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A YANG Data Model for Flexi-Grid Optical Networks  
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## Abstract

This document defines a YANG module for managing flexi-grid optical networks. The model defined in this document specifies a flexi-grid traffic engineering database that is used to describe the topology of a flexi-grid network. It is based on and augments existing YANG models that describe network and traffic engineering topologies.

The YANG data model defined in this document conforms to the Network Management Datastore Architecture (NMDA).

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Internet-Draft

Flexi-Grid YANG

July 2021

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[1.](#) Introduction

The flexible grid (flexi-grid) optical network technology defined by the International Telecommunication Union Telecommunication Standardization Sector (ITU-T) and documented in Recommendation

G.694.1 [[G.694.1](#)] and G.872 [[G.872](#)] provides an enhanced Dense Wavelength Division Multiplexing (DWDM) grid by defining a set of nominal central frequencies, slot widths, and the concept of the "frequency slot". This technology increases both transport network

scalability and flexibility, allowing the optimization of bandwidth usage.

[RFC7698] provides a framework for GMPLS-Based control of flexi-grid DWDM networks while [[RFC7699](#)] defines generalized labels for the use of GMPLS in flexi-grid networks.

This document presents a YANG data model [[RFC7950](#)] for flexi-grid objects in the dynamic optical network, including nodes, transponders and links, as well as how such links interconnect nodes.

This document identifies the flexi-grid components, parameters and their values, characterizes the features and the performances of the flexi-grid elements. For this, it augments [[RFC8795](#)], and imports the generic Layer 0 types and use of "media-channel" defined in [[I-D.ietf-ccamp-layer0-types](#)].

An application example in [Section 4](#) is also provided to better understand the utility of this YANG model.

A partner document defines a second YANG module that described flexi-grid tunnels, i.e., the paths from source to destination through a number of intermediate nodes [[I-D.ietf-ccamp-flexigrid-media-channel-yang](#)].

Impairment-aware traffic engineering topology is described in [[I-D.ietf-ccamp-optical-impairment-topology-yang](#)].

The YANG data model defined in this document conforms to the Network Management Datastore Architecture (NMDA) [[RFC8342](#)].

## [2.](#) Terminology

Refer to [[RFC7698](#)] and [[RFC7699](#)] for the key terms used in this document.

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

- o client
- o server
- o augment
- o data model
- o data node

The following terms are defined in [[RFC6241](#)] and are not redefined here:

- o configuration data
- o state data

The terminology for describing YANG data models is found in [[RFC7950](#)].

### [3.](#) Tree Diagram

A simplified graphical representation of the data model is used in this document. The meaning of the symbols in these diagrams is defined in [[RFC8340](#)].

#### [3.1.](#) Prefixes in Data Node Names

In this document, names of data nodes and other data model objects are prefixed using the standard prefix associated with the corresponding YANG imported modules, as shown in Figure 1. It uses prefixes from [[I-D.ietf-ccamp-layer0-types](#)], [[RFC8345](#)], and [[RFC8795](#)].

Prefix	YANG module	Reference
l0-types	ietf-layer0-types	[RFCXXXX]

flexgt	ietf-flexi-grid-topology	[RFCYYYY]
nw	ietf-network	[RFC8345]
nt	ietf-network-topology	[RFC8345]
tet	ietf-te-topology	[RFC8795]

Figure 1: Prefixes and Corresponding YANG modules

RFC Editor Note: Please replace XXXX with the RFC numbers assigned to [I-D.ietf-ccamp-layer0-types]. Please replace YYYY with the RFC number assigned to this document. Please remove this note.

#### 4. Example of Use

In order to explain how this model is used, we provide the following example. An optical network usually has multiple transponders, switches (nodes) and links. Figure 1 shows a simple topology.

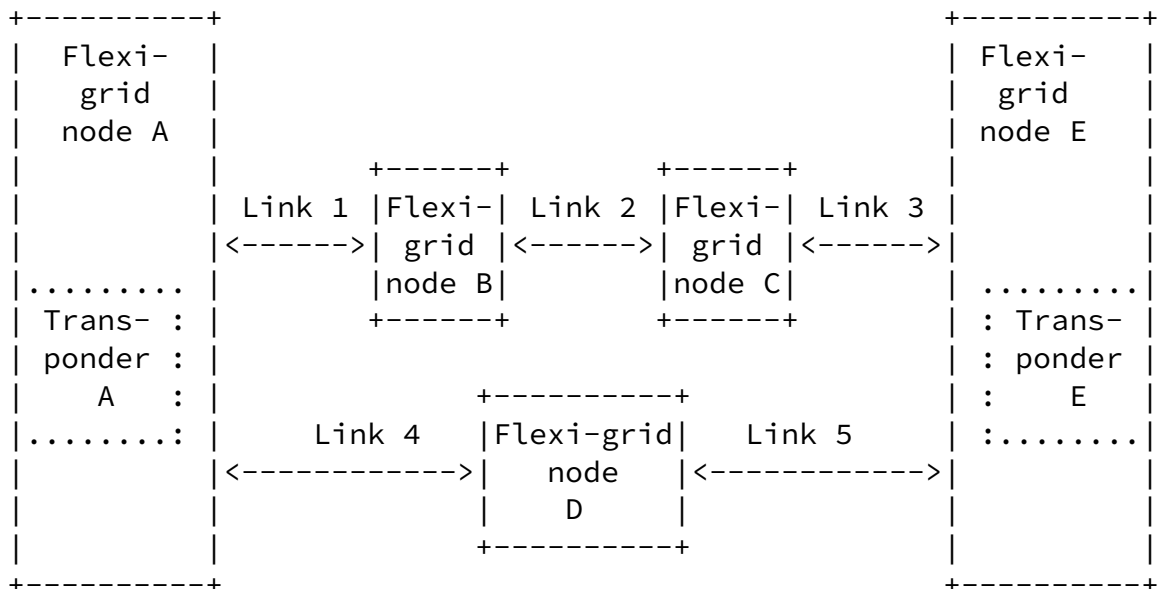


Figure 2: Topology Example

In order to configure a network media channel to interconnect transponders A and E, first of all we have to populate the flexi-grid topology YANG model with all elements in the network:

- o We define the transponders within nodes A and E as tunnel termination points (TTPs) and provide their internal local link connectivity towards the node interfaces. We also provide nodes A and B identifiers, addresses and interfaces.
- o We do the same for the nodes B, C and D, providing their identifiers, addresses and interfaces, as well as the internal connectivity matrix between interfaces.
- o Then, we also define the links 1 to 5 that interconnect nodes, indicating which flexi-grid labels are available.
- o Other information, such as the slot frequency and granularity are also provided.

