

Internet Engineering Task Force  
Internet-Draft  
Intended status: Standards Track  
Expires: December 24, 2012

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June 22, 2012

A SNMP MIB to manage black-link optical interface parameters of DWDM applications  
draft-galikusze-ccamp-g-698-2-snmp-mib-00

## Abstract

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 or characterized by the Optical Transport Network (OTN) in accordance with the Black-Link approach defined in ITU-T Recommendation G.698.2. [[ITU.G698.2](#)]

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

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June 2012

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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 or characterized by the Optical Transport Network (OTN) in accordance with the Black-Link approach defined in G.698.2 [[ITU.G698.2](#)]

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 underway for 40 and 100 Gbit/s interfaces. There is possibility for extensions to a lower channel frequency spacing.

This draft refers and supports also the [draft-kunze-g698-mgmt-ctrl-framework](#).

The building of a 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 multivendor 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].

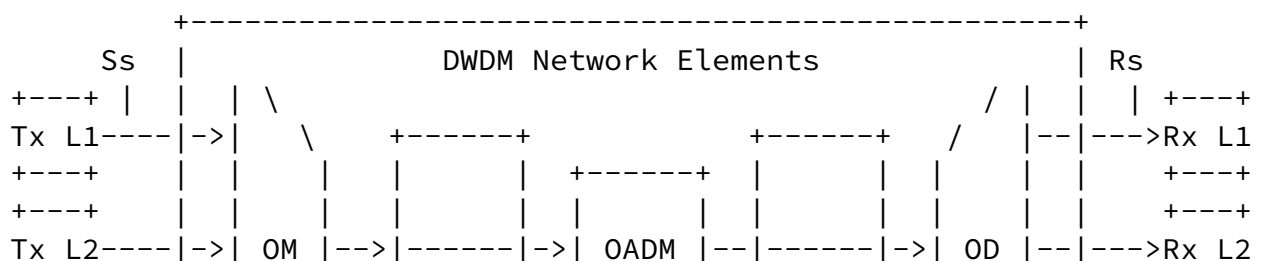
### 3. Conventions

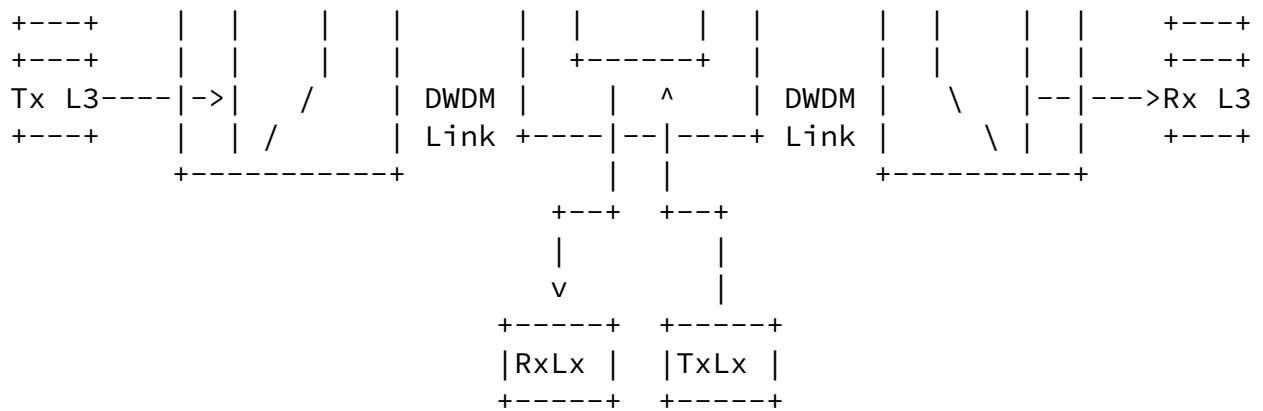
The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC 2119](#) [RFC2119]. In the description of OIDs the convention: Set (S) Get (G) and Trap (T) conventions will describe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

### 4. Overview

In this document, the term OTN (Optical Transport Network) system is used to describe devices that are compliant with the requirements specified in the ITU-T Recommendations G.872 [ITU.G872], G.709 [ITU.G709], G.798 [ITU.G798], G.874 [ITU.G874], and G.874.1 [ITU.G874.1] while refers to G.698.2 [ITU.G698.2] for the Black Link and DWDM parameter description.

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] for the optical

interface, in G.798 [ITU.G798] for the equipment aspect, and in G.7710/Y.1701 [ITU.G7710] and G.874 [ITU.G874] for fault management and performance monitoring.

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 configuratoin table of the OCh Layer for the parameters at Tx (S) and Rx (R).

#### [4.1.1](#). General

The following general parameters from G.698.2 [[ITU.G698.2](#)] and G.694.1 [[ITU.G694.1](#)] provide general information at the optical interface reference points.

##### Minimum channel spacing:

This is the minimum nominal difference in frequency (in GHz) between two adjacent channels (G).

##### Bit rate/line coding of optical tributary signals:

Optical tributary signal class NRZ 2.5G (from nominally 622 Mbit/s to nominally 2.67 Gbit/s) or NRZ 10G nominally 2.4 Gbit/s to nominally 10.71 Gbit/s. (nominally 2.4 Gbit/s to nominally 10.71 Gbit/s). 40Gbit/s and 100Gbit/s are under study (G, S).

##### FEC Coding:

This parameter indicate what Forward Error Correction (FEC) code is used at Ss and Rs (G, S) (not mentioned in G.698). EDITOR NOTE: Need to check whether this parameter is to be put in "vendor specific" parameter or can be a standard parameter as defined in G.698.2. Is this the various adaptations (FEC encoding types) specified in G.798 clauses 12.3.1.1 (with FEC), 12.3.1.2 (without FEC), and 12.3.1.5 (vendor-specific FEC) .

##### Maximum bit error ratio (BER):

This parameter indicate the maximum Bit error rate can be supported by the application at the Receiver. In case of FEC applications it is intended after the FEC correction (G) .

Fiber type:



Fiber type as per fibre types are chosen from those defined in ITU-T Recs G.652, G.653, G.654 and G.655 (G,S) .

Wavelength Range (see G.694.1): [[ITU.G694.1](#)]

This parameter indicate minimum and maximum wavelength spectrum (G) in a definite wavelength Band (L, C and S).

Wavelength Value (see G.694.1):

This parameter indicates the wavelength value that Ss and Rs will be set to work (G, S).

Vendor Transceiver Class:

Other than specifying all the Transceiver parameter, it might be convenient for the vendors to summarize a set of parameters in a single proprietary parameter: the Class of transceiver. The Transceiver classification will be based on the Vendor Name and the main TX and RX parameters (i.e. Trunk Mode, Framing, Bit rate, Trunk Type, Channel Band, Channel Grid, Modulation Format, Channel Modulation Format, FEC Coding, Electrical Signal Framing at Tx, Minimum maximum Chromatic Disperion (CD) at Rx, Maximum Polarization Mode Dispersion (PMD) at Rx, Maximum differential group delay at Rx, Loopbacks, TDC, Pre-FEC BER, Q-factor, Q-margin,etc.). If this parameter is used, the MIB parameters specifying the Transceiver characteristics may not be significant and the vendor will be responsible to specify the Class contents and values. The Vendor can publish the parameters of its Classes or declare to be compatible with published Classes.(G) Optional for compliance. (not mentioned in G.698)

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 5.3 - this parameter can be called Optical Interface Identifier OII as per [[draft-martinelli-wson-interface-class](#)] (G, S).

#### 4.1.2. Parameters at Ss

The following parameters for the interface at point S are defined in G.698.2 [[ITU.G698.2](#)].

Maximum and minimum mean channel output power:

The mean launched power at Ss is the average power (in dBm) of a pseudo-random data sequence coupled into the DWDM link. It is defined as the rrange (Max and Min ) of the parameter (G, S)

Minimum and maximum central frequency:

The central frequency is the nominal single-channel frequency (in THz) on which the digital coded information of the particular optical channel is modulated by use of the NRZ line code. The central frequencies of all channels within an application lie on the frequency grid for the minimum channel spacing of the application given in ITU-T Rec. G.694.1. This parameter give the Maximum and minimum frequency interval the channel must be modulated (G)

Maximum spectral excursion:

This is the maximum acceptable difference between the nominal central frequency (in GHz) of the channel and the minus 15 dB points of the transmitter spectrum furthest from the nominal central frequency measured at point Ss. (G)

Maximum transmitter (residual) dispersion OSNR penalty (B.3/G.959.1) [[ITU.G959.1](#)]

Defines a reference receiver that this penalty is measured with. Lowest OSNR at Ss with worst case (residual) dispersion minus the Lowest OSNR at Ss with no dispersion. Lowest OSNR at Ss with no dispersion (G)

Minimum side mode suppression ratio, Minimum channel extinction ratio, Eye mask:

Although are defined in G.698.2 are not supported by this draft (G).

Current Laser Output power:

This parameter report the current Transceiver Output power, it can be either a setting and measured value (G, S) NEED TO DISCUSS ON THIS.

#### [4.1.3](#). Optical path from point Ss to Rs

The following parameters for the optical path from point S and R are defined in G.698.2 [[ITU.G698.2](#)].

Maximum and minimum (residual) chromatic dispersion:

These parameters define the maximum and minimum value of the optical path "end to end chromatic dispersion" (in ps/nm) that the system shall be able to tolerate. (G)

Minimum optical return loss at Ss:

These parameter defines minimum optical return loss (in dB) of the cable plant at the source reference point (Ss), including any

Maximum discrete reflectance between SS and RS:

Optical reflectance is defined to be the ratio of the reflected optical power present at a point, to the optical power incident to that point. Control of reflections is discussed extensively in ITU-T Rec. G.957 (G)

Maximum differential group delay:

Differential group delay (DGD) is the time difference between the fractions of a pulse that are transmitted in the two principal states of polarization of an optical signal. For distances greater than several kilometres, and assuming random (strong) polarization mode coupling, DGD in a fibre can be statistically modelled as having a Maxwellian distribution. (G)

Maximum polarisation dependent loss:

The polarisation dependent loss (PDL) is the difference (in dB) between the maximum and minimum values of the channel insertion loss (or gain) of the black-link from point SS to RS due to a variation of the state of polarization (SOP) over all SOPs. (G)

Maximum inter-channel crosstalk:

Inter-channel crosstalk is defined as the ratio of total power in all of the disturbing channels to that in the wanted channel, where the wanted and disturbing channels are at different wavelengths. The parameter specifies the isolation of a link conforming to the "black-link" approach such that under the worst-case operating conditions the inter-channel crosstalk at any reference point RS is less than the maximum inter-channel crosstalk value (G)

Maximum interferometric crosstalk:

This parameter places a requirement on the isolation of a link conforming to the "black-link" approach such that under the worst case operating conditions the interferometric crosstalk at any reference point RS is less than the maximum interferometric crosstalk value. (G)

Maximum optical path OSNR penalty:

The optical path OSNR penalty is defined as the difference between

the Lowest OSNR at Rs and Lowest OSNR at Ss that meets the BER requirement (G)

Maximum ripple:

Although is defined in G.698.2, this parameter is not supported by this draft.

