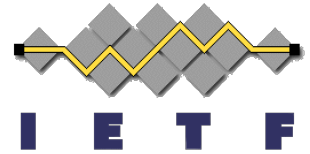# Generic Metric extensions for AIGP attribute
draft-ssangli-idr-bgp-generic-metric-aigp-04
IETF 116

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I E T F

Agenda

- Recap
  - Problem statement
  - Solution summary
- Updates to the draft
  - Deployment use cases
- Next steps

Problem Statement

- Different types of traffic may need to be routed satisfying specific constraints

- Link metric has evolved beyond traditional IGP cost

  - Delay, bandwidth as defined in IGP metric-type registry

  - Administratively assigned metric-types proposed by (draft-ietf-lsr-flex-algo-bw-con)

Problem Statement

- Operator may want to provision end-to-end paths across multiple AS domains

  - intent-based inter-domain routing

- AIGP attribute defined in RFC7311 can carry IGP default cost

  - 1 TLV defined - AIGP TLV carries the IGP cost

Alignment between IGP metric types and AIGP metric would simplify network operations

Summary of Proposal: Generic-metric TLV
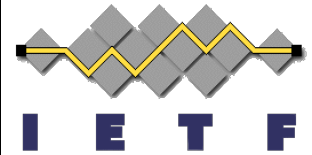
- Extensions to AIGP attribute to carry Generic-metric TLV

- New metric-type field maps to IGP metric-type registry

```
0                   1                   2                   3
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 2
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|      Type     |              Length           |  metric-type |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| metric-value                                                 |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+........................
```
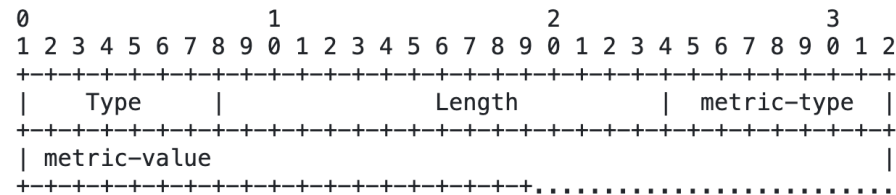
Figure 2: Generic-Metric TLV

Generic-Metric TLV Type (1 octet): Code point to be assigned by IANA

Generic-Metric TLV Length (2 octets): 12

Generic-Metric TLV Value (9 octets): 2 sub-fields as shown below:

1.   metric-type (1 octet): Value from IGP metric-type registry.

2.   metric-value (8 octets): Value range (0 - 0xffffffffffffffff)

Summary of Proposal:
Usage of Generic-Metric TLV

- Originator - same as RFC7311
  - encode the metric in Generic-Metric TLV
- Receiver - mostly similar to RFC7311
  - metric-type of domain matches metric-type in route
    - use the received value
  - metric-type of domain differs from metric-type in route
    - normalize the local cost to route's metric-type
    - non-zero value to be added

Summary of Proposal:
Best path computation

- Updates to RFC7311 Decision Process
  - generic_metric TLV preferred over AIGP TLV
  - Route R has generic-metric value = T
    - metric-type matches local domain metric-type
      - Compute $C = T + n$ (metric to reach NH)
    - metric-type does not match local domain metric-type
      - Compute $C = T + m$ (normalize metric to reach NH)
    - Consider routes tied with lowest value of C
  - among routes with generic_metric TLV, prefer routes with lowest metric-type

