

CCAMP Working Group
Internet Draft
Intended status: Standard Track
Expires: February 22, 2019

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

V. Lopez
Telefonica

D. King
U. of Lancaster

B. Yoon
ETRI

Ricard Vilalta
CTTC

August 22, 2018

A Yang Data Model for WSON Optical Networks

[draft-ietf-ccamp-wson-yang-13](#)

Abstract

This document provides a YANG data model for the routing and wavelength assignment (RWA) TE topology in wavelength switched optical networks (WSONs).

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>

Lee, et al.

Expires February 2019

[Page 1]

This Internet-Draft will expire on February 22, 2019.

Copyright Notice

Copyright (c) 2018 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](#)
- [2. YANG Model \(Tree Structure\).....3](#)
- [3. IETF-WSON-Topology YANG Model.....17](#)
- [4. IETF-TE-WSON-Types YANG Model.....51](#)
- [5. Security Considerations.....60](#)
- [6. IANA Considerations.....61](#)
- [7. Acknowledgments.....61](#)
- [8. References.....62](#)
 - [8.1. Normative References.....62](#)
 - [8.2. Informative References.....62](#)
- [9. Contributors.....62](#)
- [Authors' Addresses.....62](#)

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-TOPO](#)].

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-te-wson-types ([Section 4](#)).

2. YANG Model (Tree Structure)

```

module: ietf-wson-topology
  augment /nw:networks/nw:network/nw:network-types/tet:te-topology:
    +--rw wson-topology!
  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*   te-wson-types:operational-mode
    +--rw configured-operational-modes?  te-wson-types:operational-mode
    +--rw supported-fec-types*           identityref
    +--rw supported-termination-types*   identityref
    +--rw supports-bit-stuffing?         boolean
  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 channel-freq?          decimal64
      +--:(cwdm)
        +--rw channel-wavelength?  uint32
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 channel-freq?          decimal64
      +--:(cwdm)
        +--rw channel-wavelength?  uint32
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 channel-freq?          decimal64
    +--:(cwdm)
      +-rw channel-wavelength?   uint32
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 channel-freq?          decimal64
        +--:(cwdm)
          +-rw channel-wavelength?   uint32
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 channel-freq?          decimal64
        +--:(cwdm)
          +-rw channel-wavelength?   uint32
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 channel-freq?          decimal64
        +--:(cwdm)
          +-rw channel-wavelength?   uint32
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 channel-freq?          decimal64
        +--:(cwdm)
          +-ro channel-wavelength?   uint32
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 channel-freq?          decimal64
      +--:(cwdm)
        +--rw channel-wavelength?    uint32
    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 channel-freq?          decimal64
      +--:(cwdm)
        +--rw channel-wavelength?    uint32
    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 channel-freq?          decimal64
      +--:(cwdm)
        +--rw channel-wavelength?    uint32
    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 channel-freq?          decimal64
      +--:(cwdm)
        +--rw channel-wavelength?    uint32
    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 channel-freq?          decimal64
      +--:(cwdm)
```

```

        +--rw channel-wavelength?  uint32
    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 channel-freq?          decimal64
            +--:(cwdm)
                +--rw channel-wavelength?  uint32
    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 channel-freq?          decimal64
            +--:(cwdm)
                +--rw channel-wavelength?  uint32
    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 channel-freq?          decimal64
            +--:(cwdm)
                +--rw channel-wavelength?  uint32
    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 channel-freq?          decimal64
            +--:(cwdm)
                +--ro channel-wavelength?  uint32
    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 channel-freq?          decimal64
```

```
+--:(cwdm)
```

```
+--ro channel-wavelength?  uint32
```

```
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 channel-freq?          decimal64
```

```
+--:(cwdm)
```

```
+--ro channel-wavelength?  uint32
```

```
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 channel-freq?          decimal64
```

```
+--:(cwdm)
```

```
+--ro channel-wavelength?  uint32
```

```
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 channel-freq?          decimal64
```

```
+--:(cwdm)
```

```
+--ro channel-wavelength?  uint32
```

```
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 channel-freq?          decimal64
```

```
+--:(cwdm)
```

```
+--ro channel-wavelength?  uint32
```

```
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:

Lee, et al.

Expires August 2018

[Page 9]

