ALTO Incremental Updates

draft-schwan-incr-updates-01

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Outline

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- Existing HTTP Mechanisms
- Incremental Change Messages
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Problem Statement

- ALTO Network and Cost Maps can be large, e.g.
  - Network Map: 5000 PIDs, 10 CIDRs per PID → ~ 1.25 MB
  - Cost Map: 5000 PIDs → 5000x5000 matrix → ~ 417 MB
- Estimated update frequency:
  - Network Map: Maybe once every day or two
  - Cost Map: ***Something*** changes every few minutes

→Need conditional *and* incremental updates to **avoid retransmission of full map** for every change

- Draft lists options where client polls ALTO server and server decides based on client request

Existing HTTP Mechanisms

- Conditional retrieval:
  - **`If-Modified-Since`** header:
    - Use **`Last-Modified`** date returned by ALTO server in previous full map response.
  - **`If-None-Match`** header:
    - Use **`Etag`** returned by ALTO server in previous full map response.
- Partial retrieval:
  - **`Range`** header:
    - Fetch a byte range. Fine if a GET stopped 25 megs into a 50 meg file.
    - Not useful for fetching changes when updates change the byte offsets.
- Compression:
  - Even at 10:1 compression, 400 megs is still a lot of data.
- Conclusion:
  - HTTP might work for conditional retrieval of a full map, but not for incremental retrieval of changes.

Incremental Change Messages

- JSON Patch:
  - **`{ "replace": "/data/map/PID1/ipv4",`**
    `"value": ["192.0.2.0/24", "198.51.200.0/25"] }`
    `{ "delete": "/data/map/PID2" }`
- But the existing Filtered Network Map and Cost Map response messages work just as well!
  - Network Map:
    - For each PID in the message, replace previous CIDRs with new CIDRs
    - To delete a PID, use “delete” as the value (or an empty array)
    - PIDs not in the message stay the same
  - Cost Map:
    - Costs in the message replace the previous costs for those source/dest PIDs
    - To delete a cost, use the value “delete” (or “-1”, or “NaN”, or …)
    - Costs not in the message stay the same

Our Proposal (Overview)

- Two new requests: ***Get Network Map Updates*** and ***Get Cost Map Updates***
  - Response is Filtered Network Map or Filtered Cost Map message
  - Add a cost map version tag to full Cost Map responses:

    ```
    {"data": {"cost-vtag": "1266506140", "map": ... }}
    ```

  - Update requests are POST, with a simple input message of MIME type “application/alto-update-param+json”. The input gives the tag for the client’s current network map or cost map:

    ```
    {"reference-tag": "1266506140"}
    ```

Our Proposal (Continued)

- New optional field in response:

  ```
  {"full-map": true, ...}
  ```

  If true, the response is the full map, not an incremental update.
  - E.g., the client's map is so old that the server can no longer provide incremental changes relative to that version.
- The Cost Map Update request returns the cost-vtag for the new version
- Update URIs are identified in IRD with a capability:

```
{ "uri" : "http://alto.example.com/incrementalupdate/networkmap",
    "media-types" : [ "application/alto-networkmap+json" ]
    "accepts" : [ "application/alto-update-param+json" ]
    "capabilities" : { "cost-type" : "routingcost",
                       "cost-mode" : ”numerical",
                       "incremental-update" : true } }
```

Example

- Request:

```
POST /incrementalupdate/costmap
Content-Type: application/alto-update-param+json
Accept: application/alto-costmap+json

{ "reference-tag": "1266506140" }
```

- Response:

```
HTTP/1.1 200 OK
Content-Type: application/alto-costmap+json

{ "meta": {},
  "data": {
     "cost-mode": "numerical",
     "cost-type": "routingcost",
     "map-vtag": "314159",
     "cost-vtag": "1266506141",
     "full-map": false,
     "map": { "PID1": { "PID2": 1, "PID3": 2 } }
  }
}
```

Conclusion

- Current draft identifies partial update options
  - Identify Map Version
    - HTTP
    - ALTO Extension
  - Partial Update Options
  - Information Resource Capability

- Next steps:
  - Other options?
  - Identify most suitable option