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