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An SNMP MIB extension to RFC3591 to manage optical interface parameters of DWDM applications
draft-galikunze-ccamp-g-698-2-snmp-mib-10

Abstract

This memo defines a module of the Management Information Base (MIB) used by Simple Network Management Protocol (SNMP) in TCP/IP- based internet. In particular, it defines objects for managing Optical parameters associated with Dense Wavelength Division Multiplexing (DWDM) interfaces. This is an extension of the RFC3591 to support the optical parameters described in ITU-T G.698.2. [ITU.G698.2] and used in ITU-T G.872. [ITU.G872] and ITU-T G.874.1. [ITU.G874.1]

The MIB module defined in this memo can be used for Optical Parameters monitoring and/or configuration of the endpoints of Black Links.

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 portion of the Management Information Base (MIB) used by Simple Network Management Protocol (SNMP) in TCP/IP- based internets. In particular, it defines objects for managing Optical parameters associated with Wavelength Division Multiplexing (WDM) systems in accordance with the optical interface defined in G.698.2 [ITU.G698.2] and ITU-T G.874.1. [ITU.G874.1]

Black Link approach allows supporting an optical transmitter/receiver pair of one vendor to inject a DWDM channel and run it over an optical network composed of amplifiers, filters, add-drop multiplexers from a different vendor. From architectural point of view, the "Black Link" is a set of pre-configured/qualified network connections between the G.698.2 reference points S and R. The black links will be managed at the edges (i.e. 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 G.7710/Y.1701 [ITU-T G.7710] and and G.874.1 [ITU.G874.1].

The G.698.2 [ITU.G698.2] provides optical parameter values for physical layer interfaces of Dense Wavelength Division Multiplexing (DWDM) systems primarily intended for metro applications which 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 specify the details of the optical link, e.g. the maximum fibre length, explicitly. 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 few optical parameter not included in the application code definition.

This draft refers and supports also the draft-kunze-g-698-2-management-control-framework

The building of an SNMP MIB describing the optical parameters defined in G.698.2 [ITU.G698.2] G.798 [ITU.G798], G.874 [ITU.G874], parameters specified G.7710/Y.1701 [ITU-T G.7710] allows the different vendors and operator to retrieve, provision and exchange information related to Optical blak links in a standardized way. This facilitates interworking in case of using optical interfaces from different vendors at the end of the link.

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

Although RFC 3591 [RFC3591] describes and defines the SNMP MIB of a number of key optical parameters, alarms and Performance Monitoring, a more complete description of optical parameters and processes can be found in the ITU-T Recommendations. Appendix A of this document provides an overview about the extensive ITU-T documentation in this area. 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].

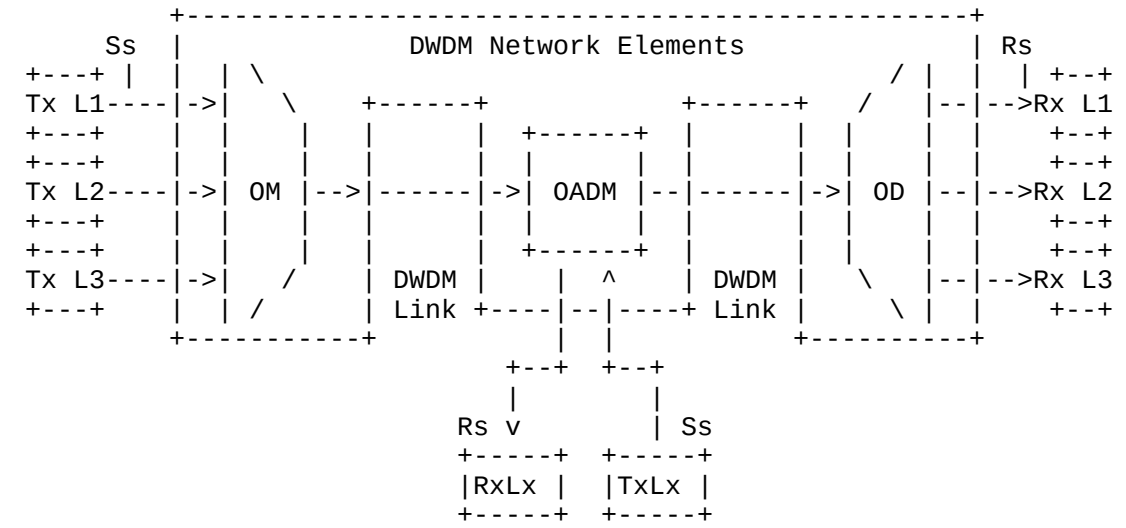
Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIv2, which is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580 [RFC2580].