```

+---:(wson)
  +--ro (grid-type)?
    +---:(dwdm)
      | +--ro channel-freq?          decimal64
    +---:(cwdm)
      +--ro channel-wavelength?    uint32
  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 channel-freq?          decimal64
      +---:(cwdm)
        +--ro channel-wavelength?    uint32
    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 channel-freq?          decimal64
        +---:(cwdm)
          +--ro channel-wavelength?    uint32
      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 channel-freq?          decimal64
          +---:(cwdm)
            +--ro channel-wavelength?    uint32
        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 channel-freq?          decimal64
    +--:(cwdm)
      +--ro channel-wavelength?  uint32
    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 channel-freq?          decimal64
        +--:(cwdm)
          +--ro channel-wavelength?  uint32
      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 channel-freq?          decimal64
        +--:(cwdm)
          +--ro channel-wavelength?  uint32
      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 channel-freq?          decimal64
        +--:(cwdm)
          +--ro channel-wavelength?  uint32
      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:
  +--:(wson)
    +--ro (grid-type)?
      +--:(dwdm)
        | +--ro channel-freq?          decimal64
        +--:(cwdm)
          +--ro channel-wavelength?  uint32
      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 channel-freq?          decimal64
    +--:(cwdm)
      +-ro channel-wavelength?  uint32
    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 channel-freq?          decimal64
        +--:(cwdm)
          +-ro channel-wavelength?  uint32
      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 channel-freq?          decimal64
              +--:(cwdm)
                +-rw channel-wavelength?  uint32
            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 channel-freq?          decimal64
                    +--:(cwdm)
                      +-rw channel-wavelength?  uint32
                  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)
                          | +-rw channel-freq?          decimal64
                          +--:(cwdm)
                            +-rw channel-wavelength?  uint32
                      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)?
```

Lee, et al.

Expires August 2018

[Page 12]


```

    +--:(dwdm)
      | +--rw channel-freq?          decimal64
    +--:(cwdm)
      +--rw channel-wavelength?    uint32
  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:
  +--:(wson)
    +--rw (grid-type)?
      +--:(dwdm)
        | +--rw channel-freq?          decimal64
      +--:(cwdm)
        +--rw channel-wavelength?    uint32
  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:
  +--:(wson)
    +--rw (grid-type)?
      +--:(dwdm)
        | +--rw channel-freq?          decimal64
      +--:(cwdm)
        +--rw channel-wavelength?    uint32
  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 channel-freq?          decimal64
      +--:(cwdm)
        +--ro channel-wavelength?    uint32
  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 channel-freq?          decimal64

```

+--(cwm)

Lee, et al.

Expires August 2018

[Page 13]

```

        +--rw channel-wavelength?  uint32
    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 channel-freq?          decimal64
            +--:(cwdm)
                +--rw channel-wavelength?  uint32
    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 channel-freq?          decimal64
            +--:(cwdm)
                +--rw channel-wavelength?  uint32
    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 channel-freq?          decimal64
            +--:(cwdm)
                +--rw channel-wavelength?  uint32
    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:
    +--:(wson)
        +--rw (grid-type)?
            +--:(dwdm)
                | +--rw channel-freq?          decimal64
            +--:(cwdm)
                +--rw channel-wavelength?  uint32
    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:
    +--:(wson)
        +--rw (grid-type)?

```

+ - - : (dwdm)

Lee, et al.

Expires August 2018

[Page 14]

