ALTO Traffic Engineering Cost Metrics

draft-wu-alto-te-metrics-00
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Recap.

- **Draft-wu-alto-json-te-01** was presented in the last IETF 87 Berlin ALTO side meeting and got a lot of interests, discussion and supports.

- Richard Yang recently raised discussion on the list by reviewing three documents (**draft-wu-alto-json-te**, **draft-lee-alto-app-net-info-exchange**, **draft-randriamasy-alto-multi-cost-07**) and suggested to consolidate these three documents and have two new work items for ALTO extension:
  - Work item 1: One document defining a complete list of cost metrics.
  - Work item 2: One document specifying multi-cost filtering.

- **Draft-wu-alto-json-te** is more close to the first work item.

- **draft-wu-alto-te-metrics-00** is built mostly based on **draft-wu-alto-json-te** and also merging additional ideas by consolidating with **draft-lee-alto-app-net-info-exchange**, **draft-randriamasy-alto-multi-cost-07** on multi-cost filtering and additional metrics.

- Draft-wu-alto-te-metrics-00 follows the guideline per RFC 6390 and defines a set of cost metrics, including the naming, the semantics, ...
  - These cost metrics are derived from OSPF-TE and ISIS-TE, to report network delay, jitter, packet loss, hop count, and bandwidth.
Motivation

• ALTO protocol may gather network topology and cost information from multiple systems (e.g., Routing protocol) and uses JSON to represent them and provide to the application to effectively utilize them;

• Currently, ALTO only defines a single cost metric ‘routing cost’. Also ‘hopcount’ is not well specified.
  – It is necessary to consider the TE performance for path computation or endpoint selection, especially for the performance sensitive applications (e.g., stock-market, gaming, video);

• As described in [draft-ietf-isis-te-metric-extensions-01],[draft-ietf-ospf-te-metric-extensions-04],[draft-ietf-idr-ls-distribution-03],[draft-wu-idr-te-pm-bgp-03], TE performance related information is needed by some external components, e.g., ALTO
  – ALTO server can gather and aggregate these dynamic network performance information and use these info to help applications deciding which endpoint to connect.
ALTO Cost metrics Extensions

- This draft defines 11 Cost Metrics, derived from OSPF-TE and ISIS-TE, to measure network delay, jitter, packet loss, hop count, and bandwidth.
  - The metrics defined in this document provide a relatively comprehensive set of Cost Metrics for ALTO focusing on traffic engineering.
  - The metrics include:
    • Delay, DelayJitter
    • Pktloss
    • Bandwidth, MaxBandwidth, maxreservbw, unreservbw, residuebw, availbw, utilbw
  - Each metric is defined by attributes including: metric name, metric description, measurement timing, measurement unit and etc.
- This draft also provides examples to explain usage of each metric
  - Each metric is used in the same way as routing cost defined in the ALTO base protocol
- New cost metrics can be used as constraint attributes for requested cost metric attribute 'routingcost' value or as a returned new cost metric in the output or both.
  - request on 'routingcost' metric with constraint on 'latency': this implies a protocol extension
    • Allowing output and constraints use different Cost Metrics is not in the scope of this draft
  - ‘request ‘latency’: it implies extending the set of ALTO cost metrics but does not need a protocol extension on ALTO transactions
  - as a requested metric with constraints on itself: This implies extending the set of ALTO cost metrics but does not need a protocol extension
JSON format example for metric “delay”

- POST /endpointcost/lookup HTTP/1.1
- Host: alto.example.com
- Content-Length: TBA
- Content-Type: application/alto-endpointcostparams+json
- Accept: application/alto-endpointcost+json,application/alto-error+json
- {
  "cost-type": {"cost-mode" : "numerical",
               "cost-metric" : "delay"},
  "endpoints" : {
    "srcs": [ "ipv4:192.0.2.2" ],
    "dsts": [ "ipv4:192.0.2.89",
              "ipv4:198.51.100.34",
              "ipv4:203.0.113.45"
            ]
  }
}

HTTP/1.1 200 OK
Content-Length: TBA
Content-Type: application/alto-endpointcost+json
{
  "meta" : {
    "cost-type": {"cost-mode" : "numerical",
                  "cost-metric" : "delay"}
  },
  "endpoint-cost-map" : {
    "ipv4:192.0.2.2": {
      "ipv4:192.0.2.89" : 10,
      "ipv4:198.51.100.34" : 20,
      "ipv4:203.0.113.45" : 30,
    }
  }
}
Open issue- schedule of cost metric

• Richard raises one key issue:
  – ALTO use a single measurement interval?
  – Do we need to specify the measured time?
  – How can such meta info be conveyed?

• Solution
  – Rely on measurement interval defined somewhere else (e.g., IGP Routing protocol setting configurable interval, management system)
  – Assume one measurement interval is set for each ALTO Server and the value of measurement interval is fixed.
  – Discussion is welcome on the best placeholder for “measurement interval“ in the ALTO Service
Next step

• Adopt as WG draft
  – Compliant with ALTO base protocol
  – Few impact on ALTO base protocol
  – TE performance metrics are now being standardized in ISIS WG, OSPF WG and IDR WG
  – ALTO allows aggregate information from different other sources
  – Future draft iterations with
    • Refined ‘hopcount’ definition
    • Generic ‘bandwidth’ definition
    • Other abstracted TE-based ALTO metrics