

# 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

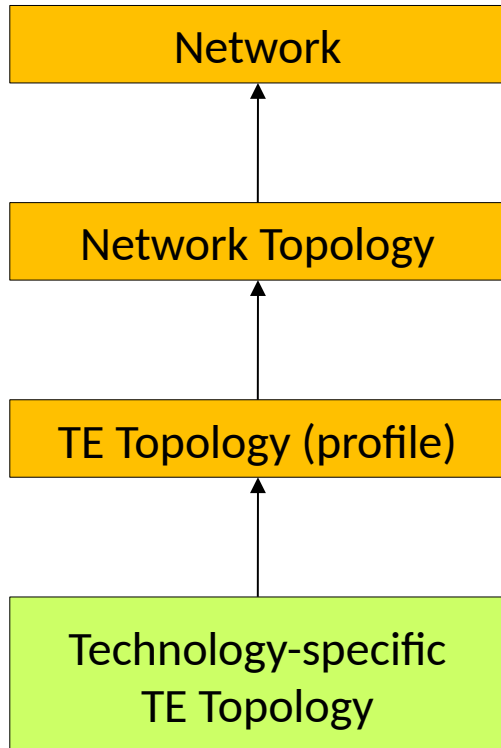
- Multiple similar discussions in IETF working groups
  - Scenario: non-TE networks
  - Requirement: sub-set TE Topology attributes
- Similar discussions recently started for the Digital Map in OPSAWG
- TE Topology Model (RFC8795) looks very complex at the first glance
  - Extensive model to support 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

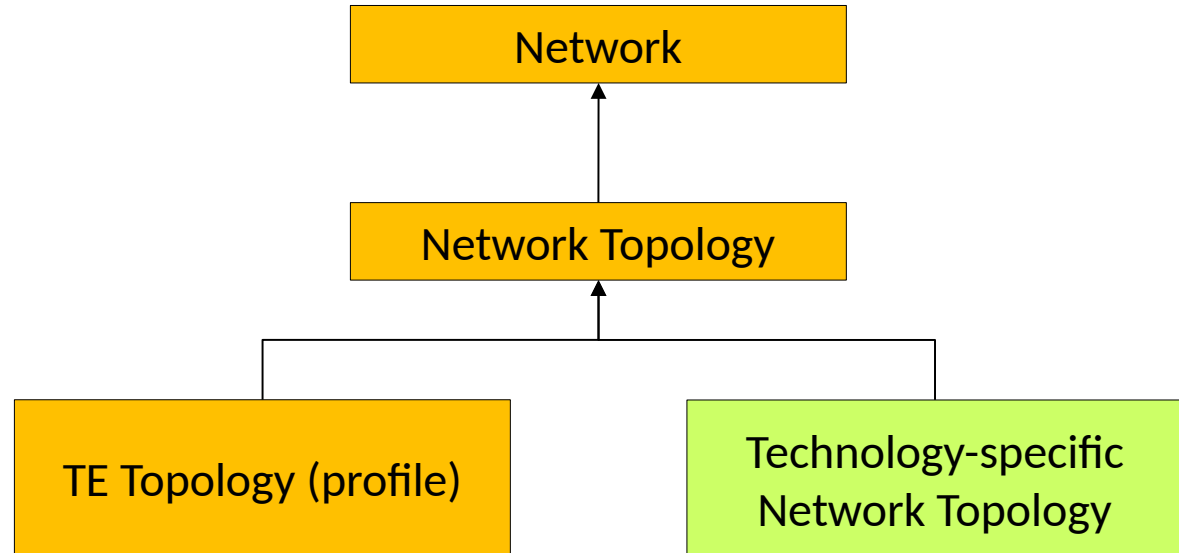
- UNI Topology Discovery
- Administrative and Operational State
- Geolocation
- Overlay and Underlay Topology
- Nodes with switching limitations

# Technology-specific Augmentations

Option 1  
(single inheritance)



Option 2  
(multi-inheritance)



