Using ALTO for exposing Time-Variant Routing information

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Rationale

• TVR is about predictable changes in the network (i.e., modifications in either nodes, links or adjacencies)

• Those predictable changes can be scheduled from a higher-level system (e.g., OSS) or from a Network Controller.

• Since the expected changes can be predicted beforehand, then it is possible to anticipate the impacts of that changes in the routing of the network
  • E.g., by means of algorithms embedded in the Network Controller or through experimental observations e.g. in network digital twins

• Thus it is possible to expose such changes in advance in a way that applications (both internal and external) can become aware of those routing variations along time.
  • Existing IETF solutions like ALTO can assist on the exposure of such predicted changes
Exposure of calendared topologies

- ALTO defines in [RFC8896] a calendared topological cost map (named ALTO cost calendar) which allows to signal future changes on the cost metric.

- ALTO cost calendar includes attributes to describe the time scope of the calendar:
  - "Calendar-start-time", which indicates the date at which the first value of the calendar applies.
  - "Time-interval-size", that defines the duration of an ALTO Calendar time interval in a unit of seconds.
  - "Number-of-intervals", that indicates the number of values of the cost calendar array.
  - "Reweekly", which is an optional attribute that indicates how many iterations of the calendar value array have the same values.
Discussion on the usage of ALTO for TVR

• ALTO enables exposing TVR information to applications.
  • To assess if the exposed information reflects the problems to solve according to [I-D.taylor-tvr-prb-stmt].

• ALTO cost calendar defines a number of time-related attributes.
  • To be analyze if such attributes are sufficient for expressing the time variance nature of the routing changes in TVR.

• The expectation in [I-D.taylor-tvr-prb-stmt] is to extend existing routing protocols to convey TVR information.
  • To define how ALTO can participate of the routing processing of the new TVR-related information included in the routing protocols.

• The data model (or models) that could be defined in TVR could be leveraged by ALTO
  • To analyze potential improvements to calendared routing-related information in ALTO cost calendar.
Relevance to TVR

- Two ways:
  - Attributes that ALTO considers for handling scheduled changes in the routing cost can serve as input for info and data models defined in TVR
  - ALTO Cost Calendar can be considered as an additional scenario of usage of TVR use cases
    - Different applications consuming ALTO can benefit for anticipated information about routing changes (e.g., CDNs, gaming, XR/VR, etc)

- Next steps
  - Collect feedback from TVR
  - Identify work that could be in scope of TVR (and ALTO) for further development