

Performance Measurement Using TWAMP Light for Segment Routing Networks

draft-gandhi-spring-twamp-srpm-11

Rakesh Gandhi - Cisco Systems (rgandhi@cisco.com) - Presenter

Clarence Filsfils - Cisco Systems (cfilsfil@cisco.com)

Daniel Voyer - Bell Canada (daniel.voyer@bell.ca)

Mach(Guoyi) Chen - Huawei (mach.chen@huawei.com)

Bart Janssens - Colt (Bart.Janssens@colt.net)

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

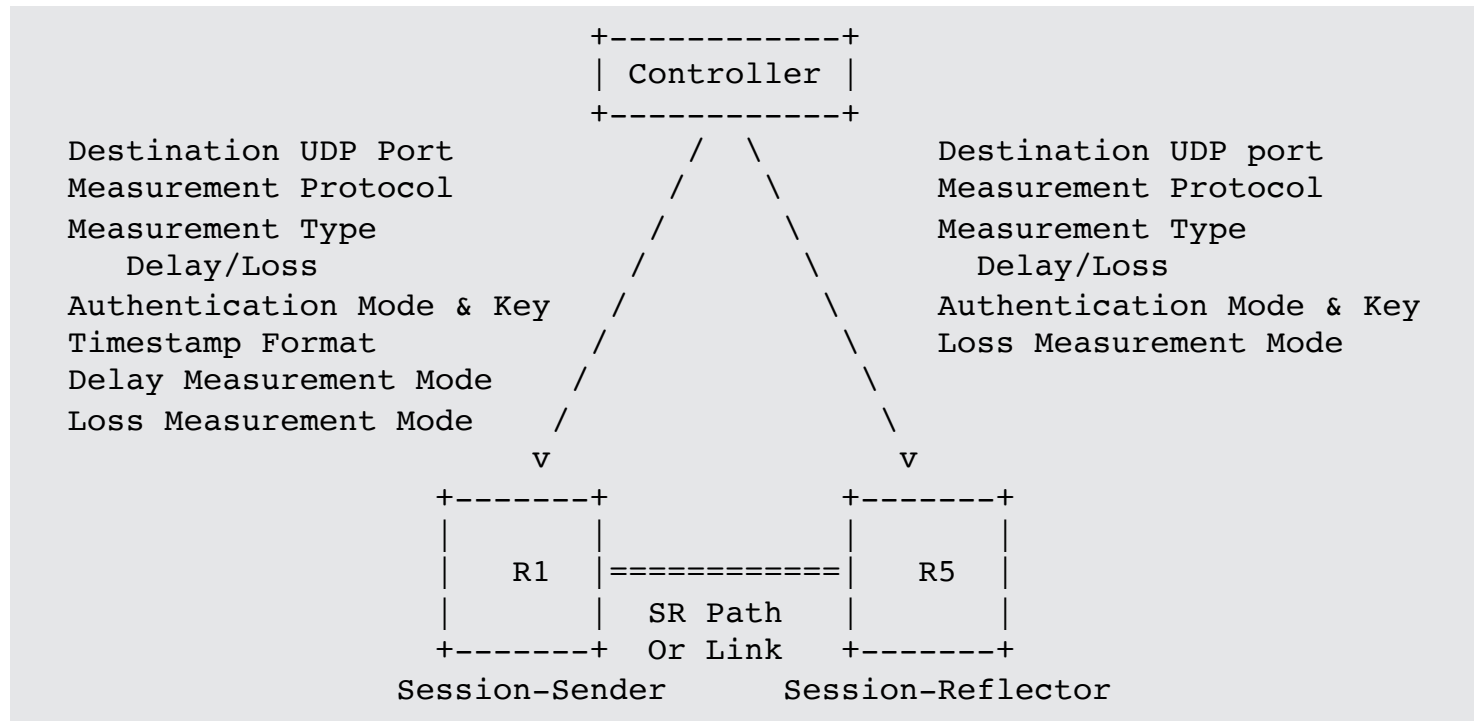
Scope:

- 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 direct-mode 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 = Session-Sender IPv4 or IPv6 Address .
. Destination IP Address = Session-Reflector IPv4 or IPv6 Addr .
. Protocol = UDP .
. .
+-----+
| UDP Header                                   |
. Source Port = As chosen by Session-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 direct-mode LM probe messages (unauthenticated mode) – same as Links.

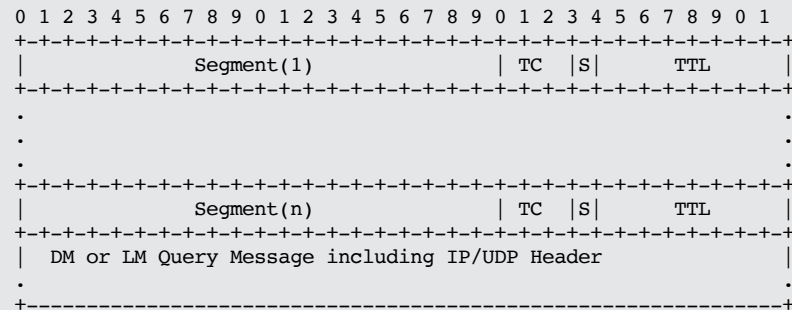


Figure: Example Probe Query Message for SR-MPLS Policy

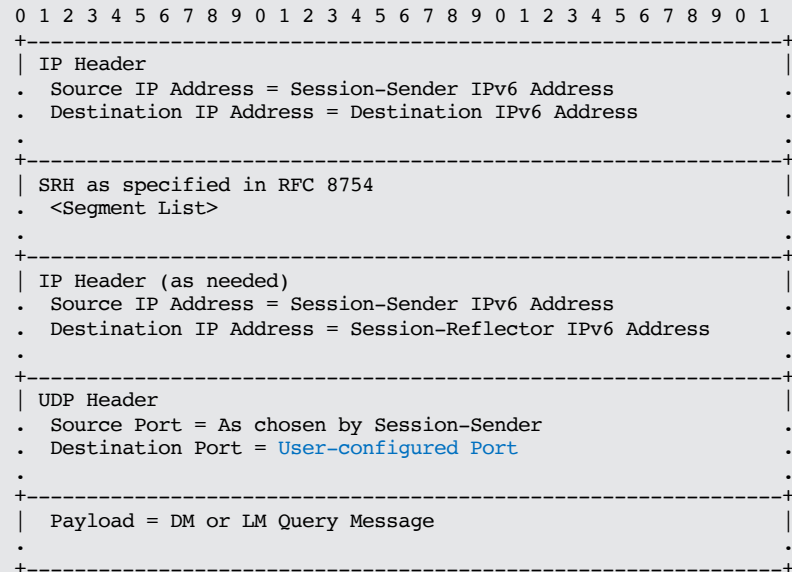


Figure: Example Probe Query Message for SRv6 Policy

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

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

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

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)

Next Steps

- Welcome your comments and suggestions
- Request SPRING WG adoption

Thank you