#### [4.1.4.](#) Interface at point Rs

The following parameters for the interface at point R are defined in G.698.2.

##### [4.1.4.1.](#) Mandatory parameters

Maximum and minimum mean input power:

The maximum and minimum values of the average received power (in dBm) at point Rs. (G)

Minimum optical signal-to-noise ratio (OSNR):

The minimum optical signal-to-noise ratio (OSNR) is the minimum value of the ratio of the signal power in the wanted channel to the highest noise power density in the range of the central frequency plus and minus the maximum spectral excursion (G)

Receiver OSNR tolerance:

The receiver OSNR tolerance is defined as the minimum value of OSNR at point Rs that can be tolerated while maintaining the maximum BER of the application. (G)

Maximum reflectance at receiver:

Although is defined in G.698.2, this parameter is not supported by this draft (G).

##### [4.1.4.2.](#) Optional parameters

Current Chromatic Dispersion (CD):

Residual Chromatic Dispersion measured at Rx Transceiver port (G).

Current Optical Signal to Noise Ratio (OSNR):  
Current Optical Signal to Noise Ratio (OSNR) estimated at Rx  
Transceiver port (G).

Current Quality factor (Q):  
"Q" factor estimated at Rx Transceiver port (G).

#### 4.1.5. Alarms and Threshold definition

This section describes the Alarms and the Thresholds at Ss and Rs points according to ITU-T Recommendations G.798 [[ITU.G798](#)], G.874 [[ITU.G874](#)], and G.874.1 [[ITU.G874.1](#)].

OTN alarms defined in [RFC3591](#):

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Threshold Crossing Alert (TCA Alarm)

LOW-TXPOWER

HIGH-TXPOWER

LOW-RXPOWER

HIGH-RXPOWER

Loss of Signal (LOS)

Loss of Frame (LOF)

Server Signal Failure-P (SSF-P)

Loss of Multiframe (LOM)

OTN Thresholds (for TCA) defined in [RFC3591](#)

LOW-TXPOWER

HIGH-TXPOWER

LOW-RXPOWER

## HIGH-RXPOWER

As the above parameters/alarms are already defined in [RFC3591](#), they are out of scope of this document and the [RFC3591](#) will continue to be the only reference for them

The list below reports the new Alarms and Thresholds not managed in [RFC3591](#)

### [4.1.6](#). Performance Monitoring (PM) description

This section describes the Performance Monitoring parameters and their thresholds at Ss and Rs points (Near -End and Far-End) according to ITU-T Recommendations G.826 [[ITU.G826](#)], G.8201 [[ITU.G8201](#)], G.709 [[ITU.G709](#)], G.798 [[ITU.G798](#)], G.874 [[ITU.G874](#)], and G.874.1 [[ITU.G874.1](#)].

Failure Counts (fc) :

Number of Failures occurred in an observation period (G)

Errored Second (es) :

It is a one-second period in which there is one or more errored blocks or during which a defect (e.g. Loss of Signal (LOS)) is detected. The number of errored seconds is summed over 15-minute and 24-hour intervals. (G)

Severely Errored Seconds (ses) :

It is a one-second period in which the errored block ratio exceeds a threshold or during which a defect is detected. See ITU-T Recommendation G.8201 Table 7-1 for details. The number of severely errored seconds is summed over 15-minute and 24-hour intervals.(G)

Unavailable Seconds (uas) :

It is a one-second period in the unavailable time. A period of unavailable time begins at the onset of ten consecutive SES events. These ten seconds are considered to be part of unavailable time. A new period of available time begins at the

onset of ten consecutive non-SES events. These ten seconds are considered to be part of available time. (G)

Background Block Errors (bbe) :

An errored block not occurring as part of an SES(G)

Error Seconds Ratio (esr) :

The ratio of ES in available time to total seconds in available time during a fixed measurement interval(G)

Severely Errored Seconds Ratio (sesr) :

The ratio of SES in available time to total seconds in available time during a fixed measurement interval(G)

Background Block Errored Seconds Ratio (bber) :

The ratio of Background Block Errors (BBE) to total blocks in available time during a fixed measurement interval. The count of total blocks excludes all blocks during SESs.(G)

FEC corrected Bit Error (FECcorrErr):

The number of bits corrected by the FEC are counted over one second (G)

FEC un-corrected Bit Error :

The number of bits un-corrected by the FEC are counted over one second (G)

Pre-FEC Bit Error :

The number of Errored bits at receiving side before the FEC function counted over one second (G)

OTN Valid Intervals :

The number of contiguous 15 minute intervals for which valid OTN performance monitoring data is available for the particular interface (G)

FEC Valid Intervals :

The number of contiguous 15 minute intervals for which valid FEC

PM data is available for the particular interface.(G)

#### 4.1.7. Generic Parameter description

This section describes the Generic Parameters at Ss and Rs points according to ITU-T Recommendations G.872 [[ITU.G872](#)], G.709 [[ITU.G709](#)], G.798 [[ITU.G798](#)], G.874 [[ITU.G874](#)], and G.874.1 [[ITU.G874.1](#)].

Interface Admin Status :

The Administrative Status of an Interface: Up/Down - In Service/Out of Service (can be Automatic in Service) (G/S)

Interface Operational Status :

The Operational Status of an Interface: Up/Down - In Service/Out of Service (G)

#### 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.



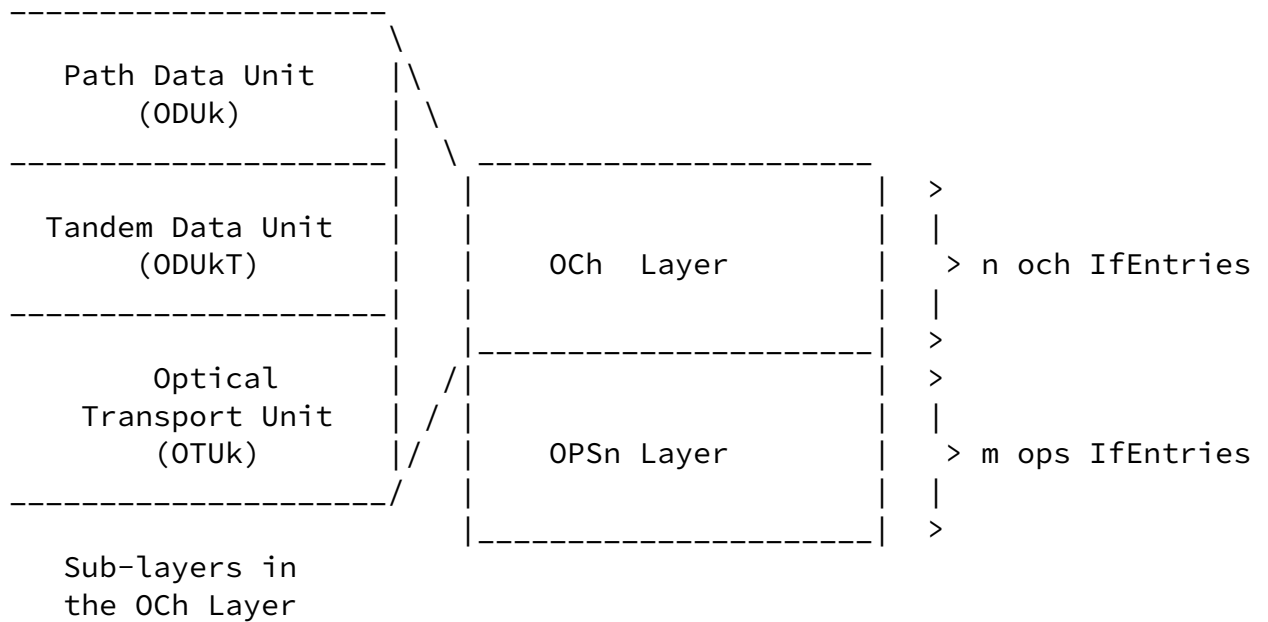


Figure 2: OTN Layers for OPS and OCh

Each opticalChannel IfEntry may be mapped to m opticalPhyiscalSection IfEntries, where m is greater than or equal to 1. Conversely, each opticalTransPhyiscalSection port entry may be mapped to 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 xxxDirectionality 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-EXT-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    MODULE-IDENTITY,  
    OBJECT-TYPE,  
    Gauge32,  
    Integer32,  
    Unsigned32,  
    transmission,  
    NOTIFICATION-TYPE  
        FROM SNMPv2-SMI  
    TEXTUAL-CONVENTION,  
    RowPointer,  
    RowStatus,  
    TruthValue,  
    DateAndTime  
        FROM SNMPv2-TC  
    SnmpAdminString  
        FROM SNMP-FRAMEWORK-MIB  
    MODULE-COMPLIANCE, OBJECT-GROUP  
        FROM SNMPv2-CONF  
    ifIndex  
        FROM IF-MIB  
    optIfMibModule,  
    optIfOchConfigEntry,  
    optIfOchSinkCurrentEntry,  
    OptIfDirectionality
```

FROM OPT-IF-MIB;

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

optIfExtMibModule MODULE-IDENTITY  
LAST-UPDATED "201204250000Z"  
ORGANIZATION "IETF OPSAWG/CCAMP Working Group"  
CONTACT-INFO  
"WG charter:  
<http://www.ietf.org/html.charters/>  
  
Mailing Lists:  
Editor: Gabrielle Galimberti  
Email: ggalimbe@cisco.com"

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DESCRIPTION

"The MIB module to describe Black Link extension to [rfc3591](#).

Copyright (C) The Internet Society (2012). This version  
of this MIB module is part of ; see the RFC  
itself for full legal notices."

REVISION "201204250000Z"

DESCRIPTION

"Draft version 1.0"  
::={ optIfMibModule 3 }

OptIfChannelSpacing ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"Channel spacing  
1 - 100 Ghz  
2 - 50GHz  
3 - 25GHz  
4 - 12.5GHz

