

CCAMP Working Group
Internet Draft
Intended status: Standard Track
Expires: August 26, 2019

Y. Lee (Editor)
D. Dhody
A. Guo
Huawei

V. Lopez
Telefonica

D. King
U. of Lancaster

February 27, 2019

A YANG Data Model for WSON (Wavelength Switched Optical Networks)

[draft-ietf-ccamp-wson-yang-19](#)

Abstract

This document provides a YANG data model for the routing and wavelength assignment (RWA) TE topology in wavelength switched optical networks (WSONs). The YANG data model defined in this document conforms to the Network Management Datastore Architecture defined in [RFC 8342](#).

Status of this Memo

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

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

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

The list of current Internet-Drafts can be accessed at <http://www.ietf.org/ietf/1id-abstracts.txt>

The list of Internet-Draft Shadow Directories can be accessed at <http://www.ietf.org/shadow.html>

This Internet-Draft will expire on August 26, 2019.

Copyright Notice
Lee, et al.

Expires August 2019

[Page 1]

Internet-Draft

WSOY YANG Model

December 2018

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

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents (<http://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the [Trust Legal Provisions](#) and are provided without warranty as described in the Simplified BSD License.

Table of Contents

1.	Introduction.....	2
1.1.	Requirements Language.....	3
1.2.	Terminology.....	3
1.3.	Tree diagram.....	4
1.4.	Prefixes in Data Node Names.....	4
2.	YANG Model (Tree Structure).....	4
3.	IETF-WSOY-Topology YANG Model.....	28
4.	IETF-Layer0-Types YANG Model.....	67
5.	Security Considerations.....	83
6.	IANA Considerations.....	84
7.	Acknowledgments.....	85
8.	References.....	86
8.1.	Normative References.....	86
8.2.	Informative References.....	86
9.	Contributors.....	88
	Authors' Addresses.....	88

[1.](#) Introduction

This document provides a YANG data model for the routing and wavelength assignment (RWA) Traffic Engineering (TE) topology in

wavelength switched optical networks (WSONs). The YANG model described in this document is a WSON technology-specific YANG model based on the information model developed in [[RFC7446](#)] and the two encoding documents [[RFC7581](#)] and [[RFC7579](#)] that developed protocol independent encodings based on [[RFC7446](#)].

This document augments the generic TE topology draft [[TE-TOP0](#)].

What is not in scope of this document is both impairment-aware WSON and flex-grid.

This document defines two YANG models: ietf-wson-topology ([Section 3](#)) and ietf-layer0-types ([Section 4](#)).

There are multiple applications for the yang data model defined in this document. For example, nodes within the network can use the data model to capture their understanding of the overall WSON topology and expose it to a controller. A controller can further propagate the topology to other controllers. The YANG model is used by NETCONF [[RFC6020](#)], [[RFC8341](#)] or a RESTCONF [[RFC8040](#)] protocol. The YANG data model defined in this document conforms to the Network Management Datastore Architecture [[RFC8342](#)].

[1.1](#). Requirements Language

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.

[1.2](#). Terminology

Refer to [[RFC7446](#)] and [[RFC7581](#)] 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](#)].

[1.3.](#) Tree diagram

A simplified graphical representation of the data model is used in chapter 2 of this this document. The meaning of the symbols in these diagrams is defined in [[RFC8340](#)].

[1.4.](#) 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 Table 1.

Prefix	YANG module	Reference
layer0-type	ietf-layer0-types	[RFCXXXX]
wson	ietf-wson-topology	[RFCXXXX]
nw	ietf-network	[RFC8345]
nt	ietf-network-topology	[RFC8345]
tet	ietf-te-topology	[TE-TOP0]

Table 1: Prefixes and corresponding YANG modules

Note: The RFC Editor will replace XXXX with the number assigned to the RFC once this draft becomes an RFC.

YANG module "ietf-layer0-types" (defined in [Section 4](#)) references [\[RFC6163\]](#), [\[RFC7205\]](#), and [\[RFC7698\]](#).

2. YANG Model (Tree Structure)

```
module: ietf-wson-topology
  augment /nw:networks/nw:network/nw:network-types/tet:te-topology:
    +--rw wson-topology!
```

Lee, et al.

Expires August 2018

[Page 4]

Internet-Draft

WSN YANG Model

December 2018

```
  augment /nw:networks/nw:network/nt:link/tet:te/tet:te-link-
attributes:
  augment /nw:networks/nw:network/nw:node/nt:termination-point/tet:te:
    +--rw supported-payload-types* [index]
      | +--rw index          uint16
      | +--rw payload-type?  string
    +--rw client-facing?      boolean
  augment /nw:networks/nw:network/nw:node/tet:te/tet:te-node-
attributes:
    +--rw wson-node
      +--rw node-type?  identityref
  augment /nw:networks/nw:network/nw:node/tet:te/tet:tunnel-
termination-point:
    +--rw supported-operational-modes*      layer0-types:operational-mode
    +--rw configured-operational-modes?     layer0-types:operational-mode
    +--rw supported-fec-types*              identityref
    +--rw supported-termination-types*      identityref
    +--rw supports-bit-stuffing?            boolean
    +--rw is-tunable?                      boolean
    +--rw max-subcarrier-channel-num?       uint8
  augment /nw:networks/nw:network/nw:node/nt:termination-
point/tet:te/tet:interface-switching-capability/tet:max-lsp-
bandwidth/tet:te-bandwidth/tet:technology:
    +--:(wson)
      +--rw bandwidth-type?  identityref
  augment /nw:networks/nw:network/nw:node/tet:te/tet:te-node-
attributes/tet:connectivity-matrices/tet:path-constraints/tet:te-
```

```

bandwidth/tet:technology:
  +--:(wson)
    +--rw supported-bandwidth-list*   identityref
  augment /nw:networks/nw:network/nw:node/tet:te/tet:te-node-
attributes/tet:connectivity-matrices/tet:connectivity-matrix/tet:path-
constraints/tet:te-bandwidth/tet:technology:
  +--:(wson)
    +--rw supported-bandwidth-list*   identityref
  augment /nw:networks/nw:network/nw:node/tet:te/tet:information-
source-entry/tet:connectivity-matrices/tet:path-constraints/tet:te-
bandwidth/tet:technology:
  +--:(wson)
    +--ro supported-bandwidth-list*   identityref

```

```

  augment /nw:networks/nw:network/nw:node/tet:te/tet:information-
source-entry/tet:connectivity-matrices/tet:connectivity-
matrix/tet:path-constraints/tet:te-bandwidth/tet:technology:
  +--:(wson)
    +--ro supported-bandwidth-list*   identityref
  augment /nw:networks/nw:network/nw:node/tet:te/tet:tunnel-
termination-point/tet:client-layer-adaptation/tet:switching-
capability/tet:te-bandwidth/tet:technology:
  +--:(wson)
    +--rw supported-bandwidth-list*   identityref
  augment /nw:networks/nw:network/nw:node/tet:te/tet:tunnel-
termination-point/tet:local-link-connectivities/tet:path-
constraints/tet:te-bandwidth/tet:technology:
  +--:(wson)
    +--rw supported-bandwidth-list*   identityref
  augment /nw:networks/nw:network/nw:node/tet:te/tet:tunnel-
termination-point/tet:local-link-connectivities/tet:local-link-
connectivity/tet:path-constraints/tet:te-bandwidth/tet:technology:
  +--:(wson)
    +--rw supported-bandwidth-list*   identityref
  augment /nw:networks/nw:network/nt:link/tet:te/tet:te-link-
attributes/tet:interface-switching-capability/tet:max-lsp-
bandwidth/tet:te-bandwidth/tet:technology:
  +--:(wson)
    +--rw bandwidth-type?   identityref
  augment /nw:networks/nw:network/nt:link/tet:te/tet:te-link-
attributes/tet:max-link-bandwidth/tet:te-bandwidth/tet:technology:
  +--:(wson)

```

```

    +--rw supported-bandwidth-list*   identityref
    augment /nw:networks/nw:network/nt:link/tet:te/tet:te-link-
attributes/tet:max-resv-link-bandwidth/tet:te-bandwidth/tet:technology:
    +--:(wson)
    +--rw supported-bandwidth-list*   identityref
    augment /nw:networks/nw:network/nt:link/tet:te/tet:te-link-
attributes/tet:unreserved-bandwidth/tet:te-bandwidth/tet:technology:
    +--:(wson)
    +--rw supported-bandwidth-list*   identityref
    augment /nw:networks/nw:network/nt:link/tet:te/tet:information-
source-entry/tet:interface-switching-capability/tet:max-lsp-
bandwidth/tet:te-bandwidth/tet:technology:
    +--:(wson)

```

```

    +--ro bandwidth-type?   identityref
    augment /nw:networks/nw:network/nt:link/tet:te/tet:information-
source-entry/tet:max-link-bandwidth/tet:te-bandwidth/tet:technology:
    +--:(wson)
    +--ro supported-bandwidth-list*   identityref
    augment /nw:networks/nw:network/nt:link/tet:te/tet:information-
source-entry/tet:max-resv-link-bandwidth/tet:te-
bandwidth/tet:technology:
    +--:(wson)
    +--ro supported-bandwidth-list*   identityref
    augment /nw:networks/nw:network/nt:link/tet:te/tet:information-
source-entry/tet:unreserved-bandwidth/tet:te-bandwidth/tet:technology:
    +--:(wson)
    +--ro supported-bandwidth-list*   identityref
    augment /nw:networks/tet:te/tet:templates/tet:link-template/tet:te-
link-attributes/tet:interface-switching-capability/tet:max-lsp-
bandwidth/tet:te-bandwidth/tet:technology:
    +--:(wson)
    +--rw bandwidth-type?   identityref
    augment /nw:networks/tet:te/tet:templates/tet:link-template/tet:te-
link-attributes/tet:max-link-bandwidth/tet:te-bandwidth/tet:technology:
    +--:(wson)
    +--rw supported-bandwidth-list*   identityref
    augment /nw:networks/tet:te/tet:templates/tet:link-template/tet:te-
link-attributes/tet:max-resv-link-bandwidth/tet:te-
bandwidth/tet:technology:
    +--:(wson)
    +--rw supported-bandwidth-list*   identityref
    augment /nw:networks/tet:te/tet:templates/tet:link-template/tet:te-

```

```

link-attributes/tet:unreserved-bandwidth/tet:te-
bandwidth/tet:technology:
  +--:(wson)
    +--rw supported-bandwidth-list*  identityref
  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
  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:

```

```

  +--:(wson)
    +--rw (grid-type)?
      +--:(dwdm)
        | +--rw dwdm-n?  int16
      +--:(cwdm)
        +--rw cwdm-n?  int16
  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:
  +--:(wson)
    +--rw (grid-type)?
      +--:(dwdm)
        | +--rw dwdm-n?  int16
      +--:(cwdm)
        +--rw cwdm-n?  int16
  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:
  +--:(wson)
    +--rw (layer0-grid-type)?
      +--:(dwdm)
        | +--rw wson-dwdm?  identityref
      +--:(cwdm)
        +--rw wson-cwdm?  identityref
  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:
  +--:(wson)
    +--rw (grid-type)?

