

CCAMP Working Group  
Internet-Draft  
Intended status: Standards Track  
Expires: May 7, 2020

H. Zheng  
Huawei Technologies  
A. Guo  
Individual  
I. Busi  
Huawei Technologies  
Y. Xu  
CAICT  
Y. Zhao  
China Mobile  
X. Liu  
Volta Networks  
November 4, 2019

**A YANG Data Model for Ethernet TE Topology  
draft-zheng-ccamp-client-topo-yang-07**

Abstract

A transport network is a server-layer network to provide connectivity services to its client. In this draft the topology of Ethernet with TE is described with YANG data model.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <https://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on May 7, 2020.

Copyright Notice

Copyright (c) 2019 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents

(<https://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

## Table of Contents

<a href="#">1.</a>	Introduction . . . . .	<a href="#">2</a>
<a href="#">2.</a>	Terminology and Notations . . . . .	<a href="#">3</a>
<a href="#">3.</a>	YANG Model for Topology of Client Layer . . . . .	<a href="#">3</a>
<a href="#">3.1.</a>	YANG Tree for Ethernet Topology . . . . .	<a href="#">3</a>
<a href="#">4.</a>	YANG Code for Topology Client Layer . . . . .	<a href="#">21</a>
<a href="#">4.1.</a>	The ETH Topology YANG Code . . . . .	<a href="#">21</a>
<a href="#">5.</a>	Considerations and Open Issue . . . . .	<a href="#">63</a>
<a href="#">6.</a>	IANA Considerations . . . . .	<a href="#">63</a>
<a href="#">7.</a>	Manageability Considerations . . . . .	<a href="#">63</a>
<a href="#">8.</a>	Security Considerations . . . . .	<a href="#">63</a>
<a href="#">9.</a>	Acknowledgements . . . . .	<a href="#">64</a>
<a href="#">10.</a>	Contributors . . . . .	<a href="#">64</a>
<a href="#">11.</a>	References . . . . .	<a href="#">65</a>
<a href="#">11.1.</a>	Normative References . . . . .	<a href="#">65</a>
<a href="#">11.2.</a>	Informative References . . . . .	<a href="#">65</a>
	Authors' Addresses . . . . .	<a href="#">66</a>

## [1.](#) Introduction

A transport network is a server-layer network designed to provide connectivity services for a client-layer network to carry the client traffic transparently across the server-layer network resources. The topology model in Traffic-Engineered network has been defined in both generic way and technology-specific way. The generic model, which is the base TE YANG model, can be found at [[I-D.ietf-teas-yang-te-topo](#)]. Technology-specific models, such as OTN/WSON topology model, have also been defined in [[I-D.ietf-ccamp-otn-topo-yang](#)] and [[I-D.ietf-ccamp-wson-yang](#)] respectively. Corresponding topology on client-layer is also required, to have a complete topology view from the perspective of network controllers.

This document defines a data model of all client-layer Topology, using YANG language defined in [[RFC7950](#)]. The model is augmenting the generic TE topology model, and can be used by either applications exposing to a network controller or among controllers. Furthermore, it can be used by an application for topology description in client-layer network.

## **2. Terminology and Notations**

A simplified graphical representation of the data model is used in this document. The meaning of the symbols in the YANG data tree presented later in this document is defined in [\[RFC8340\]](#). They are provided below for reference.

- o Brackets "[" and "]" enclose list keys.
- o Abbreviations before data node names: "rw" means configuration (read-write) and "ro" state data (read-only).
- o Symbols after data node names: "?" means an optional node, "!" means a presence container, and "\*" denotes a list and leaf-list.
- o Parentheses enclose choice and case nodes, and case nodes are also marked with a colon (":").
- o Ellipsis ("...") stands for contents of subtrees that are not shown.

## **3. YANG Model for Topology of Client Layer**

### **3.1. YANG Tree for Ethernet Topology**

```

module: ietf-eth-te-topology
  augment /nw:networks/nw:network/nw:network-types
    /tet:te-topology:
      +--rw eth-tran-topology!
  augment /nw:networks/nw:network/nw:node
    /nt:termination-point:
      +--rw ltp-mac-address?
      |   yang:mac-address
      +--rw port-vlan-id?
      |   eth-types:vlanid
      +--rw maximum-frame-size?                uint16
      +--rw (direction)?
      |   +--:(symmetrical)
      |   |   +--rw ingress-egress-bandwidth-profile
      |   |   |   +--rw bandwidth-profile-type?
      |   |   |   |   eth-types:bandwidth-profile-type
      |   |   |   +--rw CIR?                        uint64
      |   |   |   +--rw CBS?                        uint64
      |   |   |   +--rw EIR?                        uint64
      |   |   |   +--rw EBS?                        uint64
      |   |   |   +--rw color-aware?                boolean
      |   |   |   +--rw coupling-flag?              boolean

```

```

|   +--:(asymmetrical)
|   |   +--rw ingress-bandwidth-profile
|   |   |   +--rw bandwidth-profile-type?
|   |   |   |   etht-types:bandwidth-profile-type
|   |   |   +--rw CIR?                               uint64
|   |   |   +--rw CBS?                               uint64
|   |   |   +--rw EIR?                               uint64
|   |   |   +--rw EBS?                               uint64
|   |   |   +--rw color-aware?                       boolean
|   |   |   +--rw coupling-flag?                     boolean
|   |   +--rw egress-bandwidth-profile
|   |   |   +--rw bandwidth-profile-type?
|   |   |   |   etht-types:bandwidth-profile-type
|   |   |   +--rw CIR?                               uint64
|   |   |   +--rw CBS?                               uint64
|   |   |   +--rw EIR?                               uint64
|   |   |   +--rw EBS?                               uint64
|   |   |   +--rw color-aware?                       boolean
|   |   |   +--rw coupling-flag?                     boolean
+--rw eth-svc!
|   +--rw client-facing?                             boolean
|   +--rw supported-classification
|   |   +--rw port-classification?                   boolean
|   |   +--rw vlan-classification
|   |   |   +--rw vlan-tag-classification?           boolean
|   |   |   +--rw outer-tag
|   |   |   |   +--rw supported-tag-types*
|   |   |   |   |   etht-types:eth-tag-classify
|   |   |   |   +--rw vlan-bundling?                 boolean
|   |   |   |   +--rw vlan-range?
|   |   |   |   |   etht-types:vid-range-type
|   |   |   +--rw second-tag
|   |   |   |   +--rw second-tag-classification?     boolean
|   |   |   |   +--rw supported-tag-types*
|   |   |   |   |   etht-types:eth-tag-classify
|   |   |   |   +--rw vlan-bundling?                 boolean
|   |   |   |   +--rw vlan-range?
|   |   |   |   |   etht-types:vid-range-type
+--rw supported-vlan-operations
|   +--rw asymmetrical-operations?                   boolean
|   +--rw transparent-vlan-operations?               boolean
+--rw vlan-pop
|   +--rw vlan-pop-operations?                       boolean
|   +--rw max-pop-tags?                              uint8
+--rw vlan-push
|   +--rw vlan-push-operation?                       boolean
|   +--rw outer-tag
|   |   +--rw supported-tag-types*

```

```

    | |          etht-types:eth-tag-type
    | +--rw vlan-range?
    |          etht-types:vid-range-type
+--rw second-tag
    +--rw push-second-tag?          boolean
    +--rw supported-tag-types*
    |          etht-types:eth-tag-type
    +--rw vlan-range?
           etht-types:vid-range-type
augment /nw:networks/nw:network/nw:node
  /nt:termination-point/tet:te
  /tet:interface-switching-capability
  /tet:max-lsp-bandwidth/tet:te-bandwidth
  /tet:technology:
+--:(eth)
  +--rw eth-bandwidth?  uint64
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices/tet:path-constraints
  /tet:te-bandwidth/tet:technology:
+--:(eth)
  +--rw eth-bandwidth?  uint64
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:path-constraints
  /tet:te-bandwidth/tet:technology:
+--:(eth)
  +--rw eth-bandwidth?  uint64
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices/tet:path-constraints
  /tet:te-bandwidth/tet:technology:
+--:(eth)
  +--ro eth-bandwidth?  uint64
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:path-constraints
  /tet:te-bandwidth/tet:technology:
+--:(eth)
  +--ro eth-bandwidth?  uint64
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:tunnel-termination-point
  /tet:client-layer-adaptation
  /tet:switching-capability/tet:te-bandwidth
  /tet:technology:
+--:(eth)

```

```

    +--rw eth-bandwidth?  uint64
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:tunnel-termination-point
  /tet:local-link-connectivities
  /tet:path-constraints/tet:te-bandwidth
  /tet:technology:
+--:(eth)
  +--rw eth-bandwidth?  uint64
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:tunnel-termination-point
  /tet:local-link-connectivities
  /tet:local-link-connectivity
  /tet:path-constraints/tet:te-bandwidth
  /tet:technology:
+--:(eth)
  +--rw eth-bandwidth?  uint64
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:te-link-attributes
  /tet:interface-switching-capability
  /tet:max-lsp-bandwidth/tet:te-bandwidth
  /tet:technology:
+--:(eth)
  +--rw eth-bandwidth?  uint64
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:te-link-attributes/tet:max-link-bandwidth
  /tet:te-bandwidth/tet:technology:
+--:(eth)
  +--rw eth-bandwidth?  uint64
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:te-link-attributes
  /tet:max-resv-link-bandwidth/tet:te-bandwidth
  /tet:technology:
+--:(eth)
  +--rw eth-bandwidth?  uint64
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:te-link-attributes/tet:unreserved-bandwidth
  /tet:te-bandwidth/tet:technology:
+--:(eth)
  +--rw eth-bandwidth?  uint64
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:information-source-entry
  /tet:interface-switching-capability
  /tet:max-lsp-bandwidth/tet:te-bandwidth
  /tet:technology:
+--:(eth)
  +--ro eth-bandwidth?  uint64
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:information-source-entry

