Performance Measurement Using Simple TWAMP for Segment Routing Networks

draft-gandhi-spring-stamp-srpm-03

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Agenda

- Requirements and Scope
- History of the Draft
- Summary of Procedures
- Next Steps

Requirements and Scope

Requirements:

- Delay and Loss Performance Measurement (PM)
  - ✓ Links and End-to-end P2P/P2MP SR Paths
    - ✓ Links include physical, virtual, LAG (bundle), LAG member, numbered/unnumbered links
  - ✓ Applicable to SR-MPLS/SRv6 data planes
- No need to signal to PM parameters - spirit of SR
  - ✓ Stateless on egress node - spirit of SR
  - ✓ State is in the probe message
- Handle ECMP for SR Paths
- Support stand-alone direct-mode loss measurement

Scope:

- STAMP [RFC 8762]
- STAMP TLVs [draft-ietf-ippm-stamp-option-tlv]

History of the Draft

- Feb 2019
  - Draft was published - *draft-gandhi-spring-twamp-srpm-00*
- Mar 2019
  - Presented *draft-gandhi-spring-twamp-srpm-00* at IETF 104 Prague in SPRING WG
- May 2019
  - Added STAMP TLV for Return Path
- July 2019
  - Presented *draft-gandhi-spring-twamp-srpm-01* at IETF 105 Montreal in IPPM WG
    - Slide 9 Titled - Applicability of STAMP
- Nov 2019
  - SPRING Chairs announced in the meeting the agreement with IPPM chairs to progress the draft in SPRING WG
  - Presented *draft-gandhi-spring-twamp-srpm-04* at IETF 106 Singapore in SPRING WG
- Mar 2020
  - Moved STAMP support to *draft-gandhi-spring-**stamp**-srpm-00*
  - Keep TWAMP Light support as informational in *draft-gandhi-spring-**twamp**-srpm-08*
- Jul 2020
  - Presented *draft-gandhi-spring-stamp-srpm-01* at IETF 109 in SPRING and IPPM WG
- October 2020
  - Split draft into *draft-gandhi-**spring**-stamp-srpm-03 and draft-gandhi-**ippm**-stamp-srpm-00*