```



```

+--:(dwdm)
|   +--rw (single-or-super-channel)?
|       +--:(single)
|           |   +--rw dwdm-n?                int16
|       +--:(super)
|           +--rw subcarrier-dwdm-n*         int16
+--:(cwdm)
    +--rw cwdm-n?                            int16

```

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:

```

+--:(wson)
    +--rw (grid-type)?
        +--:(dwdm)
            |   +--rw (single-or-super-channel)?
            |       +--:(single)
            |           |   +--rw dwdm-n?                int16
            |       +--:(super)
            |           +--rw subcarrier-dwdm-n*         int16
        +--:(cwdm)
            +--rw cwdm-n?                            int16

```

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:

```

+--:(wson)
    +--rw (grid-type)?
        +--:(dwdm)
            |   +--rw (single-or-super-channel)?
            |       +--:(single)
            |           |   +--rw dwdm-n?                int16
            |       +--:(super)
            |           +--rw subcarrier-dwdm-n*         int16
        +--:(cwdm)
            +--rw cwdm-n?                            int16

```

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:
  +--:(wson)
    +--rw (grid-type)?
      +--:(dwdm)
        | +--rw (single-or-super-channel)?
        |   +--:(single)
        |     | +--rw dwdm-n?          int16
        |     +--:(super)
        |       +--rw subcarrier-dwdm-n*  int16
      +--:(cwdm)

```

```

      +--rw cwdm-n?          int16
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:
  +--:(wson)
    +--ro (grid-type)?
      +--:(dwdm)
        | +--ro (single-or-super-channel)?
        |   +--:(single)
        |     | +--ro dwdm-n?          int16
        |     +--:(super)
        |       +--ro subcarrier-dwdm-n*  int16
      +--:(cwdm)
        +--ro cwdm-n?          int16
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
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:
  +--:(wson)
    +--rw (grid-type)?
      +--:(dwdm)
        | +--rw dwdm-n?  int16
      +--:(cwdm)
        +--rw cwdm-n?  int16
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:
```

```
  +--:(wson)  
    +--rw (grid-type)?  
      +--:(dwdm)  
        | +--rw dwdm-n?   int16  
      +--:(cwdm)  
        +--rw cwdm-n?   int16
```

```
  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:
```

```
  +--:(wson)  
    +--rw (layer0-grid-type)?  
      +--:(dwdm)  
        | +--rw wson-dwdm?  identityref  
      +--:(cwdm)  
        +--rw wson-cwdm?  identityref
```

```
  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
```

```
  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:
```

```
  +--:(wson)  
    +--rw (grid-type)?  
      +--:(dwdm)  
        | +--rw dwdm-n?   int16  
      +--:(cwdm)  
        +--rw cwdm-n?   int16
```

```
  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:
```

```
  +--:(wson)  
    +--rw (grid-type)?  
      +--:(dwdm)  
        | +--rw dwdm-n?   int16
```

```

        +--:(cwdm)
            +--rw cwdm-n?    int16
    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:
    +--:(wson)
        +--rw (layer0-grid-type)?

```

```

        +--:(dwdm)
            | +--rw wson-dwdm?    identityref
        +--:(cwdm)
            +--rw wson-cwdm?    identityref
    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:
    +--:(wson)
        +--rw (grid-type)?
            +--:(dwdm)
                | +--rw (single-or-super-channel)?
                |     +--:(single)
                |         | +--rw dwdm-n?                int16
                |         +--:(super)
                |             +--rw subcarrier-dwdm-n*    int16
            +--:(cwdm)
                +--rw cwdm-n?                int16
    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:
    +--:(wson)
        +--rw (grid-type)?
            +--:(dwdm)
                | +--rw (single-or-super-channel)?
                |     +--:(single)
                |         | +--rw dwdm-n?                int16
                |         +--:(super)
                |             +--rw subcarrier-dwdm-n*    int16
            +--:(cwdm)
                +--rw cwdm-n?                int16
    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:
  +--:(wson)
    +--rw (grid-type)?
      +--:(dwdm)
        |   +--rw (single-or-super-channel)?

```

```

    |   +--:(single)
    |   |   +--rw dwdm-n?                int16
    |   +--:(super)
    |       +--rw subcarrier-dwdm-n*    int16
  +--:(cwdm)
    +--rw cwdm-n?                      int16
  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:
  +--:(wson)
    +--rw (grid-type)?
      +--:(dwdm)
        |   +--rw (single-or-super-channel)?
        |   +--:(single)
        |   |   +--rw dwdm-n?                int16
        |   +--:(super)
        |       +--rw subcarrier-dwdm-n*    int16
      +--:(cwdm)
        +--rw cwdm-n?                      int16
  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:
  +--:(wson)
    +--ro (grid-type)?
      +--:(dwdm)
        |   +--ro (single-or-super-channel)?
        |   +--:(single)
        |   |   +--ro dwdm-n?                int16
        |   +--:(super)
        |       +--ro subcarrier-dwdm-n*    int16
      +--:(cwdm)
        +--ro cwdm-n?                      int16

```

```

    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

```

```

    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:
    +--:(wson)
    +--ro (grid-type)?
    +--:(dwdm)
    |   +--ro dwdm-n?    int16
    +--:(cwdm)
    +--ro cwdm-n?       int16

    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:
    +--:(wson)
    +--ro (grid-type)?
    +--:(dwdm)
    |   +--ro dwdm-n?    int16
    +--:(cwdm)
    +--ro cwdm-n?       int16

    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:
    +--:(wson)
    +--ro (layer0-grid-type)?
    +--:(dwdm)
    |   +--ro wson-dwdm?  identityref
    +--:(cwdm)
    +--ro wson-cwdm?     identityref

    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:
    +--:(wson)
    +--ro (grid-type)?
    +--:(dwdm)

```

```

|   +---ro (single-or-super-channel)?
|       +---:(single)
|           |   +---ro dwdm-n?                int16
|       +---:(super)
|           +---ro subcarrier-dwdm-n*        int16

```

```

    +---:(cwdm)
        +---ro cwdm-n?                int16
    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:
    +---:(wson)
        +---ro (grid-type)?
            +---:(dwdm)
                |   +---ro (single-or-super-channel)?
                |       +---:(single)
                |           |   +---ro dwdm-n?                int16
                |       +---:(super)
                |           +---ro subcarrier-dwdm-n*        int16
            +---:(cwdm)
                +---ro cwdm-n?                int16
    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:
    +---:(wson)
        +---ro (grid-type)?
            +---:(dwdm)
                |   +---ro (single-or-super-channel)?
                |       +---:(single)
                |           |   +---ro dwdm-n?                int16
                |       +---:(super)
                |           +---ro subcarrier-dwdm-n*        int16
            +---:(cwdm)
                +---ro cwdm-n?                int16
    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:
    +---:(wson)

```

```

+--ro (grid-type)?
  +--:(dwdm)
  |   +--ro (single-or-super-channel)?
  |       +--:(single)

```

```

    |   |   +--ro dwdm-n?           int16
    |   +--:(super)
    |       +--ro subcarrier-dwdm-n*  int16
+--:(cwdm)
    +--ro cwdm-n?           int16
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:
+--:(wson)
+--ro (grid-type)?
  +--:(dwdm)
  |   +--ro (single-or-super-channel)?
  |       +--:(single)
  |   |   +--ro dwdm-n?           int16
  |   +--:(super)
  |       +--ro subcarrier-dwdm-n*  int16
+--:(cwdm)
    +--ro cwdm-n?           int16
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
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:
+--:(wson)
+--ro (grid-type)?
  +--:(dwdm)
  |   +--ro dwdm-n?  int16
+--:(cwdm)
    +--ro cwdm-n?  int16
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:

```



```

    +--:(wson)
      +--ro (grid-type)?
        +--:(dwdm)

```

```

    | +--ro dwdm-n?   int16
    +--:(cwdm)
      +--ro cwdm-n?   int16
    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:
  +--:(wson)
    +--ro (layer0-grid-type)?
      +--:(dwdm)
        | +--ro wson-dwdm?   identityref
        +--:(cwdm)
          +--ro wson-cwdm?   identityref
    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
  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:
  +--:(wson)
    +--ro (grid-type)?
      +--:(dwdm)
        | +--ro dwdm-n?   int16
        +--:(cwdm)
          +--ro cwdm-n?   int16
    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:
  +--:(wson)
    +--ro (grid-type)?
      +--:(dwdm)
        | +--ro dwdm-n?   int16
        +--:(cwdm)
          +--ro cwdm-n?   int16
  augment /nw:networks/nw:network/nw:node/tet:te/tet:information-

```

Internet-Draft

WSN YANG Model

December 2018

matrix/tet:to/tet:label-restrictions/tet:label-restriction/tet:label-step/tet:technology:

```

  +--:(wson)
    +--ro (layer0-grid-type)?
      +--:(dwdm)
        |   +--ro wson-dwdm?   identityref
      +--:(cwdm)
        |   +--ro wson-cwdm?   identityref

```

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:

```

  +--:(wson)
    +--ro (grid-type)?
      +--:(dwdm)
        |   +--ro (single-or-super-channel)?
        |     +--:(single)
        |       |   +--ro dwdm-n?           int16
        |       +--:(super)
        |         +--ro subcarrier-dwdm-n*   int16
      +--:(cwdm)
        |   +--ro cwdm-n?                   int16

```

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:

```

  +--:(wson)
    +--ro (grid-type)?
      +--:(dwdm)
        |   +--ro (single-or-super-channel)?
        |     +--:(single)
        |       |   +--ro dwdm-n?           int16
        |       +--:(super)
        |         +--ro subcarrier-dwdm-n*   int16
      +--:(cwdm)
        |   +--ro cwdm-n?                   int16

```

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-

