Performance Measurement Using Simple TWAMP for Segment Routing Networks

draft-gandhi-spring-stamp-srpm-05

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Agenda

- Requirements and Scope
- Summary of Procedure
- Next Steps

Requirements and Scope

Requirements:

- Performance Delay and Loss Measurement
  - ✓ Links and end-to-end P2P/P2MP SR paths
    - ✓ Links include physical, virtual, LAG, LAG member links
  - ✓ Applicable to SR-MPLS/SRv6 data planes
- Handle ECMP for SR paths

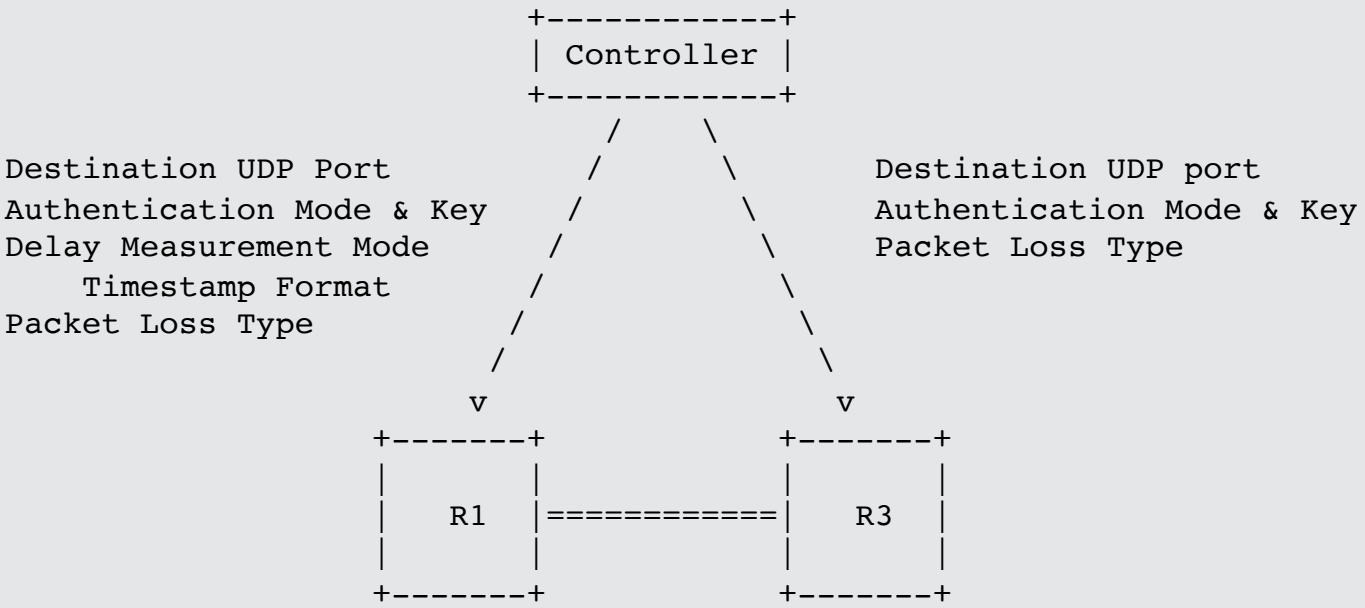
Goals:

- Avoid provisioning test sessions on Session-Reflector - Stateless mode
- Avoid control protocol for signaling dynamic parameters
- Very high scale for number of test sessions and faster detection interval
  - Support hardware implementation

Scope:

- STAMP [RFC 8762]
- STAMP Extensions [RFC 8972]
- draft-gandhi-ippm-stamp-srpm

Example STAMP Reference Model



Session-Sender Test Packet for Links

- For links, the STAMP Session-Sender test packets are transmitted over the links using local and remote link addresses
- User-configured destination UDP port is used for STAMP test packets (or port 862)
- TTL is set to 1
- Applicable to physical, virtual, LAG, LAG member links

