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YANG Data Model for Layer 3 TE Topologies
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Abstract

This document defines a YANG data model for layer 3 traffic engineering topologies.

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1. Introduction

This document defines a YANG [RFC7950] data model for describing the relationship between a layer 3 network topology [RFC8346] and a TE topology [I-D.ietf-teas-yang-te-topo].

When traffic engineering is enabled on a layer 3 network topology, there will be a corresponding TE topology. The TE topology may or

may not be congruent to the layer 3 network topology. When such a congruent TE topology exists, there will be a one-to-one association between the one modeling element in the layer 3 topology to another element in the TE topology. When such a congruent TE topology does not exist, the association will not be one-to-one. This YANG data model allows both cases.

1.1. Terminology

The keywords "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14, [RFC2119].

The following terms are defined in [RFC7950] and are not redefined here:

- o augment
- o data model
- o data node

1.2. Tree Diagrams

Tree diagrams used in this document follow the notation defined in [RFC8340].

2. Modeling Considerations for L3 TE Topologies

2.1. Relationship Between Layer 3 Topology and TE topology

In general, layer 3 network topology model and TE topology model can be used independently. When traffic engineering is enabled on a layer 3 network topology, there will be associations between objects in layer 3 network topologies and objects in TE topologies. The properties of these relations are:

- o The associations are between objects of the same class, i.e. node to node or link to link.
- o The multiplicity of such an association is: 0..1 to 0..1. An object in a layer 3 network may have zero or one associated object in the corresponding TE network.

2.2. Relationship Modeling

YANG data type leafref is used to model the association relationship between a layer 3 network topology and a TE topology. YANG must statements are used to enforce the referenced objects are in the topologies of proper type.

2.2.1. Topology Referencing

When TE is enabled on a layer 3 network topology, if the TE topology is not congruent to the layer 3 network topology, the layer 3 network topology will have a reference to the corresponding TE topology. Such a reference is modeled as follows:

```
augment /nw:networks/nw:network/l3t:l3-topology-attributes:
  +--rw l3-te-topology-attributes
     +--rw network-ref?   -> /nw:networks/network/network-id
```

If the TE topology is congruent to the layer 3 network topology, the above reference can still be used to specified TE paramenters defined in the TE topology model.

2.2.2. Node Referencing

When TE is enabled on a layer 3 network topology, if the TE topology is not congruent to the layer 3 network topology, a layer 3 network node may have a reference to the corresponding TE node. Such a reference is modeled as follows:

```
augment /nw:networks/nw:network/nw:node/l3t:l3-node-attributes:
  +--rw l3-te-node-attributes
     +--rw node-ref?      leafref
     +--rw network-ref?   -> /nw:networks/network/network-id
```

2.2.3. Link Termination Point Referencing

When TE is enabled on a layer 3 network topology, if the TE topology is not congruent to the layer 3 network topology, a layer 3 link termination point may have a reference to the corresponding TE link termination point. Such a reference is modeled as follows:

```
augment /nw:networks/nw:network/nw:node/nt:termination-point
          /l3t:l3-termination-point-attributes:
  +--rw l3-te-tp-attributes
     +--rw tp-ref?        leafref
     +--rw node-ref?      leafref
     +--rw network-ref?   -> /nw:networks/network/network-id
```

2.2.4. Link Referencing

When TE is enabled on a layer 3 network topology, if the TE topology is not congruent to the layer 3 network topology, a layer 3 link may have a reference to the corresponding TE link. Such a reference is modeled as follows:

```
augment /nw:networks/nw:network/nt:link/l3t:l3-link-attributes:
  +--rw l3-te-link-attributes
     +--rw link-ref?      leafref
     +--rw network-ref?   -> /nw:networks/network/network-id
```

2.3. Topology Type Modeling

A new topology type is defined in this document, to indicate a topology that is a layer 3 topology with TE enabled.

```
augment /nw:networks/nw:network/nw:network-types
          /l3t:l3-unicast-topology:
  +--rw l3-te!
```

3. Packet Switching Technology Extensions

3.1. Technology Specific Link Attributes

The technology agnostic TE Topology model is augmented with packet switching specific link attributes:

```
augment /nw:networks/tet:te/tet:templates/tet:link-template
          /tet:te-link-attributes
          /tet:interface-switching-capability:
  +--rw packet-switch-capable
     +--rw minimum-lsp-bandwidth?   rt-types:bandwidth-ieee-float32
     +--rw interface-mtu?           uint16
augment /nw:networks/nw:network/nt:link/tet:te
          /tet:te-link-attributes
          /tet:interface-switching-capability:
  +--rw packet-switch-capable
     +--rw minimum-lsp-bandwidth?   rt-types:bandwidth-ieee-float32
     +--rw interface-mtu?           uint16
augment /nw:networks/nw:network/nt:link/tet:te
          /tet:information-source-entry
          /tet:interface-switching-capability:
  +--ro packet-switch-capable
     +--ro minimum-lsp-bandwidth?   rt-types:bandwidth-ieee-float32
     +--ro interface-mtu?           uint16
```

3.2. Performance Metric

[RFC7471], [RFC7810] and [RFC7823] specify TE performance metric parameters and their usage. The packet switching augmentations specified in this moducment support such a capability, which can be conditional enabled by a YANG feature "te-performance-metric".

```
augment /nw:networks/nw:network/nw:node/tet:te
          /tet:te-node-attributes/tet:connectivity-matrices:
  +--rw performance-metric
     +--rw measurement
     |     ......
     +--rw normality
     |     ......
     +--rw throttle
           ......
```

Such an augmentation has been applied to:

- o Connectivity matrices container
- o Connectivity matrix entry
- o Local ink connectivities container
- o Local ink connectivity entry
- o TE link attributes containr in a TE link template
- o TE link attributes containr in a TE link
- o TE link attributes containr in a TE link
- o Information source entry in a TE link

4. Model Structure

4.1. Layer 3 TE Topology Module

The model tree structure of the layer 3 TE topology module is as shown below:

```
module: ietf-l3-te-topology
  augment /nw:networks/nw:network/nw:network-types
            /l3t:l3-unicast-topology:
    +--rw l3-te!
  augment /nw:networks/nw:network/l3t:l3-topology-attributes:
    +--rw l3-te-topology-attributes
       +--rw network-ref?   -> /nw:networks/network/network-id
  augment /nw:networks/nw:network/nw:node/l3t:l3-node-attributes:
    +--rw l3-te-node-attributes
       +--rw node-ref?      leafref
       +--rw network-ref?   -> /nw:networks/network/network-id
  augment /nw:networks/nw:network/nw:node/nt:termination-point
            /l3t:l3-termination-point-attributes:
    +--rw l3-te-tp-attributes
       +--rw tp-ref?        leafref
       +--rw node-ref?      leafref
       +--rw network-ref?   -> /nw:networks/network/network-id
  augment /nw:networks/nw:network/nt:link/l3t:l3-link-attributes:
    +--rw l3-te-link-attributes
       +--rw link-ref?      leafref
       +--rw network-ref?   -> /nw:networks/network/network-id
```

