YANG Data Models for TE and RSVP
draft-saad-teas-yang-te-02
draft-saad-teas-yang-rsvp-02

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

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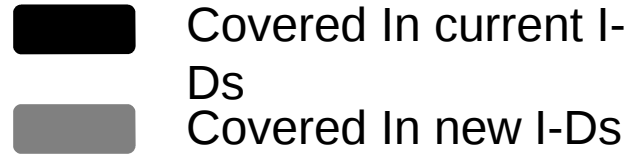
Agenda

- Scope
- Update
- Discussion/Next steps

Scope



- Generic TE YANG model
- Base RSVP YANG model
- Generic RSVP-TE YANG model
- Packet/MPLS RSVP-TE YANG model
- Static MPLS LSP model
- Extensions to Generic TE for Segment-Routing TE and MPLS-TP

Progress Update

- Weekly recurring meetings since IETF91
- Periodic sync-up meetings with Open-Config team for alignment with consolidated MPLS work
- In-progress models at:
  - Github: https://github.com/ietf-mpls-yang
- Wiki: https://github.com/ietf-mpls-yang/te/wiki/MPLS-TE-YANG

Changes from previous version

- Adopted openconfig-netmod-opstate approach for modeling config and state
- Split RSVP-TE module into two: generic RSVP-TE and PSC technology specific RSVP-TE
- Added state data to TE and (RSVP)-TE models

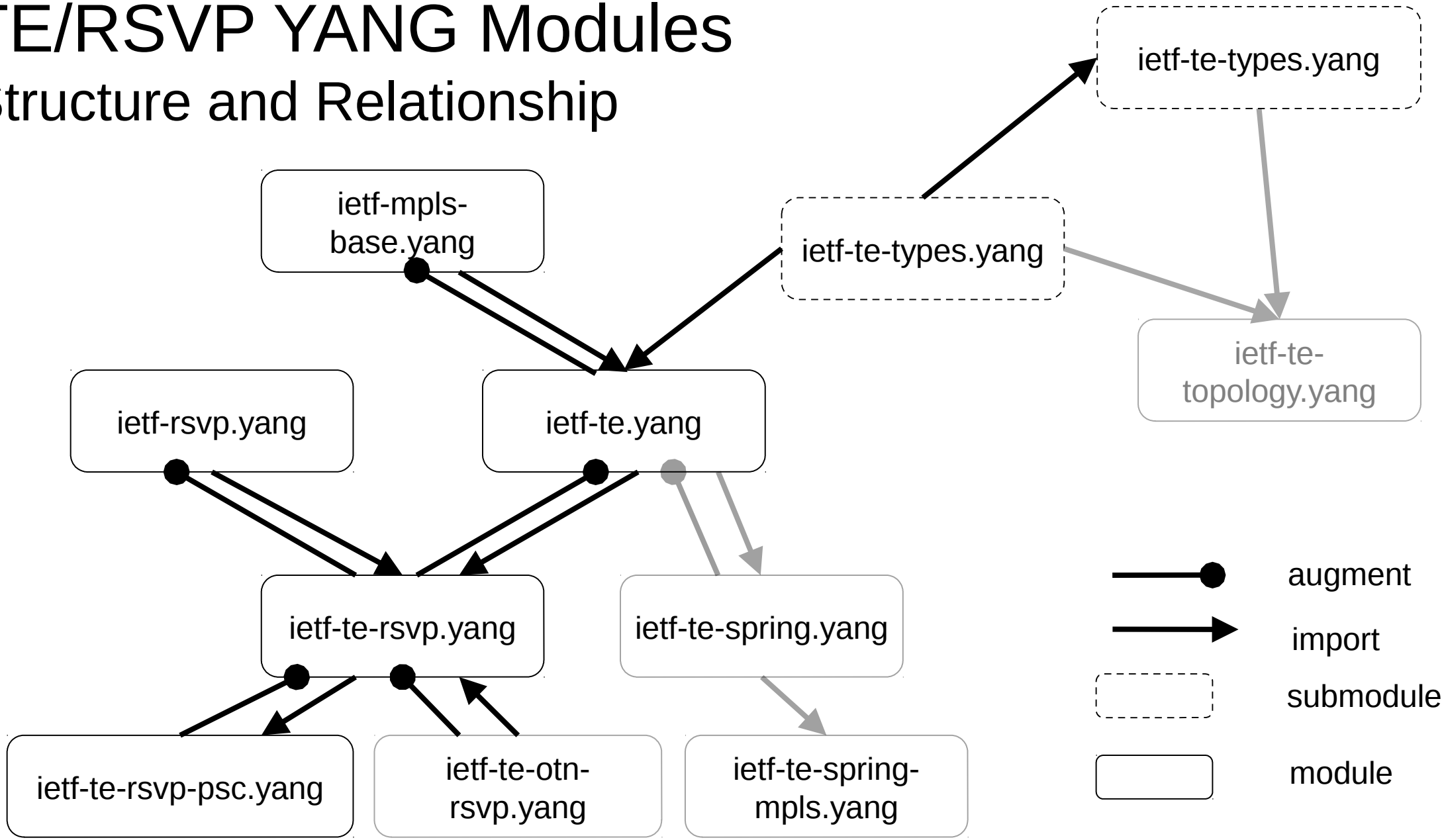
Modeling considerations: generic extensible models