# 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

# 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
```

# 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

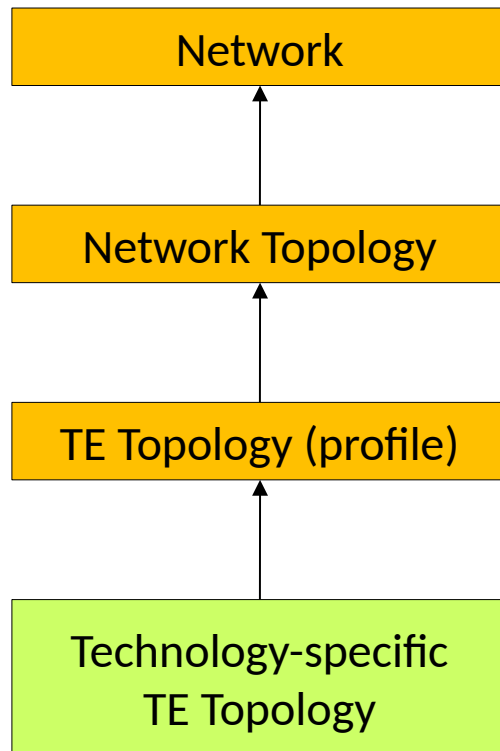
```
module: ietf-te-topology
augment /nw:networks/nw:network/nw:network-types:
  +--rw te-topology!
augment /nw:networks/nw:network/nw:node:
  +--rw te-node-id?   te-types:te-node-id
  +--rw te!
    +--rw te-node-attributes