```

    +--:(wson)
      +--ro (grid-type)?
        +--:(dwdm)
          | +--ro (single-or-super-channel)?
          |   +--:(single)
          |     | +--ro dwdm-n?                int16
          |     +--:(super)
          |       +--ro subcarrier-dwdm-n*    int16
        +--:(cwdm)
          +--ro cwdm-n?                      int16
  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:
    +--:(wson)
      +--ro (grid-type)?
        +--:(dwdm)
          | +--ro (single-or-super-channel)?
          |   +--:(single)
          |     | +--ro dwdm-n?                int16
          |     +--:(super)
          |       +--ro subcarrier-dwdm-n*    int16
        +--:(cwdm)
          +--ro cwdm-n?                      int16
  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:
    +--:(wson)
      +--ro (grid-type)?
        +--:(dwdm)
          | +--ro (single-or-super-channel)?
          |   +--:(single)
          |     | +--ro dwdm-n?                int16
          |     +--:(super)
          |       +--ro subcarrier-dwdm-n*    int16
        +--:(cwdm)
          +--ro cwdm-n?                      int16

```

Internet-Draft

WSN YANG Model

December 2018

```

    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
    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:
    +--:(wson)
    +--rw (grid-type)?
        +--:(dwdm)
        |   +--rw dwdm-n?    int16
        +--:(cwdm)
        +--rw cwdm-n?    int16
    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:
    +--:(wson)
    +--rw (grid-type)?
        +--:(dwdm)
        |   +--rw dwdm-n?    int16
        +--:(cwdm)
        +--rw cwdm-n?    int16
    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:
    +--:(wson)
    +--rw (layer0-grid-type)?
        +--:(dwdm)
        |   +--rw wson-dwdm?    identityref
        +--:(cwdm)
        +--rw wson-cwdm?    identityref
    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:
    +--:(wson)
    +--rw (grid-type)?
        +--:(dwdm)

```

Internet-Draft

WSON YANG Model

December 2018

```

    |   +--rw (single-or-super-channel)?
    |   |   +--:(single)
    |   |   |   +--rw dwdm-n?                int16
    |   |   +--:(super)
    |   |   |   +--rw subcarrier-dwdm-n*      int16
    |   +--:(cwdm)
    |   |   +--rw cwdm-n?                    int16
    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:
+--:(wson)
+--rw (grid-type)?
+--:(dwdm)
|   +--rw (single-or-super-channel)?
|   |   +--:(single)
|   |   |   +--rw dwdm-n?                int16
|   |   +--:(super)
|   |   |   +--rw subcarrier-dwdm-n*      int16
|   +--:(cwdm)
|   |   +--rw cwdm-n?                    int16
    augment /nw:networks/nw:network/nw:node/tet:te/tet:tunnel-
termination-point/tet:local-link-
connectivities/tet:optimizations/tet:algorithm/tet:metric/tet:optimizat
ion-metric/tet:explicit-route-exclude-objects/tet:route-object-exclude-
object/tet:type/tet:label/tet:label-hop/tet:te-label/tet:technology:
+--:(wson)
+--rw (grid-type)?
+--:(dwdm)
|   +--rw (single-or-super-channel)?
|   |   +--:(single)
|   |   |   +--rw dwdm-n?                int16
|   |   +--:(super)
|   |   |   +--rw subcarrier-dwdm-n*      int16
|   +--:(cwdm)
|   |   +--rw cwdm-n?                    int16
    augment /nw:networks/nw:network/nw:node/tet:te/tet:tunnel-
termination-point/tet:local-link-
connectivities/tet:optimizations/tet:algorithm/tet:metric/tet:optimizat
ion-metric/tet:explicit-route-include-objects/tet:route-object-include-
object/tet:type/tet:label/tet:label-hop/tet:te-label/tet:technology:

```



```

    +--:(wson)
      +--rw (grid-type)?
        +--:(dwdm)
          | +--rw (single-or-super-channel)?
          |   +--:(single)
          |     | +--rw dwdm-n?          int16
          |     +--:(super)
          |       +--rw subcarrier-dwdm-n*  int16
          +--:(cwdm)
            +--rw cwdm-n?          int16
      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:
        +--:(wson)
          +--ro (grid-type)?
            +--:(dwdm)
              | +--ro (single-or-super-channel)?
              |   +--:(single)
              |     | +--ro dwdm-n?          int16
              |     +--:(super)
              |       +--ro subcarrier-dwdm-n*  int16
              +--:(cwdm)
                +--ro cwdm-n?          int16
          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
          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:
            +--:(wson)
              +--rw (grid-type)?
                +--:(dwdm)
                  | +--rw dwdm-n?  int16
                  +--:(cwdm)
                    +--rw cwdm-n?  int16
              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:
  +--:(wson)
    +--rw (grid-type)?
      +--:(dwdm)
        |   +--rw dwdm-n?   int16
      +--:(cwdm)
        +--rw cwdm-n?   int16
    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:
  +--:(wson)
    +--rw (layer0-grid-type)?
      +--:(dwdm)
        |   +--rw wson-dwdm?   identityref
      +--:(cwdm)
        +--rw wson-cwdm?   identityref
    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:
  +--:(wson)
    +--rw (grid-type)?
      +--:(dwdm)
        |   +--rw (single-or-super-channel)?
        |     +--:(single)
        |       |   +--rw dwdm-n?   int16
        |     +--:(super)
        |       +--rw subcarrier-dwdm-n*   int16
      +--:(cwdm)
        +--rw cwdm-n?   int16
    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:
  +--:(wson)
    +--rw (grid-type)?
      +--:(dwdm)
        |   +--rw (single-or-super-channel)?
        |     +--:(single)

```



```

        |         |  +--rw dwdm-n?                int16
        |         +---:(super)
        |         +--rw subcarrier-dwdm-n*        int16
    +---:(cwdm)
        +--rw cwdm-n?                             int16
    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:optimizatio
n-metric/tet:explicit-route-exclude-objects/tet:route-object-exclude-
object/tet:type/tet:label/tet:label-hop/tet:te-label/tet:technology:
    +---:(wson)
        +--rw (grid-type)?
            +---:(dwdm)
                |  +--rw (single-or-super-channel)?
                |      +---:(single)
                |      |  +--rw dwdm-n?                int16
                |      +---:(super)
                |      +--rw subcarrier-dwdm-n*        int16
            +---:(cwdm)
                +--rw cwdm-n?                             int16
    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:optimizatio
n-metric/tet:explicit-route-include-objects/tet:route-object-include-
object/tet:type/tet:label/tet:label-hop/tet:te-label/tet:technology:
    +---:(wson)
        +--rw (grid-type)?
            +---:(dwdm)
                |  +--rw (single-or-super-channel)?
                |      +---:(single)
                |      |  +--rw dwdm-n?                int16
                |      +---:(super)
                |      +--rw subcarrier-dwdm-n*        int16
            +---:(cwdm)
                +--rw cwdm-n?                             int16
    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:
    +---:(wson)
        +--ro (grid-type)?

```

```

    +--:(dwdm)
    |   +--ro (single-or-super-channel)?
    |       +--:(single)
    |           |   +--ro dwdm-n?               int16
    |           +--:(super)
    |               +--ro subcarrier-dwdm-n*    int16
    +--:(cwdm)
        +--ro cwdm-n?                          int16
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:
    +--:(wson)
        +--rw (grid-type)?
            +--:(dwdm)
            |   +--rw (single-or-super-channel)?
            |       +--:(single)
            |           |   +--rw dwdm-n?               int16
            |           +--:(super)
            |               +--rw subcarrier-dwdm-n*    int16
            +--:(cwdm)
                +--rw cwdm-n?                          int16
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:
    +--:(wson)
        +--rw (grid-type)?
            +--:(dwdm)
            |   +--rw (single-or-super-channel)?
            |       +--:(single)
            |           |   +--rw dwdm-n?               int16
            |           +--:(super)
            |               +--rw subcarrier-dwdm-n*    int16
            +--:(cwdm)
                +--rw cwdm-n?                          int16
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
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:

```

```

    +--:(wson)
      +--rw (grid-type)?
        +--:(dwdm)
          | +--rw dwdm-n?   int16
        +--:(cwdm)
          +--rw cwdm-n?   int16
    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:
    +--:(wson)
      +--rw (grid-type)?
        +--:(dwdm)
          | +--rw dwdm-n?   int16
        +--:(cwdm)
          +--rw cwdm-n?   int16
    augment /nw:networks/nw:network/nt:link/tet:te/tet:te-link-
attributes/tet:label-restrictions/tet:label-restriction/tet:label-
step/tet:technology:
    +--:(wson)
      +--rw (layer0-grid-type)?
        +--:(dwdm)
          | +--rw wson-dwdm?  identityref
        +--:(cwdm)
          +--rw wson-cwdm?  identityref
    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
    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:
      +--:(wson)
        +--ro (grid-type)?
          +--:(dwdm)
            | +--ro dwdm-n?   int16
          +--:(cwdm)
            +--ro cwdm-n?   int16
    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:
      +--:(wson)

```

```

    +---ro (grid-type)?
      +---:(dwdm)
        | +---ro dwdm-n?    int16
      +---:(cwdm)
        +---ro cwdm-n?    int16
  augment /nw:networks/nw:network/nt:link/tet:te/tet:information-
source-entry/tet:label-restrictions/tet:label-restriction/tet:label-
step/tet:technology:
    +---:(wson)
      +---ro (layer0-grid-type)?
        +---:(dwdm)
          | +---ro wson-dwdm?    identityref
        +---:(cwdm)
          +---ro wson-cwdm?    identityref
  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:
    +---:(wson)
      +---rw (grid-type)?
        +---:(dwdm)
          | +---rw (single-or-super-channel)?
          |   +---:(single)
          |     | +---rw dwdm-n?          int16
          |     +---:(super)
          |       +---rw subcarrier-dwdm-n*  int16
        +---:(cwdm)
          +---rw cwdm-n?          int16
  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:
    +---:(wson)
      +---rw (grid-type)?
        +---:(dwdm)
          | +---rw (single-or-super-channel)?
          |   +---:(single)
          |     | +---rw dwdm-n?          int16
          |     +---:(super)
          |       +---rw subcarrier-dwdm-n*  int16
        +---:(cwdm)
          +---rw cwdm-n?          int16

```