## [5.](#) YANG Data Model for Flexi-Grid Topology

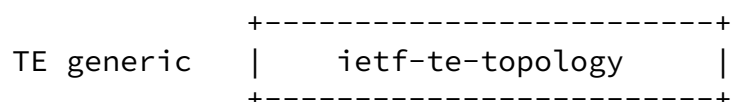
### [5.1.](#) Flexi-Grid Topology Data Model Overview

This document aims to describe the data model for Flexi-Grid topology. As a classic Traffic-engineering (TE) technology, Flexi-Grid provide WDM switching in transport network. Therefore the YANG

module presented in this document augments from a more generic Traffic Engineered (TE) network topology data model, i.e., the ietf-te-topology, as specified in [[RFC8795](#)], following the guidelines provided in [section 6 of \[RFC8795\]](#).

Common types, identities and groupings defined in [[I-D.ietf-ccamp-layer0-types](#)] are reused in this document.

The figure below shows the augmentation relationship between YANG models.



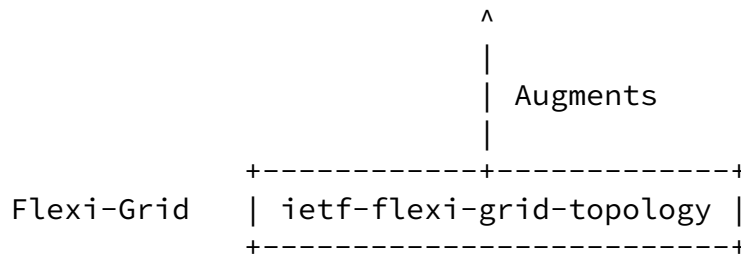


Figure 3: Relationship between Flexi-Grid and TE topology models

The entities and TE attributes, such as node, termination points and links, are still applicable for describing an Flexi-Grid topology and the model presented in this document only specifies with technology-specific attributes/information.

The Flexi-Grid specific attributes in [RFC7699], including the grid type, channel spacing, slot width granularity, n and m parameters, can be used to represent the label information. These attributes have been specified in [I-D.ietf-ccamp-layer0-types], and used in this document for augmentation of the generic TE topology model.

The YANG module `ietf-flexi-grid-topology` defined in this document conforms to the Network Management Datastore Architecture (NMDA) defined in [RFC8342].

## 5.2. Attributes Augmentation

There are a few characteristics augmenting to the generic TE topology.

Following the guidelines in [RFC8795], a `flexi-grid-topology` network-type is specified as the indicator of Flexi-Grid in the topology as follows.

```

augment /nw:networks/nw:network/nw:network-types/tet:te-topology:
  +--rw flexi-grid-topology!
  
```

Figure 4: Flexi-Grid Topology Augmentation

A flexi-grid-node presence container is specified, augmenting the generic TE node attributes, to indicate that the TE node is a Flexi-Grid node

```
augment /nw:networks/nw:network/nw:node/tet:te
      /tet:te-node-attributes:
      +--rw flexi-grid-node!
```

Figure 5: Flex-Grid Node Augmentation

It is assumed that all the Flexi-Grid nodes are reconfigurable.

### [5.3.](#) Bandwidth Augmentation

As described in [Section 4.2 of \[RFC7699\]](#), there is some overlap between bandwidth and label in layer0.

The flexi-grid label resource information described in [section 5.4](#), is sufficient to describe also the spectrum resources within a flexi-grid network. Therefore, the model does not define any augmentation for the te-bandwidth containers defined in [\[RFC8795\]](#).

### [5.4.](#) Label Augmentation

The model augments all the occurrences of the label-restriction list with flexi-grid technology specific attributes using the flexi-grid-label-range-info grouping defined in [\[I-D.ietf-ccamp-layer0-types\]](#).

The Flexi-Grid label resource information described in [section 5.4](#), is sufficient to describe also the spectrum resources within a flexi-Grid network. Therefore, the YANG model does not define any



[[I-D.ietf-ccamp-layer0-types](#)].

Moreover, following the guidelines in [[RFC8795](#)], the model augments all the occurrences of the te-label container with the flexi-Grid technology specific attributes using the flexi-grid-label-start-end, flexi-grid-label-hop and flexi-grid-label-step groupings defined in [[I-D.ietf-ccamp-layer0-types](#)].

## 6. YANG Model (Tree Structure) for Flexi-Grid Topology

```
module: ietf-flexi-grid-topology
  augment /nw:networks/nw:network/nw:network-types/tet:te-topology:
    +--rw flexi-grid-topology!
  augment /nw:networks/nw:network/nw:node/tet:te
    /tet:te-node-attributes:
    +--rw flexi-grid-node!
  augment /nw:networks/nw:network/nw:node/tet:te
    /tet:te-node-attributes/tet:connectivity-matrices
    /tet:label-restrictions/tet:label-restriction:
    +--rw grid-type?      identityref
    +--rw priority?      uint8
    +--rw flexi-grid
      +--rw slot-width-granularity?  identityref
      +--rw min-slot-width-factor?   uint16
      +--rw max-slot-width-factor?   uint16
  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 grid-type?      identityref
    +--rw priority?      uint8
    +--rw flexi-grid
      +--rw slot-width-granularity?  identityref
      +--rw min-slot-width-factor?   uint16
      +--rw max-slot-width-factor?   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 grid-type?      identityref
    +--rw priority?      uint8
    +--rw flexi-grid
      +--rw slot-width-granularity?  identityref
      +--rw min-slot-width-factor?   uint16
      +--rw max-slot-width-factor?   uint16
  augment /nw:networks/nw:network/nw:node/tet:te
```

---

```
        /tet:information-source-entry/tet:connectivity-matrices
        /tet:label-restrictions/tet:label-restriction:
+---ro grid-type?      identityref
+---ro priority?      uint8
+---ro flexi-grid
    +---ro slot-width-granularity?  identityref
    +---ro min-slot-width-factor?   uint16
    +---ro max-slot-width-factor?   uint16
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 grid-type?      identityref
+---ro priority?      uint8
+---ro flexi-grid
    +---ro slot-width-granularity?  identityref
    +---ro min-slot-width-factor?   uint16
    +---ro max-slot-width-factor?   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 grid-type?      identityref
+---ro priority?      uint8
+---ro flexi-grid
    +---ro slot-width-granularity?  identityref
    +---ro min-slot-width-factor?   uint16
    +---ro max-slot-width-factor?   uint16
augment /nw:networks/nw:network/nw:node/tet:te
        /tet:tunnel-termination-point
        /tet:local-link-connectivities/tet:label-restrictions
        /tet:label-restriction:
+---rw grid-type?      identityref
+---rw priority?      uint8
+---rw flexi-grid
    +---rw slot-width-granularity?  identityref
    +---rw min-slot-width-factor?   uint16
    +---rw max-slot-width-factor?   uint16
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 grid-type?      identityref
+---rw priority?      uint8
+---rw flexi-grid
```

```

+--rw slot-width-granularity?  identityref
+--rw min-slot-width-factor?    uint16