- Reusable data definitions and groupings placed in separate TE types modules
  - generic data are grouped in “ietf-te-types.yang”
  - technology-specific data (e.g. packet PSC) grouped in separate module, e.g. "ietf-te-psc-types.yang”.
- TE generic module holds control plane and data plane independent data nodes, “ietf-te.yang”
- Generic signaling control plane module (e.g. RSVP-TE or SR-TE) augments TE generic module, “ietf-rsvp-te.yang”
  - Technology specific signaling control plane module “ietf-rsvp-te-psc.yang” augments the generic one

Modeling considerations: configuration and state data organization

- Configuration Inheritance
  - Apply to one, or “all” elements of a list (e.g. TE/RSVP interfaces, etc.)
  - Apply to global for system wide parameters
- State data organization
  - “intended configuration” reflected in “config” subcontainer and “applied configuration” in a “state” subcontainer
  - derived state in “state” subcontainer
  - ephemeral state for auto

TE/RSVP YANG Modules
Structure and Relationship



TE YANG Data Model

High-level Structure

```
module: ietf-te
  +-te!
    +- globals
      +- config
         <<intended configuration>>
         ...
      +- state
         <<applied configuration>>
         <<derived state associated>>>
            ...
      +- interfaces
         +- config
            <<intended configuration>>
            .
         +- state
            <<applied configuration>>
            <<derived state associated>>
```

```
module: ietf-te
  +- te!
      ...
     +- tunnels
        +- config
           <<intended configuration>>
        +-- ro state
           <<applied configuration>>
           <<derived state>>
       +--ro lsps-state
             <<ephemeral tunnels>>
rpcs:
   +---x tunnels-rpc
   +---x lsps-rpc
   +---x global-rpc
   +---x interfaces-rpc
notifications:
   +---n tunnels-notif
   +---n lsps-notif
   +---n interfaces-notif
   +---n global-notif
```

TE YANG Data Model
Globals and Interfaces TE Properties

```
module: ietf-te
   +--rw te!
      +--rw globals
      |  +--rw named-admin-groups* [name]
      |        +-- config
      |            ...
      |        +-- state
      |            ...
      |  +--rw named-srlgs* [name]
         ...
      |  +--rw named-explicit-paths* [name]
         ...
      |  +--rw named-path-constraints* [name]
```

```
      +--rw interfaces
      |  + <<applicable to all interfaces>>
      |  +--rw interface* [interface]
      |     +-- config
      |         <<intended configuration>>
      |     +-- state
      |         <<applied configuration>>
      |         <<derived state associated with the TE interface>>
      |     +--rw te-admin-groups*
      |           +-- config
      |           +-- state
      |     +--rw te-srlgs* [named-srlg]?
      |     +--rw te-switching-capabilities*
...
```