```

    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
    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:
    +--:(wson)
    +--rw (grid-type)?
    +--:(dwdm)
    |   +--rw dwdm-n?    int16
    +--:(cwdm)
    +--rw cwdm-n?       int16
    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:
    +--:(wson)
    +--rw (grid-type)?
    +--:(dwdm)
    |   +--rw dwdm-n?    int16
    +--:(cwdm)
    +--rw cwdm-n?       int16
    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:
    +--:(wson)
    +--rw (layer0-grid-type)?
    +--:(dwdm)
    |   +--rw wson-dwdm?  identityref
    +--:(cwdm)
    +--rw wson-cwdm?     identityref

```

3. IETF-WSN-Topology YANG Model

<CODE BEGINS> file ietf-wson-topology@2019-02-27.yang

```

module ietf-wson-topology {

    yang-version 1.1;

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

    prefix "wson";

```

```
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 YYYY: YANG Data Model for
    Traffic Engineering (TE) Topologies";
}

/* Note: The RFC Editor will replace YYYY with the number assigned to
   the RFC once draft-ietf-teas-yang-te-topo becomes an RFC.*/

import ietf-layer0-types {
  prefix "layer0-types";
  reference
    "RFC XXXX: A YANG Data Model for WSON
    (Wavelength Switched Optical Networks)";
}

/* Note: The RFC Editor will replace XXXX with the number assigned to
   the RFC once draft-ietf-ccamp-wson-yang becomes an RFC.*/

organization
  "IETF CCAMP Working Group";

contact
  "Editor:   Young Lee   <leeyoung@huawei.com>
   Editor:   Aihua Guo  <aihuaguo@huawei.com>";

description
  "This module provides a YANG data model for the routing and
   wavelength assignment (RWA) Traffic Engineering (TE)
   topology in wavelength switched optical networks (WSONs).
   The YANG model described in this document is a WSON
   technology-specific YANG model augmenting the generic TE
   topology module [TE-TOP0] based on the information model
   developed in [RFC7446] and the two encoding documents
```

[RFC7581] and [RFC7579] that developed protocol independent encodings based on [RFC7446].

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

Redistribution and use in source and binary forms, with or without modification, is permitted pursuant to, and subject to 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 (<http://trustee.ietf.org/license-info>).";

```
revision 2019-02-27 {
  description
    "Initial Version";

  reference
    "RFC XXXX: A YANG Data Model for WSON (Wavelength Switched
    Optical Networks)";
}

/*
 * Groupings
 */
grouping wson-node-attributes {
  description "WSON node attributes";
  container wson-node {
    description "WSON node attributes";
    leaf node-type {
      type identityref {
        base layer0-types:layer0-node-type;
      }
      description "WSON node type";
    }
  }
}

grouping wson-link-attributes {
  description
    "Future WSON link attributes extensions";
```

```

}

grouping wson-tp-attributes {
    description "wson-tp-attributes";

    list supported-payload-types {
        key "index";
        description
            "Supported payload types of a TP (Termination Point).
            The payload type is defined as the generalized PIDs

```

```

        (Payload Identifiers) in GMPLS";
    leaf index {
        type uint16;
        description "payload type index";
    }
    leaf payload-type {
        type string;
        description "the payload type supported by this client TP";
        reference
            "http://www.iana.org/assignments/gmpls-sig-parameters
            /gmpls-sig-parameters.xhtml";
    }
}
leaf client-facing {
    type boolean;
    default 'false';
    description
        "Indicates if it is a client-facing TP";
}
}

grouping wson-ttp-attributes {
    description
        "WSON tunnel termination point (e.g., tranponder) attributes";

    leaf-list supported-operational-modes {
        type layer0-types:operational-mode;
        description
            "List of all supported vendor-specific
            mode identifiers";
    }
}

```



```

leaf configured-operational-modes {
  type layer0-types:operational-mode;
  description
    "Vendor-specific mode identifier configured
    on the TTP (TE-tunnel Termination Point)";
}

leaf-list supported-fec-types {
  type identityref {
    base layer0-types:fec-type;
  }
  description
    "List of all supported FEC (Forward Error Correction)
    types by this TTP";
}

leaf-list supported-termination-types {

```

```

  type identityref {
    base layer0-types:term-type;
  }
  description
    "List of all supported termination types by this TTP";
}

leaf supports-bit-stuffing {
  type boolean;
  description
    "Indicates whether bit stuffing is supported by this TTP";
}

leaf is-tunable {
  type boolean;
  description
    "Indicates if the TTP, or transponder, is tunable. Tunable
    transponders are assumed to be fully tunable to any of the
    96 channels within DWDM C-band";
}

leaf max-subcarrier-channel-num {
  type uint8 {

```

```

        range "1..max";
    }
    default 1;
    description
    "Indicates the maximum number of subcarrier channels for
    super-channel transponders. When the value equals 1 it
    represents regular single-channel transponder";
}
}

/*
 * Data nodes
 */

augment "/nw:networks/nw:network/nw:network-types"
+ "/tet:te-topology" {
    description "wson-topology augmented";
    container wson-topology {
        presence "indicates a topology of WSON";
        description
        "Container to identify WSON topology type";
    }
}

augment "/nw:networks/nw:network/nt:link/tet:te"
+ "/tet:te-link-attributes" {

```

```

    when "/nw:networks/nw:network/nw:network-types"
    + "/tet:te-topology/wson:wson-topology" {
        description "This augment is only valid for WSON";
    }
    description "WSON Link augmentation.";
    uses wson-link-attributes;
}

augment "/nw:networks/nw:network/nw:node/nt:termination-point/"
+ "tet:te" {
    when "/nw:networks/nw:network/nw:network-types"
    + "/tet:te-topology/wson:wson-topology" {
        description "This augment is only valid for WSON";
    }
    description "WSON TP attributes";
}

```

```

    uses wson-tp-attributes;
}

augment "/nw:networks/nw:network/nw:node/tet:te"
  + "/tet:te-node-attributes" {
    when "/nw:networks/nw:network/nw:network-types"
      + "/tet:te-topology/wson:wson-topology" {
      description "This augment is only valid for WSON";
    }
    description "WSON Node augmentation";
    uses wson-node-attributes;
}

augment "/nw:networks/nw:network/nw:node/tet:te"
  + "/tet:tunnel-termination-point" {
    when "/nw:networks/nw:network/nw:network-types"
      + "/tet:te-topology/wson:wson-topology" {
      description "This augment is only valid for WSON";
    }
    description "WSON tunnel termination point augmentation";
    uses wson-ttp-attributes;
}

/*
 * Augment TE bandwidth
 */

augment "/nw:networks/nw:network/nw:node/nt:termination-point/"
  + "tet:te/"
  + "tet:interface-switching-capability/tet:max-lsp-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
    when "../..../nw:network-types/tet:te-topology/"
      + "wson:wson-topology" {
      description "Augment WSON TE bandwidth";
    }
  }

```

```

}
description
  "Augment maximum LSP WSON bandwidth of link termination point
  (LTP)";
case wson {
  uses layer0-types:wson-path-bandwidth;
}

```

```

}

augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:path-constraints/tet:te-bandwidth/tet:technology" {
when "../..../nw:network-types/tet:te-topology/"
  + "wson:wson-topology" {
  description "Augment WSON TE bandwidth";
}
description
  "Augment WSON bandwidth path constraints of
  connectivity-matrices";
case wson {
  uses layer0-types:wson-link-bandwidth;
}
}

augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/"
  + "tet:path-constraints/tet:te-bandwidth/tet:technology" {
when "../..../nw:network-types/tet:te-topology/"
  + "wson:wson-topology" {
  description "Augment WSON TE bandwidth";
}
description
  "Augment WSON bandwidth path constraints of
  connectivity-matrix";
case wson {
  uses layer0-types:wson-link-bandwidth;
}
}

augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
  + "tet:path-constraints/tet:te-bandwidth/tet:technology" {
when "../..../nw:network-types/tet:te-topology/"
  + "wson:wson-topology" {
  description "Augment WSON TE bandwidth";
}
description
  "Augment WSON bandwidth path constraints of

```

```

        connectivity-matrices information-source";
    case wson {
        uses layer0-types:wson-link-bandwidth;
    }
}

augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:information-source-entry/tet:connectivity-matrices/"
    + "tet:connectivity-matrix/"
    + "tet:path-constraints/tet:te-bandwidth/tet:technology" {
    when "../..../nw:network-types/tet:te-topology/"
        + "wson:wson-topology" {
        description "Augment WSON TE bandwidth";
    }
    description
        "Augment WSON bandwidth path constraints of
        connectivity-matrix information-source";
    case wson {
        uses layer0-types:wson-link-bandwidth;
    }
}

augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:tunnel-termination-point/"
    + "tet:client-layer-adaptation/tet:switching-capability/"
    + "tet:te-bandwidth/tet:technology" {
    when "../..../nw:network-types/tet:te-topology/"
        + "wson:wson-topology" {
        description "Augment WSON TE bandwidth";
    }
    description
        "Augment client WSON bandwidth of tunnel termination point
        (TTP)";
    case wson {
        uses layer0-types:wson-link-bandwidth;
    }
}

augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:tunnel-termination-point/"
    + "tet:local-link-connectivities/tet:path-constraints/"
    + "tet:te-bandwidth/tet:technology" {
    when "../..../nw:network-types/tet:te-topology/"
        + "wson:wson-topology" {
        description "Augment WSON TE bandwidth";
    }
    description
        "Augment WSON bandwidth path constraints of
        local-link-connectivities";

```

Internet-Draft

WSON YANG Model

December 2018

```
    case wson {
      uses layer0-types:wson-link-bandwidth;
    }
  }

augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:tunnel-termination-point/"
  + "tet:local-link-connectivities/"
  + "tet:local-link-connectivity/tet:path-constraints/"
  + "tet:te-bandwidth/tet:technology" {
  when "../..../nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
    description "Augment WSON TE bandwidth";
  }
  description
    "Augment WSON bandwidth path constraints of
    local-link-connectivity (LLC)";
  case wson {
    uses layer0-types:wson-link-bandwidth;
  }
}

augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:te-link-attributes/"
  + "tet:interface-switching-capability/tet:max-lsp-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
  when "../..../nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
    description "WSON TE bandwidth";
  }
  description "Augment maximum LSP WSON bandwidth of TE link";
  case wson {
    uses layer0-types:wson-path-bandwidth;
  }
}

augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:te-link-attributes/"
  + "tet:max-link-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
  when "../..../nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
```