4.2. Packet Switching TE Topology Module

This is an augmentation to base TE topology model.

```
module: ietf-te-topology-packet
  augment /nw:networks/nw:network/nw:node/tet:te
            /tet:te-node-attributes/tet:connectivity-matrices:
    +--rw performance-metric
       +--rw measurement
       |  +--rw unidirectional-delay?                uint32
       |  +--rw unidirectional-min-delay?            uint32
       |  +--rw unidirectional-max-delay?            uint32
       |  +--rw unidirectional-delay-variation?      uint32
       |  +--rw unidirectional-packet-loss?          decimal64
       |  +--rw unidirectional-residual-bandwidth?
       |  |       rt-types:bandwidth-ieee-float32
       |  +--rw unidirectional-available-bandwidth?
       |  |       rt-types:bandwidth-ieee-float32
       |  +--rw unidirectional-utilized-bandwidth?
       |          rt-types:bandwidth-ieee-float32
       +--rw normality
       |  +--rw unidirectional-delay?
       |  |       te-types:performance-metric-normality
       |  +--rw unidirectional-min-delay?
```

```
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-max-delay?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-delay-variation?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-packet-loss?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-residual-bandwidth?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-available-bandwidth?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-utilized-bandwidth?
          |          te-types:performance-metric-normality
          +--rw throttle
             +--rw unidirectional-delay-offset?          uint32
             +--rw measure-interval?                     uint32
             +--rw advertisement-interval?               uint32
             +--rw suppression-interval?                 uint32
             +--rw threshold-out
             |  +--rw unidirectional-delay?                uint32
             |  +--rw unidirectional-min-delay?            uint32
             |  +--rw unidirectional-max-delay?            uint32
             |  +--rw unidirectional-delay-variation?      uint32
             |  +--rw unidirectional-packet-loss?          decimal64
             |  +--rw unidirectional-residual-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-available-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-utilized-bandwidth?
             |          rt-types:bandwidth-ieee-float32
             +--rw threshold-in
             |  +--rw unidirectional-delay?                uint32
             |  +--rw unidirectional-min-delay?            uint32
             |  +--rw unidirectional-max-delay?            uint32
             |  +--rw unidirectional-delay-variation?      uint32
             |  +--rw unidirectional-packet-loss?          decimal64
             |  +--rw unidirectional-residual-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-available-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-utilized-bandwidth?
             |          rt-types:bandwidth-ieee-float32
             +--rw threshold-accelerated-advertisement
                +--rw unidirectional-delay?                uint32
                +--rw unidirectional-min-delay?            uint32
                +--rw unidirectional-max-delay?            uint32
                +--rw unidirectional-delay-variation?      uint32
                +--rw unidirectional-packet-loss?          decimal64
```

```
                +--rw unidirectional-residual-bandwidth?
                |       rt-types:bandwidth-ieee-float32
                +--rw unidirectional-available-bandwidth?
                |       rt-types:bandwidth-ieee-float32
                +--rw unidirectional-utilized-bandwidth?
                        rt-types:bandwidth-ieee-float32
     augment /nw:networks/nw:network/nw:node/tet:te
               /tet:te-node-attributes/tet:connectivity-matrices
               /tet:connectivity-matrix:
       +--rw performance-metric
          +--rw measurement
          |  +--rw unidirectional-delay?                uint32
          |  +--rw unidirectional-min-delay?            uint32
          |  +--rw unidirectional-max-delay?            uint32
          |  +--rw unidirectional-delay-variation?      uint32
          |  +--rw unidirectional-packet-loss?          decimal64
          |  +--rw unidirectional-residual-bandwidth?
          |  |       rt-types:bandwidth-ieee-float32
          |  +--rw unidirectional-available-bandwidth?
          |  |       rt-types:bandwidth-ieee-float32
          |  +--rw unidirectional-utilized-bandwidth?
          |          rt-types:bandwidth-ieee-float32
          +--rw normality
          |  +--rw unidirectional-delay?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-min-delay?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-max-delay?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-delay-variation?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-packet-loss?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-residual-bandwidth?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-available-bandwidth?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-utilized-bandwidth?
          |          te-types:performance-metric-normality
          +--rw throttle
             +--rw unidirectional-delay-offset?          uint32
             +--rw measure-interval?                     uint32
             +--rw advertisement-interval?               uint32
             +--rw suppression-interval?                 uint32
             +--rw threshold-out
             |  +--rw unidirectional-delay?                uint32
             |  +--rw unidirectional-min-delay?            uint32
             |  +--rw unidirectional-max-delay?            uint32
```

```
             |  +--rw unidirectional-delay-variation?       uint32
             |  +--rw unidirectional-packet-loss?           decimal64
             |  +--rw unidirectional-residual-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-available-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-utilized-bandwidth?
             |          rt-types:bandwidth-ieee-float32
             +--rw threshold-in
             |  +--rw unidirectional-delay?                 uint32
             |  +--rw unidirectional-min-delay?             uint32
             |  +--rw unidirectional-max-delay?             uint32
             |  +--rw unidirectional-delay-variation?       uint32
             |  +--rw unidirectional-packet-loss?           decimal64
             |  +--rw unidirectional-residual-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-available-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-utilized-bandwidth?
             |          rt-types:bandwidth-ieee-float32
             +--rw threshold-accelerated-advertisement
                +--rw unidirectional-delay?                 uint32
                +--rw unidirectional-min-delay?             uint32
                +--rw unidirectional-max-delay?             uint32
                +--rw unidirectional-delay-variation?       uint32
                +--rw unidirectional-packet-loss?           decimal64
                +--rw unidirectional-residual-bandwidth?
                |       rt-types:bandwidth-ieee-float32
                +--rw unidirectional-available-bandwidth?
                |       rt-types:bandwidth-ieee-float32
                +--rw unidirectional-utilized-bandwidth?
                        rt-types:bandwidth-ieee-float32
     augment /nw:networks/nw:network/nw:node/tet:te
               /tet:information-source-entry/tet:connectivity-matrices:
       +--ro performance-metric
          +--ro measurement
          |  +--ro unidirectional-delay?                 uint32
          |  +--ro unidirectional-min-delay?             uint32
          |  +--ro unidirectional-max-delay?             uint32
          |  +--ro unidirectional-delay-variation?       uint32
          |  +--ro unidirectional-packet-loss?           decimal64
          |  +--ro unidirectional-residual-bandwidth?
          |  |       rt-types:bandwidth-ieee-float32
          |  +--ro unidirectional-available-bandwidth?
          |  |       rt-types:bandwidth-ieee-float32
          |  +--ro unidirectional-utilized-bandwidth?
          |          rt-types:bandwidth-ieee-float32
          +--ro normality
```

```
          |  +--ro unidirectional-delay?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-min-delay?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-max-delay?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-delay-variation?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-packet-loss?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-residual-bandwidth?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-available-bandwidth?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-utilized-bandwidth?
          |          te-types:performance-metric-normality
          +--ro throttle
             +--ro unidirectional-delay-offset?           uint32
             +--ro measure-interval?                      uint32
             +--ro advertisement-interval?                uint32
             +--ro suppression-interval?                  uint32
             +--ro threshold-out
             |  +--ro unidirectional-delay?                 uint32
             |  +--ro unidirectional-min-delay?             uint32
             |  +--ro unidirectional-max-delay?             uint32
             |  +--ro unidirectional-delay-variation?       uint32
             |  +--ro unidirectional-packet-loss?           decimal64
             |  +--ro unidirectional-residual-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--ro unidirectional-available-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--ro unidirectional-utilized-bandwidth?
             |          rt-types:bandwidth-ieee-float32
             +--ro threshold-in
             |  +--ro unidirectional-delay?                 uint32
             |  +--ro unidirectional-min-delay?             uint32
             |  +--ro unidirectional-max-delay?             uint32
             |  +--ro unidirectional-delay-variation?       uint32
             |  +--ro unidirectional-packet-loss?           decimal64
             |  +--ro unidirectional-residual-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--ro unidirectional-available-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--ro unidirectional-utilized-bandwidth?
             |          rt-types:bandwidth-ieee-float32
             +--ro threshold-accelerated-advertisement
                +--ro unidirectional-delay?                 uint32
                +--ro unidirectional-min-delay?             uint32
```

```
                +--ro unidirectional-max-delay?             uint32
                +--ro unidirectional-delay-variation?       uint32
                +--ro unidirectional-packet-loss?           decimal64
                +--ro unidirectional-residual-bandwidth?
                |       rt-types:bandwidth-ieee-float32
                +--ro unidirectional-available-bandwidth?
                |       rt-types:bandwidth-ieee-float32
                +--ro unidirectional-utilized-bandwidth?
                        rt-types:bandwidth-ieee-float32
     augment /nw:networks/nw:network/nw:node/tet:te
               /tet:information-source-entry/tet:connectivity-matrices
               /tet:connectivity-matrix:
       +--ro performance-metric
          +--ro measurement
          |  +--ro unidirectional-delay?                 uint32