```
    5 - 6.25Ghz
"
SYNTAX  INTEGER {
    spacing100Ghz(1),
        spacing50Ghz(2),
        spacing25Ghz(3),
        spacing12point5Ghz(4),
        spacing6point25Ghz(5)
    }

```

OptIfBitRateLineCoding ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"Optical tributary signal class

1 - NRZ 2.5G (from nominally 622 Mbit/s to nominally 2.67 Gbit/s)

2 - NRZ 10G nominally 2.4 Gbit/s to nominally 10.71 Gbit/s.

3 - 40Gbits/s

4 - 100Gbits/s

5 - 400Gbits/s

40Gbits/s and above are under study. "

```
SYNTAX  INTEGER {
    rate2point5G(1),
    rate10G(2),
    rate40G(3),
    rate100G(4),
    rate400G(5)
    }

```

OptIfFiberTypeRecommendation ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

" Fiber Types - ITU-T Recs G.652, G.653, G.654 and G.655

One for recommendation and one for category.

G.652 A, B, C, D

G.653 A, B

G.654 A, B, C

G.655 C, D, E

G.656

G.657 A, B

"

```
SYNTAX  INTEGER {

```

```
    g652(1),
    g653(2),
    g654(3),
    g655(4),
    g656(5),
    g657(6)
}
```

OptIfFiberTypeCategory ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

" Fiber Types - ITU-T Recs G.652, G.653, G.654 and G.655

G.652 A, B, C, D

G.653 A, B

G.654 A, B, C

G.655 C, D, E

G.656

G.657 A, B

Categories - A, B, C, D and E

"

```
SYNTAX INTEGER {
    categoryA(1),
    categoryB(2),
    categoryC(3),
    categoryD(4),
    categoryE(5)
}
```

OptIfPerformanceDataType ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"

This parameter indicates the parameters for the table are for  
the Near End or Far End performance data.

1 - Near End

2 - Far End

"

```
SYNTAX INTEGER {
    nearEnd(1),
    farEnd(2)
}
```



```

OptIfOTNLayer ::= TEXTUAL-CONVENTION
  STATUS current
  DESCRIPTION
  "
    This parameter indicates the parameters for the table are for OTUk,
    ODUk, TCM performance data.
    1 - OTUk
    2 - ODUk
    3 - TCM
    The ODUk layer and TCM sublayer PM is not related to the black link
    PM management, but since this could be a common PM model for the ODUk
    layer and TCM sublayers, they are included here so it may be used for
    simple scenarios where only lower order ODUk or higher order ODUk is
    present. For scenarios where both lower order ODUk and higher order
    ODUk are present, further extension to the MIB model is required, in
    particular for the indexing for these layers.
  "
  SYNTAX INTEGER {
    optIfOTUkLayer(1),
    optIfODUkLayer(2),
    optIfTCMSubLayer(3)
  }

```

```
--
```

```
-- Alarm for the OCh and OTUk layer
```

```
--
```

```

OptIfOTNOCAlarms ::= TEXTUAL-CONVENTION
  STATUS current
  DESCRIPTION
  " This is the possible alarms from the OCh and OTUk layer."
  SYNTAX INTEGER {
    -- OTN Loss of signal alarm
    optIf0tnLosAlarm(1),
    -- OTN Loss of frame alarm
    optIf0tnLofAlarm(2),
    -- OTN Loss of multi framealarm
    optIf0tnLomAlarm(3),
    -- OTN SSF alarm
    optIf0tn0tuSsfAlarm(4),
    -- OTN OTU BDI alarm
    optIf0tn0tuBdiAlarm(5),

```

```

-- OTN OTU Trail Trace mismatch alarm
optIf0tn0tuTimAlarm(6),
-- OTN OTU IAE alarm
optIf0tn0tuIaeAlarm(7),
-- OTN OTU Degraded alarm,
optIf0tn0tuDegAlarm(8),
-- OTN OTU Fec ExcessiveErrors alarm
optIf0tn0tuFecExcessiveErrsAlarm(9),
-- OTN OTU BBE Thresholdalarm
optIf15MinThreshBBETCA(10),
-- OTN OTU ES Thresholdalarm
optIf15MinThreshESTCA(11),
-- OTN OTU SES Threshold alarm
optIf15MinThreshSESTCA(12),
-- OTN OTU UAS Threshold alarm
optIf15MinThreshUASTCA(13),
-- OTN OTU Fcs Thresholdalarm alarm
optIf15MinThreshFcsTCA(14),
-- OTN FEC uncorrectedwords TCA
optIf15MinThreshFECUncorrectedWordsTCA(15),
-- OTN Pre FEC BER TCA
optIf15MinThreshPreFECBERTCA(16)
}

```

OptIfOTNODUkTcmAlarms ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

" This is the alarms from the ODUk and TCM layer."

SYNTAX INTEGER {

```

-- OTN ODU/TCM OCI alarm
optIfOTNODUkTcmOciAlarm(1),
-- OTN ODU/TCM LCK alarm
optIfOTNODUkTcmLckAlarm(2),
-- OTN ODU/TCM BDI alarm
optIfOTNODUkTcmBdiAlarm(3),
-- OTN ODU/TCM Trail Trace mismatch alarm
optIfOTNODUkTcmTimAlarm(4),
-- OTN ODU/TCM Degraded alarm,
optIfOTNODUkTcmDegAlarm(5),
-- OTN ODU/TCM SSF alarm,
optIfOTNODUkTcmSSfAlarm(6),
-- OTN OTU BBE Threshold alarm
optIfOTNODUkTcm15MinThreshBBETCA(7),
-- OTN OTU ES Threshold alarm
optIfOTNODUkTcm15MinThreshESTCA(8),
-- OTN OTU SES Threshold alarm
optIfOTNODUkTcm15MinThreshSESTCA(9),
-- OTN OTU UAS Threshold alarm

```

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```

        optIfOTNOdukTcm15MinThreshUASTCA(10),
        -- OTN OTU Fcs Threshold alarm
        optIfOTNOdukTcm15MinThreshFcsTCA(11)
    }

-- Addition to the RFC 3591 objects
optIfOPSmEntry          OBJECT IDENTIFIER ::= { optIfExtMibModule 1 }
optIfOChSrcSinkGroup    OBJECT IDENTIFIER ::= { optIfExtMibModule 2 }
optIfOTNPMGroup         OBJECT IDENTIFIER ::= { optIfExtMibModule 3 }
optIfOTNAlarm           OBJECT IDENTIFIER ::= { optIfExtMibModule 4 }
optIfOTNNotifications   OBJECT IDENTIFIER ::= { optIfExtMibModule 5 }

-- OPS - Optical Physical Section
optIfOPSmConfigTable OBJECT-TYPE
    SYNTAX SEQUENCE OF OptIfOPSmConfigEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "A table of OPS General config parameters."
    ::= { optIfObjects 10 }

optIfOPSmConfigEntry OBJECT-TYPE
    SYNTAX      OptIfOPSmConfigEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "An conceptual row of OPS General config parameters."
    INDEX { ifIndex }
    ::= { optIfOPSmConfigTable 1 }

OptIfOPSmConfigEntry ::=
    SEQUENCE {
        optIfOPSmDirectionality          OptIfDirectionality,
        optIfOPSmFiberTypeRecommendation OptIfFiberTypeRecommendation,
        optIfOPSmFiberTypeCategory       OptIfFiberTypeCategory
    }

optIfOPSmDirectionality OBJECT-TYPE
```

SYNTAX OptIfDirectionality  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"Indicates the directionality of the entity."

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::= { optIfOPSmConfigEntry 1 }

optIfOPSmFiberTypeRecommendation OBJECT-TYPE

SYNTAX OptIfFiberTypeRecommendation  
MAX-ACCESS read-write  
STATUS current  
DESCRIPTION

"Fiber type as per fibre types are chosen from those defined in  
ITU-T Recs G.652, G.653, G.654, G.655, G.656 and G.657."

::= { optIfOPSmConfigEntry 2 }

optIfOPSmFiberTypeCategory OBJECT-TYPE

SYNTAX OptIfFiberTypeCategory  
MAX-ACCESS read-write  
STATUS current  
DESCRIPTION

"Fiber type as per fibre types are chosen from those defined in  
ITU-T Recs G.652, G.653, and G.655.  
The categories are A, B, C, D and E."

::= { optIfOPSmConfigEntry 3 }

-- OCh config table  
-- modified the OCh Table group  
-- General parameters for the Black Link Ss-Rs will be added to  
-- the OchConfigTable

optIfOChConfigExtTable OBJECT-TYPE

SYNTAX SEQUENCE OF OptIfOChConfigExtEntry  
MAX-ACCESS not-accessible  
STATUS current  
DESCRIPTION

"A table of OCh General config extension parameters"

::= { optIfOChSrcSinkGroup 1 }

optIfOChConfigExtEntry OBJECT-TYPE

```

SYNTAX      OptIf0ChConfigExtEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    " A conceptual row that contains OCh configuration extension information
      of an interface. "
AUGMENTS { optIf0ChConfigEntry }
 ::= { optIf0ChConfigExtTable 1 }

```

```

OptIf0ChConfigExtEntry ::=
    SEQUENCE {

```

optIf0ChMimumChannelSpacing	OptIfChannelSpacing,
optIf0ChBitRateLineCoding	OptIfBitRateLineCoding,
optIf0ChFEC	Unsigned32,
optIf0ChSinkMaximumBERMantisa	Unsigned32,
optIf0ChSinkMaximumBERExponent	Unsigned32,
optIf0ChMinWavelength	Unsigned32,
optIf0ChMaxWavelength	Unsigned32,
optIf0ChWavelength	Unsigned32,
optIf0ChVendorTransceiverClass	OCTET STRING,
optIf0ChOpticalInterfaceApplicationCode	OCTET STRING,
optIf0ChLaserAdminState	INTEGER,
optIf0ChLaserOperationalState	INTEGER,
optIf0ChAdminState	INTEGER,
optIf0ChOperationalState	INTEGER

}

```

optIf0ChMimumChannelSpacing OBJECT-TYPE

```

```

SYNTAX      OptIfChannelSpacing
UNITS       "Gigahertz"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION

```

```

    "A minimum nominal difference in frequency (GHz) between two adjacent
    channels."