```

```

+--rw max-slot-width-factor?    uint16
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:te-link-attributes/tet:label-restrictions
  /tet:label-restriction:
+--rw grid-type?                identityref
+--rw priority?                  uint8
+--rw flexi-grid
  +--rw slot-width-granularity?  identityref
  +--rw min-slot-width-factor?    uint16
  +--rw max-slot-width-factor?    uint16
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:information-source-entry/tet:label-restrictions
  /tet:label-restriction:
+--ro grid-type?                identityref
+--ro priority?                  uint8
+--ro flexi-grid
  +--ro slot-width-granularity?  identityref
  +--ro min-slot-width-factor?    uint16
  +--ro max-slot-width-factor?    uint16
augment /nw:networks/tet:te/tet:templates/tet:link-template
  /tet:te-link-attributes/tet:label-restrictions
  /tet:label-restriction:
+--rw grid-type?                identityref
+--rw priority?                  uint8
+--rw flexi-grid
  +--rw slot-width-granularity?  identityref
  +--rw min-slot-width-factor?    uint16
  +--rw max-slot-width-factor?    uint16
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:
+--:(flexi-grid)
  +--rw flexi-n?                 l0-types:flexi-n
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:
+--:(flexi-grid)

```

```

    +--rw flexi-n?    l0-types:flexi-n
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:
+--:(flexi-grid)
    +--rw flexi-grid-channel-spacing?  identityref
    +--rw flexi-n-step?                 uint8
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:
+--:(flexi-grid)
    +--rw (single-or-super-channel)?
        +--:(single)
        | +--rw flexi-n?                l0-types:flexi-n
        | +--rw flexi-m?                l0-types:flexi-m
        +--:(super)
        +--rw subcarrier-flexi-n* [flexi-n]
        +--rw flexi-n    l0-types:flexi-n
        +--rw flexi-m?  l0-types:flexi-m
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:
+--:(flexi-grid)
    +--rw (single-or-super-channel)?
        +--:(single)
        | +--rw flexi-n?                l0-types:flexi-n
        | +--rw flexi-m?                l0-types:flexi-m
        +--:(super)
        +--rw subcarrier-flexi-n* [flexi-n]
        +--rw flexi-n    l0-types:flexi-n
        +--rw flexi-m?  l0-types:flexi-m
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:

```

```

+---:(flexi-grid)
  +---rw (single-or-super-channel)?
    +---:(single)
      | +---rw flexi-n?           l0-types:flexi-n
      | +---rw flexi-m?           l0-types:flexi-m
    +---:(super)
      +---rw subcarrier-flexi-n* [flexi-n]
        +---rw flexi-n           l0-types:flexi-n
        +---rw flexi-m?          l0-types:flexi-m
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:

```

```

+---:(flexi-grid)
  +---rw (single-or-super-channel)?
    +---:(single)
      | +---rw flexi-n?           l0-types:flexi-n
      | +---rw flexi-m?           l0-types:flexi-m
    +---:(super)
      +---rw subcarrier-flexi-n* [flexi-n]
        +---rw flexi-n           l0-types:flexi-n
        +---rw flexi-m?          l0-types:flexi-m
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:
+---:(flexi-grid)
  +---ro (single-or-super-channel)?
    +---:(single)
      | +---ro flexi-n?           l0-types:flexi-n
      | +---ro flexi-m?           l0-types:flexi-m
    +---:(super)
      +---ro subcarrier-flexi-n* [flexi-n]
        +---ro flexi-n           l0-types:flexi-n
        +---ro flexi-m?          l0-types:flexi-m
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:
+--:(flexi-grid)
  +--rw flexi-n?   l0-types:flexi-n
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:
+--:(flexi-grid)
  +--rw flexi-n?   l0-types:flexi-n
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:
+--:(flexi-grid)
  +--rw flexi-grid-channel-spacing?  identityref
  +--rw flexi-n-step?                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:
+--:(flexi-grid)
  +--rw flexi-n?   l0-types:flexi-n
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:
+--:(flexi-grid)
  +--rw flexi-n?   l0-types:flexi-n
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:
+--:(flexi-grid)
  +--rw flexi-grid-channel-spacing?  identityref
  +--rw flexi-n-step?                uint8
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:
+--:(flexi-grid)
  +--rw (single-or-super-channel)?
    +--:(single)
    | +--rw flexi-n?          l0-types:flexi-n
    | +--rw flexi-m?          l0-types:flexi-m
    +--:(super)
      +--rw subcarrier-flexi-n* [flexi-n]
      +--rw flexi-n          l0-types:flexi-n
      +--rw flexi-m?          l0-types:flexi-m
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:
+--:(flexi-grid)
  +--rw (single-or-super-channel)?
    +--:(single)
    | +--rw flexi-n?          l0-types:flexi-n
    | +--rw flexi-m?          l0-types:flexi-m
    +--:(super)
      +--rw subcarrier-flexi-n* [flexi-n]
      +--rw flexi-n          l0-types:flexi-n
      +--rw flexi-m?          l0-types:flexi-m
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:
+--:(flexi-grid)
  +--rw (single-or-super-channel)?
    +--:(single)
    | +--rw flexi-n?          l0-types:flexi-n
    | +--rw flexi-m?          l0-types:flexi-m
    +--:(super)
      +--rw subcarrier-flexi-n* [flexi-n]

```

```

        +--rw flexi-n      l0-types:flexi-n
        +--rw flexi-m?    l0-types:flexi-m
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:
+---:(flexi-grid)
    +--rw (single-or-super-channel)?
        +---:(single)
        |   +--rw flexi-n?          l0-types:flexi-n
        |   +--rw flexi-m?          l0-types:flexi-m
        +---:(super)
            +--rw subcarrier-flexi-n* [flexi-n]
            +--rw flexi-n      l0-types:flexi-n
            +--rw flexi-m?    l0-types:flexi-m
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:
+---:(flexi-grid)
    +--ro (single-or-super-channel)?
        +---:(single)
        |   +--ro flexi-n?          l0-types:flexi-n
        |   +--ro flexi-m?          l0-types:flexi-m
        +---:(super)
            +--ro subcarrier-flexi-n* [flexi-n]
            +--ro flexi-n      l0-types:flexi-n
            +--ro flexi-m?    l0-types:flexi-m
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:
+---:(flexi-grid)

