# 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.

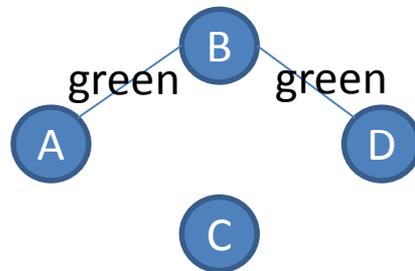- The metric-type of Flex-Algo 128 and 129 are the same.

Primary Path of Slice 1

Traffic

Primary Path of Slice 2
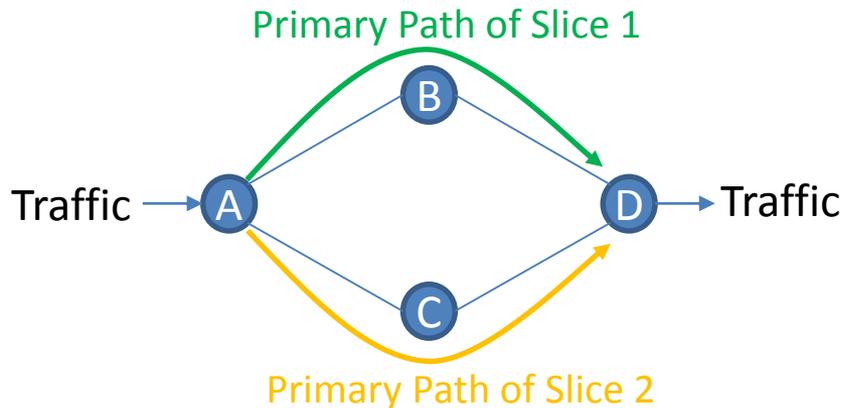
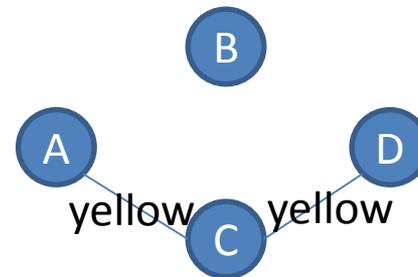| Link | Reserved Bandwidth |
|------|--------------------|
| A-B, B-D | 100 Mbps for Slice 1 |
| A-C, C-D | 100 Mbps for Slice 2 |

# 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.
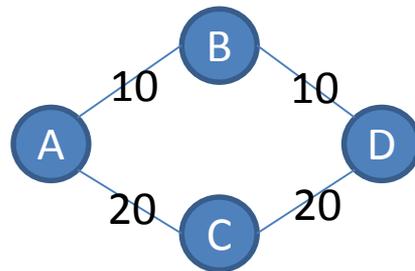


Using EAG:

Topology of Flex-algo 128

Topology of Flex-algo 129

Expectation:

Topology of Flex-algo 128
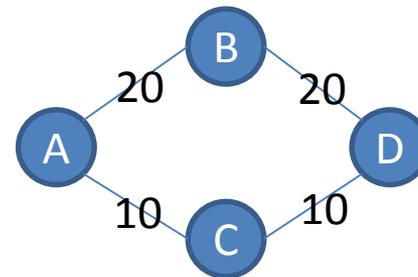
Topology of Flex-algo 129

