Advertisement of Dedicated Metric for Flexible Algorithm (Algorithm-specific Link Metric) in IGP

draft-lin-lsr-flex-algo-metric-00

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Background

• Flex-Algorithm allows IGP to compute constraint-based paths.

• Links can be pruned by using EAG rules to create different topologies for different algorithms. However, if a link is included by multiple algorithms of same metric-type, these algorithms can only share the same metric value.

• This draft extends IS-IS and OSPF to advertise algorithm-specific link metrics.
Problem Statement

• For slice 1, the network operator expects to use A-B-D as the primary path and A-C-D as the backup path. For slice 2, A-C-D is the primary path and A-B-D is the backup path. Network resources are reserved along the primary paths for slices.

• Flex-Algo 128 is used to steer the traffic of slice 1. Flex-Algo 129 is used for slice 2.

• The metric-type of Flex-Algo 128 and 129 are the same.

<table>
<thead>
<tr>
<th>Link</th>
<th>Reserved Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-B, B-D</td>
<td>100 Mbps for Slice 1</td>
</tr>
<tr>
<td>A-C, C-D</td>
<td>100 Mbps for Slice 2</td>
</tr>
</tbody>
</table>
Algorithm-specific Link Metric

- By using EAG rules, the backup path will be excluded.
- Hope Flex-Algo 128 and Flex-Algo 129 can advertise different metrics for the same link.

Using EAG:

Topography of Flex-algo 128

Topography of Flex-algo 129

Expectation:

Topography of Flex-algo 128

Topography of Flex-algo 129
Another Case (Excluding from Default Topology)

- There is a TE-tunnel (or SR Policy) between A and D. In Flex-Algo 128, forward adjacency is enabled for the tunnel A-D to allow other nodes to see it.

- In Flex-Algo 128, the traffic from S to D is steered into tunnel A-D. But for the BE traffic of default topology, tunnel A-D is not expected to be used.

- The metric-type of Flex-Algo 128 is IGP-Metric.
# IS-IS Extension

- Algorithm-specific Link Metric sub-TLV (carried in the Application-Specific Link Attribute (ASLA) for Flex-AlGORITHM):

```
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-
|      Type      |     Length     | Metric-Type | Algorithm |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-
|    Reserved     |             Metric             |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-
```

- If the Metric-Type and Algorithm fields is consistent with the FAD, that Flex-AlGORITHM should use the metric in the Algorithm-specific Link Metric sub-TLV during path calculation. The new defined sub-TLV is optional. If it is not advertised, legacy metrics are used.

- For example, if the metric-type of a Flex-AlGORITHM is IGP-Metric and the Algorithm-specific Link Metric sub-TLV of the same metric-type and algorithm is advertised in ASLA carried by TLV-22, the metric in the new defined sub-TLV should be used, other than the default metric field in TLV-22.
OSPF Extension

- Algorithm-specific Link Metric sub-TLV:

```
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Type | Length |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Metric-Type | Algorithm | Reserved |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Reserved | Metric |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

- The new sub-TLV for OSPF is also carried in the Application-Specific Link Attribute (ASLA) for Flex-Algorithm. The usage is similar with IS-IS.
Next Steps

• Any questions or comments are Welcomed
• Request further review and feedback

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