Profiles of TE Topology Model for non-TE scenarios

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draft-ietf-teas-te-topology-profiles-01

Authors:
Italo Busi (Huawei)
Xufeng Liu (Alef Edge)
Igor Bryskin
Tarek Saad (Cisco)
Oscar Gonzalez de Dios (Telefonica)

Contributors:
Vishnu Pavan Beeram (Juniper)
Aihua Guo (Futurewei)
Haomian Zheng (Huawei)
Sergio Belotti (Nokia)
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 NMOP WG

• 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

• Administrative and Operational State
• Overlay and Underlay Topology
• Nodes with switching limitations
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/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:
  +--rw te-node-id? te-types:te-node-id
  +--rw te!
    +--rw te-node-attributes
      |  +--rw admin-status? te-types:te-admin-status
      |  +--ro name? string
    +--ro oper-status? te-types:te-oper-status

augment /nw:networks/nw:network/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
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

- Network
  - Network Topology
    - TE Topology (profile)
      - Technology-specific TE Topology
        - Augment only TE Topology:
          - Bandwidth
          - Tunnel Termination Points (TTPs)
          - Connectivity Matrix

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

References

No advantages compared to Option 1

Useful only if the Technology-specific Network Topology already exists
Example: Technology-specific Augmentations (Link)

```
+-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
```
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 or NMOP 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

• Address TEAS WG adoption poll comments
• Advertising this draft to other WGs
  – Relevant to the Digital Map work within NMOP WG
  – 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
  – Digital Map Use Cases are good candidates
• Github: https://github.com/tsaad-dev/te