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1. Introduction

Transport networks have evolved from traditional Wavelength Switched Optical Networks (WSON) systems [[RFC6163](#)] based on only fixed-grid wavelength switching, towards elastic optical networks, based on flexi-grid Dense Wavelength Division Multiplexing (DWDM) transmission and switching technologies [[RFC7698](#)]. Such technology aims at increasing transport network scalability and flexibility, allowing bandwidth usage optimization.

While [[RFC9094](#)] [[I-D.ietf-ccamp-flexigrid-yang](#)] focus on flexi-grid objects such as nodes, transponders and links, this document presents a YANG [[RFC7950](#)] model for the provisioning and management of Traffic Engineering (TE) tunnels and Label Switched Paths (LSPs) in DWDM Optical Networks, which can be Wavelength Switched Optical Networks (WSON) networks or Flexi-Grid Dense Wavelength Division Multiplexing (DWDM) Networks, or a mix of these two networks. This YANG module defines the path from a source transponder or node to the destination through several intermediate nodes in such a WDM optical network.

This document identifies the WDM tunnel components, parameters and their values, and characterizes the features and the performances of the WDM elements. An application example is provided towards the end of the document to understand their utility better.

2. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [[RFC2119](#)] [[RFC8174](#)] when, and only when, they appear in all capitals, as shown here.

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

Refer to [[RFC7446](#)] and [[RFC7699](#)] for the key terms used in this document.

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

- *server

- *augment

- *data model

- *data node

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

- *state data

3. Overview

The generic TE tunnel attributes, such as source and destination node addresses, source and destination tunnel termination points (TTPs), are already defined by the base data model in [[I-D.ietf-teas-yang-te](#)]. The present model defines a WDM tunnel by augmenting the base model with the following WDM technology-specific constructs:

- *Global WDM layer constraints that influence the TE path selection, e.g., whether wavelength conversion or regeneration is considered

- *Global transponder/transceiver configuration constraints, e.g., operational modes, tuning constraints of the transceiver

- *Global optical performance constraints, e.g. generalized Signal-to-noise (G-SNR) margin of a feasible optical path

*Path-scope WDM layer constraints, e.g. identities of transceivers assigned to the primary or secondary path

*List of links that defines the path

*Other optical attributes

Each path can be a segment path (only defined by the source and destination nodes or link termination points) or an end-to-end path (additionally needs source and destination transponders). Therefore, all the attributes are optional to support both situations.

4. Example of Use

In order to explain how this model is used, the following example is provided. An optical network usually has multiple transponders, switches (nodes) and links. [Figure 1](#) shows a simple topology, where two physical paths interconnect two optical transponders via a combination of both WSON and Flexi-grid wavelength switched nodes and links.

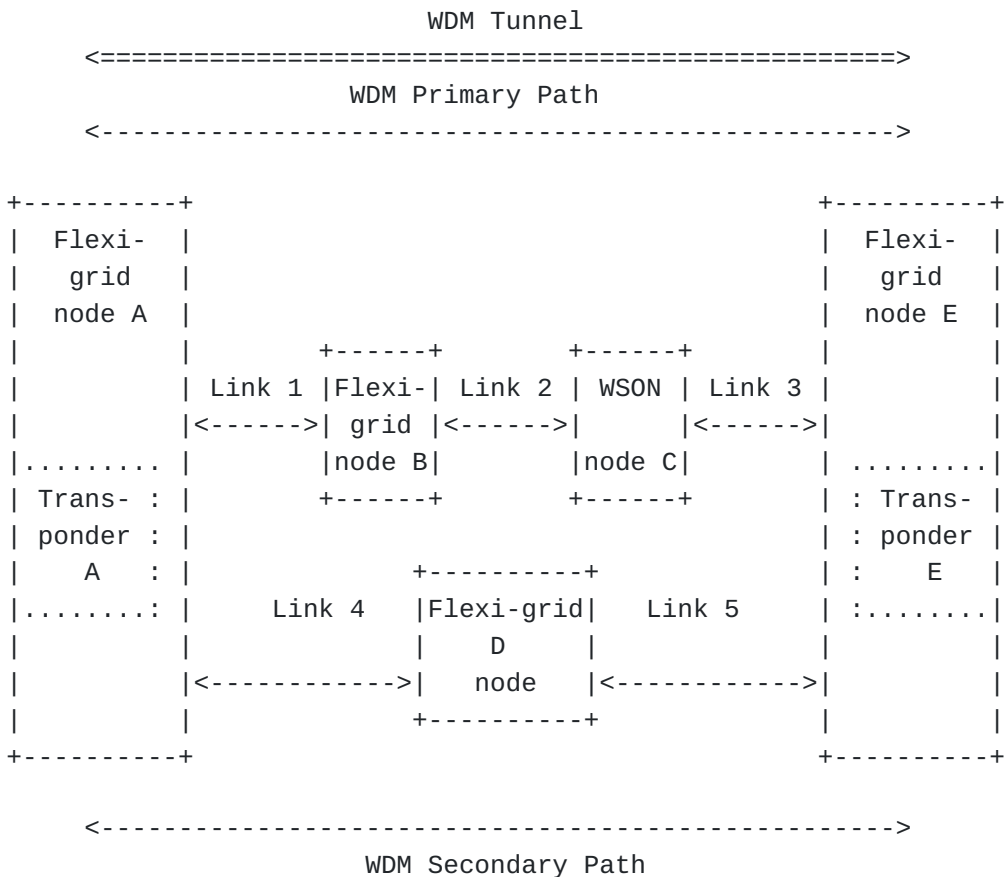


Figure 1: Topology Example

To configure an end-to-end WDM tunnel 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:

*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.

*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.

*Then, we also define the links 1 to 5 that interconnect nodes, indicating which WSON or flexi-grid labels are available.

*Other information, such as the slot frequency and granularity are also provided.

After the nodes, links and transponders have been defined using [[I-D.ietf-ccamp-flexigrid-yang](#)] and [[RFC9094](#)] we can configure the tunnel from the information we have stored in the flexi-grid topology, by querying which elements are available, and planning the resources that have to be provided on each situation, taking into account the global and path-specific WDM tunnel constraints. Note that every element in the flexi-grid topology has a reference, and this is the way in which they are called in the tunnel.

*Depending on the case, it is possible to define either the source and destination node ports, or the source and destination node and transponder. In our case, we would define a network tunnel, with source transponder A and source node B, and destination transponder E and destination node C. Thus, we are going to follow path x.

*Then, for each link in the path x, we indicate which channel we are going to use, providing information about the slots, and what nodes are connected.

*Finally, the flexi-grid topology has to be updated with each element usage status each time a tunnel is created or torn down.

5. YANG Model for WDM Tunnel

5.1. YANG Tree

module: ietf-wdm-tunnel

```
augment /te:te/te:tunnels/te:tunnel:
  +--rw wdm-constraint
    +--rw transceiver-constraint
      | +--rw operational-modes*      string
      | +--rw tx-tune-constraints
      |   +--rw min-central-frequency?  frequency-thz
      |   +--rw max-central-frequency?  frequency-thz
      |   +--rw transceiver-tunability?  frequency-ghz
      +--rw gsnr-margin?                snr
      +--rw use-regen?                  boolean
      +--rw wavelength-conversion?      boolean
      +--rw bit-stuffing?               boolean
      +--rw wavelength-assignment?      identityref
      +--rw guard-band-size?            l0-types:frequency-thz
      +--rw matching-fwd-rev-wavelength? boolean
      +--rw allow-retuning?             boolean
      +--rw delta-power?
        l0-types:gain-in-db-or-null
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:explicit-route-objects-always
  /te:route-object-exclude-always/te:type
  /te:numbered-node-hop/te:numbered-node-hop:
  +--rw path-in-transceiver
    | +--rw transponder-id?           uint32
    | +--rw transceivers* [lane-id]
    | | +--rw lane-id                uint8
    | | +--rw transceiver-id?       uint32
    | +--rw operational-modes*      string
    | +--rw tx-tune-constraints
    |   +--rw min-central-frequency?  frequency-thz
    |   +--rw max-central-frequency?  frequency-thz
    |   +--rw transceiver-tunability?  frequency-ghz
  +--rw path-out-transceiver
    +--rw transponder-id?           uint32
    +--rw transceivers* [lane-id]
    | +--rw lane-id                uint8
    | +--rw transceiver-id?       uint32
    +--rw operational-modes*      string
    +--rw tx-tune-constraints
      +--rw min-central-frequency?  frequency-thz
      +--rw max-central-frequency?  frequency-thz
      +--rw transceiver-tunability?  frequency-ghz
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:primary-reverse-path
  /te:explicit-route-objects-always
  /te:route-object-exclude-always/te:type
  /te:numbered-node-hop/te:numbered-node-hop:
```



```

+--rw path-in-transceiver
| +--rw transponder-id?      uint32
| +--rw transceivers* [lane-id]
| | +--rw lane-id           uint8
| | +--rw transceiver-id?   uint32
| +--rw operational-modes*   string
| +--rw tx-tune-constraints
|   +--rw min-central-frequency?  frequency-thz
|   +--rw max-central-frequency?  frequency-thz
|   +--rw transceiver-tunability? frequency-ghz
+--rw path-out-transceiver
  +--rw transponder-id?      uint32
  +--rw transceivers* [lane-id]
  | +--rw lane-id           uint8
  | +--rw transceiver-id?   uint32
  +--rw operational-modes*   string
  +--rw tx-tune-constraints
    +--rw min-central-frequency?  frequency-thz
    +--rw max-central-frequency?  frequency-thz
    +--rw transceiver-tunability? frequency-ghz
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:computed-paths-properties
  /te:computed-path-properties/te:path-properties:
+--ro estimated-gsnr?      snr
+--ro estimated-eol-gsnr?  snr
+--ro estimated-lowest-gsnr? snr
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:primary-reverse-path
  /te:computed-paths-properties/te:computed-path-properties
  /te:path-properties:
+--ro estimated-gsnr?      snr
+--ro estimated-eol-gsnr?  snr
+--ro estimated-lowest-gsnr? snr
augment /te:te/te:tunnels/te:tunnel/te:secondary-paths
  /te:secondary-path/te:explicit-route-objects-always
  /te:route-object-exclude-always/te:type
  /te:numbered-node-hop/te:numbered-node-hop:
+--rw path-in-transceiver
| +--rw transponder-id?      uint32
| +--rw transceivers* [lane-id]
| | +--rw lane-id           uint8
| | +--rw transceiver-id?   uint32
| +--rw operational-modes*   string
| +--rw tx-tune-constraints
|   +--rw min-central-frequency?  frequency-thz
|   +--rw max-central-frequency?  frequency-thz
|   +--rw transceiver-tunability? frequency-ghz
+--rw path-out-transceiver
  +--rw transponder-id?      uint32

```

```

+--rw transceivers* [lane-id]
| +--rw lane-id          uint8
| +--rw transceiver-id? uint32
+--rw operational-modes* string
+--rw tx-tune-constraints
    +--rw min-central-frequency? frequency-thz
    +--rw max-central-frequency? frequency-thz
    +--rw transceiver-tunability? frequency-ghz
augment /te:te/te:tunnels/te:tunnel/te:secondary-reverse-paths
    /te:secondary-reverse-path
    /te:explicit-route-objects-always
    /te:route-object-exclude-always/te:type
    /te:numbered-node-hop/te:numbered-node-hop:
+--rw path-in-transceiver
| +--rw transponder-id?    uint32
| +--rw transceivers* [lane-id]
| | +--rw lane-id          uint8
| | +--rw transceiver-id? uint32
| +--rw operational-modes* string
| +--rw tx-tune-constraints
|   +--rw min-central-frequency? frequency-thz
|   +--rw max-central-frequency? frequency-thz
|   +--rw transceiver-tunability? frequency-ghz
+--rw path-out-transceiver
+--rw transponder-id?      uint32
+--rw transceivers* [lane-id]
| +--rw lane-id          uint8
| +--rw transceiver-id? uint32
+--rw operational-modes* string
+--rw tx-tune-constraints
    +--rw min-central-frequency? frequency-thz
    +--rw max-central-frequency? frequency-thz
    +--rw transceiver-tunability? frequency-ghz
augment /te:te/te:tunnels/te:tunnel/te:secondary-paths
    /te:secondary-path/te:computed-paths-properties
    /te:computed-path-properties/te:path-properties:
+--ro estimated-gsnr?      snr
+--ro estimated-eol-gsnr?  snr
+--ro estimated-lowest-gsnr? snr
augment /te:te/te:tunnels/te:tunnel/te:secondary-reverse-paths
    /te:secondary-reverse-path/te:computed-paths-properties
    /te:computed-path-properties/te:path-properties:
+--ro estimated-gsnr?      snr
+--ro estimated-eol-gsnr?  snr
+--ro estimated-lowest-gsnr? snr
augment /te:te/te:lsp/te:lsp/te:lsp-actual-route-information:
+--ro wdm-path-state
    +--ro gsnr?  10-types:snr
augment /te:te/te:globals/te:named-path-constraints

