Profiles for TE Topology Model

TEAS WG, IETF110, Virtual Meeting

draft-busi-teas-te-topology-profiles-01

Authors:
Italo Busi (Huawei)
Xufeng Liu (Volta Networks)
Igor Bryskin
Vishnu Pavan Beeram (Juniper)
Tarek Saad (Juniper)
Oscar Gonzalez de Dios (Telefonica)

Contributors:
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
• 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
UNI Topology Discovery

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
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 Network Topology

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

References

Technology-specific TE Topology

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

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 Issues

• How to report a client the TE Topology profile a server has implemented
  – Not an issue when reading the operational DS
  – Issue when writing to running DS
    • How to avoid the client to write an attribute not used in the TE Topology profile implemented by the server
  – Should this point be described in this draft?
    • General issue: how to avoid the client to write an optional attribute which is not supported by the server
    • On-going investigation with Netmod WG

• There is not a detailed description of the multi-inheritance capability of RFC8345, as used with options 2 and 3
  – Should these details be described in this draft?
    • It is a feature of RFC8345 (network model) not of RFC8795 (te topology model)
Next Step

• Advertising this draft to other WGs
• Get more review and feedbacks
  – Address the open issues and any comments
    • Thanks Daniele for the first feedbacks
• Check interest to further progress this work
  1. Informational RFC?
  2. Merge its content with the Tutorial?
  3. Wiki?
  4. Others?
Backup
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