```

```

    +--ro flexi-n?      l0-types:flexi-n
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:
+---:(flexi-grid)
    +---ro flexi-n?    l0-types:flexi-n
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:
+---:(flexi-grid)
    +---ro flexi-grid-channel-spacing?    identityref
    +---ro flexi-n-step?                  uint8
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:
+---:(flexi-grid)
    +---ro (single-or-super-channel)?
        +---:(single)
        | +---ro flexi-n?                l0-types:flexi-n
        | +---ro flexi-m?                l0-types:flexi-m
        +---:(super)
            +---ro subcarrier-flexi-n* [flexi-n]
            +---ro flexi-n    l0-types:flexi-n
            +---ro flexi-m?    l0-types:flexi-m
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:
+---:(flexi-grid)
    +---ro (single-or-super-channel)?
        +---:(single)
        | +---ro flexi-n?                l0-types:flexi-n
        | +---ro flexi-m?                l0-types:flexi-m
        +---:(super)
            +---ro subcarrier-flexi-n* [flexi-n]
            +---ro flexi-n    l0-types:flexi-n
            +---ro flexi-m?    l0-types:flexi-m
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:
+---:(flexi-grid)

```

```

    +---ro (single-or-super-channel)?
      +---:(single)
        | +---ro flexi-n?          l0-types:flexi-n
        | +---ro flexi-m?          l0-types:flexi-m
      +---:(super)
        +---ro subcarrier-flexi-n* [flexi-n]
          +---ro flexi-n    l0-types:flexi-n
          +---ro flexi-m?   l0-types:flexi-m
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:
+---:(flexi-grid)
  +---ro (single-or-super-channel)?
    +---:(single)
      | +---ro flexi-n?          l0-types:flexi-n
      | +---ro flexi-m?          l0-types:flexi-m
    +---:(super)
      +---ro subcarrier-flexi-n* [flexi-n]
        +---ro flexi-n    l0-types:flexi-n
        +---ro flexi-m?   l0-types:flexi-m
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:
+---:(flexi-grid)
  +---ro (single-or-super-channel)?
    +---:(single)
      | +---ro flexi-n?          l0-types:flexi-n
      | +---ro flexi-m?          l0-types:flexi-m
    +---:(super)
      +---ro subcarrier-flexi-n* [flexi-n]
        +---ro flexi-n    l0-types:flexi-n
        +---ro flexi-m?   l0-types:flexi-m
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:
+---:(flexi-grid)
  +---ro flexi-n?    l0-types:flexi-n
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:information-source-entry/tet:connectivity-matrices

```

```

    /tet:label-restriction/tet:label-end/tet:te-label
    /tet:technology:
+--:(flexi-grid)
  +--ro flexi-n?  l0-types:flexi-n
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:
+--:(flexi-grid)
  +--ro flexi-grid-channel-spacing?  identityref
  +--ro flexi-n-step?                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:
+--:(flexi-grid)
  +--ro flexi-n?  l0-types:flexi-n
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:
+--:(flexi-grid)
  +--ro flexi-n?  l0-types:flexi-n
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:
+--:(flexi-grid)
  +--ro flexi-grid-channel-spacing?  identityref
  +--ro flexi-n-step?                uint8
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:
+--:(flexi-grid)
  +--ro (single-or-super-channel)?
    +--:(single)
```

```

    | +--ro flexi-n?          l0-types:flexi-n
    | +--ro flexi-m?          l0-types:flexi-m
+---:(super)
    +--ro subcarrier-flexi-n* [flexi-n]
        +--ro flexi-n      l0-types:flexi-n
        +--ro flexi-m?     l0-types:flexi-m
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:
+---:(flexi-grid)
    +--ro (single-or-super-channel)?
        +---:(single)
            | +--ro flexi-n?          l0-types:flexi-n
            | +--ro flexi-m?          l0-types:flexi-m
        +---:(super)
            +--ro subcarrier-flexi-n* [flexi-n]
                +--ro flexi-n      l0-types:flexi-n
                +--ro flexi-m?     l0-types:flexi-m
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:
+---:(flexi-grid)
    +--ro (single-or-super-channel)?
        +---:(single)
            | +--ro flexi-n?          l0-types:flexi-n
            | +--ro flexi-m?          l0-types:flexi-m
        +---:(super)
            +--ro subcarrier-flexi-n* [flexi-n]
                +--ro flexi-n      l0-types:flexi-n
                +--ro flexi-m?     l0-types:flexi-m
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:
+---:(flexi-grid)
  +---ro (single-or-super-channel)?
    +---:(single)
      | +---ro flexi-n?          l0-types:flexi-n
      | +---ro flexi-m?          l0-types:flexi-m
    +---:(super)
      +---ro subcarrier-flexi-n* [flexi-n]
        +---ro flexi-n          l0-types:flexi-n
        +---ro flexi-m?          l0-types:flexi-m
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:
+---:(flexi-grid)
  +---ro (single-or-super-channel)?
    +---:(single)
      | +---ro flexi-n?          l0-types:flexi-n
      | +---ro flexi-m?          l0-types:flexi-m
    +---:(super)
      +---ro subcarrier-flexi-n* [flexi-n]
        +---ro flexi-n          l0-types:flexi-n
        +---ro flexi-m?          l0-types:flexi-m
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:
+---:(flexi-grid)
  +---rw flexi-n?          l0-types:flexi-n
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:
+---:(flexi-grid)
  +---rw flexi-n?          l0-types:flexi-n
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:
+---:(flexi-grid)
    +--rw flexi-grid-channel-spacing?  identityref
    +--rw flexi-n-step?                 uint8
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:
+---:(flexi-grid)
    +--rw (single-or-super-channel)?
        +---:(single)
        |   +--rw flexi-n?             l0-types:flexi-n
        |   +--rw flexi-m?             l0-types:flexi-m
        +---:(super)
            +--rw subcarrier-flexi-n* [flexi-n]
                +--rw flexi-n         l0-types:flexi-n
                +--rw flexi-m?         l0-types:flexi-m
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:
+---:(flexi-grid)
    +--rw (single-or-super-channel)?
        +---:(single)
        |   +--rw flexi-n?             l0-types:flexi-n
        |   +--rw flexi-m?             l0-types:flexi-m
        +---:(super)
            +--rw subcarrier-flexi-n* [flexi-n]
                +--rw flexi-n         l0-types:flexi-n
                +--rw flexi-m?         l0-types:flexi-m
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:
+---:(flexi-grid)

```

```

    +--rw (single-or-super-channel)?
      +--:(single)
        | +--rw flexi-n?          l0-types:flexi-n
        | +--rw flexi-m?          l0-types:flexi-m
      +--:(super)
        +--rw subcarrier-flexi-n* [flexi-n]
          +--rw flexi-n          l0-types:flexi-n
          +--rw flexi-m?          l0-types:flexi-m
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:
+--:(flexi-grid)
  +--rw (single-or-super-channel)?
    +--:(single)
      | +--rw flexi-n?          l0-types:flexi-n
      | +--rw flexi-m?          l0-types:flexi-m
    +--:(super)
      +--rw subcarrier-flexi-n* [flexi-n]
        +--rw flexi-n          l0-types:flexi-n
        +--rw flexi-m?          l0-types:flexi-m
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:

