Generic Metric extensions for AIGP attribute
draft-ssangli-idr-bgp-generic-metric-aigp-07

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Agenda

- Recap
- Updates to the draft
- Deployment options
- Next steps
Recap

- Operator may provision intent-based end-to-end path across multiple AS domains
  - Need metrics beyond IGP-default, e.g. delay, bandwidth, administratively assigned metric-types.

- AIGP attribute defined in RFC7311 can carry default IGP-Metric
  - 1 TLV defined - AIGP TLV carries the default IGP cost

- Extensions to AIGP attribute to carry Generic-metric TLV
  - metric-type and metric-value sub-fields map to IGP metric-type registry
Updates to 05 version (1/3)

- Introduces metric-flags sub-field

```
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-flags | metric-value |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-
```

- The flags indicate Continuity and Normalization
  - I – indicates Incomplete or discontinuous
  - N – indicates that metric-value has been normalized
  - R – Reserved for future use

- Multiple Generic-Metric TLVs can be sent by originator to express the intent
Updates to 05 version (2/3)

- Originating BGP speaker
  - Set metric-flags I=0 & N=0

- Non-originating BGP speaker
  - Before propagating to peers, update metric-flags
    - I=1 if metric-type is unrecognized
    - N=1 if intra-domain IGP cost was normalized

- Updates to Section 4 RFC7311 Decision Process for tie breaker between two routes with Generic-Metric TLV
  - Prefer route with “I=0” over ”I=1”, meaning prefer complete accumulation over incomplete accumulation of end-to-end metric
  - Prefer route with “N=0” over “N=1” routes, meaning prefer non-normalized over normalized metric
Updates to 05 version (3/3)

Deployment use case3

Router along the path does not understand new metric-type

- Domain1, domain2 use igp-metric
- Domain3, domain4 use delay-metric

- Domain2 does not understand delay-metric and ASBR21 sets “I” bit of metric-flags
- PE1 will have 2 paths, Prefer complete over incomplete path.
  - Metric complete accumulation via Domain3
  - Metric incomplete accumulation via Domain2
Issue

- At least few different interpretations of RFC7311
  - Some vendors propagate AIGP TLV and drop unrecognized TLV
  - Some vendors update AIGP TLV with metric-type other than default IGP-metric
  - Some vendors do not propagate AIGP attribute if AIGP TLV is missing even if Generic-Metric TLV is present
  - May be more..

- The Continuity bit will not solve all scenarios
  - A router along the path does not recognize Generic-Metric TLV, does not update value and flags, yet will propagate AIGP attribute
  - Receiving router cannot determine the metric continuity
Options for deployed networks

Option1: Current AIGP attribute with Generic-Metric TLV
- Issue: The continuity bit does not provide deterministic behavior
- Solution: Upgrade all routers that modify next hop along the path

Option2: New AIGPv2 as optional & non-transitive attribute
- Generic-Metric TLV only in AIGPv2
- Upgrade all routers including Route Reflectors
  - If any router along the path is not upgraded, it drops AIGPv2 hence deterministic
- Continuity bit will provide deterministic behavior in all scenarios
Next Steps

- Request review and comments
Thank you