```

    | +-rw channel-freq?          decimal64
    +--:(cwdm)
      +-rw channel-wavelength?   uint32
    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 channel-freq?      decimal64
        +--:(cwdm)
          +-ro channel-wavelength? uint32
      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 channel-freq?    decimal64
              +--:(cwdm)
                +-rw channel-wavelength? uint32
            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 channel-freq?    decimal64
                +--:(cwdm)
                  +-rw channel-wavelength? uint32
            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 channel-freq?    decimal64
                  +--:(cwdm)
                    +-rw channel-wavelength? uint32
              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 channel-freq?          decimal64
```

```

    +---:(cwdm)
      +--rw channel-wavelength?  uint32
  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 channel-freq?      decimal64
          +---:(cwdm)
            +--ro channel-wavelength?  uint32
  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 channel-freq?      decimal64
          +---:(cwdm)
            +--ro channel-wavelength?  uint32
  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 channel-freq?      decimal64
          +---:(cwdm)
            +--rw channel-wavelength?  uint32
  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 channel-freq?      decimal64
          +---:(cwdm)
            +--rw channel-wavelength?  uint32
  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:

Lee, et al.

Expires August 2018

[Page 16]


```

+---:(wson)
  +--rw (grid-type)?
    +---:(dwdm)
      | +--rw channel-freq?          decimal64
    +---:(cwdm)
      +--rw channel-wavelength?    uint32
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 channel-freq?          decimal64
    +---:(cwdm)
      +--rw channel-wavelength?    uint32

```

3. IETF-WSON-Topology YANG Model

```
<CODE BEGINS> file "ietf-wson-topology@2018-08-22.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";
  }

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

  import ietf-te-topology {

```

```
    prefix "tet";
  }

import ietf-te-wson-types {
  prefix "te-wson-types";
}

organization
  "IETF CCAMP Working Group";

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

description
  "This module contains a collection of YANG definitions for
  RWA WSON.

  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 2018-08-22 {
  description
    "version 13.";

  reference
    "RFC XXX: A Yang Data Model for WSON Optical Networks ";
}

grouping wson-node-attributes {
  description "WSON node attributes";
  container wson-node {
    description "WSON node attrtributes.";
    leaf node-type {
      type identityref {
        base te-wson-types:wson-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. The payload type is defined
        as the generalized PIDs 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
      "Indicating 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 te-wson-types:operational-mode;
    description
      "List of all supported vendor-specific
      mode identifiers";
  }

  leaf configured-operational-modes {
    type te-wson-types:operational-mode;
    description
      "Vendor-specific mode identifier configured
```

on the TTP.";

Lee, et al.

Expires August 2018

[Page 19]

```
    }

    leaf-list supported-fec-types {
      type identityref {
        base te-wson-types:fec-type;
      }
      description
        "List of all supported FEC types by this TTP.";
    }

    leaf-list supported-termination-types {
      type identityref {
        base te-wson-types:term-type;
      }
      description
        "List of all supported termination types by this TTP.";
    }

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

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



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

/* Augment bandwidth path constraints of connectivity-matrix */
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 "WSON bandwidth.";
case wson {
  uses te-wson-types:wson-link-bandwidth;
}
}

/* Augment bandwidth path constraints of connectivity-matrices information-
source */
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 "WSON bandwidth.";
case wson {
  uses te-wson-types:wson-link-bandwidth;
}
}

/* Augment bandwidth path constraints of connectivity-matrix information-
source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
```

+ "tet:connectivity-matrix/"

Lee, et al.

Expires August 2018

[Page 22]


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

Lee, et al.

Expires August 2018

[Page 23]

```
        description "Augment WSON TE bandwidth";
    }
    description "WSON bandwidth.";
    case wson {
        uses te-wson-types:wson-link-bandwidth;
    }
}

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

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

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

case wson {

Lee, et al.

Expires August 2018

[Page 24]

```
    uses te-wson-types:wson-link-bandwidth;
  }
}

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

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

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


}

Lee, et al.

Expires August 2018

[Page 25]

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

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

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



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

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

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

}

Lee, et al.

