

OPSAWG
Internet-Draft
Intended status: Standards Track
Expires: 10 July 2026

Y. Liu
ZTE
Z. Li
Y. Liu
China Mobile
C. Lin
New H3C Technologies
G. Dong
China Telecom
6 January 2026

Export of Segment Routing Path Segment Identifier (PSID) Information in
IPFIX
draft-ietf-opsawg-ipfix-path-segment-02

Abstract

This document introduces new IPFIX Information Elements to identify the Segment Routing (SR) Path Segment Identifier (PSID) for SR-MPLS and SRv6 paths identification.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <https://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on 10 July 2026.

Copyright Notice

Copyright (c) 2026 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to BCP 78 and the IETF Trust's Legal Provisions Relating to IETF Documents (<https://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights

and restrictions with respect to this document. Code Components extracted from this document must include Revised BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Revised BSD License.

Table of Contents

1. Introduction	2
1.1. SR-MPLS Path Identification	3
1.2. SRv6 Path Identification	3
1.3. SR Path Segment	4
2. Terminology	4
3. PSID in IPFIX	5
3.1. SR-MPLS PSID in IPFIX	5
3.2. SRv6 PSID in IPFIX	6
3.3. PSID Usecases	6
4. Operational Considerations	6
4.1. Operational Considerations for psidMpls	7
4.2. Operational Considerations for srhPsidIPv6	7
5. Security Considerations	8
6. IANA Considerations	8
7. Acknowledgement	8
8. References	8
8.1. Normative References	8
8.2. Informative References	9
Authors' Addresses	10

1. Introduction

When monitoring a traffic flow in an SR network, a typical use case is to answer the following questions:

- * How many packets are steered into a certain SR path ?
- * Which SR Policy or candidate path or segment list this SR path belongs to ?

To answer these questions, when exporting IPFIX flow records, the SR path information needs to be included. However, there are still some shortcomings with the existing mechanisms.

1.1. SR-MPLS Path Identification

In SR-MPLS[RFC8660], a segment is encoded as an MPLS label. For MPLS label stack information collection, IPFIX IE `mplsLabelStackSection` (elementID:316) [RFC5477] can carry a series of `n` octets from the MPLS label stack of a sampled packet, which can be leveraged to carry the whole or part of the MPLS label stack. And IEs from `mplsTopLabelStackSection`, `mplsLabelStackSection2`, `mplsLabelStackSection3` to `mplsLabelStackSection10` (elementID from 70 to 79) [RFC5102] provide mechanism to carry the individual MPLS label information in the IPFIX message.

But the above IEs are not sufficient for SR-MPLS path identification:

- * The intermediate node and the egress node cannot use the SR label stack to determine along which SR path the packet came, because when a packet is transmitted along an SR path, the labels in the MPLS label stack will be swapped or popped.
- * Although the headend node may have the information of the whole segment list, the size of IPFIX messages (especially the data record) would be big when a segment list contains many SIDs, making the collecting and analyzing of flow records inefficient.
- * In the cases that different SR (whether it is SR-MPLS or SRv6) policies use the same segment list for traffic steering, it is difficult to distinguish the traffic flow of different SR policies even with the whole SR list information of the traffic flow.

1.2. SRv6 Path Identification

[RFC9487] introduces new IP Flow Information Export (IPFIX) Information Elements (IEs) to identify a set of information related to Segment Routing over IPv6 (SRv6). For the SRv6 segment list, two IPFIX IPv6 SRH IEs are defined in [RFC9487], `srhSegmentIPv6BasicList` (elementID:496) and `srhSegmentIPv6ListSection` (elementID:497), both encoding the Segment List in the SRH starting from Segment List[0].

An SRv6 path could be identified by the content of a segment list in IPFIX using IE496 or IE497, but the segment list is not always the best key identifier due to the following reasons:

- * The size of an SRv6 SID is much bigger than an SR-MPLS SID, making the size of IPFIX message even larger when the segment list contains many SIDs.

- * An SRv6 path may not be identified by the segment list carried by the SRH in reduced mode as described in section 4.1.1 of [RFC8754] where the first SID is not present in the SRH.
- * When the `srhSegmentIPv6BasicList` or `srhSegmentIPv6ListSection` contains compressed-SID containers [RFC9800], additional information and processing procedures are required to decode compressed-SID containers as described in [RFC9487] section 6.2 to obtain the original segment list information before compression.

1.3. SR Path Segment

Path Segment is a type of Segment Routing (SR) segment, and a Path Segment Identifier (PSID) is used to identify an SR path.

For SR-MPLS, as specified in [RFC9545], a PSID is a single label that is assigned from the Segment Routing Local Block (SRLB) of the egress node of an SR path, and it immediately follows the last label of the SR path.

PSID for SRv6 networks is defined in [I-D.ietf-spring-srv6-path-segment]. In SRH, the PSID appears as the last entry in the segment list.

This document introduces new IPFIX Information Elements to identify the PSIDs for SR-MPLS and SRv6 paths identification.

2. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

This document makes use of the terms defined in [RFC7011], [RFC8402], [RFC8754] and [RFC9545].

The following terms are used as defined in [RFC7011]:

- * IPFIX
- * IPFIX Information Elements
- * Metering Process
- * Template Record

- * Data Record

- * Collector

The following terms are used as defined in [RFC8402]:

- * Segment Routing (SR)

- * Segment List

- * SRv6

The following terms are used as defined in [RFC8754]:

- * SRH

- * Last Entry

The following terms are used as defined in [RFC9545] and [I-D.ietf-spring-srv6-path-segment]:

- * PSID: Path Segment Identifier

3. PSID in IPFIX

3.1. SR-MPLS PSID in IPFIX

A new IE "psidMpls" is defined in this document to identify the SR-MPLS PSID, it carries a 32-bit MPLS label that represents an SR-MPLS PSID.

Name: psidMpls

ElementID: TBD1

Description: The 24-bit field carrying the Label, Exp, and S of the MPLS label stack entry that contains an SR-MPLS PSID.

Abstract Data Type: octetArray

Data Type Semantics: identifier

Additional Information: Specified in [RFC9545].

Reference: This document.

3.2. SRv6 PSID in IPFIX

A new IE "srhPsidIPv6" is defined in this document to identify the PSID in the SRH, it carries a 128-bit IPv6 address that represents an SRv6 PSID.

Name: srhPsidIPv6

ElementID: TBD2

Description: The 128-bit IPv6 address that represents an SRv6 PSID.

Abstract Data Type: ipv6Address

Data Type Semantics: default

Additional Information: Specified in Section 3 of [I-D.ietf-spring-srv6-path-segment].

Reference: This document.

Although IE srhPsidIPv6 is used to identify an SRv6 path, this document doesn't limit using srhPsidIPv6 together with srhSegmentIPv6BasicList or srhSegmentIPv6ListSection in the same IPFIX message, see section 4.2 for more information.

3.3. PSID Usecases

Network Observability, as described in [I-D.ietf-nmop-terminology], is the process of enabling network behavioral assessment through analysis of observed operational network data, and Network Telemetry(e.g,IPFIX) is the basis of Network Observability.

PSID benefits the SR IPFIX flow visibility for Network Observability. As described in [RFC9545] section 3 and [I-D.ietf-spring-srv6-path-segment] section 2, SR-MPLS and SRv6 PSID may be used to identify an SR Path in use cases such as performance measurement, bi-directional path association, end-to-end path protection and etc. By carrying PSID information in IPFIX messages, SR path of the traffic flow can be easily identified in the above uses cases.

4. Operational Considerations

4.1. Operational Considerations for psidMpls

To generate Flow Records with psidMpls, the metering process needs to acquire the information of the corresponding PSID, i.e., which label is the PSID. This may be achieved by configuration or signaling. How to get this information is out of the scope of this document.

After decoding the IPFIX messages at the collector, to get the flow record with PSID, the collector might process the flow record locally or send it to a data processing or analytics component. In order to recognize the SR path, the analysis node SHOULD be aware of which SR path the SR-MPLS PSID identifies. How to get this information is out of the scope of this document.

4.2. Operational Considerations for srhPsidIPv6

As specified in [I-D.ietf-spring-srv6-path-segment], the P-flag in the SRH is set to indicate the presence of PSID. To generate Flow Records with PSID included, the metering process MUST understand the P-flag. Only when the P-flag is set SHOULD the metering process capture the last entry in the SRH to get the PSID. If the P-flag in the packet is unset, when the srhPsidIPv6 appears in the template record, the corresponding field in the data record is RECOMMENDED to set to all zeros.

After decoding the IPFIX messages at the collector, to get the flow record with SRv6 PSID, the collector might process the flow record locally or send it to a data processing or analytics component. In order to recognize the SR path, the analysis node SHOULD be aware of which SR path the SRv6 PSID identifies. How to get this information is out of the scope of this document.

As in [I-D.ietf-spring-srv6-path-segment] section 3, the PSID allocation depends on the use cases, including:

- * each segment list may have its own PSID with different value;
- * the same PSID may be used for some or all the segment list under a Candidate path;
- * the same PSID may be used for some or all Candidate Path within an SRv6 policy.

If `srhPsidIPv6` and `srhSegmentIPv6BasicList/srhSegmentIPv6ListSection` appear together, the `srhPsidIPv6` MAY be used to identify an SR Policy or candidate path, and the information carried in `srhSegmentIPv6BasicList/srhSegmentIPv6ListSection` shows the detailed segment list belonging to this SR Policy or candidate path. This document does not limit how to use `srhPsidIPv6` and the detail is out of scope.

5. Security Considerations

There are no additional security considerations regarding allocation of these new IPFIX IEs compared to [RFC7012].

Other security considerations for SR-MPLS PSID in [RFC9545] and for SRv6 PSID described in [I-D.ietf-spring-srv6-path-segment] apply to this document.

6. IANA Considerations

This document requests IANA to create new IEs under the "IPFIX Information Elements" registry [RFC7012] available at [IANA-IPFIX].

