

# Performance Measurement in Segment Routing Networks with MPLS Data Plane

## draft-gandhi-spring-sr-mpls-pm-03

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# Agenda

- Requirements and Scope
- In-band Probes for SR Links and P2P and P2MP SR Policies
- DM and LM Packets for SR Links and SR Policies
- Probe Responses
- Path Segment ID for PM
- SR Link Extended TE Metrics Advertisements
- Next Steps

# Requirements and Scope

## Requirements:

- Delay and Loss Performance Measurement (PM) for SR links and end-to-end P2P and P2MP SR Policies
- Delay and Loss extended TE link metrics advertisement in the network

## Scope:

- Segment Routing (SR) with MPLS data plane
- **In-band PM probe messages**
- Use RFC 6374 (defined for MPLS-TP) based mechanisms
- Use RFC 7876 (UDP return path) for probe response messages
- Informational

# PM Probes for SR Links

- For SR links, the PM probe query messages for link delay and packet loss measurements are sent **in-band** using MPLS GAL/GAch header as defined in [RFC6374].

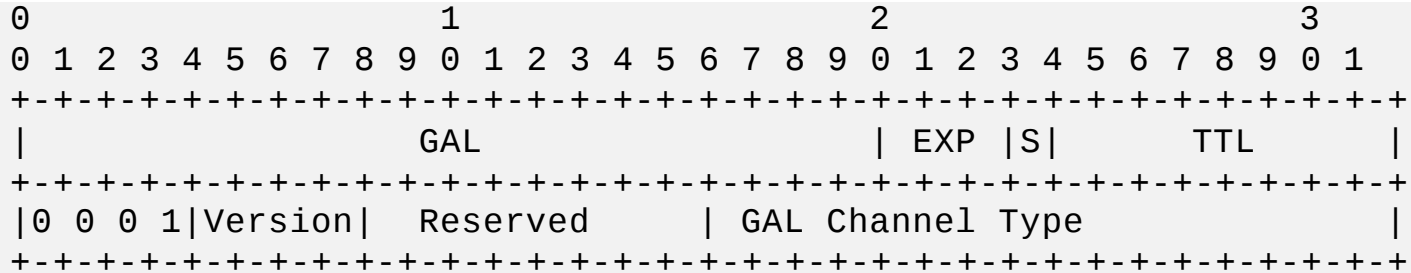


Figure 3: Probe Packet Header for an SR-MPLS Link

# PM Probes for P2P and P2MP SR Policies

- For end-to-end measurement of P2P and P2MP SR Policies, the PM probe query messages for delay and loss measurements are sent **in-band** using MPLS GAL/GAch header as defined in [RFC6374] and SR-MPLS label stack.

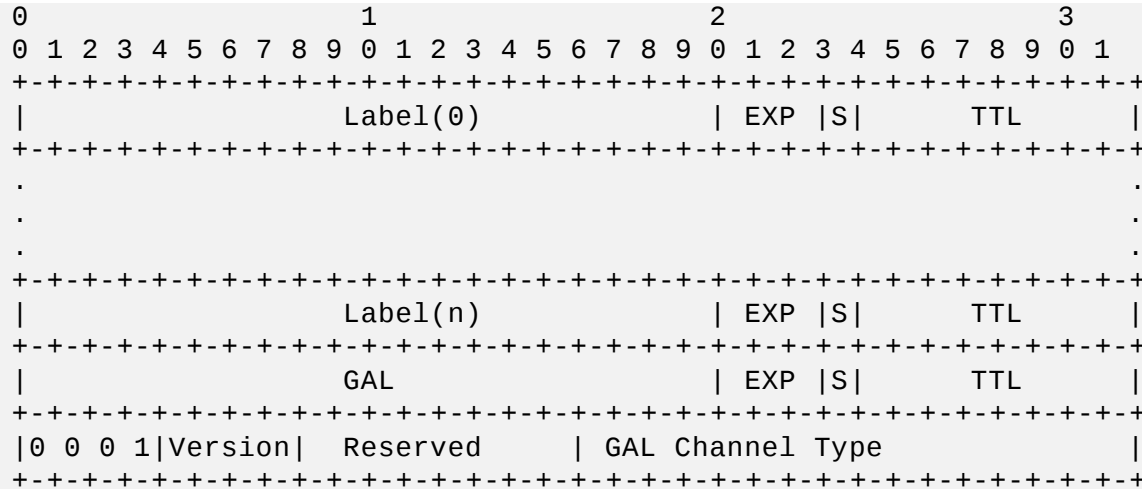


Figure 2: Probe Packet Header for an SR-MPLS Policy



# LM Probes for SR Links and SR Policies

LM probes use the message format defined in [RFC6374] as payload.

