

Performance Measurement Using TWAMP Light for Segment Routing Networks

draft-gandhi-spring-twamp-srpm-11

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Agenda

- Requirements and Scope
- History of the Draft
- Summary
- 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

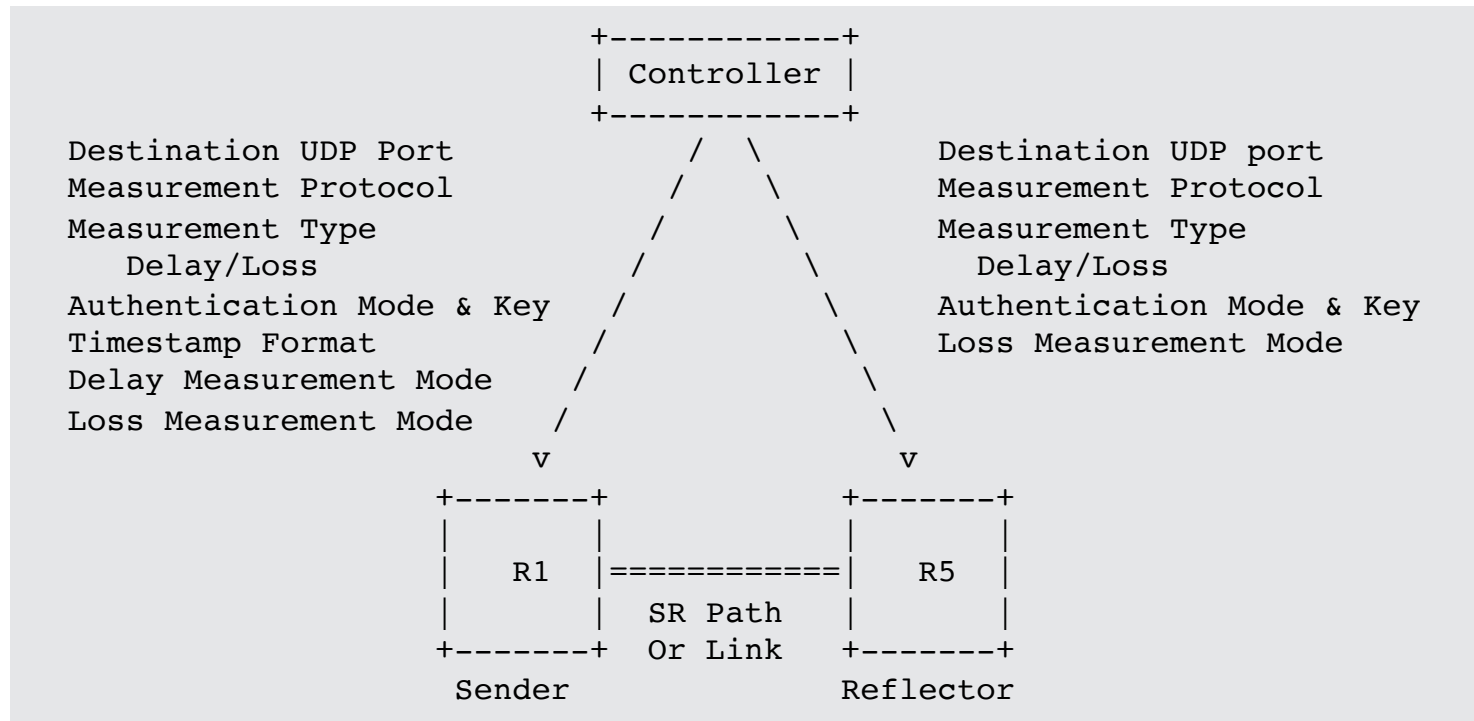
Scope:

- RFC 5357 (TWAMP Light) defined probe messages
- User-configured IP/UDP path for probe messages

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
- 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-twamp-srpm-09* at IETF 109 in IPPM WG
- October 2020
 - Split draft into *draft-gandhi-**spring**-twamp-srpm-11* and *draft-gandhi-**ippm**-twamp-srpm-00*

