YANG Data Models for TE and RSVP

draft-ietf-teas-yang-te-09

draft-ietf-teas-yang-rsvp-08

draft-ietf-teas-yang-rsvp-te-02

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

Tarek Saad and Rakesh Gandhi (Presenter), Cisco Systems

Vishnu Pavan Beeram, Juniper Networks

Xufeng Liu, Jabil

Igor Bryskin, Huawei

Himanshu Shah, Ciena

IETF-100, November 2017, Singapore

Agenda

- Updates to I-Ds (since IETF-99)

- Open issues

- Next steps

I-D: draft-ietf-teas-yang-te-09

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 (especially Aihua Guo) for the continued discussions during regular meetings
- High-level model changes:
  - NMDA compliance changes
  - Bidirectional LSP modeling
  - Protection and restoration changes
  - Per technology bandwidth

Update # 1
<draft-ietf-teas-yang-te-09 >

NMDA compliance changes (example)

BEFORE

AFTER

```
+--rw p2p-primary-paths
| +--rw p2p-primary-path* [name]
|   +--rw name                       -> ../config/name
|   +--rw config
|   | +--rw name?                  string
|   | +--rw preference?            uint8
|   | +--rw path-setup-protocol?   identityref
|   | +--rw path-computation-method?  identityref
|   | +--rw path-computation-server?  inet:ip-address
|   | +--rw compute-only?          empty
|   | +--rw use-path-computation?  boolean
|   | +--rw verbatim?              empty
|   | +--rw lockdown?              empty
|   | +--rw named-explicit-path?   ->
|   | +--rw named-path-constraint?   ->
|   | +--rw te-mpls:static-lsp-name?  mpls-static:static-lsp-ref
|   +--ro state
|   | +--ro name?                  string
|   | +--ro preference?            uint8
|   | +--ro path-setup-protocol?   identityref
|   | +--ro path-computation-method?  identityref
|   | +--ro path-computation-server?  inet:ip-address
|   | +--ro compute-only?          empty
|   | +--ro use-path-computation?  boolean
|   | +--ro verbatim?              empty
|   | +--ro lockdown?              empty
|   | +--ro named-explicit-path?   ->
|   +--ro lsps
|   | +--ro lsp*
|   |   +--ro source             -> ../state/source
|   |   +--ro destination        -> ../state/destination
|   |   +--ro tunnel-id          -> ../state/tunnel-id
```

DELETED

```
+--rw p2p-primary-paths
| +--rw p2p-primary-path* [name]
|   +--rw name                     string
|   +--rw preference?              uint8
|   +--rw path-setup-protocol?     identityref
|   +--rw path-computation-method?   identityref
|   +--rw path-computation-server?   inet:ip-address
|   +--rw compute-only?            empty
|   +--rw use-path-computation?    boolean
|   +--rw lockdown?                empty
|   +--rw path-scope?              identityref
|   +--rw named-explicit-path?
|   +--rw named-path-constraint?
|   +--ro state
|   | +--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
```

Update # 1
NMDA compliance changes

- Removal of read-write "config" container and keep the leaves directly under the feature container

- Removal of reflected configuration leafs under the read-only "state" container

- Keep read-only "state" container to contain protocol and system generated state

Update # 2
TE tunnel bidirectional properties

<draft-ietf-teas-yang-te-09>

```
+--rw p2p-primary-paths
|  +--rw p2p-primary-path* [name]

<snip>

|    +--rw p2p-reverse-primary-path
|    |  +--rw name?              string

<snip>
|    |    +--rw p2p-reverse-secondary-path
|    |      +--rw secondary-path? -> p2p-secondary-paths/p2p-secondary-path/name
|    |      +--rw path-setup-protocol?   identityref
|    +--rw candidate-p2p-secondary-paths
|    |  +--rw candidate-p2p-secondary-path* [secondary-path]
|    |    +--rw secondary-path -> p2p-secondary-paths/p2p-secondary-path/name
|    |    +--rw path-setup-protocol?   identityref
|    |    +--ro state
|    |      +--ro active?   boolean
```

- reverse primary path
  - child of (forward) primary path

- reverse secondary path
  - children of reverse primary path

- For co-routed bidirectional LSPs, reverse primary path can be auto-created to reflect the forward path

Update # 3
Tunnel Protection and Restoration

```
+--rw tunnels
| +--rw tunnel* [name]
| | +--rw name                              string
| | +--rw identifier?                       uint16
| | +--rw description?                      string
| | +--rw encoding?                         identityref
| | +--rw switching-type?                   identityref
| | +--rw provisioning-state?              identityref
| | +--rw preference?                       uint8
| | +--rw reoptimize-timer?                 uint16
| | +--rw source?                           inet:ip-address
| | +--rw destination?                      inet:ip-address
| | +--rw src-tp-id?                        binary
| | +--rw dst-tp-id?                        binary
| | +--rw ignore-overload?                  boolean
| | +--rw protection
| | | +--rw enable?                         boolean
| | | +--rw protection-type?               identityref
| | | +--rw protection-reversion-disable?  boolean
| | | +--rw hold-off-time?                  uint32
| | | +--rw wait-to-revert?                 uint16
| | +--rw restoration
| | | +--rw enable?                         boolean
| | | +--rw restoration-type?              identityref
| | | +--rw restoration-scheme?            identityref
| | | +--rw restoration-reversion-disable? boolean
| | | +--rw hold-off-time?                  uint32
| | | +--rw wait-to-restore?               uint16
| | | +--rw wait-to-revert?                 uint16
```

