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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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**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 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:config/tet:te-node-
attributes/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/nd:node/tet:te/tet:state/tet:te-node-
attributes/tet:connectivity-matrix:
    +--ro matrix-interface* [in-port-id]
      +--ro in-port-id      wson-interface-ref
      +--ro out-port-id?   wson-interface-ref
  augment /nd:networks/nd:network/lnk:link/tet:te/tet:config/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/lnk:link/tet:te/tet:state/tet:te-link-
attributes:
    +--ro channel-max?          int32
    +--ro default-frequency?    decimal64
    +--ro channel-spacing?      decimal64
    +--ro wavelength-available-bitmap*  binary
  augment /nd:networks/nd:network/nd:node/tet:te/tet:config/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
  augment /nd:networks/nd:network/nd:node/tet:te/tet:state/tet:te-node-
attributes:
    +--ro wson-node

```

```
|  +--ro device-type?   devicetype
|  +--ro dir?           directionality
|  +--ro interfaces* [name]
|      +--ro name       string
```

```
|   +--ro port-number?   uint32
|   +--ro input-port?    boolean
|   +--ro output-port?   boolean
|   +--ro description?   string
+--ro resource-pool* [resource-pool-id]
  +--ro resource-pool-id  uint32
  +--ro pool-state?      boolean
  +--ro matrix-interface* [in-port-id]
    +--ro in-port-id     wson-interface-ref
    +--ro out-port-id?   wson-interface-ref
```

### 3. WSON-RWA YANG Model

<CODE BEGINS> file "ietf-wson-topology@2017-02-21.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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  authors of the code. All rights reserved.

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  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 2017-02-21 {
  description
    "version 5.";

  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 ROAMD/OXC";
    }
}
description
    "device type: fixed (ADM) or switched (ROADM/OXC)";
}

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

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```
        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";
    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 {
```

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```
        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 {
    converter";
    description "resource pool describes regeneration or wave";
    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:config"
      + "/tet:te-node-attributes/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 config augmentation";
        uses wson-connectivity-matrix;
      }

    augment "/nd:networks/nd:network/nd:node/tet:te/tet:state"
      + "/tet:te-node-attributes/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:config"
      + "/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/lnk:link/tet:te/tet:state"
      + "/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;

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```
    }

    augment "/nd:networks/nd:network/nd:node/tet:te/tet:config"
      + "/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;
      }

    augment "/nd:networks/nd:network/nd:node/tet:te/tet:state"
      + "/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](#).

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## 8. Contributors

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