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 the linear "black link" approach, for single-channel connection (Ss and Rs) 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: Linear Black Link

G.698.2 [ITU.G698.2] defines also Ring Black Link configurations [Fig. 5.2/G.698.2] and Bidirectional Black Link configurations [Fig. 5.3/G.698.2]

4.1. Optical Parameters Description

The black links are managed at the edges, i.e. at the transmitters (Tx) and receivers (Rx) attached to the S and R reference points respectively. The parameters that could be managed at the black link edges are specified in G.698.2 [ITU.G698.2] section 5.3 referring 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 (G) the parameter can be retrieve with a GET, when (S) it can be provisioned by a SET, (G,S) can be either GET and SET.

To support the management of these parameters, the SNMP MIB in RFC 3591 [RFC3591] is extended with a new MIB module defined in section 6 of this document. This new MIB module includes the definition of new configuration table of the OCh Layer for the parameters at Tx (S) and Rx (R).

4.1.1. Rs-Ss Configuration

The Rs-Ss configuration table allows configuration of Central Frequency, Power and Application identifiers 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):
This parameter indicates the central frequency value that Ss and Rs will be set, to work (in THz), in particular Section 6/G.694.1 (G, S).

Single-channel application identifiers (see G.698.2):
This parameter indicates the transceiver application identifier 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 identifiers 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, see RFC3591.

Current Laser Input power:

This parameter report the current Transceiver Input power see RFC3591.

PARAMETERS	Get/Set	Reference
Central Frequency	G,S	G.694.1 S.6
Single-channel Application Identifier number in use	G	G.874.1
Single-channel Application Identifier Type in use	G	G.874.1
Single-channel Application Identifier in use	G	G.874.1
Number of Single-channel Application Identifiers Supported	G	N.A.
Current Output Power	G,S	RFC3591
Current Input Power	G	RFC3591

Table 1: Rs-Ss Configuration

4.1.2. Table of Application Identifiers

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

Application Identifier Number:
The number that uniquely identifies the Application Identifier.

Application Identifier Type:
Type of application Identifier: STANDARD / PROPRIETARY in G.874.1
Note: if the A.I. type = PROPRIETARY, the first 6 Octets of the Application Identifier (PrintableString) must contain the Hexadecimal representation of an OUI (organizationally unique identifier) assigned to the vendor whose implementation generated the Application Identifier; the remaining octets of the PrintableString are unspecified.

Application Identifier:
This is the application Identifier that is defined in G.874.1.

4.2. Use of ifTable

This section specifies how the MIB II interfaces group, as defined in RFC 2863 [RFC2863], is used for the link ends of a black link. Only the ifGeneralInformationGroup will be supported for the ifTable and

the ifStackTable to maintain the relationship between the OCh and OPS layers. The OCh and OPS layers are managed in the ifTable using IfEntries that correlate to the layers depicted in Figure 1.

For example, a device with TX and/or RX will have an Optical Physical Section (OPS) layer, and an Optical Channel (OCh) layer. There is a one to n relationship between the OPS and OCh layers.

EDITOR NOTE: Reason for changing from OChr to OCh: Work on revised G.872 in the SG15 December 2011 meeting agreed to remove OChr from the architecture and to update G.709 to account for this architectural change. The meeting also agreed to consent the revised text of G.872 and G.709 at the September 2012 SG15 meeting.

Figure 2 In the following figures, opticalChannel and opticalPhysicalSection are abbreviated as OCh and ops respectively.

