SR Generic FEC TLV for LSP Ping

(draft-nainar-mpls-spring-lsp-ping-sr-generic-sid)

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Problem Statement

- Requires new target FEC Stack sub-TLV definition and standardization efforts for each new Segment ID defined.
  - Define new TLV.
  - Update FEC validation procedure of RFC-8029

- Requires domain/node wide software upgrade depending on the type of the Segment ID defined.

- Raises usability and scalability challenges.
Problem Statement (A partial list of New SR FECs)

- BGP Peer Node SID
- BGP Peer Adj-SID
- BGP Peer Set SID
- BGP Peer Set SID Sub-TLVs

FEC changes for Flex-Algo
Problem Statement (Cont’ed)

- Complex validation procedures at Egress (one for each SID type).

- Requires a lot of information to be derived by the Initiator to include in the Echo Request.

- Complex FEC filling procedures at Ingress (one for each SID type).

- In some cases, ingress is unable to fill-in the required information.
  - E.g., Initiator of ping (node 1) does not know how the packet will be load balanced at a target node (node 2).
Solution

- SR SID data model is:
  - Segment ID (Label)
  - SID Assigner

- Define a SID based on the SR SID data model and use it for all various SID types.
## SR Generic Label Sub-TLV

<table>
<thead>
<tr>
<th>SR SID (20 Bits)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SID Assigner</td>
<td></td>
</tr>
<tr>
<td>LSP End Point (Optional; may be 0.0.0.0)</td>
<td></td>
</tr>
</tbody>
</table>

- **SR SID**
  - Carries 20 bits of Segment ID used for validation.

- **SID Assigner**
  - Node address of the Segment ID assigner.

- **LSP End Point**
  - Node address of the endpoint that terminates the LSP.
  - LSP End Point may be set to 0.0.0.0 by the initiator.
    - E.g., for parallel adjacency.
  - If LSP End Point address is set, the Egress MAY skip the SID assigner check.
    - E.g., for BSID
Responder behavior (New)

**Initial Variables**
- `top-label` = `label_at_stackdepth`
- `sr_label` = SR SID (From the FEC)
- `Orig_addr` = SID Assigner (From the FEC)
- `End_point_addr` = LSP End Point Address

**End_point_addr is 0.0.0.0?**

- **Yes**
  - Top-label = Imp-Null
  - Set RSC = 10
  - Set RSC = 10 (no mapping for FEC)

- **No**
  - End_point_addr is self.address??
    - **Yes**
      - Top-label = Imp-Null
      - Set RSC = 10
      - Set RSC = 10 (no mapping for FEC)
    - **No**
      - Top-label = Imp-Null
      - Set RSC = 10
      - Set RSC = 10 (no mapping for FEC)

**Top-label = Imp-Null**

- **Yes**
  - sr_label is local with PHP?
    - **Yes**
      - Set RSC = 3 (OK)
    - **No**
      - Orig_addr is upstream neighbor??
        - **Yes**
          - Interface-I matches the incoming interface??
            - **Yes**
              - Prefix SID, Adj-SID, Any Flex-Algo, Binding SID
            - **No**
              - Set RSC = 3 (OK)
        - **No**
          - Set RSC = 3 (OK)

- **No**
  - Orig_addr is in Topology database??
    - **Yes**
      - sr_label advertised by orig_addr
        - **Yes**
          - Orig_addr is upstream neighbor??
            - **Yes**
              - Interface-I matches the incoming interface??
                - **Yes**
                  - Set RSC = 35
                  - Set RSC = 35 (Mapping for FEC does not match incoming IF)
                - **No**
                  - Parallel Adj-SID, Peer Set SID
            - **No**
              - Set RSC = 3 (OK)
        - **No**
          - Set RSC = 3 (OK)
    - **No**
      - Set RSC = 10 (no mapping for FEC)

**Prefix SID, Adj-SID, Any Flex-Algo, Binding SID**
Initiator (R1) triggers LSP Ping with below SR Generic Label Sub-TLV:

- For Prefix SID 160008 {SID=160008; SID Assigner = R8; LSP-EndPoint = R8}
- For Prefix SID 161288 {SID=161288; LSP-EndPoint = R8}

R8 validates if LSP-EndPoint == self; and if 160008 is assigned locally.
Initiator (R1) triggers LSP Ping with below SR Generic Label Sub-TLV:

- For Parallel Adj SID 9378 {SID=9378; SID Assigner = R7; LSP-EndPoint = R8}

R8 validates if LSP-EndPoint == self; and if Interface-I matches interface for 9378.
Initiator (R1) triggers LSP Ping with below SR Generic Label Sub-TLV:

- For Parallel Adj SID 9378 {SID=9378; SID Assigner = R7; LSP-EndPoint = 0.0.0.0}

Responder (R8 or R88) validates if SID Assigned==upstream; validates if Interface-I matches interface for 9378.
In a nutshell

- One Target FEC Stack Sub-TLV that covers multiple Segment IDs.
- Drastically reduces the information required on the Initiator.
  - Ease of operation.
- Reduces the information to be processed by the responder.
- Extendable to accommodate future Segment IDs.
IANA Registry Allocation

- Request for a new Sub-TLV for TLV types 1, 16 and 21.
- Value from range 38-31743 (Unassigned range)
- Re-uses existing Return codes and Return Sub-codes
MPLS or SPRING WG?

- It is really up to the chairs to decide.
I-D Status

Next Steps:
- WG feedback sought
- Textual Contributions Welcomed!
- WG Adoption after Montreal

Thank you!