# 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.



Tunnel:
- Metric for default topology = Max-metric
- Metric for Flex-Algo 128 = 1 (Algorithm-specific Link Metric)
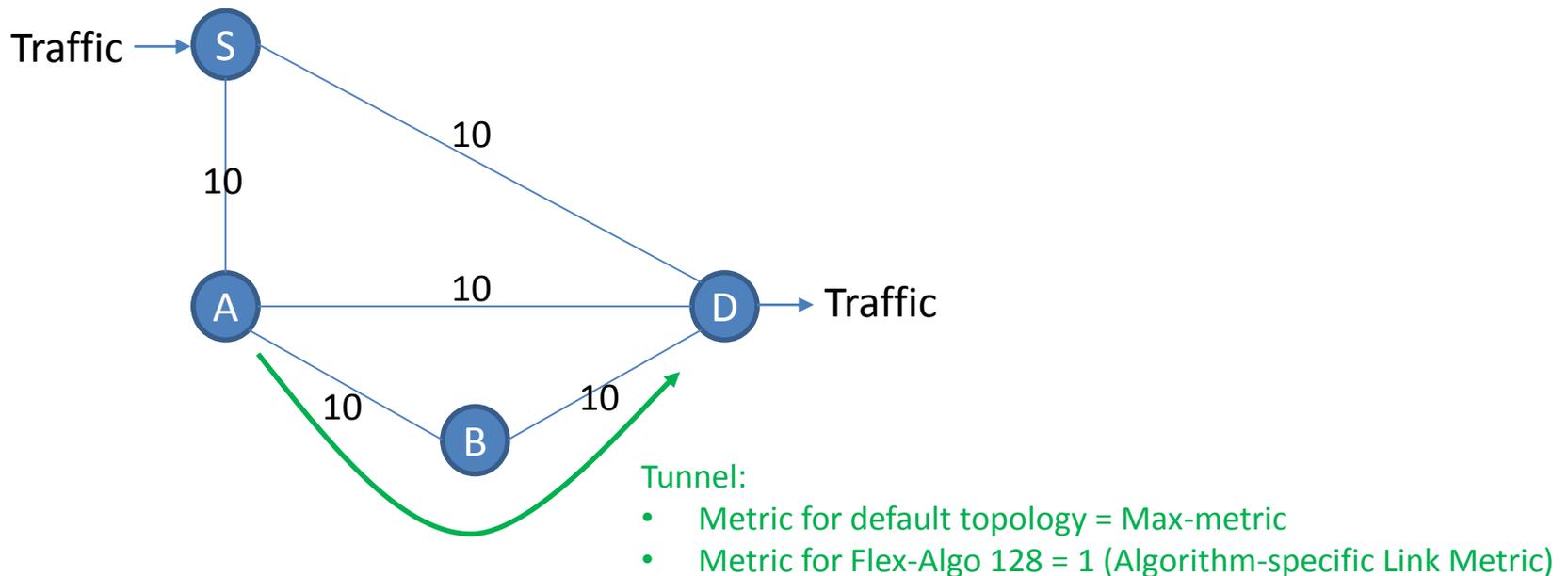
# IS-IS Extension

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

```
 0                   1                   2                   3
 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    | Metric-Type |   Algorithm   |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   Reserved    |                    Metric                    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
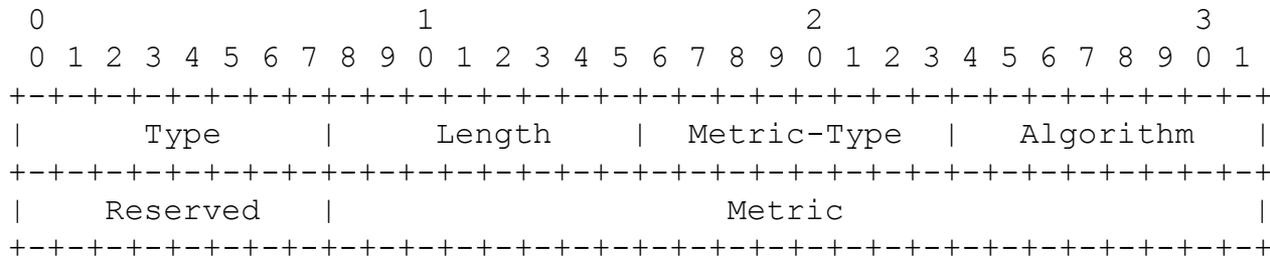
- If the Metric-Type and Algorithm fields is consistent with the FAD, that Flex-Algorithm should use the metric in the Algorithm-specific Link Metric sub-TLV during path calculation. The new defined sub-TLV is optional. If it is not advertised, legacy metrics are used.

- 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
 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            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| 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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