          |  +--ro unidirectional-min-delay?             uint32
          |  +--ro unidirectional-max-delay?             uint32
          |  +--ro unidirectional-delay-variation?       uint32
          |  +--ro unidirectional-packet-loss?           decimal64
          |  +--ro unidirectional-residual-bandwidth?
          |  |       rt-types:bandwidth-ieee-float32
          |  +--ro unidirectional-available-bandwidth?
          |  |       rt-types:bandwidth-ieee-float32
          |  +--ro unidirectional-utilized-bandwidth?
          |          rt-types:bandwidth-ieee-float32
          +--ro normality
          |  +--ro unidirectional-delay?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-min-delay?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-max-delay?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-delay-variation?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-packet-loss?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-residual-bandwidth?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-available-bandwidth?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-utilized-bandwidth?
          |          te-types:performance-metric-normality
          +--ro throttle
             +--ro unidirectional-delay-offset?           uint32
             +--ro measure-interval?                      uint32
             +--ro advertisement-interval?                uint32
             +--ro suppression-interval?                  uint32
             +--ro threshold-out
```

```
             |  +--ro unidirectional-delay?                 uint32
             |  +--ro unidirectional-min-delay?             uint32
             |  +--ro unidirectional-max-delay?             uint32
             |  +--ro unidirectional-delay-variation?       uint32
             |  +--ro unidirectional-packet-loss?           decimal64
             |  +--ro unidirectional-residual-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--ro unidirectional-available-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--ro unidirectional-utilized-bandwidth?
             |          rt-types:bandwidth-ieee-float32
             +--ro threshold-in
             |  +--ro unidirectional-delay?                 uint32
             |  +--ro unidirectional-min-delay?             uint32
             |  +--ro unidirectional-max-delay?             uint32
             |  +--ro unidirectional-delay-variation?       uint32
             |  +--ro unidirectional-packet-loss?           decimal64
             |  +--ro unidirectional-residual-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--ro unidirectional-available-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--ro unidirectional-utilized-bandwidth?
             |          rt-types:bandwidth-ieee-float32
             +--ro threshold-accelerated-advertisement
                +--ro unidirectional-delay?                 uint32
                +--ro unidirectional-min-delay?             uint32
                +--ro unidirectional-max-delay?             uint32
                +--ro unidirectional-delay-variation?       uint32
                +--ro unidirectional-packet-loss?           decimal64
                +--ro unidirectional-residual-bandwidth?
                |       rt-types:bandwidth-ieee-float32
                +--ro unidirectional-available-bandwidth?
                |       rt-types:bandwidth-ieee-float32
                +--ro unidirectional-utilized-bandwidth?
                        rt-types:bandwidth-ieee-float32
     augment /nw:networks/nw:network/nw:node/tet:te
               /tet:tunnel-termination-point
               /tet:local-link-connectivities:
       +--rw performance-metric
          +--rw measurement
          |  +--rw unidirectional-delay?                 uint32
          |  +--rw unidirectional-min-delay?             uint32
          |  +--rw unidirectional-max-delay?             uint32
          |  +--rw unidirectional-delay-variation?       uint32
          |  +--rw unidirectional-packet-loss?           decimal64
          |  +--rw unidirectional-residual-bandwidth?
          |  |       rt-types:bandwidth-ieee-float32
          |  +--rw unidirectional-available-bandwidth?
```

```
          |  |       rt-types:bandwidth-ieee-float32
          |  +--rw unidirectional-utilized-bandwidth?
          |          rt-types:bandwidth-ieee-float32
          +--rw normality
          |  +--rw unidirectional-delay?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-min-delay?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-max-delay?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-delay-variation?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-packet-loss?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-residual-bandwidth?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-available-bandwidth?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-utilized-bandwidth?
          |          te-types:performance-metric-normality
          +--rw throttle
             +--rw unidirectional-delay-offset?           uint32
             +--rw measure-interval?                      uint32
             +--rw advertisement-interval?                uint32
             +--rw suppression-interval?                  uint32
             +--rw threshold-out
             |  +--rw unidirectional-delay?                 uint32
             |  +--rw unidirectional-min-delay?             uint32
             |  +--rw unidirectional-max-delay?             uint32
             |  +--rw unidirectional-delay-variation?       uint32
             |  +--rw unidirectional-packet-loss?           decimal64
             |  +--rw unidirectional-residual-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-available-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-utilized-bandwidth?
             |          rt-types:bandwidth-ieee-float32
             +--rw threshold-in
             |  +--rw unidirectional-delay?                 uint32
             |  +--rw unidirectional-min-delay?             uint32
             |  +--rw unidirectional-max-delay?             uint32
             |  +--rw unidirectional-delay-variation?       uint32
             |  +--rw unidirectional-packet-loss?           decimal64
             |  +--rw unidirectional-residual-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-available-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-utilized-bandwidth?
```

```
             |          rt-types:bandwidth-ieee-float32
             +--rw threshold-accelerated-advertisement
                +--rw unidirectional-delay?                 uint32
                +--rw unidirectional-min-delay?             uint32
                +--rw unidirectional-max-delay?             uint32
                +--rw unidirectional-delay-variation?       uint32
                +--rw unidirectional-packet-loss?           decimal64
                +--rw unidirectional-residual-bandwidth?
                |       rt-types:bandwidth-ieee-float32
                +--rw unidirectional-available-bandwidth?
                |       rt-types:bandwidth-ieee-float32
                +--rw unidirectional-utilized-bandwidth?
                        rt-types:bandwidth-ieee-float32
     augment /nw:networks/nw:network/nw:node/tet:te
               /tet:tunnel-termination-point
               /tet:local-link-connectivities
               /tet:local-link-connectivity:
       +--rw performance-metric
          +--rw measurement
          |  +--rw unidirectional-delay?                uint32
          |  +--rw unidirectional-min-delay?            uint32
          |  +--rw unidirectional-max-delay?            uint32
          |  +--rw unidirectional-delay-variation?      uint32
          |  +--rw unidirectional-packet-loss?          decimal64
          |  +--rw unidirectional-residual-bandwidth?
          |  |       rt-types:bandwidth-ieee-float32
          |  +--rw unidirectional-available-bandwidth?
          |  |       rt-types:bandwidth-ieee-float32
          |  +--rw unidirectional-utilized-bandwidth?
          |          rt-types:bandwidth-ieee-float32
          +--rw normality
          |  +--rw unidirectional-delay?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-min-delay?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-max-delay?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-delay-variation?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-packet-loss?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-residual-bandwidth?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-available-bandwidth?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-utilized-bandwidth?
          |          te-types:performance-metric-normality
          +--rw throttle
```

```
             +--rw unidirectional-delay-offset?           uint32
             +--rw measure-interval?                      uint32
             +--rw advertisement-interval?                uint32
             +--rw suppression-interval?                  uint32
             +--rw threshold-out
             |  +--rw unidirectional-delay?                 uint32
             |  +--rw unidirectional-min-delay?             uint32
             |  +--rw unidirectional-max-delay?             uint32
             |  +--rw unidirectional-delay-variation?       uint32
             |  +--rw unidirectional-packet-loss?           decimal64
             |  +--rw unidirectional-residual-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-available-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-utilized-bandwidth?
             |          rt-types:bandwidth-ieee-float32
             +--rw threshold-in
             |  +--rw unidirectional-delay?                 uint32
             |  +--rw unidirectional-min-delay?             uint32
             |  +--rw unidirectional-max-delay?             uint32
             |  +--rw unidirectional-delay-variation?       uint32
             |  +--rw unidirectional-packet-loss?           decimal64
             |  +--rw unidirectional-residual-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-available-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-utilized-bandwidth?
             |          rt-types:bandwidth-ieee-float32
             +--rw threshold-accelerated-advertisement
                +--rw unidirectional-delay?                 uint32
                +--rw unidirectional-min-delay?             uint32
                +--rw unidirectional-max-delay?             uint32
                +--rw unidirectional-delay-variation?       uint32
                +--rw unidirectional-packet-loss?           decimal64
                +--rw unidirectional-residual-bandwidth?
                |       rt-types:bandwidth-ieee-float32
                +--rw unidirectional-available-bandwidth?
                |       rt-types:bandwidth-ieee-float32
                +--rw unidirectional-utilized-bandwidth?
                        rt-types:bandwidth-ieee-float32
     augment /nw:networks/tet:te/tet:templates/tet:link-template
               /tet:te-link-attributes:
       +--rw performance-metric
          +--rw measurement
          |  +--rw unidirectional-delay?                 uint32
          |  +--rw unidirectional-min-delay?             uint32
          |  +--rw unidirectional-max-delay?             uint32
          |  +--rw unidirectional-delay-variation?       uint32
```

```
          |  +--rw unidirectional-packet-loss?           decimal64
          |  +--rw unidirectional-residual-bandwidth?
          |  |       rt-types:bandwidth-ieee-float32
