

# Enhanced Performance Measurement Using Simple TWAMP in Segment Routing Networks

*draft-gandhi-spring-enhanced-srpm-04*

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# Agenda

- Requirements and Scope
- Summary of the Solution
  - SR-MPLS
  - SRv6
- Next Steps

# Requirements and Scope

## Requirements:

- Performance Measurement in SR networks
  - ✓ SR paths, including SR Policies
  - ✓ Applicable to SR-MPLS/SRv6 data planes

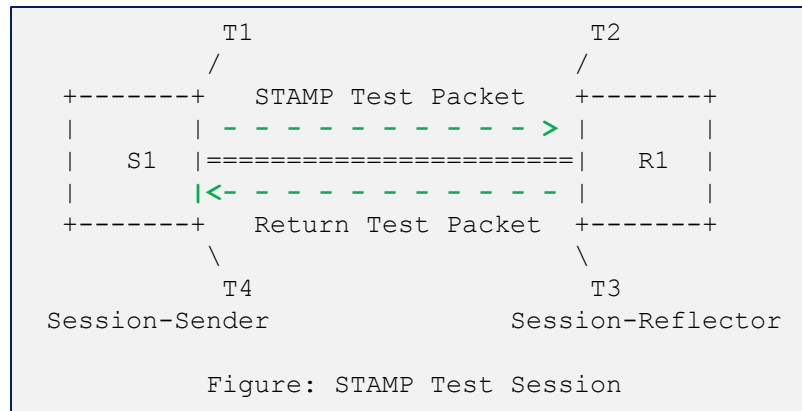
## Goals:

- No Session-Reflector dependency for STAMP protocol
  - ✓ State is in the packet - spirit of SR
- Higher STAMP session scale and faster measurement interval

## Scope:

- Using RFC 8762 (Simple TWAMP (STAMP))
- Extension of [draft-ietf-spring-stamp-srpm]

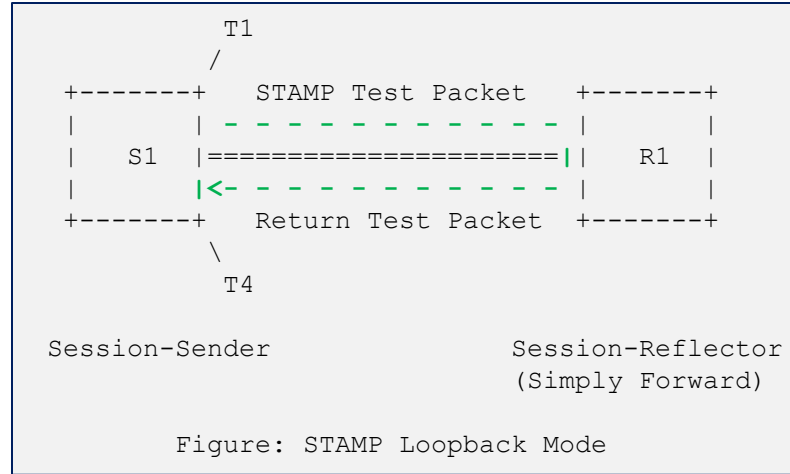
# Recap from [draft-ietf-spring-stamp-srpm]



[draft-ietf-spring-stamp-srpm] describes 3 measurement modes in SR networks:

1. One-way measurement mode [RFC8762]
  - One-way delay =  $(T2 - T1)$  -> (Requires clock sync between Sender and Reflector)
2. Two-way measurement mode [RFC8762]
  - Round-trip delay =  $(T4 - T1) - (T3 - T2)$
3. Loopback measurement mode [draft-ietf-spring-stamp-srpm]
  - This mode is enhanced in [draft-gandhi-spring-enhanced-srpm]