```

```

 ::= { optIf0ChConfigExtEntry 1 }

```

```

optIf0ChBitRateLineCoding OBJECT-TYPE

```

```

SYNTAX      OptIfBitRateLineCoding

```

```
MAX-ACCESS read-write
STATUS current
DESCRIPTION
    " Optical tributary signal class
      NRZ 2.5G (from nominally 622 Mbit/s to nominally 2.67 Gbit/s)
      NRZ 10G (nominally 2.4 Gbit/s to nominally 10.71 Gbit/s)
    "
 ::= { optIf0ChConfigExtEntry 2 }
```

```
optIf0ChFEC OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-write
STATUS current
DESCRIPTION
    " This parameter indicates what Forward Error Correction (FEC) code
      is used at Source and Sink.
      GFEC (from G709) and the I.x EFEC's
      (G.975 - Table I.1 super FEC).
      1 - No FEC
```

```
    2 - GFEC
    3 - I.2 EFEC
    4 - I.3 EFEC
    5 - I.4 EFEC
    6 - I.5 EFEC
    7 - I.6 EFEC
    8 - I.7 EFEC
    9 - I.8 EFEC
   10 - I.9 EFEC
   99 - Vendor Specific
  "
 ::= { optIf0ChConfigExtEntry 3 }
```

```
optIf0ChSinkMaximumBERMantisa OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    " This parameter indicate the maximum Bit(mantisa) error rate can be
      supported by the application at the Receiver. In case of FEC
      applications it is intended after the FEC correction .
    "
```

```
::= { optIf0ChConfigExtEntry 4 }
```

```
optIf0ChSinkMaximumBERExponent OBJECT-TYPE
```

```
SYNTAX Unsigned32
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
" This parameter indicate the maximum Bit(exponent) error rate can be supported by the application at the Receiver. In case of FEC applications it is intended after the FEC correction .
```

```
"
```

```
::= { optIf0ChConfigExtEntry 5 }
```

```
optIf0ChMinWavelength OBJECT-TYPE
```

```
SYNTAX Unsigned32
```

```
UNITS "0.01 Ghz"
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
"
```

```
 This parameter indicate minimum wavelength spectrum in a definite wavelength Band (L, C and S).
```

```
 For eg 1528.77 Ghz will be represented as 152877.
```

```
"
```

```
::= { optIf0ChConfigExtEntry 6 }
```

```
optIf0ChMaxWavelength OBJECT-TYPE
```

```
SYNTAX Unsigned32
```

```
UNITS "hertz"
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
"
```

```
 This parameter indicate maximum wavelength spectrum in a definite wavelength Band (L, C and S)
```

```
"
```

```
::= { optIf0ChConfigExtEntry 7 }
```

```
optIf0ChWavelength OBJECT-TYPE
```

```
SYNTAX Unsigned32
```

```
UNITS "hertz"
```

MAX-ACCESS read-write  
STATUS current  
DESCRIPTION  
" This parameter indicates the wavelength value.  
"  
 ::= { optIf0ChConfigExtEntry 8 }

optIf0ChVendorTransceiverClass OBJECT-TYPE  
SYNTAX OCTET STRING  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
" As defined in G.698  
Vendors can summarize a set of parameters in a single proprietary parameter: the Class of transceiver. The Transceiver classification will be based on the Vendor Name and the main TX and RX parameters (i.e. Trunk Mode, Framing, Bit rate, Trunk Type etc).  
If this parameter is used, the MIB parameters specifying the Transceiver characteristics may not be significant and the vendor will be responsible to specify the Class contents and values. The Vendor can publish the parameters of its Classes or declare to be compatible with published Classes.(G) Optional for compliance. (not mentioned in G.698)  
"  
 ::= { optIf0ChConfigExtEntry 9 }

optIf0ChOpticalInterfaceApplicationCode OBJECT-TYPE  
SYNTAX OCTET STRING  
MAX-ACCESS read-write  
STATUS current  
DESCRIPTION  
" This parameter indicates the transceiver application code at Ss

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and Rs as defined in [[ITU.G698.2](#)] Chapter 5.3  
"  
 ::= { optIf0ChConfigExtEntry 10 }

optIf0ChLaserAdminState OBJECT-TYPE  
SYNTAX INTEGER {  
off(0),  
on(1),



```

        autoInService(2)
    }
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"
    The configured State of the laser: 0 - Off
    1 - On
    2 - Automatic - Inservice
"
 ::= { optIf0ChConfigExtEntry 11 }

```

```

optIf0ChLaserOperationalState OBJECT-TYPE
SYNTAX INTEGER {
    off(0),
    on(1)
}
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
    The Operational Status of Laser : 0 - Off
    1 - On
"
 ::= { optIf0ChConfigExtEntry 12 }

```

```

optIf0ChAdminState OBJECT-TYPE
SYNTAX INTEGER {
    off(0),
    on(1),
    autoInService(2)
}
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"
    The Administrative Status of an Interface:
    0 - Out of Service
    1 - In Service
    2 - Automatic in Service.
"

```

```

 ::= { optIf0ChConfigExtEntry 13 }

optIf0ChOperationalState OBJECT-TYPE
    SYNTAX    INTEGER {
                off(0),
                on(1)
            }
    MAX-ACCESS read-only
    STATUS    current
    DESCRIPTION
        "
            The Operational Status of an Interface:
                0 - Off
                1 - On
        "
 ::= { optIf0ChConfigExtEntry 14 }

-- Parameters at OCh Src (Ss)
-- OptIf0ChSrcConfigEntry

optIf0ChSrcConfigTable OBJECT-TYPE
    SYNTAX    SEQUENCE OF OptIf0ChSrcConfigEntry
    MAX-ACCESS not-accessible
    STATUS    current
    DESCRIPTION
        "A configuration table of OCh Src (Ss) parameters."
 ::= { optIf0ChSrcSinkGroup 2 }

optIf0ChSrcConfigEntry OBJECT-TYPE
    SYNTAX    OptIf0ChSrcConfigEntry
    MAX-ACCESS not-accessible
    STATUS    current
    DESCRIPTION
        " A conceptual row that contains the Src (Ss) configuration
            parameters for a given interface."
    INDEX { ifIndex }
 ::= { optIf0ChSrcConfigTable 1 }

OptIf0ChSrcConfigEntry ::=
    SEQUENCE {
        optIf0ChMinimumMeanChannelOutputPower      Integer32,
        optIf0ChMaximumMeanChannelOutputPower      Integer32,
        optIf0ChMinimumCentralFrequency             Unsigned32,
        optIf0ChMaximumCentralFrequency            Unsigned32,
        optIf0ChMaximumSpectralExcursion            Unsigned32,

```

```
        optIf0ChMaximumTxDispersionOSNRPenalty          Integer32
    }

optIf0ChMinimumMeanChannelOutputPower  OBJECT-TYPE
SYNTAX  Integer32
UNITS   "0.1 dbm"
MAX-ACCESS  read-write
STATUS   current
DESCRIPTION
    "
        The minimum mean launched power at Ss is the average power (in dBm)
        of a pseudo-random data sequence coupled into the DWDM link.
    "
 ::= { optIf0ChSrcConfigEntry 1}

optIf0ChMaximumMeanChannelOutputPower  OBJECT-TYPE
SYNTAX  Integer32
UNITS   "0.1 dbm"
MAX-ACCESS  read-write
STATUS   current
DESCRIPTION
    "
        The maximum mean launched power at Ss is the average power (in dBm)
        of a pseudo-random data sequence coupled into the DWDM link.
    "
 ::= { optIf0ChSrcConfigEntry 2}

optIf0ChMinimumCentralFrequency  OBJECT-TYPE
SYNTAX  Unsigned32
UNITS   "0.0001 THz"
MAX-ACCESS  read-only
STATUS   current
DESCRIPTION
    "
        The minimum central frequency is the nominal single-channel frequency
        (in THz) on which the digital coded information of the particular
        optical channel is modulated by use of the NRZ line code.
        Eg 191.5THz will be represented as 1915000
    "
 ::= { optIf0ChSrcConfigEntry 3}

optIf0ChMaximumCentralFrequency  OBJECT-TYPE
SYNTAX  Unsigned32
UNITS   "0.0001 THz"
MAX-ACCESS  read-only
STATUS   current
```

DESCRIPTION

"

The maximum central frequency is the nominal single-channel frequency (in THz) on which the digital coded information of the particular optical channel is modulated by use of the NRZ line code.

Eg 191.5THz will be represented as 1915000.

"

::= { optIf0ChSrcConfigEntry 4}

optIf0ChMaximumSpectralExcursion OBJECT-TYPE

SYNTAX Unsigned32

UNITS "0.1 GHz"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

This is the maximum acceptable difference between the nominal central frequency (in GHz) of the channel and the minus 15 dB points of the transmitter spectrum furthest from the nominal central frequency measured at point Ss.