```

```

        /tet:max-link-bandwidth/tet:te-bandwidth
        /tet:technology:
    +--:(eth)
      +--ro eth-bandwidth?  uint64
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:information-source-entry
  /tet:max-resv-link-bandwidth/tet:te-bandwidth
  /tet:technology:
+--:(eth)
  +--ro eth-bandwidth?  uint64
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:information-source-entry
  /tet:unreserved-bandwidth/tet:te-bandwidth
  /tet:technology:
+--:(eth)
  +--ro eth-bandwidth?  uint64
augment /nw:networks/tet:te/tet:templates
  /tet:link-template/tet:te-link-attributes
  /tet:interface-switching-capability
  /tet:max-lsp-bandwidth/tet:te-bandwidth
  /tet:technology:
+--:(eth)
  +--rw eth-bandwidth?  uint64
augment /nw:networks/tet:te/tet:templates
  /tet:link-template/tet:te-link-attributes
  /tet:max-link-bandwidth/tet:te-bandwidth
  /tet:technology:
+--:(eth)
  +--rw eth-bandwidth?  uint64
augment /nw:networks/tet:te/tet:templates
  /tet:link-template/tet:te-link-attributes
  /tet:max-resv-link-bandwidth/tet:te-bandwidth
  /tet:technology:
+--:(eth)
  +--rw eth-bandwidth?  uint64
augment /nw:networks/tet:te/tet:templates
  /tet:link-template/tet:te-link-attributes
  /tet:unreserved-bandwidth/tet:te-bandwidth
  /tet:technology:
+--:(eth)
  +--rw eth-bandwidth?  uint64
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices
  /tet:label-restrictions/tet:label-restriction:
  +--rw tag-type?  etht-types:eth-tag-type
  +--rw priority?  uint8
augment /nw:networks/nw:network/nw:node/tet:te

```

```

        /tet:te-node-attributes
        /tet:connectivity-matrices
        /tet:label-restrictions/tet:label-restriction
        /tet:label-start/tet:te-label/tet:technology:
+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices
  /tet:label-restrictions/tet:label-restriction
  /tet:label-end/tet:te-label/tet:technology:
+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices
  /tet:label-restrictions/tet:label-restriction
  /tet:label-step/tet:technology:
+--:(eth)
  +--rw eth-step?  uint16
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices/tet:underlay
  /tet:primary-path/tet:path-element/tet:type
  /tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices/tet:underlay
  /tet:backup-path/tet:path-element/tet:type
  /tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices/tet:optimizations
  /tet:algorithm/tet:metric
  /tet:optimization-metric
  /tet:explicit-route-exclude-objects
  /tet:route-object-exclude-object/tet:type
  /tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te

```



```

    /tet:te-node-attributes
    /tet:connectivity-matrices/tet:optimizations
    /tet:algorithm/tet:metric
    /tet:optimization-metric
    /tet:explicit-route-include-objects
    /tet:route-object-include-object/tet:type
    /tet:label/tet:label-hop/tet:te-label
    /tet:technology:
+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices/tet:path-properties
  /tet:path-route-objects/tet:path-route-object
  /tet:type/tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--ro vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:from
  /tet:label-restrictions/tet:label-restriction:
+--rw tag-type?   etht-types:eth-tag-type
+--rw priority?   uint8
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:from
  /tet:label-restrictions/tet:label-restriction
  /tet:label-start/tet:te-label/tet:technology:
+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:from
  /tet:label-restrictions/tet:label-restriction
  /tet:label-end/tet:te-label/tet:technology:
+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:from
  /tet:label-restrictions/tet:label-restriction
  /tet:label-step/tet:technology:
+--:(eth)

```

```
    +--rw eth-step?  uint16
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:to
  /tet:label-restrictions/tet:label-restriction:
+--rw tag-type?  etht-types:eth-tag-type
+--rw priority?  uint8
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:to
  /tet:label-restrictions/tet:label-restriction
  /tet:label-start/tet:te-label/tet:technology:
+--:(eth)
  +--rw vlanid?  etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:to
  /tet:label-restrictions/tet:label-restriction
  /tet:label-end/tet:te-label/tet:technology:
+--:(eth)
  +--rw vlanid?  etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:to
  /tet:label-restrictions/tet:label-restriction
  /tet:label-step/tet:technology:
+--:(eth)
  +--rw eth-step?  uint16
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:underlay
  /tet:primary-path/tet:path-element/tet:type
  /tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--rw vlanid?  etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:underlay
  /tet:backup-path/tet:path-element/tet:type
  /tet:label/tet:label-hop/tet:te-label
  /tet:technology:
```

```
+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:optimizations
  /tet:algorithm/tet:metric
  /tet:optimization-metric
  /tet:explicit-route-exclude-objects
  /tet:route-object-exclude-object/tet:type
  /tet:label/tet:label-hop/tet:te-label
  /tet:technology:

+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:optimizations
  /tet:algorithm/tet:metric
  /tet:optimization-metric
  /tet:explicit-route-include-objects
  /tet:route-object-include-object/tet:type
  /tet:label/tet:label-hop/tet:te-label
  /tet:technology:

+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:path-properties
  /tet:path-route-objects/tet:path-route-object
  /tet:type/tet:label/tet:label-hop/tet:te-label
  /tet:technology:

+--:(eth)
  +--ro vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices
  /tet:label-restrictions/tet:label-restriction:
  +--ro tag-type? etht-types:eth-tag-type
  +--ro priority? uint8
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices
  /tet:label-restrictions/tet:label-restriction
  /tet:label-start/tet:te-label/tet:technology:

+--:(eth)
  +--ro vlanid?   etht-types:vlanid
```

```
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices
  /tet:label-restrictions/tet:label-restriction
  /tet:label-end/tet:te-label/tet:technology:
+--:(eth)
  +--ro vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices
  /tet:label-restrictions/tet:label-restriction
  /tet:label-step/tet:technology:
+--:(eth)
  +--ro eth-step?  uint16
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices/tet:underlay
  /tet:primary-path/tet:path-element/tet:type
  /tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--ro vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices/tet:underlay
  /tet:backup-path/tet:path-element/tet:type
  /tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--ro vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices/tet:optimizations
  /tet:algorithm/tet:metric
  /tet:optimization-metric
  /tet:explicit-route-exclude-objects
  /tet:route-object-exclude-object/tet:type
  /tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--ro vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices/tet:optimizations
  /tet:algorithm/tet:metric
  /tet:optimization-metric
  /tet:explicit-route-include-objects
  /tet:route-object-include-object/tet:type
```

```

        /tet:label/tet:label-hop/tet:te-label
        /tet:technology:
    +--:(eth)
      +--ro vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices/tet:path-properties
  /tet:path-route-objects/tet:path-route-object
  /tet:type/tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--ro vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:from
  /tet:label-restrictions/tet:label-restriction:
+--ro tag-type?   etht-types:eth-tag-type
+--ro priority?   uint8
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:from
  /tet:label-restrictions/tet:label-restriction
  /tet:label-start/tet:te-label/tet:technology:
+--:(eth)
  +--ro vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:from
  /tet:label-restrictions/tet:label-restriction
  /tet:label-end/tet:te-label/tet:technology:
+--:(eth)
  +--ro vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:from
  /tet:label-restrictions/tet:label-restriction
  /tet:label-step/tet:technology:
+--:(eth)
  +--ro eth-step?   uint16
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:to
  /tet:label-restrictions/tet:label-restriction:

```

```

  +--ro tag-type?   etht-types:eth-tag-type
  +--ro priority?   uint8
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:to
  /tet:label-restrictions/tet:label-restriction
  /tet:label-start/tet:te-label/tet:technology:
+--:(eth)
  +--ro vlanid?    etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:to
  /tet:label-restrictions/tet:label-restriction
  /tet:label-end/tet:te-label/tet:technology:
+--:(eth)
  +--ro vlanid?    etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:to
  /tet:label-restrictions/tet:label-restriction
  /tet:label-step/tet:technology:
+--:(eth)
  +--ro eth-step?  uint16
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:underlay
  /tet:primary-path/tet:path-element/tet:type
  /tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--ro vlanid?    etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:underlay
  /tet:backup-path/tet:path-element/tet:type
  /tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--ro vlanid?    etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:optimizations
```

```

    /tet:algorithm/tet:metric
    /tet:optimization-metric
    /tet:explicit-route-exclude-objects
    /tet:route-object-exclude-object/tet:type
    /tet:label/tet:label-hop/tet:te-label
    /tet:technology:
+--:(eth)
  +--ro vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:optimizations
  /tet:algorithm/tet:metric
  /tet:optimization-metric
  /tet:explicit-route-include-objects
  /tet:route-object-include-object/tet:type
  /tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--ro vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry
  /tet:connectivity-matrices
  /tet:connectivity-matrix/tet:path-properties
  /tet:path-route-objects/tet:path-route-object
  /tet:type/tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--ro vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:tunnel-termination-point
  /tet:local-link-connectivities
  /tet:label-restrictions/tet:label-restriction:
+--rw tag-type?   etht-types:eth-tag-type
+--rw priority?   uint8
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:tunnel-termination-point
  /tet:local-link-connectivities
  /tet:label-restrictions/tet:label-restriction
  /tet:label-start/tet:te-label/tet:technology:
+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:tunnel-termination-point
  /tet:local-link-connectivities
  /tet:label-restrictions/tet:label-restriction
  /tet:label-end/tet:te-label/tet:technology:
+--:(eth)