```

```

        /te:named-path-constraint/te:path-in-segment
        /te:label-restrictions/te: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 /te:te/te:globals/te:named-path-constraints
        /te:named-path-constraint/te:path-out-segment
        /te:label-restrictions/te: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 /te:te/te:tunnels/te:tunnel/te:primary-paths
        /te:primary-path/te:path-in-segment/te:label-restrictions
        /te: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 /te:te/te:tunnels/te:tunnel/te:primary-paths
        /te:primary-path/te:path-out-segment
        /te:label-restrictions/te: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 /te:te/te:tunnels/te:tunnel/te:primary-paths
        /te:primary-path/te:primary-reverse-path
        /te:path-in-segment/te:label-restrictions
        /te: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 /te:te/te:tunnels/te:tunnel/te:primary-paths
        /te:primary-path/te:primary-reverse-path
        /te:path-out-segment/te:label-restrictions
        /te: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 /te:te/te:tunnels/te:tunnel/te:secondary-paths
    /te:secondary-path/te:path-in-segment
    /te:label-restrictions/te: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 /te:te/te:tunnels/te:tunnel/te:secondary-paths
    /te:secondary-path/te:path-out-segment
    /te:label-restrictions/te: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 /te:te/te:tunnels/te:tunnel/te:secondary-reverse-paths
    /te:secondary-reverse-path/te:path-in-segment
    /te:label-restrictions/te: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 /te:te/te:tunnels/te:tunnel/te:secondary-reverse-paths
    /te:secondary-reverse-path/te:path-out-segment
    /te:label-restrictions/te: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 /te:te/te:globals/te:named-path-constraints
    /te:named-path-constraint
    /te:explicit-route-objects-always
    /te:route-object-exclude-always/te:type/te:label
    /te:label-hop/te:te-label/te:technology:
+--:(wdm)
    +--rw (grid-type)?

```

```

+--:(fixed-dwdm)
| +--rw (fixed-single-or-super-channel)?
|   +--:(single)
|     | +--rw dwdm-n?          l0-types:dwdm-n
|     +--:(multi)
|       +--rw subcarrier-dwdm-n*  l0-types:dwdm-n
+--:(cwdm)
| +--rw cwdm-n?          l0-types:cwdm-n
+--:(flexi-grid)
  +--rw (single-or-super-channel)?
  +--:(single)
  | +--rw flexi-n?          l0-types:flexi-n
  | +--rw flexi-m?          l0-types:flexi-m
  x--:(super)
  | +--rw subcarrier-flexi-n* [flexi-n]
  |   +--rw flexi-n    l0-types:flexi-n
  |   +--rw flexi-m?  l0-types:flexi-m
  +--:(multi)
  +--rw frequency-slots
  +--rw frequency-slot* [flexi-n]
  +--rw flexi-n    l0-types:flexi-n
  +--rw flexi-m?  l0-types:flexi-m
augment /te:te/te:globals/te:named-path-constraints
  /te:named-path-constraint
  /te:explicit-route-objects-always
  /te:route-object-include-exclude/te:type/te:label
  /te:label-hop/te:te-label/te:technology:
+--:(wdm)
  +--rw (grid-type)?
  +--:(fixed-dwdm)
  | +--rw (fixed-single-or-super-channel)?
  |   +--:(single)
  |     | +--rw dwdm-n?          l0-types:dwdm-n
  |     +--:(multi)
  |       +--rw subcarrier-dwdm-n*  l0-types:dwdm-n
  +--:(cwdm)
  | +--rw cwdm-n?          l0-types:cwdm-n
  +--:(flexi-grid)
  +--rw (single-or-super-channel)?
  +--:(single)
  | +--rw flexi-n?          l0-types:flexi-n
  | +--rw flexi-m?          l0-types:flexi-m
  x--:(super)
  | +--rw subcarrier-flexi-n* [flexi-n]
  |   +--rw flexi-n    l0-types:flexi-n
  |   +--rw flexi-m?  l0-types:flexi-m
  +--:(multi)
  +--rw frequency-slots
  +--rw frequency-slot* [flexi-n]

```

```

        +--rw flexi-n      l0-types:flexi-n
        +--rw flexi-m?    l0-types:flexi-m
augment /te:te/te:globals/te:named-path-constraints
    /te:named-path-constraint/te:path-in-segment
    /te:label-restrictions/te:label-restriction
    /te:label-start/te:te-label/te:technology:
+--:(wdm)
    +--rw (grid-type)?
        +--:(fixed-dwdm)
            | +--rw dwdm-n?    l0-types:dwdm-n
        +--:(cwdm)
            | +--rw cwdm-n?    l0-types:cwdm-n
        +--:(flexi-grid)
            +--rw flexi-n?    l0-types:flexi-n
augment /te:te/te:globals/te:named-path-constraints
    /te:named-path-constraint/te:path-in-segment
    /te:label-restrictions/te:label-restriction/te:label-end
    /te:te-label/te:technology:
+--:(wdm)
    +--rw (grid-type)?
        +--:(fixed-dwdm)
            | +--rw dwdm-n?    l0-types:dwdm-n
        +--:(cwdm)
            | +--rw cwdm-n?    l0-types:cwdm-n
        +--:(flexi-grid)
            +--rw flexi-n?    l0-types:flexi-n
augment /te:te/te:globals/te:named-path-constraints
    /te:named-path-constraint/te:path-in-segment
    /te:label-restrictions/te:label-restriction/te:label-step
    /te:technology:
+--:(wdm)
    +--rw (l0-grid-type)?
        +--:(fixed-dwdm)
            | +--rw wson-dwdm-channel-spacing?    identityref
        +--:(cwdm)
            | +--rw wson-cwdm-channel-spacing?    identityref
        +--:(flexi-grid)
            x--rw flexi-grid-channel-spacing?    identityref
            +--rw flexi-ncfg?                    identityref
            +--rw flexi-n-step?                  uint8
augment /te:te/te:globals/te:named-path-constraints
    /te:named-path-constraint/te:path-out-segment
    /te:label-restrictions/te:label-restriction
    /te:label-start/te:te-label/te:technology:
+--:(wdm)
    +--rw (grid-type)?
        +--:(fixed-dwdm)
            | +--rw dwdm-n?    l0-types:dwdm-n
        +--:(cwdm)

```

```

    | +--rw cwdm-n?    l0-types:cwdm-n
  +--:(flexi-grid)
    +--rw flexi-n?    l0-types:flexi-n
augment /te:te/te:globals/te:named-path-constraints
  /te:named-path-constraint/te:path-out-segment
  /te:label-restrictions/te:label-restriction/te:label-end
  /te:te-label/te:technology:
+--:(wdm)
  +--rw (grid-type)?
  +--:(fixed-dwdm)
  | +--rw dwdm-n?    l0-types:dwdm-n
  +--:(cwdm)
  | +--rw cwdm-n?    l0-types:cwdm-n
  +--:(flexi-grid)
    +--rw flexi-n?    l0-types:flexi-n
augment /te:te/te:globals/te:named-path-constraints
  /te:named-path-constraint/te:path-out-segment
  /te:label-restrictions/te:label-restriction/te:label-step
  /te:technology:
+--:(wdm)
  +--rw (l0-grid-type)?
  +--:(fixed-dwdm)
  | +--rw wson-dwdm-channel-spacing?  identityref
  +--:(cwdm)
  | +--rw wson-cwdm-channel-spacing?  identityref
  +--:(flexi-grid)
    x--rw flexi-grid-channel-spacing?  identityref
    +--rw flexi-ncfg?                  identityref
    +--rw flexi-n-step?                uint8
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:optimizations/te:algorithm/te:metric
  /te:optimization-metric/te:explicit-route-exclude-objects
  /te:route-object-exclude-object/te:type/te:label
  /te:label-hop/te:te-label/te:technology:
+--:(wdm)
  +--rw (grid-type)?
  +--:(fixed-dwdm)
  | +--rw (fixed-single-or-super-channel)?
  |   +--:(single)
  |   | +--rw dwdm-n?                  l0-types:dwdm-n
  |   +--:(multi)
  |     +--rw subcarrier-dwdm-n*      l0-types:dwdm-n
  +--:(cwdm)
  | +--rw cwdm-n?                    l0-types:cwdm-n
  +--:(flexi-grid)
    +--rw (single-or-super-channel)?
    +--:(single)
    | +--rw flexi-n?                  l0-types:flexi-n
    | +--rw flexi-m?                  l0-types:flexi-m

```

```

x--:(super)
| +--rw subcarrier-flexi-n* [flexi-n]
|   +--rw flexi-n    l0-types:flexi-n
|   +--rw flexi-m?   l0-types:flexi-m
+--:(multi)
  +--rw frequency-slots
    +--rw frequency-slot* [flexi-n]
      +--rw flexi-n    l0-types:flexi-n
      +--rw flexi-m?   l0-types:flexi-m
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:optimizations/te:algorithm/te:metric
  /te:optimization-metric/te:explicit-route-include-objects
  /te:route-object-include-object/te:type/te:label
  /te:label-hop/te:te-label/te:technology:
+--:(wdm)
  +--rw (grid-type)?
    +--:(fixed-dwdm)
      | +--rw (fixed-single-or-super-channel)?
      |   +--:(single)
      |   | +--rw dwdm-n?                l0-types:dwdm-n
      |   +--:(multi)
      |   +--rw subcarrier-dwdm-n*      l0-types:dwdm-n
    +--:(cwdm)
      | +--rw cwdm-n?                  l0-types:cwdm-n
    +--:(flexi-grid)
      +--rw (single-or-super-channel)?
        +--:(single)
          | +--rw flexi-n?              l0-types:flexi-n
          | +--rw flexi-m?              l0-types:flexi-m
        x--:(super)
          | +--rw subcarrier-flexi-n* [flexi-n]
          |   +--rw flexi-n    l0-types:flexi-n
          |   +--rw flexi-m?   l0-types:flexi-m
          +--:(multi)
            +--rw frequency-slots
              +--rw frequency-slot* [flexi-n]
                +--rw flexi-n    l0-types:flexi-n
                +--rw flexi-m?   l0-types:flexi-m
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:explicit-route-objects-always
  /te:route-object-exclude-always/te:type/te:label
  /te:label-hop/te:te-label/te:technology:
+--:(wdm)
  +--rw (grid-type)?
    +--:(fixed-dwdm)
      | +--rw (fixed-single-or-super-channel)?
      |   +--:(single)
      |   | +--rw dwdm-n?                l0-types:dwdm-n
      |   +--:(multi)