"

::= { optIf0ChSrcConfigEntry 5}

optIf0ChMaximumTxDispersionOSNRPenalty OBJECT-TYPE

SYNTAX Integer32

UNITS "0.1 dB"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

Defines a reference receiver that this penalty is measured with. Lowest OSNR at Ss with worst case (residual) dispersion minus the Lowest OSNR at Ss with no dispersion. Lowest OSNR at Ss with no dispersion

"

::= { optIf0ChSrcConfigEntry 6}

-- Optical Path from Point Src (Ss) to Sink (Rs)

-- Alternatively this can be optIf0ChSsRsTable

```

optIf0ChSrcSinkConfigTable OBJECT-TYPE
    SYNTAX SEQUENCE OF OptIf0ChSrcSinkConfigEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "A table of paramters for the optical path from Src to Sink
        (Ss to Rs)."
```

```
 ::= { optIf0ChSrcSinkGroup 3 }
```

```

optIf0ChSrcSinkConfigEntry OBJECT-TYPE
    SYNTAX OptIf0ChSrcSinkConfigEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "A conceptual row that contains the optical path Src-Sink (Ss-Rs)
        configuration parameters for a given interface."
```

```
INDEX { ifIndex }
```

```
 ::= { optIf0ChSrcSinkConfigTable 1 }
```

```
OptIf0ChSrcSinkConfigEntry ::=
```

```
SEQUENCE {
```

optIf0ChSrcSinkMinimumChromaticDispersion	Integer32,
optIf0ChSrcSinkMaximumChromaticDispersion	Integer32,
optIf0ChSrcSinkMinimumSrcOpticalReturnLoss	Integer32,
optIf0ChSrcSinkMaximumDiscreteReflectanceSrcToSink	Integer32,
optIf0ChSrcSinkMaximumDifferentialGroupDelay	Integer32,
optIf0ChSrcSinkMaximumPolarisationDependentLoss	Integer32,
optIf0ChSrcSinkMaximumInterChannelCrosstalk	Integer32,
optIf0ChSrcSinkMaximumInterFerometricCrosstalk	Integer32,
optIf0ChSrcSinkMaximumOpticalPathOSNRPenalty	Integer32

```
}
```

```
optIf0ChSrcSinkMinimumChromaticDispersion OBJECT-TYPE
```

```
SYNTAX Integer32
```

```
UNITS "ps/nm"
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
"
```

These parameters define the minimum value of the optical path 'end to end chromatic dispersion' (in ps/nm) that the

```
system shall be able to tolerate."
 ::= { optIf0ChSrcSinkConfigEntry 1}
```

optIf0ChSrcSinkMaximumChromaticDispersion OBJECT-TYPE

```
SYNTAX Integer32
```

```
UNITS "ps/nm"
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
" These parameters define the maximum value of the
optical path 'end to end chromatic dispersion' (in ps/nm) that the
system shall be able to tolerate."
```

```
 ::= { optIf0ChSrcSinkConfigEntry 2 }
```

optIf0ChSrcSinkMinimumSrcOpticalReturnLoss OBJECT-TYPE

```
SYNTAX Integer32
```

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```
UNITS ".1 db"
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
"
```

```
These parameter defines minimum optical return loss (in dB) of the
cable plant at the source reference point (Src/Ss), including any
connectors."
```

```
 ::= { optIf0ChSrcSinkConfigEntry 3 }
```

optIf0ChSrcSinkMaximumDiscreteReflectanceSrcToSink OBJECT-TYPE

```
SYNTAX Integer32
```

```
UNITS ".1 db"
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
"
```

```
Optical reflectance is defined to be the ratio of the reflected
optical power present at a point, to the optical power incident to
that point. Control of reflections is discussed extensively in
ITU-T Rec. G.957."
```

```
 ::= { optIf0ChSrcSinkConfigEntry 4 }
```

optIf0ChSrcSinkMaximumDifferentialGroupDelay OBJECT-TYPE

SYNTAX Integer32  
UNITS "ps"  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION

"

Differential group delay (DGD) is the time difference between the fractions of a pulse that are transmitted in the two principal states of polarization of an optical signal. For distances greater than several kilometres, and assuming random (strong) polarization mode coupling, DGD in a fibre can be statistically modelled as having a Maxwellian distribution."

::= { optIf0ChSrcSinkConfigEntry 5}

optIf0ChSrcSinkMaximumPolarisationDependentLoss OBJECT-TYPE

SYNTAX Integer32  
UNITS "0.1 db"  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION

"

The polarisation dependent loss (PDL) is the difference (in dB)

between the maximum and minimum values of the channel insertion loss (or gain) of the black-link from point SS to RS due to a variation of the state of polarization (SOP) over all SOPs."

::= { optIf0ChSrcSinkConfigEntry 6}

optIf0ChSrcSinkMaximumInterChannelCrosstalk OBJECT-TYPE

SYNTAX Integer32  
UNITS "0.1 db"  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION

"

Inter-channel crosstalk is defined as the ratio of total power in all of the disturbing channels to that in the wanted channel, where the wanted and disturbing channels are at different wavelengths. The parameter specifies the isolation of a link conforming to the 'black-link' approach such that under the worst-case operating conditions the inter-channel crosstalk at any

```
reference point RS is less than the maximum inter-channel
crosstalk value."
 ::= { optIf0ChSrcSinkConfigEntry 7}
```

```
optIf0ChSrcSinkMaximumInterFerometricCrosstalk OBJECT-TYPE
SYNTAX Integer32
UNITS "0.1 db"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
This parameter places a requirement on the isolation of a link
conforming to the 'black-link' approach such that under the worst
case operating conditions the interferometric crosstalk at any
reference point RS is less than the maximum interferometric
crosstalk value.."
 ::= { optIf0ChSrcSinkConfigEntry 8}
```

```
optIf0ChSrcSinkMaximumOpticalPathOSNRPenalty OBJECT-TYPE
SYNTAX Integer32
UNITS "0.1 db"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
The optical path OSNR penalty is defined as the difference between
the Lowest OSNR at Rs and Lowest OSNR at Ss that meets the BER
requirement."
 ::= { optIf0ChSrcSinkConfigEntry 9}
```

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```
-- Parameters at Sink (Rs)
-- optIf0ChSinkConfigTable
optIf0ChSinkConfigTable OBJECT-TYPE
SYNTAX SEQUENCE OF OptIf0ChSinkConfigEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"A table of 0Ch Sink (Rs) configuration parameters."
 ::= { optIf0ChSrcSinkGroup 4 }
```

```
optIf0ChSinkConfigEntry OBJECT-TYPE
```



```

SYNTAX      OptIf0ChSinkConfigEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "A conceptual row that contains the Sink (Rs) configuration
    parameters for a given interface."
INDEX       { ifIndex }
 ::= { optIf0ChSinkConfigTable 1 }

```

```

OptIf0ChSinkConfigEntry ::=
    SEQUENCE {
        optIf0ChSinkMinimumMeanIntputPower      Integer32,
        optIf0ChSinkMaximumMeanIntputPower      Integer32,
        optIf0ChSinkMinimumOSNR                 Integer32,
        optIf0ChSinkOSNRTolerance               Integer32
    }

```

```

optIf0ChSinkMinimumMeanIntputPower OBJECT-TYPE
SYNTAX      Integer32
UNITS       "0.1 dBm"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    " The minimum values of the average received power (in dBm
    at point the Sink (Rs))."
 ::= { optIf0ChSinkConfigEntry 1}

```

```

optIf0ChSinkMaximumMeanIntputPower OBJECT-TYPE
SYNTAX      Integer32
UNITS       "0.1 dBm"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    " The maximum values of the average received power (in dBm)
    at point the Sink (Rs))."
 ::= { optIf0ChSinkConfigEntry 2}

```

```

optIf0ChSinkMinimumOSNR OBJECT-TYPE
SYNTAX      Integer32
UNITS       "0.1 dB"
MAX-ACCESS  read-only

```

```
STATUS current
DESCRIPTION
    " The minimum optical signal-to-noise ratio (OSNR) is the minimum
    value of the ratio of the signal power in the wanted channel to
    the highest noise power density in the range of the central
    frequency plus and minus the maximum spectral excursion."
 ::= { optIf0ChSinkConfigEntry 3 }
```

```
optIf0ChSinkOSNRTolerance OBJECT-TYPE
```

```
SYNTAX Integer32
UNITS "0.1 dB"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    " The receiver OSNR tolerance is defined as the minimum value of
    OSNR at point Sink (Rs) that can be tolerated while maintaining the
    maximum BER of the application. Sink (Rs). "
 ::= { optIf0ChSinkConfigEntry 4 }
```

```
-- Performance Monitoring
```

```
-- The OptIf0ChSinkCurrentExtEntry table is an extension to the
-- optIf0ChSinkCurrentExtEntry
-- following optional parameters for current status
-- OptIf0ChSinkCurrentExtEntry
```

```
optIf0ChSinkCurrentExtTable OBJECT-TYPE
```

```
SYNTAX SEQUENCE OF OptIf0ChSinkCurrentExtEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
    "A table of 0Ch sink extension to the performance monitoring information for
    the current 15-minute interval."
 ::= { optIf0TNPMGroup 1 }
```

```
optIf0ChSinkCurrentExtEntry OBJECT-TYPE
```

```
SYNTAX OptIf0ChSinkCurrentExtEntry
MAX-ACCESS not-accessible
STATUS current
```

## DESCRIPTION

"A conceptual row that contains 0Ch sink performance monitoring information for an interface for the current 15-minute interval."

