

MPLS Data Plane Encapsulation for In-situ OAM Data

draft-gandhi-mpls-ioam-sr-03

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

Zafar Ali - Cisco Systems (zali@cisco.com)

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

Frank Brockners - Cisco Systems (fbrockne@cisco.com)

Bin Wen - Comcast (Bin_Wen@cable.comcast.com)

Voitek Kozak - Comcast (Voitek_Kozak@comcast.com)

Agenda

- Requirements and Scope
- History of the Draft
- Updates Since IETF-108
- 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
 - Presented *draft-gandhi-mpls-ioam-sr-02* at IETF 107 in MPLS WG Interim (ran out of time)
- Jul 2020
 - Presented *draft-gandhi-mpls-ioam-sr-02* at IETF 108 in MPLS WG

Updates Since IETF-108 (Version-02)

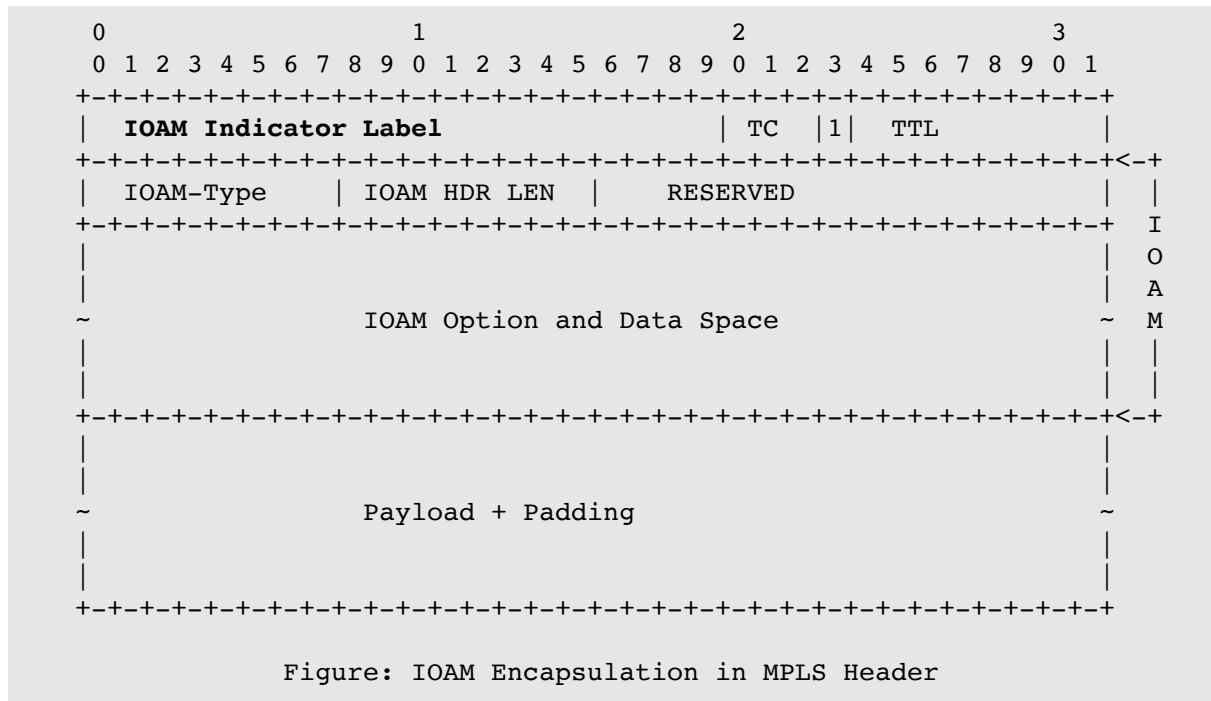
Updates:

- ✓ Protocol type field 0010b
- ✓ Need for different HbH and E2E Indicator Labels
- ✓ Added MSD consideration
- ✓ Various editorial changes

Open Items:

- None

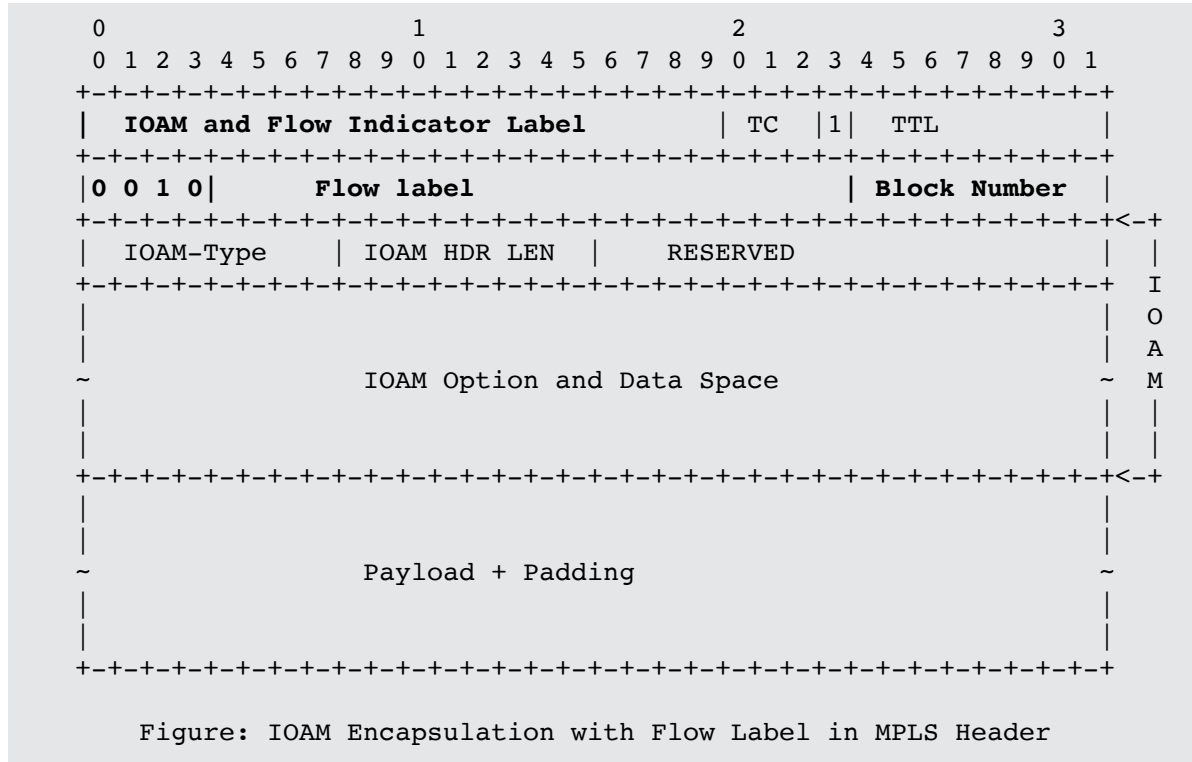
IOAM Data Field Encapsulation in MPLS Header



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 0010b 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