TE Generic YANG Data Model
Tunnels and LSPs Properties

```
+--rw te!
      +--rw tunnels
      |  +--rw tunnel* [name type]
      |     +--rw name              string
      |     +--rw type              identityref
      |     +--rw identifier?       uint16
      |     +--rw config
      |     |  +--rw (path-type)?
      |     |     +--:(p2p)
      |     |     |  +--rw primary-paths* [preference]
      |     |     |    +--rw seondary-paths*[preference]
      |     |     +--:(p2mp) {ietf-te-types:p2mp-te}?
      |     |        +--rw p2mp-paths* [destination]
      |     |          +--rw primary-paths*[preference]
      |     +--ro state
      |         <<intended configuration>>
```

tunnel properties

```
<<tunnels ctd...>>
      |       +--ro lsp* [source destination tunnel-id lsp-id]
      |          +--ro source                 leafref
      |          +--ro destination            leafref
      |          +--ro tunnel-id              leafref
      |          +--ro lsp-id                 leafref
      |          +--ro extended-tunnel-id?    leafref
      |          +--ro type?                  leafref
      |
      +--ro lsps
         |   +--ro lsp* [source destination tunnel-id lsp-id
         |   |   |   |   |   extended-tunnel-id type]
         |   |   |   |   +--ro oper-status?              identityref
         |   |   |   |   +--ro origin-type?              enumeration
         |   |   |   |   +--ro lsp-resource-status?      enumeration
         |   |   |   |   +--ro lsp-protection-status?    enumeration
         |   |   |   |   +--ro lsp-operational-status?   empty
         |   |   |   |   +--ro lsp-timers
         |   |   |   |   |  +--ro life-time?         uint32
         |   |   |   |   |  +--ro time-to-install?   uint32
         |   |   |   |   |  +--ro time-to-die?       uint32
         |   |   |   |   +--ro downstream-info
         |   |   |   |   +--ro upstream-info
```

LSP properties

RSVP Data Model

```
module: ietf-rsvp
   +--rw rsvp!
      +--rw globals
            +-- rw config
                  <<intended configuration>>
            +-- ro state
                  <<applied configuration>>
                  <<derived state>>
      +--rw interfaces
            +-- rw config
                  <<intended configuration>>
            +-- ro state
                  <<applied configuration>>
                  <<derived state>>
      +--rw neighbors
            +-- rw config
                  <<intended configuration>>
            .
            +-- ro state
                  <<applied configuration>>
                  <<derived state>>
         .
      +--rw sessions
            +-- rw config
                  <<intended configuration>>
            +-- ro state
                  <<applied configuration>>
                  <<derived state>>
rpcs:
   +--x global-rpc
   +--x interfaces-rpc
   +--x neighbors-rpc
   +--x sessions-rpc
notifications:
   +--n global-notif
```

