



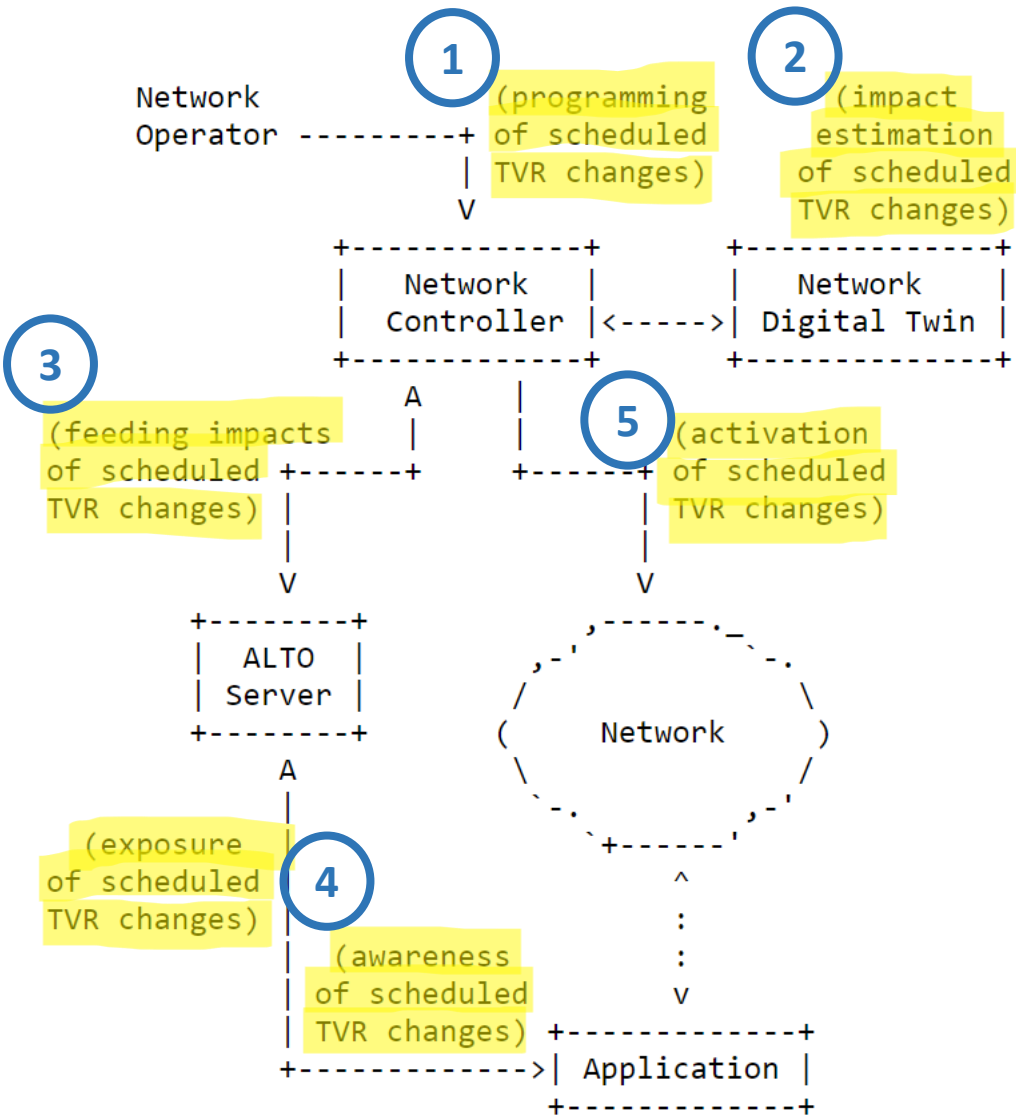
Using ALTO for exposing Time-Variant Routing information

draft-contreras-tvr-alto-exposure-05

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Recap



- Presented at IETF 116, 117, 118, 119 & 120
- It enables an **off-path mechanism** for **exposing scheduled topological changes**
 - It can **co-exist with on-path** solution
 - It **offload the processing of changes** from the network elements (centralized solution as described in Requirements draft)
- It serves the purpose of **exposing scheduled topological changes to Applications / Services** so those can become aware of routing variations impacting them
- **ALTO** allows to expose anticipated and predictable topological changes by leveraging on the standard **cost calendar feature**, defined in [RFC8896]

