IETF 102 – Montreal
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IDR Working Group

Advertising Segment Routing Policies in BGP

draft-ietf-idr-segment-routing-te-policy-04

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Agenda

- Share updates with the WG
  - Last update was presented at IETF-98
  - Latest update submitted as revision 04 prior to IETF-102
  - https://tools.ietf.org/html/draft-ietf-idr-segment-routing-te-policy-04
- Collect feedback/comments from the WG

Introduction

- This draft defines signaling of Segment Routing Policies via BGP protocol
- BGP Signals a Candidate Path of a given SR Policy
- A new SAFI (SR-Policy, code 73) is defined in this draft
    - Identification of the SR Policy is encoded in NLRI bits
    - Details of the SR Policy Candidate Path are encoded in the SR Policy TLV within Tunnel Encapsulation attribute
- Defines extensions to the Color Extended Community to achieve Automatic Steering

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

Attributes:
Tunnel Encaps Attribute (23)
 Tunnel Type (15): SR Policy
  Binding SID
  Preference
  Priority
  Policy Name
  Explicit NULL Label Policy (ENLP)
  Segment List
     Weight
     Segment
     Segment
       ...
       ...
```

Summary of Updates

- Updates to the Segment Types
  - Correction in SID type 3 and 8 definitions
  - Addition of segment 9, 10, 11 to cover SRv6 segments
- Addition of new sub-TLVs
  - SR Policy Symbolic name sub-TLV
  - SR Policy Priority sub-TLV
  - ENLP sub-TLV
- Addition of SR Flex Algorithm specification in Segment Type sub-TLV
  - Type 3, 8 refer to the Segments with IP Prefix
  - Head-end calculates the SR SID corresponding to the prefix
  - Addition of SR Algorithm ID to indicate Head-End to calculate the Flex-Algo SID
- Addition of new flags in Segment Type sub-TLV
  - V-Flag : Enable Verification of the SID supplied by the controller
  - A-Flag: Enable SR Algorithm
- Addition of new flags to Binding SID
  - S-Flag : “specified-BSID-only” behavior
  - I-Flag: “Drop upon Invalid” behavior
- Other updates

```
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<Distinguisher, Policy-Color, Endpoint>

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     Segment
     Segment
       ...
       ...
```

Other updates

- Next-Hop address length specification to cover IPv4 or IPv6 next-hop in both SAFIs
- Defaults for Policy Preference, Weight parameters
- Updates to align terminology and the section references post WG adoption of SR Policy Architecture doc
    - https://tools.ietf.org/html/draft-ietf-spring-segment-routing-policy-01
    - https://tools.ietf.org/html/draft-filsfils-spring-sr-policy-considerations-01
- Updates to the Error handling text in few sections
    - Malformed sub-TLVs
    - Duplicate sub-TLVs
    - Clarification on Mandatory and optional sub-TLVs
- Editorial corrections

Next Steps

- Address any comments
- IANA code points assignments for newly defined sub-TLVs and Flags
- Request for WGLC subsequently

Backup (sub-TLV details)

New Sub-TLVs (Policy Priority)

- Policy Priority sub-TLV
- An operator MAY set the Policy Priority sub-TLV to indicate the order in which the SR policies are re-computed upon topological change
- Reference - section 2 in https://tools.ietf.org/html/draft-ietf-spring-segment-routing-policy-01

```
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     |   Priority    |   RESERVED    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

New Sub-TLVs (Policy Name)

- Policy Name sub-TLV
- An operator MAY set the Policy Name sub-TLV to attach a symbolic name to the SR Policy candidate path
- Reference - section 2 in https://tools.ietf.org/html/draft-ietf-spring-segment-routing-policy-01

```
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                      |   RESERVED    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
//                        Policy Name                          //
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

New Sub-TLVs (ENLP)

- Explicit Null Label Policy (ENLP) sub-TLV
- An operator MAY set the ENLP sub-TLV to indicate whether an Explicit NULL Label [RFC3032] must be pushed on an unlabeled IP packet before any other labels
- Reference - section 4 in https://tools.ietf.org/html/draft-ietf-spring-segment-routing-policy-01

```
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    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     ENLP      |
+-+-+-+-+-+-+-+-+
```

SR Algorithm

- SR Flex Algorithm Flag (A-Flag)
- An operator MAY signal this flag with the Segment Type and supply a SR Algorithm ID.
- Reference - section 4 in https://tools.ietf.org/html/draft-ietf-spring-segment-routing-policy-01

```
 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     | SR Algorithm |
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 |                 IPv4 Node Address (4 octets)                   |
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 |                 SID (optional, 4 octets)                       |
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

New Segments

- Type 9: IPv6 Node Address with optional SID for SRv6
- Type 10: IPv6 Address + index for local and remote pair with optional SID for SRv6
- Type 11: IPv6 Local and Remote addresses for SRv6
- Reference - section 4 in https://tools.ietf.org/html/draft-ietf-spring-segment-routing-policy-01

Type 9:

```
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     | SR Algorithm  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
//                 IPv6 Node Address (16 octets)               //
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
//                     SID (optional, 16 octets)               //
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Segment Flags

- Segment Flags encode the per Segment behavior
- V-Flag : Segment Verification is performed on Head-end
  - Reference - section 5 in https://tools.ietf.org/html/draft-ietf-spring-segment-routing-policy-01

- A-Flag: SR Flex Algorithm is used for SID calculation
  - Reference - section 4 in https://tools.ietf.org/html/draft-ietf-spring-segment-routing-policy-01

```
 0 1 2 3 4 5 6 7

+-+-+-+-+-+-+-+-+
|V|A|           |
+-+-+-+-+-+-+-+-+
```

Binding SID Flags

- S-Flag : Enable “Specified-BSID-only” behavior on Head-End
  - Reference - section 6 in https://tools.ietf.org/html/draft-ietf-spring-segment-routing-policy-01

- I-Flag: Enable “Drop Upon Invalid” behavior on Head-End
  - Reference - section 8 in https://tools.ietf.org/html/draft-ietf-spring-segment-routing-policy-01

```
 0 1 2 3 4 5 6 7
+-+-+-+-+-+-+-+-+
|S|I|           |
+-+-+-+-+-+-+-+-+
```