STAMP - Summary of PM Drafts

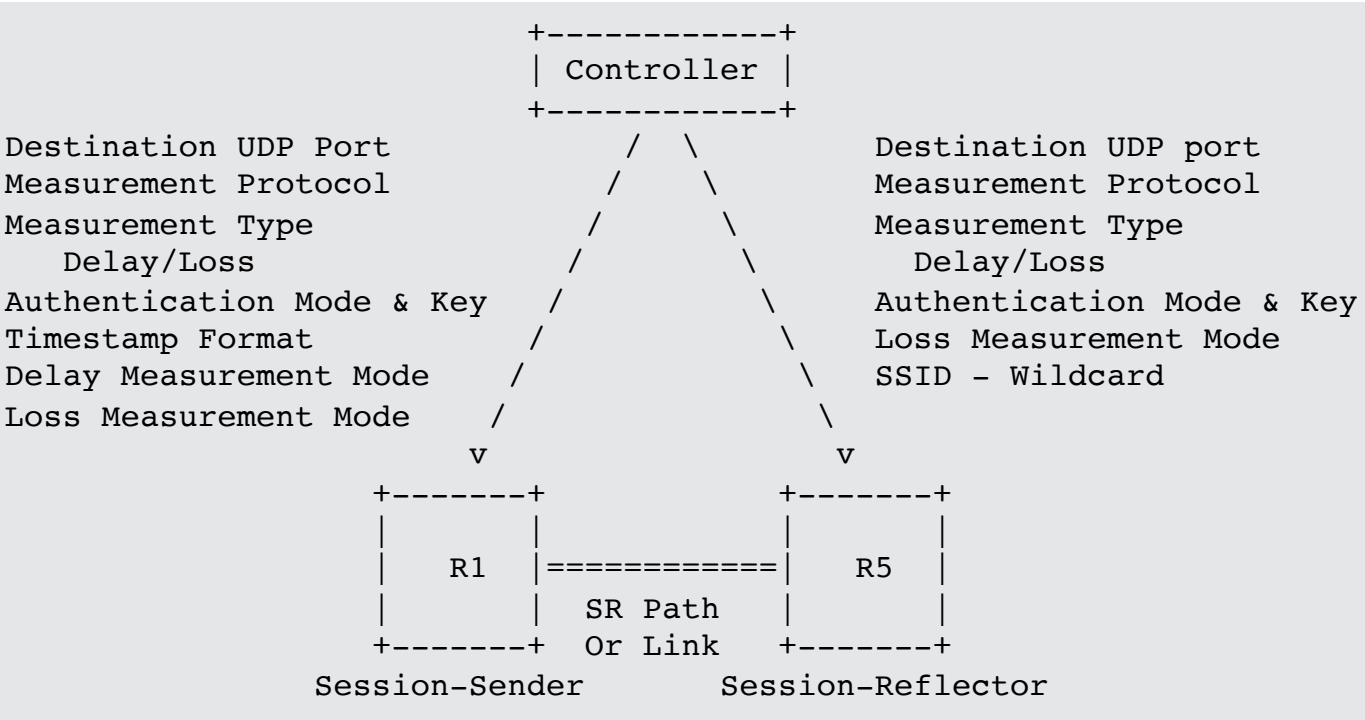
draft-gandhi-spring-stamp-srpm

- Defines procedures for STAMP messages for delay, synthetic loss and direct-mode loss measurements
- Procedures are defined for Links and end-to-end SR Paths for SR-MPLS and SRv6 data-planes

draft-gandhi-ippm-stamp-srpm

- Defines extensions for STAMP for Segment Routing
- Defines Session-Sender Control code field for in-band response request
- Defines stand-alone direct-mode loss measurement query and response messages
- Defines TLVs to carry Destination Node Address and Return Path

Example Provisioning Model



Probe Query for Links

- User-configured destination UDP **port1** is used for DM probe messages and **port2** is used for direct-mode LM probe messages (unauthenticated mode)
- Applicable to physical, virtual, LAG, LAG member, numbered/unnumbered links – probe messages pre-routed over the links

