

MPLS Data Plane Encapsulation for In-situ OAM Data

draft-gandhi-mpls-ioam-sr-05

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Agenda

- Requirements and Scope
- Summary
- Next Steps

Requirements and Scope

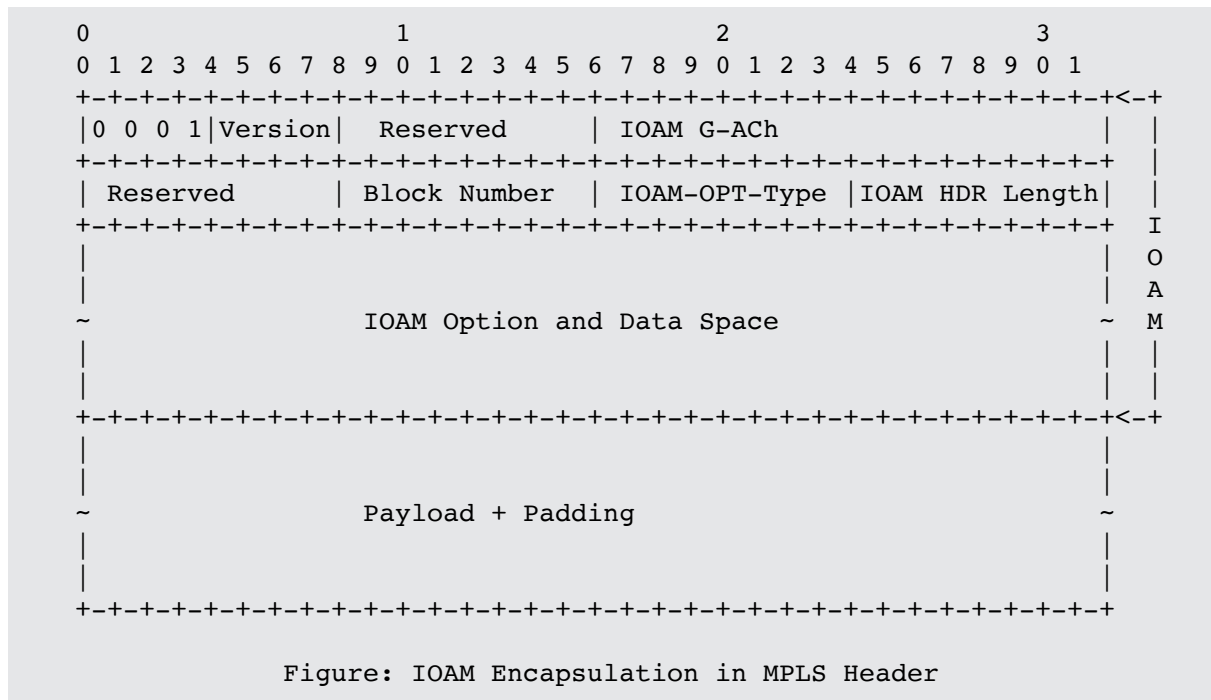
Requirements:

- Transport In-situ OAM (IOAM) data fields with MPLS Encapsulation

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

IOAM Data Field Encapsulation in MPLS Header



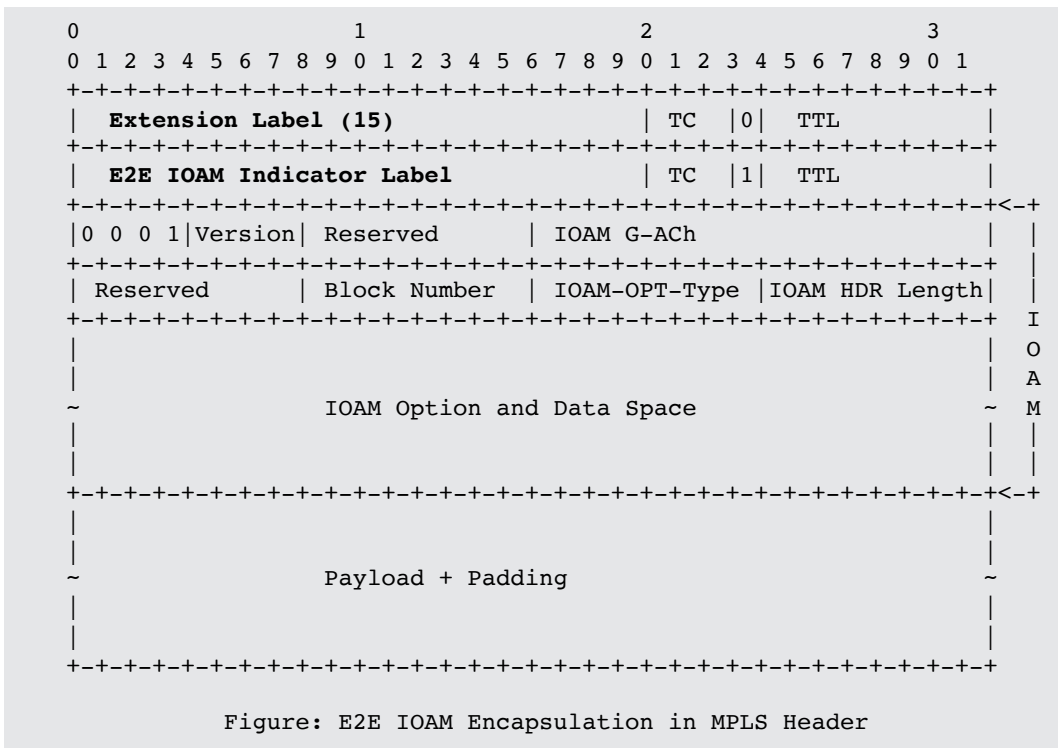
IOAM G-ACh Header

- New Generic Associated Channel (G-ACh) Type (value TBA3) defined for IOAM
- Protocol value *0001b* allows to avoid incorrect IP header based hashing over ECMP paths
- 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

IOAM Indicator Label

- “IOAM Indicator Label” is used to indicate the presence of the IOAM data fields in the MPLS header after EOS.
- Separate Label values are used for E2E and HbH IOAM to optimize IOAM processing on transit nodes:
 - E2E Label TBA1
 - HbH Label TBA2

E2E IOAM Encapsulation in MPLS Header



E2E Indicator Label Allocation Methods

1. Extension Label (15) and Label assigned by IANA with value TBA1
 - 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/advertisement extensions to convey the label to all encapsulating nodes (out of scope)

E2E IOAM Procedure

1. The encapsulating node inserts an E2E Indicator Label and one or more IOAM data field(s) in the MPLS header.
2. The decapsulating node "punts the timestamped copy" of the data packet including IOAM data field(s).
 - The decapsulating node for E2E IOAM also pops the IOAM Indicator Label and the IOAM data field(s) from the MPLS header.
 - The decapsulating node processes IOAM data field(s).
 - The decapsulating node forwards the data packet downstream.