```

```

    +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
    /tet:tunnel-termination-point
    /tet:local-link-connectivities
    /tet:label-restrictions/tet:label-restriction
    /tet:label-step/tet:technology:
+--:(eth)
    +--rw eth-step?   uint16
augment /nw:networks/nw:network/nw:node/tet:te
    /tet:tunnel-termination-point
    /tet:local-link-connectivities/tet:underlay
    /tet:primary-path/tet:path-element/tet:type
    /tet:label/tet:label-hop/tet:te-label
    /tet:technology:
+--:(eth)
    +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
    /tet:tunnel-termination-point
    /tet:local-link-connectivities/tet:underlay
    /tet:backup-path/tet:path-element/tet:type
    /tet:label/tet:label-hop/tet:te-label
    /tet:technology:
+--:(eth)
    +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
    /tet:tunnel-termination-point
    /tet:local-link-connectivities/tet:optimizations
    /tet:algorithm/tet:metric
    /tet:optimization-metric
    /tet:explicit-route-exclude-objects
    /tet:route-object-exclude-object/tet:type
    /tet:label/tet:label-hop/tet:te-label
    /tet:technology:
+--:(eth)
    +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
    /tet:tunnel-termination-point
    /tet:local-link-connectivities/tet:optimizations
    /tet:algorithm/tet:metric
    /tet:optimization-metric
    /tet:explicit-route-include-objects
    /tet:route-object-include-object/tet:type
    /tet:label/tet:label-hop/tet:te-label
    /tet:technology:
+--:(eth)
    +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
    /tet:tunnel-termination-point

```



```

    /tet:local-link-connectivities
    /tet:path-properties/tet:path-route-objects
    /tet:path-route-object/tet:type/tet:label
    /tet:label-hop/tet:te-label/tet:technology:
+--:(eth)
  +--ro vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:tunnel-termination-point
  /tet:local-link-connectivities
  /tet:local-link-connectivity
  /tet:label-restrictions/tet:label-restriction:
+--rw tag-type?  etht-types:eth-tag-type
+--rw priority?  uint8
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:tunnel-termination-point
  /tet:local-link-connectivities
  /tet:local-link-connectivity
  /tet:label-restrictions/tet:label-restriction
  /tet:label-start/tet:te-label/tet:technology:
+--:(eth)
  +--rw vlanid?  etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:tunnel-termination-point
  /tet:local-link-connectivities
  /tet:local-link-connectivity
  /tet:label-restrictions/tet:label-restriction
  /tet:label-end/tet:te-label/tet:technology:
+--:(eth)
  +--rw vlanid?  etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:tunnel-termination-point
  /tet:local-link-connectivities
  /tet:local-link-connectivity
  /tet:label-restrictions/tet:label-restriction
  /tet:label-step/tet:technology:
+--:(eth)
  +--rw eth-step?  uint16
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:tunnel-termination-point
  /tet:local-link-connectivities
  /tet:local-link-connectivity/tet:underlay
  /tet:primary-path/tet:path-element/tet:type
  /tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--rw vlanid?  etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:tunnel-termination-point

```

```

    /tet:local-link-connectivities
    /tet:local-link-connectivity/tet:underlay
    /tet:backup-path/tet:path-element/tet:type
    /tet:label/tet:label-hop/tet:te-label
    /tet:technology:
+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:tunnel-termination-point
  /tet:local-link-connectivities
  /tet:local-link-connectivity/tet:optimizations
  /tet:algorithm/tet:metric
  /tet:optimization-metric
  /tet:explicit-route-exclude-objects
  /tet:route-object-exclude-object/tet:type
  /tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:tunnel-termination-point
  /tet:local-link-connectivities
  /tet:local-link-connectivity/tet:optimizations
  /tet:algorithm/tet:metric
  /tet:optimization-metric
  /tet:explicit-route-include-objects
  /tet:route-object-include-object/tet:type
  /tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:tunnel-termination-point
  /tet:local-link-connectivities
  /tet:local-link-connectivity/tet:path-properties
  /tet:path-route-objects/tet:path-route-object
  /tet:type/tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--ro vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:te-link-attributes/tet:underlay
  /tet:primary-path/tet:path-element/tet:type
  /tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nt:link/tet:te

```

```

        /tet:te-link-attributes/tet:underlay
        /tet:backup-path/tet:path-element/tet:type
        /tet:label/tet:label-hop/tet:te-label
        /tet:technology:
    +--:(eth)
      +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:te-link-attributes/tet:label-restrictions
  /tet:label-restriction:
    +--rw tag-type?   etht-types:eth-tag-type
    +--rw priority?   uint8
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:te-link-attributes/tet:label-restrictions
  /tet:label-restriction/tet:label-start
  /tet:te-label/tet:technology:
    +--:(eth)
      +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:te-link-attributes/tet:label-restrictions
  /tet:label-restriction/tet:label-end
  /tet:te-label/tet:technology:
    +--:(eth)
      +--rw vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:te-link-attributes/tet:label-restrictions
  /tet:label-restriction/tet:label-step
  /tet:technology:
    +--:(eth)
      +--rw eth-step?   uint16
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:information-source-entry
  /tet:label-restrictions/tet:label-restriction:
    +--ro tag-type?   etht-types:eth-tag-type
    +--ro priority?   uint8
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:information-source-entry
  /tet:label-restrictions/tet:label-restriction
  /tet:label-start/tet:te-label/tet:technology:
    +--:(eth)
      +--ro vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:information-source-entry
  /tet:label-restrictions/tet:label-restriction
  /tet:label-end/tet:te-label/tet:technology:
    +--:(eth)
      +--ro vlanid?   etht-types:vlanid
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:information-source-entry

```

```

        /tet:label-restrictions/tet:label-restriction
        /tet:label-step/tet:technology:
+--:(eth)
  +--ro eth-step?   uint16
augment /nw:networks/tet:te/tet:templates
  /tet:link-template/tet:te-link-attributes
  /tet:underlay/tet:primary-path/tet:path-element
  /tet:type/tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/tet:te/tet:templates
  /tet:link-template/tet:te-link-attributes
  /tet:underlay/tet:backup-path/tet:path-element
  /tet:type/tet:label/tet:label-hop/tet:te-label
  /tet:technology:
+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/tet:te/tet:templates
  /tet:link-template/tet:te-link-attributes
  /tet:label-restrictions/tet:label-restriction:
  +--rw tag-type? etht-types:eth-tag-type
  +--rw priority? uint8
augment /nw:networks/tet:te/tet:templates
  /tet:link-template/tet:te-link-attributes
  /tet:label-restrictions/tet:label-restriction
  /tet:label-start/tet:te-label/tet:technology:
+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/tet:te/tet:templates
  /tet:link-template/tet:te-link-attributes
  /tet:label-restrictions/tet:label-restriction
  /tet:label-end/tet:te-label/tet:technology:
+--:(eth)
  +--rw vlanid?   etht-types:vlanid
augment /nw:networks/tet:te/tet:templates
  /tet:link-template/tet:te-link-attributes
  /tet:label-restrictions/tet:label-restriction
  /tet:label-step/tet:technology:
+--:(eth)
  +--rw eth-step?   uint16

```

## **4. YANG Code for Topology Client Layer**

### **4.1. The ETH Topology YANG Code**

```
<CODE BEGINS> file "ietf-eth-te-topology@2019-11-04.yang"
module ietf-eth-te-topology {

  namespace "urn:ietf:params:xml:ns:yang:ietf-eth-te-topology";

  prefix "ethtetopo";

  import ietf-network {
    prefix "nw";
  }

  import ietf-network-topology {
    prefix "nt";
  }

  import ietf-te-topology {
    prefix "tet";
  }

  import ietf-yang-types {
    prefix "yang";
  }

  import ietf-eth-tran-types {
    prefix "eth-t-types";
  }

  organization
    "Internet Engineering Task Force (IETF) CCAMP WG";
  contact
    "
      WG List: <mailto:ccamp@ietf.org>

      ID-draft editor:
        Haomian Zheng (zhenghaomian@huawei.com);
        Italo Busi (italo.busi@huawei.com);
        Aihua Guo (aihuaguo.ietf@gmail.com);
        Yunbin Xu (xuyunbin@caict.ac.cn);
        Yang Zhao (zhaoyangy@chinamobile.com);
        Xufeng Liu (xufeng.liu.ietf@gmail.com);
    ";

  description
```

"This module defines a YANG data model for describing layer-2 Ethernet transport topologies. The model fully conforms to the Network Management Datastore Architecture (NMDA).