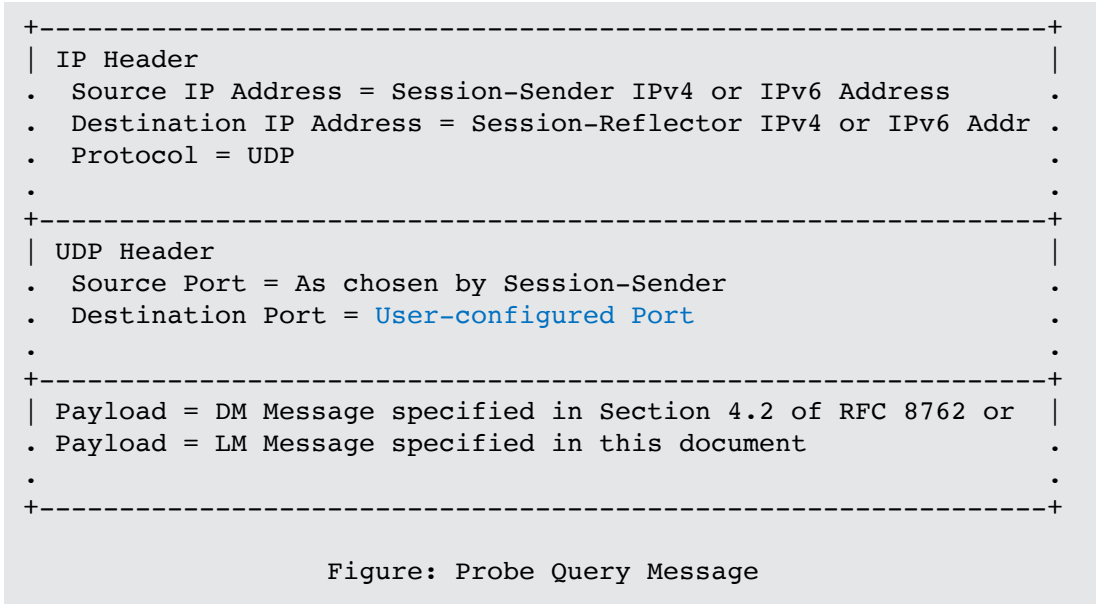


Figure: Probe Query Message

Probe Query for SR-MPLS and SRv6 Policy

For performance delay/loss measurement of **end-to-end** SR Policy, the probe query message is sent on the SR Policy with:

1. MPLS label stack of SR-MPLS Policy
2. SRv6 SRH [RFC 8754] with Segment List of SRv6 Policy

User-configured destination UDP **port1** is used for DM probe messages and **port2** is used for direct-mode LM probe messages (unauthenticated mode) – same as Links.

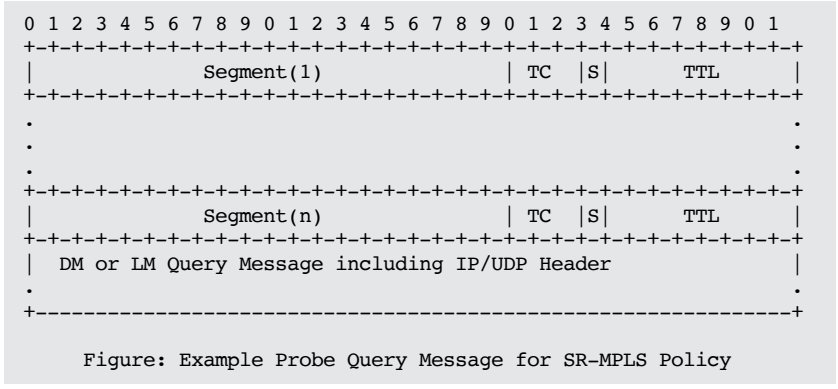


Figure: Example Probe Query Message for SR-MPLS Policy

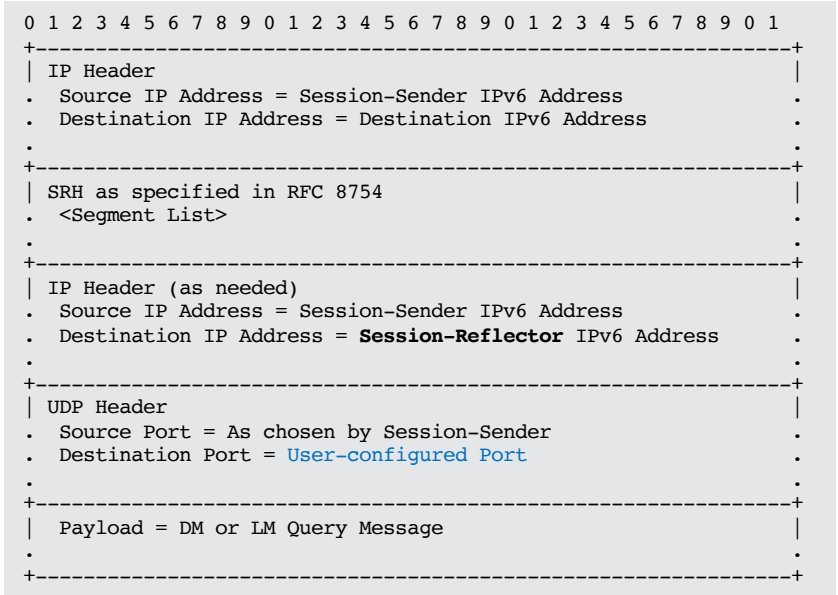


Figure: Example Probe Query Message for SRv6 Policy

Probe Response Message

- The probe response message is sent using the IP/UDP information from the probe query message.
- Based on Control Code from the probe query message
- Use Segment List from Return Path TLV if present in probe query message.