      +--rw underlay-topology {te-topology-hierarchy}?
        +--rw network-ref?   -> /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
```

# Technology-specific Augmentations

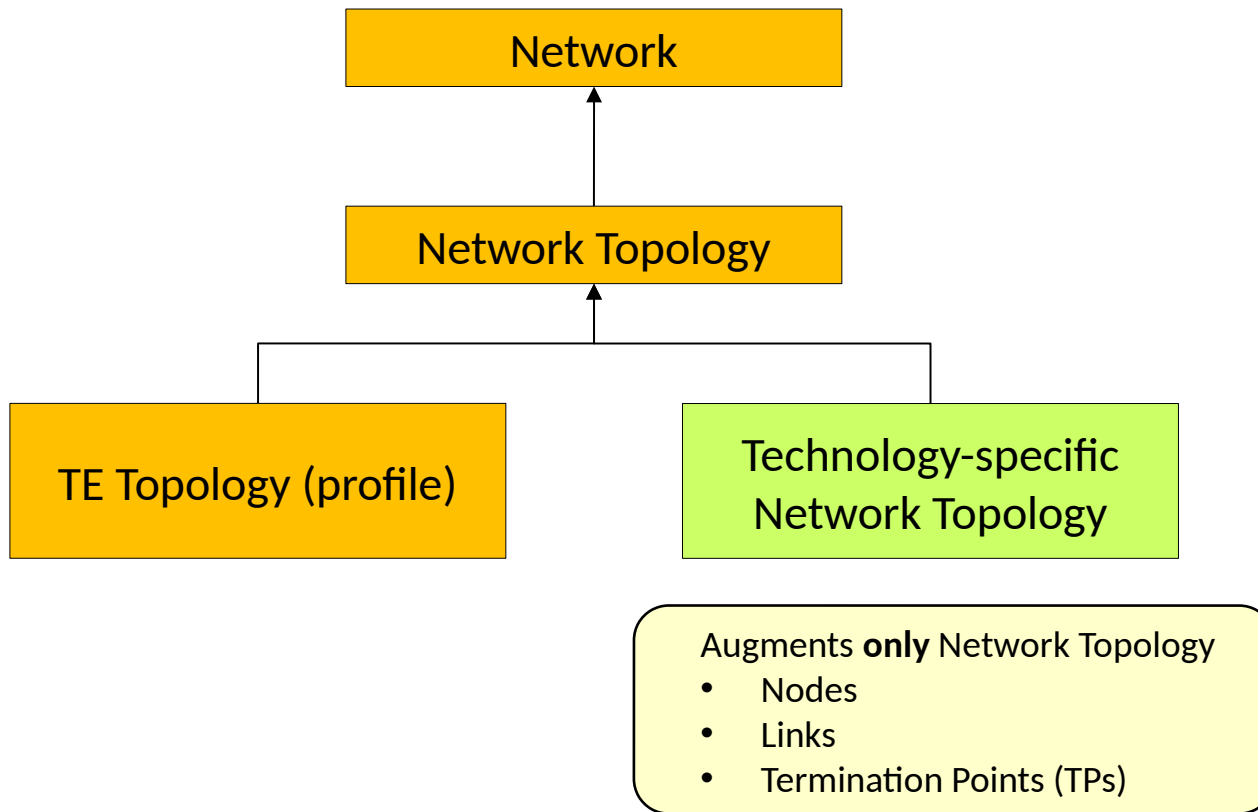
## Option 1



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

# Technology-specific Augmentations

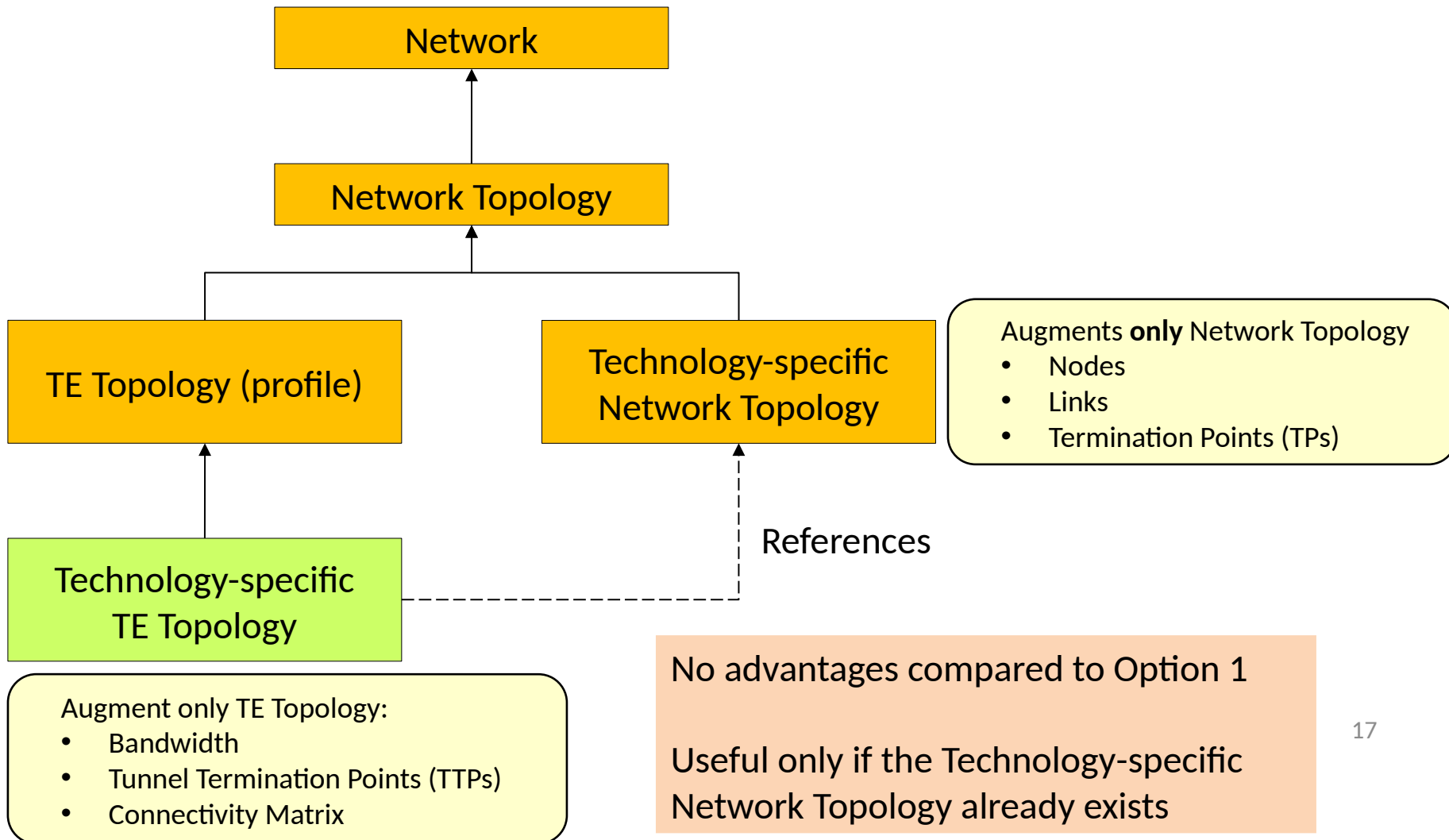
## Option 2





# 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
```