Network Working Group
Internet-Draft
Intended status: Standards Track
Expires: June 16, 2016

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December 14, 2015

Segment Routing IPv6 Prefix-SID
draft-previdi-isis-ipv6-prefix-sid-01

Abstract

This document defines the Segment Routing IPv6 Prefix-SID sub-TLV. This new sub-TLV allows to specify which of the prefixes advertised by a node are to be used as Segment Routing Identifiers (SID) for the IPv6 dataplane.

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 RFC 2119 [RFC2119].

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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This Internet-Draft will expire on June 16, 2016.

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1. Introduction

With Segment Routing (SR)[I-D.ietf-spring-segment-routing], a node steers a packet through an ordered list of instructions, called segments. Segments are identified through Segment Identifiers (SIDs) that are advertised by routing protocols. The IS-IS extensions for SR information advertisement are defined in [I-D.ietf-isis-segment-routing-extensions].

Segment Routing can be directly applied to the IPv6 dataplane through the use of the Segment Routing Header defined in [I-D.previdi-6man-segment-routing-header].

When applied to the IPv6 dataplane, the SID is represented by an IPv6 address. This document defines a new IS-IS Prefix sub-TLV where information related to the IPv6 address used as SR-IPv6 SID is conveyed.

2. SRv6 Prefix SID

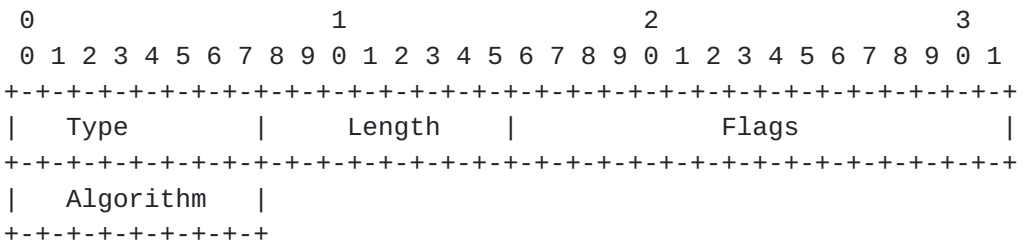
When SR is applied to the IPv6 dataplane, Segment Identifiers (SIDs) are regular IPv6 addresses that are advertised in routing protocols. When SR is used over IPv6 dataplane, it is desirable to identify which of the prefixes originated by a node can be used as SIDs compared to any other prefix that the node advertises. Moreover, and in order to provide the same functionalities defined in [I-D.ietf-spring-segment-routing] and [I-D.ietf-isis-segment-routing-extensions], a new sub-TLV is defined: the SRv6-Prefix-SID sub-TLV

A SRv6-Prefix-SID sub-TLV is associated to a IPv6 prefix advertised by a node and MAY be present in any of the following TLVs:

TLV-236 (IPv6) defined in [RFC5308].

TLV-237 (MT-IPv6) defined in [RFC5120].

The SRv6-Prefix-SID sub-TLV has the following format:



where:

Type: To be assigned by IANA (suggested value 5).

Length: 3 octets.

Flags: 2 octet field of flags. None of them is defined at this stage.

Algorithm: the router may use various algorithms when calculating reachability to other nodes or to prefixes attached to these nodes. Algorithms identifiers are defined in [I-D.ietf-isis-segment-routing-extensions]. Examples of these algorithms are metric based Shortest Path First (SPF), various sorts of Constrained SPF, etc. The algorithm field of the SRv6-Prefix-SID contains the identifier of the algorithm the router has used in order to compute the reachability of the IPv6 prefix that is used as a SID. At origination, the SRv6-Prefix-SID algorithm field MUST be set to 0 on all SRv6-Prefix-SIDs of prefixes computed using SPF algorithm (Shortest Path First). On reception of the SRv6-Prefix-SID sub-TLV, any non-zero algorithm value MUST match what advertised in the SR-Algorithm sub-TLV (as defined in [I-D.ietf-isis-segment-routing-extensions]).

A router advertising an IPv6 prefix with the SRv6-Prefix-SID sub-TLV MUST support the Segment Routing Header (SRH, defined in [I-D.previdi-6man-segment-routing-header] and its associated procedures for packets destined to the advertised prefix. The advertising router MUST also set the H-flag in the SR-Capability sub-TLV as defined in [I-D.ietf-isis-segment-routing-extensions].

Within an area (or within the level-2 subdomain), a router receiving the advertisement of an IPv6 prefix with the SRv6-Prefix-SID sub-TLV MUST check whether the originator has set the H-flag in its SR-Capability Sub-TLV prior to validate the SRv6-Prefix-SID sub-TLV.

A router receiving a SRv6-Prefix-SID from a remote node and with an algorithm value that such remote node has not advertised in the SR-Capability sub-TLV (as defined in [I-D.ietf-isis-segment-routing-extensions]) MUST ignore the SRv6-Prefix-SID sub-TLV.

The SRv6-Prefix-SID sub-TLV defines the prefix (it is associated to) as an SR-IPv6 Prefix SID. If the prefix is to be used as a Node-SID:

- The IPv6 prefix MUST be advertised with the SRv6-Prefix-SID sub-TLV attached.

- The N-flag defined in [I-D.ietf-isis-prefix-attributes] MUST be set.

3. IANA Considerations

This document makes the following registrations in the "sub-TLVs for TLV 135,235,236 and 237" registry.

- Type: TBD (suggested value 5)

- Description: SRv6 Prefix Segment Identifier

- TLV 135: no

- TLV 235: no

- TLV 236: yes

- TLV 237: yes

- Reference: This document (Section 2)

4. Security Considerations

This document doesn't introduce new security considerations.

5. Acknowledgements

The authors would like to thank Nagendra Kumar for his review of this document.

6. References

6.1. Normative References

[I-D.ietf-isis-prefix-attributes]
Ginsberg, L., Decraene, B., Filsfils, C., Litkowski, S., Previdi, S., Xu, X., and U. Chunduri, "IS-IS Prefix Attributes for Extended IP and IPv6 Reachability", draft-ietf-isis-prefix-attributes-02 (work in progress), December 2015.

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[RFC5308] Hopps, C., "Routing IPv6 with IS-IS", RFC 5308, DOI 10.17487/RFC5308, October 2008, <http://www.rfc-editor.org/info/rfc5308>.

6.2. Informative References

[I-D.ietf-isis-segment-routing-extensions]
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[I-D.ietf-spring-segment-routing]
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[I-D.previdi-6man-segment-routing-header]
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