Encapsulation of BFD for SRv6 Policy

draft-liu-bfd-srv6-policy-encap-01

Yisong Liu (China Mobile)(Presenter)

Weiqiang Cheng(China Mobile**)**

Changwang Lin (New H3C Technologies**)**

Mengxiao Chen (New H3C Technologies)

Min Xiao (ZTE Corp.)

IETF-114

Monitoring SRv6 Policy

- ☐ BFD session associated with segment list

- BFD session down --->**segment list** fail---> stop forwarding packet with this segment list

- All segment list fail of active Candidate Path ---> switchover to backup Candidate Path

- All Candidate Path fail --->SRv6 Policy fail

- ☐ Choice of Address

  - ◆ **S-BFD**

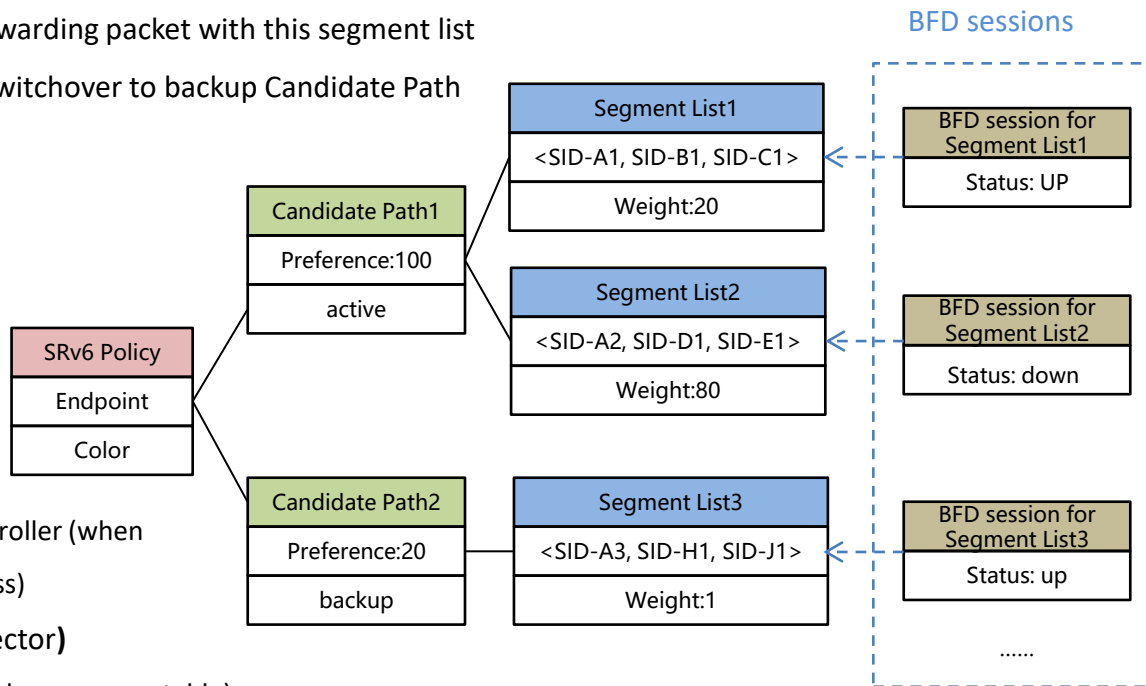 **Headend Address**:

  – IPv6 Address of **headend**

  Tailend Address:

  – endpoint of SRv6 Policy **or**

  – specified by local configuration or network controller (when

  the endpoint of SRv6 Policy is the unspecified address)

  - ◆ **U-BFD (**for echo packet's U-turn on the reflector**)**

  Headend Address: IPv6 address of **headend** (routable or non-routable)

  Tailend Address: routable IPv6 address of **headend**

BFD sessions

SRv6 Policy | Endpoint | Color

Candidate Path1 | Preference:100 | active

Candidate Path2 | Preference:20 | backup

Segment List1 | <SID-A1, SID-B1, SID-C1> | Weight:20

Segment List2 | <SID-A2, SID-D1, SID-E1> | Weight:80

Segment List3 | <SID-A3, SID-H1, SID-J1> | Weight:1

BFD session for Segment List1 | Status: UP

BFD session for Segment List2 | Status: down

BFD session for Segment List3 | Status: up

......

Encapsulation of BFD packet

BFD packet needs to carry a Segment Routing Header(SRH), which contain a list of SRv6 SID associated with the BFD session.

