ALTO Cost Schedule

- Extends ALTO Cost values in time horizon
  - Specifies time slots (hourly slots) over a period of time (24 slots)
- New Cost Mode = "schedule"
- Cost Mode attributes
  "cost-scope": [{"unit": ["hour", 1], "size": 24, "begin": 0, "time zone": "UTC", "lastupdate": mm/hh/dd/mm/yyyy, "nextupdate": mm/hh/dd/mm/yyyy} ]

- ALTO cost values in Schedule mode can be used
  - As historic or predictive information to estimate the expected QoE
  - To accordingly schedule transfers or access to application resources (contents, services...).
  - To schedule ALTO requests, since the value change frequency in known
Use cases

- Applicable ALTO Services
  - Endpoint cost service
  - Filtered cost map of “affordable” size

- ALTO Cost Schedule is meant for non-real time applications that have a degree of freedom on when to “use a resource”,
  - Resource = content in a CDN, computation resource in a DC
  - “use a resource” includes
    - data transfer between caches,
    - access a service,
    - use a physical server for a virtualized application,
    - download content
Diff1 – use case section 2.2

• End systems with connectivity or access to datacenters that is *variable* and *predictable*
  – Applications: remote learning, enterprise database update, remote distributed computation, …
  ➔ Wish to schedule their connection to application Endpoints

Example: scattered endpoints/resources

➔ Interaction with Endpoints can be scheduled at times with the best possible ALTO Cost value

• ALTO Client themselves can schedule their requests
  • Know *when* noticeable ALTO values may occur
Diff2 – § 2.3 SDN Controller guided access to application endpoints (new)

- Base ALTO protocol allows to perform SDN primitives
  - Abstraction, Get Network Topology, Get device capabilities

- SDN primitive “Get network resources”
  - Provides applications with informations to evaluate QoE
  - Abstracting e.g. delay, bandwidth → requires new ALTO Cost Types
Diff2 – § 2.3 SDN Controller guided access to application endpoints (new)

- SDN-C can use ALTO Cost Schedule to influence the scheduling of application traffic
  - Get network state history
  - Derive *estimation/prediction* over given time frames
  - Store their abstraction in ALTO server
  - Give the values to SDN applications via the ALTO ECS

- Applications get a better QoE as they pick the best time

- SDN-C improves load balancing as it may
  - guide application traffic to selected Endpoints
  - AND indirectly distribute application traffic over time via carefully specified ALTO cost Schedule values
Thank You

• Back-up slides
Example

• Request:
POST /endpointcost/lookup HTTP/1.1
Content-Type: application/alto-endpointcostparams+json

{
    "cost-type" : ["pathoccupationcost"],
    "cost-mode" : ["schedule"]
}

• Response:
HTTP/1.1 200 OK
Content-Type: application/alto-endpointcost+json

{
    "meta" : {},
    "data" : {
        "cost-type" : ["pathoccupationcost"],
        "cost-mode" : ["schedule"],
        "map" : {
            "ipv4:192.0.2.2": {
                "ipv4:192.0.2.89" : [7, ... 24 values],
                "ipv4:198.51.100.34" : [4, ... 24 values],
                "ipv4:203.0.113.45" : [2, ... 24 values]
            }
        }
    }
}