```

```

+--:(flexi-grid)
  +--ro (single-or-super-channel)?
    +--:(single)
      | +--ro flexi-n?          l0-types:flexi-n
      | +--ro flexi-m?          l0-types:flexi-m
    +--:(super)
      +--ro subcarrier-flexi-n* [flexi-n]
        +--ro flexi-n          l0-types:flexi-n
        +--ro flexi-m?          l0-types:flexi-m
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:
+---:(flexi-grid)
    +--rw flexi-n?    l0-types:flexi-n
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:
+---:(flexi-grid)
    +--rw flexi-n?    l0-types:flexi-n
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:
+---:(flexi-grid)
    +--rw flexi-grid-channel-spacing?  identityref
    +--rw flexi-n-step?                uint8
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:
+---:(flexi-grid)
    +--rw (single-or-super-channel)?
        +---:(single)
            | +--rw flexi-n?          l0-types:flexi-n
            | +--rw flexi-m?          l0-types:flexi-m
        +---:(super)
            +---rw subcarrier-flexi-n* [flexi-n]
                +---rw flexi-n    l0-types:flexi-n
                +---rw flexi-m?   l0-types:flexi-m

```

```

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:
+---:(flexi-grid)
  +--rw (single-or-super-channel)?
    +---:(single)
      | +--rw flexi-n?           l0-types:flexi-n
      | +--rw flexi-m?           l0-types:flexi-m
    +---:(super)
      +--rw subcarrier-flexi-n* [flexi-n]
        +--rw flexi-n           l0-types:flexi-n
        +--rw flexi-m?          l0-types:flexi-m
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:
+---:(flexi-grid)
  +--rw (single-or-super-channel)?
    +---:(single)
      | +--rw flexi-n?           l0-types:flexi-n
      | +--rw flexi-m?           l0-types:flexi-m
    +---:(super)
      +--rw subcarrier-flexi-n* [flexi-n]
        +--rw flexi-n           l0-types:flexi-n
        +--rw flexi-m?          l0-types:flexi-m
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:
+---:(flexi-grid)
  +--rw (single-or-super-channel)?
    +---:(single)
      | +--rw flexi-n?           l0-types:flexi-n
      | +--rw flexi-m?           l0-types:flexi-m
    +---:(super)
      +--rw subcarrier-flexi-n* [flexi-n]
        +--rw flexi-n           l0-types:flexi-n

```

```

        +---rw flexi-m?    l0-types:flexi-m
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:
+---:(flexi-grid)
    +---ro (single-or-super-channel)?
        +---:(single)
        |   +---ro flexi-n?          l0-types:flexi-n
        |   +---ro flexi-m?          l0-types:flexi-m
        +---:(super)
            +---ro subcarrier-flexi-n* [flexi-n]
            +---ro flexi-n    l0-types:flexi-n
            +---ro flexi-m?    l0-types:flexi-m
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:
+---:(flexi-grid)
    +---rw (single-or-super-channel)?
        +---:(single)
        |   +---rw flexi-n?          l0-types:flexi-n
        |   +---rw flexi-m?          l0-types:flexi-m
        +---:(super)
            +---rw subcarrier-flexi-n* [flexi-n]
            +---rw flexi-n    l0-types:flexi-n
            +---rw flexi-m?    l0-types:flexi-m
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:
+---:(flexi-grid)
    +---rw (single-or-super-channel)?
        +---:(single)
        |   +---rw flexi-n?          l0-types:flexi-n
        |   +---rw flexi-m?          l0-types:flexi-m
        +---:(super)
            +---rw subcarrier-flexi-n* [flexi-n]
            +---rw flexi-n    l0-types:flexi-n
            +---rw flexi-m?    l0-types:flexi-m
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:
+---:(flexi-grid)
    +---rw flexi-n?    l0-types:flexi-n

```

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```

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:
+--:(flexi-grid)
  +--rw flexi-n?   l0-types:flexi-n
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:te-link-attributes/tet:label-restrictions
  /tet:label-restriction/tet:label-step/tet:technology:
+--:(flexi-grid)
  +--rw flexi-grid-channel-spacing?  identityref
  +--rw flexi-n-step?                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:
+--:(flexi-grid)
  +--ro flexi-n?   l0-types:flexi-n
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:
+--:(flexi-grid)
  +--ro flexi-n?   l0-types:flexi-n
augment /nw:networks/nw:network/nt:link/tet:te
  /tet:information-source-entry/tet:label-restrictions
  /tet:label-restriction/tet:label-step/tet:technology:
+--:(flexi-grid)
  +--ro flexi-grid-channel-spacing?  identityref
  +--ro flexi-n-step?                uint8
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:
+--:(flexi-grid)
  +--rw (single-or-super-channel)?
    +--:(single)
    | +--rw flexi-n?                l0-types:flexi-n
    | +--rw flexi-m?                l0-types:flexi-m
    +--:(super)
    +--rw subcarrier-flexi-n* [flexi-n]
    +--rw flexi-n   l0-types:flexi-n

```

```

        +--rw flexi-m?    l0-types:flexi-m
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:
+--:(flexi-grid)

```

```

        +--rw (single-or-super-channel)?
        +--:(single)
        |   +--rw flexi-n?          l0-types:flexi-n
        |   +--rw flexi-m?          l0-types:flexi-m
        +--:(super)
        +--rw subcarrier-flexi-n* [flexi-n]
        +--rw flexi-n    l0-types:flexi-n
        +--rw flexi-m?   l0-types:flexi-m
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:
+--:(flexi-grid)
        +--rw flexi-n?    l0-types:flexi-n
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:
+--:(flexi-grid)
        +--rw flexi-n?    l0-types:flexi-n
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:
+--:(flexi-grid)
        +--rw flexi-grid-channel-spacing?  identityref
        +--rw flexi-n-step?                 uint8

```

## [7.](#) The YANG Code for Flexi-grid topology

```

<CODE BEGINS> file "ietf-flexi-grid-topology@2020-02-22.yang"
module ietf-flexi-grid-topology {
  yang-version 1.1;

```

```
namespace "urn:ietf:params:xml:ns:yang:ietf-flexi-grid-topology";
prefix "flexgt";

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-te-topology {
  prefix "tet";
  reference
    "RFC 8795: YANG Data Model for Traffic Engineering
    (TE) Topologies";
}

import ietf-layer0-types {
  prefix "l0-types";
  reference
    "RFC XXXX: A YANG Data Model for Layer 0 Types";
}
```

/\* Note: The RFC Editor will replace XXXX with the number assigned  
to the RFC once [draft-ietf-ccamp-layer0-types](#) becomes an RFC.\*/

```
organization
  "IETF CCAMP Working Group";
contact
  "WG Web: <http://tools.ietf.org/wg/ccamp/>
  WG List: <mailto:ccamp@ietf.org>
  Editor: Jorge E. Lopez de Vergara
         <mailto:jorge.lopez\_vergara@uam.es>
  Editor: Daniel Perdices
         <mailto:daniel.perdices@uam.es>
  Editor: Haomian Zheng
```

