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S-BFD over SRv6
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Abstract

Bidirectional Forwarding Detection (BFD) can be used to monitor paths between node. Seamless BFD (S-BFD) provides a simplified mechanism which is suitable for monitoring of paths that are setup dynamically and on a large scale network. This draft describes a method to simplify the implementation of S-BFD over SRv6 by using SRH.flag to instruct the S-BFD peer node to do reverse operation of SRv6 SID list.

Requirements 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 .

Status of This Memo

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1. Introduction

With the increasing adoption of segment routing (SR) technology, ISPs have upgraded their networks seamlessly from MPLS to SR MPLS, and their next goal might be the overall upgrading of the IPv6 underlay network forwarding plane.

We hope to implement BFD over SRv6 while retaining the bidirectional detection capabilities of traditional BFD, rather than using asymmetrical path detection only. Another problem relates to the bidirectional detection mechanism in BFD over SRv6, Using SR Policy or using TLV to carry the return path brings extra load to the message parsing depth on existing SRv6 device.

In order to accelerate applying BFD in SRv6 networks, this paper proposed a S-BFD over SRv6 implementation solution.

2. Motiviation for Proposing S-BFD over SRv6

As shown in the figure below, the BFD initiator is A and the peer node is D, while bfd packets forwarding from A to D via the path: A->B->C->D, and return via the path: D->C->B->A.

```
               +-----B-------C-----+
              /                     \
             A-----------E-----------D
              \                     /
               +-----F-------G-----+

               Forward Paths: A-B-C-D
               Return Paths: D-C-B-A
```

Traditional BFD in SRv6 Data Plane

SRv6 SID operations on the initial node A: The SRv6 SID list {A, B, C, D} is pushed into Node A.

SRv6 SID operations on the terminal node D: The SRv6 SID list {A, B, C, D} is swapped in Node D, and the updated SRv6 SID list is : {D, C, B, A}, and the Last Entry, Segment Left, and other fields are updated.Return Path: D->C->B->A.

As shown in the figure below, the length of the flags field in the SRH header is 8-bit. This draft uses the left third bit (0|0|R|0|0|0|0|0) to represent the reverse operation of the SRv6 SID list.

```
 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 Hdr=144  |  Hdr Ext Len  | Routing Type  | Segments Left |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|  Last Entry   |     Flags     |              Tag              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
|            Segment List[0] (128-bit IPv6 address)             |
|                                                               |
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
|                                                               |
                              ...
|                                                               |
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
|            Segment List[n] (128-bit IPv6 address)             |
|                                                               |
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
|            SRv6 SPAN Header                                   |
|                                                               |
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|           Origin  Packet                                      |
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

The reverse operations for S-BFD of SRv6 Flag

BFD peer node D check if SRH.Flags[5] == 1, it means that this device requires the reverse operation of the SRv6 SID list.

3. The benefits of S-BFD over SRv6

This solution does not need to use the SRv6 Policy to add length of the SID list or to carry the SID list of the return path by TLV. It only needs to support reverse SRv6 SID in the reflector node to solve the issue of S-BFD over SRv6 described in the previous.

4. Future Considerations and Enhancements of S-BFD over SRv6

In future versions of this paper, we will also consider the compatibility of using compressed IDs in SRv6, such as seamlessly merging S-BFD over G-SRv6. Furthermore, there will be no effect on intermediate nodes within the SRv6 network and it only requires S-BFD reflector support the SID reverse operation.

5. Security Considerations

TBD.

6. IANA Considerations

TBD.

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