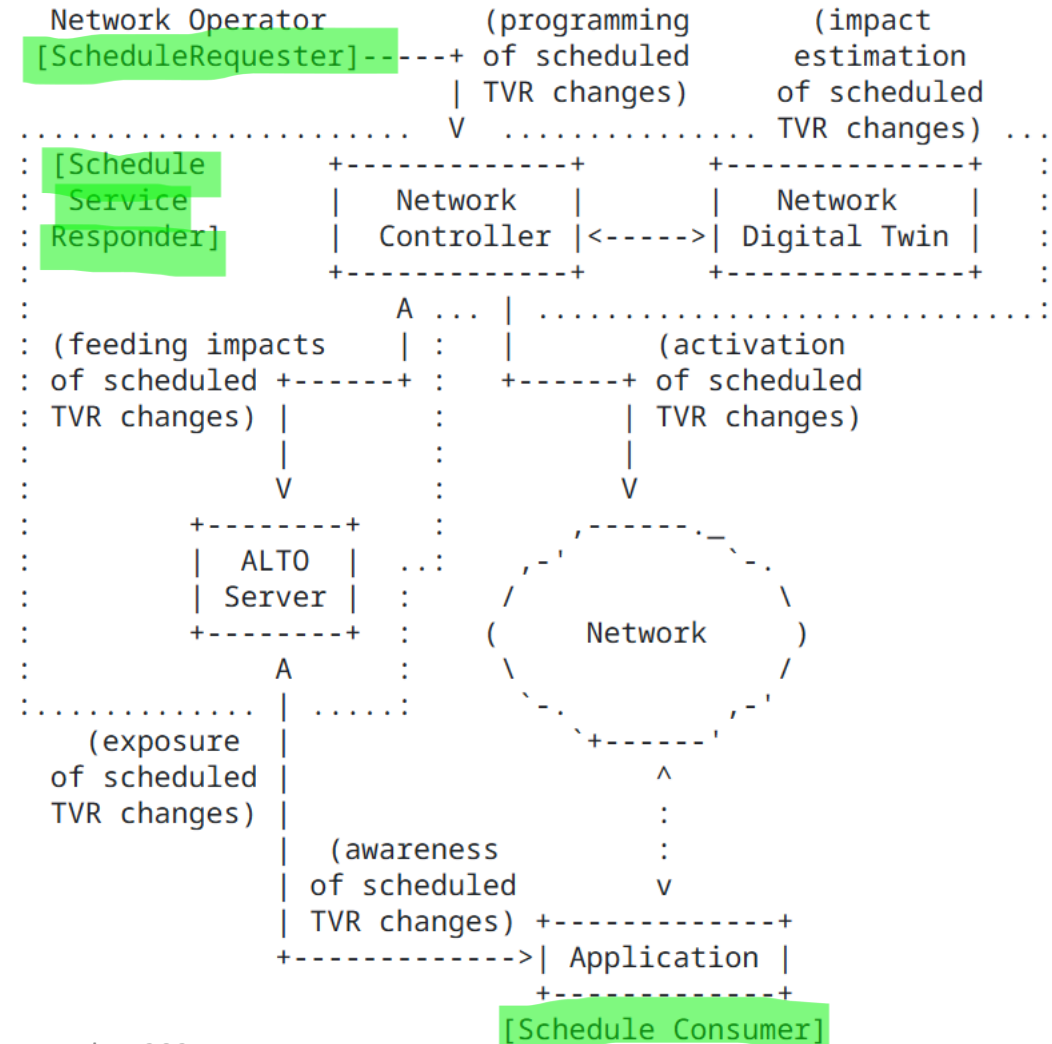
Changes from -04

- Security considerations updated according to the updated security part in [I-D. ietf-tvr-requirements]
- New appendix with assessment of the architecture proposed in [I-D.wqb-tvr-applicability]
- Editorial: update of references, correction of typos