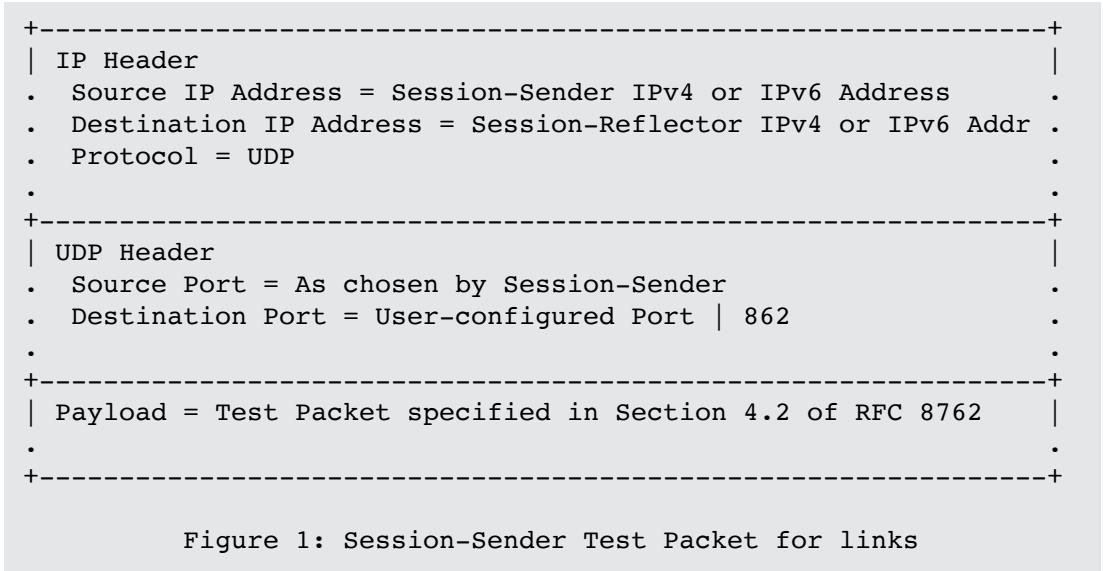


Figure 1: Session-Sender Test Packet for links

STAMP Session-Sender Test Packet for SR-MPLS and SRv6 Policy

For end-to-end SR Policy, the STAMP Session-Sender test packets are transmitted on the SR Policy with:

1. MPLS label stack of SR-MPLS Policy
2. SRv6 SRH [RFC 8754] with Segment List of SRv6 Policy
   - Using upper-layer processing defined in SRv6 network programming

- User-configured destination UDP port is used for STAMP test packets (or port 862)
- TTL is set to 255
- Color only SR-MPLS Policy:
  - Destination Address in 127/8 address
  - TTL is set 1

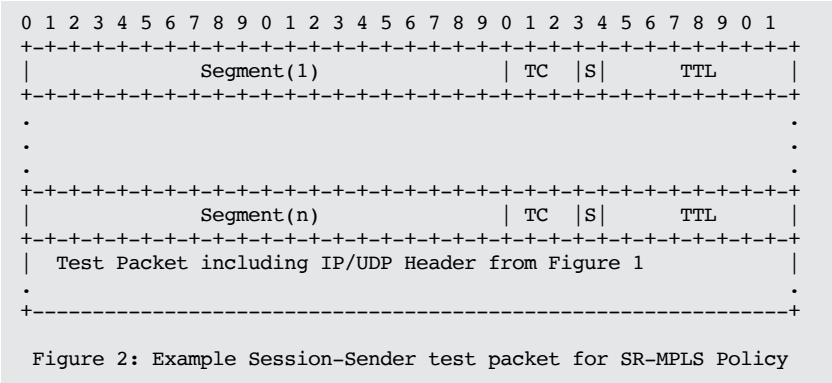


Figure 2: Example Session-Sender test packet for SR-MPLS Policy

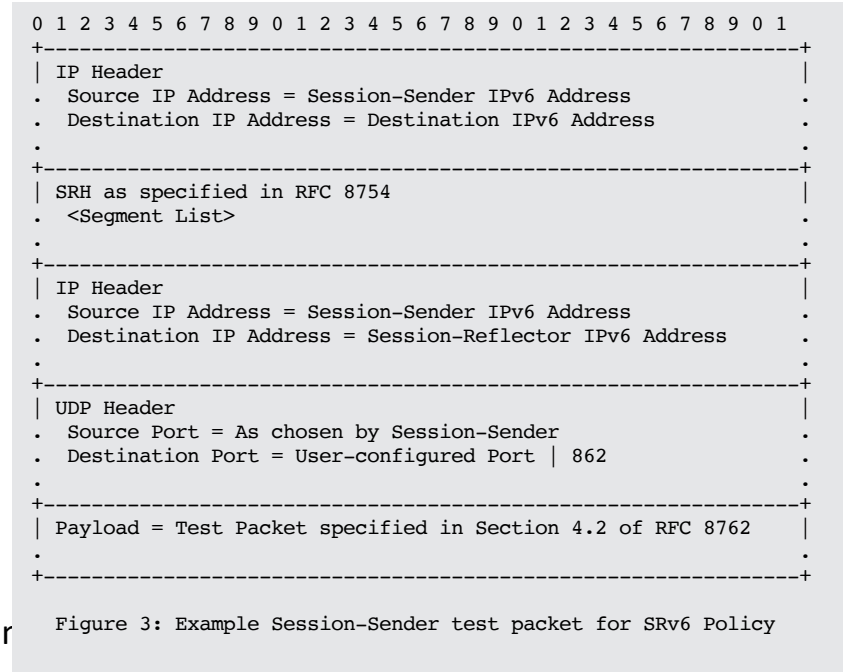


Figure 3: Example Session-Sender test packet for SRv6 Policy

STAMP Session-Sender Test Packet for P2MP SR-MPLS Policy

For end-to-end P2MP SR-MPLS Policy, the STAMP Session-Sender test packet is sent with:

- Tree-SID of the SR-MPLS Policy
- IPv4 destination address selected from 127/8 range
- TTL is set to 1

