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            Export of SRv6 Path Segment Identifier Information in IPFIX
                     draft-liu-opsawg-ipfix-path-segment-03

Abstract

   This document introduces a new IPFIX Information Element to identify
   the Path Segment Identifier(PSID) in the SRH for SRv6 and MPLS path
   identification purpose.

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1. Introduction

   [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].

   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 an certain SR path?

   * Which SR Policy or candidate path or segment list does this SR path
      belongs to?

   To answer these questions, when exporting the flow record using IPFIX
   Messagesflow records, the SR path information needs to be included.

   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:

   * When a segment list contains many SIDs, the size of IPFIX message
      (especially the data record) would be large, making the collecting
      and analyzing of flow records inefficient.

> **Commented [TG1]:** If you intend to cover MPLS-SR as well, I suggest to separate the introduction section into a SRv6 and a MPLS-SR part. In MPLS-SR you can refer to https://www.rfc-editor.org/rfc/rfc5102.html#section-5.6.15 to the mplsLabelStackSection* IE's and describe that a network node may not capable to export the entire MPLS label stack.

   * In the cases that different SRv6 policies use the same segment
      list for traffic steering, it is difficult to distinguish the
      traffic flow of different SRv6 policies.

   * 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]
      as where the first SID is not present
      in the SRH.

   * When the srhSegmentIPv6BasicList or
      srhSegmentIPv6ListSection contains compressed-SID
      containers[I-D.ietf-spring-srv6-srh-compression], 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.

   Path Segment is a type of Segment Routing (SR) segment, and a Path
   Segment Identifier (PSID) is used to identify an SR path. PSID in
   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 a new IPFIX Information Element to identify
   the Path Segment Identifier (PSID) in the SRH for SRv6 path
   identification purpose.

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],
   and [RFC8754].

   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

3. SRv6 PSID in IPFIX

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

   Name: srhPsidIPv6~~srhPSID~~

   ElementID: TBD1

   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~~srhPSID~~ is used to identify an SRv6 path, this
document
   doesn't limit using srhPsidIPv6~~srhPSID~~ together with
srhSegmentIPv6BasicList or
   srhSegmentIPv6ListSection in the same IPFIX message, see section4.2
   for more information.

4. Operational Considerations

Commented [TG2]: Please add also Path Segment Identifier with the PSID abbreviation and normative reference to RFC 9545 and reference to draft-ietf-spring-srv6-path-segment.

Formatted: English (United States)

Commented [TG3]: I suggest to add a use case section and mention that they visibility for Network Observability is provided described in https://datatracker.ietf.org/doc/html/draft-ietf-spring-srv6-path-segment-12#section-2 and https://www.rfc-editor.org/rfc/rfc9545.html#section-3.

You may want to start the use case section by mentioning Network Observability and why Flow Characteristics should be monitored by refering to terms and their relationships defined in https://datatracker.ietf.org/doc/html/draft-ietf-nmop-terminology.

Commented [TG4]: I suggest to define a second IPFIX entity for MPLS as well and reference RFC 9545.

4.1. Exporting, Decoding and Analyzing srhPsidIPv6srhPSID

   As specified in [I-D.ietf-spring-srv6-path-segment], the P-flag in
   the SRH is set to indicate the presence of PSID. In order toTo
   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 srhPsidIPv6srhPSID
appears in the
   template record, the corresponding field in the data record is
   RECOMMENDED to set to all zero.

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

4.2. Scope of srhPsidIPv6srhPSID

   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 srhPsidIPv6srhPSID and srhSegmentIPv6BasicList/
   srhSegmentIPv6ListSection appear together, the srhPsidIPv6srhPSID 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 srhPsidIPv6srhPSID 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 SRv6 PSID described in
   [I-D.ietf-spring-srv6-path-segment] apply to this document.

6. IANA Considerations

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

```
         +-------+-------------------------------+
         |Element|      Name        |  Reference  |
         |  ID   |                  |             |
         +-------+-----------------+-------------+
         | TBD1  |   srhPsidIPv6srhPSID  |This document |
         +-------+-----------------+-------------+
```

7. Acknowledgement

   The authors would like to thank Thomas Graf, Cheng Li and Chongfeng
   Xie for their helpful comments and suggestions.

8. References

8.1. Normative References

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8.2. Informative References

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