```



```

|      +--rw subcarrier-dwdm-n*   l0-types:dwdm-n
+--:(cwdm)
| +--rw cwdm-n?                   l0-types:cwdm-n
+--:(flexi-grid)
  +--rw (single-or-super-channel)?
    +--:(single)
      | +--rw flexi-n?             l0-types:flexi-n
      | +--rw flexi-m?             l0-types:flexi-m
    x--:(super)
      | +--rw subcarrier-flexi-n* [flexi-n]
      |   +--rw flexi-n           l0-types:flexi-n
      |   +--rw flexi-m?         l0-types:flexi-m
    +--:(multi)
      +--rw frequency-slots
        +--rw frequency-slot* [flexi-n]
          +--rw flexi-n           l0-types:flexi-n
          +--rw flexi-m?         l0-types:flexi-m
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:explicit-route-objects-always
  /te:route-object-include-exclude/te:type/te:label
  /te:label-hop/te:te-label/te:technology:
+--:(wdm)
  +--rw (grid-type)?
    +--:(fixed-dwdm)
      | +--rw (fixed-single-or-super-channel)?
      |   +--:(single)
      |     | +--rw dwdm-n?         l0-types:dwdm-n
      |     | +--:(multi)
      |     |   +--rw subcarrier-dwdm-n*   l0-types:dwdm-n
      |     +--:(cwdm)
      |       | +--rw cwdm-n?         l0-types:cwdm-n
      |       +--:(flexi-grid)
      |         +--rw (single-or-super-channel)?
      |           +--:(single)
      |             | +--rw flexi-n?             l0-types:flexi-n
      |             | +--rw flexi-m?             l0-types:flexi-m
      |           x--:(super)
      |             | +--rw subcarrier-flexi-n* [flexi-n]
      |             |   +--rw flexi-n           l0-types:flexi-n
      |             |   +--rw flexi-m?         l0-types:flexi-m
      |           +--:(multi)
      |             +--rw frequency-slots
      |               +--rw frequency-slot* [flexi-n]
      |                 +--rw flexi-n           l0-types:flexi-n
      |                 +--rw flexi-m?         l0-types:flexi-m
    +--:(flexi-grid)
      +--rw (single-or-super-channel)?
        +--:(single)
          | +--rw flexi-n?             l0-types:flexi-n
          | +--rw flexi-m?             l0-types:flexi-m
        x--:(super)
          | +--rw subcarrier-flexi-n* [flexi-n]
          |   +--rw flexi-n           l0-types:flexi-n
          |   +--rw flexi-m?         l0-types:flexi-m
        +--:(multi)
          +--rw frequency-slots
            +--rw frequency-slot* [flexi-n]
              +--rw flexi-n           l0-types:flexi-n
              +--rw flexi-m?         l0-types:flexi-m
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:path-in-segment/te:label-restrictions
  /te:label-restriction/te:label-start/te:te-label
  /te:technology:

```

```

+--:(wdm)
  +--rw (grid-type)?
    +--:(fixed-dwdm)
      | +--rw dwdm-n?    l0-types:dwdm-n
    +--:(cwdm)
      | +--rw cwdm-n?    l0-types:cwdm-n
    +--:(flexi-grid)
      +--rw flexi-n?    l0-types:flexi-n
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:path-in-segment/te:label-restrictions
  /te:label-restriction/te:label-end/te:te-label
  /te:technology:
+--:(wdm)
  +--rw (grid-type)?
    +--:(fixed-dwdm)
      | +--rw dwdm-n?    l0-types:dwdm-n
    +--:(cwdm)
      | +--rw cwdm-n?    l0-types:cwdm-n
    +--:(flexi-grid)
      +--rw flexi-n?    l0-types:flexi-n
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:path-in-segment/te:label-restrictions
  /te:label-restriction/te:label-step/te:technology:
+--:(wdm)
  +--rw (l0-grid-type)?
    +--:(fixed-dwdm)
      | +--rw wson-dwdm-channel-spacing?  identityref
    +--:(cwdm)
      | +--rw wson-cwdm-channel-spacing?  identityref
    +--:(flexi-grid)
      x--rw flexi-grid-channel-spacing?  identityref
      +--rw flexi-ncfg?                  identityref
      +--rw flexi-n-step?                 uint8
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:path-out-segment
  /te:label-restrictions/te:label-restriction
  /te:label-start/te:te-label/te:technology:
+--:(wdm)
  +--rw (grid-type)?
    +--:(fixed-dwdm)
      | +--rw dwdm-n?    l0-types:dwdm-n
    +--:(cwdm)
      | +--rw cwdm-n?    l0-types:cwdm-n
    +--:(flexi-grid)
      +--rw flexi-n?    l0-types:flexi-n
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:path-out-segment
  /te:label-restrictions/te:label-restriction/te:label-end
  /te:te-label/te:technology:

```

```

+--:(wdm)
  +--rw (grid-type)?
    +--:(fixed-dwdm)
      | +--rw dwdm-n?    l0-types:dwdm-n
    +--:(cwdm)
      | +--rw cwdm-n?    l0-types:cwdm-n
    +--:(flexi-grid)
      +--rw flexi-n?    l0-types:flexi-n
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:path-out-segment
  /te:label-restrictions/te:label-restriction/te:label-step
  /te:technology:
+--:(wdm)
  +--rw (l0-grid-type)?
    +--:(fixed-dwdm)
      | +--rw wson-dwdm-channel-spacing?  identityref
    +--:(cwdm)
      | +--rw wson-cwdm-channel-spacing?  identityref
    +--:(flexi-grid)
      x--rw flexi-grid-channel-spacing?  identityref
      +--rw flexi-ncfg?                  identityref
      +--rw flexi-n-step?                 uint8
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:computed-paths-properties
  /te:computed-path-properties/te:path-properties
  /te:path-route-objects/te:path-route-object/te:type
  /te:label/te:label-hop/te:te-label/te:technology:
+--:(wdm)
  +--ro (grid-type)?
    +--:(fixed-dwdm)
      | +--ro (fixed-single-or-super-channel)?
      |   +--:(single)
      |   | +--ro dwdm-n?                    l0-types:dwdm-n
      |   +--:(multi)
      |   +--ro subcarrier-dwdm-n*          l0-types:dwdm-n
    +--:(cwdm)
      | +--ro cwdm-n?                    l0-types:cwdm-n
    +--:(flexi-grid)
      +--ro (single-or-super-channel)?
      +--:(single)
      | +--ro flexi-n?                    l0-types:flexi-n
      | +--ro flexi-m?                    l0-types:flexi-m
      x--:(super)
      | +--ro subcarrier-flexi-n* [flexi-n]
      | +--ro flexi-n    l0-types:flexi-n
      | +--ro flexi-m?  l0-types:flexi-m
      +--:(multi)
      +--ro frequency-slots
      +--ro frequency-slot* [flexi-n]

```



```

+--rw (single-or-super-channel)?
  +--:(single)
  | +--rw flexi-n?          l0-types:flexi-n
  | +--rw flexi-m?          l0-types:flexi-m
  x--:(super)
  | +--rw subcarrier-flexi-n* [flexi-n]
  |   +--rw flexi-n          l0-types:flexi-n
  |   +--rw flexi-m?         l0-types:flexi-m
  +--:(multi)
    +--rw frequency-slots
      +--rw frequency-slot* [flexi-n]
        +--rw flexi-n          l0-types:flexi-n
        +--rw flexi-m?         l0-types:flexi-m
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:primary-reverse-path
  /te:explicit-route-objects-always
  /te:route-object-exclude-always/te:type/te:label
  /te:label-hop/te:te-label/te:technology:
+--:(wdm)
  +--rw (grid-type)?
  +--:(fixed-dwdm)
  | +--rw (fixed-single-or-super-channel)?
  |   +--:(single)
  |   | +--rw dwdm-n?          l0-types:dwdm-n
  |   +--:(multi)
  |     +--rw subcarrier-dwdm-n* l0-types:dwdm-n
  +--:(cwdm)
  | +--rw cwdm-n?              l0-types:cwdm-n
  +--:(flexi-grid)
  +--rw (single-or-super-channel)?
  +--:(single)
  | +--rw flexi-n?              l0-types:flexi-n
  | +--rw flexi-m?              l0-types:flexi-m
  x--:(super)
  | +--rw subcarrier-flexi-n* [flexi-n]
  |   +--rw flexi-n            l0-types:flexi-n
  |   +--rw flexi-m?           l0-types:flexi-m
  +--:(multi)
    +--rw frequency-slots
      +--rw frequency-slot* [flexi-n]
        +--rw flexi-n            l0-types:flexi-n
        +--rw flexi-m?           l0-types:flexi-m
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:primary-reverse-path
  /te:explicit-route-objects-always
  /te:route-object-include-exclude/te:type/te:label
  /te:label-hop/te:te-label/te:technology:
+--:(wdm)
  +--rw (grid-type)?

```

```

+--:(fixed-dwdm)
| +--rw (fixed-single-or-super-channel)?
|   +--:(single)
|     | +--rw dwdm-n?          l0-types:dwdm-n
|     +--:(multi)
|       +--rw subcarrier-dwdm-n*  l0-types:dwdm-n
+--:(cwdm)
| +--rw cwdm-n?          l0-types:cwdm-n
+--:(flexi-grid)
  +--rw (single-or-super-channel)?
  +--:(single)
  | +--rw flexi-n?          l0-types:flexi-n
  | +--rw flexi-m?          l0-types:flexi-m
  x--:(super)
  | +--rw subcarrier-flexi-n* [flexi-n]
  |   +--rw flexi-n    l0-types:flexi-n
  |   +--rw flexi-m?  l0-types:flexi-m
  +--:(multi)
    +--rw frequency-slots
      +--rw frequency-slot* [flexi-n]
        +--rw flexi-n    l0-types:flexi-n
        +--rw flexi-m?  l0-types:flexi-m
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:primary-reverse-path
  /te:path-in-segment/te:label-restrictions
  /te:label-restriction/te:label-start/te:te-label
  /te:technology:
+--:(wdm)
  +--rw (grid-type)?
  +--:(fixed-dwdm)
  | +--rw dwdm-n?    l0-types:dwdm-n
  +--:(cwdm)
  | +--rw cwdm-n?    l0-types:cwdm-n
  +--:(flexi-grid)
  +--rw flexi-n?    l0-types:flexi-n
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:primary-reverse-path
  /te:path-in-segment/te:label-restrictions
  /te:label-restriction/te:label-end/te:te-label
  /te:technology:
+--:(wdm)
  +--rw (grid-type)?
  +--:(fixed-dwdm)
  | +--rw dwdm-n?    l0-types:dwdm-n
  +--:(cwdm)
  | +--rw cwdm-n?    l0-types:cwdm-n
  +--:(flexi-grid)
  +--rw flexi-n?    l0-types:flexi-n
augment /te:te/te:tunnels/te:tunnel/te:primary-paths

```

```

    /te:primary-path/te:primary-reverse-path
    /te:path-in-segment/te:label-restrictions
    /te:label-restriction/te:label-step/te:technology:
+--:(wdm)
  +--rw (l0-grid-type)?
    +--:(fixed-dwdm)
      | +--rw wson-dwdm-channel-spacing?  identityref
    +--:(cwdm)
      | +--rw wson-cwdm-channel-spacing?  identityref
    +--:(flexi-grid)
      x--rw flexi-grid-channel-spacing?  identityref
      +--rw flexi-ncfg?                  identityref
      +--rw flexi-n-step?                 uint8
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:primary-reverse-path
  /te:path-out-segment/te:label-restrictions
  /te:label-restriction/te:label-start/te:te-label
  /te:technology:
+--:(wdm)
  +--rw (grid-type)?
    +--:(fixed-dwdm)
      | +--rw dwdm-n?    l0-types:dwdm-n
    +--:(cwdm)
      | +--rw cwdm-n?   l0-types:cwdm-n
    +--:(flexi-grid)
      +--rw flexi-n?   l0-types:flexi-n
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:primary-reverse-path
  /te:path-out-segment/te:label-restrictions
  /te:label-restriction/te:label-end/te:te-label
  /te:technology:
+--:(wdm)
  +--rw (grid-type)?
    +--:(fixed-dwdm)
      | +--rw dwdm-n?    l0-types:dwdm-n
    +--:(cwdm)
      | +--rw cwdm-n?   l0-types:cwdm-n
    +--:(flexi-grid)
      +--rw flexi-n?   l0-types:flexi-n
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:primary-reverse-path
  /te:path-out-segment/te:label-restrictions
  /te:label-restriction/te:label-step/te:technology:
+--:(wdm)
  +--rw (l0-grid-type)?
    +--:(fixed-dwdm)
      | +--rw wson-dwdm-channel-spacing?  identityref
    +--:(cwdm)
      | +--rw wson-cwdm-channel-spacing?  identityref