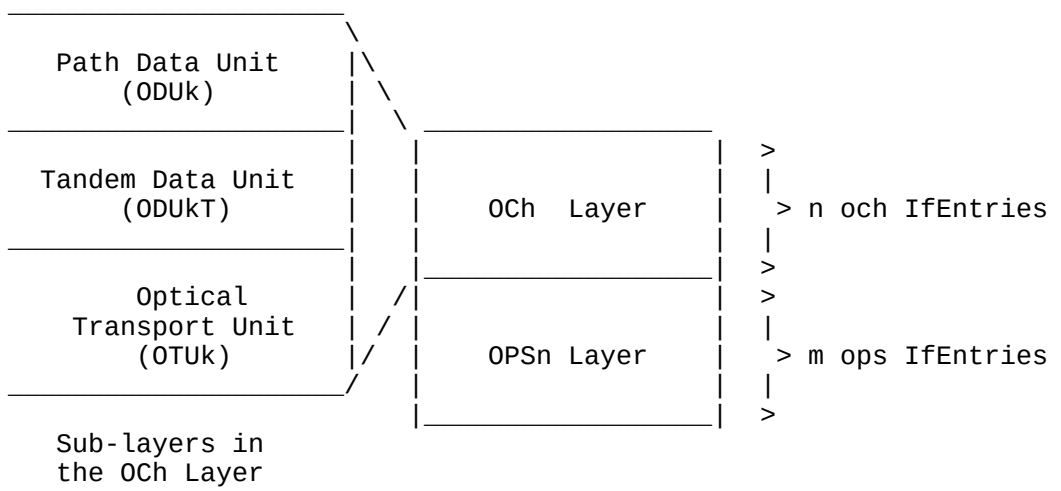


Figure 2: OTN Layers for OPS and OCh

Each opticalChannel IfEntry is mapped to one of the m opticalPhysicalSection IfEntries, where m is greater than or equal to 1. Conversely, each opticalTransPhysicalSection port entry is mapped to one of the n opticalChannel IfEntries, where n is greater than or equal to 1.

The design of the Optical Interface MIB provides the option to model an interface either as a single bidirectional object containing both

sink and source functions or as a pair of unidirectional objects, one containing sink functions and the other containing source functions.

If the sink and source for a given protocol layer are to be modelled as separate objects, then there need to be two ifTable entries, one that corresponds to the sink and one that corresponds to the source, where the directionality information is provided in the configuration tables for that layer via the associated Directionality objects. The agent is expected to maintain consistent directionality values between ifStackTable layers (e.g., a sink must not be stacked in a 1:1 manner on top of a source, or vice-versa), and all protocol layers that are represented by a given ifTable entry are expected to have the same directionality.

When separate ifTable entries are used for the source and sink functions of a given physical interface, association between the two uni-directional ifTable entries (one for the source function and the other for the sink functions) should be provided. It is recommended that identical ifName values are used for the two ifTable entries to indicate such association. An implementation shall explicitly state what mechanism is used to indicate the association, if ifName is not used.

4.2.1. Use of ifTable for OPS Layer

Only the ifGeneralInformationGroup needs to be supported.

ifTable Object	Use for OTN OPS Layer
ifIndex	The interface index.
ifDescr	Optical Transport Network (OTN) Optical Physical Section (OPS)
ifType	opticalPhysicalSection (xxx)

<<<Editor Note: Need new IANA registration value for xxx. >>>

ifSpeed	Actual bandwidth of the interface in bits per second. If the bandwidth of the interface is greater than the maximum value of 4,294,967,295, then the maximum value is reported and ifHighSpeed must be used to report the interface's speed.
ifPhysAddress	An octet string with zero length. (There is

	no specific address associated with the interface.)
ifAdminStatus	The desired administrative state of the interface. Supports read-only access.
ifOperStatus	The operational state of the interface. The value lowerLayerDown(7) is not used, since there is no lower layer interface. This object is set to notPresent(6) if a component is missing, otherwise it is set to down(2) if either of the objects optIfOPSnCurrentStatus indicates that any defect is present.
ifLastChange	The value of sysUpTime at the last change in ifOperStatus.
ifName	Enterprise-specific convention (e.g., TL-1 AID) to identify the physical or data entity associated with this interface or an OCTET STRING of zero length. The enterprise-specific convention is intended to provide the means to reference one or more enterprise-specific tables.
ifLinkUpDownTrapEnable	Default value is enabled(1). Supports read-only access.
ifHighSpeed	Actual bandwidth of the interface in Mega-bits per second. A value of n represents a range of 'n-0.5' to 'n+0.499999'.
ifConnectorPresent	Set to true(1).
ifAlias	The (non-volatile) alias name for this interface as assigned by the network manager.