Example Provisioning Model



Probe Query for Links

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

```
+-----+
| IP Header                                     |
. Source IP Address = Sender IPv4 or IPv6 Address      .
. Destination IP Address = Reflector IPv4 or IPv6 Address .
. Protocol = UDP                                         .
.                                                       .
+-----+
| UDP Header                                     |
. Source Port = As chosen by Sender                     .
. Destination Port = User-configured Port               .
.                                                       .
+-----+
| Payload = DM Message as specified in Section 4.2.1 of RFC 5357 |
. Payload = DM Message as specified in Section 4.1.2 of RFC 5357.
. Payload = LM Message as specified in this document      .
.                                                       .
+-----+
```

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

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

```

0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-----+-----+-----+-----+-----+-----+-----+-----+
|                                     | TC | S |           TTL |
+-----+-----+-----+-----+-----+-----+-----+-----+
.
.
.
+-----+-----+-----+-----+-----+-----+-----+-----+
|                                     | TC | S |           TTL |
+-----+-----+-----+-----+-----+-----+-----+-----+
| DM or LM Query Message including IP/UDP Header |
.
+-----+-----+-----+-----+-----+-----+-----+-----+

```

Figure: Example Probe Query Message for SR-MPLS Policy

```

0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-----+-----+-----+-----+-----+-----+-----+-----+
| IP Header |
. Source IP Address = Sender IPv6 Address
. Destination IP Address = Destination IPv6 Address
.
+-----+-----+-----+-----+-----+-----+-----+-----+
| SRH as specified in RFC 8754 |
. <Segment List>
.
+-----+-----+-----+-----+-----+-----+-----+-----+
| IP Header (as needed) |
. Source IP Address = Sender IPv6 Address
. Destination IP Address = Reflector IPv6 Address
.
+-----+-----+-----+-----+-----+-----+-----+-----+
| UDP Header |
. Source Port = As chosen by Sender
. Destination Port = User-configured Port
.
+-----+-----+-----+-----+-----+-----+-----+-----+
| Payload = DM or LM Query Message |
.
+-----+-----+-----+-----+-----+-----+-----+-----+

```

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

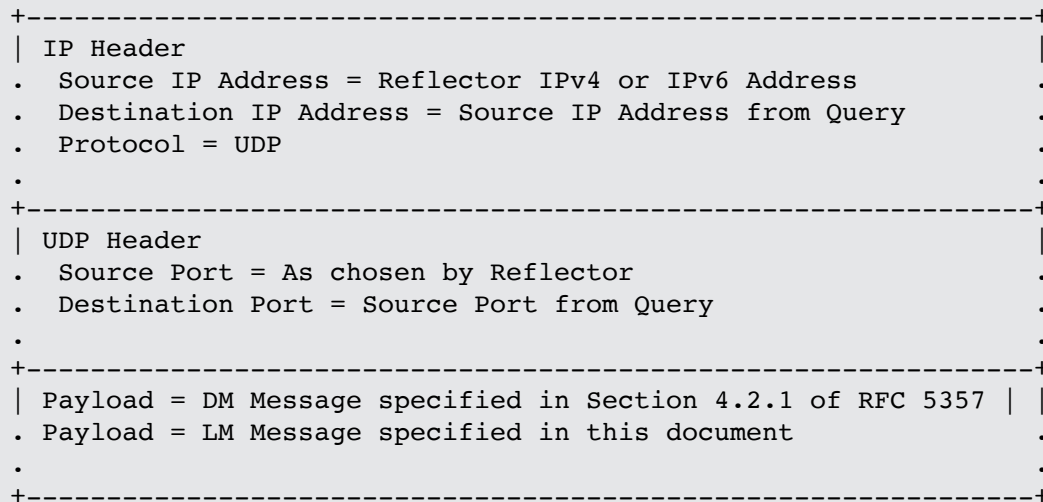


Figure: Probe Response Message

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 - default
- Two-way Measurement Mode
 - Reply sent “in-band” on reverse SR path
 - Based on Control Code from the probe query message
- Loopback Measurement Mode
 - Probe message carries the return path in the header of the packet

Next Steps

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

Thank you