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A YANG model to manage the optical interface parameters for an external transponder in a WDM network
draft-dharini-netmod-dwdm-if-yang-00

Abstract

This memo defines a Yang model that translates the SNMP mib module defined in draft-galikunze-ccamp-dwdm-if-snmp-mib for managing single channel optical interface parameters of DWDM applications. This model is to support the optical parameters specified in ITU-T G.698.2 [ITU.G698.2] and application identifiers specified in ITU-T G.874.1 [ITU.G874.1] . Note that G.874.1 encompasses vendor-specific codes, which if used would make the interface a single vendor IaDI and could still be managed.

The Yang model defined in this memo can be used for Optical Parameters monitoring and/or configuration of the endpoints of the multi-vendor IaDI optical link.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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1. Introduction

This memo defines a Yang model that translates the SNMP mib module defined in draft-galikunze-ccamp-dwdm-if-snmp-mib for managing single channel optical interface parameters of DWDM applications, using the approach specified in G.698.2. This model is to support the optical parameters specified in ITU-T G.698.2 [ITU.G698.2], application identifiers specified in ITU-T G.874.1 [ITU.G874.1] and the Optical Power at Transmitter and Receiver side. Note that G.874.1 encompasses vendor-specific codes, which if used would make the interface a single vendor IaDI and could still be managed.‘

[Editor’s note: In G.698.2 this corresponds to the optical path from point S to R; network media channel is also used and explained in draft-ietf-ccamp-flexi-grid-fwk-02]

Management will be performed at the edges of the network media channel (i.e., at the transmitters and receivers attached to the S and R reference points respectively) for the relevant parameters specified in G.698.2 [ITU.G698.2], G.798 [ITU.G798], G.874 [ITU.G874], and the performance parameters specified in G.7710/Y.1701 [ITU-T G.7710] and G.874.1 [ITU.G874.1].

G.698.2 [ITU.G698.2] is primarily intended for metro applications that include optical amplifiers. Applications are defined in G.698.2 [ITU.G698.2] using optical interface parameters at the single-channel connection points between optical transmitters and the optical multiplexer, as well as between optical receivers and the optical demultiplexer in the DWDM system. This Recommendation uses a methodology which does not explicitly specify the details of the optical network between reference point Ss and Rs, e.g., the passive and active elements or details of the design. The Recommendation currently includes unidirectional DWDM applications at 2.5 and 10 Gbit/s (with 100 GHz and 50 GHz channel frequency spacing). Work is still under way for 40 and 100 Gbit/s interfaces. There is possibility for extensions to a lower channel frequency spacing. This document specifically refers to the "application code" defined in the G.698.2 [ITU.G698.2] and included in the Application Identifier defined in G.874.1 [ITU.G874.1] and G.872 [ITU.G872], plus a few optical parameters not included in the G.698.2 application code specification.

This draft refers and supports the draft-kdkgall-ccamp-dwdm-if-mng-ctrl-fwk

The building of a yang model describing the optical parameters defined in G.698.2 [ITU.G698.2], and reflected in G.874.1 [ITU.G874.1], allows the different vendors and operator to retrieve,

provision and exchange information across the G.698.2 multi-vendor IaDI in a standardized way. In addition to the parameters specified in ITU recommendations the Yang models support also the "vendor specifica application identifier", the Tx and Rx power at the Ss and Rs points and the channel frequency.

The Yang Model, reporting the Optical parameters and their values, characterizes the features and the performances of the optical components and allow a reliable link design in case of multi vendor optical networks.

Although RFC 3591 [RFC3591], which draft-galikunze-ccamp-DWDM-if-snmp-mib is extending, describes and defines the SNMP MIB of a number of key optical parameters, alarms and Performance Monitoring, as this RFC is over a decade old, it is primarily pre-OTN, and a more complete and up-to-date description of optical parameters and processes can be found in the relevant ITU-T Recommendations. The same considerations can be applied to the RFC 4054 [RFC4054].

