                 Support Postcard-Based Telemetry for SRv6 OAM
                         draft-song-6man-srv6-pbt-01

Abstract

   Applications such as SRv6 TE may require to collect detailed
   performance data on SR paths. Existing in-situ OAM techniques incur
   encapsulation and header overhead issues. This document describes a
   method based on Postcard-based Telemetry with Packet Marking for SRv6
   on-path OAM, which avoids the extra overhead for encapsulating
   telemetry-related instruction and metadata in SRv6 packets.

Requirements Language

   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.

Table of Contents

1. Introduction

   The ability to collect the on-path data about SRv6 packets at each
   segment is important for SRv6 OAM, especially for monitoring the
   application-aware services. Some SR-TE algorithms need to acquire
   realtime flow forwarding performance on each path. The In-situ OAM
   (IOAM) [I-D.ietf-ippm-ioam-data] trace option can be used for such
   purpose. However, SRv6's SRH can be large due to the long segment
   list. The IOAM trace option introduces significant additional
   overhead to the SRv6 packets with its instruction and data trace.
   The large header overhead complicates the packet processing and may
   exceed the forwarding hardware's header processing capability.

   The extra IOAM trace option header also brings encapsulation
   challenges as documented in [I-D.li-6man-ipv6-sfc-ifit]. Here we
   only restate a subtle issue about the IOAM scope: if IOAM header is
   encapsulated as another IPv6 extension header, the juxtaposition of
   IOAM and SRH makes it ambiguous to determine the scope and coverage
   of IOAM: it is unclear if the IOAM is applied to the entire
   forwarding path or just to the segment nodes. In reality, either
   case can find its application.

The Direct EXport (DEX) option of IOAM described in
[I-D.ioamteam-ippm-ioam-direct-export] partially relieves the packet
overhead pressure by avoiding including trace data in SRv6 packet,
but the encapsulation issue remains, so does the aforementioned
ambiguirty. In this document, we propose to apply the PBT-M scheme
from [I-D.song-ippm-postcard-based-telemetry] for on-path SRv6
telemetry, which can help to solve the encapsulation and overhead
issues.

2. PBT Triggered by Marking for SRv6

   PBT-M requires marking a packet as a trigger to collect on-path data
   about the packet. The collected data are exported by an independent
   "postcard" packet. Therefore, there is no new header encapsulation
   requirement.

   Eight flag bits are currently reserved in SRH. One of those bits can
   be used as the marking flag, as shown in the following figure. If
   the "T"-bit is set to 1, the segment node which process the SRH needs
   to export the on-path data about this packet as pre-configured
   through management interface.

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Next Header   |  Hdr Ext Len  | Routing Type  | Segments Left |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|  Last Entry   |T|  Flags      |              Tag              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
|                                                               |
~                Segment List[] & TLV                           ~
|                                                               |
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

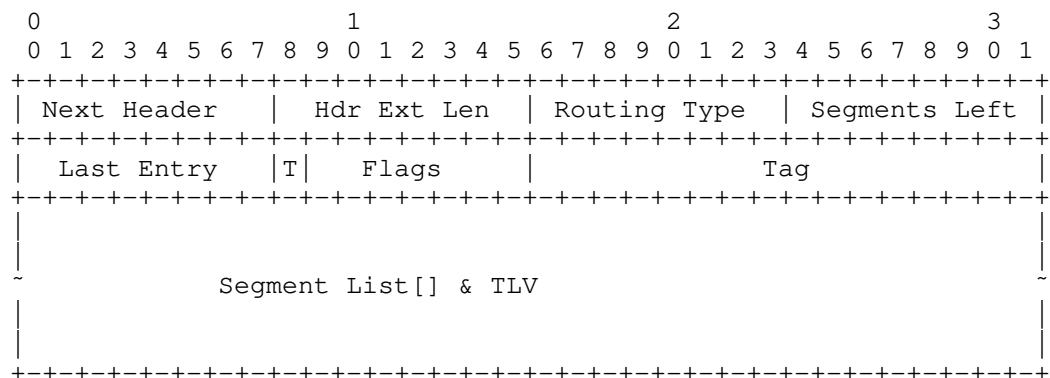   Figure 1: SRH with PBT Mark Flag

2.1. Data Template

   It is possible to have the same configuration for all the segment
   nodes on the data set to collect. However, different flows may
   require different data collection profiles. It would be more
   flexible to have multiple different data templates supported by the
   segment nodes and each packet can designate one template that best

   suits its interests to use. The template ID can be carried as a TLV
   in SRH.

2.2. Postcard Correlation

   As discussed in [I-D.song-ippm-postcard-based-telemetry], PBT-M has
   some issues to correlate the postcards from the different segment
   nodes for the same user packet. While several solutions are given to
   mitigate the problem, it is ideal to be able to correlate the
   postcards without any constraint and precondition.

   A flow ID and a sequence number can be included as TLVs in SRH. The
   format and usage of the flow ID and the sequence number are the same
   as those in IOAM DEX option in
   [I-D.ioamteam-ippm-ioam-direct-export]. Further, the exported
   postcard may include the SRH or the current SID which provides a
   trace to order the postcards.

2.3. Operational Considerations

   The SR source node is responsible to determine the policy for setting
   or resetting the "T"-bit.

   A segment node can decide independently whether or not to react on
   the "T"-bit.

3. Use Cases

   TBD.

4. Security Considerations

   Since PBT incurs some extra packet processing and transport cost, "T"
   flag is usually selectively set on a subset of packets by the source
   node. A potential DoS attack may set the "T" flag for all the packet
   with the intention to overwhelm the segment nodes. Therefore, the
   postcards should be generated on the basis of the best effort.

5. IANA Considerations

   [I-D.ietf-6man-segment-routing-header] defines a new registry named
   "Segment Routing Header Flags". This document requests the
   allocation of a new flag bit "T" for the telemetry trigger mark.

6. Contributors

    TBD.

7. Acknowledgments

    TBD.

8. References

8.1. Normative References

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