There are two encapsulation mode:

☐ transport mode

   the SRH is inserted after the IPv6 header

```
                                          Transport mode
+--------------+----------+-------------+------------+
| IPv6 header  |   SRH    | UDP Header  |  Payload   |
+--------------+----------+-------------+------------+
```
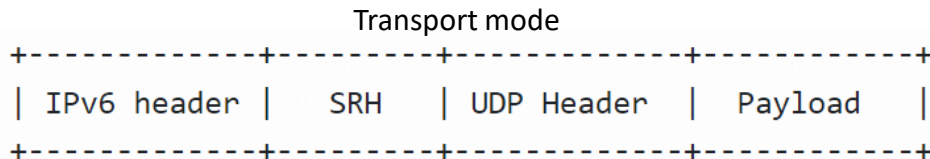
☐ tunnel mode

  an outer IPv6 header with an SRH is encapsulated, which looks like an BFD packet for plain IPv6 is steered into an SRv6 Policy.

```
                                tunnel mode
+----------------+---------+--------------+-------------+-----------+
| IPv6 header    |   SRH   | IPv6 header  | UDP Header  |  Payload  |
+----------------+---------+--------------+-------------+-----------+
```
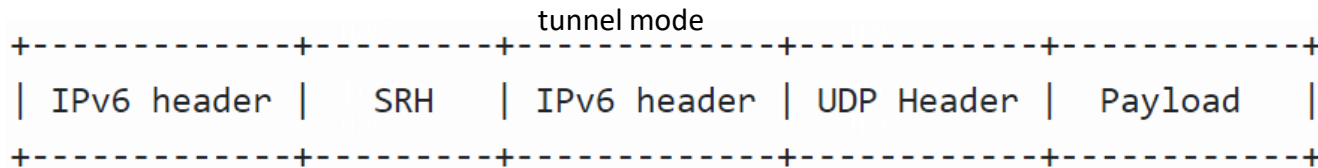
S-BFD(Control Packet) Encapsulation

✓ **transport mode**

- Encapsulate **one IPv6 header** and SRH.

- **Segment List[0]** should be the SRv6 SID or IPv6 address of the tail-end node.

✓ **tunnel mode**

- Encapsulate **inner IPv6 header** and **Outer SRv6** Encapsulation

- **Segment List[0]** should be the SRv6 SID or IPv6 address of the tail-end node.

```
+---------------------------------------------------+
| IPv6 Header                                       |
.  Source IP Address = Headend IPv6 Address         .
.  Destination IP Address = Segment List[SL]        .
.  Next-Header = SRH                                .
.                                                   .
+---------------------------------------------------+
| SRH                                               |
.  Segment List[0] = Tail-end IPv6 Address, or      .
.        Last Segment of SRv6 Policy Segment-List   .
.  Segment List[1]                                  .
.  Segment List[2]                                  .
.  ...                                              .
.  Next-Header = UDP                                .
.                                                   .
+---------------------------------------------------+
| UDP Header                                        |
.                                                   .
+---------------------------------------------------+
| Payload                                           |
.                                                   .
+---------------------------------------------------+
```

Transport mode
- End.x segment of penultimate hop.
- Binding SID

Tunnel mode
- End.x segment of penultimate hop without USD flavor
- Binding SID

In such cases,:

Segment List[0] = IPv6 address or SID of the tail-end node

Segment List[1] = the last segment of the SRv6 Policy Segment-List

```
+---------------------------------------------------+
| IPv6 Header                                       |
.  Source IP Address = Headend IPv6 Address         .
.  Destination IP Address = Segment List[SL]        .
.  Next-Header = SRH                                .
.                                                   .
+---------------------------------------------------+
| SRH                                               |
.  Segment List[0] = Tail-end IPv6 Address, or      .
.           Last Segment of SRv6 Policy Segment-List.
.  Segment List[1]                                  .
.  Segment List[2]                                  .
.  ...                                              .
.  Next-Header = IPv6                               .
.                                                   .
+---------------------------------------------------+
| IPv6 Header                                       |
.  Source IP Address = Headend IPv6 Address         .
.  Destination IP Address = Tail-end IPv6 Address   .
.  Next-Header = UDP                                .
.                                                   .
+---------------------------------------------------+
| UDP Header                                        |
.                                                   .
+---------------------------------------------------+
| Payload                                           |
.                                                   .
+---------------------------------------------------+
```

U-BFD (Echo packet) Encapsulation

✓ **transport mode**

- Encapsulate **one IPv6 header** and SRH.
- **Segment List[0]** should be SRv6 SID or IPv6 address of the **Headend**