Copyright (c) 2019 IETF Trust and the persons identified as authors of the code. All rights reserved.

Redistribution and use in source and binary forms, with or without modification, is permitted pursuant to, and subject to the license terms contained in, the Simplified BSD License set forth in [Section 4.c](#) of the IETF Trust's Legal Provisions Relating to IETF Documents (<https://trustee.ietf.org/license-info>).

This version of this YANG module is part of RFC XXXX; see the RFC itself for full legal notices.";

```
revision 2019-11-04 {
  description
    "Initial Revision";
  reference
    "RFC XXXX: A YANG Data Model for Client-layer Topology";
  // RFC Ed.: replace XXXX with actual RFC number, update date
  // information and remove this note
}

/*
 * Groupings
 */

grouping eth-tran-topology-type {
  description
    "Identifies the Ethernet Transport topology type";

  container eth-tran-topology {
    presence "indicates a topology type of
      Ethernet Transport Network.";
    description "Eth transport topology type";
  }
}

grouping ltp-bandwidth-profiles {
  description
    "A grouping which represents the bandwidth profile(s)
    for the ETH LTP.";

  choice direction {
    description
```

```
    "Whether the bandwidth profiles are symmetrical or
    asymmetrical";
  case symmetrical {
    description
      "The same bandwidth profile is used to describe the ingress
      and the egress bandwidth profile.";

    container ingress-egress-bandwidth-profile {
      description
        "The bandwidth profile used in the ingress and egress
        direction.";
      uses etht-types:etht-bandwidth-profiles;
    }
  }
  case asymmetrical {
    description
      "Different ingress and egress bandwidth profiles
      can be specified.";
    container ingress-bandwidth-profile {
      description
        "The bandwidth profile used in the ingress direction.";
      uses etht-types:etht-bandwidth-profiles;
    }
    container egress-bandwidth-profile {
      description
        "The bandwidth profile used in the egress direction.";
      uses etht-types:etht-bandwidth-profiles;
    }
  }
}

grouping eth-ltp-attributes {
  description
    "Ethernet transport link termination point attributes";

  /*
  * Open Issue: should we remove this attribute
  * (duplicates with I2RS L2 attributes)?
  */
  leaf ltp-mac-address {
    type yang:mac-address;
    description "the MAC address of the LTP.";
  }
  /*
  * Open Issue: should we remove this attribute
  * (duplicates with I2RS L2 attributes)?
  */
}
```

```
leaf port-vlan-id {
  type etht-types:vlanid;
  description "the port VLAN ID of the LTP.";
}
/*
 * Open Issue: should we remove this attribute
 * (duplicates with I2RS L2 attributes)?
 */
leaf maximum-frame-size {
  type uint16 {
    range "64 .. 65535";
  }
  description
    "Maximum frame size";
}
uses ltp-bandwidth-profiles;
}

grouping svc-vlan-classification {
  description
    "Grouping defining the capabilities for VLAN classification.";

  leaf-list supported-tag-types {
    type etht-types:eth-tag-classify;
    description
      "List of VLAN tag types that can be used for the VLAN
      classification. In case VLAN classification is not
      supported, the list is empty.";
  }
  leaf vlan-bundling {
    type boolean;
    description
      "In case VLAN classification is supported, indicates whether
      VLAN bundling classification is also supported.";
  }
  leaf vlan-range {
    type etht-types:vid-range-type;
    description
      "In case VLAN classification is supported, indicates the
      of available VLAN ID values.";
  }
}

grouping svc-vlan-push {
  description
    "Grouping defining the capabilities for VLAN push or swap
    operations.";
```



```
leaf-list supported-tag-types {
  type etht-types:eth-tag-type;
  description
    "List of VLAN tag types that can be used to push or swap a
    VLAN tag. In case VLAN push/swap is not supported, the list
    is empty.";
}
leaf vlan-range {
  type etht-types:vid-range-type;
  description
    "In case VLAN push/swap operation is supported, the range
    of available VLAN ID values.";
}
}

grouping eth-ltp-svc-attributes {
  description
    "Ethernet link termination point (LTP) service attributes.";

  container supported-classification {
    description
      "Service classification capability supported by the ETH LTP.";

    leaf port-classification {
      type boolean;
      description
        "Indicates that the ETH LTP support port-based service
        classification.";
    }
    container vlan-classification {
      description
        "Service classification capabilities based on the VLAN
        tag(s) supported by the ETH LTP.";

      leaf vlan-tag-classification {
        type boolean;
        description
          "Indicates that the ETH LTP supports VLAN service
          classification.";
      }
    }
    container outer-tag {
      description
        "Service classification capabilities based on the outer
        VLAN tag, supported by the ETH LTP.";
      uses svc-vlan-classification;
    }
    container second-tag {
      description
```

```
        "Service classification capabilities based on the second
        VLAN tag, supported by the ETH LTP.";
    /*
    * Open issue: indicates that second-tag-classification
    * can be True only if outer-tag-classification is also True.
    */
    leaf second-tag-classification {
        type boolean;
        description
            "Indicates that the ETH LTP support VLAN service
            classification based on the second VLAN tag.";
    }
    uses svc-vlan-classification;
}
}
}

container supported-vlan-operations {
    description
        "Reports the VLAN operations supported by the ETH LTP.";

    leaf asymmetrical-operations {
        type boolean;
        description
            "Indicates whether the ETH LTP supports also asymmetrical
            VLAN operations.It is assumed that symmetrical VLAN
            operations are always supported.";
    }
    leaf transparent-vlan-operations {
        type boolean;
        description
            "Indicates that the ETH LTP supports transparent
            operations.";
    }
}

container vlan-pop {
    description
        "Indicates VLAN pop or swap operations capabilities.";

    leaf vlan-pop-operations {
        type boolean;
        description
            "Indicates that the ETH LTP supports VLAN pop or
            swap operations.";
    }
    leaf max-pop-tags {
        type uint8 {
            range "1..2";
        }
    }
}
```

```
        description
            "Indicates the maximum number of tags that can be
            popped/swapped.";
    }
}
container vlan-push {
    description
        "Indicates VLAN push or swap operations capabilities.";

    leaf vlan-push-operation {
        type boolean;
        description
            "Indicates that the ETH LTP supports VLAN push or
            swap operations.";
    }
    container outer-tag {
        description
            "Indicates the supported VLAN operation capabilities
            on the outer VLAN tag.";
        uses svc-vlan-push;
    }
    container second-tag {
        description
            "Indicates the supported VLAN operation capabilities
            on the second VLAN tag.";
        leaf push-second-tag {
            type boolean;
            description
                "Indicates that the ETH LTP supports VLAN push or swap
                operations for the second VLAN tag.";
        }
        uses svc-vlan-push;
    }
}
}
}
}
}
/*
 * Data nodes
 */

augment "/nw:networks/nw:network/nw:network-types/tet:te-topology" {
    description
        "Augment network types to include ETH transport network";

    uses eth-tran-topology-type;
}
```

```

augment "/nw:networks/nw:network/nw:node/nt:termination-point" {
  when "../../../nw:network-types/tet:te-topology/eth-tran-topology" {
    description
      "Augment only for ETH transport network";
  }
  description
    "Augment ETH LTP attributes";

  uses eth-ltp-attributes;

  container eth-svc {
    presence "client-facing LTP.";
    description
      "ETH LTP Service attributes.";

    leaf client-facing {
      type boolean;
      default "false";
      description
        "Indicates whether this LTP is a client-facing LTP.";
    }
    uses eth-ltp-svc-attributes;
  }
}

/*
 * Augment TE bandwidth
 */

/* Augment maximum LSP bandwidth of link terminationpoint (LTP) */
augment "/nw:networks/nw:network/nw:node/nt:termination-point/"
  + "tet:te/"
  + "tet:interface-switching-capability/tet:max-lsp-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
  when "../../../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE bandwidth";
  }
  description "Ethernet bandwidth.";
  case eth {
    uses etht-types:eth-bandwidth;
  }
}

/* Augment bandwidth path constraints of connectivity-matrices */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:path-constraints/tet:te-bandwidth/tet:technology" {
  when "../../../nw:network-types/tet:te-topology/"