Expires August 2018

[Page 27]

```
}

/*
 * Augment TE label.
 */

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

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

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

}

Lee, et al.

Expires August 2018

[Page 28]

```
}

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

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

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


description "Augment WSON TE label";

Lee, et al.

Expires August 2018

[Page 29]

```
    }
    description "WSON label.";
    case wson {
      uses te-wson-types:wson-path-label;
    }
  }

/* Augment label hop of route-include of connectivity-matrices (added) */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:optimizations/tet:algorithm/tet:metric/"
  + "tet:optimization-metric/"
  + "tet:explicit-route-include-objects/"
  + "tet:route-object-include-object/"
  + "tet:type/tet:label/tet:label-hop/"
  + "tet:te-label/tet:technology" {
when "../../../../../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "wson:wson-topology" {
  description "Augment WSON TE label";
}
description "WSON label.";
case wson {
  uses te-wson-types:wson-path-label;
}
}

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

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

```
+ "tet:label-restrictions/tet:label-restriction" {
```

```

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

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

/* Augment ingress label restrictions end of connectivity-matrix */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:te-node-attributes/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/tet:from/"
  + "tet:label-restrictions/tet:label-restriction/"
  + "tet:label-end/"
  + "tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "wson:wson-topology" {
  description "Augment WSON TE label";
}
description "WSON label.";
case wson {
  uses te-wson-types:wson-link-label;
}
}

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

```

+ "tet:connectivity-matrix/tet:to/"

Lee, et al.

Expires August 2018

[Page 31]

```

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

/* Augment egress label restrictions start of connectivity-matrix */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:te-node-attributes/tet:connectivity-matrices/"
    + "tet:connectivity-matrix/tet:to/"
    + "tet:label-restrictions/tet:label-restriction/"
    + "tet:label-start/"
    + "tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
    + "nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
    }
description "WSON label.";
case wson {
    uses te-wson-types:wson-link-label;
}
}

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

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

```

+ "tet:te-node-attributes/tet:connectivity-matrices/"

```

    + "tet:connectivity-matrix/"
    + "tet:underlay/tet:primary-path/tet:path-element/"
    + "tet:type/tet:label/tet:label-hop/"
    + "tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
    + "nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
    }
description "WSON label.";
case wson {
    uses te-wson-types:wson-path-label;
}
}

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

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

```


uses te-wson-types:wson-path-label;

Lee, et al.

Expires August 2018

[Page 33]

```

}
}

```

```

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

```

```

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

```

```

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

```

}

Lee, et al.

Expires August 2018

[Page 34]

```

    description "WSON label.";
    uses te-wson-types:wson-label-restriction;
}

```

/* Augment label restrictions start of connectivity-matrices information-source */

```

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

```

/* Augment label restrictions end of connectivity-matrices information-source */

```

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

```

/* Augment label hop of underlay primary path of connectivity-matrices information-source */

```

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

```

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

Lee, et al.

Expires August 2018

[Page 35]

```

    description "Augment WSON TE label";
  }
  description "WSON label.";
  case wson {
    uses te-wson-types:wson-path-label;
  }
}

```

/* Augment label hop of underlay backup path of connectivity-matrices information-source */

```

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

```

/* Augment label hop of route-exclude of connectivity-matrices information-source */

```

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

```

/* Augment label hop of route-include of connectivity-matrices information-source */

```

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

```

+ "tet:information-source-entry/tet:connectivity-matrices/"

Lee, et al.

Expires August 2018

[Page 36]

```

    + "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 "WSON label.";
case wson {
    uses te-wson-types:wson-path-label;
}
}
}

```

/* Augment label hop of path-route of connectivity-matrices information-source */

```

augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:information-source-entry/tet:connectivity-matrices/"
    + "tet:path-properties/tet:path-route-objects/"
    + "tet:path-route-object/tet:type/"
    + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
    + "nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
}
description "WSON label.";
case wson {
    uses te-wson-types:wson-path-label;
}
}
}

```

/* Augment ingress label restrictions of connectivity-matrix information-source */

