

# MPLS Data Plane Encapsulation for In-situ OAM Data

*draft-gandhi-mpls-ioam-sr-02*

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# Agenda

- Requirements and Scope
- History of the Draft
- Updates Since IETF-106
- Summary
- Next Steps

# Requirements and Scope

## Requirements:

- Transport In-situ OAM (IOAM) data fields with MPLS Encapsulation
  - OAM information (e.g. timestamps) carried by data traffic

## Scope:

- Using data fields defined in:
  - *draft-ietf-ippm-ioam-data*
  - *draft-ietf-ippm-ioam-direct-export*
  - *draft-ietf-ippm-ioam-flags*
- Edge-to-edge (E2E) IOAM
- Hop-by-hop (HbH) IOAM

# History of the Draft

- Oct 2018
  - Draft was published *draft-gandhi-spring-ioam-sr-mpls-00*
- Nov 2018 and March 2019
  - Draft was discussed in IPPM WG meetings as part of the IOAM updates
- July 2019
  - Presented *draft-gandhi-spring-ioam-sr-mpls-01* at IETF 105 Montreal in SPRING and MPLS WGs
- Oct 2019
  - Chairs agreed to progress the work in MPLS WG
  - Draft renamed to *draft-gandhi-mpls-ioam-sr-00*
- Nov 2019
  - Presented *draft-gandhi-mpls-ioam-sr-00* at IETF 106 Singapore in MPLS WG
- Apr 2020
  - Quickly presented *draft-gandhi-mpls-ioam-sr-02* at IETF 107 in MPLS WG Interim

# Updates Since IETF-106 (Version-00)

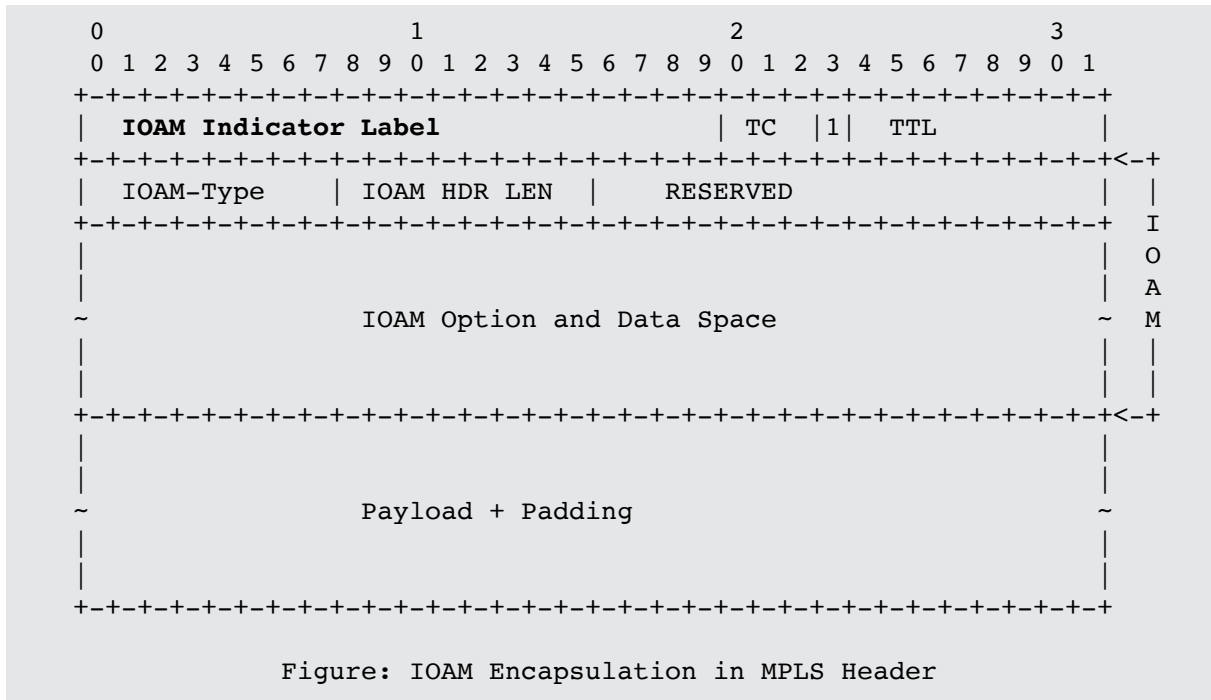
## Updates:

