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A Yang Data Model for WSON Optical Networks

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Abstract

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

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Table of Contents

1. Introduction.....	2
2. YANG Model (Tree Structure).....	3
3. WSON-RWA YANG Model.....	4
4. Security Considerations.....	10
5. IANA Considerations.....	10
6. Acknowledgments.....	10
7. References.....	11
7.1. Normative References.....	11
7.2. Informative References.....	11
8. Contributors.....	11
Authors' Addresses.....	11

[1. Introduction](#)

This document provides a YANG data model for the routing and wavelength assignment (RWA) Traffic Engineering (TE) topology in wavelength switched optical networks (WSONs). The YANG model described in this document is a WSON technology-specific Yang model based on the information model developed in [\[RFC7446\]](#) and the two encoding documents [\[RFC7581\]](#) and [\[RFC7579\]](#) that developed protocol

independent encodings based on [\[RFC7446\]](#). This document augments the generic TE topology draft [\[TE-TOP0\]](#).

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

2. YANG Model (Tree Structure)

```
module: ietf-wson-topology
  augment /nd:networks/nd:network/nd:network-types:
    +--rw wson-topology!
  augment /nd:networks/nd:network/nd:node/tet:te/tet:te-node-
attributes/tet:connectivity-matrices/tet:connectivity-matrix:
    +--rw matrix-interface* [in-port-id]
      +--rw in-port-id      wson-interface-ref
      +--rw out-port-id?    wson-interface-ref
  augment /nd:networks/nd:network/lnk:link/tet:te/tet:te-link-attributes:
    +--rw channel-max?      int32
    +--rw default-frequency? decimal64
    +--rw channel-spacing?  decimal64
    +--rw wavelength-available-bitmap* binary
  augment /nd:networks/nd:network/nd:node/tet:te/tet:te-node-attributes:
    +--rw wson-node
      | +--rw device-type?  devicetype
      | +--rw dir?          directionality
      | +--rw interfaces* [name]
      |   +--rw name        string
      |   +--rw port-number? uint32
      |   +--rw input-port?  boolean
      |   +--rw output-port? boolean
      |   +--rw description? string
    +--rw resource-pool* [resource-pool-id]
      +--rw resource-pool-id  uint32
      +--rw pool-state?      boolean
      +--rw matrix-interface* [in-port-id]
        +--rw in-port-id      wson-interface-ref
        +--rw out-port-id?    wson-interface-ref
```

3. WSON-RWA YANG Model

<CODE BEGINS> file "ietf-wson-topology@2017-07-03.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 "nd";
  }

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

  import ietf-inet-types {
    prefix "inet";
  }
  import ietf-te-topology {
    prefix "tet";
  }

  organization
    "IETF CCAMP Working Group";

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

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

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```


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```
revision 2017-07-03 {
    description
        "version 7.";

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

typedef wson-topology-id {
    type inet:uri;
    description
        "The WSON Topology ID";
}

typedef wson-node-id {
    type inet:ip-address;
    description
        "The WSON Node ID";
}

typedef devicetype {
    type enumeration {
        enum adm {
            value 1;
            description
                "Device is ADM";
        }

        enum roadm {
            value 2;
            description
                "Device is ROADMD/OXC";
        }
    }
    description
        "device type: fixed (ADM) or switched (ROADMD/OXC)";
}

typedef directionality {
    type enumeration {
        enum bidir {
            value 0;
            description
                "bi-directional";
        }
    }
}
```

}

Lee, et al.

Expires January 3, 2018

[Page 5]

```
        enum input {
            value 1;
            description
                "input direction";
        }
        enum output {
            value 2;
            description
                "output direction";
        }
    }
    description
        "The directionality of link set";
}

typedef wson-interface-ref {
    type leafref {
        path "/nd:networks/nd:network/nd:node/tet:te/"
            + "tet:te-node-attributes/wson:wson-node/"
            + "wson:interfaces/wson:name";
    }
    description
        "This type is used by data models that need to
        reference WSON interface.";
}

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 "wson node attributes";
    container wson-node {
        description "WSON node attributes.";
        leaf device-type {
            type devicetype;
            description
                "device type: fixed (ADM) or switched
                (ROADM/OXC)";
        }
        leaf dir {
            type directionality;
            description

```

"bi-directionality or input or output

Lee, et al.

Expires January 3, 2018

[Page 6]

```
        of link set";
    }
    list interfaces {
        key "name";
        unique "port-number"; // TODO Puerto y TP ID
        description "List of interfaces contained in the node";
        uses node-interface;
    }
}

grouping node-interface {
    description "node interface definition";
    leaf name {
        type string;
        description "Interface name";
    }
    leaf port-number {
        type uint32;
        description "Number of the port used by the interface";
    }
    leaf input-port {
        type boolean;
        description "Determines if the port is an input port";
    }
    leaf output-port {
        type boolean;
        description
            "Determines if the port is an output port";
    }
    leaf description {
        type string;
        description "Description of the interface";
    }
}

grouping available-wavelength {
    description "describe available wavelengths";
    leaf-list wavelength-available-bitmap {
        type binary;
        description
            "array of bits (i.e., bitmap) that indicates
            if a wavelength is available or not on each
            channel.";
    }
}

grouping wson-link-attributes {
```

description "Set of WSON link attributes";

Lee, et al.

Expires January 3, 2018

[Page 7]

```
        leaf channel-max {
            type int32;
            description "Maximum Number of OCh channels available
by the node";
        }
        leaf default-frequency {
            type decimal64 {
                fraction-digits 5;
            }
            units THz;
            default 193.1;
            description "Default Central Frequency";
        }
        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, ..";
        }
    }

    grouping wson-connectivity-matrix {
        description "wson connectivity matrix";
        list matrix-interface {
            key "in-port-id";

            description
                "matrix-interface describes input-ports
                and out-ports around a connectivity
                matrix";

            leaf in-port-id {
                type wson-interface-ref;
                description
                    "The reference to in-port";
            }

            leaf out-port-id {
                type wson-interface-ref;
                description
                    "The reference to out-port";
            }
        }
    }

    grouping resource-pool-attributes {
```

description "resource pool describes regeneration or wave
converter";

Lee, et al.

Expires January 3, 2018

[Page 8]

```
list resource-pool {
  key "resource-pool-id";
  description
    "The resource pool list";

  leaf resource-pool-id {
    type uint32;
    description
      "The resource pool ID";
  }

  leaf pool-state {
    type boolean;
    description
      "TRUE is state UP; FALSE is state down";
  }

  uses wson-connectivity-matrix;
}

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

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"
    + "/wson-topology" {
    description
      "This augment is only valid for
      WSON connectivity matrix.";
  }
  description "WSON connectivity matrix state augmentation";
  uses wson-connectivity-matrix;
}

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



```
        uses wson-link-attributes;
        uses available-wavelength;
    }

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

      uses wson-node-attributes;
      uses resource-pool-attributes;
    }
  }
<CODE ENDS>
```

[4. Security Considerations](#)

TDB

[5. IANA Considerations](#)

TDB

[6. Acknowledgments](#)

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

7. References

7.1. Normative References

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

7.2. 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.

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