BGP Extensions of SR Policy for Path Protection

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

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Background 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.

![Segment routing example]

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.

\begin{center}
\begin{tikzpicture}
  \node[draw] (headend) at (0,0) {SR Policy Headend};
  \node[draw] (cp1) at (-3,-3) {SR Policy A CP1 \newline Preference 200 \newline List 1 Weigh 1 \newline List 2 Weigh 1 \newline List 3 (Backup W1)};
  \node[draw] (cp2) at (3,-3) {SR Policy A CP2 \newline Preference 100 \newline List 21 \newline List 22 (Backup)};
  \draw[->,line width=2pt] (headend) -- (cp1);
  \draw[->,line width=2pt] (headend) -- (cp2);
\end{tikzpicture}
\end{center}
### BGP Extensions for SR Policy

#### B-Flag in Segment List Sub-TLV

```
+----------------+----------+----------+
|    Type        |    Length|    B     |
+----------------+----------+----------+
|                |          | RESERVED |
+----------------+----------+----------+
```

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:** Identifier of the corresponding segment list

#### List Protection Sub-TLV

```
+----------------+----------+----------+
|    Type        |    Length| RESERVED  |
+----------------+----------+----------+
|                |          |          |
+----------------+----------+----------+
```

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
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

  - 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

  - 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!