```

    description "WSON TE bandwidth";
  }
  description
    "Augment maximum WSON bandwidth of TE link";
  case wson {
    uses layer0-types:wson-link-bandwidth;
  }

```

```

}

augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:te-link-attributes/"
  + "tet:max-resv-link-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
  when "../..../nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
    description "WSON TE bandwidth";
  }
  description
    "Augment maximum reservable WSON bandwidth of
    TE link";
  case wson {
    uses layer0-types:wson-link-bandwidth;
  }
}

augment "/nw:networks/nw:network/nt:link/tet:te/"
  + "tet:te-link-attributes/"
  + "tet:unreserved-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
  when "../..../nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
    description "WSON TE bandwidth";
  }
  description
    "Augment unreserved WSON bandwidth of TE Link";
  case wson {
    uses layer0-types:wson-link-bandwidth;
  }
}

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

```

```

    + "tet:information-source-entry/"
    + "tet:interface-switching-capability/"
    + "tet:max-lsp-bandwidth/"
    + "tet:te-bandwidth/tet:technology" {
when "../..../..../nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
    description "WSON TE bandwidth";
}
description
    "Augment maximum LSP WSON bandwidth of TE link
    information-source";
case wson {
    uses layer0-types:wson-path-bandwidth;
}
}

```

```

augment "/nw:networks/nw:network/nt:link/tet:te/"
    + "tet:information-source-entry/"
    + "tet:max-link-bandwidth/"
    + "tet:te-bandwidth/tet:technology" {
when "../..../..../nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
    description "WSON TE bandwidth";
}
description
    "Augment maximum WSON bandwidth of TE link
    information-source";
case wson {
    uses layer0-types:wson-link-bandwidth;
}
}

```

```

augment "/nw:networks/nw:network/nt:link/tet:te/"
    + "tet:information-source-entry/"
    + "tet:max-resv-link-bandwidth/"
    + "tet:te-bandwidth/tet:technology" {
when "../..../..../nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
    description "WSON TE bandwidth";
}
description

```



```

        "Augment maximum reservable WSON bandwidth of TE link
        information-source";
    case wson {
        uses layer0-types:wson-link-bandwidth;
    }
}

augment "/nw:networks/nw:network/nt:link/tet:te/"
    + "tet:information-source-entry/"
    + "tet:unreserved-bandwidth/"
    + "tet:te-bandwidth/tet:technology" {
    when "../..../nw:network-types/tet:te-topology/"
        + "wson:wson-topology" {
        description "WSON TE bandwidth";
    }
    description
        "Augment unreserved WSON bandwidth of TE link
        information-source";
    case wson {
        uses layer0-types:wson-link-bandwidth;
    }
}

```

```

augment "/nw:networks/tet:te/tet:templates/"
    + "tet:link-template/tet:te-link-attributes/"
    + "tet:interface-switching-capability/"
    + "tet:max-lsp-bandwidth/"
    + "tet:te-bandwidth/tet:technology" {
    description
        "Augment maximum WSON LSP bandwidth of TE link
        template";
    case wson {
        uses layer0-types:wson-path-bandwidth;
    }
}

augment "/nw:networks/tet:te/tet:templates/"
    + "tet:link-template/tet:te-link-attributes/"
    + "tet:max-link-bandwidth/"
    + "tet:te-bandwidth/tet:technology" {
    description

```

```

    "Augment maximum WSON bandwidth of TE link template";
  case wson {
    uses layer0-types:wson-link-bandwidth;
  }
}

augment "/nw:networks/tet:te/tet:templates/"
  + "tet:link-template/tet:te-link-attributes/"
  + "tet:max-resv-link-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
  description
    "Augment maximum reservable WSON bandwidth of TE link
    template";
  case wson {
    uses layer0-types:wson-link-bandwidth;
  }
}

augment "/nw:networks/tet:te/tet:templates/"
  + "tet:link-template/tet:te-link-attributes/"
  + "tet:unreserved-bandwidth/"
  + "tet:te-bandwidth/tet:technology" {
  description
    "Augment unreserved WSON bandwidth of TE link template";
  case wson {
    uses layer0-types:wson-link-bandwidth;
  }
}

/*
 * 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" {
  when "../..../nw:network-types/tet:te-topology/"
  + "wson:wson-topology" {
    description "Augment WSON TE label";
  }
  description

```

```

    "Augment WSON label restrictions of connectivity-matrices";
    uses layer0-types:layer0-label-restriction;
}

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/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
  }
  description
    "Augment WSON label restrictions start of
    connectivity-matrices";
  case wson {
    uses layer0-types:wson-link-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-end/"
  + "tet:te-label/tet:technology" {
  when "../..../..../..../..../..../"
    + "nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
  }
  description
    "Augment WSON label restrictions end of
    connectivity-matrices";
  case wson {
    uses layer0-types:wson-link-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-step/"
    + "tet:technology" {
when "../..../..../..../..../.."
    + "nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
}
description
    "Augment WSON label restrictions step of
    connectivity-matrices";
case wson {
    uses layer0-types:wson-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/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
}
description
    "Augment WSON label hop of underlay primary path of
    connectivity-matrices";
case wson {
    uses layer0-types:wson-path-label;
}
}

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/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
}
description
    "Augment WSON label hop of underlay backup path of
    connectivity-matrices";
case wson {
    uses layer0-types:wson-path-label;
}
}

```

```
augment "/nw:networks/nw:network/nw: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/"
+ "wson:wson-topology" {
description "Augment WSON TE label";
}
description
"Augment WSON label hop of route-include of
connectivity-matrices";
case wson {
uses layer0-types:wson-path-label;
}
}
```

```
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/"
+ "wson:wson-topology" {
description "Augment WSON TE label";
}
description
"Augment WSON label hop of path-route of
connectivity-matrices";
case wson {
uses layer0-types:wson-path-label;
}
}

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/"
+ "wson:wson-topology" {
description "Augment WSON TE label";
}
description
"Augment ingress WSON label restrictions of
connectivity-matrix";
uses layer0-types:layer0-label-restriction;
}

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/"
+ "wson:wson-topology" {
```

```

    description "Augment WSON TE label";
  }
  description
    "Augment ingress WSON label restrictions start of
    connectivity-matrix ";
  case wson {
    uses layer0-types:wson-link-label;
  }
}

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/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
  }
  description
    "Augment ingress WSON label restrictions end of
    connectivity-matrix";
  case wson {
    uses layer0-types:wson-link-label;
  }
}

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/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
  }
  description

```

```

    "Augment ingress WSON label restrictions step of
    connectivity-matrix";
  case wson {
    uses layer0-types:wson-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" {
  when "../..../..../..../..../..../..../.."
    + "nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
  }
  description
    "Augment egress WSON label restrictions of
    connectivity-matrix";
}

```

```

  uses layer0-types:layer0-label-restriction;
}

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/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
  }
  description
    "Augment egress WSON label restrictions start of
    connectivity-matrix";
  case wson {
    uses layer0-types:wson-link-label;
  }
}
}

```



```

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/"
  + "wson:wson-topology" {
  description "Augment WSON TE label";
}
description
  "Augment egress WSON label restrictions end of
  connectivity-matrix";
case wson {
  uses layer0-types:wson-link-label;
}
}

```

```

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/"

```

```

  + "wson:wson-topology" {
  description "Augment WSON TE label";
}
description
  "Augment egress WSON label restrictions step of
  connectivity-matrix";
case wson {
  uses layer0-types:wson-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/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
}
description
    "Augment WSON label hop of underlay primary path of
    connectivity-matrix";
case wson {
    uses layer0-types:wson-path-label;
}
}

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/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
}
description
    "Augment WSON label hop of underlay backup path of
    connectivity-matrix";
case wson {
    uses layer0-types:wson-path-label;
}
}

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/"
  + "wson:wson-topology" {
    description "Augment WSON TE label";
  }
description
  "Augment WSON label hop of route-exclude of
  connectivity-matrix";
case wson {
  uses layer0-types:wson-path-label;
}
}

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/"
  + "wson:wson-topology" {
    description "Augment WSON TE label";
  }
description
  "Augment WSON label hop of route-include of
  connectivity-matrix";
case wson {
  uses layer0-types:wson-path-label;
}
}

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/"
  + "wson:wson-topology" {
    description "Augment WSON TE label";
  }
}

```

```

    }
    description
        "Augment WSON label hop of path-route of
        connectivity-matrix";
    case wson {
        uses layer0-types:wson-path-label;
    }
}

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/"
        + "wson:wson-topology" {
        description "Augment WSON TE label";
    }
    description
        "Augment WSON label restrictions of connectivity-matrices
        information-source";
    uses layer0-types:layer0-label-restriction;
}

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/"
        + "wson:wson-topology" {
        description "Augment WSON TE label";
    }
    description
        "Augment WSON label restrictions start of
        connectivity-matrices information-source";
    case wson {
        uses layer0-types:wson-link-label;
    }
}

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/"
        + "wson:wson-topology" {

```

Internet-Draft

WSOY YANG Model

December 2018

```
    description "Augment WSON TE label";
  }
  description
    "Augment WSON label restrictions end of
    connectivity-matrices information-source";
  case wson {
    uses layer0-types:wson-link-label;
  }
}

augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/"
  + "tet:connectivity-matrices/tet:label-restrictions/"
  + "tet:label-restriction/"
  + "tet:label-step/tet:technology" {
  when "../..../..../..../..../..../"
    + "nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
  }
  description
    "Augment WSON label restrictions step of
    connectivity-matrices information-source";
  case wson {
    uses layer0-types:wson-label-step;
  }
}

augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
  + "tet:underlay/tet:primary-path/tet:path-element/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
  when "../..../..../..../..../..../"
    + "nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
  }
  description
    "Augment WSON label hop of underlay primary path of
    connectivity-matrices information-source";
  case wson {
```

```

    uses layer0-types:wson-path-label;
  }
}

augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
  + "tet:underlay/tet:backup-path/tet:path-element/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {

```

```

when "../..//../..//../..//../..//../..//.."
  + "nw:network-types/tet:te-topology/"
  + "wson:wson-topology" {
  description "Augment WSON TE label";
}
description
  "Augment label hop of underlay backup path of
  connectivity-matrices information-source";
case wson {
  uses layer0-types:wson-path-label;
}
}

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/"
  + "wson:wson-topology" {
  description "Augment WSON TE label";
}
description
  "Augment WSON label hop of route-exclude of
  connectivity-matrices information-source";
case wson {
  uses layer0-types:wson-path-label;
}
}
}

```

