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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 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-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/nd:node/tet:te/tet:state/tet:te-node-
attributes/tet:connectivity-matrices/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@2017-06-20.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>
  Editor: Dhruv Dhody <dhruv.ietf@gmail.com>
  Editor: Ricard Vilalta <ricard.vilalta@cttc.es>";

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

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  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 2017-06-20 {
  description
    "corrected connectivity matrix references";

  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";
            }
            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";
        }
    }
```

}

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```
        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";
        }
    }
}
```

}

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```
    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";
    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";
  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-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 config augmentation";
    uses wson-connectivity-matrix;
}

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"
        + "/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

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```
        "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: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

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7.2. Informative References

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[RFC7581] G. Bernstein, Y. Lee, D. Li, W. Imajuku, "Routing and Wavelength Assignment Information Encoding for Wavelength Switched Optical Networks", [RFC 7581](#), June 2015.

8. Contributors

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