- ✓ Generic MPLS data plane encapsulation including SR
- ✓ Added procedure for hop-by-hop IOAM
- ✓ Addressed review comments
- ✓ Various editorial changes

## Open Items:

- None

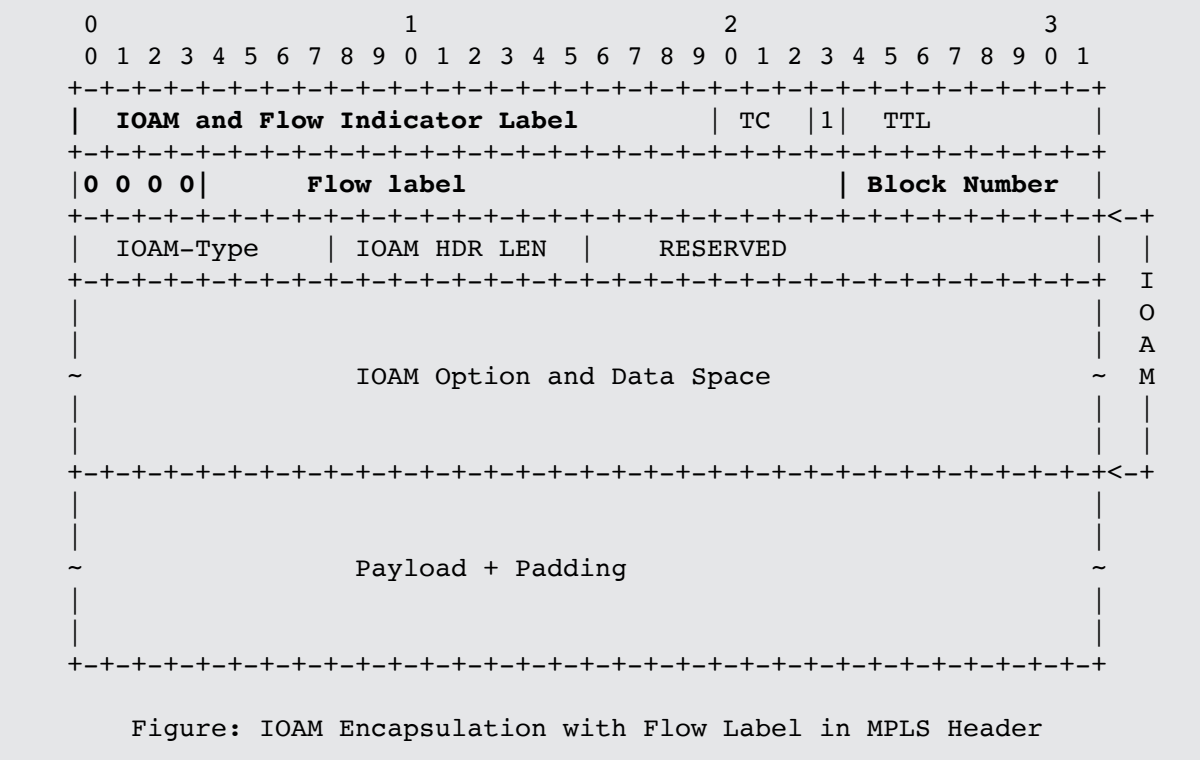
# IOAM Data Field Encapsulation in MPLS Header



# IOAM Indicator Label

- “IOAM Indicator Label” is used to indicate the presence of the IOAM data fields in the MPLS header.
- Separate Label values are used for edge-to-edge and hop-by-hop IOAM:
  - Edge-to-edge TBA1
  - Hop-by-hop TBA3

# IOAM Data Field Encapsulation with Flow Label in MPLS Header





# IOAM and Flow Indicator Label

- “IOAM and Flow Indicator Label” is used to indicate the presence of the IOAM data fields with Flow Label in the MPLS header.
- Separate Label values are used for edge-to-edge and hop-by-hop IOAM:
  - Edge-to-edge TBA2
  - Hop-by-hop TBA4
- **Protocol** value 0000b allows to avoid incorrect IP header based hashing over ECMP paths
  - Using RFC 4928 defined procedure. This is similar to RFC 4385 for Generic PW MPLS Control Word.
- **Flow Label** identifies the traffic flow that can be used for IOAM purpose.
- **Block Number** can be used to
  - **Aggregate** IOAM data collected in data plane, e.g. compute measurement metrics for each block of a flow
  - **Correlate** IOAM data from different nodes

