BGP Extensions of SR Policy for Path Protection

draft-lp-idr-sr-path-protection-00

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Backgroud and Motivation

➢ When SR policies are involved and a strict compliance of the policy is required, an end-to-end protection should be preferred over a local repair mechanism.

➢ Using a Candidate Path for Path Protection *[draft-ietf-spring-segment-routing-policy]* :
- An SR Policy allows for multiple candidate paths
- A single active candidate path that is provisioned in the forwarding plane and used for traffic steering
- Other (lower preference) candidate path(s) MAY be designated as the backup.
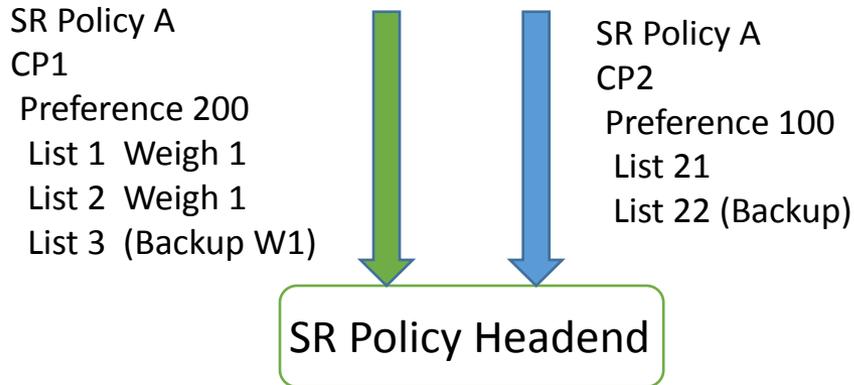
➢ When distributing SR Policies using BGP, each candidate path is carried in an NLRI *[draft-ietf-idr-segment-routing-te-policy]*.
- No mechanism to carry the protection relationship of candidate paths in BGP advertisement yet.
- Provide protection only when all the segment lists in the active CP are invalid. Not flexible enough in scenarios like load balancing.

```
SR Policy
  CP1
          SL1 W1
          SL2 W2
  CP2
          SL3 W3
          SL4 W4
```

This document proposes extensions of BGP in order to provide path protection using segment list(s) when delivering SR policy.

Segment list for Path Protection

➢ segment list can be used solely for path protection

➢ segment list and candidate path can be combined together for path protection
- When a path fails, the backup segment list within the same candidate path is used preferentially for path protection. If the backup list is also invalid, then other candidate path can be enabled for protection.

SR Policy A
CP1
Preference 200
List 1 Weigh 1
List 2 Weigh 1
List 3 (Backup W1)

SR Policy A
CP2
Preference 100
List 21
List 22 (Backup)

SR Policy Headend

BGP Extensions for SR Policy

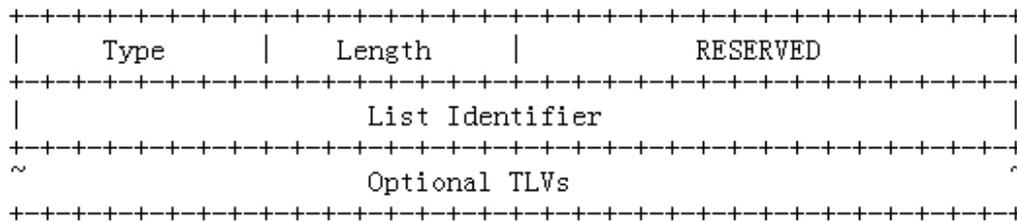➢ B-Flag in Segment List Sub-TLV

```
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|      Type        |          Length           |B|  RESERVED    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
//                         sub-TLVs                            //
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
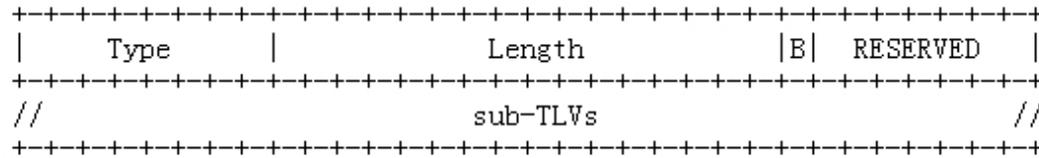
Segment List sub-TLV

- B-Flag(Backup Flag): one bit. It indicates the segment list acts as a pure backup path in the candidate path

➢ List Identifier Sub-TLV
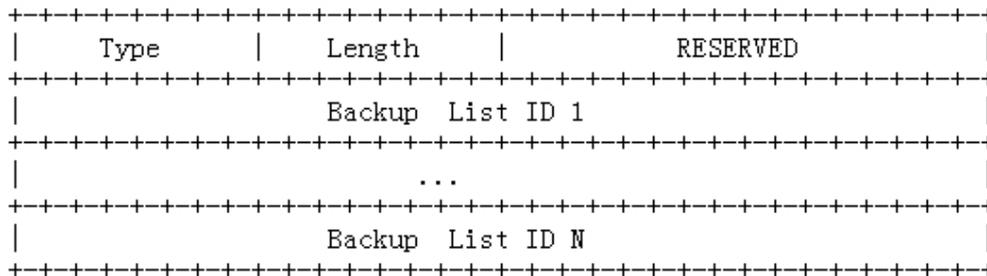
```
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|      Type        |     Length      |          RESERVED        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                       List Identifier                        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~                       Optional TLVs                          ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

List Identifier Sub-TLV

- List Identifier: Identifier of the corresponding segment list

➢ List Protection Sub-TLV

```
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|      Type        |     Length      |          RESERVED        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                       Backup List ID 1                       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                           ...                                |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                       Backup List ID N                       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

List protection Sub-TLV

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)
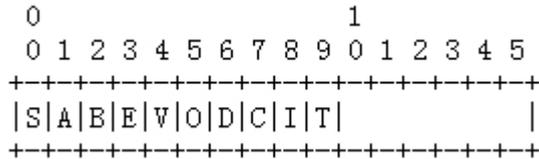   Segment List
                List Identifier
                    List Protection Sub-TLV
            Weight
            Segment
            Segment
            ...

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BGP-LS Extensions for Segment List States

➢ *[draft-ietf-idr-te-lsp-distribution]* describes a mechanism to collect the Traffic Engineering and Policy information that is locally available in a node and advertise it into BGP Link State (BGP-LS) updates.

➢ Flags in SR Candidate Path (CP) State TLV

```
 0                   1
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|S|A|B|E|V|O|D|C|I|T|           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

- S-Flag : Indicates the CP is in administrative shut state

- A-Flag : Indicates the CP is the active path

- B-Flag : Indicates the CP is the backup path

➢ New Flags in SR Segment List TLV

```
 0                   1
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|D|E|C|V|R|F|A|T|M|B|S|         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

- S-Flag : Indicates the segment list is in administrative shut state

- B-Flag : Indicates the segment list is the backup path

Next Steps

- Request feedbacks and comments

Thank You !