Source Segment for Multicast Source Routing over IPv6

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Source Segment Concept

- SRv6-SID as Destination Address ⬜

  - [RFC8402] The active segment is indicated by the Destination Address (DA) of the packet.

- SRv6-SID as Source Address in the existing work

  - [RFC8986 & draft-ietf-6man-spring-srv6-oam-11] The active segment (SRv6-SID indicated by the DA) can be PING.

  - [RFC4433] Requires that the IPv6 address in the DA of a Ping request (the SRv6-SID above) as SOURCE Address of the Echo Reply Packet.

- This Document:

  - Uses SRv6-SID as SOURCE Address of an IPv6-encapsulated multicast packet;

  - The SRv6 Segment represented by such SRv6-SID is defined as "Source Segment" ;

  - When the "Source Segment" Identifier (SID) is used as active segment (in DA of a packet), the behavior is locally configured.

Source Segment for Multicast-Segment-Routing-6(MSR6) MVPN service

- In the multicast service, packet is replicated along the tree towards a set of leaf nodes.

- MVPN routing and the corresponding information could be encapsulated in the source segment carried in the IPv6 source address.

- Source Segment for MVPN is distributed by the root node and the function is executed by the leaf nodes.

The following is a set of behaviors that can be associated with a source segment for MVPN.

```
+-------------+------------------------------------------------------+
|   Src.DT4   |Source address for decapsulation and IPv4 table lookup|
|-------------|------------------------------------------------------+
|   Src.DT6   |Source address for decapsulation and IPv6 table lookup|
|-------------|------------------------------------------------------+
|   Src.DT46  |Source address for decapsulation and IP table lookup  |
|-------------|------------------------------------------------------+
|   Src.DT2   |Source address for decapsulation and L2 table lookup  |
|-------------|------------------------------------------------------+
```

Source Segment Benefits

- Using source segment could bring the following benefits:

  - ✓ Be unchanged along the P2MP path;

  - ✓ Enhance network programming capability for more functions and extend the programming space in IPv6 header;

  - ✓ Be able to provide sematic for source address with similar IPv6 address allocation and management method as SRv6;

Next Step?

Next steps for consideration:

[A] A separate 6MAN document to clarify and categorize SRv6 SIDs is
needed. We are happy to work to find authors for this document.

The document should explain SIDs' deviation from RFC 4291 (probably
likening them to other addresses within prefixes handled by some virtual
network function, like NAT64 prefixes, and clarify that they are not
assigned to an interface) and capture many of the observations like those
in Brian Carpenter's recent email [BC]. We think the document should also
clarify when a SID can appear in the Source Address field vs. when it can
only appear in the Destination Address field, and whether such a
distinction should exist. It should describe the behaviour of IPv6

- The question of "SID appeared in Source Address field" has been captured by 6man chairs and INT ADs in https://mailarchive.ietf.org/arch/msg/spring/z_3nbdwVQ_V66ZqkV-ZhIg7kakA/

- This document adds a new use case and defines "Source Segment" for such kind of SRv6-Segment & SRv6-SID.

- More clarification will be helpful, especially from the view of IPv6; This document could provide the use cases for "SID appeared in the Source Address field" .

Thanks