```

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

```



```

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

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

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

```

}

Lee, et al.

Expires August 2018

[Page 38]

```

    description "WSON label.";
    uses te-wson-types:wson-label-restriction;
}

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

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

/* Augment label hop of underlay primary path of connectivity-matrix
information-source */
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/"
  + "tet:underlay/tet:primary-path/tet:path-element/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../../../../../../../../../"

```

+ "nw:network-types/tet:te-topology/"

Lee, et al.

Expires August 2018

[Page 39]

```

    + "wson:wson-topology" {
      description "Augment WSON TE label";
    }
  description "WSON label.";
  case wson {
    uses te-wson-types:wson-path-label;
  }
}

```

/* Augment label hop of underlay backup path of connectivity-matrix information-source */

```

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

```

/* Augment label hop of route-exclude of connectivity-matrix information-source */

```

augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:information-source-entry/tet:connectivity-matrices/"
  + "tet:connectivity-matrix/"
  + "tet:optimizations/tet:algorithm/tet:metric/"
  + "tet:optimization-metric/"
  + "tet:explicit-route-exclude-objects/"
  + "tet:route-object-exclude-object/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "wson:wson-topology" {
  description "Augment WSON TE label";
}
description "WSON label.";
case wson {
  uses te-wson-types:wson-path-label;
}
}

```

/* Augment label hop of route-include of connectivity-matrix information-

Lee, et al.

Expires August 2018

[Page 40]

description "WSON label.";

Lee, et al.

Expires August 2018

[Page 41]

```
    uses te-wson-types:wson-label-restriction;
  }

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

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

/* Augment label hop of underlay primary path of local-link-connectivities
*/
augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:tunnel-termination-point/"
  + "tet:local-link-connectivities/"
  + "tet:underlay/tet:primary-path/tet:path-element/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../.../.../.../.../.../.../.../.../.../..."
  + "nw:network-types/tet:te-topology/"
```

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

Lee, et al.

Expires August 2018

[Page 42]

```
        description "Augment WSON TE label";
    }
    description "WSON label.";
    case wson {
        uses te-wson-types:wson-path-label;
    }
}

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

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

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

+ "tet:local-link-connectivities/"

Lee, et al.

Expires August 2018

[Page 43]

```

    + "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 "WSON label.";
case wson {
    uses te-wson-types:wson-path-label;
}
}

/* Augment label hop of path-route of local-link-connectivities */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:tunnel-termination-point/"
    + "tet:local-link-connectivities/"
    + "tet:path-properties/tet:path-route-objects/"
    + "tet:path-route-object/tet:type/"
    + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
    + "nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
}
description "WSON label.";
case wson {
    uses te-wson-types:wson-path-label;
}
}

/* Augment label restrictions of local-link-connectivity (LLC) */
augment "/nw:networks/nw:network/nw:node/tet:te/"
    + "tet:tunnel-termination-point/"
    + "tet:local-link-connectivities/"
    + "tet:local-link-connectivity/"
    + "tet:label-restrictions/tet:label-restriction" {
when "../../../../../../../nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
description "Augment WSON TE label";
}
description "WSON label.";
uses te-wson-types:wson-label-restriction;
}

```

/* Augment label restrictions start of local-link-connectivity (LLC) */

Lee, et al.

Expires August 2018

[Page 44]

```

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 "WSON label.";
case wson {
  uses te-wson-types:wson-link-label;
}
}

```

/* Augment label restrictions end of local-link-connectivity (LLC) */

```

augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:tunnel-termination-point/"
  + "tet:local-link-connectivities/"
  + "tet:local-link-connectivity/"
  + "tet: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 "WSON label.";
case wson {
  uses te-wson-types:wson-link-label;
}
}

```

/* Augment label hop of underlay primary path of local-link-connectivity (LLC) */

```

augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:tunnel-termination-point/"
  + "tet:local-link-connectivities/"
  + "tet:local-link-connectivity/"
  + "tet:underlay/tet: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 "WSON label.";

Lee, et al.

Expires August 2018

[Page 45]