```
        <mailto:zhenghaomian@huawei.com>
Editor: Daniel King
        <mailto:d.king@lancaster.ac.uk>
Editor: Young Lee
        <mailto:younglee.tx@gmail.com>";
```

description

"This module provides a YANG data model for the routing and wavelength assignment (RWA) Traffic Engineering (TE) topology in flexi-grid optical networks. The YANG model described in this document is a flexi-grid technology-specific YANG model augmenting the generic TE topology module (ietf-te-topology, [RFC 9795](#)) based on the [RFC 7698](#) and 7699. Copyright (c) 2020 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

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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 2020-02-22 {
  description
    "Initial Version";
  reference
    "RFC XXXX: A YANG Data Model for Flexi-Grid Optical Networks";
  // RFC Ed.: replace XXXX with actual RFC number, update date
  // information and remove this note
}

/*
 * Data nodes
 */

augment "/nw:networks/nw:network/nw:network-types"
  + "/tet:te-topology" {
  description
```

```

    "Augment network types to define flexi-grid topology type.";
  container flexi-grid-topology {
    presence
      "Its presence identifies the flexi-grid topology type.";
    description
      "Introduce new network type for flexi-grid topology.";
  }
}

augment "/nw:networks/nw:network/nw:node/tet:te"
  + "/tet:te-node-attributes" {
  when "/nw:networks/nw:network/nw:network-types"
    + "/tet:te-topology/flexgt:flexi-grid-topology" {
    description
      "Augmentation parameters apply only for networks with
        flexi-grid topology type.";
  }
  description "Augment TE node attributes.";
  container flexi-grid-node {
    presence "The TE node is a flexi-grid node.";
    description
      "Introduce new TE node type for flexi-grid node.";
  }
}

/*
 * Augment TE label range information

```

```

*/

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/"
    + "flexgt:flexi-grid-topology" {
    description
      "Augmentation parameters apply only for networks with
        flexi-grid topology type.";
  }
  description
    "Augment TE label range information for the TE node
      connectivity matrices.";
}

```

```

    uses l0-types:flexi-grid-label-range-info;
}

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label range information for the source Link
  Termination Point (LTP) of the connectivity matrix entry.";
uses l0-types:flexi-grid-label-range-info;
}

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label range information for the destination LTP
  of the connectivity matrix entry.";
uses l0-types:flexi-grid-label-range-info;
}

```

```

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/"
  + "flexgt:flexi-grid-topology" {
  description

```



```

        "Augmentation parameters apply only for networks with
          flexi-grid topology type.";
    }
    description
      "Augment TE label range information for the TE node
        connectivity matrices information source.";
    uses l0-types:flexi-grid-label-range-info;
  }

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/"
    + "flexgt:flexi-grid-topology" {
    description
      "Augmentation parameters apply only for networks with
        flexi-grid topology type.";
  }
  description
    "Augment TE label range information for the source LTP
      of the connectivity matrix entry information source.";
  uses l0-types:flexi-grid-label-range-info;
}

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/"
    + "flexgt:flexi-grid-topology" {
    description
      "Augmentation parameters apply only for networks with
        flexi-grid topology type.";
  }
  description
    "Augment TE label range information for the destination LTP
      of the connectivity matrix entry information source.";
  uses l0-types:flexi-grid-label-range-info;
}

```

```

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label range information for the Tunnel
  Termination Point (TTP) Local Link Connectivities.";
uses l0-types:flexi-grid-label-range-info;
}

```

```

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label range information for the TTP
  Local Link Connectivity entry.";
uses l0-types:flexi-grid-label-range-info;
}

```

```

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label range information for the TE link.";
uses l0-types:flexi-grid-label-range-info;
}

```

```

augment "/nw:networks/nw:network/nt:link/tet:te/"

```

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```
    + "tet:information-source-entry/"
    + "tet:label-restrictions/tet:label-restriction" {
when "../..../..../nw:network-types/tet:te-topology/"
    + "flexgt:flexi-grid-topology" {
    description
        "Augmentation parameters apply only for networks with
        flexi-grid topology type.";
}
description
    "Augment TE label range information for the TE link
    information source.";
uses l0-types:flexi-grid-label-range-info;
}

augment "/nw:networks/tet:te/tet:templates/"
    + "tet:link-template/tet:te-link-attributes/"
    + "tet:label-restrictions/tet:label-restriction" {
    description
        "Augment TE label range information for the TE link template.";
    uses l0-types:flexi-grid-label-range-info;
}

/*
 * Augment TE label
 */

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/"
    + "flexgt:flexi-grid-topology" {
    description
        "Augmentation parameters apply only for networks with
        flexi-grid topology type.";
}
description
    "Augment TE label range start for the TE node
    connectivity matrices.";
case flexi-grid {
    uses l0-types:flexi-grid-label-start-end;
}
}
```

```
}
```

```
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/"  
  + "flexgt:flexi-grid-topology" {  
  description  
    "Augmentation parameters apply only for networks with  
    flexi-grid topology type.";  
  }  
  description  
    "Augment TE label range end for the TE node  
    connectivity matrices.";  
  case flexi-grid {  
    uses l0-types:flexi-grid-label-start-end;  
  }  
}
```

```
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/"  
  + "flexgt:flexi-grid-topology" {  
  description  
    "Augmentation parameters apply only for networks with  
    flexi-grid topology type.";  
  }  
  description  
    "Augment TE label range step for the TE node  
    connectivity matrices.";  
  case flexi-grid {  
    uses l0-types:flexi-grid-label-step;  
  }  
}
```

```
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/"
    + "flexgt:flexi-grid-topology" {
description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description

```

```

    "Augment TE label hop for the underlay primary path of the
    TE node connectivity matrices.";
case flexi-grid {
    uses l0-types:flexi-grid-label-hop;
}
}

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/"
    + "flexgt:flexi-grid-topology" {
description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
    "Augment TE label hop for the underlay backup path of the
    TE node connectivity matrices.";
case flexi-grid {
    uses l0-types:flexi-grid-label-hop;
}
}

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/"
+ "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
  flexi-grid topology type.";
}
description
  "Augment TE label hop for the explicit route objects excluded
  by the path computation of the TE node connectivity
  matrices.";
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;
}
}
}

```

```

}
}

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/"
+ "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
  flexi-grid topology type.";
}
description
  "Augment TE label hop for the explicit route objects included
  by the path computation of the TE node connectivity
  matrices.";
}
}
}

```

```

    case flexi-grid {
      uses l0-types:flexi-grid-label-hop;
    }
  }

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label hop for the computed path route objects
  of the TE node connectivity matrices.";
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;
}
}

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label range start for the source LTP
  of the connectivity matrix entry.";

```