```

```

+--:(flexi-grid)
  x--rw flexi-grid-channel-spacing?  identityref
  +--rw flexi-ncfg?                  identityref
  +--rw flexi-n-step?                uint8
augment /te:te/te:tunnels/te:tunnel/te:primary-paths
  /te:primary-path/te:primary-reverse-path
  /te:computed-paths-properties/te:computed-path-properties
  /te:path-properties/te:path-route-objects
  /te:path-route-object/te:type/te:label/te:label-hop
  /te:te-label/te:technology:
+--:(wdm)
  +--ro (grid-type)?
    +--:(fixed-dwdm)
      | +--ro (fixed-single-or-super-channel)?
      |   +--:(single)
      |     | +--ro dwdm-n?                  l0-types:dwdm-n
      |     +--:(multi)
      |       +--ro subcarrier-dwdm-n*      l0-types:dwdm-n
    +--:(cwdm)
      | +--ro cwdm-n?                      l0-types:cwdm-n
    +--:(flexi-grid)
      +--ro (single-or-super-channel)?
        +--:(single)
          | +--ro flexi-n?                  l0-types:flexi-n
          | +--ro flexi-m?                  l0-types:flexi-m
        x--:(super)
          | +--ro subcarrier-flexi-n* [flexi-n]
          |   +--ro flexi-n    l0-types:flexi-n
          |   +--ro flexi-m?   l0-types:flexi-m
        +--:(multi)
          +--ro frequency-slots
            +--ro frequency-slot* [flexi-n]
              +--ro flexi-n    l0-types:flexi-n
              +--ro flexi-m?   l0-types:flexi-m
augment /te:te/te:tunnels/te:tunnel/te:secondary-paths
  /te:secondary-path/te:optimizations/te:algorithm
  /te:metric/te:optimization-metric
  /te:explicit-route-exclude-objects
  /te:route-object-exclude-object/te:type/te:label
  /te:label-hop/te:te-label/te:technology:
+--:(wdm)
  +--rw (grid-type)?
    +--:(fixed-dwdm)
      | +--rw (fixed-single-or-super-channel)?
      |   +--:(single)
      |     | +--rw dwdm-n?                  l0-types:dwdm-n
      |     +--:(multi)
      |       +--rw subcarrier-dwdm-n*      l0-types:dwdm-n
    +--:(cwdm)

```



```

| +--rw cwdm-n?                               l0-types:cwdm-n
+--:(flexi-grid)
  +--rw (single-or-super-channel)?
    +--:(single)
      | +--rw flexi-n?                         l0-types:flexi-n
      | +--rw flexi-m?                         l0-types:flexi-m
      x--:(super)
        | +--rw subcarrier-flexi-n* [flexi-n]
        |   +--rw flexi-n   l0-types:flexi-n
        |   +--rw flexi-m?  l0-types:flexi-m
        +--:(multi)
          +--rw frequency-slots
            +--rw frequency-slot* [flexi-n]
              +--rw flexi-n   l0-types:flexi-n
              +--rw flexi-m?  l0-types:flexi-m
augment /te:te/te:tunnels/te:tunnel/te:secondary-paths
  /te:secondary-path/te:optimizations/te:algorithm
  /te:metric/te:optimization-metric
  /te:explicit-route-include-objects
  /te:route-object-include-object/te:type/te:label
  /te:label-hop/te:te-label/te:technology:
+--:(wdm)
  +--rw (grid-type)?
    +--:(fixed-dwdm)
      | +--rw (fixed-single-or-super-channel)?
      |   +--:(single)
      |     | +--rw dwdm-n?                     l0-types:dwdm-n
      |     | +--:(multi)
      |     |   +--rw subcarrier-dwdm-n*      l0-types:dwdm-n
      +--:(cwdm)
        | +--rw cwdm-n?                         l0-types:cwdm-n
        +--:(flexi-grid)
          +--rw (single-or-super-channel)?
            +--:(single)
              | +--rw flexi-n?                 l0-types:flexi-n
              | +--rw flexi-m?                 l0-types:flexi-m
              x--:(super)
                | +--rw subcarrier-flexi-n* [flexi-n]
                |   +--rw flexi-n   l0-types:flexi-n
                |   +--rw flexi-m?  l0-types:flexi-m
                +--:(multi)
                  +--rw frequency-slots
                    +--rw frequency-slot* [flexi-n]
                      +--rw flexi-n   l0-types:flexi-n
                      +--rw flexi-m?  l0-types:flexi-m
augment /te:te/te:tunnels/te:tunnel/te:secondary-paths
  /te:secondary-path/te:explicit-route-objects-always
  /te:route-object-exclude-always/te:type/te:label
  /te:label-hop/te:te-label/te:technology:

```

```

+--:(wdm)
  +--rw (grid-type)?
    +--:(fixed-dwdm)
      | +--rw (fixed-single-or-super-channel)?
      |   +--:(single)
      |     | +--rw dwdm-n?          l0-types:dwdm-n
      |     | +--:(multi)
      |     |   +--rw subcarrier-dwdm-n*  l0-types:dwdm-n
    +--:(cwdm)
      | +--rw cwdm-n?          l0-types:cwdm-n
    +--:(flexi-grid)
      +--rw (single-or-super-channel)?
        +--:(single)
          | +--rw flexi-n?      l0-types:flexi-n
          | +--rw flexi-m?      l0-types:flexi-m
        x--:(super)
          | +--rw subcarrier-flexi-n* [flexi-n]
          |   +--rw flexi-n    l0-types:flexi-n
          |   +--rw flexi-m?   l0-types:flexi-m
        +--:(multi)
          +--rw frequency-slots
            +--rw frequency-slot* [flexi-n]
              +--rw flexi-n    l0-types:flexi-n
              +--rw flexi-m?   l0-types:flexi-m
augment /te:te/te:tunnels/te:tunnel/te:secondary-paths
  /te:secondary-path/te:explicit-route-objects-always
  /te:route-object-include-exclude/te:type/te:label
  /te:label-hop/te:te-label/te:technology:
+--:(wdm)
  +--rw (grid-type)?
    +--:(fixed-dwdm)
      | +--rw (fixed-single-or-super-channel)?
      |   +--:(single)
      |     | +--rw dwdm-n?          l0-types:dwdm-n
      |     | +--:(multi)
      |     |   +--rw subcarrier-dwdm-n*  l0-types:dwdm-n
    +--:(cwdm)
      | +--rw cwdm-n?          l0-types:cwdm-n
    +--:(flexi-grid)
      +--rw (single-or-super-channel)?
        +--:(single)
          | +--rw flexi-n?      l0-types:flexi-n
          | +--rw flexi-m?      l0-types:flexi-m
        x--:(super)
          | +--rw subcarrier-flexi-n* [flexi-n]
          |   +--rw flexi-n    l0-types:flexi-n
          |   +--rw flexi-m?   l0-types:flexi-m
        +--:(multi)
          +--rw frequency-slots

```

```

        +-rw frequency-slot* [flexi-n]
        +-rw flexi-n    l0-types:flexi-n
        +-rw flexi-m?  l0-types:flexi-m
augment /te:te/te:tunnels/te:tunnel/te:secondary-paths
        /te:secondary-path/te:path-in-segment
        /te:label-restrictions/te:label-restriction
        /te:label-start/te:te-label/te:technology:
+--:(wdm)
  +-rw (grid-type)?
  +--:(fixed-dwdm)
  | +-rw dwdm-n?    l0-types:dwdm-n
  +--:(cwdm)
  | +-rw cwdm-n?   l0-types:cwdm-n
  +--:(flexi-grid)
  +-rw flexi-n?   l0-types:flexi-n
augment /te:te/te:tunnels/te:tunnel/te:secondary-paths
        /te:secondary-path/te:path-in-segment
        /te:label-restrictions/te:label-restriction/te:label-end
        /te:te-label/te:technology:
+--:(wdm)
  +-rw (grid-type)?
  +--:(fixed-dwdm)
  | +-rw dwdm-n?    l0-types:dwdm-n
  +--:(cwdm)
  | +-rw cwdm-n?   l0-types:cwdm-n
  +--:(flexi-grid)
  +-rw flexi-n?   l0-types:flexi-n
augment /te:te/te:tunnels/te:tunnel/te:secondary-paths
        /te:secondary-path/te:path-in-segment
        /te:label-restrictions/te:label-restriction/te:label-step
        /te:technology:
+--:(wdm)
  +-rw (l0-grid-type)?
  +--:(fixed-dwdm)
  | +-rw wson-dwdm-channel-spacing?  identityref
  +--:(cwdm)
  | +-rw wson-cwdm-channel-spacing?  identityref
  +--:(flexi-grid)
  | x--rw flexi-grid-channel-spacing?  identityref
  | +-rw flexi-ncfg?                  identityref
  | +-rw flexi-n-step?                uint8
augment /te:te/te:tunnels/te:tunnel/te:secondary-paths
        /te:secondary-path/te:path-out-segment
        /te:label-restrictions/te:label-restriction
        /te:label-start/te:te-label/te:technology:
+--:(wdm)
  +-rw (grid-type)?
  +--:(fixed-dwdm)
  | +-rw dwdm-n?    l0-types:dwdm-n

```

```

    +--:(cwdm)
    | +--rw cwdm-n?    l0-types:cwdm-n
    +--:(flexi-grid)
    +--rw flexi-n?    l0-types:flexi-n
augment /te:te/te:tunnels/te:tunnel/te:secondary-paths
    /te:secondary-path/te:path-out-segment
    /te:label-restrictions/te:label-restriction/te:label-end
    /te:te-label/te:technology:
+--:(wdm)
  +--rw (grid-type)?
  +--:(fixed-dwdm)
  | +--rw dwdm-n?    l0-types:dwdm-n
  +--:(cwdm)
  | +--rw cwdm-n?    l0-types:cwdm-n
  +--:(flexi-grid)
  +--rw flexi-n?    l0-types:flexi-n
augment /te:te/te:tunnels/te:tunnel/te:secondary-paths
    /te:secondary-path/te:path-out-segment
    /te:label-restrictions/te:label-restriction/te:label-step
    /te:technology:
+--:(wdm)
  +--rw (l0-grid-type)?
  +--:(fixed-dwdm)
  | +--rw wson-dwdm-channel-spacing?    identityref
  +--:(cwdm)
  | +--rw wson-cwdm-channel-spacing?    identityref
  +--:(flexi-grid)
  x--rw flexi-grid-channel-spacing?    identityref
  +--rw flexi-ncfg?                    identityref
  +--rw flexi-n-step?                  uint8
augment /te:te/te:tunnels/te:tunnel/te:secondary-paths
    /te:secondary-path/te:computed-paths-properties
    /te:computed-path-properties/te:path-properties
    /te:path-route-objects/te:path-route-object/te:type
    /te:label/te:label-hop/te:te-label/te:technology:
+--:(wdm)
  +--ro (grid-type)?
  +--:(fixed-dwdm)
  | +--ro (fixed-single-or-super-channel)?
  |   +--:(single)
  |   | +--ro dwdm-n?                    l0-types:dwdm-n
  |   +--:(multi)
  |   +--ro subcarrier-dwdm-n*          l0-types:dwdm-n
  +--:(cwdm)
  | +--ro cwdm-n?                        l0-types:cwdm-n
  +--:(flexi-grid)
  +--ro (single-or-super-channel)?
  +--:(single)
  | +--ro flexi-n?                        l0-types:flexi-n