          |  +--rw unidirectional-available-bandwidth?
          |  |       rt-types:bandwidth-ieee-float32
          |  +--rw unidirectional-utilized-bandwidth?
          |          rt-types:bandwidth-ieee-float32
          +--rw normality
          |  +--rw unidirectional-delay?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-min-delay?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-max-delay?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-delay-variation?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-packet-loss?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-residual-bandwidth?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-available-bandwidth?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-utilized-bandwidth?
          |          te-types:performance-metric-normality
          +--rw throttle
             +--rw unidirectional-delay-offset?           uint32
             +--rw measure-interval?                      uint32
             +--rw advertisement-interval?                uint32
             +--rw suppression-interval?                  uint32
             +--rw threshold-out
             |  +--rw unidirectional-delay?                 uint32
             |  +--rw unidirectional-min-delay?             uint32
             |  +--rw unidirectional-max-delay?             uint32
             |  +--rw unidirectional-delay-variation?       uint32
             |  +--rw unidirectional-packet-loss?           decimal64
             |  +--rw unidirectional-residual-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-available-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-utilized-bandwidth?
             |          rt-types:bandwidth-ieee-float32
             +--rw threshold-in
             |  +--rw unidirectional-delay?                 uint32
             |  +--rw unidirectional-min-delay?             uint32
             |  +--rw unidirectional-max-delay?             uint32
             |  +--rw unidirectional-delay-variation?       uint32
             |  +--rw unidirectional-packet-loss?           decimal64
             |  +--rw unidirectional-residual-bandwidth?
```

```
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-available-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-utilized-bandwidth?
             |          rt-types:bandwidth-ieee-float32
             +--rw threshold-accelerated-advertisement
                +--rw unidirectional-delay?                 uint32
                +--rw unidirectional-min-delay?             uint32
                +--rw unidirectional-max-delay?             uint32
                +--rw unidirectional-delay-variation?       uint32
                +--rw unidirectional-packet-loss?           decimal64
                +--rw unidirectional-residual-bandwidth?
                |       rt-types:bandwidth-ieee-float32
                +--rw unidirectional-available-bandwidth?
                |       rt-types:bandwidth-ieee-float32
                +--rw unidirectional-utilized-bandwidth?
                        rt-types:bandwidth-ieee-float32
     augment /nw:networks/nw:network/nt:link/tet:te
               /tet:te-link-attributes:
       +--rw performance-metric
          +--rw measurement
          |  +--rw unidirectional-delay?                 uint32
          |  +--rw unidirectional-min-delay?             uint32
          |  +--rw unidirectional-max-delay?             uint32
          |  +--rw unidirectional-delay-variation?       uint32
          |  +--rw unidirectional-packet-loss?           decimal64
          |  +--rw unidirectional-residual-bandwidth?
          |  |       rt-types:bandwidth-ieee-float32
          |  +--rw unidirectional-available-bandwidth?
          |  |       rt-types:bandwidth-ieee-float32
          |  +--rw unidirectional-utilized-bandwidth?
          |          rt-types:bandwidth-ieee-float32
          +--rw normality
          |  +--rw unidirectional-delay?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-min-delay?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-max-delay?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-delay-variation?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-packet-loss?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-residual-bandwidth?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-available-bandwidth?
          |  |       te-types:performance-metric-normality
          |  +--rw unidirectional-utilized-bandwidth?
```

```
          |          te-types:performance-metric-normality
          +--rw throttle
             +--rw unidirectional-delay-offset?           uint32
             +--rw measure-interval?                      uint32
             +--rw advertisement-interval?                uint32
             +--rw suppression-interval?                  uint32
             +--rw threshold-out
             |  +--rw unidirectional-delay?                 uint32
             |  +--rw unidirectional-min-delay?             uint32
             |  +--rw unidirectional-max-delay?             uint32
             |  +--rw unidirectional-delay-variation?       uint32
             |  +--rw unidirectional-packet-loss?           decimal64
             |  +--rw unidirectional-residual-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-available-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-utilized-bandwidth?
             |          rt-types:bandwidth-ieee-float32
             +--rw threshold-in
             |  +--rw unidirectional-delay?                 uint32
             |  +--rw unidirectional-min-delay?             uint32
             |  +--rw unidirectional-max-delay?             uint32
             |  +--rw unidirectional-delay-variation?       uint32
             |  +--rw unidirectional-packet-loss?           decimal64
             |  +--rw unidirectional-residual-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-available-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--rw unidirectional-utilized-bandwidth?
             |          rt-types:bandwidth-ieee-float32
             +--rw threshold-accelerated-advertisement
                +--rw unidirectional-delay?                 uint32
                +--rw unidirectional-min-delay?             uint32
                +--rw unidirectional-max-delay?             uint32
                +--rw unidirectional-delay-variation?       uint32
                +--rw unidirectional-packet-loss?           decimal64
                +--rw unidirectional-residual-bandwidth?
                |       rt-types:bandwidth-ieee-float32
                +--rw unidirectional-available-bandwidth?
                |       rt-types:bandwidth-ieee-float32
                +--rw unidirectional-utilized-bandwidth?
                        rt-types:bandwidth-ieee-float32
     augment /nw:networks/nw:network/nt:link/tet:te
               /tet:information-source-entry:
       +--ro performance-metric
          +--ro measurement
          |  +--ro unidirectional-delay?                uint32
          |  +--ro unidirectional-min-delay?            uint32
```

```
          |  +--ro unidirectional-max-delay?             uint32
          |  +--ro unidirectional-delay-variation?       uint32
          |  +--ro unidirectional-packet-loss?           decimal64
          |  +--ro unidirectional-residual-bandwidth?
          |  |       rt-types:bandwidth-ieee-float32
          |  +--ro unidirectional-available-bandwidth?
          |  |       rt-types:bandwidth-ieee-float32
          |  +--ro unidirectional-utilized-bandwidth?
          |          rt-types:bandwidth-ieee-float32
          +--ro normality
          |  +--ro unidirectional-delay?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-min-delay?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-max-delay?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-delay-variation?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-packet-loss?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-residual-bandwidth?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-available-bandwidth?
          |  |       te-types:performance-metric-normality
          |  +--ro unidirectional-utilized-bandwidth?
          |          te-types:performance-metric-normality
          +--ro throttle
             +--ro unidirectional-delay-offset?           uint32
             +--ro measure-interval?                      uint32
             +--ro advertisement-interval?                uint32
             +--ro suppression-interval?                  uint32
             +--ro threshold-out
             |  +--ro unidirectional-delay?                 uint32
             |  +--ro unidirectional-min-delay?             uint32
             |  +--ro unidirectional-max-delay?             uint32
             |  +--ro unidirectional-delay-variation?       uint32
             |  +--ro unidirectional-packet-loss?           decimal64
             |  +--ro unidirectional-residual-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--ro unidirectional-available-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--ro unidirectional-utilized-bandwidth?
             |          rt-types:bandwidth-ieee-float32
             +--ro threshold-in
             |  +--ro unidirectional-delay?                 uint32
             |  +--ro unidirectional-min-delay?             uint32
             |  +--ro unidirectional-max-delay?             uint32
             |  +--ro unidirectional-delay-variation?       uint32
```

```
             |  +--ro unidirectional-packet-loss?          decimal64
             |  +--ro unidirectional-residual-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--ro unidirectional-available-bandwidth?
             |  |       rt-types:bandwidth-ieee-float32
             |  +--ro unidirectional-utilized-bandwidth?
             |          rt-types:bandwidth-ieee-float32
             +--ro threshold-accelerated-advertisement
                +--ro unidirectional-delay?                uint32
                +--ro unidirectional-min-delay?            uint32
                +--ro unidirectional-max-delay?            uint32
                +--ro unidirectional-delay-variation?      uint32
                +--ro unidirectional-packet-loss?          decimal64
                +--ro unidirectional-residual-bandwidth?
                |       rt-types:bandwidth-ieee-float32
                +--ro unidirectional-available-bandwidth?
                |       rt-types:bandwidth-ieee-float32
                +--ro unidirectional-utilized-bandwidth?
                        rt-types:bandwidth-ieee-float32
     augment /nw:networks/tet:te/tet:templates/tet:link-template
               /tet:te-link-attributes
               /tet:interface-switching-capability:
       +--rw packet-switch-capable
          +--rw minimum-lsp-bandwidth?   rt-types:bandwidth-ieee-float32
          +--rw interface-mtu?           uint16
     augment /nw:networks/nw:network/nt:link/tet:te
               /tet:te-link-attributes
               /tet:interface-switching-capability:
       +--rw packet-switch-capable
          +--rw minimum-lsp-bandwidth?   rt-types:bandwidth-ieee-float32
          +--rw interface-mtu?           uint16
     augment /nw:networks/nw:network/nt:link/tet:te
               /tet:information-source-entry
               /tet:interface-switching-capability:
       +--ro packet-switch-capable
          +--ro minimum-lsp-bandwidth?   rt-types:bandwidth-ieee-float32
          +--ro interface-mtu?           uint16
```

