Profiles of TE Topology Model for non-TE scenarios

TEAS WG, IETF118, Prague

draft-busi-teas-te-topology-profiles-06

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History

• IETF 110: initial proposal
  – Few positive feedbacks from TEAS WG mailing list (thanks to Daniele Ceccarelli)

• IETF 111: updated proposal based on mailing list and weekly call discussions
  – Few positive feedbacks from TEAS WG meeting (thanks to Scott Mansfield)
  – To be further discussion on the mailing list

• TEAS WG recently polled for interest
  – Few positive feedbacks form TEAS WG mailing list (thanks to Julien Meuric)
Motivation

• Multiple similar discussions in IETF working groups
  – Scenario: non-TE networks
  – Requirement: sub-set TE Topology attributes
• Similar discussions recently started for the Digital Map in OPSAWG
• TE Topology Model (RFC8795) looks very complex at the first glance
  – Extensive model to support many features
    • Some applicable only to TE networks
    • Others applicable to both TE and non-TE networks
  – Most of the features/attributes are optional
• Clarify that a sub-set (profile) of TE Topology can be used in specific scenarios (including non-TE use cases)
Examples of non-TE scenarios

• UNI Topology Discovery
• Administrative and Operational State
• Geolocation
• Overlay and Underlay Topology
• Nodes with switching limitations
Technology-specific Augmentations

Option 1
(single inheritance)

Network

Network Topology

TE Topology (profile)

Technology-specific TE Topology

Option 2
(multi-inheritance)

Network

Network Topology

TE Topology (profile)

Technology-specific Network Topology
Open Issue #1

• How to report to the client the profiles implemented by a server
  – may be different for different instances/network types

• Proposal
  – Out of scope from this draft (Informational)
  – Trigger discuss (and further work) with Netmod WG or OPSAWG WG (Digital Map) for a generic solution to support profiling standard YANG models

• See: https://github.com/tsaad-dev/te/issues/161
Open Issue #2

• Explanation of the difference between supporting-node/supporting-link (in RFC8345) and overlay/underlay (in RFC8795)
  – See comment from Scott Mansfield at IETF 111

• Proposal
  – Overlay/underlay concept in RFC8795 is used to model multi-layer relationship: a TE path in an underlay topology is supporting a TE Link in the overlay topology
  – Supporting-node/link in RFC8345 is used to model abstraction relationship: an abstract node in an abstract network topology is supported by a physical node in the native network topology

• See: https://github.com/tsaad-dev/te/issues/167
Next Step

• TEAS WG adoption
• Advertising this draft to other WGs
  – Relevant to the Digital Map work within OPSAWG?
  – Trigger work for a generic solution for profiling standard YANG models?
• Get more review and feedbacks
  – Address the open issues and any comments
• Add other useful examples
• Github: https://github.com/tsaad-dev/te
Backup
module: ietf-te-topology
    augment /nw:networks/nw:network/nw:network-types:
      --rw te-topology!
    augment /nw:networks/nw:network/nw:node/nt:termination-point:
      --rw te-tp-id?   te-types:te-tp-id
      --rw te!
        --rw admin-status?
          te-types:te-admin-status
      --rw inter-domain-plug-id?   binary
      --ro oper-status?   te-types:te-oper-status
Administrative and Operational State

module: ietf-te-topology

augment /nw:networks/nw:network/nw:network-types:
    +-rw te-topology!

augment /nw:networks/nw:network:
    +-rw te-topology-identifier
        |  +-rw provider-id? te-global-id
        |  +-rw client-id? te-global-id
        |  +-rw topology-id? te-topology-id
    +-rw te!
        +-rw name? string

augment /nw:networks/nw:network/nw:node:
    +-rw te-node-id? te-types:te-node-id

    +-rw te!
        +-rw te-node-attributes
            |  +-rw admin-status? te-types:te-admin-status
            |  +-rw name? string
        +-ro oper-status? te-types:te-oper-status

augment /nw:networks/nw:network/nt:link:
    +-rw te!
        +-rw te-link-attributes
            |  +-rw name? string
            |  +-rw admin-status? te-types:te-admin-status
        +-ro oper-status? te-types:te-oper-status

augment /nw:networks/nw:network/nw:node/nt:termination-point:
    +-rw te-tp-id? te-types:te-tp-id