```

    case flexi-grid {
      uses l0-types:flexi-grid-label-start-end;
    }
  }

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
  }
  description
    "Augment TE label range end for the source LTP
    of the connectivity matrix entry.";
  case flexi-grid {
    uses l0-types:flexi-grid-label-start-end;
  }
}

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
  }
  description
    "Augment TE label range step for the source LTP

```



```

    of the connectivity matrix entry.";
case flexi-grid {
  uses l0-types:flexi-grid-label-step;
}
}

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/"
  + "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
  flexi-grid topology type.";
}
description
  "Augment TE label range start for the destination LTP
  of the connectivity matrix entry.";
case flexi-grid {
  uses l0-types:flexi-grid-label-start-end;
}
}

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/"
  + "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
  flexi-grid topology type.";
}
}

```

description

```

    "Augment TE label range end for the destination LTP
    of the connectivity matrix entry.";
case flexi-grid {
  uses l0-types:flexi-grid-label-start-end;
}
}

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label range step for the destination LTP
  of the connectivity matrix entry.";
case flexi-grid {
  uses l0-types:flexi-grid-label-step;
}
}

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label hop for the underlay primary path
  of the connectivity matrix entry.";
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;
}
}

```

```
}

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/"
    + "flexgt:flexi-grid-topology" {
    description
      "Augmentation parameters apply only for networks with
      flexi-grid topology type.";
  }
  description
    "Augment TE label hop for the underlay backup path
    of the connectivity matrix entry.";
  case flexi-grid {
    uses l0-types:flexi-grid-label-hop;
  }
}

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/"
    + "flexgt:flexi-grid-topology" {
    description
      "Augmentation parameters apply only for networks with
      flexi-grid topology type.";
  }
  description
    "Augment TE label hop for the explicit route objects excluded
    by the path computation of the connectivity matrix entry.";
  case flexi-grid {
    uses l0-types:flexi-grid-label-hop;
  }
}

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/"
+ "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
  flexi-grid topology type.";
}
description
  "Augment TE label hop for the explicit route objects included
  by the path computation of the connectivity matrix entry.";
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;
}
}

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/"
+ "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
  flexi-grid topology type.";
}
description
  "Augment TE label hop for the computed path route objects
  of the connectivity matrix entry.";
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;
}
}
}
```

```

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/"
  + "flexgt:flexi-grid-topology" {

```

```

    description
      "Augmentation parameters apply only for networks with
      flexi-grid topology type.";
  }
  description
    "Augment TE label range start for the TE node connectivity
    matrices information source.";
  case flexi-grid {
    uses l0-types:flexi-grid-label-start-end;
  }
}

```

```

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
  }
  description
    "Augment TE label range end for the TE node connectivity
    matrices information source.";
  case flexi-grid {
    uses l0-types:flexi-grid-label-start-end;
  }
}
}

```



```

    + "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/"
    + "flexgt:flexi-grid-topology" {
description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
    "Augment TE label hop for the underlay backup path
    of the TE node connectivity matrices of the information
    source entry.";
case flexi-grid {
    uses l0-types:flexi-grid-label-hop;
}
}

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/"
    + "flexgt:flexi-grid-topology" {
description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
    "Augment TE label hop for the explicit route objects excluded
    by the path computation of the TE node connectivity matrices
    information source.";
case flexi-grid {
    uses l0-types:flexi-grid-label-hop;
}
}
}

```

```

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/"
  + "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label hop for the explicit route objects included
    by the path computation of the TE node connectivity matrices
    information source.";
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;
}
}

```

```

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/"
  + "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label hop for the computed path route objects
    of the TE node connectivity matrices information source.";
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;

```



```

    }
  }

  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/"
    + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
  }
  description
    "Augment TE label range start for the source LTP
    of the connectivity matrix entry information source.";
  case flexi-grid {
    uses l0-types:flexi-grid-label-start-end;
  }
}

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/"
    + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
  }
  description

```

```

    "Augment TE label range end for the source LTP
    of the connectivity matrix entry information source.";
  case flexi-grid {
    uses l0-types:flexi-grid-label-start-end;
  }
}

```

```

    }
  }

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/"
  + "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
  flexi-grid topology type.";
}
description
  "Augment TE label range step for the source LTP
  of the connectivity matrix entry information source.";
case flexi-grid {
  uses l0-types:flexi-grid-label-step;
}
}

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/"
  + "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
  flexi-grid topology type.";
}
description
  "Augment TE label range start for the destination LTP
  of the connectivity matrix entry information source.";
case flexi-grid {
  uses l0-types:flexi-grid-label-start-end;
}
}
}

```

```
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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label range end for the destination LTP
  of the connectivity matrix entry information source.";
case flexi-grid {
  uses l0-types:flexi-grid-label-start-end;
}
}

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label range step for the destination LTP
  of the connectivity matrix entry information source.";
case flexi-grid {
  uses l0-types:flexi-grid-label-step;
}
}

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/"
```

```
+ "flexgt:flexi-grid-topology" {
```

```
    description
      "Augmentation parameters apply only for networks with
        flexi-grid topology type.";
  }
  description
    "Augment TE label hop for the underlay primary path
      of the connectivity matrix entry information source.";
  case flexi-grid {
    uses l0-types:flexi-grid-label-hop;
  }
}

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/"
    + "flexgt:flexi-grid-topology" {
    description
      "Augmentation parameters apply only for networks with
        flexi-grid topology type.";
  }
  description
    "Augment TE label hop for the underlay backup path
      of the connectivity matrix entry information source.";
  case flexi-grid {
    uses l0-types:flexi-grid-label-hop;
  }
}

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description

```

```

    "Augment TE label hop for the explicit route objects excluded
    by the path computation of the connectivity matrix entry
    information source.";
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;
}
}

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label hop for the explicit route objects included
  by the path computation of the connectivity matrix entry
  information source.";
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;
}
}

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/"
+ "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
  flexi-grid topology type.";
}
description
  "Augment TE label hop for the computed path route objects
  of the connectivity matrix entry information source.";
```

```
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;
}
}

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/"
+ "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
  flexi-grid topology type.";
}
description
  "Augment TE label range start for the TTP
  Local Link Connectivities.";
case flexi-grid {
  uses l0-types:flexi-grid-label-start-end;
}
}
```

```

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
  }
  description
    "Augment TE label range end for the TTP
    Local Link Connectivities.";
  case flexi-grid {
    uses l0-types:flexi-grid-label-start-end;
  }
}

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
  }
  description
    "Augment TE label range step for the TTP
    Local Link Connectivities.";
  case flexi-grid {
    uses l0-types:flexi-grid-label-step;
  }
}

```

```

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/"
  + "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
  flexi-grid topology type.";
}
description
  "Augment TE label hop for the underlay primary path
  of the TTP Local Link Connectivities.";
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;
}
}

```

```

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/"
  + "flexgt:flexi-grid-topology" {

```