2. The Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to section 7 of RFC 3410 [RFC3410].

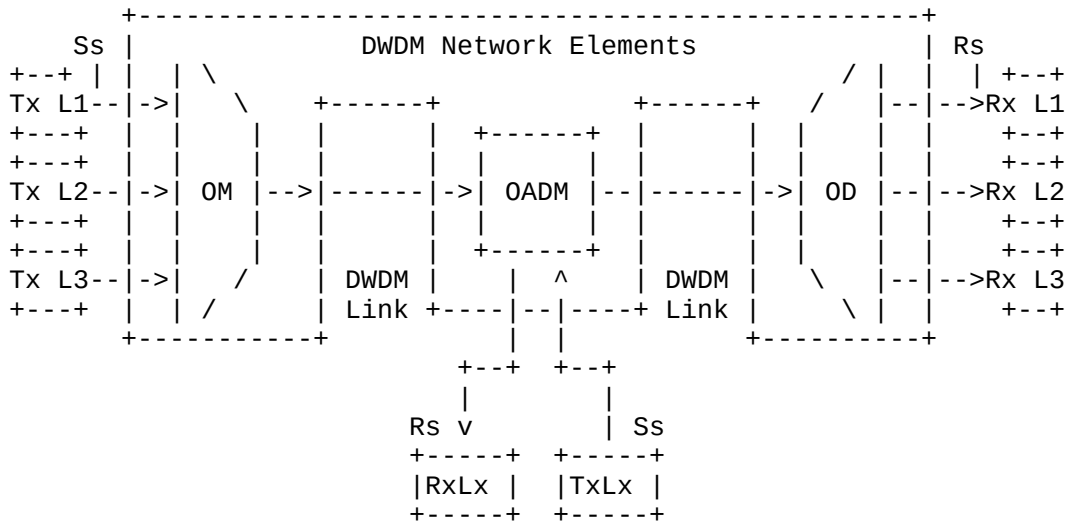
This memo specifies a Yang model for optical interfaces.

3. Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119] In the description of OIDs the convention: Set (S) Get (G) and Trap (T) conventions will describe the action allowed by the parameter.

4. Overview

Figure 1 shows a set of reference points, for single-channel connection between transmitters (Tx) and receivers (Rx). Here the DWDM network elements include an OM and an OD (which are used as a pair with the opposing element), one or more optical amplifiers and may also include one or more OADMs.



Ss = reference point at the DWDM network element tributary output
Rs = reference point at the DWDM network element tributary input
Lx = Lambda x
OM = Optical Mux
OD = Optical Demux
OADM = Optical Add Drop Mux

from Fig. 5.1/G.698.2

Figure 1: External transponder in WDM netwoks

4.1. Optical Parameters Description

The link between the external transponders through a WDM network media channels are managed at the edges, i.e. at the transmitters (Tx) and receivers (Rx) attached to the S and R reference points respectively. The set of parameters that could be managed are defined by the "application code" notation

The definitions of the optical parameters are provided below to increase the readability of the document, where the definition is

ended by (R) the parameter can be retrieve with a read, when (W) it can be provisioned by a write, (R,W) can be either read or written.

4.1.1. Rs-Ss Configuration

The Rs-Ss configuration table allows configuration of Central Frequency, Power and Application codes as described in [ITU.G698.2] and G.694.1 [ITU.G694.1]
This parameter report the current Transceiver Output power, it can be either a setting and measured value (G, S).

Central frequency (see G.694.1 Table 1) (see G.694.1 Table 1):
This parameter indicates the Central frequency value that Ss and Rs will be set to work (in THz). See the details in Section 6/ G.694.1 (G, S).

Single-channel application codes(see G.698.2):
This parameter indicates the transceiver application code at Ss and Rs as defined in [ITU.G698.2] Chapter 5.4 - this parameter can be called Optical Interface Identifier OII as per [draft-martinelli-wson-interface-class](G).

Number of Single-channel application codes Supported
This parameter indicates the number of Single-channel application codes supported by this interface (G).

Current Laser Output power:
This parameter report the current Transceiver Output power, it can be either a setting and measured value (G, S).

Current Laser Input power:
This parameter report the current Transceiver Input power (G).

PARAMETERS	Get/Set	Reference
Central frequency Value	G,S	G.694.1 S.6
Single-channel application codes	G	G.698.2 S.5.3
Number of Single-channel application codes Supported	G	N.A.
Current Output Power	G,S	N.A.
Current Input Power	G	N.A.

Table 1: Rs-Ss Configuration

4.1.2. Table of Application Codes

This table has a list of Application codes supported by this interface at point R are defined in G.698.2.

Application code Identifier:
The Identifier for the Application code.