HbH IOAM Encapsulation in MPLS Header

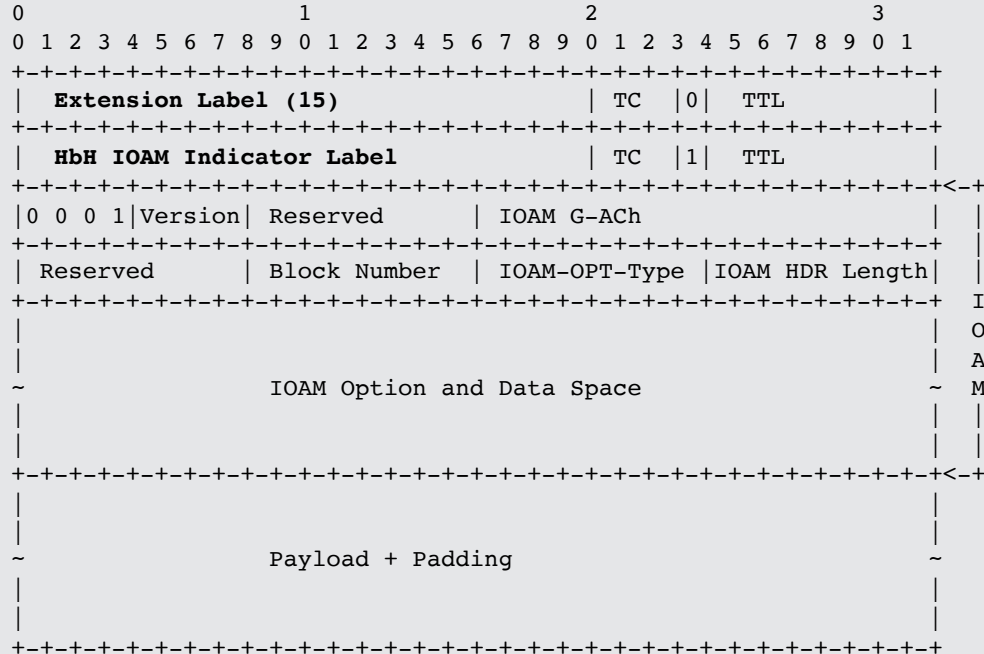


Figure: HbH IOAM Encapsulation in MPLS Header

HbH Indicator Label Allocation Methods

1. Extension Label (15) and Label assigned by IANA with value TBA2
 - 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

HbH IOAM Procedure

1. The encapsulating node inserts a HbH Indicator Label and one or more IOAM data field(s) in the MPLS header.
2. The transit node processes HbH IOAM data field(s) and forwards the data packet including updated IOAM data field(s).
3. The decapsulating node "punts the timestamped copy" of the data packet including IOAM data field(s).
 - The decapsulating node for E2E IOAM also pops the IOAM Indicator Label and the IOAM data field(s) from the MPLS header.
 - The decapsulating node processes IOAM data field(s).
 - The decapsulating node forwards the data packet downstream.

Next Steps

- Welcome your comments and suggestions
- Requesting MPLS WG adoption

Thank you

Backup

Impact on Label Stack Size Imposed (MSD)

- Available label stack size reduced
 - Extension Label 15
 - HbH IOAM Indicator SPL
- May need to add entropy label due to ECMP path impact, further reducing available label stack size
 - ELI
 - Entropy Label
- ✓ This is true for all schemes using eSPL, e.g., draft-cheng-mpls-inband-pm-encapsulation

Transit Nodes Scan Deeper in MPLS Header

- Transit nodes need to scan deeper into the MPLS header.
- ✓ This is also true for ELI and EL today.
- ✓ Note that with any indicator scheme, the node will have to look deeper into the packet to find the IOAM data that needs to be processed.

