

Profiles for TE Topology Model

TEAS WG, IETF110, Virtual Meeting

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

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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

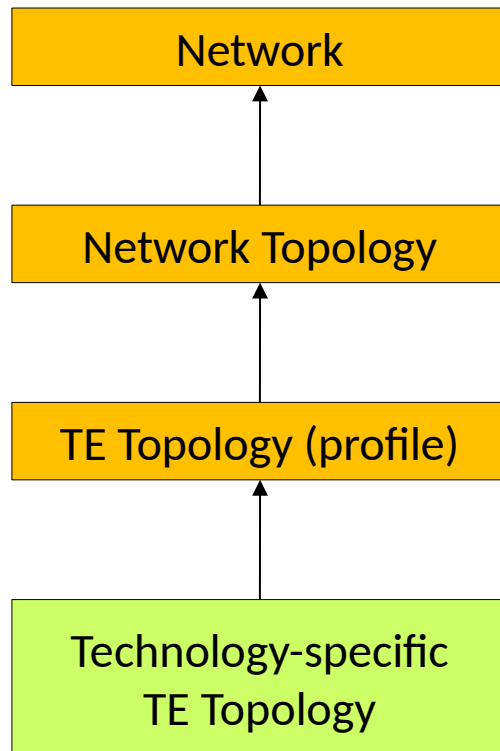
```
module: ietf-te-topology
  augment /nw:networks/nw:network/nw:network-types:
    +--rw te-topology!
  augment /nw:networks/nw:network/nw:node/nt:termination-point:
    +--rw te-tp-id?    te-types:te-tp-id
    +--rw te!
      +--rw admin-status?
        |      te-types:te-admin-status
      +--rw 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