Application code Type:
This parameter indicates the transceiver type of application code at Ss and Rs as defined in [ITU.G874.1], that is used by this interface Standard = 0, PROPRIETARY = 1
The first 6 octets of the printable string will be the OUI (organizationally unique identifier) assigned to the vendor whose implementation generated the Application Identifier Code.

Application code Length:
The number of octets in the Application Code.

Application code:
This is the application code that is defined in G.698.2 or the vendor generated code which has the OUI.

4.2. Use Cases

The use cases are described in draft-kdkgall-ccamp-dwdm-if-mng-ctrl-fwk

4.3. Optical Interface for external transponder in a WDM network

The ietf-ext-xponder-wdm-if is an augment to the ietf-interface. It allows the user to set the application code/vendor transceiver class/ Central frequency and the output power. The module can also be used to get the list of supported application codes/transceiver class and also the Central frequency/output power/input power of the interface.

```
        module: ietf-ext-xponder-wdm-if
        augment /if:interfaces/if:interface:
            +--rw optIfOChRsSs
                  +--rw if-current-application-code
                  |  +--rw application-code-id    uint8
                  |  +--rw application-code-type  uint8
                  |  +--rw application-code-length uint8
                  |  +--rw application-code?     string
                  +--ro if-supported-application-codes
                  |  +--ro number-application-codes-supported?   uint32
                  |  +--ro application-codes-list* [application-code-id]
                  |     +--ro application-code-id   uint8
                  |     +--rw application-code-type  uint8
                  |     +--rw application-code-length uint8
                  |     +--ro application-code?    string
                  +--rw output-power?                    int32
                  +--ro input-power?                     int32
                  +--rw central-frequency?               uint32


       notifications:
      +---n opt-if-och-central-frequency-change
      |  +--ro if-name?      leafref
      |  +--ro new-central-frequency
      |     +--ro central-frequency?   uint32
      +---n opt-if-och-application-code-change
      |  +--ro if-name?              leafref
      |  +--ro new-application-code
      |     +--ro application-code-id?   uint8
      |     +--rw application-code-type  uint8
      |     +--rw application-code-length uint8
      |     +--ro application-code?     string
```

5. Structure of the Yang Module

ietf-ext-xponder-wdm-if is a top level model for the support of this feature.

6. Yang Module

The ietf-ext-xponder-wdm-if is defined as an extension to ietf interfaces.