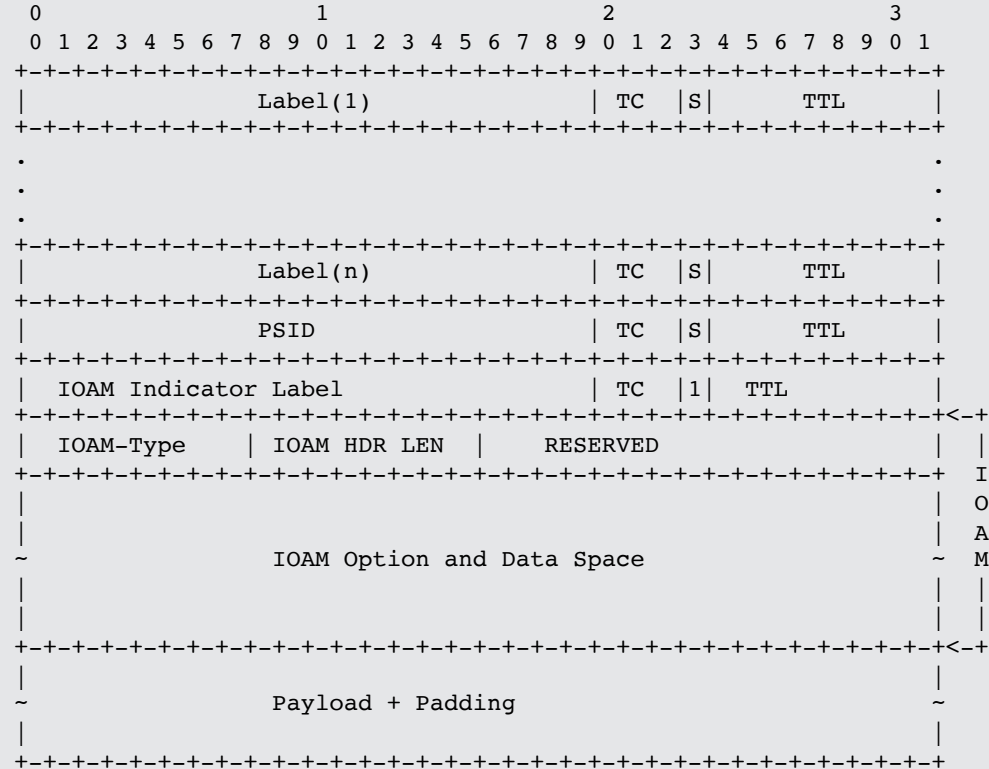


Figure: IOAM Encapsulation Example with SR-MPLS Header

IOAM Encapsulation with Flow Label Example with SR-MPLS Header

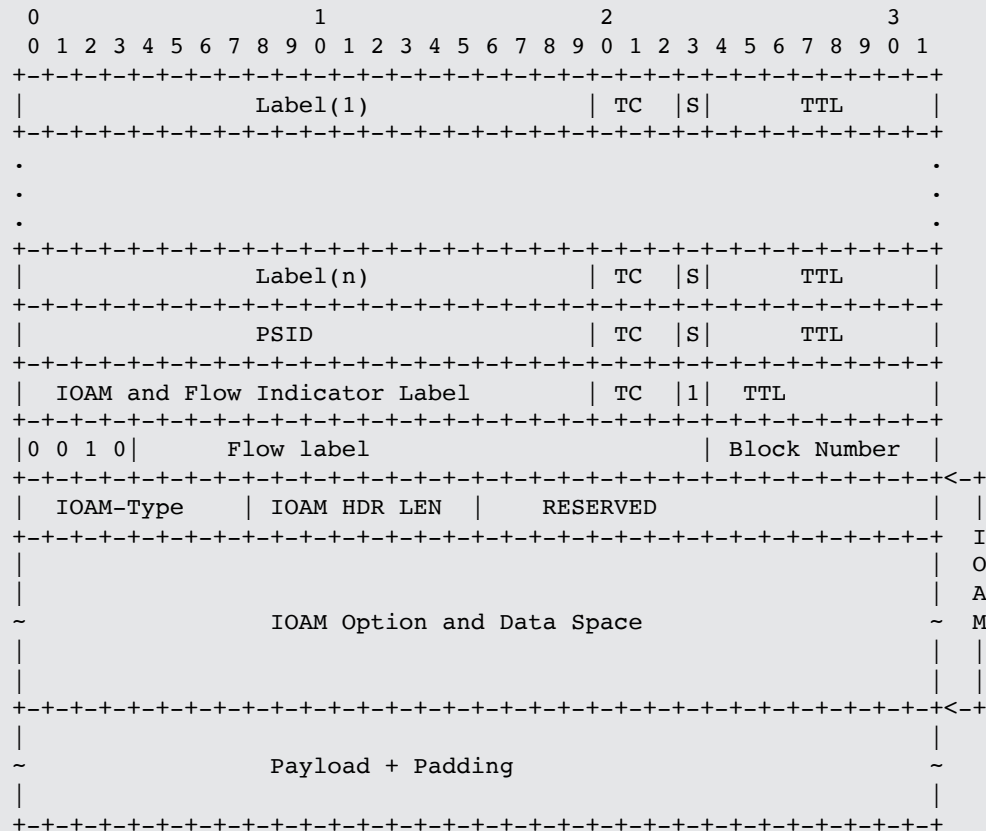


Figure: IOAM Encapsulation with Flow Label Example with SR-MPLS Header

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