

YANG Data Models for TE and RSVP

draft-ietf-teas-yang-te-08

draft-ietf-teas-yang-rsvp-07

draft-ietf-teas-yang-rsvp-te-01

code @ <https://github.com/ietf-mpls-yang/te>

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Agenda

- Updates to I-Ds (since IETF98)
- Open issues
- Next steps

I-D: draft-ietf-teas-yang-te-08

Summary of Changes

- Credits:
 - Thanks to Sergio Belotti, Italo Busi, Carlo Perocchio, Francesco Lazzeri et. al for their feedback and review comments
 - Thanks to multi-vendor team for the continued discussions during meetings
- High-level model changes:
 - Moved auto-bandwidth properties to te-mpls module
 - Additional path constraints
 - Per LSP oper state and path computed properties
 - In/out segment stitching properties

Update # 1

LSP path operational state

<draft-ietf-teas-yang-te-08 >

```
++ro lsp*  
<snip>  
+--ro operational-state? identityref
```

```
identity lsp-path-computing {  
  base lsp-state-type;  
  description  
    "State path compute in progress";  
}  
identity lsp-path-computation-ok {  
  base lsp-state-type;  
  description  
    "State path compute successful";  
}  
identity lsp-path-computatione-failed {  
  base lsp-state-type;  
  description  
    "State path compute failed";  
}  
identity lsp-state-setting-up {  
  base lsp-state-type;  
  description  
    "State setting up";  
}
```

```
++ro lsp*  
<snip>  
+--ro operational-state? identityref
```

```
identity lsp-state-setup-ok {  
  base lsp-state-type;  
  description  
    "State setup successful";  
}  
  
identity lsp-state-setup-failed {  
  base lsp-state-type;  
  description  
    "State setup failed";  
}  
  
identity lsp-state-up {  
  base lsp-state-type;  
  description "State up";  
}
```

Update # 2

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TE path computed computed properties state

```
+-ro lsp*
  -ro computed-path-properties
    +-ro path-metric* [metric-type]
      | +-ro metric-type -> ../state/metric-type
      | +-ro state
      |   +-ro metric-type? identityref
      |   +-ro accumulative-value? uint64
    +-ro path-affinities
      | +-ro constraints* [usage]
      |   +-ro usage -> ../state/usage
      |   +-ro state
      |     +-ro usage? identityref
      |     +-ro (style)?
      |       +--:(value)
      |         | +-ro value? te-types:admin-groups
      |         +--:(named)
      |           +-ro affinity-names* [name]
      |           +-ro name string
    +-ro path-srlgs
      | +-ro (style)?
      |   +--:(values)
      |     | +-ro state
      |     | | +-ro usage? identityref
      |     | | +-ro values* te-types:srlg
```

- Models per LSP path state computed properties
 - Accumulative path-metrics
 - TE, IGP, latency, hop-count, average-delay, and other additive metrics
 - Accumulative path affinities
 - presented as bit-map values or names
 - Accumulative path SRLGs
 - presented as bit-map values or names

Update # 3

TE path computed state

```
-ro path-computed-route-objects
+--ro path-computed-route-object* [index]
  +--ro index -> ../state/index
  +--ro state
    +--ro index?      uint32
    +--ro (type)?
      +--:(numbered)
        | +--ro numbered-hop
        |   +--ro address? te-types:te-tp-id
        |   +--ro hop-type? te-hop-type
        +--:(as-number)
          | +--ro as-number-hop
          |   +--ro as-number? binary
          |   +--ro hop-type? te-hop-type
          +--:(unnumbered)
            | +--ro unnumbered-hop
            |   +--ro node-id? te-types:te-node-id
            |   +--ro link-tp-id? te-types:te-tp-id
            |   +--ro hop-type? te-hop-type
            +--:(label)
              | +--ro label-hop
              |   +--ro value? rt-types:generalized-label
            +--:(sid)
              +--ro sid-hop
                +--ro sid? rt-types:generalized-label
```

- Models per LSP path state computed computed properties:
 - Shows for head-end/ingress LSPs
 - Shows for transit for path expanded transit LSPs
 - Path computed route/ERO

Update # 4

TE path additional constraints

```
rw named-path-constraints
+--rw named-path-constraint* [name]
  +--rw name
  +--rw path-metric-bounds
    | +--rw path-metric-bound* [metric-type]
    |   +--rw metric-type -> ../config/metric-type
    |   +--rw config
    |     | +--rw metric-type? identityref
    |     | +--rw upper-bound? uint64
    |     +--ro state
    |       +--ro metric-type? identityref
    |       +--ro upper-bound? uint64
```

