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Supplement of BGP-LS Distribution for SR Policies and State draft-lp-idr-bgp-ls-sr-policy-supplement-04

Abstract

This document supplements additional information of the segment list in the BGP-LS advertisement for SR Policy state information. Two new flags and a new sub-TLV are introduced in the SR Segment List TLV of BGP-LS SR Policy Candidate Path NLRI.

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 6 May 2026.

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1. Introduction

SR Policy architecture details are specified in [RFC9256]. An SR Policy comprises one or more candidate paths (CP) of which at a given time one and only one may be active. Each CP in turn may have one or more SID-List of which one or more may be active; when multiple are active then traffic is load balanced over them.

[RFC9857] describes a mechanism to collect the SR policy information that is locally available in a node and advertise it into BGP Link State (BGP-LS) updates. Various TLVs are defined to enable the headend to report the state at the candidate path level and the segment list level.

Currently, a few segment-list-related information is not yet included in [RFC9857]:

* Whether the segment list is a backup path. [I-D.ietf-pce-multipath] proposes extensions to PCEP to specify the protection relationship among segment lists within the candidate path. There would be segment lists in the CP acting as backup for one or more primary segment lists, the backup lists only carry rerouted traffic after the protected path fails.

* Whether the segment list is in administrative shut state. For the candidate path, there's already an S-Flag in the SR Candidate Path State TLV in [RFC9857] indicating the CP is in an administrative shut state. In some usecases, the segment list may also be shut by an administrator for traffic engineering or power saving purpose, e.g, the network administrator may shut certain segment list when the load on the SR Policy is light. This information may also be needed and reported via BGP-LS.

Besides, [I-D.ietf-mpls-mna-hdr] defines the MPLS Network Actions (MNA) sub-stack solution for carrying Network Actions and Ancillary Data in the MPLS label stack, different Label Stack Entry(LSE) formats are defined for different purpose. Unlike traditional MPLS LSE, which consists of 20-bit MPLS label, 3-bit TC, 1-bit S(bottom of stack indication) and 8-bit TTL, some LSEs defined for MNA repurposed the TC and TTL field to carry additional information. MNA such as Network Resource Partition (NRP) [I-D.ietf-mpls-mna-nrp-selector], IOAM [I-D.ietf-mpls-mna-ioam] may be inserted in the SID list in the format of LSEs. The contents of the LSEs inserted in the SID-lists may be required by the controller when the headend reports the state of SR Policies via BGP-LS. However, SR Segment List TLV [RFC9857] only supports carry 20-bit MPLS labels, which are encoded in SR Segment Sub-TLV, carrying 32-bit MPLS LSEs in BGP-LS is not yet supported.

This document supplements some additional information of the segment list state as mentioned above in the BGP-LS advertisement for SR Policy state information.

2. 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 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

3. BGP-LS Extensions for Distributing Segment List States

3.1. New Flags in SR Segment List TLV

SR Segment List TLV is defined in [RFC9857] to report the SID-List(s) of a candidate path. As show in Figure 1,this document introduces two new flags in the flag field of SR Segment List TLV, where,

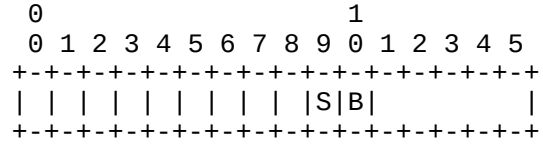

Figure 1: New Flags in the Flag Field of SR Segment List TLV

* S-Flag: Indicates the segment list is in administrative shut state when set. The segment list may be shut by the administrator via CLI or other methods, and it is out of the scope of this document.

* B-Flag: Indicates that the segment list is a pure backup path as specified in [I-D.ietf-pce-multipath] section 4.4 when set. When B-Flag is clear, it indicates it is the primary path that carries normal traffic.

3.2. MPLS LSE Sub-TLV

The MPLS LSE sub-TLV is defined in this section to carry the generic MPLS LSE information. The MPLS LSE sub-TLV is an optional sub-TLV of SR Segment List TLV, and it may be used as the sub-TLV of other TLVs, for the latter case, the detailed usage is out of the scope of this document.

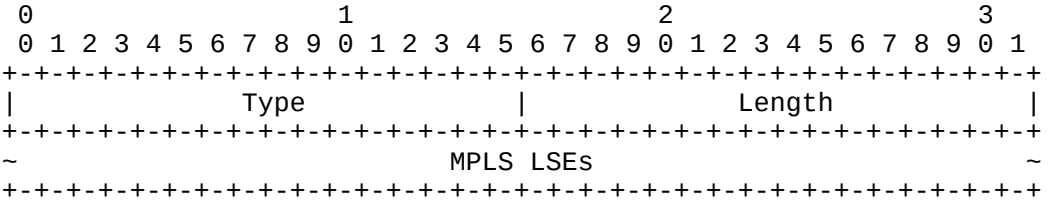

Figure 2: MPLS LSE Sub-TLV

Type: TBA

Length: Variable, the total length (in octets) of MPLS LSE portion in octets, MUST be the multiple of 4. The value indicates the number of the LSEs in this sub-TLV.

MPLS LSEs: one or more 4-octet-field carrying the MPLS LSEs.

4. IANA Considerations

This document requests bit 9 and bit 10 in the flag field of "SR Segment List TLV" [RFC9857] under the "BGP-LS Node Descriptor, Link Descriptor, Prefix Descriptor, and Attribute TLVs" registry.

Bit	Description	Reference
9	Administrative Shut State Flag(S-Flag)	This document
10	Backup Path State Flag(B-Flag)	This document

This document requests a new type sub-TLV of "SR Segment List TLV" [RFC9857] under the "BGP-LS Node Descriptor, Link Descriptor, Prefix Descriptor, and Attribute TLVs" registry.

Type	Description	Reference
TBA	MPLS LSE Sub-TLV	This document

5. Security Considerations

Procedures and protocol extensions defined in this document do not affect the security considerations discussed in [RFC9857].

6. References

6.1. Normative References

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[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <https://www.rfc-editor.org/info/rfc2119>.

[RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", BCP 14, RFC 8174, DOI 10.17487/RFC8174, May 2017, <https://www.rfc-editor.org/info/rfc8174>.

[RFC9857] Previdi, S., Talaulikar, K., Ed., Dong, J., Gredler, H., and J. Tantsura, "Advertisement of Segment Routing Policies Using BGP - Link State", RFC 9857, DOI 10.17487/RFC9857, October 2025, <https://www.rfc-editor.org/info/rfc9857>.

6.2. Informative References

[I-D.ietf-mpls-mna-hdr]
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[I-D.ietf-mpls-mna-ioam]
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Li, T., Drake, J., Beeram, V. P., Saad, T., and I. Meilik, "MPLS Network Actions for Network Resource Partition Selector", Work in Progress, Internet-Draft, draft-ietf-mpls-mna-nrp-selector-00, 13 May 2025, <https://datatracker.ietf.org/doc/html/draft-ietf-mpls-mna-nrp-selector-00>.

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[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>.

[RFC8662] Kini, S., Kompella, K., Sivabalan, S., Litkowski, S., Shakir, R., and J. Tantsura, "Entropy Label for Source Packet Routing in Networking (SPRING) Tunnels", RFC 8662, DOI 10.17487/RFC8662, December 2019, <https://www.rfc-editor.org/info/rfc8662>.

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