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Export of Path Segment Identifier Information in IPFIX

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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.

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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 a certain SR path?

\* Which SR Policy or candidate path or segment list does this SR path

belongs to?

To answer these questions, when exporting IPFIX

flow 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.

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\* 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] 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

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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 "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

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 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 section4.2

for more information.

4. Operational Considerations

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4.1. Exporting, Decoding and Analyzing 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 zero.

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 PSID identifies. How to get this

information the is out of the scope of this document.

4.2. Scope of srhPsidIPv6

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 SRv6 PSID described in

[I-D.ietf-spring-srv6-path-segment] apply to this document.

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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 | srhPsidIPv6 |This document |

+-------+-----------------+--------------+

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