4.2.2. Use of ifTable for OCh Layer

Use of ifTable for OCh Layer See RFC 3591 [RFC3591] section 2.4

4.2.3. Use of ifStackTable

Use of the ifStackTable and ifInvStackTable to associate the opticalPhysicalSection and opticalChannel interface entries is best illustrated by the example shown in Figure 3. The example assumes an ops interface with ifIndex i that carries two multiplexed OCh

interfaces with ifIndex values of j and k, respectively. The example shows that j and k are stacked above (i.e., multiplexed into) i. Furthermore, it shows that there is no layer lower than i and no layer higher than j and/or k.

Figure 3

HigherLayer	LowerLayer
0	j
0	k
j	i
k	i
i	0

Figure 3: Use of ifStackTable for an OTN port

For the inverse stack table, it provides the same information as the interface stack table, with the order of the Higher and Lower layer interfaces reversed.

5. Structure of the MIB Module

EDITOR NOTE:text will be provided based on the MIB module in Section 6

6. Object Definitions

EDITOR NOTE: Once the scope in Section 1 and the parameters in Section 4 are finalized, a MIB module will be defined. It could be an extension to the OPT-IF-MIB module of RFC 3591. >>>

```
   OPT-IF-698-MIB DEFINITIONS ::= BEGIN

      IMPORTS
              MODULE-IDENTITY,
              OBJECT-TYPE,
              Gauge32,
              Integer32,
              Unsigned32,
              Counter64,
              transmission,
              NOTIFICATION-TYPE
                      FROM SNMPv2-SMI
              TEXTUAL-CONVENTION,
              RowPointer,
              RowStatus,
              TruthValue,
              DisplayString,
              DateAndTime
                      FROM SNMPv2-TC
              SnmpAdminString
                      FROM SNMP-FRAMEWORK-MIB
              MODULE-COMPLIANCE, OBJECT-GROUP
                      FROM SNMPv2-CONF
              ifIndex
                      FROM IF-MIB
              optIfMibModule
                     FROM OPT-IF-MIB;


   --  This is the MIB module for the optical parameters -
   --  Application codes associated with the black link end points.



   optIfXcvrMibModule MODULE-IDENTITY
       LAST-UPDATED "201401270000Z"
       ORGANIZATION "IETF Ops/Camp MIB Working Group"
       CONTACT-INFO
          "WG charter:
             http://www.ietf.org/html.charters/

           Mailing Lists:
           Editor: Gabriele Galimberti
           Email:  ggalimbe@cisco.com"
       DESCRIPTION
          "The MIB module to describe Black Link tranceiver
           characteristics to rfc3591.
```

```
           Copyright (C) The Internet Society (2014).  This version
           of this MIB module is an extension to rfc3591;  see the RFC
           itself for full legal notices."
       REVISION  "201305050000Z"
       DESCRIPTION
          "Draft version 1.0"
       REVISION  "201305050000Z"
       DESCRIPTION
          "Draft version 2.0"
       REVISION  "201302270000Z"
           DESCRIPTION
          "Draft version 3.0"
       REVISION  "201307020000Z"
       DESCRIPTION
          "Draft version 4.0
               Changed the draft to include only the G.698 parameters."
           REVISION  "201311020000Z"
       DESCRIPTION
          "Draft version 5.0
               Mib has a table of application code/vendor
               transcievercode G.698"
           REVISION  "201401270000Z"
       DESCRIPTION
          "Draft version 6.0"
           REVISION  "201407220000Z"
       DESCRIPTION
          "Draft version 8.0
          Removed Vendor transceiver code"
       REVISION  "201502220000Z"
       DESCRIPTION
          "Draft version 9.0
           Added reference to OUI in the first 6 Octets of a proprietary
           Application code
           Added a Length field for the Application code
           Changed some names"
       ::= { optIfMibModule 4 }


   -- Addition to the RFC 3591 objects
   optIfOChSsRsGroup   OBJECT IDENTIFIER   ::= { optIfXcvrMibModule 1 }
```

```
 -- OCh Ss/Rs config table
 -- The application code/vendor tranceiver class for the Black Link
 -- Ss-Rs will be added to the OchConfigTable

 optIfOChSsRsConfigTable OBJECT-TYPE
     SYNTAX  SEQUENCE OF OptIfOChSsRsConfigEntry
     MAX-ACCESS  not-accessible
     STATUS  current
     DESCRIPTION
         "A table of Och General config extension parameters"
     ::= {  optIfOChSsRsGroup 1 }

 optIfOChSsRsConfigEntry OBJECT-TYPE
     SYNTAX      OptIfOChSsRsConfigEntry
     MAX-ACCESS  not-accessible
     STATUS  current
     DESCRIPTION
         "A conceptual row that contains G.698 parameters for an
          interface."
     INDEX   { ifIndex }
     ::= { optIfOChSsRsConfigTable 1 }

 OptIfOChSsRsConfigEntry ::=
     SEQUENCE {
         optIfOChCentralFrequency                    Unsigned32,
         optIfOChCfgApplicationIdentifierNumber      Unsigned32,
         optIfOChCfgApplicationIdentifierType        Unsigned32,
         optIfOChCfgApplicationIdentifierLength      Unsigned32,
         optIfOChCfgApplicationIdentifier            DisplayString,
         optIfOChNumberApplicationCodesSupported     Unsigned32