# Edge-to-edge IOAM Procedure

1. The encapsulating node inserts an edge-to-edge Indicator Label and one or more IOAM data field(s) in the MPLS header.
2. The decapsulating node for edge-to-edge IOAM "forwards and punts the timestamped copy" of the data packet including IOAM data field(s).
  - The decapsulating node for edge-to-edge IOAM also pops the IOAM Indicator Label and the IOAM data field(s) from the MPLS header.

# E2E Indicator Label Allocation Methods

1. Label assigned by IANA with values TBA1 and TBA2
  - From Extended Special Purpose Labels (eSPL) range
2. Global Label allocated by a controller
  - The controller provisions the label on encapsulating and decapsulating nodes
3. The label allocated by the decapsulating node
  - Signaling mechanism used to convey the label to all encapsulating nodes

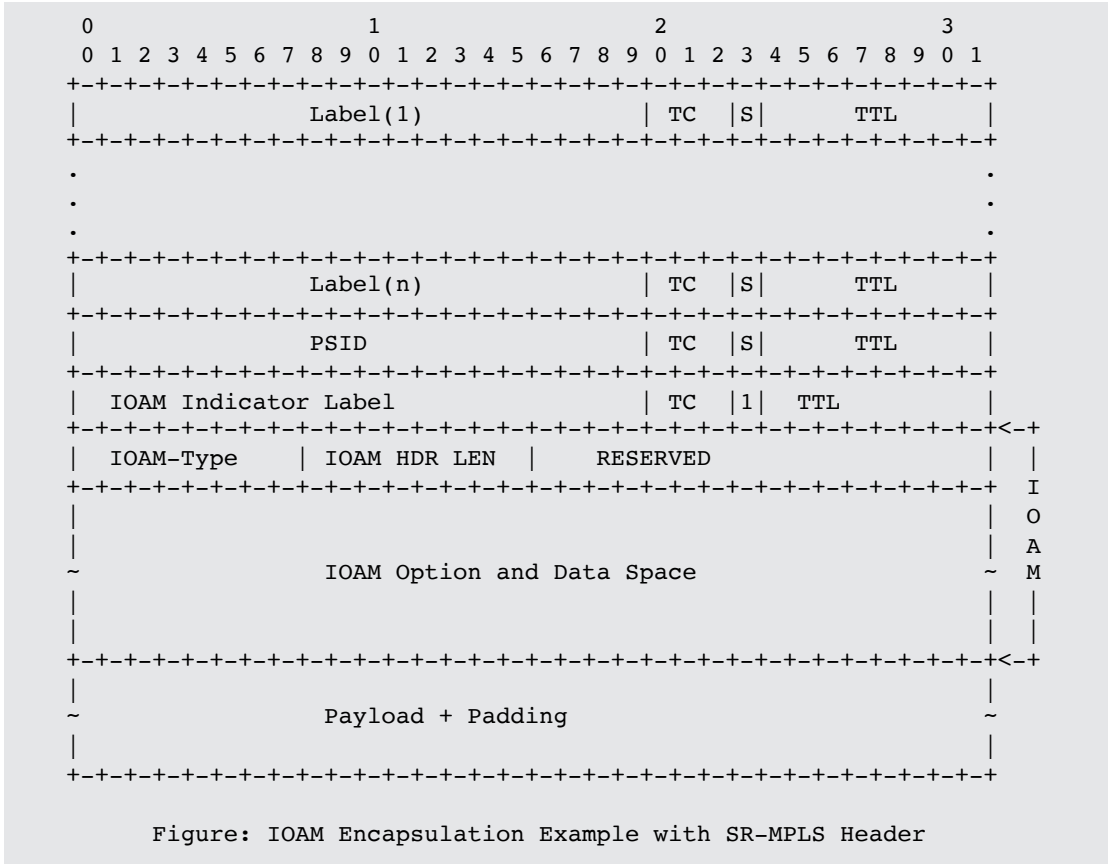
# Hop-by-hop IOAM Procedure

1. The encapsulating node inserts a hop-by-hop Indicator Label and one or more IOAM data field(s) in the MPLS header.
2. The transit node for hop-by-hop IOAM "forwards and punts the timestamped copy" of the data packet including IOAM data field(s).
3. The decapsulating node for hop-by-hop IOAM "forwards and punts the timestamped copy" of the data packet including IOAM data field(s).
  - The decapsulating node for hop-by-hop IOAM also pops the IOAM Indicator Label and the IOAM data field(s) from the MPLS header.