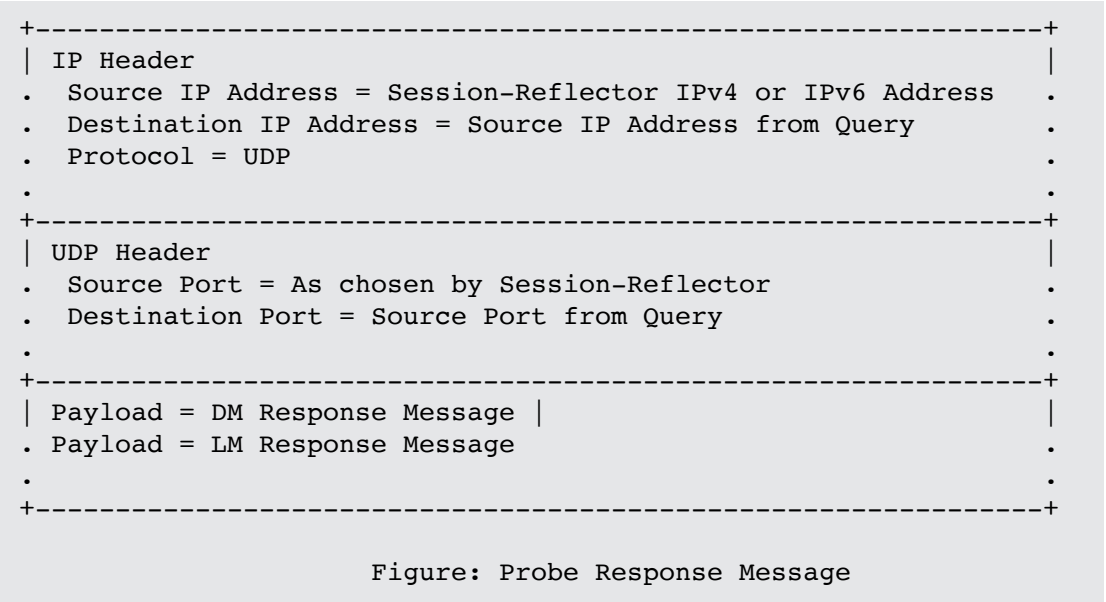


Figure: Probe Response Message

ECMP Support for SR Path

- SR Path can have ECMP between the ingress and transit nodes, between transit nodes and between transit and egress nodes.
- Sending probe queries that can take advantage of the hashing function in forwarding plane.
- Existing forwarding mechanisms are applicable to probe messages. Examples are:
  - For IPv4
    - Sweeping destination address in IPv4 header (e.g. 127/8)
  - For IPv6
    - Sweeping flow label in IPv6 header

Performance Measurement Modes

- One-way Measurement Mode
  - Reply sent “out of band” on IP/UDP path by default
- Two-way Measurement Mode
  - Reply sent “in-band” on reverse SR path
    - Based on Control Code from the probe query message
  - **Use Return Path TLV for STAMP from the probe query message**
- Loopback Measurement Mode
  - Probe message carries the return path in the header of the packet

Example PM Metrics

- PM probe packets can be used to compute following delay metrics:
  - Minimum delay
  - Maximum delay
  - Average delay
  - Delay variance
- PM probe packet loss can be used to compute following loss metrics:
  - Synthetic packet loss (aka indirect-mode packet loss measurement)
  - Connection loss (aka liveness heart-beat failure detection)

Next Steps

- Welcome your comments and suggestions
- Implementation exists
- Request SPRING WG adoption

Thank you