         }

 optIfOChCentralFrequency  OBJECT-TYPE
     SYNTAX  Unsigned32
     MAX-ACCESS  read-write
     UNITS "THz"
     STATUS  current
     DESCRIPTION
         " This parameter indicates the frequency of this interface.
         "
     ::= { optIfOChSsRsConfigEntry  1 }

 optIfOChCfgApplicationIdentifierNumber  OBJECT-TYPE
     SYNTAX Unsigned32
     MAX-ACCESS  read-write
     STATUS  current
     DESCRIPTION
         "This parameter uniquely indicates the transceiver application
```

```
          code at Ss and Rs as defined in [ITU.G874.1], that is used by
          this interface. The optIfOChSrcApplicationIdentifierTable has
          all the application codes supported by this interface. "
     ::= { optIfOChSsRsConfigEntry  2 }

 optIfOChCfgApplicationIdentifierType  OBJECT-TYPE
     SYNTAX Unsigned32
     MAX-ACCESS  read-write
     STATUS  current
     DESCRIPTION
         "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. The optIfOChSrcApplicationIdentifierTable
          has all the application codes supported by this interface
          Standard = 0, PROPRIETARY = 1. "
     ::= { optIfOChSsRsConfigEntry  3 }

 optIfOChCfgApplicationIdentifierLength  OBJECT-TYPE
     SYNTAX Unsigned32
     MAX-ACCESS  read-write
     STATUS  current
     DESCRIPTION
         "This parameter indicates the number of octets in the
          Application Identifier.
          "
     ::= { optIfOChSsRsConfigEntry  4 }


 optIfOChCfgApplicationIdentifier  OBJECT-TYPE
     SYNTAX DisplayString
     MAX-ACCESS  read-write
     STATUS  current
     DESCRIPTION
         "This parameter indicates the transceiver application code at
          Ss and Rs as defined in [ITU.G698.2] Chapter 5.3, that
          is used by this interface.
          The optIfOChSrcApplicationCodeTable  has all the application
          codes supported by this interface.
          If the optIfOChCfgApplicationIdentifierType is 1
          (Proprietory), then 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."
     ::= { optIfOChSsRsConfigEntry  5 }

 optIfOChNumberApplicationIdentifiersSupported  OBJECT-TYPE
     SYNTAX Unsigned32
     MAX-ACCESS  read-only
```

```
    STATUS  current
    DESCRIPTION
       " Number of Application codes supported by this interface."
    ::= { optIfOChSsRsConfigEntry  6 }

-- Table of Application codes supported by the interface
--  OptIfOChSrcApplicationCodeEntry

optIfOChSrcApplicationIdentifierTable  OBJECT-TYPE
    SYNTAX  SEQUENCE OF OptIfOChSrcApplicationIdentifierEntry
    MAX-ACCESS  not-accessible
    STATUS  current
    DESCRIPTION
        "A Table of Application codes supported by this interface."
    ::= { optIfOChSsRsGroup 2 }

optIfOChSrcApplicationIdentifierEntry OBJECT-TYPE
    SYNTAX      OptIfOChSrcApplicationIdentifierEntry
    MAX-ACCESS  not-accessible
    STATUS  current
    DESCRIPTION
        "A conceptual row that contains the Application code for this
         interface."
    INDEX  { ifIndex, optIfOChApplicationIdentiferNumber  }
    ::= { optIfOChSrcApplicationIdentifierTable 1 }

OptIfOChSrcApplicationIdentifierEntry ::=
    SEQUENCE {
        optIfOChApplicationIdentiferNumber            Integer32,
        optIfOChApplicationIdentiferType              Integer32,
        optIfOChApplicationIdentiferLength            Integer32,
        optIfOChApplicationIdentifier                 DisplayString
     }


optIfOChApplicationIdentiferNumber  OBJECT-TYPE
    SYNTAX  Integer32 (1..255)
    MAX-ACCESS  not-accessible
    STATUS  current
    DESCRIPTION
      " The number/identifier of the application code supported at this
            interface. The interface can support more than one
                application codes.
      "
    ::= { optIfOChSrcApplicationIdentifierEntry  1}

optIfOChApplicationIdentiferType  OBJECT-TYPE
    SYNTAX  Integer32 (1..255)
```

```
    MAX-ACCESS  read-only
    STATUS  current
    DESCRIPTION
      " The type of identifier of the application code supported at
        this interface.
                Standard = 0, PROPRIETARY = 1
      "
    ::= { optIfOChSrcApplicationIdentifierEntry  2}

 optIfOChApplicationIdentiferLength  OBJECT-TYPE
    SYNTAX  Integer32 (1..255)
    MAX-ACCESS  read-only
    STATUS  current
    DESCRIPTION
      " This parameter indicates the number of octets in the
        Application Identifier.
      "
    ::= { optIfOChSrcApplicationIdentifierEntry  3}

 optIfOChApplicationIdentifier  OBJECT-TYPE
    SYNTAX DisplayString
    MAX-ACCESS  read-only
    STATUS  current
    DESCRIPTION
        " The application code supported by this interface DWDM link
          If the optIfOChApplicationIdentiferType is 1 (Proprietory),
          then 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."
    ::= { optIfOChSrcApplicationIdentifierEntry  4}




 -- Notifications

 -- Central Frequency Change Notification
 optIfOChCentralFrequencyChange NOTIFICATION-TYPE
    OBJECTS { optIfOChCentralFrequency }
    STATUS  current
    DESCRIPTION
        "Notification of a change in the central frequency."
    ::= { optIfXcvrMibModule 1 }

 END
```