5. YANG Modules

5.1. Layer 3 TE Topology Module

This module references [RFC8345], [RFC8346], and [I-D.ietf-teas-yang-te-topo].

```
<CODE BEGINS> file "ietf-l3-te-topology@2018-06-22.yang"
```

```
module ietf-l3-te-topology {
  yang-version 1.1;
  namespace "urn:ietf:params:xml:ns:yang:ietf-l3-te-topology";
  prefix "l3tet";

  import ietf-network {
    prefix "nw";
    reference "RFC 8345: A YANG Data Model for Network Topologies";
  }
  import ietf-network-topology {
    prefix "nt";
    reference "RFC 8345: A YANG Data Model for Network Topologies";
  }
  import ietf-l3-unicast-topology {
    prefix "l3t";
    reference "RFC 8346: A YANG Data Model for Layer 3 Topologies";
  }
  import ietf-te-topology {
    prefix "tet";
    reference
      "I-D.ietf-teas-yang-te-topo: YANG Data Model for Traffic
       Engineering (TE) Topologies";
  }

  organization
    "IETF Traffic Engineering Architecture and Signaling (TEAS)
     Working Group";

  contact
    "WG Web:   <http://tools.ietf.org/wg/teas/>
     WG List:  <mailto:teas@ietf.org>

     Editor:   Xufeng Liu
               <mailto:xufeng.liu.ietf@gmail.com>

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     Editor:   Tarek Saad
               <mailto:tsaad@cisco.com>

     Editor:   Himanshu Shah
               <mailto:hshah@ciena.com>

     Editor:   Oscar Gonzalez De Dios
```

```
                  <mailto:oscar.gonzalezdedios@telefonica.com>";

     description
       "YANG data model for representing and manipulating Layer 3 TE
        Topologies.

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        authors of the code.  All rights reserved.

        Redistribution and use in source and binary forms, with or
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        (http://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 2018-06-22 {

       description "Initial revision";
       reference "RFC XXXX: YANG Data Model for Layer 3 TE Topologies";
     }

     grouping l3-te-topology-type {
       description
         "Identifies the L3 TE topology type.";
       container l3-te {
         presence "indiates L3 TE Topology";
         description
           "Its presence identifies the L3 TE topology type.";
       }
     }

     augment "/nw:networks/nw:network/nw:network-types/"
       + "l3t:l3-unicast-topology" {
       description
         "Defines the L3 TE topology type.";
       uses l3-te-topology-type;
     }

     augment "/nw:networks/nw:network/l3t:l3-topology-attributes" {
       when "../nw:network-types/l3t:l3-unicast-topology/l3tet:l3-te" {
         description "Augment only for L3 TE topology";
       }
       description "Augment topology configuration";
       uses l3-te-topology-attributes;
```

```
     }

     augment "/nw:networks/nw:network/nw:node/l3t:l3-node-attributes" {
       when "../../nw:network-types/l3t:l3-unicast-topology/"
         + "l3tet:l3-te" {
         description "Augment only for L3 TE topology";
       }
       description "Augment node configuration";
       uses l3-te-node-attributes;
     }

     augment "/nw:networks/nw:network/nw:node/nt:termination-point/"
       + "l3t:l3-termination-point-attributes" {
       when "../../../nw:network-types/l3t:l3-unicast-topology/"
         + "l3tet:l3-te" {
         description "Augment only for L3 TE topology";
       }
       description "Augment termination point configuration";
       uses l3-te-tp-attributes;
     }

     augment "/nw:networks/nw:network/nt:link/l3t:l3-link-attributes" {
       when "../../nw:network-types/l3t:l3-unicast-topology/"
         + "l3tet:l3-te" {
         description "Augment only for L3 TE topology";
       }
       description "Augment link configuration";
       uses l3-te-link-attributes;
     }

     grouping l3-te-topology-attributes {
       description "L3 TE topology scope attributes";
       container l3-te-topology-attributes {
         must "/nw:networks/nw:network"
           + "[nw:network-id = current()/network-ref]/nw:network-types/"
           + "tet:te-topology" {
           error-message
             "The referenced network must be a TE topology.";
           description
             "The referenced network must be a TE topology.";
         }
         description "Containing TE topology references";
         uses nw:network-ref;
       } // l3-te-topology-attributes
     } // l3-te-topology-attributes

     grouping l3-te-node-attributes {
       description "L3 TE node scope attributes";
```

```
      container l3-te-node-attributes {
        must "/nw:networks/nw:network"
          + "[nw:network-id = current()/network-ref]/nw:network-types/"
          + "tet:te-topology" {
          error-message
            "The referenced network must be a TE topology.";
          description
            "The referenced network must be a TE topology.";
        }
        description "Containing TE node references";
        uses nw:node-ref;
      } // l3-te
    } // l3-te-node-attributes

    grouping l3-te-tp-attributes {
      description "L3 TE termination point scope attributes";
      container l3-te-tp-attributes {
        must "/nw:networks/nw:network"
          + "[nw:network-id = current()/network-ref]/nw:network-types/"
          + "tet:te-topology" {
          error-message
            "The referenced network must be a TE topology.";
          description
            "The referenced network must be a TE topology.";
        }
        description "Containing TE termination point references";
        uses nt:tp-ref;
      } // l3-te
    } // l3-te-tp-attributes

    grouping l3-te-link-attributes {
      description "L3 TE link scope attributes";
      container l3-te-link-attributes {
        must "/nw:networks/nw:network"
          + "[nw:network-id = current()/network-ref]/nw:network-types/"
          + "tet:te-topology" {
          error-message
            "The referenced network must be a TE topology.";
          description
            "The referenced network must be a TE topology.";
        }
        description "Containing TE link references";
        uses nt:link-ref;
      }
    } // l3-te-link-attributes
  }
  <CODE ENDS>
```