```

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/"
+ "wson:wson-topology" {
description "Augment WSON TE label";
}
description
  "Augment WSON label hop of route-include of
  connectivity-matrices information-source";
case wson {

```

```

    uses layer0-types:wson-path-label;
  }
}

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/"
+ "wson:wson-topology" {
description "Augment WSON TE label";
}
description
  "Augment WSON label hop of path-route of connectivity-matrices
  information-source";
case wson {
  uses layer0-types:wson-path-label;
}
}

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/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
    }
description
    "Augment ingress WSON label restrictions of
    connectivity-matrix information-source";
uses layer0-types:layer0-label-restriction;
}

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/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
    }
description

```

```

    "Augment ingress WSON label restrictions start of
    connectivity-matrix information-source";
case wson {
    uses layer0-types:wson-link-label;
}
}

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/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
    }
}

```



```

description
  "Augment ingress WSON label restrictions end of
    connectivity-matrix information-source";
case wson {
  uses layer0-types:wson-link-label;
}
}

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/"
  + "wson:wson-topology" {
  description "Augment WSON TE label";
}
description
  "Augment ingress WSON label restrictions step of
    connectivity-matrix information-source";
case wson {
  uses layer0-types:wson-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" {
when "../.../.../.../.../.../.../.../..."

```

```

  + "nw:network-types/tet:te-topology/"
  + "wson:wson-topology" {
  description "Augment WSON TE label";
}
description
  "Augment egress WSON label restrictions of connectivity-matrix
    information-source";
uses layer0-types:layer0-label-restriction;
}

```

```

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/"
  + "wson:wson-topology" {
  description "Augment WSON TE label";
}
description
  "Augment egress WSON label restrictions start of
  connectivity-matrix information-source";
case wson {
  uses layer0-types:wson-link-label;
}
}

```

```

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/"
  + "wson:wson-topology" {
  description "Augment WSON TE label";
}
description
  "Augment egress WSON label restrictions end of
  connectivity-matrix information-source";
case wson {
  uses layer0-types:wson-link-label;
}
}

```

```

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/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
}
description
    "Augment egress WSON label restrictions step of
    connectivity-matrix information-source";
case wson {
    uses layer0-types:wson-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/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
}
description
    "Augment WSON label hop of underlay primary path of
    connectivity-matrix information-source";
case wson {
    uses layer0-types:wson-path-label;
}
}

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/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
}
description
    "Augment WSON label hop of underlay backup path of
    connectivity-matrix information-source";
case wson {
    uses layer0-types:wson-path-label;
}
}

```

```
}  
  
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/"  
    + "wson:wson-topology" {  
description "Augment WSON TE label";  
}  
description  
    "Augment label hop of route-exclude of connectivity-matrix  
    information-source";  
case wson {  
uses layer0-types:wson-path-label;  
}  
}  
  
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/"  
    + "wson:wson-topology" {  
description "Augment WSON TE label";  
}  
description  
    "Augment WSON label hop of route-include of  
    connectivity-matrix information-source";  
case wson {  
uses layer0-types:wson-path-label;  
}  
}
```

```

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/"
  + "wson:wson-topology" {
description "Augment WSON TE label";
}
description
  "Augment WSON label hop of path-route of connectivity-matrix
  information-source";
case wson {
  uses layer0-types:wson-path-label;
}
}

```

```

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/"
  + "wson:wson-topology" {
description "Augment WSON TE label";
}
description
  "Augment WSON label restrictions of
  local-link-connectivities";
uses layer0-types:layer0-label-restriction;
}

```

```

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/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
}
description
  "Augment WSON label restrictions start of
  local-link-connectivities";
case wson {
  uses layer0-types:wson-link-label;
}
}

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/"
  + "wson:wson-topology" {
description "Augment WSON TE label";
}
description
  "Augment WSON label restrictions end of
  local-link-connectivities";
case wson {
  uses layer0-types:wson-link-label;
}
}

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/"
  + "wson:wson-topology" {
description "Augment WSON TE label";
}
}

```

```

    }
    description
      "Augment WSON label restrictions step of
        local-link-connectivities";
    case wson {
      uses layer0-types:wson-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/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
  }
  description
    "Augment WSON label hop of underlay primary path of
      local-link-connectivities";

```

```

    case wson {
      uses layer0-types:wson-path-label;
    }
  }

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/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
  }
  description
    "Augment WSON label hop of underlay backup path of
      local-link-connectivities";
  case wson {

```

```

    uses layer0-types:wson-path-label;
  }
}

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/"
+ "wson:wson-topology" {
description "Augment WSON TE label";
}
description
  "Augment WSON label hop of route-exclude of
  local-link-connectivities";
case wson {
uses layer0-types:wson-path-label;
}
}

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/"
+ "wson:wson-topology" {
description "Augment WSON TE label";
}
description
  "Augment label hop of route-include of
  local-link-connectivities";
}

```



```

    case wson {
      uses layer0-types:wson-path-label;
    }
  }

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/"
  + "wson:wson-topology" {
  description "Augment WSON TE label";
}
description
  "Augment WSON label hop of path-route of
  local-link-connectivities";
case wson {
  uses layer0-types:wson-path-label;
}
}

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/"
  + "wson:wson-topology" {
  description "Augment WSON TE label";
}
description
  "Augment WSON label restrictions of
  local-link-connectivity (LLC)";
uses layer0-types:layer0-label-restriction;
}

```

```

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/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
}
description
    "Augment WSON label restrictions start of
    local-link-connectivity (LLC)";
case wson {
    uses layer0-types:wson-link-label;
}
}

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/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
}
description
    "Augment WSON label restrictions end of
    local-link-connectivity (LLC)";
case wson {
    uses layer0-types:wson-link-label;
}
}

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/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
}
}

```

```
    }
    description
      "Augment WSON label restrictions step of
      local-link-connectivity (LLC)";
    case wson {
      uses layer0-types:wson-label-step;
    }
  }

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/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
  }
  description
    "Augment WSON label hop of underlay primary path of
    local-link-connectivity (LLC)";
  case wson {
    uses layer0-types:wson-path-label;
  }
}

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/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
  }
  description
    "Augment WSON label hop of underlay backup path of
    local-link-connectivity (LLC)";
  case wson {
    uses layer0-types:wson-path-label;
  }
}
```

```
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/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
}
description
    "Augment WSON label hop of route-exclude of
    local-link-connectivity (LLC)";
case wson {
    uses layer0-types:wson-path-label;
}
}
```

```
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/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
}
description
    "Augment WSON label hop of route-include of
    local-link-connectivity (LLC)";
case wson {
    uses layer0-types:wson-path-label;
}
```

```

    }
}

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/"
      + "wson:wson-topology" {
        description "Augment WSON TE label";
      }
    description
      "Augment WSON label hop of path-route of
        local-link-connectivity (LLC)";
    case wson {
      uses layer0-types:wson-path-label;
    }
  }
}

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/"
    + "wson:wson-topology" {
      description "Augment WSON TE label";
    }
  description
    "Augment WSON label hop of underlay primary path of TE link";
  case wson {
    uses layer0-types:wson-path-label;
  }
}

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/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
}
description
    "Augment WSON label hop of underlay backup path of TE link";
case wson {
    uses layer0-types:wson-path-label;
}
}

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/"
    + "wson:wson-topology" {

```

```

    description "Augment WSON TE label";
}
description
    "Augment WSON label restrictions of TE link";
uses layer0-types:layer0-label-restriction;
}

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/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
}
description
    "Augment WSON label restrictions start of TE link";
case wson {
    uses layer0-types:wson-link-label;
}
}

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/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
}
description
    "Augment WSON label restrictions end of TE link";
case wson {
    uses layer0-types:wson-link-label;
}
}

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/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
}
description
    "Augment WSON label restrictions step of TE link";
case wson {
    uses layer0-types:wson-label-step;
}
}

```

```

}
}

augment "/nw:networks/nw:network/nt:link/tet:te/"
    + "tet:information-source-entry/"
    + "tet:label-restrictions/tet:label-restriction" {
when "../..../nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
}
description
    "Augment WSON label restrictions of TE link
    information-source";
uses layer0-types:layer0-label-restriction;
}

```

```

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/"
  + "wson:wson-topology" {
  description "Augment WSON TE label";
}
description
  "Augment WSON label restrictions start of TE link
  information-source";
case wson {
  uses layer0-types:wson-link-label;
}
}

```

```

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/"
  + "wson:wson-topology" {
  description "Augment WSON TE label";
}
description
  "Augment WSON label restrictions end of TE link
  information-source";
case wson {
  uses layer0-types:wson-link-label;
}
}

```

```

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/"
  + "wson:wson-topology" {
  description "Augment WSON TE label";
}
}

```



```

    description
      "Augment WSON label restrictions step of TE link
      information-source";
    case wson {
      uses layer0-types:wson-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 WSON label hop of underlay primary path of TE link
    template";
  case wson {
    uses layer0-types:wson-path-label;
  }
}

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 WSON label hop of underlay backup path of TE link
    template";
  case wson {
    uses layer0-types:wson-path-label;
  }
}

augment "/nw:networks/tet:te/tet:templates/"
  + "tet:link-template/tet:te-link-attributes/"
  + "tet:label-restrictions/tet:label-restriction" {
  description
    "Augment WSON label restrictions of TE link template";
  uses layer0-types:layer0-label-restriction;
}

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 WSON label restrictions start of TE link template";
case wson {
    uses layer0-types:wson-link-label;
}
}

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 WSON label restrictions end of TE link template";
case wson {
    uses layer0-types:wson-link-label;
}
}

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 WSON label restrictions step of TE link template";
case wson {
    uses layer0-types:wson-label-step;
}
}
}

```

<CODE ENDS>

[4. IETF-Layer0-Types YANG Model](#)

<CODE BEGINS> file ietf-layer0-types@2019-02-07.yang

```

module ietf-layer0-types {
    namespace "urn:ietf:params:xml:ns:yang:ietf-layer0-types";
    prefix "layer0-types";

    organization
        "IETF CCAMP Working Group";
    contact
        "WG Web: <http://tools.ietf.org/wg/ccamp/>
        WG List: <mailto:ccamp@ietf.org>

```

Internet-Draft

WSON YANG Model

December 2018

Editor: Aihua Guo
<mailto:aihuaguo@huawei.com>

Editor: Young Lee
<mailto:leeyoung@huawei.com>

Editor: Italo Busi
<mailto:Italo.Busi@huawei.com>;

description

"This module defines Optical Layer 0 types. This module provides groupings that can be applicable to Layer 0 Fixed Optical Networks (e.g., CWDM (Coarse Wavelength Division Multiplexing) and DWDM (Dense Wavelength Division Multiplexing)) and Flexi-grid Optical Networks.

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

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