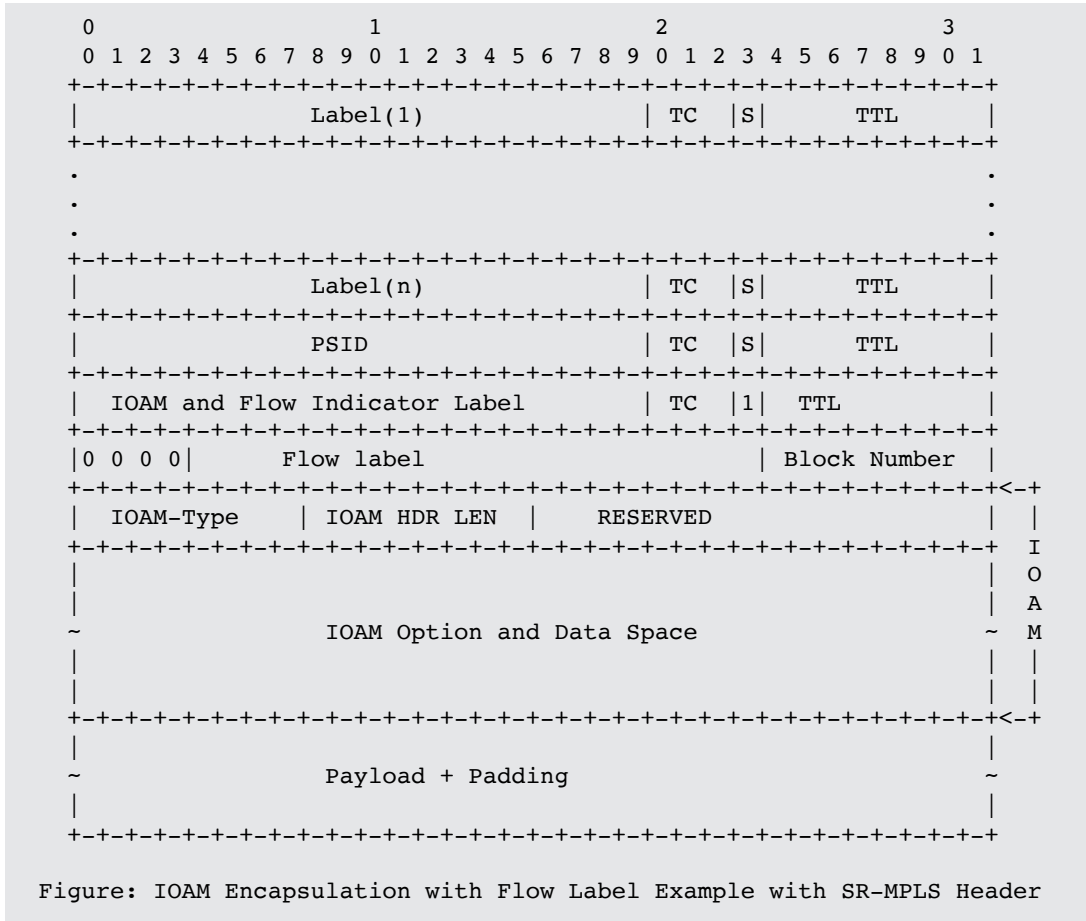
# HbH Indicator Label Allocation Methods

1. Label assigned by IANA with values TBA3 and TBA4
  - From Extended Special Purpose Labels (eSPL) range
2. Global Label allocated by a controller
  - The controller provisions the label on encapsulating, **transit** and decapsulating nodes

# IOAM Encapsulation Example with SR-MPLS Header



# IOAM Encapsulation with Flow Label Example with SR-MPLS Header



# Next Steps

- Welcome your comments and suggestions
- Requesting MPLS WG adoption
- Keep SPRING WG in the loop for SR aspects
- Inform IPPM WG about the milestones
  - IOAM base work is done in IPPM WG



Thank you