5.2. Packet Switching TE Topology Module

This module references [RFC7471], [RFC7810], [RFC7823], [RFC8294], [RFC8345], [RFC8346]. [I-D.ietf-teas-yang-te], and [I-D.ietf-teas-yang-te-topo].

```
<CODE BEGINS> file "ietf-te-topology-packet@2018-06-22.yang"
module ietf-te-topology-packet {
  yang-version 1.1;
  namespace "urn:ietf:params:xml:ns:yang:ietf-te-topology-packet";

  prefix "tet-pkt";

  import ietf-network {
    prefix "nw";
    reference "RFC 8345: A YANG Data Model for Network Topologies";
  }

  import ietf-network-topology {
    prefix "nt";
    reference "RFC 8345: A YANG Data Model for Network Topologies";
  }

  import ietf-routing-types {
    prefix "rt-types";
    reference
      "RFC 8294: Common YANG Data Types for the Routing Area";
  }

  import ietf-te-topology {
    prefix "tet";
    reference
      "I-D.ietf-teas-yang-te-topo: YANG Data Model for Traffic
       Engineering (TE) Topologies";
  }

  import ietf-te-types {
    prefix "te-types";
    reference
      "I-D.ietf-teas-yang-te: A YANG Data Model for Traffic
       Engineering Tunnels and Interfaces";
  }

  organization
    "Traffic Engineering Architecture and Signaling (TEAS)
     Working Group";
```

```
     contact
       "WG Web:   <http://tools.ietf.org/wg/teas/>
        WG List:  <mailto:teas@ietf.org>

        Editor:   Xufeng Liu
                  <mailto:xufeng.liu.ietf@gmail.com>

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        Editor:   Himanshu Shah
                  <mailto:hshah@ciena.com>

        Editor:   Oscar Gonzalez De Dios
                  <mailto:oscar.gonzalezdedios@telefonica.com>";

     description
       "YANG data model for representing and manipulating PSC (Packet
        Switching) TE Topologies.

        Copyright (c) 2018 IETF Trust and the persons identified as
        authors of the code.  All rights reserved.

        Redistribution and use in source and binary forms, with or
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        forth in Section 4.c of the IETF Trust's Legal Provisions
        Relating to IETF Documents
        (http://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 2018-06-22 {
       description "Initial revision";
       reference "RFC XXXX: YANG Data Model for Layer 3 TE Topologies";
     }

     /*
      * Features
      */
```

```
     feature te-performance-metric {
       description
         "This feature indicates that the system supports
          TE performance metric.";
       reference
         "RFC7471: OSPF Traffic Engineering (TE) Metric Extensions.
          RFC7810: IS-IS Traffic Engineering (TE) Metric Extensions.
          RFC7823: Performance-Based Path Selection for Explicitly
          Routed Label Switched Paths (LSPs) Using TE Metric
          Extensions";
     }

     /*
      * Groupings
      */
     grouping packet-switch-capable-container {
       description
         "The container of packet switch capable attributes.";
       container packet-switch-capable {
         description
           "Interface has packet-switching capabilities.";
         leaf minimum-lsp-bandwidth {
           type rt-types:bandwidth-ieee-float32;
           description
             "Minimum LSP Bandwidth. Units in bytes per second";
         }
         leaf interface-mtu {
           type uint16;
           description
             "Interface MTU.";
         }
       }
     }

     /*
      * Augmentations
      */
     /* Augmentations to connectivity-matrix */
     augment "/nw:networks/nw:network/nw:node/tet:te/"
       + "tet:te-node-attributes/tet:connectivity-matrices" {
       description
         "Parameters for PSC TE topology.";
       uses te-types:performance-metric-container {
         if-feature te-performance-metric;
       }
     }

     augment "/nw:networks/nw:network/nw:node/tet:te/"
```

```
           + "tet:te-node-attributes/tet:connectivity-matrices/"
           + "tet:connectivity-matrix" {
       description
         "Parameters for PSC TE topology.";
       uses te-types:performance-metric-container {
         if-feature te-performance-metric;
       }
     }

     augment "/nw:networks/nw:network/nw:node/tet:te/"
           + "tet:information-source-entry/tet:connectivity-matrices" {
       description
         "Parameters for PSC TE topology.";
       uses te-types:performance-metric-container {
         if-feature te-performance-metric;
       }
     }

     augment "/nw:networks/nw:network/nw:node/tet:te/"
           + "tet:information-source-entry/tet:connectivity-matrices/"
           + "tet:connectivity-matrix" {
       description
         "Parameters for PSC TE topology.";
       uses te-types:performance-metric-container {
         if-feature te-performance-metric;
       }
     }

     /* Augmentations to tunnel-termination-point */
     augment "/nw:networks/nw:network/nw:node/tet:te/"
           + "tet:tunnel-termination-point/"
           + "tet:local-link-connectivities" {
       description
         "Parameters for PSC TE topology.";
       uses te-types:performance-metric-container {
         if-feature te-performance-metric;
       }
     }

     augment "/nw:networks/nw:network/nw:node/tet:te/"
           + "tet:tunnel-termination-point/"
           + "tet:local-link-connectivities/"
           + "tet:local-link-connectivity" {
       description
         "Parameters for PSC TE topology.";
       uses te-types:performance-metric-container {
         if-feature te-performance-metric;
       }
```

```
     }

     /* Augmentations to te-link-attributes */
     augment "/nw:networks/tet:te/tet:templates/"
           + "tet:link-template/tet:te-link-attributes" {
       when "tet:interface-switching-capability "
         + "[tet:switching-capability = 'te-types:switching-psc1']" {
         description "Valid only for PSC";
       }
       description
         "Parameters for PSC TE topology.";
       uses te-types:performance-metric-container {
         if-feature te-performance-metric;
       }
     }

     augment "/nw:networks/nw:network/nt:link/tet:te/"
           + "tet:te-link-attributes" {
       when "tet:interface-switching-capability "
         + "[tet:switching-capability = 'te-types:switching-psc1']" {
         description "Valid only for PSC";
       }
       description
         "Parameters for PSC TE topology.";
       uses te-types:performance-metric-container {
         if-feature te-performance-metric;
       }
     }

     augment "/nw:networks/nw:network/nt:link/tet:te/"
           + "tet:information-source-entry" {
       when "tet:interface-switching-capability "
         + "[tet:switching-capability = 'te-types:switching-psc1']" {
         description "Valid only for PSC";
       }
       description
         "Parameters for PSC TE topology.";
       uses te-types:performance-metric-container {
         if-feature te-performance-metric;
       }
     }

     /* Augmentations to interface-switching-capability */
     augment "/nw:networks/tet:te/tet:templates/"
           + "tet:link-template/tet:te-link-attributes/"
           + "tet:interface-switching-capability" {
       when "tet:switching-capability = 'te-types:switching-psc1' " {
         description "Valid only for PSC";
```

```
      }
      description
        "Parameters for PSC TE topology.";
      uses packet-switch-capable-container;
    }

    augment "/nw:networks/nw:network/nt:link/tet:te/"
          + "tet:te-link-attributes/"
          + "tet:interface-switching-capability" {
      when "tet:switching-capability = 'te-types:switching-psc1' " {
        description "Valid only for PSC";
      }
      description
        "Parameters for PSC TE topology.";
      uses packet-switch-capable-container;
    }

    augment "/nw:networks/nw:network/nt:link/tet:te/"
          + "tet:information-source-entry/"
          + "tet:interface-switching-capability" {
      when "tet:switching-capability = 'te-types:switching-psc1' " {
        description "Valid only for PSC";
      }
      description
        "Parameters for PSC TE topology.";
      uses packet-switch-capable-container;
    }
  }
  <CODE ENDS>
```

6. IANA Considerations

RFC Ed.: In this section, replace all occurrences of 'XXXX' with the actual RFC number (and remove this note).

This document registers the following namespace URIs in the IETF XML registry [RFC3688]:

```
---------------------------------------------------------------------
URI: urn:ietf:params:xml:ns:yang:ietf-l3-te-topology
Registrant Contact: The IESG.
XML: N/A, the requested URI is an XML namespace.
---------------------------------------------------------------------
```

```
--------------------------------------------------------------------
URI: urn:ietf:params:xml:ns:yang:ietf-l3-te-topology-state
Registrant Contact: The IESG.
XML: N/A, the requested URI is an XML namespace.
--------------------------------------------------------------------

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

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

This document registers the following YANG modules in the YANG Module Names registry [RFC6020]:

```
--------------------------------------------------------------------
name:         ietf-l3-te-topology
namespace:    urn:ietf:params:xml:ns:yang:ietf-l3-te-topology
prefix:       l3te
reference:    RFC XXXX
--------------------------------------------------------------------

--------------------------------------------------------------------
name:         ietf-l3-te-topology-state
namespace:    urn:ietf:params:xml:ns:yang:ietf-l3-te-topology-state
prefix:       l3te-s
reference:    RFC XXXX
--------------------------------------------------------------------

--------------------------------------------------------------------
name:         ietf-te-topology-packet
namespace:    urn:ietf:params:xml:ns:yang:ietf-te-topology-packet
prefix:       tet-pkt
reference:    RFC XXXX
--------------------------------------------------------------------