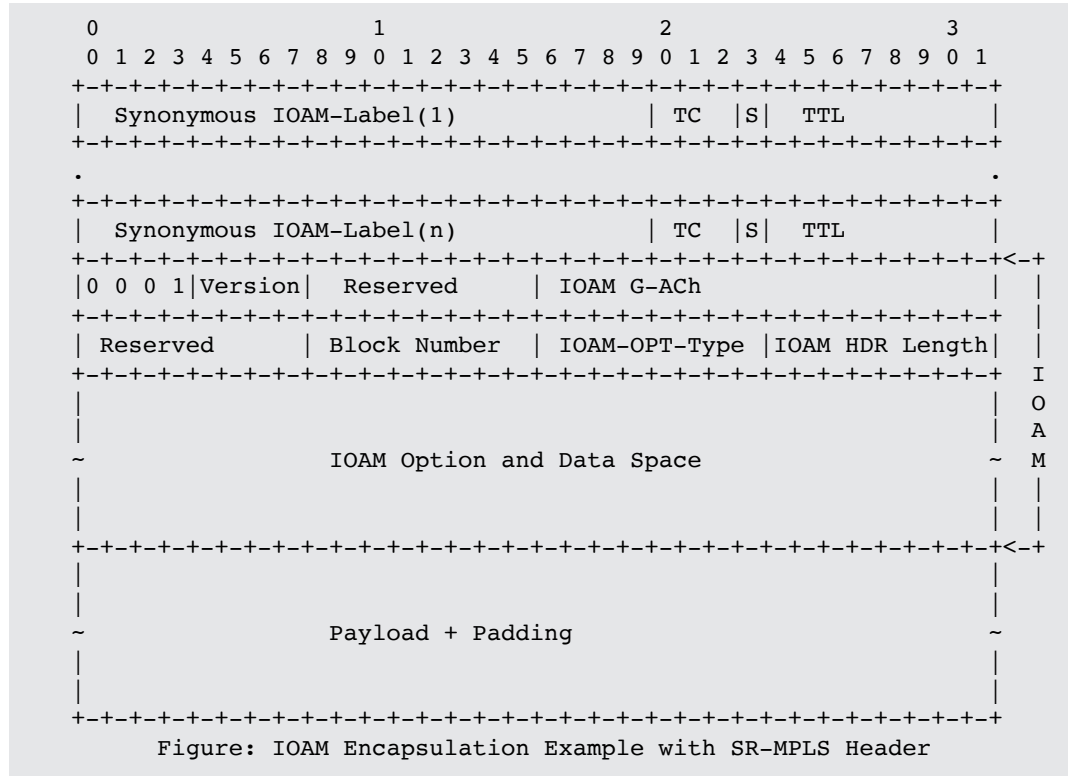
Different FEC (SFL) for IOAM Packets

- With a special FEC for IOAM packets and a "normal" FEC for data packets that don't carry IOAM info, it might mean that we drop the normal traffic while the iOAM traffic works.
- ✓ This is indeed an issue with using SFL kind of approach. OAM reports the metrics of the LSP on which the normal traffic is not really flowing. The forwarding normal packets are not using the LSP used by the OAM, as there are two synonymous LSPs.

IOAM Data After EoS

- What if the LSP is carrying a PW or is DetNet?
- What if it is a MS-PW?
- In all these cases there is a CW immediately after EoS.
- Then there is the universal fragmentation idea that is floating about that also wants to follow BoS.

Example HbH IOAM Encapsulation Using SFL



IOAM Encapsulation Example with SR-MPLS Header

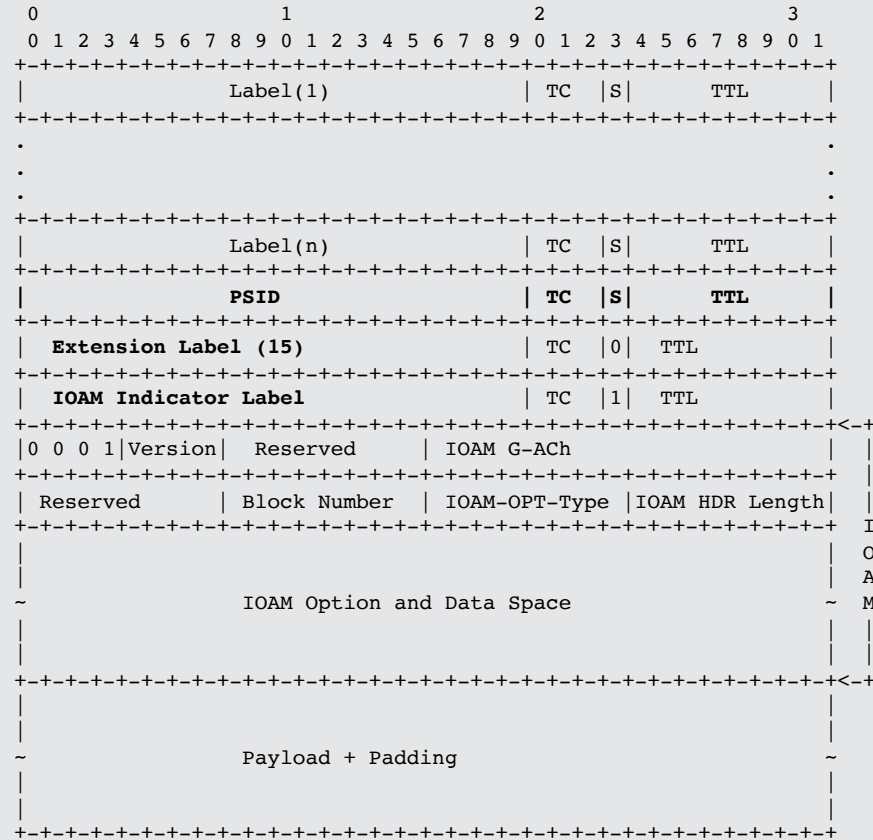


Figure: IOAM Encapsulation Example with SR-MPLS Header

Thank you