

CCAMP Working Group
Internet Draft
Intended status: Standard Track
Expires: August 27, 2018

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

V. Lopez
Telefonica

D. King
U. of Lancaster

B. Yoon
ETRI

Ricard Vilalta
CTTC

February 27, 2018

A Yang Data Model for WSON Optical Networks

[draft-ietf-ccamp-wson-yang-10](#)

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>

This Internet-Draft will expire on August 27, 2018.

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-WSN-Topology YANG Model.....	4
4. IETF-TE-WSN-Types YANG Model.....	11
5. Security Considerations.....	13
6. IANA Considerations.....	14
7. Acknowledgments.....	14
8. References.....	15
8.1. Normative References.....	15
8.2. Informative References.....	15
9. Contributors.....	15
Authors' Addresses.....	15

[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 (WSNs). 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 /nd:networks/nd:network/nd:network-types/tet:te-topology:
    +--rw wson-topology!
  augment /nd:networks/nd:network/nd:node/tet:te/tet:te-node-
attributes/tet:connectivity-matrices/tet:connectivity-matrix:
    +--rw wavelength-availability-range?  te-wson-types:wavelength-range-type
  augment /nd:networks/nd:network/lnk:link/tet:te/tet:te-link-attributes:
    +--rw channel-num?                    int32
    +--rw first-channel-frequency?         decimal64
    +--rw channel-spacing?                 decimal64
    +--rw available-wavelength-info* [priority]
      +--rw priority                      uint8
      +--rw wavelength-availability-range? te-wson-types:wavelength-range-
type
  augment /nd:networks/nd:network/nd:node/tet:te/tet:te-node-attributes:
    +--rw wson-node
      +--rw node-type?  identityref
  augment /nd:networks/nd:network/nd:node/tet:te/tet:tunnel-termination-point:
    +--rw available-operational-mode*  te-wson-types:operational-mode
    +--rw operational-mode?            te-wson-types:operational-mode
```

3. IETF-WSN-Topology YANG Model

<CODE BEGINS> file "ietf-wson-topology@2018-02-27.yang"

```
module ietf-wson-topology {
//TODO: FIXME
    //yang-version 1.1;

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

    prefix "wson";

    import ietf-network {
        prefix "nd";
    }

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

    import ietf-inet-types {
        prefix "inet";
    }

    import ietf-te-topology {
        prefix "tet";
    }
    import ietf-te-wson-types { //Modified
        prefix "te-wson-types";
    }

    //NOT NEEDED
    /*import ietf-transport-types {
        prefix "tran-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) 2017 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 2018-02-27 {  
  description  
    "version 10.";  
  
  reference  
    "RFC XXX: A Yang Data Model for WSON Optical  
Networks ";  
}  
  
typedef wson-topology-id {  
  type inet:uri;  
  description  
    "The WSON Topology ID";  
}  
  
grouping wson-topology-type {  
  description "wson-topology type";  
  container wson-topology {  
    presence "indicates a topology of wson";  
    description  
      "Container to identify wson topology type";  
  }  
}  
  
grouping wson-node-attributes {  
  description "WSO node attributes";  
  container wson-node {
```

```

        description "WSON node attributes.";
        leaf node-type {
            type identityref {
                base te-wson-types:wson-node-type;
            }
            description "WSON node type.";
        }
    }
}

grouping wson-wavelength-availability-range{
    description "wavelength availability range";

    leaf wavelength-availability-range{
        type te-wson-types:wavelength-range-type;
        description
            "range that indicates if a wavelength is
            available or not on each channel at
            specified priority level.";
    }
}

grouping wson-link-attributes {
    description "WSON link attributes";
    leaf channel-num {
        type int32;
        description "Number of OCh channels available";
    }
    leaf first-channel-frequency {
        type decimal64 {
            fraction-digits 5;
        }
        units THz;
        description "First channel frequency in the grid";
    }
    leaf channel-spacing {
        type decimal64 {
            fraction-digits 5;
        }
        units GHz;
        description "This is fixed channel spacing for
WSON,
        e.g, 12.5, 25, 50, 100, ..";
    }

    list available-wavelength-info{

```



```

        key "priority";
        max-elements "8";

        description
            "List of available wavelength channels on
this link";
        leaf priority {
            type uint8 {
                range "0..7";
            }
            description "priority";
        }
        uses wson-wavelength-availability-range;
    }
}
grouping wson-tp-attributes {
    description "wson-tp-attributes";

    leaf client-facing {
        type empty;
        description
            "if present, it means this tp is a client-
facing tp.
            adding/dropping client signal flow.";
    }