AUGMENTS { optIf0ChSinkCurrentEntry }  
 ::= { optIf0ChSinkCurrentExtTable 1 }

OptIf0ChSinkCurrentExtEntry ::=

```
SEQUENCE {
    optIf0ChSinkCurrentChromaticDispersion      Integer32,
    optIf0ChSinkCurrentOSNR                     Integer32,
    optIf0ChSinkCurrentQ                        Integer32
}
```

optIf0ChSinkCurrentChromaticDispersion OBJECT-TYPE

```
SYNTAX Integer32
UNITS "ps/nm"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    " Residual Chromatic Dispersion measured at Rx Transceiver port."
 ::= { optIf0ChSinkCurrentExtEntry 1}
```

optIf0ChSinkCurrentOSNR OBJECT-TYPE

```
SYNTAX Integer32
UNITS "0.1 db"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    " Current Optical Signal to Noise Ratio (OSNR) estimated at Rx
      Transceiver port ."
 ::= { optIf0ChSinkCurrentExtEntry 2}
```

optIf0ChSinkCurrentQ OBJECT-TYPE

```
SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    " 'Q' factor estimated at Rx Transceiver port."
 ::= { optIf0ChSinkCurrentExtEntry 3}
```

-- Performance Monitoring

-- OTN PM Config Table

--

optIf0TNPMConfigTable OBJECT-TYPE

```

MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
  "A table of performance monitoring configuration for the type
  'optIfOTNPMConfigLayer' layer."
 ::= { optIfOTNPMGroup 2 }

```

```

optIfOTNPMConfigEntry OBJECT-TYPE
SYNTAX      OptIfOTNPMConfigEntry
MAX-ACCESS not-accessible
STATUS      current
DESCRIPTION
  " A conceptual entry in the performance monitoring configuration
  for the type
  'optIfOTNPMConfigLayer' layer.
  "
INDEX { ifIndex, optIfOTNPMConfigType, optIfOTNPMConfigLayer,
optIfOTNPMConfigTCMLLevel }
 ::= { optIfOTNPMConfigTable 1 }

```

```

OptIfOTNPMConfigEntry ::=
  SEQUENCE {
    optIfOTNPMConfigType           OptIfPerformanceDataType,
    optIfOTNPMConfigLayer          OptIfOTNLayer,
    optIfOTNPMConfigTCMLLevel     Unsigned32,
    optIfOTNPM15MinFcsThreshold   Unsigned32,
    optIfOTNPM15MinESsThreshold   Unsigned32,
    optIfOTNPM15MinSESSsThreshold Unsigned32,
    optIfOTNPM15MinUASsThreshold  Unsigned32,
    optIfOTNPM15MinBBEsThreshold  Unsigned32
  }

```

```

optIfOTNPMConfigType      OBJECT-TYPE
SYNTAX OptIfPerformanceDataType
MAX-ACCESS read-only
STATUS current
DESCRIPTION
  "
  This parameter indicates the parameters for the table are for the
  Near End or Far End performance data.

```

```
    1 - Near End
    2 - Far End
    "
 ::= { optIfOTNPMConfigEntry 1}
```

```
optIfOTNPMConfigLayer OBJECT-TYPE
    SYNTAX OptIfOTNLayer
    MAX-ACCESS read-only
```

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```
STATUS current
DESCRIPTION
    "
    This parameter indicates the parameters for the table are for OTUk,
    ODUk, TCMn performance data.
    1 - OTUk
    2 - ODUk
    3 - TCM
    The ODUk/TCM Layer PM is not related to the black link PM
    management, but since this is a common PM model for the ODU/TCM layer,
    we may include it here.
    "
 ::= { optIfOTNPMConfigEntry 2}
```

```
optIfOTNPMConfigTCMLevel OBJECT-TYPE
    SYNTAX Unsigned32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "
        This parameter indicates the TCM level (1-6)
        if the PM is of the type TCM. This will be 0 for OTUk/ODUk.
        "
    ::= { optIfOTNPMConfigEntry 3}
```

```
optIfOTNPM15MinFcsThreshold OBJECT-TYPE
    SYNTAX Unsigned32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "
        The number of Fcs encountered by the interface within any
        given 15 minutes performance data collection period, which causes the
```

SNMP agent to send optIf15MinThreshFcsTCA. One notification will be sent per interval per interface. A value of `0' will disable the notification.

"

::= { optIf0TNPMConfigEntry 4 }

optIf0TNPM15MinESsThreshold OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

The number of ES encountered by the interface within any given 15 minutes performance data collection period, which causes the SNMP agent to send optIf15MinThreshEsTCA. One notification will be

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sent per interval per interface if the threshold is exceeded. A value of `0' will disable the notification.

"

::= { optIf0TNPMConfigEntry 5 }

optIf0TNPM15MinSESsThreshold OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

The number of SES encountered by the interface within any given 15 minutes performance data collection period, which causes the SNMP agent to send optIf15MinThreshSESTCA. One notification will be sent per interval per interface if the threshold is exceeded. A value of `0' will disable the notification.

"

::= { optIf0TNPMConfigEntry 6 }

optIf0TNPM15MinUASsThreshold OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

The number of UAS encountered by the interface within any given 15 minutes performance data collection period, which causes the SNMP agent to send optIf15MinThreshUASTCA. One notification will be sent per interval per interface if the threshold is exceeded. A value of `0` will disable the notification.

"

::= { optIf0TNPMConfigEntry 7 }

optIf0TNPM15MinBBEsThreshold OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

The number of UAS encountered by the interface within any given 15 minutes performance data collection period, which causes the SNMP agent to send optIf15MinThreshBBETCA. One notification will be sent per interval per interface if the threshold is exceeded. A value of `0` will disable the notification.

"

::= { optIf0TNPMConfigEntry 8 }

--

-- PM Current Entry at either the OTU/ODUk/TCM

--

optIf0TNPMCurrentTable OBJECT-TYPE

SYNTAX SEQUENCE OF OptIf0TNPMCurrentEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table for the Performance monitoring Current Table.

"

::= {optIf0TNPMGroup 3}

optIf0TNPMCurrentEntry OBJECT-TYPE

SYNTAX OptIf0TNPMCurrentEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A conceptual entry in the Near end or Far End performance monitoring Current table for the type 'optIf0TNPMCurrentLayer' layer.

```

"
INDEX { ifIndex, optIfOTNPMCurrentType ,
        optIfOTNPMCurrentLayer, optIfOTNPMCurrentTCMLevel }
 ::= { optIfOTNPMCurrentTable 1 }

```

```

OptIfOTNPMCurrentEntry ::=
  SEQUENCE {
    optIfOTNPMCurrentType           OptIfPerformanceDataType,
    optIfOTNPMCurrentLayer          OptIfOTNLayer,
    optIfOTNPMCurrentTCMLevel      Unsigned32,
    optIfOTNPMCurrentSuspectedFlag TruthValue,
    optIfOTNPMCurrentInterval      Unsigned32,
    optIfOTNPMCurrentValidIntervals Unsigned32,
    optIfOTNPMCurrentFcs           Unsigned32,
    optIfOTNPMCurrentESs           Unsigned32,
    optIfOTNPMCurrentSESS          Unsigned32,
    optIfOTNPMCurrentUASs         Unsigned32,
    optIfOTNPMCurrentBBEs         Unsigned32,
    optIfOTNPMCurrentESR          Unsigned32,
    optIfOTNPMCurrentSESR         Unsigned32,
    optIfOTNPMCurrentBBER         Unsigned32
  }

```

```

optIfOTNPMCurrentType          OBJECT-TYPE
  SYNTAX  OptIfPerformanceDataType
  MAX-ACCESS  read-only
  STATUS  current
  DESCRIPTION
  "

```

This parameter indicates the parameters for the table are for the Near End or Far End performance data.

- 1 - Near End
- 2 - Far End

```

"
 ::= { optIfOTNPMCurrentEntry 1}

```

```

optIfOTNPMCurrentLayer        OBJECT-TYPE
  SYNTAX  OptIfOTNLayer
  MAX-ACCESS  read-only
  STATUS  current
  DESCRIPTION

```



```
"
  This parameter indicates the parameters for the table are for OTUk,
  ODUk, TCMn performance data.
  1 - OTUk (OCh which is used for the black link)
  2 - ODUk
  3 - TCM
  The ODUk/TCM Layer PM is not related to the black link PM
  management, but since this is a common PM model for the ODU/TCM layer,
  we may include it here.
"
```

```
::= { optIf0TNPMCurrentEntry 2 }
```

```
optIf0TNPMCurrentTCMLevel OBJECT-TYPE
```

```
SYNTAX Unsigned32
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
"
  This parameter indicates the TCM level (1-6)
  if the PM is of the type TCM. This will be 0 for OTUK/ODUK.
"
```

```
::= { optIf0TNPMCurrentEntry 3 }
```

```
optIf0TNPMCurrentSuspectedFlag OBJECT-TYPE
```

```
SYNTAX TruthValue
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
"
  If true, the data in this entry may be unreliable.
"
```

```
::= { optIf0TNPMCurrentEntry 4 }
```

```
optIf0TNPMCurrentInterval OBJECT-TYPE
```

```
SYNTAX Unsigned32
```

```
UNITS "seconds"
```

```
MAX-ACCESS read-write
```

```
STATUS current
```

```
DESCRIPTION
```

```
" This parameter indicates the measurement interval
```

```

        for calculation of the ratios.
    "
 ::= { optIf0TNPMCurrentEntry 5}

optIf0TNPMCurrentValidIntervals OBJECT-TYPE
    SYNTAX Unsigned32
    UNITS "seconds"
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
        " The number of contiguous 15 minute intervals for which valid
          PM data is available for the particular interface.
        "
 ::= { optIf0TNPMCurrentEntry 6}

optIf0TNPMCurrentFcs OBJECT-TYPE
    SYNTAX Unsigned32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "
          Number of Failures occurred in an observation period.
        "
 ::= { optIf0TNPMCurrentEntry 7 }

optIf0TNPMCurrentESs OBJECT-TYPE
    SYNTAX Unsigned32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "
          This is the number of seconds in which one or more blocks are in
          error or during which a defect (e.g. Loss of Signal (LOS)) is
          detected.
        "
 ::= { optIf0TNPMCurrentEntry 8 }

optIf0TNPMCurrentSESSs OBJECT-TYPE
    SYNTAX Unsigned32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        " The number of seconds which have a severe error.

```

This is the number of seconds in which the errored block ratio exceeds the threshold or during which a defect (e.g. Loss of Signal (LOS)) is detected.

"

::= { optIf0TNPMCurrentEntry 9 }

optIf0TNPMCurrentUASs OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

" It is the number of unavailable seconds.

A period of unavailable time begins at the onset of ten consecutive SES events. These ten seconds are considered to be part of unavailable time. A new period of available time begins at the onset of ten consecutive non-SES events. These ten seconds are considered to be part of available time.

"

::= { optIf0TNPMCurrentEntry 10 }

optIf0TNPMCurrentBBEs OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

An errored block not occurring as part of an SES.

"

::= { optIf0TNPMCurrentEntry 11 }

optIf0TNPMCurrentESR OBJECT-TYPE

SYNTAX Unsigned32

UNITS ".001"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

The ratio of ES in available time to total seconds in available time during a fixed measurement interval.

"

::= { optIf0TNPMCurrentEntry 12 }

optIf0TNPMCurrentSESR OBJECT-TYPE

SYNTAX Unsigned32

UNITS ".001"

MAX-ACCESS read-only

STATUS current

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```
DESCRIPTION
"
    The ratio of SES in available time to total seconds in available
    time during a fixed measurement interval.
"
 ::= { optIfOTNPMCurrentEntry 13 }

optIfOTNPMCurrentBBER OBJECT-TYPE
SYNTAX      Unsigned32
UNITS       ".001"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
"
    The ratio of BER in available time to total seconds in available
    time during a fixed measurement interval.
"
 ::= { optIfOTNPMCurrentEntry 14 }

--
-- OTN PM Interval Table
-- Upto 96 15-minute intervals
--
optIfOTNPMIntervalTable OBJECT-TYPE
SYNTAX      SEQUENCE OF OptIfOTNPMIntervalEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "A Performance monitoring Interval Table.
"
 ::= { optIfOTNPMGroup 4 }

optIfOTNPMIntervalEntry OBJECT-TYPE
SYNTAX      OptIfOTNPMIntervalEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "A conceptual entry in the Near end or Far End performance monitoring
    Interval table for the type 'optIfOTNPMIntervalLayer' layer.
"
INDEX       { ifIndex, optIfOTNPMIntervalType, optIfOTNPMIntervalLayer,
              optIfOTNPMIntervalTCMLLevel, optIfOTNPMIntervalNumber }
```

```
::= { optIfOTNPMIntervalTable 1 }
```

```
OptIfOTNPMIntervalEntry ::=
    SEQUENCE {
        optIfOTNPMIntervalType          OptIfPerformanceDataType,
        optIfOTNPMIntervalLayer         OptIfOTNLayer,
```