```

```

    | +--ro flexi-m?          l0-types:flexi-m
x--:(super)
    | +--ro subcarrier-flexi-n* [flexi-n]
    |   +--ro flexi-n      l0-types:flexi-n
    |   +--ro flexi-m?    l0-types:flexi-m
+--:(multi)
    +--ro frequency-slots
        +--ro frequency-slot* [flexi-n]
            +--ro flexi-n      l0-types:flexi-n
            +--ro flexi-m?    l0-types:flexi-m
augment /te:te/te:tunnels/te:tunnel/te:secondary-reverse-paths
        /te:secondary-reverse-path/te:optimizations/te:algorithm
        /te:metric/te:optimization-metric
        /te:explicit-route-exclude-objects
        /te:route-object-exclude-object/te:type/te:label
        /te:label-hop/te:te-label/te:technology:
+--:(wdm)
    +--rw (grid-type)?
        +--:(fixed-dwdm)
            | +--rw (fixed-single-or-super-channel)?
            |   +--:(single)
            |   | +--rw dwdm-n?          l0-types:dwdm-n
            |   +--:(multi)
            |   +--rw subcarrier-dwdm-n*  l0-types:dwdm-n
        +--:(cwdm)
            | +--rw cwdm-n?          l0-types:cwdm-n
        +--:(flexi-grid)
            +--rw (single-or-super-channel)?
            +--:(single)
            | +--rw flexi-n?          l0-types:flexi-n
            | +--rw flexi-m?          l0-types:flexi-m
            x--:(super)
            | +--rw subcarrier-flexi-n* [flexi-n]
            |   +--rw flexi-n      l0-types:flexi-n
            |   +--rw flexi-m?    l0-types:flexi-m
            +--:(multi)
                +--rw frequency-slots
                    +--rw frequency-slot* [flexi-n]
                        +--rw flexi-n      l0-types:flexi-n
                        +--rw flexi-m?    l0-types:flexi-m
augment /te:te/te:tunnels/te:tunnel/te:secondary-reverse-paths
        /te:secondary-reverse-path/te:optimizations/te:algorithm
        /te:metric/te:optimization-metric
        /te:explicit-route-include-objects
        /te:route-object-include-object/te:type/te:label
        /te:label-hop/te:te-label/te:technology:
+--:(wdm)
    +--rw (grid-type)?
        +--:(fixed-dwdm)

```

```

| +--rw (fixed-single-or-super-channel)?
|   +--:(single)
|     | +--rw dwdm-n?          l0-types:dwdm-n
|     +--:(multi)
|       +--rw subcarrier-dwdm-n*  l0-types:dwdm-n
+--:(cwdm)
| +--rw cwdm-n?          l0-types:cwdm-n
+--:(flexi-grid)
  +--rw (single-or-super-channel)?
  +--:(single)
  | +--rw flexi-n?          l0-types:flexi-n
  | +--rw flexi-m?          l0-types:flexi-m
  x--:(super)
  | +--rw subcarrier-flexi-n* [flexi-n]
  |   +--rw flexi-n    l0-types:flexi-n
  |   +--rw flexi-m?  l0-types:flexi-m
  +--:(multi)
  +--rw frequency-slots
    +--rw frequency-slot* [flexi-n]
      +--rw flexi-n    l0-types:flexi-n
      +--rw flexi-m?  l0-types:flexi-m
augment /te:te/te:tunnels/te:tunnel/te:secondary-reverse-paths
  /te:secondary-reverse-path
  /te:explicit-route-objects-always
  /te:route-object-exclude-always/te:type/te:label
  /te:label-hop/te:te-label/te:technology:
+--:(wdm)
  +--rw (grid-type)?
  +--:(fixed-dwdm)
  | +--rw (fixed-single-or-super-channel)?
  |   +--:(single)
  |     | +--rw dwdm-n?          l0-types:dwdm-n
  |     +--:(multi)
  |       +--rw subcarrier-dwdm-n*  l0-types:dwdm-n
  +--:(cwdm)
  | +--rw cwdm-n?          l0-types:cwdm-n
  +--:(flexi-grid)
  +--rw (single-or-super-channel)?
  +--:(single)
  | +--rw flexi-n?          l0-types:flexi-n
  | +--rw flexi-m?          l0-types:flexi-m
  x--:(super)
  | +--rw subcarrier-flexi-n* [flexi-n]
  |   +--rw flexi-n    l0-types:flexi-n
  |   +--rw flexi-m?  l0-types:flexi-m
  +--:(multi)
  +--rw frequency-slots
    +--rw frequency-slot* [flexi-n]
      +--rw flexi-n    l0-types:flexi-n

```

```

        +--rw flexi-m?    l0-types:flexi-m
augment /te:te/te:tunnels/te:tunnel/te:secondary-reverse-paths
    /te:secondary-reverse-path
    /te:explicit-route-objects-always
    /te:route-object-include-exclude/te:type/te:label
    /te:label-hop/te:te-label/te:technology:
+--:(wdm)
  +--rw (grid-type)?
    +--:(fixed-dwdm)
      | +--rw (fixed-single-or-super-channel)?
      |   +--:(single)
      |     | +--rw dwdm-n?                l0-types:dwdm-n
      |     | +--:(multi)
      |     | +--rw subcarrier-dwdm-n*    l0-types:dwdm-n
    +--:(cwdm)
      | +--rw cwdm-n?                    l0-types:cwdm-n
    +--:(flexi-grid)
      +--rw (single-or-super-channel)?
        +--:(single)
          | +--rw flexi-n?                l0-types:flexi-n
          | +--rw flexi-m?                l0-types:flexi-m
        x--:(super)
          | +--rw subcarrier-flexi-n* [flexi-n]
          |   +--rw flexi-n    l0-types:flexi-n
          |   +--rw flexi-m?   l0-types:flexi-m
        +--:(multi)
          +--rw frequency-slots
            +--rw frequency-slot* [flexi-n]
              +--rw flexi-n    l0-types:flexi-n
              +--rw flexi-m?   l0-types:flexi-m
augment /te:te/te:tunnels/te:tunnel/te:secondary-reverse-paths
    /te:secondary-reverse-path/te:path-in-segment
    /te:label-restrictions/te:label-restriction
    /te:label-start/te:te-label/te:technology:
+--:(wdm)
  +--rw (grid-type)?
    +--:(fixed-dwdm)
      | +--rw dwdm-n?    l0-types:dwdm-n
    +--:(cwdm)
      | +--rw cwdm-n?    l0-types:cwdm-n
    +--:(flexi-grid)
      +--rw flexi-n?    l0-types:flexi-n
augment /te:te/te:tunnels/te:tunnel/te:secondary-reverse-paths
    /te:secondary-reverse-path/te:path-in-segment
    /te:label-restrictions/te:label-restriction/te:label-end
    /te:te-label/te:technology:
+--:(wdm)
  +--rw (grid-type)?
    +--:(fixed-dwdm)

```

```

    | +--rw dwdm-n?    10-types:dwdm-n
+--:(cwdm)
    | +--rw cwdm-n?    10-types:cwdm-n
+--:(flexi-grid)
    +--rw flexi-n?    10-types:flexi-n
augment /te:te/te:tunnels/te:tunnel/te:secondary-reverse-paths
    /te:secondary-reverse-path/te:path-in-segment
    /te:label-restrictions/te:label-restriction/te:label-step
    /te:technology:
+--:(wdm)
    +--rw (10-grid-type)?
    +--:(fixed-dwdm)
    | +--rw wson-dwdm-channel-spacing?    identityref
+--:(cwdm)
    | +--rw wson-cwdm-channel-spacing?    identityref
+--:(flexi-grid)
    x--rw flexi-grid-channel-spacing?    identityref
    +--rw flexi-ncfg?                    identityref
    +--rw flexi-n-step?                  uint8
augment /te:te/te:tunnels/te:tunnel/te:secondary-reverse-paths
    /te:secondary-reverse-path/te:path-out-segment
    /te:label-restrictions/te:label-restriction
    /te:label-start/te:te-label/te:technology:
+--:(wdm)
    +--rw (grid-type)?
    +--:(fixed-dwdm)
    | +--rw dwdm-n?    10-types:dwdm-n
+--:(cwdm)
    | +--rw cwdm-n?    10-types:cwdm-n
+--:(flexi-grid)
    +--rw flexi-n?    10-types:flexi-n
augment /te:te/te:tunnels/te:tunnel/te:secondary-reverse-paths
    /te:secondary-reverse-path/te:path-out-segment
    /te:label-restrictions/te:label-restriction/te:label-end
    /te:te-label/te:technology:
+--:(wdm)
    +--rw (grid-type)?
    +--:(fixed-dwdm)
    | +--rw dwdm-n?    10-types:dwdm-n
+--:(cwdm)
    | +--rw cwdm-n?    10-types:cwdm-n
+--:(flexi-grid)
    +--rw flexi-n?    10-types:flexi-n
augment /te:te/te:tunnels/te:tunnel/te:secondary-reverse-paths
    /te:secondary-reverse-path/te:path-out-segment
    /te:label-restrictions/te:label-restriction/te:label-step
    /te:technology:
+--:(wdm)
    +--rw (10-grid-type)?

```



```

+--:(fixed-dwdm)
| +--rw wson-dwdm-channel-spacing? identityref
+--:(cwdm)
| +--rw wson-cwdm-channel-spacing? identityref
+--:(flexi-grid)
  x--rw flexi-grid-channel-spacing? identityref
  +--rw flexi-ncfg? identityref
  +--rw flexi-n-step? uint8
augment /te:te/te:tunnels/te:tunnel/te:secondary-reverse-paths
  /te:secondary-reverse-path/te:computed-paths-properties
  /te:computed-path-properties/te:path-properties
  /te:path-route-objects/te:path-route-object/te:type
  /te:label/te:label-hop/te:te-label/te:technology:
+--:(wdm)
  +--ro (grid-type)?
    +--:(fixed-dwdm)
    | +--ro (fixed-single-or-super-channel)?
    |   +--:(single)
    |   | +--ro dwdm-n? l0-types:dwdm-n
    |   +--:(multi)
    |   +--ro subcarrier-dwdm-n* l0-types:dwdm-n
    +--:(cwdm)
    | +--ro cwdm-n? l0-types:cwdm-n
    +--:(flexi-grid)
    +--ro (single-or-super-channel)?
    +--:(single)
    | +--ro flexi-n? l0-types:flexi-n
    | +--ro flexi-m? l0-types:flexi-m
    x--:(super)
    | +--ro subcarrier-flexi-n* [flexi-n]
    | +--ro flexi-n l0-types:flexi-n
    | +--ro flexi-m? l0-types:flexi-m
    +--:(multi)
    +--ro frequency-slots
    +--ro frequency-slot* [flexi-n]
    +--ro flexi-n l0-types:flexi-n
    +--ro flexi-m? l0-types:flexi-m
augment /te:te/te:lsps/te:lsp/te:lsp-actual-route-information
  /te:lsp-actual-route-information/te:type/te:label
  /te:label-hop/te:te-label/te:technology:
+--:(wdm)
  +--ro (grid-type)?
    +--:(fixed-dwdm)
    | +--ro (fixed-single-or-super-channel)?
    |   +--:(single)
    |   | +--ro dwdm-n? l0-types:dwdm-n
    |   +--:(multi)
    |   +--ro subcarrier-dwdm-n* l0-types:dwdm-n
    +--:(cwdm)

```

```
| +--ro cwdm-n?                l0-types:cwdm-n
+--:(flexi-grid)
  +--ro (single-or-super-channel)?
    +--:(single)
      | +--ro flexi-n?          l0-types:flexi-n
      | +--ro flexi-m?          l0-types:flexi-m
      x--:(super)
        | +--ro subcarrier-flexi-n* [flexi-n]
        |   +--ro flexi-n    l0-types:flexi-n
        |   +--ro flexi-m?  l0-types:flexi-m
    +--:(multi)
      +--ro frequency-slots
        +--ro frequency-slot* [flexi-n]
          +--ro flexi-n    l0-types:flexi-n
          +--ro flexi-m?  l0-types:flexi-m
```

5.2. YANG Code

```
<CODE BEGINS> file "ietf-wdm-tunnel@2023-10-22.yang"
```

```
module ietf-wdm-tunnel {
  yang-version 1.1;
  namespace
    "urn:ietf:params:xml:ns:yang:ietf-wdm-tunnel";
  prefix "wdm-tnl";

  import ietf-te {
    prefix "te";
    revision-date "2023-06-16";
    reference
      "I-D.ietf-teas-yang-te-34: A YANG Data Model for Traffic
      Engineering Tunnels, Label Switched Paths and Interfaces.";
  }

  import ietf-layer0-types {
    prefix "l0-types";
  }

  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
           <jorge.lopez\_vergara@uam.es>

    Editor: Daniel Perdices
           <daniel.perdices@naudit.es>

    Editor: Victor Lopez
           <victor.lopez@nokia.com>

    Editor: Italo Busi
           <italo.busi@nokia.com>

    Editor: Aihua Guo
           <aihuaguo.ietf@gmail.com>";

  description
    "This module defines a YANG data model for configuring
    and managing Wavelength-Division Multiplexing (WDM) switched
    optical tunnels.

    The model fully conforms to the Network Management
    Datastore Architecture (NMDA).

    Copyright (c) 2021 IETF Trust and the persons
```

identified as authors of the code. All rights reserved.