Deployment use case1

Delay-based end-to-end path from PE1-PE2

```
                        +--------------+
                        |   Domain2    |
                        |      |       |
                  ......+ASBR21  ASBR22+....
                  .     |      |       |   .
+------------+    .     | igp-metric   |   .  +--------------+
| Domain1    |    .     +--------------+   .  |   Domain4    |
|      |     |    .                        .  |      |       |
|    ASBR11+..                              ..+ASBR41        |
+PE1   |     |                                |           PE2+
|    ASBR12+..                              ..+ASBR42        |
|      |     |    .                        .  |      |       |
| IGP-metric |    .     +--------------+   .  | delay-metric |
+------------+    .     |   Domain3    |   .  +--------------+
                  .     |      |       |   .
                  ......+ASBR31  ASBR32+....
                        |      |       |
                        | delay-metric |
                        +--------------+
```
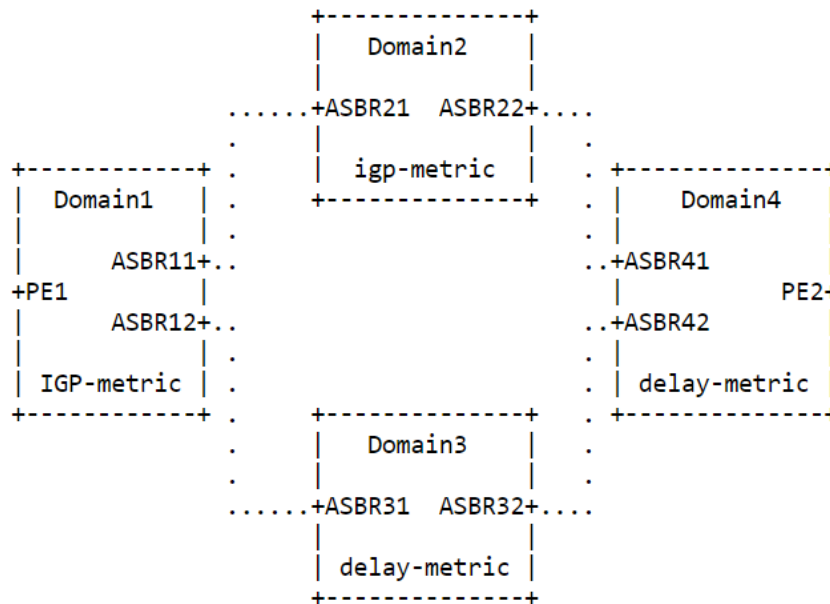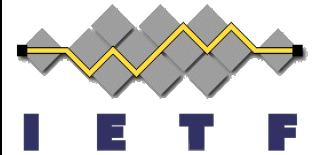
- domain1, domain2 use igp-metric
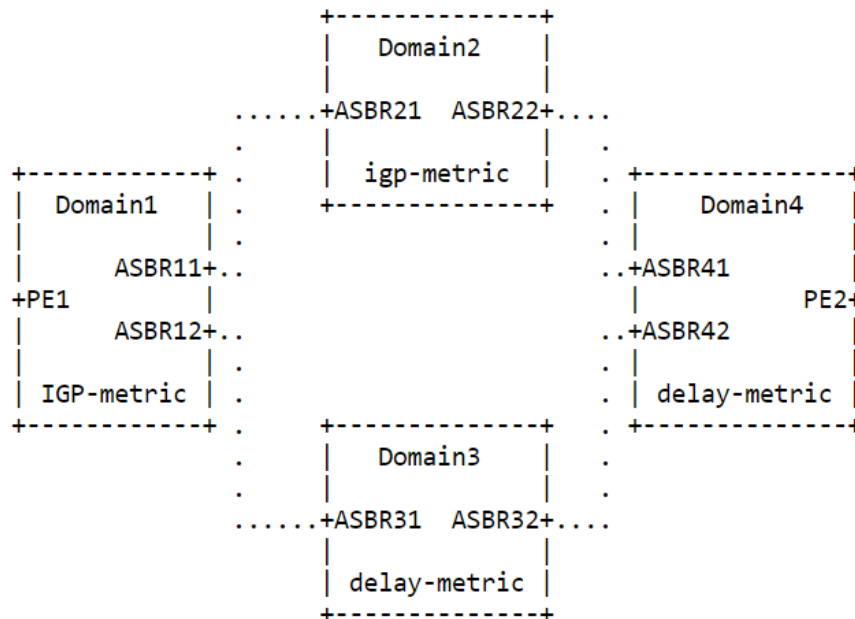- domain3, domain4 use delay-metric

- ASBR41, ASBR42 originate route with generic-Metric TLV, metric-type is delay-metric (1).

- domain1 and domain2 normalize IGP cost before updating generic-metric TLV

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Deployment use case2

End-to-end path based on IGP-cost but use delay-metric within a local domain

```
               +--------------+
               |   Domain2    |
               |              |
          ......+ASBR21  ASBR22+....
          .    |  igp-metric  |    .
+-------------+ .  +--------------+  . +--------------+
|  Domain1    | .                    . |   Domain4    |
|             | .                    . |              |
|      ASBR11+..                      ..+ASBR41       |
+PE1         |                          |         PE2+
|      ASBR12+..                      ..+ASBR42       |
|             | .                    . |              |
| IGP-metric  | .                    . | delay-metric |
+-------------+ .  +--------------+  . +--------------+
          .    |   Domain3    |    .
          .    |              |    .
          ......+ASBR31  ASBR32+....
               |              |
               | delay-metric |
               +--------------+
```
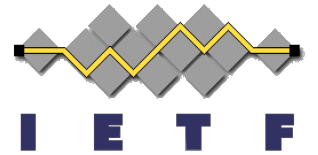
- domain1, domain2 use igp-metric
- domain3, domain4 use delay-metric

- All routers update generic-metric TLV with IGP-cost
- Intra-domain path to reach ASBR will be based on local metric-type.
- For e.g., ASBR31 choses path with lowest delay to reach ASBR32

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Next Steps

- Request review and comments
- Ready for WG adoption

Thank you