```



```
    }
    description "Ethernet bandwidth.";
    case eth {
        uses etht-types:eth-bandwidth;
    }
}

/* Augment client bandwidth of tunnel termination point (TTP) */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:tunnel-termination-point/"
    + "tet:client-layer-adaptation/tet:switching-capability/"
    + "tet:te-bandwidth/tet:technology" {
    when "../..../..../nw:network-types/tet:te-topology/"
        + "ethtetopo:eth-tran-topology" {
        description "Ethernet TE bandwidth";
    }
    description "Ethernet bandwidth.";
    case eth {
        uses etht-types:eth-bandwidth;
    }
}

/* Augment bandwidth path constraints of local-link-connectivities */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:tunnel-termination-point/"
    + "tet:local-link-connectivities/tet:path-constraints/"
    + "tet:te-bandwidth/tet:technology" {
    when "../..../..../nw:network-types/tet:te-topology/"
        + "ethtetopo:eth-tran-topology" {
        description "Ethernet TE bandwidth";
    }
    description "Ethernet bandwidth.";
    case eth {
        uses etht-types:eth-bandwidth;
    }
}

/* Augment bandwidth path constraints of local-link-connectivity */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:tunnel-termination-point/"
    + "tet:local-link-connectivities/"
    + "tet:local-link-connectivity/tet:path-constraints/"
    + "tet:te-bandwidth/tet:technology" {
    when "../..../..../nw:network-types/tet:te-topology/"
        + "ethtetopo:eth-tran-topology" {
        description "Ethernet TE bandwidth";
    }
    description "Ethernet bandwidth.";
```

```
    case eth {
      uses etht-types:eth-bandwidth;
    }
  }

/* Augment maximum LSP bandwidth of TE link */
augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:te-link-attributes/"
  + "tet:interface-switching-capability/tet:max-lsp-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
  when "../..../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE bandwidth";
  }
  description "Ethernet bandwidth.";
  case eth {
    uses etht-types:eth-bandwidth;
  }
}

/* Augment maximum bandwidth of TE link */
augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:te-link-attributes/"
  + "tet:max-link-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
  when "../..../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE bandwidth";
  }
  description "Ethernet bandwidth.";
  case eth {
    uses etht-types:eth-bandwidth;
  }
}

/* Augment maximum reservable bandwidth of TE link */
augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:te-link-attributes/"
  + "tet:max-resv-link-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
  when "../..../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE bandwidth";
  }
  description "Ethernet bandwidth.";
  case eth {
    uses etht-types:eth-bandwidth;
  }
}
```

```
}

/* Augment unreserved bandwidth of TE Link */
augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:te-link-attributes/"
  + "tet:unreserved-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
when "../..../nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
  description "Ethernet TE bandwidth";
}
description "Ethernet bandwidth.";
case eth {
  uses etht-types:eth-bandwidth;
}
}

/* Augment maximum LSP bandwidth of TE link information-source */
augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:information-source-entry/"
  + "tet:interface-switching-capability/"
  + "tet:max-lsp-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
when "../..../nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
  description "Ethernet TE bandwidth";
}
description "Ethernet bandwidth.";
case eth {
  uses etht-types:eth-bandwidth;
}
}

/* Augment maximum bandwidth of TE link information-source */
augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:information-source-entry/"
  + "tet:max-link-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
when "../..../nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
  description "Ethernet TE bandwidth";
}
description "Ethernet bandwidth.";
case eth {
  uses etht-types:eth-bandwidth;
}
}

/* Augment maximum reservable bandwidth of TE link
```



```

* information-source */
augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:information-source-entry/"
  + "tet:max-resv-link-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
when "../../../../../../../nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
  description "Ethernet TE bandwidth";
}
description "Ethernet bandwidth.";
case eth {
  uses etht-types:eth-bandwidth;
}
}

/* Augment unreserved bandwidth of TE link information-source */
augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:information-source-entry/"
  + "tet:unreserved-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
when "../../../../../../../nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
  description "Ethernet TE bandwidth";
}
description "Ethernet bandwidth.";
case eth {
  uses etht-types:eth-bandwidth;
}
}

/* Augment maximum LSP bandwidth of TE link template */
augment "/nw:networks/tet:te/tet:templates/"
  + "tet:link-template/tet:te-link-attributes/"
  + "tet:interface-switching-capability/"
  + "tet:max-lsp-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
/*
when "../../../../../../../nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
  description "Ethernet TE bandwidth";
}
*/
description "Ethernet bandwidth.";
case eth {
  uses etht-types:eth-bandwidth;
}
}

```

```
/* Augment maximum bandwidth of TE link template */
augment "/nw:networks/tet:te/tet:templates/"
  + "tet:link-template/tet:te-link-attributes/"
  + "tet:max-link-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
/*
  when "../../../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE bandwidth";
  }
*/
  description "Ethernet bandwidth.";
  case eth {
    uses etht-types:eth-bandwidth;
  }
}

/* Augment maximum reservable bandwidth of TE link template */
augment "/nw:networks/tet:te/tet:templates/"
  + "tet:link-template/tet:te-link-attributes/"
  + "tet:max-resv-link-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
/*
  when "../../../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE bandwidth";
  }
*/
  description "Ethernet bandwidth.";
  case eth {
    uses etht-types:eth-bandwidth;
  }
}

/* Augment unreserved bandwidth of TE link template */
augment "/nw:networks/tet:te/tet:templates/"
  + "tet:link-template/tet:te-link-attributes/"
  + "tet:unreserved-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
/*
  when "../../../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE bandwidth";
  }
*/
  description "Ethernet bandwidth.";
  case eth {
    uses etht-types:eth-bandwidth;
  }
}
```

```
    }
  }

/*
 * Augment TE label.
 */

/* Augment label restrictions of connectivity-matrices */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:label-restrictions/tet:label-restriction" {
  when "../..../nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
  description "Ethernet TE label";
  }
  description "Ethernet label restriction.";
  uses etht-types:eth-label-restriction;
}

/* Augment label restrictions start of connectivity-matrices */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:label-restrictions/tet:label-restriction/tet:label-start/"
  + "tet:te-label/tet:technology" {
  when "../..../nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
  description "Ethernet TE label";
  }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}

/* Augment label restrictions end of connectivity-matrices */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:label-restrictions/tet:label-restriction/tet:label-end/"
  + "tet:te-label/tet:technology" {
  when "../..../nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
  description "Ethernet TE label";
  }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}
```

```

/* Augment label restrictions step of connectivity-matrices */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:label-restrictions/tet:label-restriction/tet:label-step/"
  + "tet:technology" {
  when "../.../..../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
  }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label-step;
  }
}

/* Augment label hop of underlay primary path of
 * connectivity-matrices */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:underlay/tet:primary-path/tet:path-element/"
  + "tet:type/tet:label/tet:label-hop/"
  + "tet:te-label/tet:technology" {
  when "../.../..../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
  }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}

/* Augment label hop of underlay backup path of
 * connectivity-matrices */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:underlay/tet:backup-path/tet:path-element/"
  + "tet:type/tet:label/tet:label-hop/"
  + "tet:te-label/tet:technology" {
  when "../.../..../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
  }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}

```

```

}

/* Augment label hop of route-exclude of connectivity-matrices */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:optimizations/tet:algorithm/tet:metric/"
  + "tet:optimization-metric/"
  + "tet:explicit-route-exclude-objects/"
  + "tet:route-object-exclude-object/"
  + "tet:type/tet:label/tet:label-hop/"
  + "tet:te-label/tet:technology" {
when "../../../../../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
  description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
  uses etht-types:eth-label;
}
}

/* Augment label hop of route-include of connectivity-matrices */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:optimizations/tet:algorithm/tet:metric/"
  + "tet:optimization-metric/"
  + "tet:explicit-route-include-objects/"
  + "tet:route-object-include-object/"
  + "tet:type/tet:label/tet:label-hop/"
  + "tet:te-label/tet:technology" {
when "../../../../../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
  description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
  uses etht-types:eth-label;
}
}

/* Augment label hop of path-route of connectivity-matrices */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:path-properties/tet:path-route-objects/"
  + "tet:path-route-object/tet:type/tet:label/tet:label-hop/"
  + "tet:te-label/tet:technology" {

```

```

when "../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
  }
description "Ethernet label.";
case eth {
  uses etht-types:eth-label;
}
}

/* Augment ingress label restrictions of connectivity-matrix */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/tet:from/"
  + "tet:label-restrictions/tet:label-restriction" {
when "../../../../../../../../../../../nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
  description "Ethernet TE label";
}
description "Ethernet label.";
uses etht-types:eth-label-restriction;
}

/* Augment ingress label restrictions start of
 * connectivity-matrix */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/tet:from/"
  + "tet:label-restrictions/tet:label-restriction/tet:label-start/"
  + "tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
  description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
  uses etht-types:eth-label;
}
}

/* Augment ingress label restrictions end of connectivity-matrix */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/tet:from/"
  + "tet:label-restrictions/tet:label-restriction/tet:label-end/"
  + "tet:te-label/tet:technology" {

```

```

    when "../../../../../../../../../../../"
      + "nw:network-types/tet:te-topology/"
      + "ethtetopo:eth-tran-topology" {
        description "Ethernet TE label";
      }
    description "Ethernet label.";
    case eth {
      uses etht-types:eth-label;
    }
  }
}

/* Augment ingress label restrictions step of connectivity-matrix */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/tet:from/"
  + "tet:label-restrictions/tet:label-restriction/tet:label-step/"
  + "tet:technology" {
  when "../../../../../../../"
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
      description "Ethernet TE label";
    }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label-step;
  }
}

/* Augment egress label restrictions of connectivity-matrix */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/tet:to/"
  + "tet:label-restrictions/tet:label-restriction" {
  when "../../../../../../../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
  }
  description "Ethernet label.";
  uses etht-types:eth-label-restriction;
}

/* Augment egress label restrictions start of
 * connectivity-matrix */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/tet:to/"
  + "tet:label-restrictions/tet:label-restriction/tet:label-start/"
  + "tet:te-label/tet:technology" {