    /*
//can it be fully covered by interface-switching-capability of base
TE model?
        leaf-list supported-client-signals {
            type identityref {
                base tran-types:client-signal;
            }
            description
                "Supported client signals at this TP";
        }
    */
}

grouping wson-ttp-attributes {
    description "WSON tunnel termination point (e.g.
tranponder)
    attributes";
    leaf-list available-operational-mode {
        type te-wson-types:operational-mode;

```

```

        description "List of all vendor-specific supported
        mode identifiers";
    }

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

/* AUGMENTS */

augment "/nd:networks/nd:network/nd:network-types"
+ "/tet:te-topology" {
    description "wson-topology augmented";
    uses wson-topology-type;
}

//FIXING NMDA
augment "/nd:networks/nd:network/nd:node/tet:te"
+ "/tet:te-node-attributes/tet:connectivity-matrices"
+ "/tet:connectivity-matrix" {
    when "/nd:networks/nd:network/nd:network-types"
    + "/tet:te-topology/wson:wson-topology" {
        description
            "This augment is only valid for WSON
connectivity
matrix.";
    }
    description "WSOON connectivity matrix config
augmentation";
    uses wson-wavelength-availability-range;
}

//REMOVING
/*
augment "/nd:networks/nd:network/nd:node/tet:te/tet:state"
+ "/tet:te-node-attributes/tet:connectivity-matrices"
+ "/tet:connectivity-matrix" {
    when "/nd:networks/nd:network/nd:network-types"
    + "/tet:te-topology/wson-topology" {
        description
            "This augment is only valid for WSON
connectivity
matrix.";

```

```
    }
    description "WSON connectivity matrix state augmentation";
    uses wson-wavelength-availability-range;
  }*/

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

  uses wson-link-attributes;
}

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

  uses wson-link-attributes;
}*/

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

  uses wson-node-attributes;
}
```

```
//REMOVING
/*
augment "/nd:networks/nd:network/nd:node/tet:te/tet:state"
  + "/tet:te-node-attributes" {
    when "/nd:networks/nd:network/nd:network-types"
      +"/tet:te-topology/wson:wson-topology" {
      description
        "This augment is only valid for WSON.";
    }
    description "WSON Node augmentation.";

    uses wson-node-attributes;
  }*/

//FIXING NMDA
augment "/nd:networks/nd:network/nd:node/tet:te"
  + "/tet:tunnel-termination-point" {
    when "/nd:networks/nd:network/nd: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;
  }

//removing
/*augment "/nd:networks/nd:network/nd:node/tet:te"
  + "/tet:tunnel-termination-point/tet:state" {
    when "/nd:networks/nd:network/nd: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;
  }*/
}
```

<CODE ENDS>

4. IETF-TE-WSON-Types YANG Model

```
<CODE BEGINS> file "ietf-te-wson-types@2018-02-27.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 "2018-02-27" {
      description
        "Revision 2";
      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
            "WSOY node type.";
        reference
            "";
    }

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

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

    identity wsoy-node-ila {
        base wsoy-node-type;
        description
            "ILA (In-Line Amplifier) node.";
    }

//ADDED
    typedef wavelength-range-type {
        type string {
            pattern "([1-9][0-9]{0,3}(-[1-9][0-9]{0,3})?" +
                "(,[1-9][0-9]{0,3}(-[1-9][0-9]{0,3})?)*";
        }
        description
            "A list of WDM channel numbers (starting at 1)
            in ascending order. For example: 1,12-20,40,50-80";
    }

    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).";
    }

}
```

<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