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**Segment Routing with MPLS Data Plane encapsulation  
for In-situ OAM Data  
draft-gandhi-spring-ioam-sr-mpls-00**

Abstract

In-situ Operations, Administration, and Maintenance (IOAM) records operational and telemetry information in the data packet while the packet traverses a path between two points in the network. This document defines how IOAM data fields are transported with the Segment Routing with MPLS data plane (SR-MPLS) encapsulation.

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## **[1.](#) Introduction**

In-situ Operations, Administration, and Maintenance (IOAM) records OAM information within the packet while the packet traverses a particular network domain. The term "in-situ" refers to the fact that the IOAM data fields are added to the data packets rather than being sent within probe packets specifically dedicated to OAM.

This document defines how IOAM data fields are transported with the Segment Routing with MPLS data plane [\[I-D.ietf-spring-segment-routing-mpls\]](#) encapsulation.

The IOAM data fields carried are defined in [\[I-D.ietf-ippm-ioam-data\]](#), and can be used for various use-cases including Performance Measurement (PM).

## **[2.](#) Conventions**

### **[2.1.](#) Requirement Language**

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this



document are to be interpreted as described in [[RFC2119](#)] [[RFC8174](#)] when, and only when, they appear in all capitals, as shown here.

## **2.2. Abbreviations**

Abbreviations used in this document:

IOAM	In-situ Operations, Administration, and Maintenance
OAM	Operations, Administration, and Maintenance
PM	Performance Measurement
PoT	Proof-of-Transit
SR	Segment Routing
SR-MPLS	Segment Routing with MPLS Data plane

## **3. IOAM Data Field Encapsulation in SR-MPLS Header**

SR-MPLS encapsulation is defined in [[I-D.ietf-spring-segment-routing-mpls](#)]. IOAM data fields are carried in the SR-MPLS header, as an IOAM data fields. The different IOAM data fields defined in [[I-D.ietf-ippm-ioam-data](#)] are added as TLVs. More than one TLV can be present in the IOAM data fields. The IOAM Indicator Label (value TBA1) is added at the bottom of the MPLS label stack to indicate the presence of the IOAM data fields in the header.



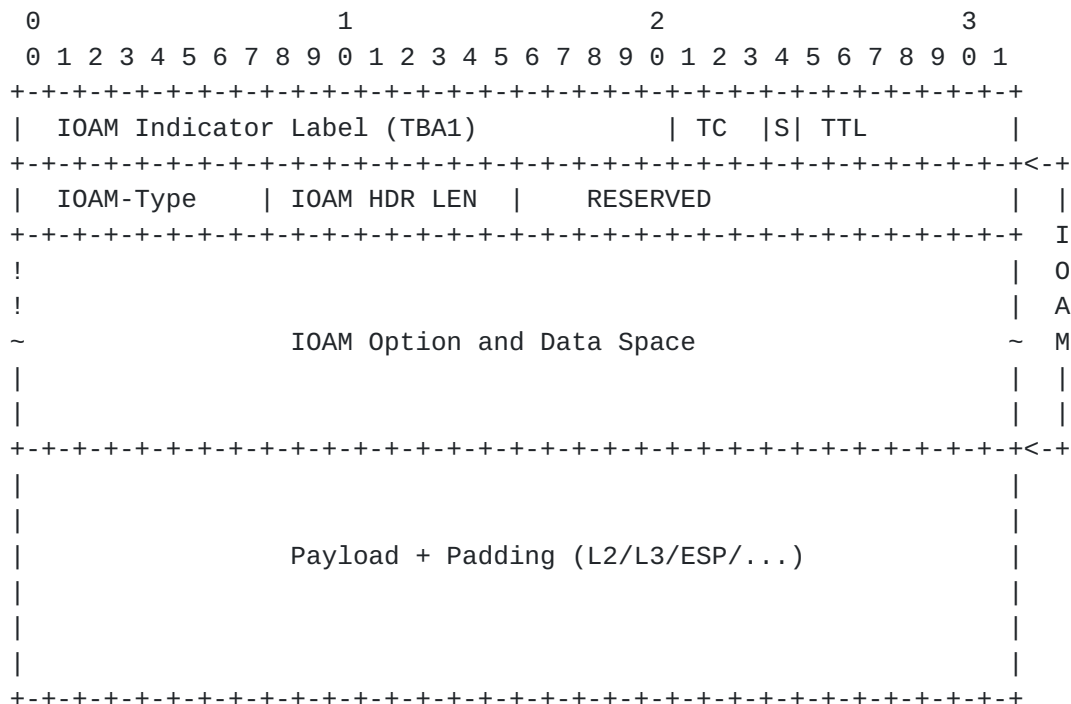


Figure 1: IOAM data encapsulation in SR-MPLS Header

IOAM Indicator Label is defined in this document as value TBA1.

The fields related to the encapsulation of IOAM data fields in the SR-MPLS header are defined as follows:

IOAM-Type: 8-bit field defining the IOAM Option type, as defined in Section 7.2 of [[I-D.ietf-ippm-ioam-data](#)].

IOAM HDR LEN: 8-bit unsigned integer. Length of the IOAM HDR in 4-octet units.

RESERVED: 8-bit reserved field MUST be set to zero upon transmission and ignored upon receipt.

IOAM Option and Data Space: IOAM option header and data is present as defined by the IOAM-Type field, and is defined in Section 4 of [[I-D.ietf-ippm-ioam-data](#)].

#### 4. Procedure

This section summarizes the procedure for IOAM data encapsulation in SR-MPLS.

- o The ingress node inserts the IOAM Indicator Label and IOAM TLV in



the MPLS header.

- o On the ultimate node where the last MPLS label is popped from the header, the node "forwards and punts the timestamped copy" of the data packet with IOAM TLV when the node recognizes the IOAM Indicator Label.
- o The ultimate node also pops the IOAM Indicator Label and the IOAM data fields from the MPLS header.

## 5. IANA Considerations

IANA maintains the "Special-Purpose Multiprotocol Label Switching (MPLS) Label Values" registry (see <https://www.iana.org/assignments/mpls-label-values/mpls-label-values.xml>). IANA is requested to allocate IOAM Indicator Label value from the "Special-Purpose MPLS Label Values" registry:

Value	Description	Reference
TBA1	IOAM Indicator Label	This document

## 6. Security Considerations

The security considerations of SR-MPLS are discussed in [[I-D.ietf-spring-segment-routing-mpls](#)], and the security considerations of IOAM in general are discussed in [[I-D.ietf-ippm-ioam-data](#)].

IOAM is considered a "per domain" feature, where one or several operators decide on leveraging and configuring IOAM according to their needs. Still, operators need to properly secure the IOAM domain to avoid malicious configuration and use, which could include injecting malicious IOAM packets into a domain.

## 7. Acknowledgements

The authors would like to thank Shwetha Bhandari and Vengada Prasad Govindan for the discussions on IOAM.





## **8. Normative References**

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