ALTO Extension: Path Vector

draft-ietf-alto-path-vector-02

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Overview

• Document goal: address the network graph milestone

• Main updates between IETF99 and IETF100
  • Text re-organization
  • Clarification on words
  • Remove "query-id"
  • New media type introduces a new service
  • move ANE Domain to [draft-ietf-alto-unified-props-new]
Recall: Three Solutions Proposed at IETF99

• PV Cost Type --- Stable
  – Cost Mode = "array"
    Indicate each returned cost value is an array
  – Cost Metric = "ane-path"
    Indicate each returned array represents an path consisting of abstract network elements

• Information Structure --- Changed
  – Path Vector information in cost map and property map
  – "Query-id" is used to correlate two maps.
  – Introduce "multipart/related" to return two maps in a single response

• Query Format --- Stable
  – Cross-product format as defined in [RFC7285]
Update 1: Text Re-Organization
Update 2: Clarification on Words

• Use Key Words MUST, MAY, SHOULD... clearly as defined [RFC2119]
• Consistent use of the abbreviations defined in terminology
• Replace the references of [I-D.ietf-alto-multi-cost] to [RFC8189]
Update 2: Clarification on Words

- Words underline that cost metric "ane-path" can only be in cost mode "array" defined in this document and the table enriched to illustrate the restriction.

<table>
<thead>
<tr>
<th>cost mode</th>
<th>cost metric</th>
<th>meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>numerical</td>
<td>routingcost</td>
<td>a number representing the routing cost</td>
</tr>
<tr>
<td>ordinal</td>
<td>hopcount</td>
<td>a ranking representing the hop count</td>
</tr>
<tr>
<td>array</td>
<td>ane-path</td>
<td>a list representing the ane path</td>
</tr>
</tbody>
</table>

Table 1: Cost Types and Their Meanings
Update 3: Remove "query-id"

- "query-id" correlates the abstract network elements in a Filtered Cost Map (Endpoint Cost Service) and a Filtered Property Map, but is inconvenient. Additional attribute in the response of unified property map and cost maps.

- ALTO Server need to ensure the uniqueness of abstract network elements in a period of time.
Update 4: A New Service "Multipart ALTO Service"

- Media Type: multipart/related
- HTTP Method: POST
- Accept Input Parameters:
  - The same as Filtered Cost or Endpoint Cost Service
- Uses:
  - Filtered Cost Map or Endpoint Cost Service
- Response:
  - Encode a Cost Map and a Unified Property Map in a single response
  OR
  - Encode a Endpoint Cost Map and a Unified Map in a single response
**Request**

POST /multipartservice/ecs-property HTTP/1.1
Host: alto.example.com
Accept: multipart/related, application/alto-costmap+json, application/alto-propmap+json, application/alto-error+json
Content-Length: [TBD]
Content-Type: application/alto-costmap filter+json

```json
{
    "multi-cost-types": [
        { "cost-mode": ""...",
          "cost-metric": ""...
        },
        { "cost-mode": "numerical",
          "cost-metric": "routingcost"
        }
    ],
    "endpoints": {
        "srcs": [ "ipv4:192.0.2.2" ],
        "dsts": [ "ipv4:192.0.2.89",
                   "ipv4:203.0.113.45",
                   "ipv6:2001:db8::10" ]
    }
}
```

**Response**

HTTP/1.1 200 OK
Content-Length: [TBD]
Content-Type: multipart/related; boundary=example-2

```plaintext
--example-2
Content-Type: application/alto-endpointcost+json

{
    "meta": {
        "multi-cost-types": [...]
    },
    "vtag": {
        ...
        "query-id": "query2"
    },
    "endpoint-cost-map": ...
}
--example-2
```

```plaintext
Content-Type: application/alto-propmap+json

{
    "property-map": ...
}
--example-2--
```
Update 5: Move ANE Domain to Unified Property Map

- Instead of specifying the format of ANE Domain in detail with "Domain Name", "Domain-Specific Entity Addresses", this document uses the same definition of entity domain name ane as defined in Section 3.4 of [I-D.ietf-alto-unified-props-new]
Next Steps

- Refinement of the use case is in progress
  Great thanks to Sabine’s fruitful review
- SSE support for Multipart ALTO Service to be discussed
- Collect feedback
Q & A

Thanks
Request
POST /endpointcostmap/multicost HTTP/1.1
Host: alto.example.com
Accept: multipart/related, application/alto-costmap+json, application/alto-propmap+json, application/alto-error+json
Content-Length: [TBD]
Content-Type: application/alto-costmap filter+json

{
    "multi-cost-types": [
        { "cost-mode": "...", "cost-metric": "..." },
        { "cost-mode": "numerical", "cost-metric": "routingcost" }
    ],
    "endpoints": {
        "srcs": [ "ipv4:192.0.2.2" ],
        "dsts": [ "ipv4:192.0.2.89",
                  "ipv4:203.0.113.45",
                  "ipv6:2001:db8::10" ]
    }
}

Response
HTTP/1.1 200 OK
Content-Length: [TBD]
Content-Type: multipart/related; boundary=example-2

--example-2
Content-Type: application/alto-endpointcost+json

{
    "meta": {
        "multi-cost-types": [...]
    },
    "vtag": {
        "query-id": "query2"
    },
    "endpoint-cost-map": ...
}

--example-2
Content-Type: application/alto-propmap+json

{
    "property-map": ...
}

--example-2--
Protocol Specifications

- **VersionTag Extension**
  
  object {
    ResourceID resource-id;
    JSONString tag;
  
  [JSONString query-id;]
  
  } VersionTag;

- **IRDResourceEntry Extension**
  
  object {
    JSONString uri;
    …
    [ResourceID uses<0..*>;]
  
    [ResourceID property-map;]
    } IRDResourceEntry;

- **Cost Map/ Endpoint Cost Map Extension**
  
  Response
  1. The "vtag" field MUST be included in the "meta" file of the response.
  2. The encoding format of each map maintains the same but introduce a new media type multipart/related to encode the multiple resources in a single response.

- **Property Map**
  
  Accept Input Parameters of IRDResourceEntry
  
  object {
    EntityAddr entities<1..*>;
    PropertyName properties<1..*>;
  
    [JSONString query-id;]
    } ReqFilteredPropertyMap;