Element ID	Name	Reference
TBD1	psidMpls	Section 3.1
TBD2	srhPsidIPv6	Section 3.2

Table 1: IPFIX Information Elements Registry

7. Acknowledgement

Thanks to Thomas Graf for his detailed review and comments. Thanks to Cheng Li and Chongfeng Xie for their helpful comments and suggestions.

8. References

8.1. Normative References

[I-D.ietf-spring-srv6-path-segment]

Li, C., Cheng, W., Zeng, G., Dhody, D., and Y. Zhu, "Path Segment Identifier (PSID) in SRv6 (Segment Routing in IPv6)", Work in Progress, Internet-Draft, draft-ietf-spring-srv6-path-segment-14, 30 November 2025, <<https://datatracker.ietf.org/doc/html/draft-ietf-spring-srv6-path-segment-14>>.

[IANA-IPFIX]

IANA, "IP Flow Information Export (IPFIX) Entities", <<https://www.iana.org/assignments/ipfix>>.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <<https://www.rfc-editor.org/info/rfc2119>>.

[RFC7011] Claise, B., Ed., Trammell, B., Ed., and P. Aitken, "Specification of the IP Flow Information Export (IPFIX) Protocol for the Exchange of Flow Information", STD 77, RFC 7011, DOI 10.17487/RFC7011, September 2013, <<https://www.rfc-editor.org/info/rfc7011>>.

[RFC7012] Claise, B., Ed. and B. Trammell, Ed., "Information Model for IP Flow Information Export (IPFIX)", RFC 7012, DOI 10.17487/RFC7012, September 2013, <<https://www.rfc-editor.org/info/rfc7012>>.

[RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <<https://www.rfc-editor.org/info/rfc8174>>.

[RFC8402] Filsfils, C., Ed., Previdi, S., Ed., Ginsberg, L., Decraene, B., Litkowski, S., and R. Shakir, "Segment Routing Architecture", RFC 8402, DOI 10.17487/RFC8402, July 2018, <<https://www.rfc-editor.org/info/rfc8402>>.

[RFC8754] Filsfils, C., Ed., Dukes, D., Ed., Previdi, S., Leddy, J., Matsushima, S., and D. Voyer, "IPv6 Segment Routing Header (SRH)", RFC 8754, DOI 10.17487/RFC8754, March 2020, <<https://www.rfc-editor.org/info/rfc8754>>.

8.2. Informative References

[I-D.ietf-nmop-terminology]

Davis, N., Farrel, A., Graf, T., Wu, Q., and C. Yu, "Some Key Terms for Network Fault and Problem Management", Work in Progress, Internet-Draft, draft-ietf-nmop-terminology-

23, 18 August 2025,
<<https://datatracker.ietf.org/doc/html/draft-ietf-nmop-terminology-23>>.

- [RFC5102] Quittek, J., Bryant, S., Claise, B., Aitken, P., and J. Meyer, "Information Model for IP Flow Information Export", RFC 5102, DOI 10.17487/RFC5102, January 2008, <<https://www.rfc-editor.org/info/rfc5102>>.
- [RFC5477] Dietz, T., Claise, B., Aitken, P., Dressler, F., and G. Carle, "Information Model for Packet Sampling Exports", RFC 5477, DOI 10.17487/RFC5477, March 2009, <<https://www.rfc-editor.org/info/rfc5477>>.
- [RFC8660] Bashandy, A., Ed., Filsfils, C., Ed., Previdi, S., Decraene, B., Litkowski, S., and R. Shakir, "Segment Routing with the MPLS Data Plane", RFC 8660, DOI 10.17487/RFC8660, December 2019, <<https://www.rfc-editor.org/info/rfc8660>>.
- [RFC9487] Graf, T., Claise, B., and P. Francois, "Export of Segment Routing over IPv6 Information in IP Flow Information Export (IPFIX)", RFC 9487, DOI 10.17487/RFC9487, November 2023, <<https://www.rfc-editor.org/info/rfc9487>>.
- [RFC9545] Cheng, W., Ed., Li, H., Li, C., Ed., Gandhi, R., and R. Zigler, "Path Segment Identifier in MPLS-Based Segment Routing Networks", RFC 9545, DOI 10.17487/RFC9545, February 2024, <<https://www.rfc-editor.org/info/rfc9545>>.
- [RFC9800] Cheng, W., Ed., Filsfils, C., Li, Z., Decraene, B., and F. Clad, Ed., "Compressed SRv6 Segment List Encoding", RFC 9800, DOI 10.17487/RFC9800, June 2025, <<https://www.rfc-editor.org/info/rfc9800>>.

Authors' Addresses

Yao Liu
ZTE
Nanjing
China
Email: liu.yao71@zte.com.cn

Zhenqiang Li
China Mobile
Email: lizhenqiang@chinamobile.com

Yisong Liu
China Mobile
Email: liuyisong@chinamobile.com

Changwang Lin
New H3C Technologies
Email: linchangwang.04414@h3c.com

Guozhen Dong
China Telecom
Email: donggz@chinatelecom.cn