```
revision "2018-02-07" {
  description
    "Initial Version";
  reference
    "RFC XXXX: A YANG Data Model for WSON (Wavelength Switched
    Optical Networks)";
}

typedef operational-mode {
  type string;
  description
    "Vendor-specific mode that guarantees interoperability.";
}

typedef standard-mode {
  type string;
```

```
description
    "ITU-T G.698.2 standard mode that guarantees interoperability.
```

```
    It must be an string with the following format:
    B-DScW-ytz(v) where all these attributes are conformant
    to the ITU-T recommendation";
    reference "ITU-T G.698.2 (11/2009) Section 5.3";
}
```

```
typedef vendor-identifier {
    type string;
    description
        "vendor identifier that uses vendor-specific mode";
    reference "TBD";
}
```

```
typedef frequency-thz {
    type decimal64 {
        fraction-digits 5;
    }
    units THz;
    description
        "The DWDM frequency in THz, e.g., 193.12500";
    reference
        "RFC6205";
}
```

```
typedef frequency-ghz {
    type decimal64 {
        fraction-digits 5;
    }
    units GHz;
    description
        "The DWDM frequency in GHz, e.g., 193125.00";
    reference
        "RFC6205";
}
```

```
identity layer0-node-type {
    description
        "layer0 node type.";
    reference
        "RFC6163";
}
```

```
}
```

```
identity flex-grid-node {  
    base layer0-node-type;  
    description
```

```
    "Flex Grid node";  
}
```

```
identity wson-node-foadm {  
    base layer0-node-type;  
    description  
        "Fixed OADM (Optical Add-Drop Multiplexer) node";  
}
```

```
identity wson-node-roadm {  
    base layer0-node-type;  
    description  
        "ROADM (Reconfigurable Optical Add-Drop Multiplexer)  
        or OXC (Optical Cross Connect) node";  
}
```

```
identity wson-node-ila {  
    base layer0-node-type;  
    description  
        "ILA (In-Line Amplifier) node";  
}
```

```
identity wavelength-assignment {  
    description  
        "Wavelength selection base";  
}
```

```
identity unspecified-wavelength-assignment {  
    base wavelength-assignment;  
    description  
        "No method specified";  
}
```

```
identity first-fit-wavelength-assignment {  
    base wavelength-assignment;  
    description  
        "All the available wavelengths are numbered,
```

```
        and this WA (Wavelength Assignment) method chooses
        the available wavelength with the lowest index";
    }
```

```
identity random-wavelength-assignment {
    base wavelength-assignment;
    description
        "This WA method chooses an available
```

```
        wavelength randomly";
    }
```

```
identity least-loaded-wavelength-assignment {
    base wavelength-assignment;
    description
        "This WA method selects the wavelength that
        has the largest residual capacity on the most loaded
        link along the route (in multi-fiber networks)";
    }
```

```
identity layer0-grid-type {
    description
        "Layer0 grid type.";
    }
```

```
identity flex-grid-dwdm {
    base layer0-grid-type;
    description
        "Flex grid";
    }
```

```
identity wson-grid-dwdm {
    base layer0-grid-type;
    description
        "DWDM grid";
    }
```

```
identity wson-grid-cwdm {
    base layer0-grid-type;
    description
        "CWDM grid";
    }
```

```

identity term-type {
    description
        "Termination type.";
}

identity term-phys {
    base term-type;
    description
        "Physical Layer Termination";
}

```

```

identity term-otu {
    base term-type;
    description
        "OTU (Optical Transport Unit) Termination";
}

identity term-odu {
    base term-type;
    description
        "ODU (Optical Data Unit) Termination";
}

identity term-opu {
    base term-type;
    description
        "OPU (Optical Payload Unit) Termination";
}

identity term-section {
    base term-type;
    description
        "Section Layer Termination";
}

identity layer0-bandwidth-type {
    description
        "Bandwidth type carried by a single wavelength channel";
}

identity bw-otu1 {
    base layer0-bandwidth-type;
}

```

```

    description
        "OTU1 (2.66G)";
}

identity bw-otu1e {
    base layer0-bandwidth-type;
    description
        "OTU1e (11.04G)";
}

identity bw-otu1f {
    base layer0-bandwidth-type;
    description
        "OTU1f (11.27G)";
}

```

```

}

identity bw-otu2 {
    base layer0-bandwidth-type;
    description
        "OTU2 (10.70G)";
}

identity bw-otu2e {
    base layer0-bandwidth-type;
    description
        "OTU2e (11.09G)";
}

identity bw-otu2f {
    base layer0-bandwidth-type;
    description
        "OTU2f (11.31G)";
}

identity bw-otu3 {
    base layer0-bandwidth-type;
    description
        "OTU3 (43.01G)";
}

identity bw-otu3e1 {
    base layer0-bandwidth-type;
}

```



```

        description
            "OTU3e1 (44.57G)";
    }

    identity bw-otu3e2 {
        base layer0-bandwidth-type;
        description
            "OTU3e2 (44.58G)";
    }

    identity bw-otu4 {
        base layer0-bandwidth-type;
        description
            "OTU4 (111.80G)";
    }

    identity bw-otucn {

```

```

        base layer0-bandwidth-type;
        description
            "OTUCn (beyond 100G)";
    }

    identity dwdm-ch-spc-type {
        description
            "DWDM channel spacing type";
    }

    identity dwdm-100ghz {
        base dwdm-ch-spc-type;
        description
            "100GHz channel spacing";
    }

    identity dwdm-50ghz {
        base dwdm-ch-spc-type;
        description
            "50GHz channel spacing";
    }

    identity dwdm-25ghz {
        base dwdm-ch-spc-type;
        description

```

```

    "25GHz channel spacing";
}

identity dwdm-12p5ghz {
    base dwdm-ch-spc-type;
    description
        "12.5GHz channel spacing";
}

identity flex-ch-spc-type {
    description
        "Flex-grid channel spacing type";
}

identity flex-ch-spc-6p25ghz {
    base flex-ch-spc-type;
    description
        "6.25GHz channel spacing";
}

```

```

identity flex-slot-width-granularity {
    description
        "Flex-grid slot width granularity";
}

identity flex-swg-12p5ghz {
    base flex-slot-width-granularity;
    description
        "12.5GHz slot width granularity";
}

identity cwdm-ch-spc-type {
    description
        "CWDM channel spacing type";
}

identity cwdm-20nm {
    base cwdm-ch-spc-type;
    description
        "20nm channel spacing";
}

```

```

identity fec-type {
    description
        "FEC (Forward Error Correction) type";
}

identity g-fec {
    base fec-type;
    description
        "G-FEC (Generic-FEC)";
}

identity e-fec {
    base fec-type;
    description
        "E-FEC (Enhanced-FEC)";
}

identity no-fec {
    base fec-type;
    description
        "No FEC";
}

/* Groupings. */
grouping wson-path-bandwidth {

```

```

    description "WSON (Wavelength Switched Optical Network)
        path bandwidth attributes";
    leaf bandwidth-type {
        type identityref {
            base layer0-bandwidth-type;
        }
        description "WSON bandwidth type";
    }
}

grouping wson-link-bandwidth {
    description "WSON link bandwidth attributes";
    leaf-list supported-bandwidth-list {
        type identityref {
            base layer0-bandwidth-type;
        }
        description "WSON bandwidth type";
    }
}

```

```

grouping wson-link-label {
  description
    "Generic label for WSON links";
  choice grid-type {
    description
      "Label for DWDM or CWDM grid";
    case dwdm {
      leaf dwdm-n {
        type int16;
        description
          "N is used to determine the Nominal Central Frequency.
          The set of nominal central frequencies can be
          built using the following expression
           $f = 193.1 \text{ THz} + N \times 0.00625 \text{ THz}$ ,
          where 193.1 THz is ITU-T 'anchor frequency'
          for transmission over the C band, N is a positive or
          negative integer including 0.";
        reference
          "RFC6205";
      }
    }
    case cwdm {
      leaf cwdm-n {
        type int16;
        description

```

```

      "N is a two's-complement integer to take either a
      positive, negative, or zero value. This value is
      used to compute the channel wavelength as such
      in G.694.2:
      Wavelength (nm) = 1471 nm + N * 20 nm";
      reference
        "RFC6205";
    }
  }
}

```

```

grouping wson-path-label {
  description
    "Generic label for WSON paths";
  choice grid-type {

```

```

description
  "Label for DWDM or CWDM grid";
case dwdm {
  choice single-or-super-channel {
    description "single or super channel";
    case single {
      leaf dwdm-n {
        type int16;
        description
          "N is used to determine the Nominal Central Frequency.
          The set of nominal central frequencies can be
          built using the following expression
           $f = 193.1 \text{ THz} + N \times 0.00625 \text{ THz}$ ,
          where 193.1 THz is ITU-T 'anchor frequency'
          for transmission over the C band, N is a positive or
          negative integer including 0.";
      }
    }
  }
  case super {
    leaf-list subcarrier-dwdm-n {
      type int16;
      description
        "List of subcarrier channels for super channel.
        Each of the channels is represented by an
        integer, n, a two's-complement integer to take
        either a positive, negative, or zero value.
        This value is used to compute the frequency as
        such in G.694.1:
        Frequency (THz) =

```

```

          193.1 THz + n * channel spacing (THz)";
        }
      }
    }
  }
}
case cwdm {
  leaf cwdm-n {
    type int16;
    description
      "Represented by an integer, n, a two's-complement
      integer to take either a positive, negative, or
      zero value. This value is used to compute the

```

```

        channel wavelength as such in G.694.2:
        Wavelength (nm) = 1471 nm + n * 20 nm";
        reference
            "RFC6205";
    }
}
}

grouping layer0-label-restriction {
    description
        "layer0 label restriction.";

    leaf grid-type {
        type identityref {
            base layer0-grid-type;
        }
        description "Grid type";
    }
    leaf priority {
        type uint8;
        description "priority";
    }
}

grouping wson-label-step {
    description "Label step information for WSON";
    choice layer0-grid-type {
        description
            "Grid type: DWDM, CWDM, etc.";
        case dwdm {
            leaf wson-dwdm {

```

