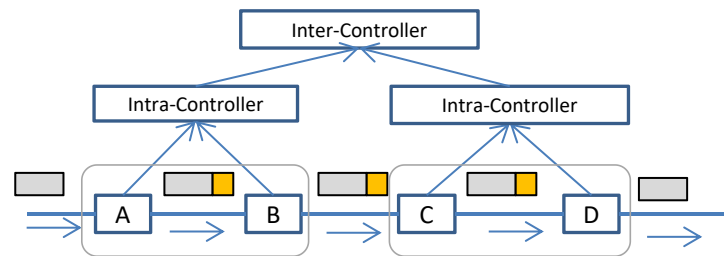
In the inter-AS scenarios the measurement data needs to be summarized, calculated and presented on the centralized inter-AS controller. This interaction is complex between different level controllers.

- **No dependent on controller**

We also hope to support forwarding path quality measurement in scenarios where controllers are not deployed.

This draft proposes **a distributed flow performance measurement method** without the participation of the controller.

The measurement results can be used by the router to select the forwarding path that meets the high SLA requirements.



# Proposal(2/3)

The distributed flow performance measurement method has two working models.

## ● Source node model

The source node completes the summary and calculation of statistical data.

- ✓ Source node
  - Insert the required flow measurement indicators into the specified traffic and marks the traffic by Flow Monitor Option.
  - Complete the summary and calculation of statistical data.
- ✓ Intermediate and egress node
  - Collects the statistical data and time stamp.
  - Periodically notify the collected information to the source node.

## ● End node model

The end node is responsible for calculating measurement result.

- ✓ Source node
  - Insert the required flow measurement indicators into the specified traffic and marks the traffic.
  - Carry the measurement data of source node to the egress node by Flow Monitor Option,
- ✓ Egress node
  - Calculate the measurement results of packet loss, delay, average packet loss, average delay, etc. for the flow.
  - Send the results to the source node.

## Extension of the Flow Monitor Option

1. Extend the Ext FM type bitmap of Flow Monitor Option for distributed flow measurement.
  - Packet timestamp bit
  - Previous period count bit
2. Carry one or more measurement information and results in the form of TLV in the additional information field of Flow Monitor Option.
  - Packet count TLV
  - Time Stamp TLV
  - Packet loss TLV
  - Packet delay TLV
  - Average Packet loss TLV
  - Average Packet delay TLV

# Overview(3/3)

## ✓ objective

To measure SRv6 Policy through stamp and twamp light, and the transmission paths of test packets and reply packets are **consistent**

## ✓ Requirement for consistent path

In the case of **inconsistent** paths:

- S1 and R1 are required to achieve high-precision clock synchronization for one-way delay measure
- Reply packets are forwarded based on IP forwarding and may be discarded for some reasons

## ✓ current situation

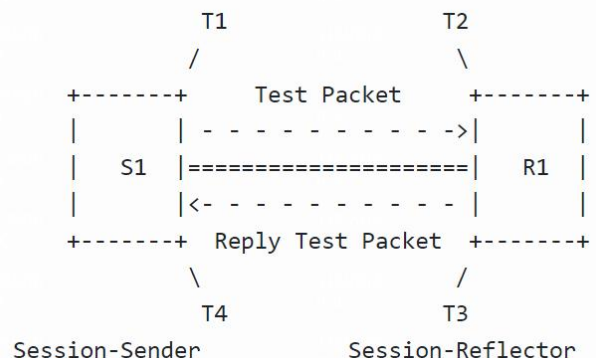
There are multiple deployment modes:

- STAMP Session-Sender with STAMP Session-Reflector.
- STAMP Session-Sender with TWAMP Light Session-Reflector.
- TWAMP Light Session-Sender with STAMP Session-Reflector.
- TWAMP Light Session-Sender with TWAMP Light Session-Reflector.

Since twamp light does not support TLV extension, this draft proposes a solution that is not based on TLV to achieve path consistency

## ✓ Fundamental

- Carrying path segment [draft-ietf-spring-srv6-path-segment] in test packet  
Encapsulate the Path segment in SRH, and set SRH.Flag to identify the existence of the path segment
- Reflector uses the path segment to forward reply packets through consistent path  
Create a mapping table in advance, and use the path segment to find the segment list of the return trip in the mapping table. Use this segment list to encapsulate the SRH of the reply packet.



# Next

The three drafts have been presented at IETF-115 and IETF-118 in IPPM WG.

- Asking for adoption Call.
- Asking for comments and feedbacks.
- Continue to improve the draft.

Thank You