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BGP SR Policy Extensions for Administrative Flags
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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 an extension to the BGP SR Policy that sets the administrative state of the candidate path or segment list, facilitating the operation and maintenance of the SR Policy.

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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, [RFC9830] specifies a mechanism by using BGP.

For management purposes, the controller may occasionally need to temporarily divert traffic from a specific forwarding path and then restore it later. In such cases, the controller can issue an Administrative Down command to a specific path in the SR Policy on the device without removing the path. When it is time to restore the path, the controller can simply issue an Administrative Up command to that same path.

In another scenario, such as in 6PE or EPE situations where it is necessary to conserve service route SIDs, the SR Policy Flag can be extended to indicate settings. For example, configuring the Candidate Path as "Ignore service routes Prefix SID" can help optimize the segment list.

In some scenarios, the Candidate Path cannot be used as a backup path. The operator needs to control the Candidate Path status to identify whether this CP can serve as a backup path.

In [RFC9256], section 8.2 defines the Drop-Upon-Invalid behavior. An SR Policy MAY be enabled for the Drop-Upon-Invalid behavior. Currently, there is no behavior control for Drop-Upon-Invalid on the path of an SR policy.

This document defines an extension to the BGP SR Policy that sets the management state of the candidate path or the segment list, facilitating the operation and maintenance of the SR Policy.

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. Admin State in SR Policy

As defined in [RFC9830], 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 Administrative Flags are 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
          Policy Candidate Path Administrative Flags
          Explicit NULL Label Policy (ENLP)
          Segment List
              Weight
              Segment List Administrative Flags
              Segment
              Segment
              ...
          ...
```

The Candidate Path Administrative Flags can also be advertised using the Candidate Path Administrative Flags sub-TLV, as defined in Section 2.1.

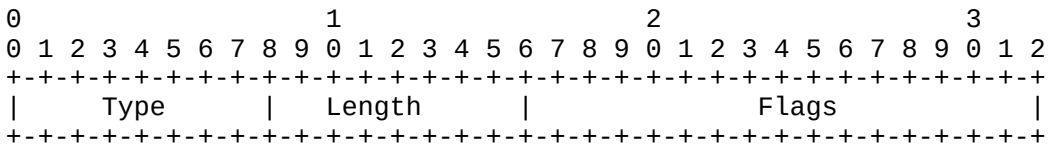
The segment list Administrative Flags can be advertised using the Segment List Administrative Flags sub-TLV, as defined in Section 2.2.

2.1. Candidate Path Administrative Flags Sub-TLV

The Candidate Path Administrative Flags sub-TLV is used to indicate the AdminState of the Candidate Path.

The Candidate Path Administrative Flags sub-TLV is optional and it MUST NOT appear more than once inside the Segment List sub-TLV.

The Candidate Path Administrative Flags sub-TLV has the following format:



where:

- Type: TBD1.
- Length: 2.
- Flags: 2 octet of flags.

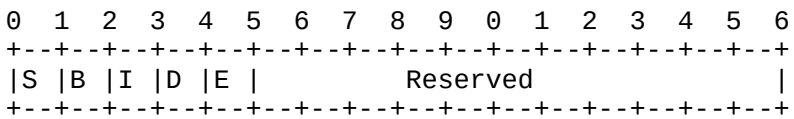


Figure 5: Administrative Flags

where:

- S-Flag: Indicates the CP is in an administrative shut state when set.
- B-Flag: Indicates the CP is configured as "backup ineligible".
- I-Flag: Indicates the CP is configured as "Ignore service route’s Prefix SID". It allows traffic to a BGP service route to be steered over an SR policy without imposing the service route’s prefix label or SRv6 Service SID.
- D-Flag: Indicates the CP has been marked as the "Drop Upon Invalid" behavior as described in section 8.2 of [RFC9256].

- E-Flag: Indicates that the CP is set to 'candidate path eligible' as defined in [I-D. ietf-spring-sr-policy-eligibility. If set, it indicates that the eligibility attribute of the candidate path is true. If not set, it indicates that the eligibility attribute of the candidate path is false.

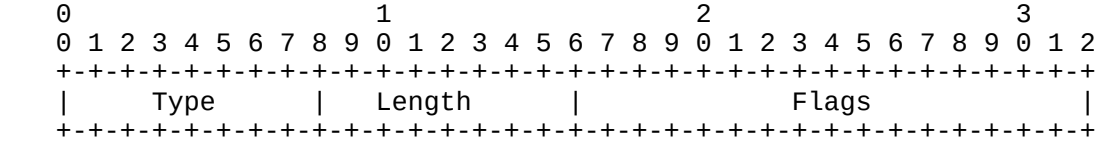
- Reserved: The unassigned bits in the Flags field MUST be set to zero upon transmission and MUST be ignored upon receipt.

2.2. Segment List Administrative Flags Sub-TLV

The Segment List Administrative Flags sub-TLV is used to indicate the AdminState of the Segment List of Candidate Path.

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

The Segment List Administrative Flags sub-TLV has the following format:



where:

o Type: TBD2.

o Length: 2.

o Flags: 2 octet of flags.

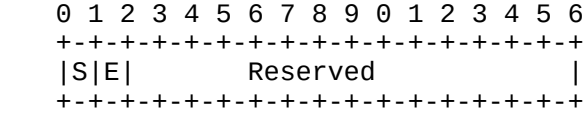


Figure 6: Administrative Flags

where:

- S-Flag: Indicates the Segment List is in an administrative shut state when set.

- E-Flag: When set, indicates the Segment List is in an eligible state (capable of forwarding traffic).
  When cleared, indicates the Segment List is ineligible (cannot forward traffic).

- Reserved: The unassigned bits in the Flags field MUST be set to zero upon transmission and MUST be ignored upon receipt.

3. Security Considerations

The security considerations of BGP [RFC4271] and BGP SR policy [RFC9830] apply to this document.

The Candidate Path Administrative Flags sub-TLV is used to indicate the AdminState of the Candidate Path. The Segment List Administrative Flags sub-TLV is used to indicate the AdminState of the Segment List of the Candidate Path. The values of these two sub-TLVs affect the state of the Candidate Path or Segment List in the SR Policy, which may consequently impact packet forwarding in the network. Therefore, when configuring, querying, and reporting control plane Candidate Path Administrative Flags and Segment List Administrative Flags in BGP, care must be taken to protect this mission critical or commercially sensitive information.

4. IANA Considerations

This document defines a new Sub-TLV in the registry "SR Policy Segment List AdminState Sub-TLVs" [RFC9830]:

Value	Description	Reference
TBD1	Candidate Path Administrative Flags sub-TLV	This document
TBD2	Segment List Administrative Flags 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.

[RFC4271] Rekhter, Y., Ed., Li, T., Ed., and S. Hares, Ed., "A Border Gateway Protocol 4 (BGP-4)", RFC 4271, DOI 10.17487/RFC4271, January 2006, <https://www.rfc-editor.org/info/rfc4271>.

[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>.

[RFC9830] Previdi, S., Filsfils, C., Talaulikar, K., Mattes, P., and D. Jain, "Advertising Segment Routing Policies in BGP", RFC 9830, DOI 10.17487/RFC9830, September 2025, <https://www.rfc-editor.org/info/rfc9830>.

[I-D. ietf-spring-sr-policy-eligibility] Karboubi, A., Shah, H., Sivalaban, S., Stone, A. and Schmutz, C., "Eligibility Concept in Segment Routing Policies", draft-ietf-spring-sr-policy-eligibility-00 (work in progress), January 2026.

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>.

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