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BGP SR Policy Extensions for Segment List Identifier
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Abstract

Segment Routing is a source routing paradigm that explicitly indicates the forwarding path for packets at the ingress node. An SR Policy is a set of candidate paths, each consisting of one or more segment lists. This document defines extensions to BGP SR Policy to specify the identifier of segment list.

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Table of Contents

1.	Introduction.....	3
1.1.	Requirements Language.....	3
2.	Segment List Identifier in SR Policy.....	4
2.1.	Segment List ID Sub-TLV.....	5
3.	Security Considerations.....	5
4.	IANA Considerations.....	6
5.	References.....	6
5.1.	Normative References.....	6
5.2.	Informative References.....	6
	Authors' Addresses.....	7

1. Introduction

Segment routing (SR) [[RFC8402](#)] is a source routing paradigm that explicitly indicates the forwarding path for packets at the ingress node. The ingress node steers packets into a specific path according to the Segment Routing Policy (SR Policy) as defined in [[RFC9256](#)]. In order to distribute SR policies to the headend, [I-D.ietf-idr-segment-routing-te-policy] specifies a mechanism by using BGP.

However, there is no identifier for segment list in BGP SR Policy, which may cause inconvenience for other mechanisms to designate segment lists distributed by BGP.

For example, a network controller distributes SR policies to the headend nodes, and the headend nodes collect traffic forwarding statistics per segment list. When a headend node reports each statistic to the controller, it needs to specify the segment list which the statistic belongs to. Due to the lack of identifier, the headend node usually reports all SIDs in the associated segment list along with the statistic, and then the controller needs to compare the SIDs one by one to recognize which segment list it is. The advertisement of all SIDs in the segment list consumes a lot of octets, and the comparison of SIDs can be complicated.

For another example, a network controller distributes SR policies using BGP, and then it uses NETCONF to set some configurations of the segment lists, which are not suitable to be carried in BGP. So, the controller needs to specify which segment list these configurations belong to when it issues them. In this case, a simple identifier of segment list can also be helpful.

An identifier of segment list may also serve as a user-friendly attribute for debugging and troubleshooting purposes, such as displaying an invalid segment list when its associated BFD session is down.

This document defines extensions to BGP SR Policy to specify the identifier of segment list.

1.1. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [BCP 14](#) [[RFC2119](#)] [[RFC8174](#)] when, and only when, they appear in all capitals, as shown here.

2. Segment List Identifier in SR Policy

As defined in [[I-D.ietf-idr-segment-routing-te-policy](#)], the SR policy encoding structure is as follows:

SR Policy SAFI NLRI: <Distinguisher, Policy-Color, Endpoint>

Attributes:

```
Tunnel Encaps Attribute (23)
  Tunnel Type: SR Policy
    Binding SID
    SRv6 Binding SID
    Preference
    Priority
    Policy Name
    Policy Candidate Path Name
    Explicit NULL Label Policy (ENLP)
    Segment List
      Weight
      Segment
      Segment
      ...
    ...
```

SR policy with segment list identifier is expressed as below:

SR Policy SAFI NLRI: <Distinguisher, Policy-Color, Endpoint>

Attributes:

```
Tunnel Encaps Attribute (23)
  Tunnel Type: SR Policy
    Binding SID
    SRv6 Binding SID
    Preference
    Priority
    Policy Name
    Policy Candidate Path Name
    Explicit NULL Label Policy (ENLP)
    Segment List
      Weight
      Segment List Identifier
      Segment
      Segment
      ...
    ...
```

The segment list identifier can be advertised using the Segment List ID sub-TLV, as defined in [Section 2.1](#).

When signaling SR Policy by PCEP [[I-D.ietf-pce-multipath](#)], a segment list is identified by "Path ID", which is a 4-octet identifier. In this document, the segment list identifier is also represented using a 4-octet ID.

2.1. Segment List ID Sub-TLV

The Segment List ID sub-TLV specifies the identifier of the segment list by a 4-octet number. The Segment List ID is unique within the context of a Candidate Path.

The Segment List ID sub-TLV is optional and it MUST NOT appear more than once inside the Segment List sub-TLV.

The Segment List ID sub-TLV has the following format:

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									
+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-									
	Type										Length										Flags										RESERVED									
+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-									
	Segment List ID																																							
+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-									

where:

- o Type: TBD.
- o Length: 6.
- o Flags: 1 octet of flags. None are defined at this stage. Flags SHOULD be set to zero on transmission and MUST be ignored on receipt.
- o RESERVED: 1 octet of reserved bits. SHOULD be set to zero on transmission and MUST be ignored on receipt.
- o Segment List ID: 4 octet of ID for the segment list.

3. Security Considerations

The security requirements and mechanisms described in [[I-D.ietf-idr-segment-routing-te-policy](#)] also apply to this document.

This document does not introduce any new security consideration.

4. IANA Considerations

This document defines a new Sub-TLV in the registry "SR Policy Segment List Sub-TLVs" [[I-D.ietf-idr-segment-routing-te-policy](#)]:

Value	Description	Reference

TBA	Segment List ID sub-TLV	This document

5. References

5.1. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in [RFC 2119](#) Key Words", [BCP 14](#), [RFC 8174](#), May 2017
- [RFC8402] Filsfils, C., Ed., Previdi, S., Ed., Ginsberg, L., Decraene, B., Litkowski, S., and R. Shakir, "Segment Routing Architecture", [RFC 8402](#), DOI 10.17487/RFC8402, July 2018, <<https://www.rfc-editor.org/info/rfc8402>>.
- [I-D.ietf-idr-segment-routing-te-policy] Previdi, S., Filsfils, C., Talaulikar, K., Mattes, P., and D. Jain, "Advertising Segment Routing Policies in BGP", Work in Progress, Internet- Draft, [draft-ietf-idr-segment-routing-te-policy-25](#), 26 September 2023, <<http://www.ietf.org/internet-drafts/draft-ietf-idr-segment-routing-te-policy-25.txt>>.

5.2. Informative References

- [RFC9256] Filsfils, C., Talaulikar, K., Ed., Voyer, D., Bogdanov, A., and P. Mattes, "Segment Routing Policy Architecture", [RFC 9256](#), DOI 10.17487/RFC9256, July 2022, <<https://www.rfc-editor.org/info/rfc9256>>.
- [I-D.ietf-pce-multipath] Koldychev, M., Sivabalan, S., Saad, T., Beeram, V. P., Bidgoli, H., Yadav, B., Peng, S., and G. S. Mishra, "PCEP Extensions for Signaling Multipath Information", Work in Progress, Internet-Draft, [draft-ietf-pce-multipath-09](#), 24 July 2023, <<https://datatracker.ietf.org/doc/html/draft-ietf-pce-multipath-09>>.

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