```

```
when "../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
  }
description "Ethernet label.";
case eth {
  uses etht-types:eth-label;
}
}

/* Augment egress label restrictions end of connectivity-matrix */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/tet:to/"
  + "tet:label-restrictions/tet:label-restriction/tet:label-end/"
  + "tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
  }
description "Ethernet label.";
case eth {
  uses etht-types:eth-label;
}
}

/* Augment egress label restrictions step of connectivity-matrix */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/tet:to/"
  + "tet:label-restrictions/tet:label-restriction/tet:label-step/"
  + "tet:technology" {
when "../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
  }
description "Ethernet label.";
case eth {
  uses etht-types:eth-label-step;
}
}

/* Augment label hop of underlay primary path of connectivity-matrix */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
```



```

    + "tet:connectivity-matrix/"
    + "tet:underlay/tet:primary-path/tet:path-element/"
    + "tet:type/tet:label/tet:label-hop/"
    + "tet:te-label/tet:technology" {
when "../.../.../.../.../.../.../.../.../.../.../..."
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
description "Ethernet TE label";
    }
description "Ethernet label.";
case eth {
    uses etht-types:eth-label;
}
}

/* Augment label hop of underlay backup path of connectivity-matrix */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:te-node-attributes/tet:connectivity-matrices/"
    + "tet:connectivity-matrix/"
    + "tet:underlay/tet:backup-path/tet:path-element/"
    + "tet:type/tet:label/tet:label-hop/"
    + "tet:te-label/tet:technology" {
when "../.../.../.../.../.../.../.../.../.../.../..."
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
description "Ethernet TE label";
    }
description "Ethernet label.";
case eth {
    uses etht-types:eth-label;
}
}

/* Augment label hop of route-exclude of connectivity-matrix */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:te-node-attributes/tet:connectivity-matrices/"
    + "tet:connectivity-matrix/tet:optimizations/"
    + "tet:algorithm/tet:metric/tet:optimization-metric/"
    + "tet:explicit-route-exclude-objects/"
    + "tet:route-object-exclude-object/tet:type/"
    + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../.../.../.../.../.../.../.../.../.../.../..."
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
description "Ethernet TE label";
    }
description "Ethernet label.";
case eth {

```

```

    uses etht-types:eth-label;
  }
}

/* Augment label hop of route-include of connectivity-matrix */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/tet:optimizations/"
  + "tet:algorithm/tet:metric/tet:optimization-metric/"
  + "tet:explicit-route-include-objects/"
  + "tet:route-object-include-object/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
  uses etht-types:eth-label;
}
}

/* Augment label hop of path-route of connectivity-matrix */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/"
  + "tet:path-properties/tet:path-route-objects/"
  + "tet:path-route-object/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
  uses etht-types:eth-label;
}
}

/* Augment label restrictions of connectivity-matrices
 * information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/"
  + "tet:connectivity-matrices/tet:label-restrictions/"
  + "tet:label-restriction" {
when "../../../../../../../../../../../nw:network-types/tet:te-topology/"

```

```

    + "ethtetopo:eth-tran-topology" {
      description "Ethernet TE label";
    }
  description "Ethernet label.";
  uses etht-types:eth-label-restriction;
}

/* Augment label restrictions start of connectivity-matrices
 * information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/"
  + "tet:connectivity-matrices/tet:label-restrictions/"
  + "tet:label-restriction/"
  + "tet:label-start/tet:te-label/tet:technology" {
  when "../.../.../.../.../.../.../.../.../..."
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
      description "Ethernet TE label";
    }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}

/* Augment label restrictions end of connectivity-matrices
 * information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/"
  + "tet:connectivity-matrices/tet:label-restrictions/"
  + "tet:label-restriction/"
  + "tet:label-end/tet:te-label/tet:technology" {
  when "../.../.../.../.../.../.../.../.../..."
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
      description "Ethernet TE label";
    }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}

/* Augment label restrictions step of connectivity-matrices
 * information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/"
  + "tet:connectivity-matrices/tet:label-restrictions/"

```

```

        + "tet:label-restriction/"
        + "tet:label-step/tet:technology" {
when "../../../../../../../"
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
        description "Ethernet TE label";
    }
description "Ethernet label.";
case eth {
    uses etht-types:eth-label-step;
}
}

/* Augment label hop of underlay primary path of
 * connectivity-matrices information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:information-source-entry/tet:connectivity-matrices/"
    + "tet:underlay/tet:primary-path/tet:path-element/tet:type/"
    + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../"
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
        description "Ethernet TE label";
    }
description "Ethernet label.";
case eth {
    uses etht-types:eth-label;
}
}

/* Augment label hop of underlay backup path of
 * connectivity-matrices information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:information-source-entry/tet:connectivity-matrices/"
    + "tet:underlay/tet:backup-path/tet:path-element/tet:type/"
    + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../"
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
        description "Ethernet TE label";
    }
description "Ethernet label.";
case eth {
    uses etht-types:eth-label;
}
}

/* Augment label hop of route-exclude of

```

```

* connectivity-matrices information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
  + "tet:optimizations/tet:algorithm/tet:metric/"
  + "tet:optimization-metric/"
  + "tet:explicit-route-exclude-objects/"
  + "tet:route-object-exclude-object/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
  description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
  uses etht-types:eth-label;
}
}

/* Augment label hop of route-include of
* connectivity-matrices information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
  + "tet:optimizations/tet:algorithm/tet:metric/"
  + "tet:optimization-metric/"
  + "tet:explicit-route-include-objects/"
  + "tet:route-object-include-object/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
  description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
  uses etht-types:eth-label;
}
}

/* Augment label hop of path-route of
* connectivity-matrices information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
  + "tet:path-properties/tet:path-route-objects/"
  + "tet:path-route-object/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"

```

```
    + "ethtetopo:eth-tran-topology" {
      description "Ethernet TE label";
    }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}

/* Augment ingress label restrictions of
 * connectivity-matrix information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/"
  + "tet:from/tet:label-restrictions/tet:label-restriction" {
  when "../..../..../..../..../..../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
      description "Ethernet TE label";
    }
  description "Ethernet label.";
  uses etht-types:eth-label-restriction;
}

/* Augment ingress label restrictions start of
 * connectivity-matrix information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/"
  + "tet:from/tet:label-restrictions/tet:label-restriction/"
  + "tet:label-start/tet:te-label/tet:technology" {
  when "../..../..../..../..../..../..../..../..../"
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
      description "Ethernet TE label";
    }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}

/* Augment ingress label restrictions end of
 * connectivity-matrix information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/"
  + "tet:from/tet:label-restrictions/tet:label-restriction/"
  + "tet:label-end/tet:te-label/tet:technology" {
```

```

    when "../../../../../../../../../../../"
      + "nw:network-types/tet:te-topology/"
      + "ethtetopo:eth-tran-topology" {
        description "Ethernet TE label";
      }
    description "Ethernet label.";
    case eth {
      uses etht-types:eth-label;
    }
  }
}

/* Augment ingress label restrictions step of
 * connectivity-matrix information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/"
  + "tet:from/tet:label-restrictions/tet:label-restriction/"
  + "tet:label-step/tet:technology" {
  when "../../../../../../../"
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
      description "Ethernet TE label";
    }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label-step;
  }
}

/* Augment egress label restrictions of
 * connectivity-matrix information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/"
  + "tet:to/tet:label-restrictions/tet:label-restriction" {
  when "../../../../../../../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
      description "Ethernet TE label";
    }
  description "Ethernet label.";
  uses etht-types:eth-label-restriction;
}

/* Augment egress label restrictions start of
 * connectivity-matrix information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/"

```

```

    + "tet:to/tet:label-restrictions/tet:label-restriction/"
    + "tet:label-start/tet:te-label/tet:technology" {
when "../.../.../.../.../.../.../.../.../.../.../..."
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
    }
description "Ethernet label.";
case eth {
    uses etht-types:eth-label;
}
}

/* Augment egress label restrictions end of
 * connectivity-matrix information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:information-source-entry/tet:connectivity-matrices/"
    + "tet:connectivity-matrix/"
    + "tet:to/tet:label-restrictions/tet:label-restriction/"
    + "tet:label-end/tet:te-label/tet:technology" {
when "../.../.../.../.../.../.../.../.../.../.../..."
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
    }
description "Ethernet label.";
case eth {
    uses etht-types:eth-label;
}
}

/* Augment egress label restrictions step of
 * connectivity-matrix information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:information-source-entry/tet:connectivity-matrices/"
    + "tet:connectivity-matrix/"
    + "tet:to/tet:label-restrictions/tet:label-restriction/"
    + "tet:label-step/tet:technology" {
when "../.../.../.../.../.../.../.../.../.../.../..."
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
    }
description "Ethernet label.";
case eth {
    uses etht-types:eth-label-step;
}
}

```



```

/* Augment label hop of underlay primary path of
 * connectivity-matrix information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/"
  + "tet:underlay/tet:primary-path/tet:path-element/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
  uses etht-types:eth-label;
}
}

/* Augment label hop of underlay backup path of
 * connectivity-matrix information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/"
  + "tet:underlay/tet:backup-path/tet:path-element/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
  uses etht-types:eth-label;
}
}

/* Augment label hop of route-exclude of
 * connectivity-matrix information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/"
  + "tet:optimizations/tet:algorithm/tet:metric/"
  + "tet:optimization-metric/"
  + "tet:explicit-route-exclude-objects/"
  + "tet:route-object-exclude-object/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"