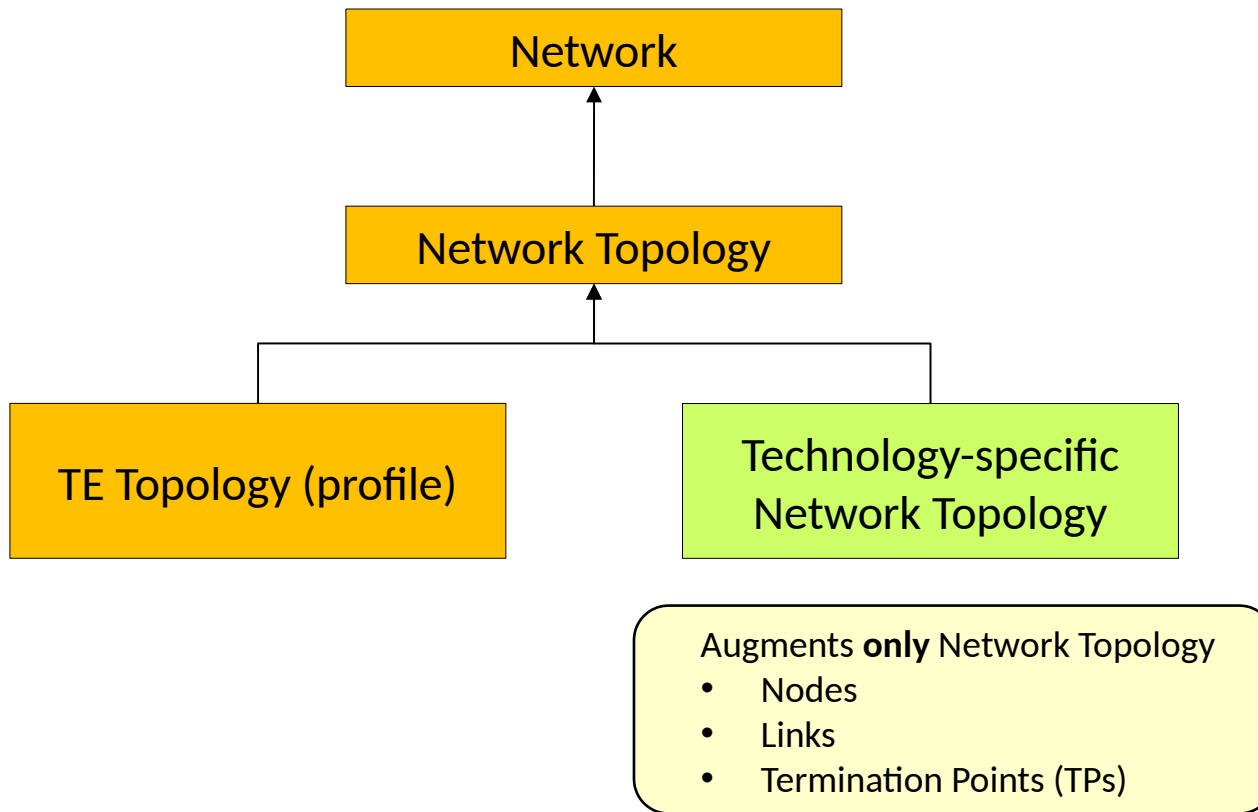
Option 1



- Augments Network Topology:
- Nodes
 - Links
 - Termination Points (TPs)
- Augment **also** TE Topology:
- Bandwidth
 - Tunnel Termination Points (TTPs)
 - Connectivity Matrix

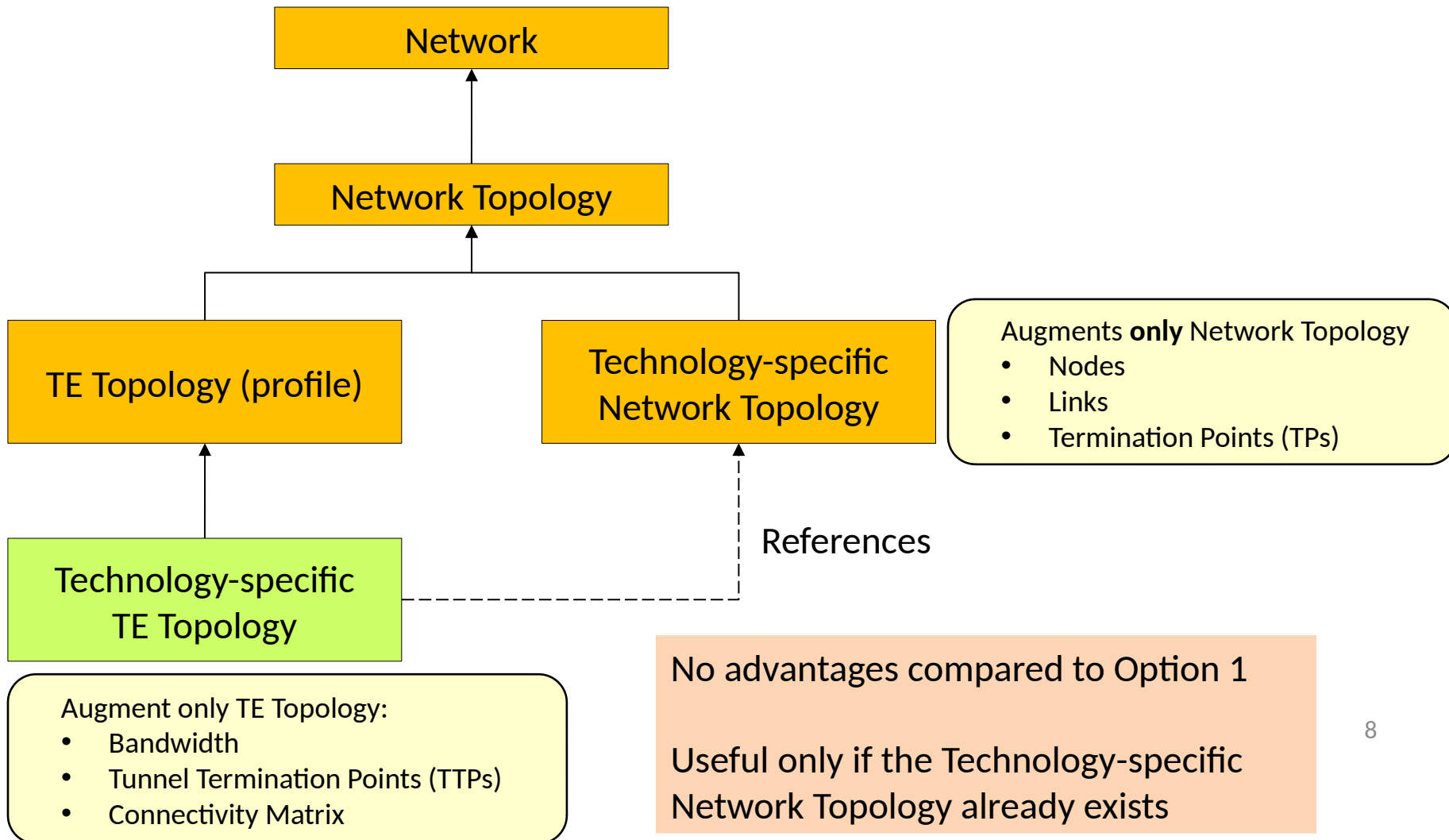
Technology-specific Augmentations

Option 2



Technology-specific Augmentations

Option 3



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

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}?
        +--rw network-ref?   -> /nw:networks/network/network-id
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
```