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

```
revision "2023-10-22" {
  description
    "Updated revision with combined WSON and Flexi-grid tunnel
    YANG model";

  reference
    "RFC XXXX: YANG data model for WDM tunnels";
    // RFC Ed.: replace XXXX with actual RFC number, update date
    // information and remove this note
}

/*
 * Identities
 */
identity lower-first-wavelength-assignment {
  base l0-types:wavelength-assignment;
  description
    "Assign first available wavelength starting from the
    lowest frequency towards the highest frequency in
    the allowable frequency range.";
}

identity upper-first-wavelength-assignment {
  base l0-types:wavelength-assignment;
  description
    "Assign first available wavelength starting from the
    highest frequency towards the lowest frequency in
    the allowable frequency range.";
}

/*
 * Groupings
 */
grouping tx-tune-constraints {
  description
    "This grouping defines the transmitter's allowed tuning
    frequency range.";
```

```

container tx-tune-constraints {
  description
    "Transmitter's allowed tuning frequency range.";

  uses 10-types:transmitter-tuning-range;
}
}

grouping transceiver-constraints-grp {
  description
    "This grouping defines constraints for transceiver
    configurations";

  leaf-list operational-modes {
    type string {
      length "1..255";
    }
    description
      "List of operational mode ids of the transceiver.";
  }

  uses tx-tune-constraints;
}

grouping path-transceiver-config-grp {
  description
    "This grouping defines explicit transceiver configurations
    on an end-to-end path.";

  leaf transponder-id {
    type uint32;
    description "transponder identifier";
  }

  list transceivers {
    key "lane-id";
    description
      "List of transceivers for all lanes.";

    leaf lane-id {
      type uint8;
      must '. >= 1' {
        error-message
          "Lane identifier must be greater than or equal to 1.";
      }
      description
        "Lane identifier starting from 1.";
    }
  }
  leaf transceiver-id {
    type uint32;
  }
}

```

```

        description
        "transceiver identifier";
    }
}

uses transceiver-constraints-grp;
}

grouping path-transceiver-grp {
    description
    "This grouping defines group of transceivers on a node
    functioning as starting, terminating transceivers, or
    regenerators.";

    container path-in-transceiver {
        description
        "Constraints for incoming direction transceiver
        configurations";

        uses path-transceiver-config-grp;
    }

    container path-out-transceiver {
        description
        "Constraints for outgoing direction transceiver
        configurations";

        uses path-transceiver-config-grp;
    }
}

grouping global-transceiver-constraint {
    description
    "This grouping defines the constraints for transceiver
    configurations.";

    container transceiver-constraint {
        description
        "Constraints for transceiver configurations";

        uses transceiver-constraints-grp;
    }
}

grouping wdm-constraint {
    description
    "Grouping for WDM tunnel constraints";

    container wdm-constraint {
        description

```

```

    "WDM tunnel constraints.";

uses global-transceiver-constraint;
uses l0-types:l0-path-constraints;

leaf use-regen {
    type boolean;
    default false;
    description
        "Indicate whether or not regenerators (e.g. 3R) should be
        considered. When this parameter is set to true, the
        tunnel path may include a regen when the path is not
        feasible for direct optical reach.";
}

leaf wavelength-conversion {
    when '../use-regen = "true"' {
        description
            "Regenerator must be enabled for wavelength conversion
            to be considered.";
    }
    type boolean;
    default false;
    description
        "Indicate whether or not wavelength conversion is allowed
        along the tunnel path. Applicable only when 3R
        regeneration is enabled.";
}

uses l0-types:l0-tunnel-attributes;

leaf guard-band-size {
    type l0-types:frequency-thz;
    description
        "Guard band size in THz.";
}

leaf matching-fwd-rev-wavelength {
    type boolean;
    default true;
    description
        "Indicate whether or not the assigned channels for
        forward and reverse wavelength path must be the same.";
}

leaf allow-retuning {
    type boolean;
    default false;
    description

```



```

        "Indicate whether or not re-tuning is allowed when one or
        more paths of a WDM tunnel is being restored. Typically,
        wavelength retuning is not preferred for wavelength
        planning considerations.";
    }
    leaf delta-power {
        type l0-types:gain-in-db-or-null;
        units "dB";
        description
            "Delta power in dB indicating the per-channel power
            deviation from the nominal power per channel at the
            output of an OMS.";
    }
}
}

grouping wdm-path-state {
    description
        "Grouping for WDM path state.";

    container wdm-path-state {
        config false;
        description
            "WDM path state.";

        leaf gsnr {
            type l0-types:snr;
            description
                "Actual received GSNR for the WDM path.";
        }
    }
}

/*
 * Data nodes
 */

/*
 * Global constraints for WDM tunnel
 */
augment "/te:te/te:tunnels/te:tunnel" {
    description
        "Augment with additional parameters required for WDM
        tunnel configurations.";
    uses wdm-constraint;
}

/*
 * Transceiver constraints for primary path

```

```

* Applicable to starting, terminating and regenerator
* transceivers.
*/
augment "/te:te/te:tunnels/te:tunnel/te:primary-paths/"
  + "te:primary-path/te:explicit-route-objects-always/"
  + "te:route-object-exclude-always/te:type/"
  + "te:numbered-node-hop/te:numbered-node-hop" {
description
  "Augment TE primary path with transceiver configurations.";

  uses path-transceiver-grp;
}

/*
* Transceiver constraints for primary reverse path
* Applicable to starting, terminating and regenerator
* transceivers.
*/
augment "/te:te/te:tunnels/te:tunnel/te:primary-paths/"
  + "te:primary-path/te:primary-reverse-path/"
  + "te:explicit-route-objects-always/"
  + "te:route-object-exclude-always/te:type/"
  + "te:numbered-node-hop/te:numbered-node-hop" {
description
  "Augment TE primary reverse path with transceiver
  configurations.";

  uses path-transceiver-grp;
}

/*
* Computed path properties for primary path.
*/
augment "/te:te/te:tunnels/te:tunnel/te:primary-paths/"
  + "te:primary-path/te:computed-paths-properties/"
  + "te:computed-path-properties/te:path-properties" {
description
  "Augment TE computed primary path with WDM properties.";

  uses l0-types:l0-path-properties;
}

/*
* Computed path properties for primary reverse path.
*/
augment "/te:te/te:tunnels/te:tunnel/te:primary-paths/"
  + "te:primary-path/te:primary-reverse-path/"
  + "te:computed-paths-properties/"
  + "te:computed-path-properties/te:path-properties" {

```

```

description
  "Augment TE computed primary reverse path with WDM
  properties.";

  uses l0-types:l0-path-properties;
}

/*
 * Transceiver constraints for secondary path
 * Applicable to starting, terminating and regenerator
 * transceivers.
 */
augment "/te:te/te:tunnels/te:tunnel/te:secondary-paths/"
  + "te:secondary-path/te:explicit-route-objects-always/"
  + "te:route-object-exclude-always/te:type/"
  + "te:numbered-node-hop/te:numbered-node-hop" {
  description
    "Augment TE secondary path with transceiver configurations.";

  uses path-transceiver-grp;
}

/*
 * Transceiver constraints for secondary reverse path
 * Applicable to starting, terminating and regenerator
 * transceivers.
 */
augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-reverse-paths/"
  + "te:secondary-reverse-path/"
  + "te:explicit-route-objects-always/"
  + "te:route-object-exclude-always/te:type/"
  + "te:numbered-node-hop/te:numbered-node-hop" {
  description
    "Augment TE secondary reverse path with transceiver
    configurations.";

  uses path-transceiver-grp;
}

/*
 * Computed path properties for secondary path.
 */
augment "/te:te/te:tunnels/te:tunnel/te:secondary-paths/"
  + "te:secondary-path/te:computed-paths-properties/"
  + "te:computed-path-properties/te:path-properties" {
  description
    "Augment TE computed secondary path with WDM properties.";
}

```

```

    uses l0-types:l0-path-properties;
}

/*
 * Computed path properties for secondary reverse path.
 */
augment "/te:te/te:tunnels/te:tunnel/te:secondary-reverse-paths/"
    + "te:secondary-reverse-path/te:computed-paths-properties/"
    + "te:computed-path-properties/te:path-properties" {
    description
        "Augment TE computed secondary reverse path with WDM
        properties.";

    uses l0-types:l0-path-properties;
}

/*
 * WDM path state
 */
augment "/te:te/te:lsp/te:lsp/"
    + "te:lsp-actual-route-information" {
    description
        "Augment TE LSP to with WDM path state.";

    uses wdm-path-state;
}

/*
 * Augment TE label range information
 */
augment "/te:te/te:globals/te:named-path-constraints/"
    + "te:named-path-constraint/te:path-in-segment/"
    + "te:label-restrictions/te:label-restriction" {
    description
        "Augment TE label range information for the ingress segment
        of the named path constraint.";
    uses l0-types:wdm-label-range-info;
}

augment "/te:te/te:globals/te:named-path-constraints/"
    + "te:named-path-constraint/te:path-out-segment/"
    + "te:label-restrictions/"
    + "te:label-restriction" {
    description
        "Augment TE label range information for the egress segment
        of the named path constraint.";
    uses l0-types:wdm-label-range-info;
}