```

```

    + "ethtetopo:eth-tran-topology" {
      description "Ethernet TE label";
    }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}

/* Augment label hop of route-include of
 * connectivity-matrix information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/"
  + "tet:optimizations/tet:algorithm/tet:metric/"
  + "tet:optimization-metric/"
  + "tet:explicit-route-include-objects/"
  + "tet:route-object-include-object/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
  when "../.../.../.../.../.../.../.../.../.../.../..."
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
      description "Ethernet TE label";
    }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}

/* Augment label hop of path-route of
 * connectivity-matrix information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/"
  + "tet:path-properties/tet:path-route-objects/"
  + "tet:path-route-object/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
  when "../.../.../.../.../.../.../.../.../.../.../..."
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
      description "Ethernet TE label";
    }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}

```

```
/* Augment label restrictions of local-link-connectivities */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:tunnel-termination-point/"
  + "tet:local-link-connectivities/"
  + "tet:label-restrictions/tet:label-restriction" {
when "../../../../../../../nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
  description "Ethernet TE label";
}
description "Ethernet label.";
uses etht-types:eth-label-restriction;
}

/* Augment label restrictions start of local-link-connectivities */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:tunnel-termination-point/"
  + "tet:local-link-connectivities/"
  + "tet:label-restrictions/tet:label-restriction/"
  + "tet:label-start/tet:te-label/tet:technology" {
when "../../../../../../../nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
  description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
  uses etht-types:eth-label;
}
}

/* Augment label restrictions end of local-link-connectivities */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:tunnel-termination-point/"
  + "tet:local-link-connectivities/"
  + "tet:label-restrictions/tet:label-restriction/"
  + "tet:label-end/tet:te-label/tet:technology" {
when "../../../../../../../nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
  description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
  uses etht-types:eth-label;
}
}

/* Augment label restrictions step of local-link-connectivities */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:tunnel-termination-point/"
```

```

    + "tet:local-link-connectivities/"
    + "tet:label-restrictions/tet:label-restriction/"
    + "tet:label-step/tet:technology"{
when "../../../../../../../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
    uses etht-types:eth-label-step;
}
}

/* Augment label hop of underlay primary path of
 * local-link-connectivities */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:tunnel-termination-point/"
    + "tet:local-link-connectivities/"
    + "tet:underlay/tet:primary-path/tet:path-element/tet:type/"
    + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../"
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
    uses etht-types:eth-label;
}
}

/* Augment label hop of underlay backup path of
 * local-link-connectivities */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:tunnel-termination-point/"
    + "tet:local-link-connectivities/"
    + "tet:underlay/tet:backup-path/tet:path-element/tet:type/"
    + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../"
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
    uses etht-types:eth-label;
}
}

```

```

/* Augment label hop of route-exclude of
 * local-link-connectivities */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:tunnel-termination-point/"
  + "tet:local-link-connectivities/"
  + "tet:optimizations/tet:algorithm/tet:metric/"
  + "tet:optimization-metric/"
  + "tet:explicit-route-exclude-objects/"
  + "tet:route-object-exclude-object/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../.../.../.../.../.../.../.../.../.../.../..."
  + "nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
  uses etht-types:eth-label;
}
}

/* Augment label hop of route-include of
 * local-link-connectivities */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:tunnel-termination-point/"
  + "tet:local-link-connectivities/"
  + "tet:optimizations/tet:algorithm/tet:metric/"
  + "tet:optimization-metric/"
  + "tet:explicit-route-include-objects/"
  + "tet:route-object-include-object/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../.../.../.../.../.../.../.../.../.../.../..."
  + "nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
  uses etht-types:eth-label;
}
}

/* Augment label hop of path-route of local-link-connectivities */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:tunnel-termination-point/"
  + "tet:local-link-connectivities/"
  + "tet:path-properties/tet:path-route-objects/"
  + "tet:path-route-object/tet:type/"

```

```

    + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
    }
description "Ethernet label.";
case eth {
    uses etht-types:eth-label;
}
}

/* Augment label restrictions of local-link-connectivity */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:tunnel-termination-point/"
    + "tet:local-link-connectivities/"
    + "tet:local-link-connectivity/"
    + "tet:label-restrictions/tet:label-restriction" {
when "../../../../../../../../../../../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
    }
description "Ethernet label.";
uses etht-types:eth-label-restriction;
}

/* Augment label restrictions start of local-link-connectivity */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:tunnel-termination-point/"
    + "tet:local-link-connectivities/"
    + "tet:local-link-connectivity/"
    + "tet:label-restrictions/tet:label-restriction/"
    + "tet:label-start/tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
    }
description "Ethernet label.";
case eth {
    uses etht-types:eth-label;
}
}

/* Augment label restrictions end of local-link-connectivity */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:tunnel-termination-point/"
    + "tet:local-link-connectivities/"

```

```

    + "tet:local-link-connectivity/"
    + "tet:label-restrictions/tet:label-restriction/"
    + "tet:label-end/tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
    }
description "Ethernet label.";
case eth {
    uses etht-types:eth-label;
}
}

/* Augment label restrictions step of local-link-connectivity */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:tunnel-termination-point/"
    + "tet:local-link-connectivities/"
    + "tet:local-link-connectivity/"
    + "tet:label-restrictions/tet:label-restriction/"
    + "tet:label-step/tet:technology" {
when "../../../../../../../../../../../"
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
    }
description "Ethernet label.";
case eth {
    uses etht-types:eth-label-step;
}
}

/* Augment label hop of underlay primary path of
 * local-link-connectivity */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:tunnel-termination-point/"
    + "tet:local-link-connectivities/"
    + "tet:local-link-connectivity/"
    + "tet:underlay/tet:primary-path/tet:path-element/tet:type/"
    + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
    }
description "Ethernet label.";
case eth {
    uses etht-types:eth-label;
}
}

```

```

    }
  }

/* Augment label hop of underlay backup path of
 * local-link-connectivity (LLC) */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:tunnel-termination-point/"
  + "tet:local-link-connectivities/"
  + "tet:local-link-connectivity/"
  + "tet:underlay/tet:backup-path/tet:path-element/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
  when "../../../../../../../../../../../"
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
  }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}

/* Augment label hop of route-exclude of
 * local-link-connectivity (LLC) */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:tunnel-termination-point/"
  + "tet:local-link-connectivities/"
  + "tet:local-link-connectivity/"
  + "tet:optimizations/tet:algorithm/tet:metric/"
  + "tet:optimization-metric/"
  + "tet:explicit-route-exclude-objects/"
  + "tet:route-object-exclude-object/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
  when "../../../../../../../../../../../"
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
  }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}

/* Augment label hop of route-include of
 * local-link-connectivity (LLC) */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:tunnel-termination-point/"

```



```

    + "tet:local-link-connectivities/"
    + "tet:local-link-connectivity/"
    + "tet:optimizations/tet:algorithm/tet:metric/"
    + "tet:optimization-metric/"
    + "tet:explicit-route-include-objects/"
    + "tet:route-object-include-object/tet:type/"
    + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../.../.../.../.../.../.../.../.../.../.../..."
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
    uses etht-types:eth-label;
}
}

/* Augment label hop of path-route of
 * local-link-connectivity (LLC) */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:tunnel-termination-point/"
    + "tet:local-link-connectivities/"
    + "tet:local-link-connectivity/"
    + "tet:path-properties/tet:path-route-objects/"
    + "tet:path-route-object/tet:type/"
    + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../.../.../.../.../.../.../.../.../.../.../..."
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
    uses etht-types:eth-label;
}
}

/* Augment label hop of underlay primary path of TE link */
augment "/nw:networks/nw:network/nt:link/tet:te/"
    + "tet:te-link-attributes/"
    + "tet:underlay/tet:primary-path/tet:path-element/tet:type/"
    + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../.../.../.../.../.../.../.../.../.../.../..."
    + "nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
description "Ethernet TE label";
}
}

