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SRv6 SID Allocation
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Abstract

This document describes a SRv6 SID allocation method.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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Table of Contents

1. Introduction

Segment Routing architecture [RFC8402]leverages the paradigm of source routing. It can be realized in a network data plane by prepending the packet with a list of instructions, a.k.a. Segment Identifiers (SIDs). A segment can be encoded as a Multi-Protocol Label Switching (MPLS) label, IPv4 address, or IPv6 address. Segment Routing can be applied in MPLS data plane by encoding 20-bits SIDs in MPLS label stack [RFC8660]. It also can be applied to IPv6 data plane by encoding a list of 128-bits SIDs in IPv6 Segment Routing Extension Header (SRH)[I-D.ietf-6man-segment-routing-header].

As we know, several proposals are introduced to reduce the overhead of SIDs. The main ideas of them are basically to use a Compressed SID to replace the complete 128 bit SID in the SID list. The consequence of this is that the SID allocation space provided to each node will be very limited, which will limit the deployment of services in the network.

This document describes an SRv6 SID allocation method to increase the SID allocation space.

2. Conventions used in this document

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 RFC2119.

3. Allocating a SRv6 Compressed SID to a node

Assign a general global SRv6 SID to the corresponding consumer type, which is called the container SID. In the SID List, the container SID is followed by the local index or identification to indicate a specific segment with complete meaning. The container SID itself is 128bits and can be compressed to a short SID (such as 32 bits or 16

bits). The local index or identifier in general can also be a short SID.

For example, END.X SIDs[I-D.ietf-spring-srv6-network-programming] are allocated to all outbound L3 links on SRv6 nodes, and all these END.X SIDs occupy the global SRv6 SID resource. Now we define a new allocation method: for the consumer type of L3 link, only one general global container SID (called END.T.X SID) is allocated, and then allocates a local index for each specific L3 link, and the combination of END.T.X SID and local index can express the meaning of the original END.X.

4. The New SR Endpoint Behaviors

This document defines a new set of behaviors. Following is a set of behaviors that can be associated with a SID.

END.T.X SID Endpoint with Layer-3 cross-connect.
Only one universal container SID (END.T.X SID) is allocated on each node,
and each outbound L3 link is represented by a local index.
END.T.DX6 SID Endpoint with decapsulation and IPv6 cross-connect.
Only one universal container SID (END.T.DX6 SID) is allocated on each node,
and each L3 link connecting the CE is represented by a local index.
END.T.DX4 SID Endpoint with decaps and IPv4 cross-connect.
Only one universal container SID (END.T.DX4 SID) is allocated on each node,
and each L3 link connecting the CE is represented by a local index.
END.T.DT6 SID Endpoint with decapsulation and IPv6 table lookup.
Only one universal container SID (END.T.DT6 SID) is allocated on each node,
and each L3VPN instance is represented by a local index.
END.T.DT4 SID Endpoint with decapsulation and IPv4 table lookup.
Only one universal container SID (END.T.DT4 SID) is allocated on each node,
and each L3VPN instance is represented by a local index.
END.T.DT46 SID Endpoint with decapsulation and IP table lookup.
Only one universal container SID (END.T.DT46 SID) is allocated on each node,
and each L3VPN instance is represented by a local index.
END.T.DX2 SID Endpoint with decapsulation and L2 cross-connect.
Only one universal container SID (END.T.DX2 SID) is allocated on each node,
and each L2 link connecting the CE is represented by a local index.
END.T.DX2V SID Endpoint with decapsulation and VLAN L2 table lookup.
Only one universal container SID (END.T.DX2V SID) is allocated on each node,
and each L2VPN/EVPN instance is represented by a local index.
END.T.DT2U SID Endpoint with decapsulation and unicast MAC L2table lookup.
Only one universal container SID (END.T.DT2U SID) is allocated on each node,
and each L2VPN/EVPN instance is represented by a local index.
END.T.DT2M SID Endpoint with decapsulation and L2 table flooding
Only one universal container SID (END.T.DT2M SID) is allocated on each node,
and each L2VPN/EVPN instance is represented by a local index.
END.T.B SID Endpoint bound to an SRv6 policy with encapsulation
Only one universal container SID (END.T.B SID) is allocated on each node,
and each SR policy is represented by a local index.

Above the END.T.X, END.T.DX6, END.T.DX4, END.T.DT6, END.T.DT4, END.T.DT46, END.T.DX2, END.T.DX2V, END.T.DT2U, END.T.DT2M, END.T.B are all variants of the End T behavior.

The END.T behavior allows the use of the next classic SRv6 SID as the key value to look up and forward in a specific IPv6 FIB table, and these variants explicitly use the next short SID of a specific length (such as 32 or 16 bits) as the key value to look-up table in the specific consumer type table . These variants can also be combined with different Flavors, such as PSP, USP and USD Flavors defined in [I-D.ietf-spring-srv6-network-programming], and UET-0, UET-1, UET-2 and UET-3 Flavor defined in [I-D.mirsky-6man-unified-id-sr].

For example,UET-0, UET-1, UET-2 and UET-3 Flavor indicates the compression type of the next SID following the current active SID. if the container SID is UET-0 flavor, it means that the index and next-sid following it in the SRH are both 128 bits. If the container SID is in a UET-2 flavor, it means that the index and next sid following it in the SRH are both 32 bits.

5. IANA Considerations

TBD.

6. Security Considerations

7. Acknowledgements

TBD.

8. Normative References

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