TWAMP Light Extensions for Segment Routing Networks

draft-gandhi-ippm-twamp-srpm-00

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Agenda

- Requirements and Scope

- History of the Draft

- Summary of Extensions

- Next Steps

Requirements and Scope

Requirements:

- Support In-band Delay and Synthetic Loss Measurement
- Support stand-alone direct-mode Loss Measurement

Scope:

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

TWAMP Light - Summary of PM Drafts

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- Defines procedures for delay, synthetic loss and direct-mode loss measurements
  - For Links and end-to-end SR Paths for SR-MPLS and SRv6 data planes
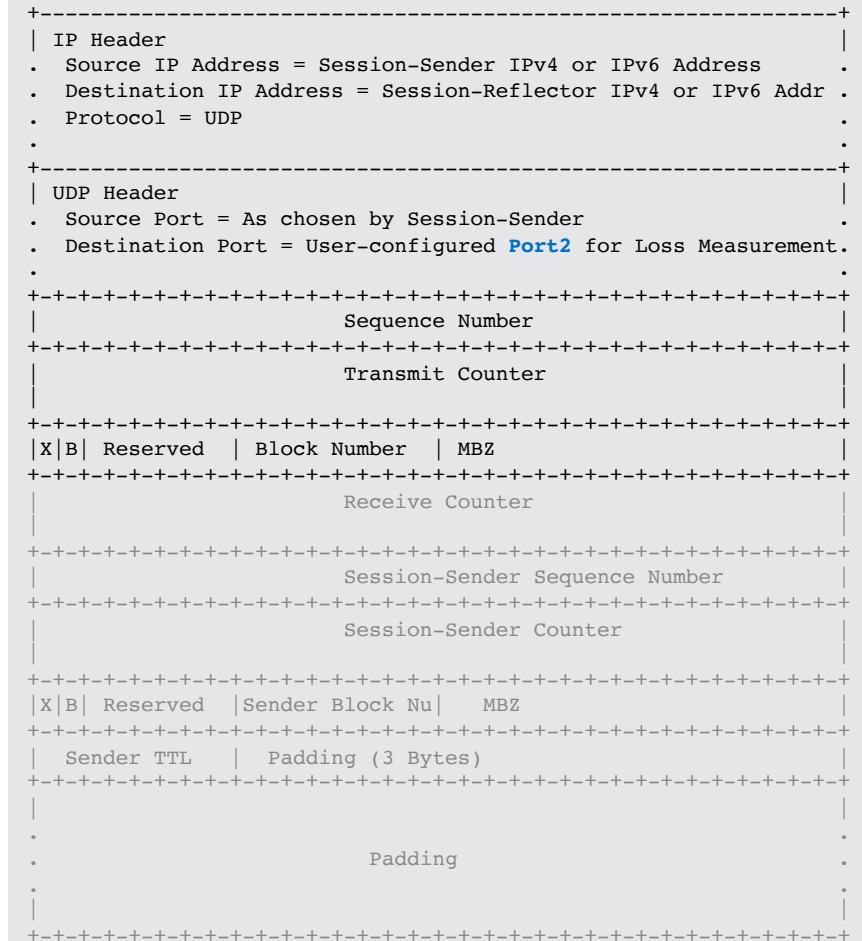
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- Defines extensions for TWAMP Light for Segment Routing
  - Defines Session-Sender Control Code field for in-band response request
  - Defines stand-alone direct-mode loss measurement query and response messages

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
- Oct 2020
  - Split draft into *draft-gandhi-**spring**-twamp-srpm-11 and draft-gandhi-**ippm**-twamp-srpm-00*

TWAMP Light - Session-Sender Control Code Field

In a Query: **Session-Sender Control Code**

0x0: Out-of-band Response Requested.
This is the existing behavior.

0x1: In-band Response Requested.
Indicates that this query has been sent over a bidirectional path and the probe response is required over the same path in the reverse direction.

0x2: No Response Requested.

```
 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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                        Sequence Number                        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                          Timestamp                            |
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|         Error Estimate         |             MBZ              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|         MBZ                     |            |Se Control Code|
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
.                                                               .
.                          Padding                              .
.                                                               .
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

    Figure: Control Code in TWAMP Light Query Message
```

- With this, the Session-Reflector node does not require any additional state for PM.

TWAMP Light - Stand-alone Direct-mode LM Message Format

- Stand-alone Direct-mode Loss Measurement (LM) query and response messages defined
  - Hardware efficient counter-stamping
    - Well-known locations for transmit and receive traffic counters
  - Stand-alone LM message, not tied to DM
- Direct-mode LM message format is also defined for authenticated mode
- User-configured destination UDP **Port2** is used for identifying direct-mode LM probe packets
- Does not modify existing TWAMP Light (which is for DM) procedure as different destination UDP port is used for direct-mode LM

```
+-----------------------------------------------------------+
| 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 Port2 for Loss Measurement.
.                                                           .
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                       Sequence Number                     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                       Transmit Counter                    |
|                                                           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|X|B| Reserved  | Block Number  | MBZ                       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                       Receive Counter                     |
|                                                           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                  Session-Sender Sequence Number           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                  Session-Sender Counter                   |
|                                                           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|X|B| Reserved  |Sender Block Nu|    MBZ                     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Sender TTL   | Padding (3 Bytes)                          |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                           |
.                                                           .
.                       Padding                             .
.                                                           .
|                                                           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

draft-gandhi-ippm-twamp-srpm - Review Comments

1. Draft status:
   a) Draft defines extensions for TWAMP Light
      - Updates RFC 5357 due to new field (control code) in the message
   b) Draft is currently informational. Should be proposed standard due to protocol extensions
2. Extensions are not specific to SR, document should be renamed
3. Editorial
   a) Define Abbreviations (BSID, SRH, HMAC-SHA)
   b) Use Session-Sender, Session-Reflector terms
   c) Show entire test packet with session-sender control code field
   d) Indicate packet loss is **direct-mode** loss
   e) Move Receive Counter and other Response message fields to Section 4.1 from 3.2
      - Explain how the counters and sequence numbers are used to do loss measurement
4. Extend ICMP for direct-mode loss measurement – out of scope

Next Steps

- Welcome your comments and suggestions
- In IPPM WG adoption poll

Thank you

Backup

draft-gandhi-spring-twamp-srpm - Review Comments

1. Add references for well-known terms "Link", "SR Path", and "Congruent paths"
2. Destination UDP port used has zero UDP checksum with IPv6 header
   a) Add Reference for RFC 6936 in Security Section – does not introduce any **new** security issue
   b) For IPv4 and IPv6 probe messages, where the hardware is not capable of re-computing the UDP checksum or adding checksum complement [RFC7820], the sender node **MAY** set the UDP checksum to 0 [RFC8085] **and reflector node MAY accept it as long as it meets requirements specified in [RFC6936]**
3. Add reference for Yang data model draft in provisioning model section
4. Liveness is to compute "connection loss" performance metric
   a) Similar to the widely deployed synthetic packet loss metric
5. Editorial
   a) Control-channel signaling -> TWAMP-control protocol
   b) Indicate packet loss is direct-mode loss
   c) Use test packet term for query message
   d) H/W timestamps required -> H/W timestamps recommended
   e) IPv6 address ::1/128 or ::FFFF:127/104
   f) Clarify - Section 4.1.4.2 and 4.2.2.2 depict the packet format with word "as needed" for inner IP Header
   g) Different UDP destination ports when running authenticated and unauthenticated sessions simultaneously