Updates since IETF93

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Multi-Cost ALTO in a nutshell

- Returns *array* of costs instead of *scalar* cost
- Defines 'OR' constraints,
  - Supports *decision trade-offs* such as:
    - "*give me costs among {those PIDs/Endpoints} with either moderate ‘routingcost’ or ‘hopcount’ equal to 0*
      - For example: 'hopcount' = 0 OR routingcost in [5, 10]"
- Proposes additional abstract cost metrics
- Applicable service information resources:
  - Filtered Cost Map (FCM),
    - For full Multi-Cost Map: use empty SRC & DEST
  - Endpoint Cost Service (ECS)
- Does not introduce new media types
- Backwards compatible with legacy ALTO Clients
WG feedback on v0

• Proposal for Introduction

• Request for clarification
  – Why full Multi-Cost maps only provided as Filtered Cost Maps
  – Difference between « testable-cost-types » and « multi-cost-types » in capabilities and constraints

• Nits and wording
 Updates in v01-1/2

• Section 3.5 Full Cost Map Resources
  – Augmented § 1: explain how a legacy client
    • would not understand Server response having « meta » with array of cost-types and
    • thus would not understand the mapping of cost values in array with cost-types.

• Section 4.1.1 Accept input parameters (to FCM)
  – testable-cost-types: appended text to explain how this features supports
    • value requests for cost-type T1 with constraints on cost-type T2 while client does not want values on T2.
    • Servers providing values on T1 and T2 with constraints on T2 only
  – constraints:
    • corrected nits and errors
Updates in v01 – 2/2

• § 9.2 Informative References
  – Removed references not used in draft

• Proposal for introduction
  – Text on motivation present in Introduction
  – Text on design choices already present in Section 3 Overview of approach
    • 3.2: Compatibility with legacy clients
    • 3.3: Filtered Multi Cost Map resources
    • 3.5: Full Cost Map resources

→ Need to consider new ToC or add condensed text on design choices in Introduction
Next steps

• Consider updates of Section 1.Introduction
• Thank you to Richard Yang and Wang Xin
• Get their feedback on updates
• Get last WG feedback and Prepare for WGLC
Thank you

Back-up follows
Example § 5.1: Filtered multi-cost map resource in IRD

"filtered-multicost-map" : {
    "uri" : "http://alto.example.com/multi/costmap/filtered",
    "media-types" : ["application/alto-costmap+json" ],
    "accepts" : ["application/alto-costmapfilter+json" ],
    "uses" : [ "my-default-network-map" ],
    "capabilities" : {
        "cost-constraints" : true,
        "max-cost-types" : 2,
        "cost-type-names" : [ "num-routingcost",
                            "num-hopcount"]
        "testable-cost-type-names" : [ "num-routingcost",
                                      "num-hopcount"]
    }
},

Indicates that this service is MC compatible

Multi-Cost ALTO clients « see » also fields in slanted blue

Base ALTO clients « see » fields in black and ignore others
Example § 5.2: full MC Map - with testable cost types-1

POST multi/costmap/filtered HTTP/1.1
Host: alto.example.com
Content-Type: application/alto-costmapfilter+json
Accept: application/alto-costmap+json,application/alto-error+json

{
  "multi-cost-types": [
    {"cost-mode": "numerical", "cost-metric": "routingcost"},
    {"cost-mode": "numerical", "cost-metric": "hopcount"}
  ],
  "testable-cost-types": [
    {"cost-mode": "numerical", "cost-metric": "routingcost"},
    {"cost-mode": "numerical", "cost-metric": "hopcount"}
  ],
  "or-constraints": [
    ["[0] le 10", "[1] le 2"],
    ["[0] le 3", "[1] le 6"]
  ],
  "pids": {
    "srcs": [],
    "dsts": []
  }
}
Motivation – use cases

• Use multiple selection metrics for endpoints and e2e paths
  – To jointly meet application needs while keeping network awareness
    • E.g. by *jointly* getting ‘routingcost’ meeting NP interests and ‘bandwidth score’ meeting app interests

• Save time and bandwidth on ALTO requests
  – 1 Multi-Cost transaction on N metrics rather than N on 1 metric
  – 1 Multi-Cost Map is smaller than N Cost Maps

• Consistency of metric values
  – Different cost-types may change at different paces
  – For multi-variate optimization

• Enrich filtering constraints to represent compromises, e.g.
  – *select paths with moderate ‘routingcost’ OR null ‘hopcount’*
Multi-Cost transactions

- Multi-Cost Requests and responses convey an **Array** of costs
  - Array may contain any Cost Mode combination
    - Requested Cost-types array
      - ["num-routingcost", "ord-hopcount", "string-status"]
    - Taking values:
      - [23, 6, "medium"]
  - **RULE**: cost values for each Source/Destination pair MUST be provided in the same order as in the array of Multi-Cost Types
Design

• Suggested new properties and costs
  – Aggregate values with or without units
    • EP-Nominal Memory, EP-Nominal Bandwidth
    • EP Occupied memory, EP Occupied bandwidth,
    • Path Occupation Cost, // or Bandwidth Score,

• Multi-Cost filtering constraints
  – Combine AND and OR operators
  – Are applied to cost-types present in value request
    • NOTE: [draft-lee-alto-app-net-info-exchange] proposes to use constraints on metrics not present in value request