✓ **tunnel mode**

- Encapsulate **inner IPv6 header** and **Outer SRv6** Encapsulation
- The **DA** of the inner payload is the address of the headend node
- **Segment List[0]** should be the SRv6 SID or IPv6 address of the **tail-end** node.

```
+--------------------------------------------------+
| IPv6 Header                                      |
.  Source IP Address = Headend IPv6 Address        .
.  Destination IP Address = Segment List[SL]       .
.  Next-Header = SRH                               .
.                                                  .
+--------------------------------------------------+
|                                                  |
| SRH                                              |
.  Segment List[0] = Headend IPv6 Address          .
.  Segment List[1]                                 .
.  Segment List[2]                                 .
.  ...                                             .
.  Next-Header = UDP                               .
.                                                  .
+--------------------------------------------------+
|                                                  |
| UDP Header                                       |
.                                                  .
.                                                  .
+--------------------------------------------------+
|                                                  |
| Payload                                          |
.                                                  .
+--------------------------------------------------+
```

For Tunnel mode:
 If the Last segment of SRv6 Policy segment list is :
- End.x segment of penultimate hop without USD flavor
- Binding SID

In this Case
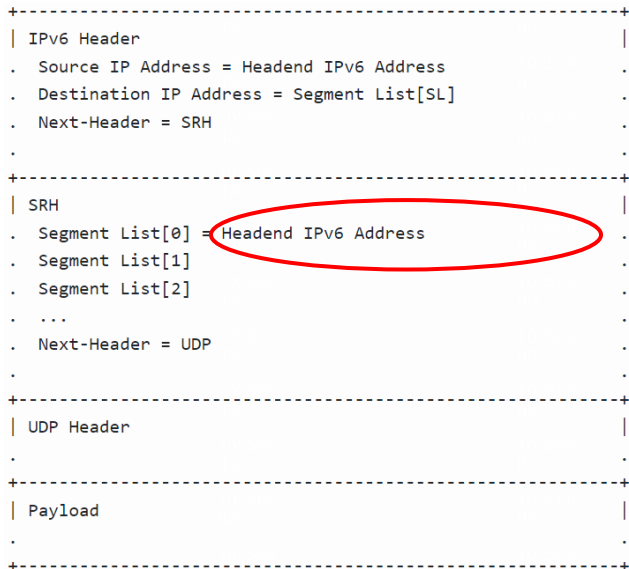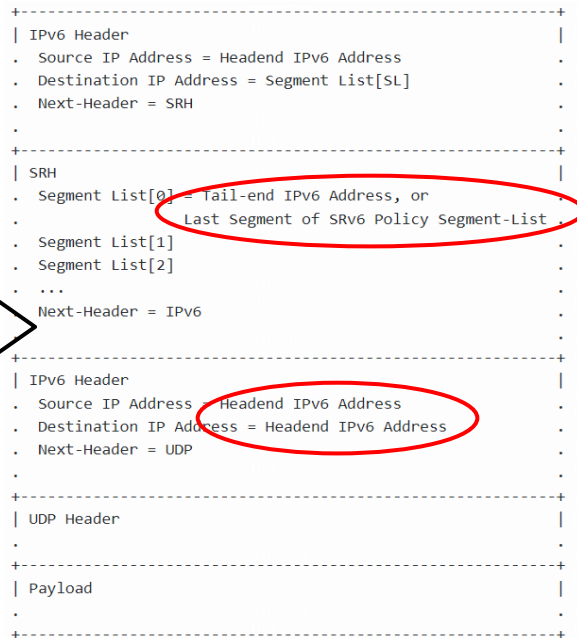   **segment list[0]** = IPv6 address or SID of the tail-end node
    segment list[1] = the last segment of the SRv6 Policy Segment-List

```
+--------------------------------------------------+
| IPv6 Header                                      |
.  Source IP Address = Headend IPv6 Address        .
.  Destination IP Address = Segment List[SL]       .
.  Next-Header = SRH                               .
.                                                  .
+--------------------------------------------------+
|                                                  |
| SRH                                              |
.  Segment List[0] = Tail-end IPv6 Address, or     .
.            Last Segment of SRv6 Policy Segment-List
.  Segment List[1]                                 .
.  Segment List[2]                                 .
.  ...                                             .
.  Next-Header = IPv6                              .
.                                                  .
+--------------------------------------------------+
|                                                  |
| IPv6 Header                                      |
.  Source IP Address = Headend IPv6 Address        .
.  Destination IP Address = Headend IPv6 Address   .
.  Next-Header = UDP                               .
.                                                  .
+--------------------------------------------------+
|                                                  |
| UDP Header                                       |
.                                                  .
+--------------------------------------------------+
|                                                  |
| Payload                                          |
.                                                  .
```

Next Steps

- Questions or comments are Welcomed
- Seeking for feedback