- Protection:
  - Enabled explicitly by knob
  - protection-type:
  - hold-off and WTR configured on per tunnel and per path

- Restoration
  - Enabled explicitly by knob
  - restoration schemes
  - timers configured per tunnel or per path

Update # 3   <draft-ietf-teas-yang-te-09>
LSP Protection and Restoration (State)

```
+--ro lsps
|  +--ro lsp* [source destination tunnel-id lsp-id extended-tunnel-id]
|    +--ro source                       inet:ip-address
|    +--ro destination                   inet:ip-address
|    +--ro tunnel-id                     uint16
|    +--ro lsp-id                        uint16
|    +--ro extended-tunnel-id             inet:ip-address
|    +--ro operational-state?            identityref
|    +--ro path-setup-protocol?           identityref
|    +--ro origin-type?                  enumeration
|    +--ro lsp-resource-status?           enumeration
|    +--ro lockout-of-normal?             boolean
|    +--ro freeze?                       boolean
|    +--ro lsp-protection-role?          enumeration
|    +--ro lsp-protection-state?         identityref
|    +--ro shared-resources-tunnels
|    |  +--ro lsp-shared-resources-tunnel*   te:tunnel-ref
```

- Protection:
  - lockout-of-normal: normal traffic not allowed to be carried over this LSP
  - freeze: traffic is pinned to this LSP and not allowed to make any switching action (e.g. revert from secondary LSP to primary LSP)
  - lsp-protection-role: working or protecting
  - lsp-protection-state: The state of the APS state machine controlling which tunnels is using the resources of the protecting LSP
  - shared-resources-tunnels:
    - List of tunnels that share the resources locked on this tunnel secondary LSP path

Update # 3 <draft-ietf-teas-yang-te-09>
LSP Protection and Restoration (Actions)

```
module: ietf-te
  +--rw te!
    +--rw globals

<snip>

    +---x protection-external-commands
    | +---w input
    |   +---w protection-external-command?   identityref
    |   +---w tunnel-using-lsp-resources?    te:tunnel-ref
```

```
identity action-lockout-of-protection {
  base protection-external-commands;
  description
    "A temporary configuration action initiated by an operator
     command to ensure that the protection transport entity is
     temporarily not available to transport a traffic signal
     (either normal or extra traffic).";
  reference
    "ITU-T G.808, RFC 4427";
}
identity action-forced-switch {
  base protection-external-commands;
  description
    "A switch action initiated by an operator command to swith
     the extra traffic signal, the normal traffic signal, or the
     null signal to the protection transport entity, unless an
     equal or higher priority switch command is in effect.";
}
identity action-manual-switch {
  base protection-external-commands;
  description
    "A switch action initiated by an operator command to swith
     the extra traffic signal, the normal traffic signal #i, or
     the null signal to the protection transport entity, unless
     a fault condition exists on other transport entities or an
     equal or higher priority switch command is in effect.";
}
identity action-exercise {
  base protection-external-commands;
  description
    "An action to start testing if the APS communication is
     operating correctly. It is lower priority than any other
     state or command.";
}
identity clear {
  base protection-external-commands;
  description
    "An action that clears the active near-end lockout of
     protection, forced switch, manual switch, WTR state,
     or exercise command.";
}
```

Update # 4
Per Technology Bandwidth

<draft-ietf-teas-yang-te-09>

```
+--rw bandwidth-generic
| +--rw te-bandwidth
|   +--rw (technology)?
|     +--:(psc)
|     | +--rw psc?       rt-types:bandwidth-ieee-float32
|     +--:(otn)
|     | +--rw otn* [rate-type]
|     |   +--rw rate-type   identityref
|     |   +--rw counter?    uint16
|     +--:(lsc)
|     | +--rw wdm* [spectrum slot]
|     |   +--rw spectrum   identityref
|     |   +--rw slot       int16
|     |   +--rw width?     uint16
|     +--:(generic)
|       +--rw generic?  te-bandwidth
```

- Per technology type bandwidth
  - covers specific technologies like PSC, OTN, LSC, and
  - generic TE bandwidth

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

I-D: draft-ietf-teas-yang-rsvp-te-02

Summary of Changes

- NMDA compliance changes
- Changes mostly editorial and to align with target augmentation path in TE model

Next Steps

- RSVP base/extended in I-D is stable and ready for WGLC

- Request further review and comments

Thank You

TE/RSVP and MPLS YANG Modules
Structure and Relationship