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```
        optIfOTNPMIntervalTCMLevel     Unsigned32,
        optIfOTNPMIntervalNumber        Unsigned32,
        optIfOTNPMIntervalSuspectedFlag TruthValue,
        optIfOTNPMIntervalFcs           Unsigned32,
        optIfOTNPMIntervalESS           Unsigned32,
        optIfOTNPMIntervalSESS          Unsigned32,
        optIfOTNPMIntervalUASS          Unsigned32,
        optIfOTNPMIntervalBBEs          Unsigned32,
        optIfOTNPMIntervalESR           Unsigned32,
        optIfOTNPMIntervalSESR          Unsigned32,
        optIfOTNPMIntervalBBER          Unsigned32
    }
```

```
optIfOTNPMIntervalType          OBJECT-TYPE
```

```
    SYNTAX OptIfPerformanceDataType
```

```
    MAX-ACCESS read-only
```

```
    STATUS current
```

```
    DESCRIPTION
```

```
    "
```

```
        This parameter indicates the parameters for the table are for the
        Near End or Far End performance data.
```

```
        1 - Near End
```

```
        2 - Far End
```

```
    "
```

```
::= { optIfOTNPMIntervalEntry 1 }
```

```
optIfOTNPMIntervalLayer         OBJECT-TYPE
```

```
    SYNTAX OptIfOTNLayer
```

```
    MAX-ACCESS read-only
```

```
    STATUS current
```

```
    DESCRIPTION
```

```
    "
```

```
        This parameter indicates the parameters for the table are for OTUk,
        ODUk, TCMn performance data.
```

```
        1 - OTUk
```

2 - ODUk

3 - TCM

The ODUk/TCM Layer PM is not related to the black link PM management, but since this is a common PM model for the ODU/TCM layer, we may include it here."

```
::= { optIfOTNPMIntervalEntry 2 }
```

```
optIfOTNPMIntervalTCMLevel OBJECT-TYPE
```

```
SYNTAX Unsigned32
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
"
```

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This parameter indicates the TCM level (1-6) if the PM is of the type TCM. This will be 0 for OTUK/ODUK.

```
"
```

```
::= { optIfOTNPMIntervalEntry 3 }
```

```
optIfOTNPMIntervalNumber OBJECT-TYPE
```

```
SYNTAX Unsigned32
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
"
```

A number between 1 and 96, where 1 is the most recently completed 15 minute interval and 96 is the 15 minutes interval completed 23 hours and 45 minutes prior to interval 1.

```
"
```

```
::= { optIfOTNPMIntervalEntry 4 }
```

```
optIfOTNPMIntervalSuspectedFlag OBJECT-TYPE
```

```
SYNTAX TruthValue
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
"
```

If true, the data in this entry may be unreliable.

```
"
```

```
::= { optIfOTNPMIntervalEntry 5 }
```

optIf0TNPMIntervalFcs OBJECT-TYPE  
SYNTAX Unsigned32  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"  
Number of Failures occurred in an observation period.  
"  
 ::= { optIf0TNPMIntervalEntry 6 }

optIf0TNPMIntervalESS OBJECT-TYPE  
SYNTAX Unsigned32  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"  
It is a one-second period which has one or more errored blocks  
or during which a defect (e.g. Loss of Signal (LOS)) is detected.  
"  
 ::= { optIf0TNPMIntervalEntry 7 }

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optIf0TNPMIntervalSESS OBJECT-TYPE  
SYNTAX Unsigned32  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
" The number of seconds which have a severe error.  
It is a one-second period in which the errored block ratio exceeds  
the threshold or during which a defect (e.g.Loss of Signal(LOS))  
is detected.  
"  
 ::= { optIf0TNPMIntervalEntry 8 }

optIf0TNPMIntervalUASS OBJECT-TYPE  
SYNTAX Unsigned32  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
" It is the number of unavailable seconds in this 15 minute interval.  
A period of unavailable time begins at the onset of ten  
consecutive SES events. These ten seconds are considered to be  
part of unavailable time. A new period of available time begins

at the onset of ten consecutive non-SES events. These ten seconds are considered to be part of available time.

"

::= { optIf0TNPMIntervalEntry 9}

optIf0TNPMIntervalBBEs OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

An errored block not occurring as part of an SES.

"

::= { optIf0TNPMIntervalEntry 10}

optIf0TNPMIntervalESR OBJECT-TYPE

SYNTAX Unsigned32

UNITS ".001"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

The ratio of ES in available time to total seconds in available time during a fixed measurement interval.

"

::= { optIf0TNPMIntervalEntry 11}

optIf0TNPMIntervalSESR OBJECT-TYPE

SYNTAX Unsigned32

UNITS ".001"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

The ratio of SES in available time to total seconds in available time during a fixed measurement interval.

"

::= { optIf0TNPMIntervalEntry 12}

optIf0TNPMIntervalBBER OBJECT-TYPE

SYNTAX Unsigned32



```

UNITS ".001"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
    The ratio of BBE in available time to total seconds in available
    time during a fixed measurement interval.
"
 ::= { optIfOTNPMIntervalEntry 13}

--
-- PM Current Day Entry
--
optIfOTNPMCurrentDayTable OBJECT-TYPE
    SYNTAX SEQUENCE OF OptIfOTNPMCurrentDayEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        " A Performance monitoring Current Day Table.
        "
    ::= { optIfOTNPMGroup 5 }

optIfOTNPMCurrentDayEntry OBJECT-TYPE
    SYNTAX OptIfOTNPMCurrentDayEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "A conceptual entry in the Near end or Far End performance
        monitoring Current day table for the type
        'optIfOTNPMCurrentDayLayer' layer.
        "
    INDEX { ifIndex, optIfOTNPMCurrentDayType, optIfOTNPMCurrentDayLayer,
            optIfOTNPMCurrentDayTCMLevel }
    ::= { optIfOTNPMCurrentDayTable 1 }

```

```

OptIfOTNPMCurrentDayEntry ::=
    SEQUENCE {
        optIfOTNPMCurrentDayType           OptIfPerformanceDataType,
        optIfOTNPMCurrentDayLayer          OptIfOTNLayer,
        optIfOTNPMCurrentDayTCMLevel      Unsigned32,
        optIfOTNPMCurrentDaySuspectedFlag TruthValue,
        optIfOTNPMCurrentDayFcs           Unsigned32,

```

```

        optIfOTNPMCurrentDayESs           Unsigned32,
        optIfOTNPMCurrentDaySEs          Unsigned32,
        optIfOTNPMCurrentDayUAs          Unsigned32,
        optIfOTNPMCurrentDayBBEs        Unsigned32,
        optIfOTNPMCurrentDayESR          Unsigned32,
        optIfOTNPMCurrentDaySESR        Unsigned32,
        optIfOTNPMCurrentDayBBER        Unsigned32
    }

optIfOTNPMCurrentDayType          OBJECT-TYPE
    SYNTAX  OptIfPerformanceDataType
    MAX-ACCESS  read-only
    STATUS   current
    DESCRIPTION
        "
            This parameter indicates the parameters for the table are for
            the Near End or Far End performance data.
            1 - Near End
            2 - Far End
        "
    ::= { optIfOTNPMCurrentDayEntry 1}

optIfOTNPMCurrentDayLayer        OBJECT-TYPE
    SYNTAX  OptIfOTNLayer
    MAX-ACCESS  read-only
    STATUS   current
    DESCRIPTION
        "
            This parameter indicates the parameters for the table are for OTUk,
            ODUk, TCMn performance data.
            1 - OTUk
            2 - ODUk
            3 - TCM
            The ODUk/TCM Layer PM is not related to the black link PM
            management, but since this is a common PM model for the ODU/TCM layer,
            we may include it here."
    ::= { optIfOTNPMCurrentDayEntry 2}

optIfOTNPMCurrentDayTCMLevel     OBJECT-TYPE
    SYNTAX  Unsigned32
    MAX-ACCESS  read-only

```

```
STATUS current
DESCRIPTION
"
    This parameter indicates the TCM level (1-6)
    if the PM is of the type TCM. This will be 0 for OTUK/ODUK.
"
::= { optIf0TNPMCurrentDayEntry 3}
```

```
optIf0TNPMCurrentDaySuspectedFlag OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
    If true, the data in this entry may be unreliable.
"
::= { optIf0TNPMCurrentDayEntry 4}
```

```
optIf0TNPMCurrentDayFcs OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
    Number of Failures occurred in an observation period.
"
::= { optIf0TNPMCurrentDayEntry 5}
```

```
optIf0TNPMCurrentDayESs OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
" The number of seconds which have an error.
    It is a one-second period which has one or more errored blocks
    or during which a defect(e.g., Loss of Signal (LOS)) is detected.
"
::= { optIf0TNPMCurrentDayEntry 6}
```