--------------------------------------------------------------------
name:         ietf-te-topology-packet-state
namespace:  urn:ietf:params:xml:ns:yang:ietf-te-topology-packet-state
prefix:       tet-pkt-s
reference:    RFC XXXX
--------------------------------------------------------------------
```

7. Security Considerations

The YANG module specified in this document defines a schema for data that is designed to be accessed via network management protocols such as NETCONF [RFC6241] or RESTCONF [RFC8040]. The lowest NETCONF layer is the secure transport layer, and the mandatory-to-implement secure transport is Secure Shell (SSH) [RFC6242]. The lowest RESTCONF layer is HTTPS, and the mandatory-to-implement secure transport is TLS [RFC5246].

The NETCONF access control model [RFC6536] provides the means to restrict access for particular NETCONF or RESTCONF users to a preconfigured subset of all available NETCONF or RESTCONF protocol operations and content.

There are a number of data nodes defined in this YANG module that 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., edit-config) to these data nodes without proper protection can have a negative effect on network operations. These are the subtrees and data nodes and their sensitivity/vulnerability:

/nw:networks/nw:network/nw:network-types/l3t:l3-unicast-topology/l3-te
This subtree specifies the layer 3 TE topology type. Modifying the configurations can make layer 3 TE topology type invalid and cause interruption to all layer 3 TE networks.

/nw:networks/nw:network/l3t:l3-topology-attributes/l3-te-topology-attributes
This subtree specifies the topology-wide configurations, including the reference to a TE topology from a layer 3 network topolopy. Modifying the configurations here can cause traffic disabled or rerouted in this topology and the connected topologies.

/nw:networks/nw:network/nw:node/l3t:l3-node-attributes/l3-te-node-attributes
This subtree specifies the configurations of layer 3 TE nodes. Modifying the configurations in this subtree can change the relationship between a TE node and a layer 3 node, causing traffic disabled or rerouted in the specified nodes and the related layer 3 topologies.

/nw:networks/nw:network/nw:node/nt:termination-point//l3t:l3-termination-point-attributes/l3-te-tp-attributes
This subtree specifies the configurations of layer 3 TE link termination points. Modifying the configurations in this subtree

can change the relationship between a TE link termination point and a layer 3 link termination point, causing traffic disabled or rerouted on the related layer 3 links and the related layer 3 topologies.

/nw:networks/nw:network/nt:link/l3t:l3-link-attributes/l3-te-link-attributes
This subtree specifies the configurations of layer 3 TE links. Modifying the configurations in this subtree can change the relationship between a TE link and a layer 3 link, causing traffic disabled or rerouted on the specified layer 3 link and the related layer 3 topologies.

performance-metric containers
The container "performance-metric" is augmented to multiple locations of the base TE topology model, as specified in Section 3.2. Modifying the configuration in such a container can change the behavours of performance metric monitoring, causing traffic disabled or rerouted on the related layer 3 links, nodes, or topologies.

Some of the readable data nodes in this YANG module may be considered sensitive or vulnerable in some network environments. It is thus important to control read access (e.g., via get, get-config, or notification) to these data nodes. These are the subtrees and data nodes and their sensitivity/vulnerability:

/nw:networks/nw:network/nw:network-types/l3t:l3-unicast-topology/l3-te
Unauthorized access to this subtree can disclose the layer 3 TE topology type.

/nw:networks/nw:network/l3t:l3-topology-attributes/l3-te-topology-attributes
Unauthorized access to this subtree can disclose the topology-wide configurations, including the reference to a TE topology from a layer 3 network topolopy.

/nw:networks/nw:network/nw:node/l3t:l3-node-attributes/l3-te-node-attributes
Unauthorized access to this subtree can disclose the operational state information of layer 3 TE nodes.

/nw:networks/nw:network/nw:node/nt:termination-point//l3t:l3-termination-point-attributes/l3-te-tp-attributes
Unauthorized access to this subtree can disclose the operational state information of layer 3 TE link termination points.

/nw:networks/nw:network/nt:link/l3t:l3-link-attributes/l3-te-link-attributes
Unauthorized access to this subtree can disclose the operational state information of layer 3 TE links.

performance-metric containers
The container "performance-metric" is augmented to multiple locations of the base TE topology model, as specified in Section 3.2. Unauthorized access to this subtree can disclose the operational state information of performance metric monitoring.

8. References

8.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <https://www.rfc-editor.org/info/rfc2119>.

[RFC5246] Dierks, T. and E. Rescorla, "The Transport Layer Security (TLS) Protocol Version 1.2", RFC 5246, DOI 10.17487/RFC5246, August 2008, <https://www.rfc-editor.org/info/rfc5246>.

[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>.

[RFC6242] Wasserman, M., "Using the NETCONF Protocol over Secure Shell (SSH)", RFC 6242, DOI 10.17487/RFC6242, June 2011, <https://www.rfc-editor.org/info/rfc6242>.

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[RFC7471] Giacalone, S., Ward, D., Drake, J., Atlas, A., and S. Previdi, "OSPF Traffic Engineering (TE) Metric Extensions", RFC 7471, DOI 10.17487/RFC7471, March 2015, <https://www.rfc-editor.org/info/rfc7471>.

[RFC7810] Previdi, S., Ed., Giacalone, S., Ward, D., Drake, J., and Q. Wu, "IS-IS Traffic Engineering (TE) Metric Extensions", RFC 7810, DOI 10.17487/RFC7810, May 2016, <https://www.rfc-editor.org/info/rfc7810>.

[RFC7823] Atlas, A., Drake, J., Giacalone, S., and S. Previdi, "Performance-Based Path Selection for Explicitly Routed Label Switched Paths (LSPs) Using TE Metric Extensions", RFC 7823, DOI 10.17487/RFC7823, May 2016, <https://www.rfc-editor.org/info/rfc7823>.

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[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>.

[RFC8294] Liu, X., Qu, Y., Lindem, A., Hopps, C., and L. Berger, "Common YANG Data Types for the Routing Area", RFC 8294, DOI 10.17487/RFC8294, December 2017, <https://www.rfc-editor.org/info/rfc8294>.

[RFC8342] Bjorklund, M., Schoenwaelder, J., Shafer, P., Watsen, K., and R. Wilton, "Network Management Datastore Architecture (NMDA)", RFC 8342, DOI 10.17487/RFC8342, March 2018, <https://www.rfc-editor.org/info/rfc8342>.

[RFC8345] Clemm, A., Medved, J., Varga, R., Bahadur, N., Ananthakrishnan, H., and X. Liu, "A YANG Data Model for Network Topologies", RFC 8345, DOI 10.17487/RFC8345, March 2018, <https://www.rfc-editor.org/info/rfc8345>.

[RFC8346] Clemm, A., Medved, J., Varga, R., Liu, X., Ananthakrishnan, H., and N. Bahadur, "A YANG Data Model for Layer 3 Topologies", RFC 8346, DOI 10.17487/RFC8346, March 2018, <https://www.rfc-editor.org/info/rfc8346>.

[I-D.ietf-teas-yang-te]
Saad, T., Gandhi, R., Liu, X., Beeram, V., Shah, H., and I. Bryskin, "A YANG Data Model for Traffic Engineering Tunnels and Interfaces", draft-ietf-teas-yang-te-15 (work in progress), June 2018.

[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-18 (work in progress), June 2018.

8.2. Informative References

[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>.

Appendix A. Companion YANG Model for Non-NMDA Compliant Implementations

The YANG modules ietf-l3-te-topology and ietf-te-topology-packet defined in this document are designed to be used in conjunction with implementations that support the Network Management Datastore Architecture (NMDA) defined in [RFC8342]. In order to allow implementations to use the model even in cases when NMDA is not supported, the following companion modules, ietf-l3-te-topology-state and ietf-te-topology-packet-state, are defined as state models, which mirror the modules ietf-l3-te-topology and ietf-te-topology-packet defined earlier in this document. However, all data nodes in the companion module are non-configurable, to represent the applied configuration or the derived operational states.

The companion modules, ietf-l3-te-topology-state and ietf-te-topology-packet-state, are redundant and SHOULD NOT be supported by implementations that support NMDA.

As the structure of the companion modules mirrors that of the coorespinding NMDA models, the YANG trees of the companion modules are not depicted separately.

A.1. Layer 3 TE Topology State Module

This module references [RFC8345], and [RFC8346].

```
<CODE BEGINS> file "ietf-l3-te-topology-state@2018-06-22.yang"
module ietf-l3-te-topology-state {
  yang-version 1.1;
  namespace "urn:ietf:params:xml:ns:yang:ietf-l3-te-topology-state";
  prefix "l3tet-s";

  import ietf-l3-te-topology {
    prefix "l3tet";
  }
  import ietf-network-state {
    prefix "nw-s";
    reference "RFC 8345: A YANG Data Model for Network Topologies";
  }
  import ietf-network-topology-state {
    prefix "nt-s";
    reference "RFC 8345: A YANG Data Model for Network Topologies";
  }
  import ietf-l3-unicast-topology-state {
    prefix "l3t-s";
    reference "RFC 8346: A YANG Data Model for Layer 3 Topologies";
  }
```

```
     organization
       "IETF Traffic Engineering Architecture and Signaling (TEAS)
        Working Group";

     contact
       "WG Web:   <http://tools.ietf.org/wg/teas/>
        WG List:  <mailto:teas@ietf.org>

        Editor:   Xufeng Liu
                  <mailto:xufeng.liu.ietf@gmail.com>

        Editor:   Igor Bryskin
                  <mailto:Igor.Bryskin@huawei.com>

        Editor:   Vishnu Pavan Beeram
                  <mailto:vbeeram@juniper.net>

        Editor:   Tarek Saad
                  <mailto:tsaad@cisco.com>

        Editor:   Himanshu Shah
                  <mailto:hshah@ciena.com>

        Editor:   Oscar Gonzalez De Dios
                  <mailto:oscar.gonzalezdedios@telefonica.com>";

     description
       "YANG data model for representing operational state information
        of Layer 3 TE Topologies, when NMDA is not supported.