<CODE BEGINS> file "ietf-ext-xponder-wdm-if.yang"

```
   module ietf-ext-xponder-wdm-if {
        namespace "urn:ietf:params:xml:ns:yang:ietf-ext-xponder-wdm-if";
        prefix ietf-ext-xponder-wdm-if;

        import ietf-interfaces {
          prefix if;
        }

        organization
          "IETF NETMOD (NETCONF Data Modelling Language)
          Working Group";

        contact
          "WG Web:   <http://tools.ietf.org/wg/netmod/>
           WG List:  <mailto:netmod@ietf.org>

           WG Chair: Thomas Nadeau
                     <mailto:tnadeau@lucidvision.com>

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           Editor:   Dharini Hiremagalur
                     <mailto:dharinih@juniper.net>";

        description
          "This module contains a collection of YANG definitions for
           configuring Optical interfaces.

           Copyright (c) 2013 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 "2015-06-24" {
              description
                 "Revision 4.0";

              reference
                 " draft-dharini-netmod-dwdm-if-yang 3.0";
       }
       revision "2015-02-24" {
              description
```

```
                "Revision 3.0";

             reference
                " draft-dharini-netmod-dwdm-if-yang 3.0";
       }
       revision "2014-11-10" {
             description
                "Revision 2.0";
             reference
                " ";
       }
       revision "2014-10-14" {
             description
                "Revision 1.0";
              reference
                " ";
       }
       revision "2014-05-10" {
             description
                 "Initial revision.";
             reference
                 "RFC XXXX: A YANG Data Model for Optical
                  Management of an Interface for an external
                  transponder in a WDM netwrok";
       }




         grouping opt-if-och-application-code  {
                description "Application code entity.";
                leaf application-code-id {
                   type uint8 {
                         range "1..255";
                   }
                   description
                         "Id for the Application code";
                }
                leaf application-code-type {
                   type uint8 {
                         range "0..1";
                }
                  description
                         "Type for the Application code
                           0 - Standard, 1 - Proprietory
                           When the Type is Proprietory, then the
                           first 6 octets of the application-code
```

```
                        will be the OUI (organizationally unique
                        identifier)";

                }
                leaf application-code-length {
                   type uint8 {
                         range "1..255";
                   }
                   description
                         "Number of octets in the Application code";

                }
                leaf application-code {
                   type string {
                         length "1..255";
                   }
                   description "This parameter indicates the
                        transceiver application code at Ss and Rs as
                        defined in [ITU.G698.2] Chapter 5.3, that
                        is/should be used by this interface.
                        The optIfOChApplicationsCodeList has all the
                        application codes supported by this
                        interface.";

                }
         }


         grouping opt-if-och-application-code-list {
           description "List of Application codes group.";
           leaf number-application-codes-supported {
               type uint32;
               description "Number of Application codes
                            supported by this interface";
            }
           list application-code-list {
               key "application-code-id";
               description "List of the application codes";
               uses opt-if-och-application-code;
           }
         }


        grouping opt-if-och-power {
           description "Interface optical Power";
           leaf output-power {
               type int32;
               units ".01dbm";
```

```
            description "The output power for this interface in
                         .01 dBm.";
          }

          leaf input-power {
               type int32;
               units ".01dbm";
               config false;
               description "The current input power of this
                     interface";
          }
        }

         grouping opt-if-och-central-frequency {
           description "Interface Central Frequency";
             leaf  central-frequency {
               type uint32;
               description "This parameter indicate This parameter
                       indicates the frequency of this interface ";

             }
        }

         notification opt-if-och-central-frequency-change {
            description "A change of Central Frequency has been
                         detected.";
            leaf "if-name" {
                type leafref {
                    path "/if:interfaces/if:interface/if:name";
                }
                description "Interface name";
            }
            container opt-if-och-central-frequency {
                   description "The new Central Frequency of the
                                interface";
                   uses opt-if-och-central-frequency;
            }
         }

         notification opt-if-och-application-code-change {
            description "A change of Application code has been
                         detected.";
            leaf "if-name" {
                type leafref {
                    path "/if:interfaces/if:interface/if:name";
                }
                description "Interface name";
            }
```

```
            container new-application-code {
               description "The new application code for the
                   interface";
               uses opt-if-och-application-code;
            }
         }



         augment "/if:interfaces/if:interface" {
           description "Parameters for an optical interface";
           container optIfOChRsSs {
              description "RsSs path configuration for an interface";
              container if-current-application-code {
                   description "Current Application code of the
                                interface";
                   uses opt-if-och-application-code;
               }

               container if-supported-application-codes {
                   config false;
                   description "Supported Application codes of
                                the interface";
                   uses opt-if-och-application-code-list;
               }

               uses opt-if-och-power;

               uses opt-if-och-central-frequency;

            }
         }
      }
```

<CODE ENDS>

7. Security Considerations

The YANG module defined in this memo is designed to be accessed via the NETCONF protocol [RFC6241]. he lowest NETCONF layer is the secure transport layer and the mandatory-to-implement secure transport is SSH [RFC6242]. The NETCONF access control model [RFC6536] provides the means to restrict access for particular NETCONF users to a pre-configured subset of all available NETCONF protocol operation and content.

8. IANA Considerations

This document registers a URI in the IETF XML registry [RFC3688]. Following the format in [RFC3688], the following registration is requested to be made:

URI: urn:ietf:params:xml:ns:yang:ietf-interfaces:ietf-ext-xponder-wdm-if

Registrant Contact: The IESG.

XML: N/A, the requested URI is an XML namespace.

This document registers a YANG module in the YANG Module Names registry [RFC6020].

This document registers a YANG module in the YANG Module Names registry [RFC6020].

prefix: ietf-ext-xponder-wdm-if reference: RFC XXXX

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11. References

11.1. Normative References

[RFC2863] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB", RFC 2863, DOI 10.17487/RFC2863, June 2000, <http://www.rfc-editor.org/info/rfc2863>.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <http://www.rfc-editor.org/info/rfc2119>.

[RFC2578] McCloghrie, K., Ed., Perkins, D., Ed., and J. Schoenwaelder, Ed., "Structure of Management Information Version 2 (SMIv2)", STD 58, RFC 2578, DOI 10.17487/RFC2578, April 1999, <http://www.rfc-editor.org/info/rfc2578>.

[RFC2579] McCloghrie, K., Ed., Perkins, D., Ed., and J. Schoenwaelder, Ed., "Textual Conventions for SMIv2", STD 58, RFC 2579, DOI 10.17487/RFC2579, April 1999, <http://www.rfc-editor.org/info/rfc2579>.