RSVP-TE (generic) Data Model

Augmentation of TE Generic Model

Augment TE tunnels

Augment TE LSP

```
module: ietf-rsvp-te
  augment /ietf-te:te/ietf-te:tunnels/ietf-te:tunnel:
     +--rw config
     |  +--rw lsp-source?
     |  +--rw lsp-signaled-name?           string
     |  +--rw lsp-priority-setup?          uint8
     |  +--rw lsp-priority-hold?           uint8
     |  +--rw local-recording-desired?     empty
     |  +--rw se-style-desired?            empty
     |  +--rw path-reevaluation-request?   empty
     |  +--rw soft-preemption-desired?     empty
     |  +--rw end-to-end-routing?          empty
     |  +--rw boundary-rerouting?          empty
     |  +--rw segment-based-rerouting?     empty
     |  +--rw lsp-integrety-required?      empty
     |  +--rw contiguous-lsp?              empty
     |  +--rw lsp-stitching-desired?       empty
     |  +--rw preplanned-lsp?              empty
     |  +--rw oob-mapping?                 empty
     +--ro state
<<...>>
```

```
augment /ietf-te:te/ietf-te:lsps-state/ietf-te:lsp:
      +--ro lsp-source inet:ip-address
      +--ro lsp-signaled-name?           string
      +--ro lsp-priority-setup?          uint8
      +--ro lsp-priority-hold?           uint8
      +--ro local-recording-desired?     empty
      +--ro se-style-desired?            empty
      +--ro path-reevaluation-request?   empty
      +--ro soft-preemption-desired?     empty
      +--ro end-to-end-routing?          empty
      +--ro boundary-rerouting?          empty
      +--ro segment-based-rerouting?     empty
      +--ro lsp-integrety-required?      empty
      +--ro contiguous-lsp?              empty
      +--ro lsp-stitching-desired?       empty
      +--ro preplanned-lsp?              empty
      +--ro oob-mapping?                 empty
      +--ro incoming-explicit-route
      +--ro outgoing-explicit-route
      +--ro path-record-route
      +--ro resv-record-route
```

RSVP-TE (packet/MPLS) Data Model

Augmentation of TE Generic Model

Augment TE tunnels

```
module: ietf-rsvp-te-psc
augment /ietf-te:te/ietf-te:tunnels/ietf-te:tunnel:
    +--rw config
    |  +--rw local-protection-desired?       empty
    |  +--rw bandwidth-protection-desired?   empty
    |  +--rw node-protection-desired?        empty
    |  +--rw non-php-desired?                empty
    |  +--rw entropy-label-cap?              empty
    |  +--rw oam-mep-entities-desired?       empty
    |  +--rw oam-mip-entities-desired?       empty
    +--ro state
       +--ro local-protection-desired?       empty
       +--ro bandwidth-protection-desired?   empty
       +--ro node-protection-desired?        empty
       +--ro non-php-desired?                empty
       +--ro entropy-label-cap?              empty
       +--ro oam-mep-entities-desired?       empty
       +--ro oam-mip-entities-desired?       empty
```

Augment TE LSP

```
augment /ietf-te:te/ietf-te:lsps-state/ietf-te:lsp:
   +--ro local-protection-desired?       empty
   +--ro bandwidth-protection-desired?   empty
   +--ro node-protection-desired?        empty
   +--ro non-php-desired?                empty
   +--ro entropy-label-cap?              empty
   +--ro oam-mep-entities-desired?       empty
   +--ro oam-mip-entities-desired?       empty
   +--ro backup-info
      +--ro backup-tunnel-name?          string
      +--ro backup-frr-on?               uint8
      +--ro backup-protected-lsp-num?    uint32
```

```
augment /ietf-te:te/ietf-te:interfaces/ietf-te:interface:
   +--rw rsvp-te-interface-attributes-psc
      +--rw config
      |  +--rw (bandwidth-value)?
      +--ro state
      |  +--ro (bandwidth-value)?
      +--rw rsvp-te-frr-backups
         +--rw config
         |  +--rw rsvp-te-frr-backups
         +--ro state
            +--ro rsvp-te-frr-backups
```

Augment TE interface

Open Issues

- Ephemeral states discussion
- Separation of device specific properties (e.g. TE interfaces) and non-device specific properties (e.g. tunnels, LSPs) into two separate modules
- Use of templates
- Notifications

Next Steps

- Current I-Ds:
  - Seeking more comments and feedback from WG and request WG adoption
  - Complete outstanding rpcs/notifications
- New I-Ds:
  - Converge on Base MPLS YANG model
  - Embark on:
    - Segment Routing TE augmentation to TE generic model
    - MPLS Static and MPLS TP

Thank You