```

```
augment "/te:te/te:tunnels/te:tunnel/"
  + "te:primary-paths/te:primary-path/"
  + "te:path-in-segment/te:label-restrictions/"
  + "te:label-restriction" {
  description
    "Augment TE label range information for the ingress segment
    of the primay path.";
  uses l0-types:wdm-label-range-info;
}
```

```
augment "/te:te/te:tunnels/te:tunnel/"
  + "te:primary-paths/te:primary-path/"
  + "te:path-out-segment/te:label-restrictions/"
  + "te:label-restriction" {
  description
    "Augment TE label range information for the egress segment
    of the primay path.";
  uses l0-types:wdm-label-range-info;
}
```

```
augment "/te:te/te:tunnels/te:tunnel/"
  + "te:primary-paths/te:primary-path/"
  + "te:primary-reverse-path/"
  + "te:path-in-segment/te:label-restrictions/"
  + "te:label-restriction" {
  description
    "Augment TE label range information for the ingress segment
    of the primay reverse path.";
  uses l0-types:wdm-label-range-info;
}
```

```
augment "/te:te/te:tunnels/te:tunnel/"
  + "te:primary-paths/te:primary-path/"
  + "te:primary-reverse-path/"
  + "te:path-out-segment/te:label-restrictions/"
  + "te:label-restriction" {
  description
    "Augment TE label range information for the egress segment
    of the primay reverse path.";
  uses l0-types:wdm-label-range-info;
}
```

```
augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-paths/te:secondary-path/"
  + "te:path-in-segment/te:label-restrictions/"
  + "te:label-restriction" {
  description
    "Augment TE label range information for the ingress segment
    of the secondary path.";
```

```

    uses l0-types:wdm-label-range-info;
}

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-paths/te:secondary-path/"
  + "te:path-out-segment/te:label-restrictions/"
  + "te:label-restriction" {
  description
    "Augment TE label range information for the egress segment
    of the secondary path.";
  uses l0-types:wdm-label-range-info;
}

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-reverse-paths/te:secondary-reverse-path/"
  + "te:path-in-segment/te:label-restrictions/"
  + "te:label-restriction" {
  description
    "Augment TE label range information for the ingress segment
    of the secondary reverse path.";
  uses l0-types:wdm-label-range-info;
}

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-reverse-paths/te:secondary-reverse-path/"
  + "te:path-out-segment/te:label-restrictions/"
  + "te:label-restriction" {
  description
    "Augment TE label range information for the egress segment
    of the secondary reverse path.";
  uses l0-types:wdm-label-range-info;
}

/*
 * Augment TE label.
 */
augment "/te:te/te:globals/te:named-path-constraints/"
  + "te:named-path-constraint/"
  + "te:explicit-route-objects-always/"
  + "te:route-object-exclude-always/te:type/te:label/"
  + "te:label-hop/te:te-label/te:technology" {
  description
    "Augment TE label hop for the explicit route objects always
    excluded by the path computation with the named path
    constraint.";
  case wdm {
    uses l0-types:wdm-label-hop;
  }
}

```

```

augment "/te:te/te:globals/te:named-path-constraints/"
  + "te:named-path-constraint/"
  + "te:explicit-route-objects-always/"
  + "te:route-object-include-exclude/te:type/te:label/"
  + "te:label-hop/te:te-label/te:technology" {
description
  "Augment TE label hop for the explicit route objects included
  or excluded by the path computation with the named path
  constraint.";
case wdm {
  uses l0-types:wdm-label-hop;
}
}
augment "/te:te/te:globals/te:named-path-constraints/"
  + "te:named-path-constraint/te:path-in-segment/"
  + "te:label-restrictions/"
  + "te:label-restriction/te:label-start/"
  + "te:te-label/te:technology" {
description
  "Augment TE label range start for the ingress segment
  of the named path constraint.";
case wdm {
  uses l0-types:wdm-label-start-end;
}
}
augment "/te:te/te:globals/te:named-path-constraints/"
  + "te:named-path-constraint/te:path-in-segment/"
  + "te:label-restrictions/"
  + "te:label-restriction/te:label-end/"
  + "te:te-label/te:technology" {
description
  "Augment TE label range end for the ingress segment
  of the named path constraint.";
case wdm {
  uses l0-types:wdm-label-start-end;
}
}
augment "/te:te/te:globals/te:named-path-constraints/"
  + "te:named-path-constraint/te:path-in-segment/"
  + "te:label-restrictions/te:label-restriction/"
  + "te:label-step/te:technology" {
description
  "Augment TE label range step for the ingress segment
  of the named path constraint.";
case wdm {
  uses l0-types:wdm-label-step;
}
}

```

```

    }
}

augment "/te:te/te:globals/te:named-path-constraints/"
  + "te:named-path-constraint/te:path-out-segment/"
  + "te:label-restrictions/"
  + "te:label-restriction/te:label-start/"
  + "te:te-label/te:technology" {
description
  "Augment TE label range start for the egress segment
  of the named path constraint.";
case wdm {
  uses l0-types:wdm-label-start-end;
}
}

augment "/te:te/te:globals/te:named-path-constraints/"
  + "te:named-path-constraint/te:path-out-segment/"
  + "te:label-restrictions/"
  + "te:label-restriction/te:label-end/"
  + "te:te-label/te:technology" {
description
  "Augment TE label range end for the egress segment
  of the named path constraint.";
case wdm {
  uses l0-types:wdm-label-start-end;
}
}

augment "/te:te/te:globals/te:named-path-constraints/"
  + "te:named-path-constraint/te:path-out-segment/"
  + "te:label-restrictions/te:label-restriction/"
  + "te:label-step/te:technology" {
description
  "Augment TE label range step for the egress segment
  of the named path constraint.";
case wdm {
  uses l0-types:wdm-label-step;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:primary-paths/te:primary-path/"
  + "te:optimizations/te:algorithm/te:metric/"
  + "te:optimization-metric/te:explicit-route-exclude-objects/"
  + "te:route-object-exclude-object/te:type/te:label/"
  + "te:label-hop/te:te-label/te:technology" {
description
  "Augment TE label hop for the optimization of the explicit

```



```

    route objects excluded by the path computation of the primary
    path.";
case wdm {
    uses l0-types:wdm-label-hop;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
    + "te:primary-paths/te:primary-path/"
    + "te:optimizations/te:algorithm/te:metric/"
    + "te:optimization-metric/te:explicit-route-include-objects/"
    + "te:route-object-include-object/te:type/te:label/"
    + "te:label-hop/te:te-label/te:technology" {
description
    "Augment TE label hop for the optimization of the explicit
    route objects included by the path computation of the primary
    path.";
case wdm {
    uses l0-types:wdm-label-hop;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
    + "te:primary-paths/te:primary-path/"
    + "te:explicit-route-objects-always/"
    + "te:route-object-exclude-always/te:type/te:label/"
    + "te:label-hop/te:te-label/te:technology" {
description
    "Augment TE label hop for the explicit route objects always
    excluded by the path computation of the primary path.";
case wdm {
    uses l0-types:wdm-label-hop;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
    + "te:primary-paths/te:primary-path/"
    + "te:explicit-route-objects-always/"
    + "te:route-object-include-exclude/te:type/te:label/"
    + "te:label-hop/te:te-label/te:technology" {
description
    "Augment TE label hop for the explicit route objects included
    or excluded by the path computation of the primary path.";
case wdm {
    uses l0-types:wdm-label-hop;
}
}

augment "/te:te/te:tunnels/te:tunnel/"

```

```

    + "te:primary-paths/te:primary-path/"
    + "te:path-in-segment/te:label-restrictions/"
    + "te:label-restriction/te:label-start/"
    + "te:te-label/te:technology" {
description
    "Augment TE label range start for the ingress segment
    of the primay path.";
case wdm {
    uses l0-types:wdm-label-start-end;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
    + "te:primary-paths/te:primary-path/"
    + "te:path-in-segment/te:label-restrictions/"
    + "te:label-restriction/te:label-end/"
    + "te:te-label/te:technology" {
description
    "Augment TE label range end for the ingress segment
    of the primay path.";
case wdm {
    uses l0-types:wdm-label-start-end;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
    + "te:primary-paths/te:primary-path/"
    + "te:path-in-segment/te:label-restrictions/"
    + "te:label-restriction/te:label-step/te:technology" {
description
    "Augment TE label range step for the ingress segment
    of the primay path.";
case wdm {
    uses l0-types:wdm-label-step;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
    + "te:primary-paths/te:primary-path/"
    + "te:path-out-segment/te:label-restrictions/"
    + "te:label-restriction/te:label-start/"
    + "te:te-label/te:technology" {
description
    "Augment TE label range start for the egress segment
    of the primay path.";
case wdm {
    uses l0-types:wdm-label-start-end;
}
}

```

```

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:primary-paths/te:primary-path/"
  + "te:path-out-segment/te:label-restrictions/"
  + "te:label-restriction/te:label-end/"
  + "te:te-label/te:technology" {
description
  "Augment TE label range end for the egress segment
  of the primay path.";
case wdm {
  uses l0-types:wdm-label-start-end;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:primary-paths/te:primary-path/"
  + "te:path-out-segment/te:label-restrictions/"
  + "te:label-restriction/te:label-step/te:technology" {
description
  "Augment TE label range end for the egress segment
  of the primay path.";
case wdm {
  uses l0-types:wdm-label-step;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:primary-paths/te:primary-path/"
  + "te:computed-paths-properties/"
  + "te:computed-path-properties/te:path-properties/"
  + "te:path-route-objects/te:path-route-object/"
  + "te:type/te:label/"
  + "te:label-hop/te:te-label/te:technology" {
description
  "Augment TE label hop for the route object of the computed
  primary path.";
case wdm {
  uses l0-types:wdm-label-hop;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:primary-paths/te:primary-path/"
  + "te:primary-reverse-path/"
  + "te:optimizations/te:algorithm/te:metric/"
  + "te:optimization-metric/te:explicit-route-exclude-objects/"
  + "te:route-object-exclude-object/te:type/te:label/"
  + "te:label-hop/te:te-label/te:technology" {
description

```

```

    "Augment TE label hop for the optimization of the explicit
    route objects excluded by the path computation of the primary
    reverse path.";
  case wdm {
    uses l0-types:wdm-label-hop;
  }
}

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:primary-paths/te:primary-path/"
  + "te:primary-reverse-path/"
  + "te:optimizations/te:algorithm/te:metric/"
  + "te:optimization-metric/te:explicit-route-include-objects/"
  + "te:route-object-include-object/te:type/te:label/"
  + "te:label-hop/te:te-label/te:technology" {
  description
    "Augment TE label hop for the optimization of the explicit
    route objects included by the path computation of the primary
    reverse path.";
  case wdm {
    uses l0-types:wdm-label-hop;
  }
}

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:primary-paths/te:primary-path/"
  + "te:primary-reverse-path/"
  + "te:explicit-route-objects-always/"
  + "te:route-object-exclude-always/"
  + "te:type/te:label/"
  + "te:label-hop/te:te-label/te:technology" {
  description
    "Augment TE label hop for the explicit route objects always
    excluded by the path computation of the primary reverse
    path.";
  case wdm {
    uses l0-types:wdm-label-hop;
  }
}

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:primary-paths/te:primary-path/"
  + "te:primary-reverse-path/"
  + "te:explicit-route-objects-always/"
  + "te:route-object-include-exclude/"
  + "te:type/te:label/"
  + "te:label-hop/te:te-label/te:technology" {
  description
    "Augment TE label hop for the explicit route objects included

```

```
    or excluded by the path computation of the primary reverse
    path.";
  case wdm {
    uses l0-types:wdm-label-hop;
  }
}
```

```
augment "/te:te/te:tunnels/te:tunnel/"
  + "te:primary-paths/te:primary-path/"
  + "te:primary-reverse-path/"
  + "te:path-in-segment/te:label-restrictions/"
  + "te:label-restriction/te:label-start/"
  + "te:te-label/te:technology" {
  description
    "Augment TE label range start for the ingress segment
    of the primay reverse path.";
  case wdm {
    uses l0-types:wdm-label-start-end;
  }
}
```

```
augment "/te:te/te:tunnels/te:tunnel/"
  + "te:primary-paths/te:primary-path/"
  + "te:primary-reverse-path/"
  + "te:path-in-segment/te:label-restrictions/"
  + "te:label-restriction/te:label-end/"
  + "te:te-label/te:technology" {
  description
    "Augment TE label range end for the ingress segment
    of the primay reverse path.";
  case wdm {
    uses l0-types:wdm-label-start-end;
  }
}
```

```
augment "/te:te/te:tunnels/te:tunnel/"
  + "te:primary-paths/te:primary-path/"
  + "te:primary-reverse-path/"
  + "te:path-in-segment/te:label-restrictions/"
  + "te:label-restriction/te:label-step/te:technology" {
  description
    "Augment TE label range step for the ingress segment
    of the primay reverse path.";
  case wdm {
    uses l0-types:wdm-label-step;
  }
}
```

```
augment "/te:te/te:tunnels/te:tunnel/"
```

```

    + "te:primary-paths/te:primary-path/"
    + "te:primary-reverse-path/"
    + "te:path-out-segment/te:label-restrictions/"
    + "te:label-restriction/te:label-start/"
    + "te:te-label/te:technology" {
description
    "Augment TE label range start for the egress segment
    of the primay reverse path.";
case wdm {
    uses l0-types:wdm-label-start-end;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
    + "te:primary-paths/te:primary-path/"
    + "te:primary-reverse-path/"
    + "te:path-out-segment/te:label-restrictions/"
    + "te:label-restriction/te:label-end/"
    + "te:te-label/te:technology" {
description
    "Augment TE label range end for the egress segment
    of the primay reverse path.";
case wdm {
    uses l0-types:wdm-label-start-end;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
    + "te:primary-paths/te:primary-path/"
    + "te:primary-reverse-path/"
    + "te:path-out-segment/te:label-restrictions/"
    + "te:label-restriction/te:label-step/te:technology" {
description
    "Augment TE label range step for the egress segment
    of the primay reverse path.";
case wdm {
    uses l0-types:wdm-label-step;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
    + "te:primary-paths/te:primary-path/"
    + "te:primary-reverse-path/"
    + "te:computed-paths-properties/te:computed-path-properties/"
    + "te:path-properties/te:path-route-objects/"
    + "te:path-route-object/te:type/te:label/"
    + "te:label-hop/te:te-label/te:technology" {
description
    "Augment TE label hop for the route object of the computed