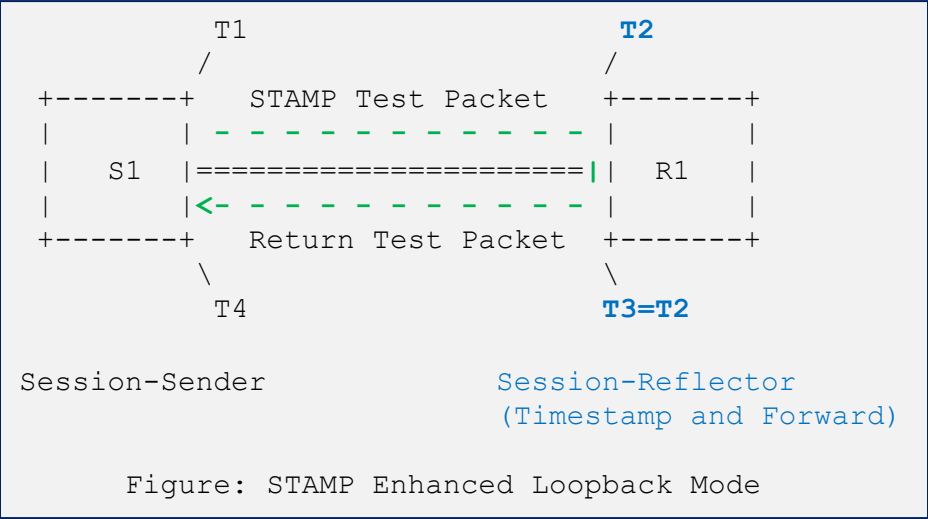
# Loopback Mode for SR Path [draft-ietf-spring-stamp-srpm]



Loopback measurement mode is defined in [draft-ietf-spring-stamp-srpm] as:

- STAMP test packets transmitted on SR Path (e.g., Segment List of SR Policy)
- Session-Reflector forwards STAMP test packets in fast-path just like data traffic
  - does not perform STAMP test packet processing (and no punt/re-inject)
- Loopback delay = (T4 - T1)

# Enhanced Loopback Mode Enabled with Network Programming Function



- STAMP test packets transmitted in enhanced loopback mode
  - Network programming function to optimize "operations of punt and generate return test packet" on Session-Reflector
  - Higher STAMP session scale and faster measurement interval can be achieved
- Session-Reflector adds receive timestamp **T2** at a specific location in the payload of the received STAMP test packet in fast-path
- One-way delay = (**T2** – T1) (Note: assumes the clocks on the Session-Sender and Session-Reflector are synchronized)



# SRv6 with Timestamp and Forward Endpoint Function

```
+-----+
| IP Header |
. Source IP Address = Session-Sender IPv6 Address .
. Destination IP Address = Destination IPv6 Address .
. . . .
+-----+
| SRH as specified in RFC 8754 |
. <Segment List> .
. <End.uTSF16 or End.uTSF32 with Session-Reflector Node SID> .
. . . .
+-----+
| IP Header |
. Source IP Address = Session-Sender IPv6 Address .
. Destination IP Address = Session-Sender IPv6 Address .
. . . .
+-----+
| UDP Header |
. Source Port = As chosen by Session-Sender .
. Destination Port = As chosen by Session-Sender .
. . . .
+-----+
| STAMP Test Packet [RFC8762] |
. . . .
+-----+
```

Example STAMP Test Packet with SRv6 Timestamp and Forward Endpoint Function

- SRv6 Endpoint Function (End.TSF) for Timestamp and Forward is carried with the Session-Reflector node Locator SID
- SRv6 uSID behaviors End.uTSF16 for offset-16 and End.uTSF32 for offset-32 statically defined on the Session-Reflector
- Reverse path can be IPv6/UDP
  - Inner IPv6 header carry the reverse path (DA is the Session-Sender)
  - Session-Reflector removes outer IPv6/SRH encapsulation
- Reverse path can be SRv6
  - Reverse direction SRv6 path segment-list carried in IPv6/SRH encapsulation