- Path metric bounds, covers bounds on metric types
 - TE, IGP, latency, hop-count, average-delay, and other additive metrics
- Added hop-type for strict/loose (applies to all route-hop-types)
- Added sid-hop to covers segment-routing hop

Update # 5

Optimization criteria

```
rw named-path-constraints
+--rw named-path-constraint* [name]
  +--rw name
  +--rw optimizations
  | +--rw optimization-metric* [metric-type]
  |   +--rw metric-type -> ../config/metric-type
  |   +--rw config
  |     | +--rw metric-type? identityref
  |     | +--rw weight? uint8
  |     +--ro state
  |       +--ro metric-type? identityref
  |       +--ro weight? uint8
  +--rw path-objective-function
  | +--rw config
  | | +--rw objective-function-type? identityref
  | +--ro state
  | +--ro objective-function-type? identityref
  +--rw tiebreakers
  | +--rw tiebreaker* [tiebreaker-type]
  |   +--rw tiebreaker-type -> ../config/tiebreaker-type
  |   +--rw config
  |     | +--rw tiebreaker-type? identityref
  |     +--ro state
  |     +--ro tiebreaker-type? identityref
```

- Optimization criteria
 - Optimize using standard objective function (RFC5541)
 - Optimize for a metric, or list of metrics by weight
- In case of ECMP, apply tiebreaker list criteria
 - in list order top to bottom

Update # 6

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Updated resource affinity constraints

```

rw named-path-constraints
+--rw named-path-constraint* [name]
  +--rw name
+--rw path-affinities
| +--rw constraints* [usage]
|   +--rw usage -> ../config/usage
|   +--rw config
|     | +--rw usage?      identityref
|     | +--rw (style)?
|     |   +--:(value)
|     |   | +--rw value?      te-types:admin-groups
|     |   | +--:(named)
|     |   |   +--rw affinity-names* [name]
|     |   |   +--rw name string
|     | +--ro state
|     |   +--rw usage?      identityref
|     |   +--rw (style)?
|     |   +--:(value)
|     |   | +--ro value?      te-types:admin-groups
|     |   | +--:(named)
|     |   |   +--ro affinity-names* [name]
|     |   |   +--ro name string

```

- Per RFC3209, added usage parameter to cover checks for 3 additional bit-maps :
 1. Exclude-any
 2. Include-any
 3. Include-all

Update # 7

Segment stitching constraints

```

rw named-path-constraints
+--rw named-path-constraint* [name]
  +--rw name
  +--rw in-segment!
  | +--rw forward
  | | +--rw config
  | | | +--rw label-set* [inclusive-exclusive label-start]
  | | |   +--rw inclusive-exclusive enumeration
  | | |   +--rw label-start      rt-types:generalized-label
  | | |   +--rw label-end?      rt-types:generalized-label
  | | |   +--rw range-bitmap?   binary
  | +--rw reverse
  |   +--rw config
  |   | +--rw label-set* [inclusive-exclusive label-start]
  |   |   +--rw inclusive-exclusive enumeration
  |   |   +--rw label-start      rt-types:generalized-label
  |   |   +--rw label-end?      rt-types:generalized-label
  |   |   +--rw range-bitmap?   binary
+--rw out-segment!
  +--rw forward
  | +--rw config
  | | +--rw label-set* [inclusive-exclusive label-start]
  | | | +--rw inclusive-exclusive enumeration
  | | | +--rw label-start      rt-types:generalized-label
  | | | +--rw label-end?      rt-types:generalized-label
  | | | +--rw range-bitmap?   binary
  
```

- In/out segment stitching
 - candidate labels on in/out interface of tunnel termination points
- forward and reverse for bidirectional segments

I-D: draft-ietf-teas-yang-rsvp-07

I-D: draft-ietf-teas-yang-rsvp-te-01

Summary of Changes

- No change to draft-ietf-teas-yang-rsvp
- Changes to draft-ietf-teas-yang-rsvp-te are mostly editorial to align with augmented TE model

Open Issue:

Migration to NMDA style

- Impact on-going existing implementation
- Impact on augmenting modules (defined in out-of-scope documents)
- Impact on state created tunnels, e.g.:
 - PCE instantiated tunnels
 - auto-created primary or bypass tunnels
 - Currently, such tunnel properties accessible under “state” branches at last level
 - NMDA proposes a having those under a state branch at the top

Next Steps

- Close on NMDA or OC-style for model
- Continue work on defining tunnel RPCs
- RSVP base/extended in I-D is stable and ready for WGLC
- Request further review and comments on other models

Thank You

TE/RSVP and MPLS YANG Modules Structure and Relationship