```

```

    primary reverse path.";
case wdm {
    uses l0-types:wdm-label-hop;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
    + "te:secondary-paths/te:secondary-path/"
    + "te:optimizations/te:algorithm/te:metric/"
    + "te:optimization-metric/te:explicit-route-exclude-objects/"
    + "te:route-object-exclude-object/te:type/te:label/"
    + "te:label-hop/te:te-label/te:technology" {
description
    "Augment TE label hop for the optimization of the explicit
    route objects excluded by the path computation of the
    secondary path.";
case wdm {
    uses l0-types:wdm-label-hop;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
    + "te:secondary-paths/te:secondary-path/"
    + "te:optimizations/te:algorithm/te:metric/"
    + "te:optimization-metric/te:explicit-route-include-objects/"
    + "te:route-object-include-object/te:type/te:label/"
    + "te:label-hop/te:te-label/te:technology" {
description
    "Augment TE label hop for the optimization of the explicit
    route objects included by the path computation of the
    secondary path.";
case wdm {
    uses l0-types:wdm-label-hop;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
    + "te:secondary-paths/te:secondary-path/"
    + "te:explicit-route-objects-always/"
    + "te:route-object-exclude-always/te:type/te:label/"
    + "te:label-hop/te:te-label/te:technology" {
description
    "Augment TE label hop for the explicit route objects always
    excluded by the path computation of the secondary path.";
case wdm {
    uses l0-types:wdm-label-hop;
}
}
}

```

```

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-paths/te:secondary-path/"
  + "te:explicit-route-objects-always/"
  + "te:route-object-include-exclude/te:type/te:label/"
  + "te:label-hop/te:te-label/te:technology" {
description
  "Augment TE label hop for the explicit route objects included
  or excluded by the path computation of the secondary path.";
case wdm {
  uses l0-types:wdm-label-hop;
}
}

```

```

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-paths/te:secondary-path/"
  + "te:path-in-segment/te:label-restrictions/"
  + "te:label-restriction/te:label-start/"
  + "te:te-label/te:technology" {
description
  "Augment TE label range start for the ingress segment
  of the secondary path.";
case wdm {
  uses l0-types:wdm-label-start-end;
}
}

```

```

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-paths/te:secondary-path/"
  + "te:path-in-segment/te:label-restrictions/"
  + "te:label-restriction/te:label-end/"
  + "te:te-label/te:technology" {
description
  "Augment TE label range end for the ingress segment
  of the secondary path.";
case wdm {
  uses l0-types:wdm-label-start-end;
}
}

```

```

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-paths/te:secondary-path/"
  + "te:path-in-segment/te:label-restrictions/"
  + "te:label-restriction/te:label-step/te:technology" {
description
  "Augment TE label range step for the ingress segment
  of the secondary path.";
case wdm {
  uses l0-types:wdm-label-step;
}
}

```



```

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-paths/te:secondary-path/"
  + "te:path-out-segment/te:label-restrictions/"
  + "te:label-restriction/te:label-start/"
  + "te:te-label/te:technology" {
description
  "Augment TE label range start for the egress segment
  of the secondary path.";
case wdm {
  uses l0-types:wdm-label-start-end;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-paths/te:secondary-path/"
  + "te:path-out-segment/te:label-restrictions/"
  + "te:label-restriction/te:label-end/"
  + "te:te-label/te:technology" {
description
  "Augment TE label range end for the egress segment
  of the secondary path.";
case wdm {
  uses l0-types:wdm-label-start-end;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-paths/te:secondary-path/"
  + "te:path-out-segment/te:label-restrictions/"
  + "te:label-restriction/te:label-step/te:technology" {
description
  "Augment TE label range step for the egress segment
  of the secondary path.";
case wdm {
  uses l0-types:wdm-label-step;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-paths/te:secondary-path/"
  + "te:computed-paths-properties/"
  + "te:computed-path-properties/"
  + "te:path-properties/te:path-route-objects/"
  + "te:path-route-object/te:type/te:label/"
  + "te:label-hop/te:te-label/te:technology" {
description
  "Augment TE label hop for the route object of the computed
  secondary path.";

```

```

    case wdm {
      uses l0-types:wdm-label-hop;
    }
  }

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-reverse-paths/te:secondary-reverse-path/"
  + "te:optimizations/te:algorithm/te:metric/"
  + "te:optimization-metric/te:explicit-route-exclude-objects/"
  + "te:route-object-exclude-object/te:type/te:label/"
  + "te:label-hop/te:te-label/te:technology" {
  description
    "Augment TE label hop for the optimization of the explicit
    route objects excluded by the path computation of the
    secondary reverse path.";
  case wdm {
    uses l0-types:wdm-label-hop;
  }
}

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-reverse-paths/te:secondary-reverse-path/"
  + "te:optimizations/te:algorithm/te:metric/"
  + "te:optimization-metric/te:explicit-route-include-objects/"
  + "te:route-object-include-object/te:type/te:label/"
  + "te:label-hop/te:te-label/te:technology" {
  description
    "Augment TE label hop for the optimization of the explicit
    route objects included by the path computation of the
    secondary reverse path.";
  case wdm {
    uses l0-types:wdm-label-hop;
  }
}

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-reverse-paths/te:secondary-reverse-path/"
  + "te:explicit-route-objects-always/"
  + "te:route-object-exclude-always/te:type/te:label/"
  + "te:label-hop/te:te-label/te:technology" {
  description
    "Augment TE label hop for the explicit route objects always
    excluded by the path computation of the secondary reverse
    path.";
  case wdm {
    uses l0-types:wdm-label-hop;
  }
}

```

```

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-reverse-paths/te:secondary-reverse-path/"
  + "te:explicit-route-objects-always/"
  + "te:route-object-include-exclude/te:type/te:label/"
  + "te:label-hop/te:te-label/te:technology" {
description
  "Augment TE label hop for the explicit route objects included
  or excluded by the path computation of the secondary reverse
  path.";
case wdm {
  uses l0-types:wdm-label-hop;
}
}

```

```

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-reverse-paths/te:secondary-reverse-path/"
  + "te:path-in-segment/te:label-restrictions/"
  + "te:label-restriction/te:label-start/"
  + "te:te-label/te:technology" {
description
  "Augment TE label range start for the ingress segment
  of the secondary reverse path.";
case wdm {
  uses l0-types:wdm-label-start-end;
}
}

```

```

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-reverse-paths/te:secondary-reverse-path/"
  + "te:path-in-segment/te:label-restrictions/"
  + "te:label-restriction/te:label-end/"
  + "te:te-label/te:technology" {
description
  "Augment TE label range end for the ingress segment
  of the secondary reverse path.";
case wdm {
  uses l0-types:wdm-label-start-end;
}
}

```

```

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-reverse-paths/te:secondary-reverse-path/"
  + "te:path-in-segment/te:label-restrictions/"
  + "te:label-restriction/te:label-step/te:technology" {
description
  "Augment TE label range step for the ingress segment
  of the secondary reverse path.";
case wdm {
  uses l0-types:wdm-label-step;
}
}

```

```

    }
}

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-reverse-paths/te:secondary-reverse-path/"
  + "te:path-out-segment/te:label-restrictions/"
  + "te:label-restriction/te:label-start/"
  + "te:te-label/te:technology" {
description
  "Augment TE label range start for the egress segment
  of the secondary reverse path.";
case wdm {
  uses l0-types:wdm-label-start-end;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-reverse-paths/te:secondary-reverse-path/"
  + "te:path-out-segment/te:label-restrictions/"
  + "te:label-restriction/te:label-end/"
  + "te:te-label/te:technology" {
description
  "Augment TE label range end for the egress segment
  of the secondary reverse path.";
case wdm {
  uses l0-types:wdm-label-start-end;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-reverse-paths/te:secondary-reverse-path/"
  + "te:path-out-segment/te:label-restrictions/"
  + "te:label-restriction/te:label-step/te:technology" {
description
  "Augment TE label range step for the egress segment
  of the secondary reverse path.";
case wdm {
  uses l0-types:wdm-label-step;
}
}

augment "/te:te/te:tunnels/te:tunnel/"
  + "te:secondary-reverse-paths/te:secondary-reverse-path/"
  + "te:computed-paths-properties/"
  + "te:computed-path-properties/"
  + "te:path-properties/te:path-route-objects/"
  + "te:path-route-object/te:type/te:label/"
  + "te:label-hop/te:te-label/te:technology" {
description

```

```
    "Augment TE label hop for the route object of the computed
    secondary reverse path.";
  case wdm {
    uses l0-types:wdm-label-hop;
  }
}

augment "/te:te/te:lsp/"
  + "te:lsp/te:lsp-actual-route-information/"
  + "te:lsp-actual-route-information/te:type/te:label/"
  + "te:label-hop/te:te-label/te:technology" {
  description
    "Augment TE label hop for the actual route of the LSP.";
  case wdm {
    uses l0-types:wdm-label-hop;
  }
}
}
```

<CODE ENDS>

6. Security Considerations

The configuration, state, and action data defined in this document are designed to be accessed via a management protocol with a secure transport layer, such as NETCONF [[RFC6241](#)] or RESTCONF [[RFC8040](#)]. 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.

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:

```
*/te:te/te:tunnels/te:tunnel
```

```
*/te:te/.../te:te-bandwidth/te:technology
```

```
*/te:te/.../te:type/te:label/te:label-hop/te:te-label/  
te:technology
```

```
*/te:te/.../te:label-restrictions/te:label-restriction/te:label-  
start/te:te-label/te:technology
```

```
*/te:te/.../te:label-restrictions/te:label-restriction/te:label-  
end/te:te-label/te:technology
```

```
*/te:te/.../te:label-restrictions/te:label-restriction/
```

Editors note: we are using simplified description by folding similar branches to avoid repetition.

7. IANA Considerations

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

URI: urn:ietf:params:xml:ns:yang:ietf-wdm-tunnel

Registrant Contact: The IESG

XML: N/A; the requested URI is an XML namespace.

This document registers the following YANG module in the YANG Module Names registry [[RFC6020](#)].

name: ietf-wdm-tunnel
namespace: urn:ietf:params:xml:ns:yang:ietf-wdm-tunnel
prefix: wdm-tnl
reference: RFC XXXX

8. References

8.1. Normative References

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8.2. Informative References

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Acknowledgments

This work is also partially funded by the Spanish State Research Agency under the project AgileMon (AEI PID2019-104451RB-C21) and by the Spanish Ministry of Science, Innovation and Universities under

the program for the training of university lecturers (Grant number: FPU19/05678).

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