Security Considerations

- Off-path approach preventing some of the security issues identified in [I-D. ietf-tvr-requirements]
 - those requiring direct access to the source of information (e.g., time synchronization)
- Off-path solution should implement the necessary mechanisms for authentication, secure data transfer and privacy preservation

Architecture Assessment



Next steps

- Address further comments, if any
- Keep working on the implementation and reporting new gaps, if any
 - For IETF 122 an initial version of the SW should be ready, with the intention of releasing it as open-source (we are delayed on this)
- Ask for WG adoption as off-path solution for TVR
 - An off-path TVR solution has some advantages: offloading of the processing of scheduled changes, facilitates the exposure of changes to services and applications, easy handling of schedule conflicts, etc
 - Adoption could trigger some work on ALTO protocol for fulfilling all the requirements (e.g., time overlap in the cost calendar feature)
 - An off-path solution could refer to ALTO as an example, but being possible to generalize the concept, if convenient

Backup

Changes from -03 (1/2)

- Added and applicability statement exemplifying the action of a human at NOC according to [I-D.ietf-tvr-schedule-yang]

```
module: ietf-tvr-node
  +--rw node-schedule
  +--rw node-id? "192.168.10.17"
  ...
  +--rw interface-schedule
    +--rw interfaces*
      +--rw name "GigabitEthernet0"
      ...
      +--rw attribute-schedule
        +--rw schedules*
          +--rw schedule-id "0123456789"
          +--rw (schedule-type)?
            +--:(period)
              ...
              +--rw period-start "2024-07-08T10:30:00"
              +--rw time-zone-identifier? "Africa/Dakar"
              +--rw (period-type)?
                ...
                +--:(duration)
                  +--rw duration? "3600"
                  ...
                  +--rw attr-value
+--rw available? "false"
```

Changes from -03 (2/2)

- Gaps identified (so far)
 - [I-D.ietf-tvr-schedule-yang] can require further granularity, as cards (by now, only schedule changes at node and link level).
 - While conflicts are easy to handle by centralized (i.e., off-path) solutions, it can require the definition of arbitration mechanisms for distributed ones.
 - Distributed scheduled changes can require ways of easily reverting proposed changes
 - When using distributed advertisement, the exposure of planned changes to external parties or applications can be a security problem, because the potential accessibility to information beyond the topological changes.
- Implementation status section added
 - Implementation is under development
- Refinement of the compliance of requirements

Changes from -02

- Editorial typos, fixing
- Assessment of ALTO as off-path solution against TVR requirements (v-01)
 - As long as the requirements draft progresses, this checking will continue

Changes from -01

- Assessment of ALTO as off-path solution against TVR requirements (v -00)
- Question about similarities wrt contact plan discussed on the mailing list
- Editorial updates (references, etc)

Requirement	Compliance	
(3.1) Resource scheduling	Feasible to reflect scheduled changes in a topology by means of a sequence of network and cost maps along the time	✓
(3.2.1) Scope of Time-Variability	Combines both time-invariant and time-variant entities. Allows representation of global and individual changes	✓
(3.2.2) Time Horizon	Specified by means of "time-interval-size" attribute expressed in seconds	✓
(3.2.3) Time Precision	Determined in units of seconds	✓
(3.2.4) Validity in a Schedule	Permits to accommodate multiple subsequent schedules	✓
(3.2.5) Periodicity in a Schedule	Repetitive states specified by means of the attribute "repeated"	✓
(3.2.6) Continuity in a Schedule	Governed by the "time-interval-size" attribute expressed in seconds	✓
(3.2.7) Time-Overlap and Priority	Not supported. It would require extension of RFC8896	✗
(3.2.8) Property Value Interpolation	Zero-order hold mode. Other modes could be potentially supported	✓
(3.2.9) Changes to Model State	Support of fine-grained changes	✓
(3.3) Topologies	Schedules applicable to nodes and links. Support of potential future connectivity	✓

Changes from -00

- Text added for discussion of strategies for advertising predicted topological changes: (1) by means of network controller + ALTO, vs (2) by advertisement of expected changes through routing protocols
- Text added for describing two ways of retrieving the scheduled topological changes by ALTO: (1) interaction with the network controller, vs (2) interaction with augmented routing protocols