GAL : 13

GACH : 0x000A (Direct mode)

0x000B (Inferred mode)

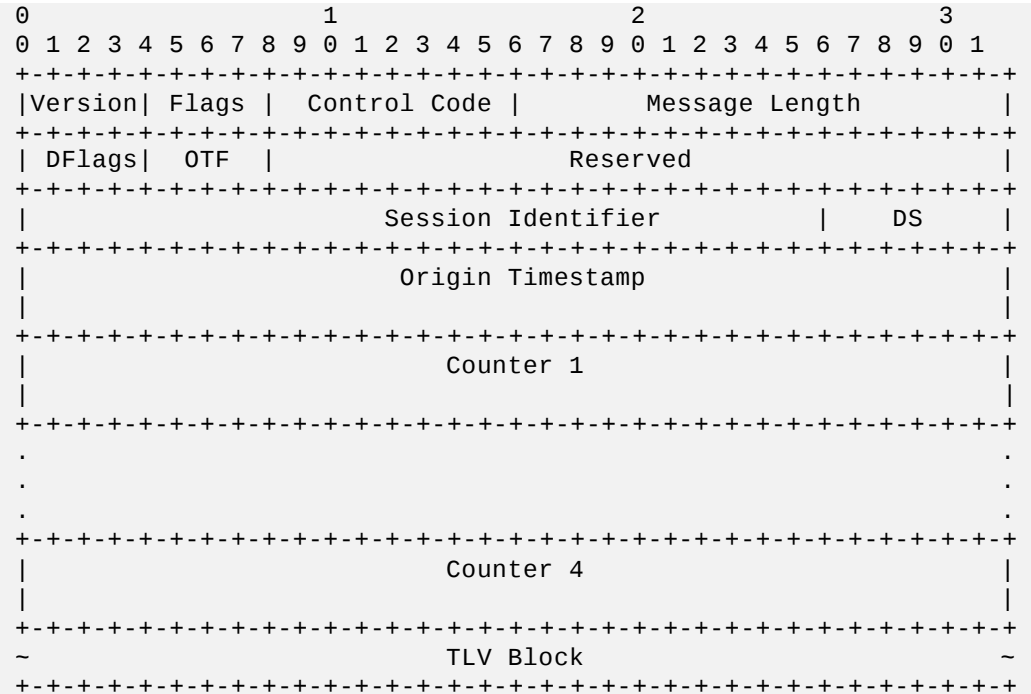


Figure 5: Loss Measurement Message Format

# Probe Responses

- One-way Measurement Response (out-of-band)
  - Sent to the querier node using the information from the UDP Return Object (URO) TLV [RFC7876].
  - URO TLV is sent by the querier node in the probe query messages and contains the UDP destination port and IP address.
- Two-way Measurement Response (in-band)
  - Sent to the querier node using a message similar to the in-band probe query message as SR-MPLS packet.



# Path Segment ID

- Path Segment IDs [draft-cheng-spring-mpls-path-segment] are useful for Performance Measurement:
  - Loss Measurement
  - Bidirectional SR Policy

# SR Link Extended TE Metrics Advertisement

- PM procedure is used to measure delay and loss performance of SR Links.
- Compute SR Link Delay metrics (minimum-delay, maximum-delay, average-delay, delay-variance) and SR Link Packet Loss metric.
- SR link extended TE metrics advertised in the network using the TLVs defined in the following RFCs/Drafts:
  - OSPF [RFC7471]
  - ISIS [RFC7810] [draft-ietf-lsr-isis-rfc7810bis]
  - BGP-LS [draft-ietf-idr-te-pm-bgp]

# Next Steps

- Welcome your comments and suggestions
- Multiple implementations already exist
- Request for WG adoption

Thank you.