    +-rw te!
        +-rw admin-status? te-types:te-admin-status
        +-rw name? string
        +-ro oper-status? te-types:te-oper-status
Geolocation

module: ietf-te-topology
  augment /nw:networks/nw:network/nw:network-types:
    +-rw te-topology!
  augment /nw:networks/nw:network:
    +-rw te-topology-identifier
      | +-rw provider-id?   te-global-id
      | +-rw client-id?     te-global-id
      | +-rw topology-id?   te-topology-id
    +-rw te!
      +-ro geolocation
        +-ro altitude?    int64
        +-ro latitude?    geographic-coordinate-degree
        +-ro longitude?   geographic-coordinate-degree
  augment /nw:networks/nw:network/nw:node:
    +-rw te-node-id?   te-types:te-node-id
    +-rw te!
      +-ro geolocation
        +-ro altitude?    int64
        +-ro latitude?    geographic-coordinate-degree
        +-ro longitude?   geographic-coordinate-degree
  augment /nw:networks/nw:network/nw:node/nt:termination-point:
    +-rw te-tp-id?   te-types:te-tp-id
    +-rw te!
      +-ro geolocation
        +-ro altitude?    int64
        +-ro latitude?    geographic-coordinate-degree
        +-ro longitude?   geographic-coordinate-degree
Overlay and Underlay Topology

module: ietf-te-topology
augment /nw:networks/nw:network/nw:network-types:
  +--rw te-topology!
augment /nw:networks/nw:network/nw:node:
  +--rw te-node-id? te-types:te-node-id
  +--rw te!
    +--rw te-node-attributes
      +--rw underlay-topology {te-topology-hierarchy}?
augment /nw:networks/nw:network/nt:link:
  +--rw te!
    +--rw te-link-attributes
      +--rw underlay {te-topology-hierarchy}?
        +--rw enabled? boolean
        +--rw primary-path
          +--rw network-ref?
            | -> /nw:networks/network/network-id
          +--rw path-element* [path-element-id]
            +--rw path-element-id uint32
            +--rw (type)?
              +--(numbered-link-hop)
                | +--rw numbered-link-hop
                | | +--rw link-tp-id te-tp-id
                | | +--rw hop-type? te-hop-type
                | | +--rw direction? te-link-direction
              +--(unnumbered-link-hop)
                +--rw unnumbered-link-hop
                  +--rw link-tp-id te-tp-id
                  +--rw node-id te-node-id
                  +--rw hop-type? te-hop-type
                  +--rw direction? te-link-direction
Nodes with switching limitations

module: ietf-te-topology
augment /nw:networks/nw:network/nw:network-types:
    +-rw te-topology!
augment /nw:networks/nw:network/nw:node:
    +-rw te-node-id? te-types:te-node-id
    +-rw te!
        +-rw te-node-attributes
            +-rw connectivity-matrices
                +-rw number-of-entries? uint16
                +-rw is-allowed? boolean
                +-rw connectivity-matrix* [id]
                    +-rw id uint32
                    +-rw from
                        | +-rw tp-ref? leafref
                    +-rw to
                        | +-rw tp-ref? leafref
                    +-rw is-allowed? boolean
Technology-specific Augmentations
Option 1

Augments Network Topology:
- Nodes
- Links
- Termination Points (TPs)

Augment also TE Topology:
- Bandwidth
- Tunnel Termination Points (TTPs)
- Connectivity Matrix
Technology-specific Augmentations
Option 2

- **Network**
- **Network Topology**
  - **TE Topology (profile)**
  - **Technology-specific Network Topology**
    - Augments *only* Network Topology
      - Nodes
      - Links
      - Termination Points (TPs)
Technology-specific Augmentations
Option 3

Augments only Network Topology
- Nodes
- Links
- Termination Points (TPs)

No advantages compared to Option 1
Useful only if the Technology-specific Network Topology already exists

Augment only TE Topology:
- Bandwidth
- Tunnel Termination Points (TTPs)
- Connectivity Matrix

References
Example: Technology-specific Augmentations (Link)

```plaintext
+-rw link* [link-id]
  +-rw link-id link-id
  <...>
  +-rw example-link-attributes // augment TE (Option 1) OR
  |  <...> // augment NT (Option 2 or 3)
  +--rw te!
      +-rw te-link-attributes
          +-rw name? string
          +-rw example-te-link-attributes // augment TE (Option 1 or 3)
          |  <...>
          +-rw max-link-bandwidth
          +-rw te-bandwidth
          +-rw (technology)?
            +-:(generic)
            |  +-rw generic? te-bandwidth
            +-:(foo) // augment TE (Option 1 or 3)
              +-rw foo? foo-bandwidth
```