        Copyright (c) 2018 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
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        forth in Section 4.c of the IETF Trust's Legal Provisions
        Relating to IETF Documents
        (http://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 2018-06-22 {

       description "Initial revision";
       reference "RFC XXXX: YANG Data Model for Layer 3 TE Topologies";
     }
```

```
    augment "/nw-s:networks/nw-s:network/nw-s:network-types/"
      + "l3t-s:l3-unicast-topology" {
      description
        "Defines the L3 TE topology type.";
      uses l3tet:l3-te-topology-type;
    }

    augment "/nw-s:networks/nw-s:network/"
      + "l3t-s:l3-topology-attributes" {
      when "../nw-s:network-types/l3t-s:l3-unicast-topology/"
        + "l3tet-s:l3-te" {
        description "Augment only for L3 TE topology";
      }
      description "Augment topology configuration";
      uses l3tet:l3-te-topology-attributes;
    }

    augment "/nw-s:networks/nw-s:network/nw-s:node/"
      + "l3t-s:l3-node-attributes" {
      when "../../nw-s:network-types/l3t-s:l3-unicast-topology/"
        + "l3tet-s:l3-te" {
        description "Augment only for L3 TE topology";
      }
      description "Augment node configuration";
      uses l3tet:l3-te-node-attributes;
    }

    augment "/nw-s:networks/nw-s:network/nw-s:node/"
      + "nt-s:termination-point/"
      + "l3t-s:l3-termination-point-attributes" {
      when "../../../nw-s:network-types/l3t-s:l3-unicast-topology/"
        + "l3tet-s:l3-te" {
        description "Augment only for L3 TE topology";
      }
      description "Augment termination point configuration";
      uses l3tet:l3-te-tp-attributes;
    }

    augment "/nw-s:networks/nw-s:network/nt-s:link/"
      + "l3t-s:l3-link-attributes" {
      when "../../nw-s:network-types/l3t-s:l3-unicast-topology/"
        + "l3tet-s:l3-te" {
        description "Augment only for L3 TE topology";
      }
      description "Augment link configuration";
      uses l3tet:l3-te-link-attributes;
    }
  }
```

```
<CODE ENDS>
```

A.2. Packet Switching TE Topology State Module

```
<CODE BEGINS> file "ietf-te-topology-packet-state@2018-06-22.yang"
module ietf-te-topology-packet-state {
  yang-version 1.1;
  namespace
    "urn:ietf:params:xml:ns:yang:ietf-te-topology-packet-state";

  prefix "tet-pkt-s";

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

  import ietf-network-state {
    prefix "nw-s";
    reference "RFC 8345: A YANG Data Model for Network Topologies";
  }

  import ietf-network-topology-state {
    prefix "nt-s";
    reference "RFC 8345: A YANG Data Model for Network Topologies";
  }

  import ietf-te-topology-state {
    prefix "tet-s";
    reference
      "I-D.ietf-teas-yang-te-topo: YANG Data Model for Traffic
       Engineering (TE) Topologies";
  }

  import ietf-te-types {
    prefix "te-types";
    reference
      "I-D.ietf-teas-yang-te: A YANG Data Model for Traffic
       Engineering Tunnels and Interfaces";
  }

  organization
    "Traffic Engineering Architecture and Signaling (TEAS)
     Working Group";

  contact
```

```
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     description
       "YANG data model for representing operational state information
        of PSC (Packet Switching) TE Topologies, when NMDA is not
         supported.

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        authors of the code.  All rights reserved.

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

     revision 2018-06-22 {
       description "Initial revision";
       reference "RFC XXXX: YANG Data Model for Layer 3 TE Topologies";
     }

     /*
      * Augmentations
      */
     /* Augmentations to connectivity-matrix */
```

```
     augment "/nw-s:networks/nw-s:network/nw-s:node/tet-s:te/"
       + "tet-s:te-node-attributes/tet-s:connectivity-matrices" {
       description
         "Parameters for PSC (Packet Switching) TE topology.";
       uses te-types:performance-metric-container {
         if-feature tet-pkt:te-performance-metric;
       }
     }

     augment "/nw-s:networks/nw-s:network/nw-s:node/tet-s:te/"
           + "tet-s:te-node-attributes/tet-s:connectivity-matrices/"
           + "tet-s:connectivity-matrix" {
       description
         "Parameters for PSC TE topology.";
       uses te-types:performance-metric-container {
         if-feature tet-pkt:te-performance-metric;
       }
     }

     augment "/nw-s:networks/nw-s:network/nw-s:node/tet-s:te/"
           + "tet-s:information-source-entry/"
           + "tet-s:connectivity-matrices" {
       description
         "Parameters for PSC TE topology.";
       uses te-types:performance-metric-container {
         if-feature tet-pkt:te-performance-metric;
       }
     }

     augment "/nw-s:networks/nw-s:network/nw-s:node/tet-s:te/"
           + "tet-s:information-source-entry/"
           + "tet-s:connectivity-matrices/"
           + "tet-s:connectivity-matrix" {
       description
         "Parameters for PSC TE topology.";
       uses te-types:performance-metric-container {
         if-feature tet-pkt:te-performance-metric;
       }
     }

     /* Augmentations to tunnel-termination-point */
     augment "/nw-s:networks/nw-s:network/nw-s:node/tet-s:te/"
           + "tet-s:tunnel-termination-point/"
           + "tet-s:local-link-connectivities" {
       description
         "Parameters for PSC TE topology.";
       uses te-types:performance-metric-container {
         if-feature tet-pkt:te-performance-metric;
```

```
      }
    }

    augment "/nw-s:networks/nw-s:network/nw-s:node/tet-s:te/"
          + "tet-s:tunnel-termination-point/"
          + "tet-s:local-link-connectivities/"
          + "tet-s:local-link-connectivity" {
      description
        "Parameters for PSC TE topology.";
      uses te-types:performance-metric-container {
        if-feature tet-pkt:te-performance-metric;
      }
    }

    /* Augmentations to te-link-attributes */
    augment "/nw-s:networks/tet-s:te/tet-s:templates/"
          + "tet-s:link-template/tet-s:te-link-attributes" {
      when "tet-s:interface-switching-capability "
        + "[tet-s:switching-capability = 'te-types:switching-psc1']" {
        description "Valid only for PSC";
      }
      description
        "Parameters for PSC TE topology.";
      uses te-types:performance-metric-container {
        if-feature tet-pkt:te-performance-metric;
      }
    }

    augment "/nw-s:networks/nw-s:network/nt-s:link/tet-s:te/"
          + "tet-s:te-link-attributes" {
      when "tet-s:interface-switching-capability "
        + "[tet-s:switching-capability = 'te-types:switching-psc1']" {
        description "Valid only for PSC";
      }
      description
        "Parameters for PSC TE topology.";
      uses te-types:performance-metric-container {
        if-feature tet-pkt:te-performance-metric;
      }
    }

    augment "/nw-s:networks/nw-s:network/nt-s:link/tet-s:te/"
          + "tet-s:information-source-entry" {
      when "tet-s:interface-switching-capability "
        + "[tet-s:switching-capability = 'te-types:switching-psc1']" {
        description "Valid only for PSC";
      }
      description
```

```
        "Parameters for PSC TE topology.";
      uses te-types:performance-metric-container {
        if-feature tet-pkt:te-performance-metric;
      }
    }

    /* Augmentations to interface-switching-capability */
    augment "/nw-s:networks/tet-s:te/tet-s:templates/"
          + "tet-s:link-template/tet-s:te-link-attributes/"
          + "tet-s:interface-switching-capability" {
      when "tet-s:switching-capability = 'te-types:switching-psc1' " {
        description "Valid only for PSC";
      }
      description
        "Parameters for PSC TE topology.";
      uses tet-pkt:packet-switch-capable-container;
    }

    augment "/nw-s:networks/nw-s:network/nt-s:link/tet-s:te/"
          + "tet-s:te-link-attributes/"
          + "tet-s:interface-switching-capability" {
      when "tet-s:switching-capability = 'te-types:switching-psc1' " {
        description "Valid only for PSC";
      }
      description
        "Parameters for PSC TE topology.";
      uses tet-pkt:packet-switch-capable-container;
    }

    augment "/nw-s:networks/nw-s:network/nt-s:link/tet-s:te/"
          + "tet-s:information-source-entry/"
          + "tet-s:interface-switching-capability" {
      when "tet-s:switching-capability = 'te-types:switching-psc1' " {
        description "Valid only for PSC";
      }
      description
        "Parameters for PSC TE topology.";
      uses tet-pkt:packet-switch-capable-container;
    }
  }
  <CODE ENDS>
```

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