[RFC2580] McCloghrie, K., Ed., Perkins, D., Ed., and J. Schoenwaelder, Ed., "Conformance Statements for SMIv2", STD 58, RFC 2580, DOI 10.17487/RFC2580, April 1999, <http://www.rfc-editor.org/info/rfc2580>.

[RFC3591] Lam, H-K., Stewart, M., and A. Huynh, "Definitions of Managed Objects for the Optical Interface Type", RFC 3591, DOI 10.17487/RFC3591, September 2003, <http://www.rfc-editor.org/info/rfc3591>.

[RFC6205] Otani, T., Ed. and D. Li, Ed., "Generalized Labels for Lambda-Switch-Capable (LSC) Label Switching Routers", RFC 6205, DOI 10.17487/RFC6205, March 2011, <http://www.rfc-editor.org/info/rfc6205>.

[ITU.G698.2] International Telecommunications Union, "Amplified multichannel dense wavelength division multiplexing applications with single channel optical interfaces", ITU-T Recommendation G.698.2, November 2009.

[ITU.G709] International Telecommunications Union, "Interface for the Optical Transport Network (OTN)", ITU-T Recommendation G.709, March 2003.

[ITU.G872] International Telecommunications Union, "Architecture of optical transport networks", ITU-T Recommendation G.872, November 2001.

[ITU.G798] International Telecommunications Union, "Characteristics of optical transport network hierarchy equipment functional blocks", ITU-T Recommendation G.798, October 2010.

[ITU.G874]
International Telecommunications Union, "Management aspects of optical transport network elements", ITU-T Recommendation G.874, July 2010.

[ITU.G874.1]
International Telecommunications Union, "Optical transport network (OTN): Protocol-neutral management information model for the network element view", ITU-T Recommendation G.874.1, January 2002.

[ITU.G959.1]
International Telecommunications Union, "Optical transport network physical layer interfaces", ITU-T Recommendation G.959.1, November 2009.

[ITU.G826]
International Telecommunications Union, "End-to-end error performance parameters and objectives for international, constant bit-rate digital paths and connections", ITU-T Recommendation G.826, November 2009.

[ITU.G8201]
International Telecommunications Union, "Error performance parameters and objectives for multi-operator international paths within the Optical Transport Network (OTN)", ITU-T Recommendation G.8201, April 2011.

[ITU.G694.1]
International Telecommunications Union, "Spectral grids for WDM applications: DWDM frequency grid", ITU-T Recommendation G.694.1, June 2002.

[ITU.G7710]
International Telecommunications Union, "Common equipment management function requirements", ITU-T Recommendation G.7710, May 2008.

11.2. Informative References

[RFC3410] Case, J., Mundy, R., Partain, D., and B. Stewart, "Introduction and Applicability Statements for Internet-Standard Management Framework", RFC 3410, DOI 10.17487/RFC3410, December 2002, <http://www.rfc-editor.org/info/rfc3410>.

[RFC2629] Rose, M., "Writing I-Ds and RFCs using XML", RFC 2629, DOI 10.17487/RFC2629, June 1999, <http://www.rfc-editor.org/info/rfc2629>.

[RFC4181] Heard, C., Ed., "Guidelines for Authors and Reviewers of MIB Documents", BCP 111, RFC 4181, DOI 10.17487/RFC4181, September 2005, <http://www.rfc-editor.org/info/rfc4181>.

[I-D.kdkgall-ccamp-dwdm-if-mng-ctrl-fwk] Kunze, R., Grammel, G., Beller, D., and G. Galimberti, "A framework for Management and Control of G.698.2 optical interface parameters", draft-kdkgall-ccamp-dwdm-if-mng-ctrl-fwk-00 (work in progress), October 2015.

[RFC4054] Strand, J., Ed. and A. Chiu, Ed., "Impairments and Other Constraints on Optical Layer Routing", RFC 4054, DOI 10.17487/RFC4054, May 2005, <http://www.rfc-editor.org/info/rfc4054>.

Appendix A. Change Log

This optional section should be removed before the internet draft is submitted to the IESG for publication as an RFC.

Note to RFC Editor: please remove this appendix before publication as an RFC.

Appendix B. Open Issues

Note to RFC Editor: please remove this appendix before publication as an RFC.

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