7. Relationship to Other MIB Modules

7.1. Relationship to the [TEMPLATE TODO] MIB

7.2. MIB modules required for IMPORTS

8. Definitions

[TEMPLATE TODO]: put your valid MIB module here.
A list of tools that can help automate the process of
checking MIB definitions can be found at
http://www.ops.ietf.org/mib-review-tools.html

9. Security Considerations

There are a number of management objects defined in this MIB module with a MAX-ACCESS clause of read-write and/or read-create. Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations. These are the tables and objects and their sensitivity/vulnerability:

o

Some of the readable objects in this MIB module (i.e., objects with a MAX-ACCESS other than not-accessible) may be considered sensitive or vulnerable in some network environments. It is thus important to control even GET and/or NOTIFY access to these objects and possibly to even encrypt the values of these objects when sending them over the network via SNMP.

SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secure (for example by using IPsec), even then, there is no control as to who on the secure network is allowed to access and GET/SET (read/change/create/delete) the objects in this MIB module.

It is RECOMMENDED that implementers consider the security features as provided by the SNMPv3 framework (see [RFC3410], section 8), including full support for the SNMPv3 cryptographic mechanisms (for authentication and privacy).

Further, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to enable cryptographic security. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an instance of this MIB module is properly configured to give access to

the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

10. IANA Considerations

Option #1:

The MIB module in this document uses the following IANA-assigned OBJECT IDENTIFIER values recorded in the SMI Numbers registry:

Descriptor	OBJECT IDENTIFIER value
sampleMIB	{ mib-2 XXX }

Option #2:

Editor's Note (to be removed prior to publication): the IANA is requested to assign a value for "XXX" under the 'mib-2' subtree and to record the assignment in the SMI Numbers registry. When the assignment has been made, the RFC Editor is asked to replace "XXX" (here and in the MIB module) with the assigned value and to remove this note.

Note well: prior to official assignment by the IANA, an internet draft MUST use place holders (such as "XXX" above) rather than actual numbers. See RFC4181 Section 4.5 for an example of how this is done in an internet draft MIB module.

Option #3:

This memo includes no request to IANA.

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12. References

12.1. Normative References

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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

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