```

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

```

/* Augment label hop of underlay backup path of local-link-connectivity (LLC) */

```

augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:tunnel-termination-point/"
  + "tet:local-link-connectivities/"
  + "tet:local-link-connectivity/"
  + "tet:underlay/tet:backup-path/tet:path-element/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "wson:wson-topology" {
  description "Augment WSON TE label";
}
description "WSON label.";
case wson {
  uses te-wson-types:wson-path-label;
}
}

```

/* Augment label hop of route-exclude of local-link-connectivity (LLC) */

```

augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:tunnel-termination-point/"
  + "tet:local-link-connectivities/"
  + "tet:local-link-connectivity/"
  + "tet:optimizations/tet:algorithm/tet:metric/"
  + "tet:optimization-metric/"
  + "tet:explicit-route-exclude-objects/"
  + "tet:route-object-exclude-object/tet:type/"
  + "tet:label/tet:label-hop/tet:te-label/tet:technology" {
when "../../../../../../../../../../../"
  + "nw:network-types/tet:te-topology/"
  + "wson:wson-topology" {
  description "Augment WSON TE label";
}
description "WSON label.";
case wson {
  uses te-wson-types:wson-path-label;
}
}

```

/* Augment label hop of route-include of local-link-connectivity (LLC) */

```

augment "/nw:networks/nw:network/nw:node/tet:te/"
  + "tet:tunnel-termination-point/"

```

+ "tet:local-link-connectivities/"

Lee, et al.

Expires August 2018

[Page 46]

```

    + "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 "WSON label.";
case wson {
    uses te-wson-types:wson-path-label;
}
}

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

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

```

uses te-wson-types:wson-path-label;

Lee, et al.

Expires August 2018

[Page 47]

```
    }
  }

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

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

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

/* Augment label restrictions end of TE link */
augment "/nw:networks/nw:network/nt:link/tet:te/"
```

+ "tet:te-link-attributes/"

Lee, et al.

Expires August 2018

[Page 48]

```
    + "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 "WSON label.";
case wson {
    uses te-wson-types:wson-link-label;
}
}

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

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

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


description "WSON label.";

Lee, et al.

Expires August 2018

[Page 49]

```
    case wson {
      uses te-wson-types:wson-link-label;
    }
  }

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

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

/* Augment label restrictions of TE link template */
augment "/nw:networks/tet:te/tet:templates/"
  + "tet:link-template/tet:te-link-attributes/"
  + "tet:label-restrictions/tet:label-restriction" {
/*
  when "../../../../../../../nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
```

description "Augment WSON TE label";

Lee, et al.

Expires August 2018

[Page 50]

```

    }
  */
  description "WSON label.";
  uses te-wson-types:wson-label-restriction;
}

/* Augment label restrictions start of TE link template */
augment "/nw:networks/tet:te/tet:templates/"
  + "tet:link-template/tet:te-link-attributes/"
  + "tet:label-restrictions/tet:label-restriction/"
  + "tet:label-start/tet:te-label/tet:technology" {
/*
  when "../../../../../../../nw:network-types/tet:te-topology/"
    + "wson:wson-topology" {
    description "Augment WSON TE label";
  }
*/
  description "WSON label.";
  case wson {
    uses te-wson-types:wson-link-label;
  }
}

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

<CODE ENDS>

```

4. IETF-TE-WSON-Types YANG Model

```

<CODE BEGINS> file "ietf-te-wson-types@2018-08-15.yang"
module ietf-te-wson-types {