# Next Steps

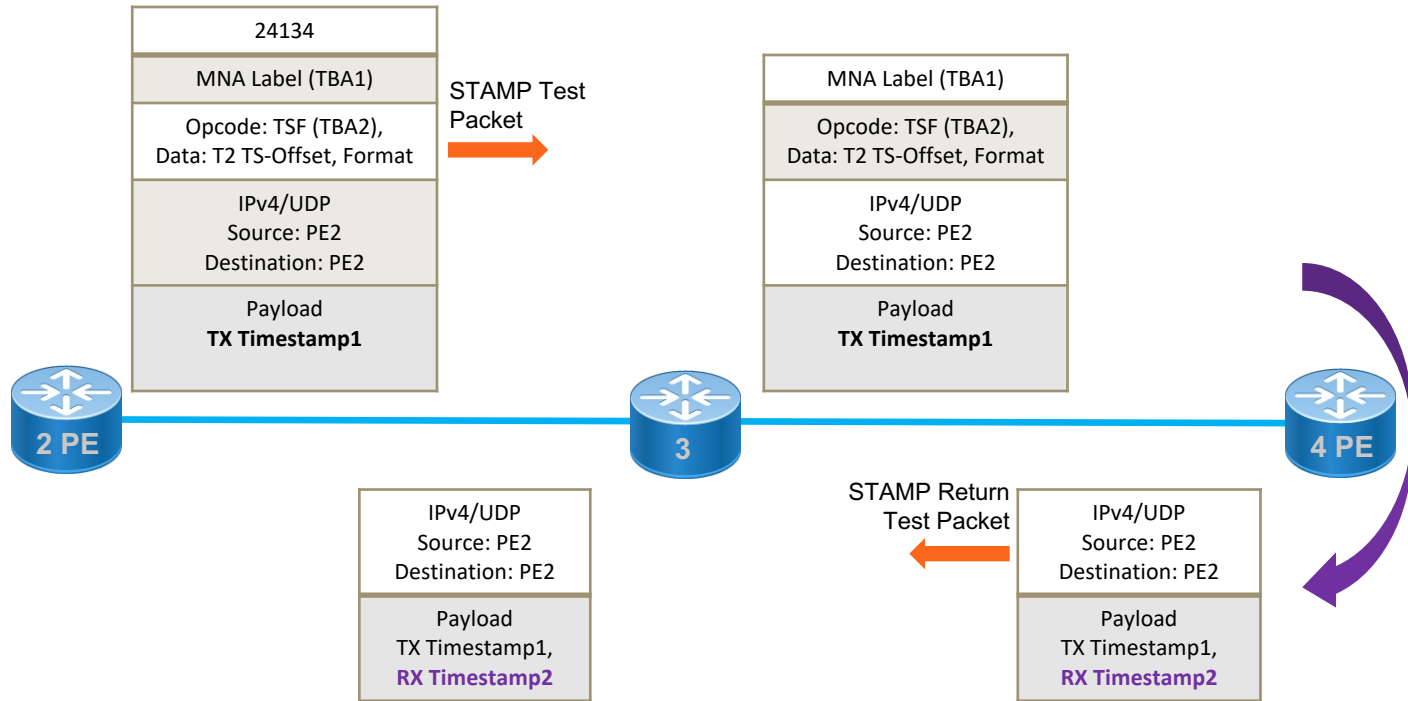
- Welcome your review comments and suggestions
- Requesting working group adoption
- Should we add in [draft-ietf-spring-stamp-srpm]?
  1. One-way measurement mode [RFC8762]
  2. Two-way measurement mode [RFC8762]
  3. Loopback measurement mode [draft-ietf-spring-stamp-srpm]
    - Enhanced loopback measurement mode [draft-gandhi-spring-enhanced-srpm]

Thank you

# Abbreviations

| Abbreviations | Meaning  |
|---------------|--|
| AD            | Ancillary Data   |
| BOS           | Bottom of Stack  |
| bSPL          | Base Special Purpose Label                               |
| E2E           | Edge To Edge   |
| HBH           | Hop By Hop   |
| IHS           | Ingress-To-Egress, Hop-By-Hop or Select Processing Scope |
| ISD           | In-Stack Data  |
| MNA           | MPLS Network Action                                      |
| MSD           | Maximum Stack Depth                                      |
| NAI           | Network Action Indicator                                 |
| NAI-OP        | Network Action Indicator Opcode                          |
| NAS           | Network Action Sub-Stack                                 |
| PSD           | Post-Stack Data  |
| TSF           | Timestamp and Forward                                    |

# Loopback Mode with Timestamp and Forward for SR-MPLS Policy



Thank you