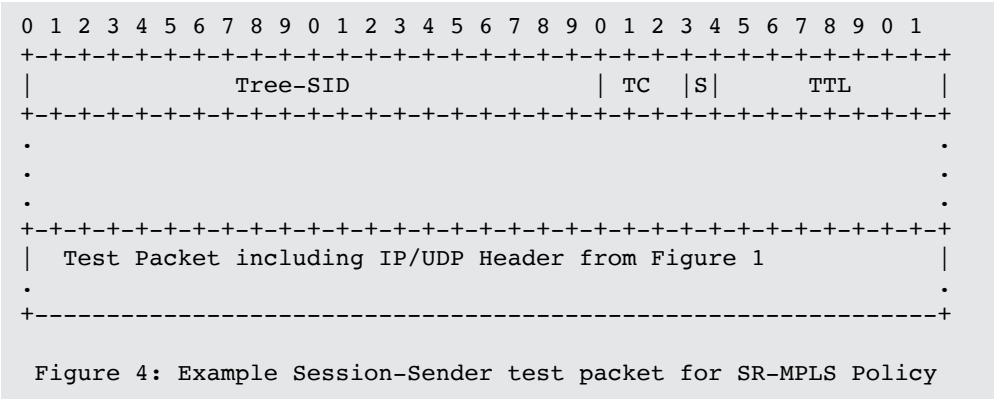


Figure 4: Example Session-Sender test packet for SR-MPLS Policy

STAMP Session-Reflector Test Packet

- The STAMP reply test packet is sent using the IP/UDP information from the received test packet.

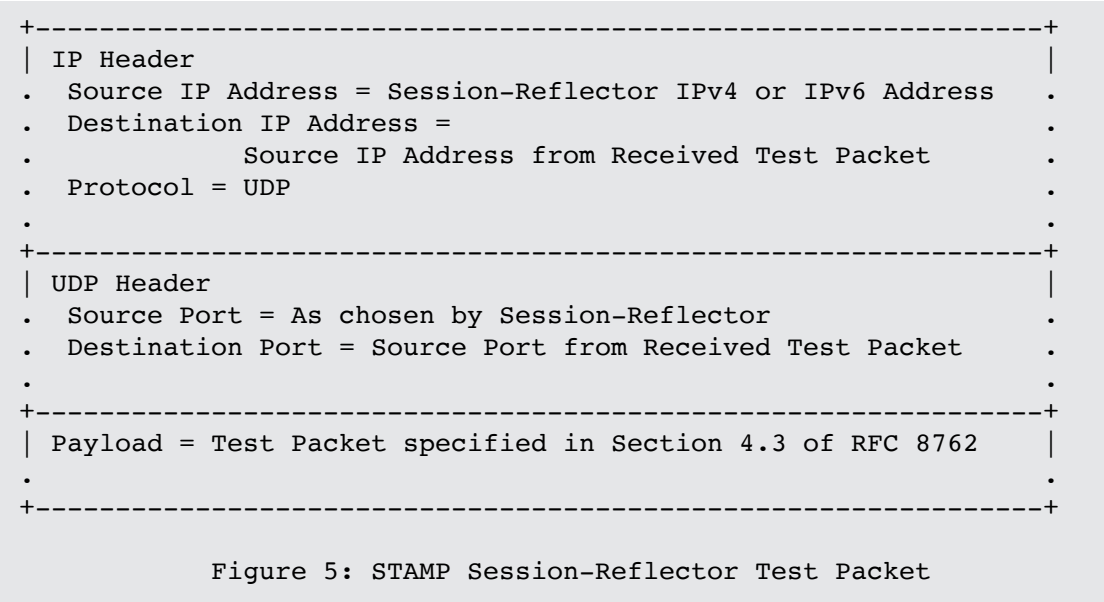


Figure 5: STAMP Session-Reflector Test Packet

Performance Measurement Modes

- One-way Delay Measurement Mode
  - Existing (default) behavior
- Two-way Delay Measurement Mode
  - STAMP Session-Reflector test packet sent “in-band” on reverse path
  - Link: Use Control Code Sub-TLV in the Return Path TLV from the received test packet.
  - E2E SR path: Use Segment List Sub-TLV in the Return Path TLV from the received test packet.
- Loopback Measurement Mode
  - STAMP Session-Sender test packet carries the return path in the packet header

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 STAMP test packets that can take advantage of the hashing function in forwarding plane.
- Existing forwarding mechanisms are applicable to test packets. Examples are:
  - For IPv4
    - Sweeping destination address in IPv4 header (e.g. 127/8)
    - Identify intended actual destination node in “Destination Node Address TLV”
  - For IPv6
    - Sweeping flow label in IPv6 header

Example PM Metrics

- Compute following example delay metrics:
  - Minimum delay
  - Maximum delay
  - Average delay
  - Delay variance
- Compute following example loss metrics:
  - Test packet loss (i.e. synthetic packet loss)
  - Data packet loss (i.e. direct measurement)
  - Session state succeeded/failed

Next Steps

- Welcome your comments and suggestions
- Requesting WG adoption

Thank you