```

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

```
prefix "te-wson-types";

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

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

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

description
  "This module defines WSON types.";

revision "2018-08-15" {
  description
    "Revision 3";
  reference "TBD";
}

typedef operational-mode {
  type string;
  description
    "Vendor-specific 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";
}

identity wson-node-type {
  description
    "WSON node type.";
  reference
    "RFC6163";
}

identity wson-node-foadm {
  base wson-node-type;
  description
    "Fixed OADM node.";
}
```

```
identity wson-node-roadm {
  base wson-node-type;
  description
    "ROADM or OXC node.";
}

identity wson-node-ila {
  base wson-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 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 wson-grid-type {
  description
    "WSON grid type.";
}

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

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

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

identity wson-bw-otu1 {
  base wson-bandwidth-type;
  description
    "OTU1 (2.66G)";
}

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

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

identity wson-bw-otu2 {
  base wson-bandwidth-type;
  description
```



```
    "OTU2 (10.70G)";
}

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

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

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

identity wson-bw-otu3e1 {
  base wson-bandwidth-type;
  description
    "OTU3e1 (44.57G)";
}

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

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

identity wson-bw-otucn {
  base wson-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 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 type.";
}
```

```
identity g-fec {
  base fec-type;
  description
    "G-FEC.";
}
identity e-fec {
  base fec-type;
  description
    "E-FEC.";
}
identity no-fec {
  base fec-type;
  description
    "No FEC.";
}

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

identity term-phys {
  base term-type;
  description
    "PHYS.";
}
identity term-otu {
  base term-type;
  description
    "OTU.";
}
identity term-odu {
  base term-type;
  description
    "ODU.";
}
identity term-opu {
  base term-type;
  description
    "OPU.";
}
identity term-section {
  base term-type;
  description
    "Section.";
```

```
}

/* Groupings. */
grouping wson-path-bandwidth {
  description "WSON path bandwidth attributes";
  leaf bandwidth-type {
    type identityref {
      base wson-bandwidth-type;
    }
    description "WSON bandwidth type";
  }
}

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

grouping wson-label {
  description
    "Generic label for WSON links and paths";
  choice grid-type {
    description
      "Label for DWDM or CWDM grid";
    case dwdm {
      leaf channel-freq {
        type decimal64 {
          fraction-digits 5;
        }
        units THz;
        description
          "The DWDM frequency in THz, e.g. 193.12500";
        reference
          "RFC6205";
      }
    }
    case cwdm {
      leaf channel-wavelength {
        type uint32;
        units nm;
      }
    }
  }
}
```

```
        description
          "The CWDM wavelength in nanometer, e.g. 1511";
        reference
          "RFC6205";
      }
    }
  }
}

grouping wson-link-label {
  description
    "Link label information for WSON links, for label-start/end";
  uses te-wson-types:wson-label;
}

grouping wson-path-label {
  description
    "Path label information for WSON links, for label-hop";
  uses te-wson-types:wson-label;
}

grouping wson-label-restriction {
  description
    "WSON label restriction.";

  leaf grid-type {
    type identityref {
      base te-wson-types:wson-grid-type;
    }
    description "Grid type";
  }
  leaf priority {
    type uint8;
    description "priority.";
  }
}

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

```
        base te-wson-types: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 cwdm {
    leaf wson-cwdm {
        type identityref {
            base te-wson-types:cwdm-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.";
    }
}
}
}
}
```

<CODE ENDS>

5. Security Considerations

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

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.

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-te-wson-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](#)]:

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

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

7. Acknowledgments

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

8. References

8.1. Normative References

[TE-TOP0] X. Liu, et al., "YANG Data Model for TE Topologies", work in progress: [draft-ietf-teas-yang-te-topo](#).

8.2. Informative References

[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.

9. Contributors

Authors' Addresses

Young Lee (ed.)
Huawei Technologies
5340 Legacy Drive, Building 3
Plano, TX 75023
USA

Phone: (469) 277-5838
Email: leeyoung@huawei.com

Dhruv Dhody
Huawei Technologies India Pvt. Ltd,
Near EPIP Industrial Area, Kundalahalli Village, Whitefield,
Bangalore - 560 037 [H1-2A-245]

Email: dhruv.dhody@huawei.com

Xian Zhang
Huawei Technologies

Email: zhang.xian@huawei.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