```

description
  "Augmentation parameters apply only for networks with
  flexi-grid topology type.";
}
description
  "Augment TE label hop for the underlay backup path
  of the TTP Local Link Connectivities.";
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;
}
}

```



```

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/"
  + "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label hop for the explicit route objects excluded
    by the path computation of the TTP Local Link
    Connectivities.";
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;
}
}

```

```

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/"
  + "flexgt:flexi-grid-topology" {
description

```

```

  "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label hop for the explicit route objects included

```

```

        by the path computation of the TTP Local Link
        Connectivities.";
    case flexi-grid {
        uses l0-types:flexi-grid-label-hop;
    }
}

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/"
    + "flexgt:flexi-grid-topology" {
    description
      "Augmentation parameters apply only for networks with
      flexi-grid topology type.";
  }
  description
    "Augment TE label hop for the computed path route objects
    of the TTP Local Link Connectivities.";
  case flexi-grid {
    uses l0-types:flexi-grid-label-hop;
  }
}

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/"
    + "flexgt:flexi-grid-topology" {
    description
      "Augmentation parameters apply only for networks with
      flexi-grid topology type.";
  }
  description
    "Augment TE label range start for the TTP

```

```

    Local Link Connectivity entry.";
case flexi-grid {
  uses l0-types:flexi-grid-label-start-end;
}
}

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label range end for the TTP
  Local Link Connectivity entry.";
case flexi-grid {
  uses l0-types:flexi-grid-label-start-end;
}
}

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label range step for the TTP
  Local Link Connectivity entry.";
case flexi-grid {
  uses l0-types:flexi-grid-label-step;
}
}
}

```

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```

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label hop for the underlay primary path
  of the TTP Local Link Connectivity entry.";
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;
}
}

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label hop for the underlay backup path
  of the TTP Local Link Connectivity entry.";
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;
}
}
}

```

```

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/"
  + "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
  flexi-grid topology type.";
}
description
  "Augment TE label hop for the explicit route objects excluded
  by the path computation of the TTP Local Link
  Connectivity entry.";
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;
}
}

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/"
  + "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
  flexi-grid topology type.";
}
}

```

```

description
  "Augment TE label hop for the explicit route objects included
  by the path computation of the TTP Local Link
  Connectivity entry.";
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;
}
}

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/"
  + "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
  flexi-grid topology type.";
}
description
  "Augment TE label hop for the computed path route objects
  of the TTP Local Link Connectivity entry.";
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;
}
}

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/"
  + "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
  flexi-grid topology type.";
}
}

```

```

description
  "Augment TE label hop for the underlay primary path
  of the TE link.";
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;
}
}

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/"
  + "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
  flexi-grid topology type.";
}
description

```

```

  "Augment TE label hop for the underlay backup path
  of the TE link.";
case flexi-grid {
  uses l0-types:flexi-grid-label-hop;
}
}

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/"
  + "flexgt:flexi-grid-topology" {
description
  "Augmentation parameters apply only for networks with
  flexi-grid topology type.";
}
description
  "Augment TE label range start for the TE link.";
case flexi-grid {
  uses l0-types:flexi-grid-label-start-end;
}
}

```

```

    }
  }

  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/"
    + "flexgt:flexi-grid-topology" {
    description
      "Augmentation parameters apply only for networks with
      flexi-grid topology type.";
  }
  description
    "Augment TE label range end for the TE link.";
  case flexi-grid {
    uses l0-types:flexi-grid-label-start-end;
  }
}

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/"
    + "flexgt:flexi-grid-topology" {
    description

```

```

      "Augmentation parameters apply only for networks with
      flexi-grid topology type.";
  }
  description
    "Augment TE label range step for the TE link.";
  case flexi-grid {
    uses l0-types:flexi-grid-label-step;
  }
}

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label range start for the TE link
  information source.";
case flexi-grid {
  uses l0-types:flexi-grid-label-start-end;
}
}

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
description
  "Augment TE label range end for the TE link
  information source.";
case flexi-grid {
  uses l0-types:flexi-grid-label-start-end;
}
}

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/"
  + "flexgt:flexi-grid-topology" {
  description
    "Augmentation parameters apply only for networks with
    flexi-grid topology type.";
}
}

```

```

    }
    description
      "Augment TE label range step for the TE link
      information source.";
    case flexi-grid {
      uses l0-types:flexi-grid-label-step;
    }
  }

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" {
  description
    "Augment TE label hop for the underlay primary path
    of the TE link template.";
  case flexi-grid {
    uses l0-types:flexi-grid-label-hop;
  }
}

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" {
  description
    "Augment TE label hop for the underlay backup path
    of the TE link template.";
  case flexi-grid {
    uses l0-types:flexi-grid-label-hop;
  }
}

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" {
  description
    "Augment TE label range start for the TE link template.";
  case flexi-grid {
    uses l0-types:flexi-grid-label-start-end;
  }
}

```

```

    }
  }

  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" {
    description
      "Augment TE label range end for the TE link template.";
    case flexi-grid {
      uses l0-types:flexi-grid-label-start-end;
    }
  }

  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" {
    description
      "Augment TE label range step for the TE link template.";
    case flexi-grid {
      uses l0-types:flexi-grid-label-step;
    }
  }
}
<CODE ENDS>

```

## 8. 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 Transport Layer Security (TLS) [RFC8446].

The NETCONF access control model [RFC8341] provides the means to restrict access for particular NETCONF users to a preconfigured subset of all available NETCONF protocol operations and content. The NETCONF Protocol SSH [RFC6242] describes a method for invoking and running NETCONF within a SSH session as an SSH subsystem. The Network Configuration Access Control Model (NACM) [RFC8341] 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.

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A number of configuration data nodes defined in this document are writable/deletable (i.e., "config true"). These data nodes may be considered sensitive or vulnerable in some network environments.

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/tet:te-topology
```

```
/nw:networks/nw:network/nt:link/tet:te/tet:te-link-attributes
```

```
/nw:networks/nw:network/nw:node/nt:termination-point/tet:te
```

```
/nw:networks/nw:network/nw:node/tet:te/tet:te-node-attributes  
/te-connectivity-matrices/te-connectivity-matrix/tet:path-  
constraints/tet:te-bandwidth/tet:technology
```

```
/nw:networks/nw:network/nw:node/tet:te  
/tet:tunnel-termination-point/tet:local-link-connectivities  
/tet:label-restrictions/tet:label-restriction
```

## 9. IANA Considerations

IANA is requested to assigned a new URI from the "IETF XML Registry" [[RFC3688](#)] as follows:

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

IANA is requested to assign a new YANG module name in the "YANG Module Names" registry [[RFC6020](#)] as follows:

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Name: ietf-flexi-grid-topology  
Namespace: urn:ietf:params:xml:ns:yang:ietf-flexi-grid-topology  
Prefix: flexi-grid-topology  
Reference: [This.I-D]

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