```

```
description "Ethernet label.";
case eth {
  uses etht-types:eth-label;
}
}

/* Augment label hop of underlay backup path of TE link */
augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:te-link-attributes/"
  + "tet:underlay/tet:backup-path/tet:path-element/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
  uses etht-types:eth-label;
}
}

/* Augment label restrictions of TE link */
augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:te-link-attributes/"
  + "tet:label-restrictions/tet:label-restriction" {
when "../../../../../../../nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
description "Ethernet TE label";
}
description "Ethernet label.";
uses etht-types:eth-label-restriction;
}

/* Augment label restrictions start of TE link */
augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:te-link-attributes/"
  + "tet:label-restrictions/tet:label-restriction/"
  + "tet:label-start/tet:te-label/tet:technology" {
when "../../../../../../../nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
description "Ethernet TE label";
}
description "Ethernet label.";
case eth {
  uses etht-types:eth-label;
}
}
}
```

```
/* Augment label restrictions end of TE link */
augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:te-link-attributes/"
  + "tet:label-restrictions/tet:label-restriction/"
  + "tet:label-end/tet:te-label/tet:technology" {
  when "../../../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
  }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}

/* Augment label restrictions step of TE link */
augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:te-link-attributes/"
  + "tet:label-restrictions/tet:label-restriction/"
  + "tet:label-step/tet:technology" {
  when "../../../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
  }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label-step;
  }
}

/* Augment label restrictions of TE link information-source */
augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:information-source-entry/"
  + "tet:label-restrictions/tet:label-restriction" {
  when "../../../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
  }
  description "Ethernet label.";
  uses etht-types:eth-label-restriction;
}

/* Augment label restrictions start of TE link information-source */
augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:information-source-entry/"
  + "tet:label-restrictions/tet:label-restriction/"
  + "tet:label-start/tet:te-label/tet:technology" {
  when "../../../nw:network-types/tet:te-topology/"
```

```

    + "ethtetopo:eth-tran-topology" {
      description "Ethernet TE label";
    }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}
/* Augment label restrictions end of TE link information-source */
augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:information-source-entry/"
  + "tet:label-restrictions/tet:label-restriction/"
  + "tet:label-end/tet:te-label/tet:technology" {
when "../../../../../../../nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
  }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}

/* Augment label restrictions step of TE link information-source */
augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:information-source-entry/"
  + "tet:label-restrictions/tet:label-restriction/"
  + "tet:label-step/tet:technology" {
when "../../../../../../../nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
  }
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label-step;
  }
}

/* Augment label hop of underlay primary path of TE link template */
augment "/nw:networks/tet:te/tet:templates/"
  + "tet:link-template/tet:te-link-attributes/"
  + "tet:underlay/tet:primary-path/tet:path-element/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
/*
when "../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "ethtetopo:eth-tran-topology" {
  description "Ethernet TE label";
}

```

```
    }
  */
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}

/* Augment label hop of underlay backup path of TE link template */
augment "/nw:networks/tet:te/tet:templates/"
  + "tet:link-template/tet:te-link-attributes/"
  + "tet:underlay/tet:backup-path/tet:path-element/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
/*
  when "../../../../../../../../../../../../../../../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
  }
*/
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}

/* Augment label restrictions of TE link template */
augment "/nw:networks/tet:te/tet:templates/"
  + "tet:link-template/tet:te-link-attributes/"
  + "tet:label-restrictions/tet:label-restriction" {
/*
  when "../../../../../../../../../../../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
  }
*/
  description "Ethernet label.";
  uses etht-types:eth-label-restriction;
}

/* Augment label restrictions start of TE link template */
augment "/nw:networks/tet:te/tet:templates/"
  + "tet:link-template/tet:te-link-attributes/"
  + "tet:label-restrictions/tet:label-restriction/"
  + "tet:label-start/tet:te-label/tet:technology" {
/*
  when "../../../../../../../../../../../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
```

```
    }
  */
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}

/* Augment label restrictions end of TE link template */
augment "/nw:networks/tet:te/tet:templates/"
  + "tet:link-template/tet:te-link-attributes/"
  + "tet:label-restrictions/tet:label-restriction/"
  + "tet:label-end/tet:te-label/tet:technology" {
/*
  when "../../../../../../../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
  }
*/
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label;
  }
}

/* Augment label restrictions step of TE link template */
augment "/nw:networks/tet:te/tet:templates/"
  + "tet:link-template/tet:te-link-attributes/"
  + "tet:label-restrictions/tet:label-restriction/"
  + "tet:label-step/tet:technology" {
/*
  when "../../../../../../../nw:network-types/tet:te-topology/"
    + "ethtetopo:eth-tran-topology" {
    description "Ethernet TE label";
  }
*/
  description "Ethernet label.";
  case eth {
    uses etht-types:eth-label-step;
  }
}
}

<CODE ENDS>
```

## **5. Considerations and Open Issue**

Editor Notes: This section is used to note temporary discussion/ conclusion that to be fixed in the future version, and will be removed before publication. 201902: we have noticed that Ethernet is the only client signal (on the perspective of OTN) which need a topology. So it is possible that the title of this document will be changed to "A YANG Data Model for Ethernet Topology". The proposal of this work is that the document will follow up the progress of [draft-zheng-ccamp-client-signal-yang](#), with [draft-zheng-ccamp-client-tunnel-yang](#) together. (solved in -06) 201902: will have to align with TE topology model, currently is a totally different format with necessary parameters, a big change is expected. (solved in -06.)

## **6. IANA Considerations**

It is proposed that IANA should assign new URIs from the "IETF XML Registry" [[RFC3688](#)] as follows:

```
URI: urn:ietf:params:xml:ns:yang:ietf-eth-te-topology
Registrant Contact: The IESG
XML: N/A; the requested URI is an XML namespace.
```

This document registers following YANG modules in the YANG Module Names registry [[RFC7950](#)].

```
name:          ietf-eth-te-topology
namespace:    urn:ietf:params:xml:ns:yang:ietf-eth-te-topology
prefix:       ethtetopo
reference:    RFC XXXX (This document)
```

## **7. Manageability Considerations**

TBD.

## **8. Security Considerations**

The data following the model defined in this document is exchanged via, for example, the interface between an orchestrator and a transport network controller. The security concerns mentioned in [[I-D.ietf-teas-yang-te-topo](#)] for using ietf-te-topology.yang model also applies to this document.

The YANG module defined in this document can be accessed via the RESTCONF protocol defined in [[RFC8040](#)], or maybe via the NETCONF protocol [[RFC6241](#)].

There are a number of data nodes defined in the YANG module which are writable/creatable/deletable (i.e., config true, which is the default). These data nodes may be considered sensitive or vulnerable in some network environments. Write operations (e.g., POST) to these data nodes without proper protection can have a negative effect on network operations.

Editors note: to list specific subtrees and data nodes and their sensitivity/vulnerability.

## **9. Acknowledgements**

We would like to thank Igor Bryskin and Daniel King for their comments and discussions.

## **10. Contributors**

Yanlei Zheng  
China Unicom  
Email: zhengyl@dimpt.com

Zhe Liu  
Huawei Technologies,  
Email: liuzhe123@huawei.com

Zheyu Fan  
Huawei Technologies,  
Email: fanzheyu2@huawei.com

Sergio Belotti  
Nokia,  
Email: sergio.belotti@nokia.com

Yingxi Yao  
Shanghai Bell,  
yingxi.yao@nokia-sbell.com

Giuseppe Fioccola  
Huawei Technologies  
giuseppe.fioccola@huawei.com



## **11. References**

### **11.1. Normative References**

- [I-D.ietf-ccamp-otn-topo-yang]  
Zheng, H., Busi, I., Liu, X., Belotti, S., and O. Dios, "A YANG Data Model for Optical Transport Network Topology", [draft-ietf-ccamp-otn-topo-yang-09](#) (work in progress), November 2019.
- [I-D.ietf-teas-yang-te-topo]  
Liu, X., Bryskin, I., Beeram, V., Saad, T., Shah, H., and O. Dios, "YANG Data Model for Traffic Engineering (TE) Topologies", [draft-ietf-teas-yang-te-topo-22](#) (work in progress), June 2019.
- [RFC3688] Mealling, M., "The IETF XML Registry", [BCP 81](#), [RFC 3688](#), DOI 10.17487/RFC3688, January 2004, <<https://www.rfc-editor.org/info/rfc3688>>.
- [RFC6241] Enns, R., Ed., Bjorklund, M., Ed., Schoenwaelder, J., Ed., and A. Bierman, Ed., "Network Configuration Protocol (NETCONF)", [RFC 6241](#), DOI 10.17487/RFC6241, June 2011, <<https://www.rfc-editor.org/info/rfc6241>>.
- [RFC7950] Bjorklund, M., Ed., "The YANG 1.1 Data Modeling Language", [RFC 7950](#), DOI 10.17487/RFC7950, August 2016, <<https://www.rfc-editor.org/info/rfc7950>>.
- [RFC8040] Bierman, A., Bjorklund, M., and K. Watsen, "RESTCONF Protocol", [RFC 8040](#), DOI 10.17487/RFC8040, January 2017, <<https://www.rfc-editor.org/info/rfc8040>>.

### **11.2. Informative References**

- [I-D.ietf-ccamp-wson-yang]  
Lee, Y., Dhody, D., Guo, A., Lopezalvarez, V., and D. King, "A YANG Data Model for WSON (Wavelength Switched Optical Networks)", [draft-ietf-ccamp-wson-yang-22](#) (work in progress), July 2019.
- [RFC8340] Bjorklund, M. and L. Berger, Ed., "YANG Tree Diagrams", [BCP 215](#), [RFC 8340](#), DOI 10.17487/RFC8340, March 2018, <<https://www.rfc-editor.org/info/rfc8340>>.

Authors' Addresses

Haomian Zheng  
Huawei Technologies  
H1-1-A043S Huawei Industrial Base, Songshanhu  
Dongguan, Guangdong 523808  
China

Email: zhenghaomian@huawei.com

Aihua Guo  
Individual

Email: aihuaguo.ietf@gmail.com

Italo Busi  
Huawei Technologies

Email: Italo.Busi@huawei.com

Yunbin Xu  
CAICT

Email: xuyunbin@caict.ac.cn

Yang Zhao  
China Mobile

Email: zhaoyangyjy@chinamobile.com

Xufeng Liu  
Volta Networks

Email: xufeng.liu.ietf@gmail.com