```

        type identityref {
            base dwdm-ch-spc-type;
        }
        description
            "Label-step is the channel-spacing (GHz), e.g.,
            100, 50, 25, or 12.5 GHz for DWDM";
        reference
            "RFC6205";
    }
}

```

```

    case cwm {
      leaf wson-cwm {
        type identityref {
          base cwm-ch-spc-type;
        }
        description
          "label-step is the channel-spacing (nm), i.e., 20 nm
          for CWDM, which is the only value defined for CWDM";
        reference
          "RFC6205";
      }
    }
  }
}

```

```

grouping flex-grid-node-attributes {
  description "Flex-grid node attributes";

```

```

  container flex-grid-node {
    description "Flex-grid node attributes";
    leaf node-type {
      type identityref {
        base layer0-node-type;
      }
      description "Flex-grid node type";
    }
  }
}

```

```

grouping flex-grid-path-bandwidth {
  description "Flex-grid path bandwidth attributes";
  leaf bandwidth-type {
    type identityref {
      base layer0-bandwidth-type;
    }
  }
}

```

```

    description "Flex-grid bandwidth type";
  }
}

```

```

grouping flex-grid-link-bandwidth {
  description "flex-grid link bandwidth attributes";
  leaf-list supported-bandwidth-list {

```

```

    type identityref {
        base layer0-bandwidth-type;
    }
    description "Flex-grid bandwidth type";
}
}

grouping flex-grid-link-label {
    description "Flex-grid link label.";
    leaf flex-n {
        type uint16;
        description
            "N is used to determine the Nominal Central Frequency.
            The set of nominal central frequencies can be
            built using the following expression
             $f = 193.1 \text{ THz} + N \times 0.00625 \text{ THz}$ ,
            where 193.1 THz is ITU-T 'anchor frequency'
            for transmission over the C band, N is a positive or
            negative integer including 0.";
        reference
            "RFC7698";
    }
}

grouping flex-grid-channel {
    description "Flex-grid channel grouping.";

    uses flex-grid-link-label;

    leaf flex-m {
        type uint16 {
            range "1..max";
        }
        description
            "M is used to determine the slot width. A slot width is
            constrained to be M x SWG (that is, M x 12.5 GHz),
            where M is an integer greater than or equal to 1.";
        reference

```

```

        "RFC7698";
    }
}
grouping flex-grid-path-label {

```



```

description "Flex-grid path label.";
choice single-or-super-channel {
  description "single of super channel";
  case single {
    uses flex-grid-channel;
  }
  case super {
    list subcarrier-flex-n {
      key flex-n;
      uses flex-grid-channel;
      description
        "List of subcarrier channels for flex-grid
        super channel.";
    }
  }
}
}

grouping flex-grid-label-restriction {
  description
    "Flex Grid-specific label restriction";
  uses layer0-label-restriction;

  container flex-grid {
    description "flex-grid definition";
    leaf nominal-central-frequency-granularity {
      type identityref {
        base flex-ch-spc-type;
      }
      default flex-ch-spc-6p25ghz;
      description
        "It is the spacing between allowed nominal central
        frequencies. Default is 6.25 GHz";
      reference
        "RFC7698";
    }

    leaf slot-width-granularity {
      type identityref {
        base flex-slot-width-granularity;
      }
    }
  }
}

```

```

default flex-swg-12p5ghz;

```

```

    description
      "Minimum space between slot widths. Default is
      12.5 GHz";
    reference
      "RFC7698";
  }

  leaf min-slot-width-factor {
    type uint16 {
      range "1..max";
    }
    default 1;
    description
      "Minimum slot width is calculated by:
      Minimum slot width (GHz) =
      min-slot-width-factor * slot-width-granularity";
    reference
      "RFC8363";
  }

  leaf max-slot-width-factor {
    type uint16 {
      range "1..max";
    }
    description
      "Maximum slot width is calculated by:
      Maximum slot width (GHz) =
      max-slot-width-factor * slot-width-granularity";
    reference
      "RFC8363";
  }
}

grouping flex-grid-label-step {
  description "Label step information for flex grid";
  leaf flex {
    type identityref {
      base flex-ch-spc-type;
    }
  }
  default flex-ch-spc-6p25ghz;
  description
    "Label-step is the nominal central frequency

```

```

        granularity (GHz), e.g., 6.25 GHz";
    reference
        "RFC7698";
    }
}
}
<CODE ENDS>

```

5. Security Considerations

The YANG module specified in this document defines a schema for data that is designed to be accessed via network management protocols such as NETCONF [[RFC6241](#)] or RESTCONF [[RFC8040](#)]. The lowest NETCONF layer is the secure transport layer, and the mandatory-to-implement secure transport is Secure Shell (SSH) [[RFC6242](#)]. The lowest RESTCONF layer is HTTPS, and the mandatory-to-implement secure transport is TLS [[RFC8446](#)].

The NETCONF access control model [[RFC6536](#)] 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 over Secure Shell (SSH) [[RFC6242](#)] describes a method for invoking and running NETCONF within a Secure Shell (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.

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

```

6. IANA Considerations

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

```

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

```

```

-----
URI: urn:ietf:params:xml:ns:yang: ietf-layer0-types
Registrant Contact: The IESG.
XML: N/A, the requested URI is an XML namespace.
-----

```

This document registers the following YANG modules in the YANG Module Names registry [[RFC7950](#)] & [[RFC6020](#)]:

```

-----
name:          ietf-wson-topology
namespace:     urn:ietf:params:xml:ns:yang:ietf-wson-topology
reference:     RFC XXXX (TDB)
-----
name:          ietf-layer0-types
namespace:     urn:ietf:params:xml:ns:yang: ietf-layer0-types
reference:     RFC XXXX (TDB)
-----

```

[7](#). Acknowledgments

This document was prepared using 2-Word-v2.0.template.dot.

Internet-Draft

WSN YANG Model

December 2018

[8](#). References

8.1. Normative References

- [RFC6020] Bjorklund, M., Ed., "YANG - A Data Modeling Language for the Network Configuration Protocol (NETCONF)", [RFC 6020](#), October 2010.
- [RFC6241] R. Enns, Ed., M. Bjorklund, Ed., J. Schoenwaelder, Ed., "Network Configuration Protocol (NETCONF)", [RFC 6241](#), June 2011.
- [RFC6242] M. Wasserman, "Using the NETCONF Protocol over Secure Shell (SSH)", [RFC 6242](#), June 2011.
- [RFC6536] A. Bierman, M. Bjorklund, "Network Configuration Protocol (NETCONF) Access Control Model", [RFC 6536](#), March 2012.
- [RFC7950] Bjorklund, M., Ed., "The YANG 1.1 Data Modeling Language", [RFC 7950](#), August 2016.
- [RFC8040] A. Bierman, M. Bjorklund, K. Watsen, "RESTCONF Protocol", [RFC 8040](#), January 2017.
- [RFC8341] A. Bierman, M. Bjorklund, "Network Configuration Access Control Model", [RFC 8341](#), March 2018.
- [RFC8446] E. Rescorla, "The Transport Layer Security (TLS) Protocol Version 1.3", [RFC8446](#), August 2018.
- [TE-TOPO] X. Liu, et al., "YANG Data Model for TE Topologies", work in progress: [draft-ietf-teas-yang-te-topo](#).

8.2. Informative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI

10.17487/RFC2119, March 1997, <<https://www.rfc-editor.org/info/rfc2119>>.

- [RFC3688] M. Mealling, "The IETF XML Registry", [RFC 3688](#), January 2004.

Lee, et al.

Expires August 2018

[Page 86]

Internet-Draft

WSN YANG Model

December 2018

- [RFC6163] Y. Lee, Ed. G. Bernstein, Ed., W. Imajuku, "Framework for GMPLS and Path Computation Element (PCE) Control of Wavelength Switched Optical Networks (WSNs)", [RFC 6163](#), April 2011.
- [RFC6205] T. Otani, Ed., D. Li, Ed., "Generalized Labels for Lambda-Switch-Capable (LSC) Label Switching Routers", [RFC 6205](#), March 2011.
- [RFC7446] Y. Lee, G. Bernstein, D. Li, W. Imajuku, "Routing and Wavelength Assignment Information Model for Wavelength Switched Optical Networks", [RFC 7446](#), February 2015.
- [RFC7579] G. Bernstein, Y. Lee, D. Li, W. Imajuku, "General Network Element Constraint Encoding for GMPLS Controlled Networks", [RFC 7579](#), June 2015.
- [RFC7581] G. Bernstein, Y. Lee, D. Li, W. Imajuku, "Routing and Wavelength Assignment Information Encoding for Wavelength Switched Optical Networks", [RFC 7581](#), June 2015.
- [RFC7698] O. Gonzalez de Dios, Ed., R. Casellas, Ed., "Framework and Requirements for GMPLS-Based Control of Flexi-Grid Dense Wavelength Division Multiplexing (DWDM) Networks", [RFC 7698](#), November 2015.
- [RFC8340] M. Bjorklund and L. Berger, Ed., "YANG Tree Diagrams", [RFC 8340](#), March 2018.
- [RFC8342] M. Bjorklund, J. Schoenwaelder, P. Shafer, K. Watsen, R. Wilton, "Network Management Datastore Architecture (NMDA)", [RFC 8342](#), March 2018.
- [RFC8345] A. Clemm, et al, "A YANG Data Model for Network Topologies", [RFC 8345](#), March 2018.

[9](#). Contributors

Authors' Addresses

Young Lee (ed.)
Huawei Technologies
5700 Tennyson Parkway, Suite 600
Plano, TX 75024
USA
Email: leeyoung@huawei.com

Dhruv Dhody
Huawei Technologies
Divyashree Techno Park, Whitefield
Bangalore, Karnataka 560066
India
EMail: dhruv.ietf@gmail.com

Aihua Guo
Huawei Technologies
Email: aihuaguo@huawei.com

Victor Lopez
Telefonica
Email: victor.lopezalvarez@telefonica.com

Daniel King
University of Lancaster
Email: d.king@lancaster.ac.uk

Bin Yeong Yoon
ETRI
218 Gaijeongro, Yuseong-gu
Daejeon, Korea
Email: byyun@etri.re.kr

Ricard Vilalta
CTTC
Email: ricard.vilalta@cttc.es

Italo Busi

Lee, et al.

Expires August 2018

[Page 88]

Internet-Draft

WSN YANG Model

December 2018

Huawei
Email: Italo.Busi@huawei.com

Lee, et al.

Expires August 2018

[Page 89]