```
optIf0TNPMCurrentDaySESSs OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
" The number of seconds which have a severe error.
```

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A severely errored second, is a one-second period in which the errored block ratio exceeds the threshold or during which a defect (e.g. Loss of Signal (LOS)) is detected.

"

::= { optIf0TNPMCurrentDayEntry 7}

optIf0TNPMCurrentDayUASS OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

" It is the number of unavailable seconds in the current day.

A period of unavailable time begins at the onset of ten consecutive SES events. These ten seconds are considered to be part of unavailable time. A new period of available time begins at the onset of ten consecutive non-SES events. These ten seconds are considered to be part of available time.

"

::= { optIf0TNPMCurrentDayEntry 8}

optIf0TNPMCurrentDayBBEs OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

An errored block not occurring as part of an SES.

"

::= { optIf0TNPMCurrentDayEntry 9}

optIf0TNPMCurrentDayESR OBJECT-TYPE

SYNTAX Unsigned32

UNITS ".001"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

The ratio of ES in available time to total seconds in available time during a fixed measurement interval.

"

::= { optIf0TNPMCurrentDayEntry 10}

optIf0TNPMCurrentDaySESR OBJECT-TYPE

SYNTAX Unsigned32  
UNITS ".001"  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION

"  
The ratio of SES in available time to total seconds in available  
time during a fixed measurement interval.  
"

::= { optIf0TNPMCurrentDayEntry 11}

optIf0TNPMCurrentDayBBER OBJECT-TYPE

SYNTAX Unsigned32  
UNITS ".001"  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION

"  
The ratio of BBE in available time to total seconds in available  
time during a fixed measurement interval.  
"

::= { optIf0TNPMCurrentDayEntry 12}

--

-- PM Prev Day Entry

--

optIf0TNMPMPrevDayTable OBJECT-TYPE

SYNTAX SEQUENCE OF OptIf0TNMPMPrevDayEntry  
MAX-ACCESS not-accessible  
STATUS current  
DESCRIPTION

"A Performance monitoring Previous Day Table.  
"

::= { optIf0TNPMGroup 6 }

optIf0TNMPMPrevDayEntry OBJECT-TYPE

SYNTAX OptIf0TNMPMPrevDayEntry  
MAX-ACCESS not-accessible  
STATUS current  
DESCRIPTION

"A conceptual entry in the Near end or Far End performance

monitoring previous day table for the type  
'optIfOTNPMPPrevDayLayer' layer.

```
"  
INDEX { ifIndex, optIfOTNPMPPrevDayType      ,  
        optIfOTNPMPPrevDayLayer, optIfOTNPMPPrevDayTCMLevel }  
 ::= { optIfOTNPMPPrevDayTable 1 }
```

```
OptIfOTNPMPPrevDayEntry ::=  
  SEQUENCE {  
    optIfOTNPMPPrevDayType      OptIfPerformanceDataType,  
    optIfOTNPMPPrevDayLayer     OptIfOTNLayer,  
    optIfOTNPMPPrevDayTCMLevel  Unsigned32,
```

```
    optIfOTNPMPPrevDaySuspectedFlag      TruthValue,  
    optIfOTNPMPPrevDayFcs                Unsigned32,  
    optIfOTNPMPPrevDayESs                Unsigned32,  
    optIfOTNPMPPrevDaySESS               Unsigned32,  
    optIfOTNPMPPrevDayUASs              Unsigned32,  
    optIfOTNPMPPrevDayBBEs              Unsigned32,  
    optIfOTNPMPPrevDayESR               Unsigned32,  
    optIfOTNPMPPrevDaySESR              Unsigned32,  
    optIfOTNPMPPrevDayBBER              Unsigned32  
  }
```

optIfOTNPMPPrevDayType OBJECT-TYPE

SYNTAX OptIfPerformanceDataType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

This parameter indicates the parameters for the table are for the  
Near End or Far End performance data.

1 - Near End

2 - Far End

"

::= { optIfOTNPMPPrevDayEntry 1 }

optIfOTNPMPPrevDayLayer OBJECT-TYPE

SYNTAX OptIfOTNLayer

MAX-ACCESS read-only

STATUS current

DESCRIPTION

```
"
This parameter indicates the parameters for the table are for OTUk,
ODUk, TCMn performance data.
1 - OTUk
2 - ODUk
3 - TCM
The ODUk/TCM Layer PM is not related to the black link PM
management, but since this is a common PM model for the ODU/TCM
layer, we may include it here."
 ::= { optIfOTNPMPPrevDayEntry 2}
```

```
optIfOTNPMPPrevDayTCMLevel OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
This parameter indicates the TCM level (1-6)
if the PM is of the type TCM.
```

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```
"
 ::= { optIfOTNPMPPrevDayEntry 3}
```

```
optIfOTNPMPPrevDaySuspectedFlag OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
If true, the data in this entry may be unreliable.
"
 ::= { optIfOTNPMPPrevDayEntry 4}
```

```
optIfOTNPMPPrevDayFcs OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
Number of pre FEC failures occurred in an observation period.
"
```

```
::= { optIf0TNPMPPrevDayEntry 5}
```

```
optIf0TNPMPPrevDayESs OBJECT-TYPE
```

```
SYNTAX Unsigned32
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
"
```

```
    The number of seconds which have an error.
```

```
    It is a one-second period which has one or more errored block  
    or during which a defect (e.g. Loss of Signal (LOS)) is detected.
```

```
"
```

```
::= { optIf0TNPMPPrevDayEntry 6}
```

```
optIf0TNPMPPrevDaySESSs OBJECT-TYPE
```

```
SYNTAX Unsigned32
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
" The number of seconds which have a severe error.
```

```
    A severely errored second, is a one-second period in which the  
    errored block ratio exceeds the threshold or during which a defect  
    (e.g. Loss of Signal (LOS)) is detected.
```

```
"
```

```
::= { optIf0TNPMPPrevDayEntry 7}
```

```
optIf0TNPMPPrevDayUASs OBJECT-TYPE
```

```
SYNTAX Unsigned32
```

```
MAX-ACCESS read-only
```

```
STATUS current
```

```
DESCRIPTION
```

```
" It is the number of unavailable seconds in the previous day.
```

```
    A period of unavailable time begins at the onset of ten  
    consecutive SES events. These ten seconds are considered to be  
    part of unavailable time. A new period of available time begins  
    at the onset of ten consecutive non-SES events. These ten seconds  
    are considered to be part of available time.
```

```
"
```

```
::= { optIf0TNPMPPrevDayEntry 8}
```

```
optIf0TNPMPPrevDayBBEs OBJECT-TYPE
```



SYNTAX Unsigned32  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"  
An errored block not occurring as part of an SES.  
"  
 ::= { optIf0TNPMPPrevDayEntry 9}

optIf0TNPMPPrevDayESR OBJECT-TYPE  
SYNTAX Unsigned32  
UNITS ".001"  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"  
The ratio of ES in available time to total seconds in available  
time during a fixed measurement interval.  
"  
 ::= { optIf0TNPMPPrevDayEntry 10}

optIf0TNPMPPrevDaySESR OBJECT-TYPE  
SYNTAX Unsigned32  
UNITS ".001"  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"  
The ratio of SES in available time to total seconds in available  
time during a fixed measurement interval.  
"  
 ::= { optIf0TNPMPPrevDayEntry 11}

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optIf0TNPMPPrevDayBBER OBJECT-TYPE  
SYNTAX Unsigned32  
UNITS ".001"  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"  
The ratio of BBE in available time to total seconds in available

```

        time during a fixed measurement interval.
    "
 ::= { optIfOTNPMMPPrevDayEntry 12}

--
-- OTN FEC PM Config Table
--
optIfOTNPMFECConfigTable OBJECT-TYPE
    SYNTAX SEQUENCE OF OptIfOTNPMFECConfigEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "A table of performance monitoring FEC configuration. "
    ::= { optIfOTNPMGroup 7 }

optIfOTNPMFECConfigEntry OBJECT-TYPE
    SYNTAX OptIfOTNPMFECConfigEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        " A conceptual entry in the performance monitoring FEC configuration
        layer."
    INDEX { ifIndex, optIfOTNPMFECConfigType }
    ::= { optIfOTNPMFECConfigTable 1 }

OptIfOTNPMFECConfigEntry ::=
    SEQUENCE {
        optIfOTNPMFECConfigType
                                OptIfPerformanceDataType,
        optIfOTNPMFECValidIntervals
                                Unsigned32,
        optIfOTNPM15MinFECUncorrectedWordsThreshold
                                Unsigned32,
        optIfOTNPM15MinPreFECBERThresholdMantissa
                                Unsigned32,
        optIfOTNPM15MinPreFECBERThresholdExponent
                                Unsigned32
    }

optIfOTNPMFECConfigType OBJECT-TYPE

```

```
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
    This parameter indicates the parameters for the table are for the
    Near End or Far End performance data.
    1 - Near End
    2 - Far End
"
 ::= { optIf0TNPMFECConfigEntry 1}
```

```
optIf0TNPMFECValidIntervals OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
    The number of contiguous 15 minute intervals for which valid FEC
    PM data is available for the particular interface.
"
 ::= {optIf0TNPMFECConfigEntry 2}
```

```
optIf0TNPM15MinFECUncorrectedWordsThreshold OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
    The number of Uncorrected words encountered by the interface within
    any given 15 minutes performance data collection period, which causes
    the SNMP agent to send optIf15MinThreshFECUncorrectedWordsTCA. One
    notification will be sent per interval per interface if the threshold
    is exceeded.. A value of `0' will disable the notification.
"
 ::= {optIf0TNPMFECConfigEntry 3}
```

```
optIf0TNPM15MinPreFECBERThresholdMantissa OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
    The Pre FEC BER (mantissa) by the interface within any
    given 15 minutes performance data collection period, which causes the
    SNMP agent to send optIf15MinThreshPreFECBERTCA. One notification
    will be sent per interval per interface. A value of `0' will disable
    the notification.
"
```

```
"
 ::= {optIf0TNPMFECConfigEntry 4}

optIf0TNPM15MinPreFECBERThresholdExponent OBJECT-TYPE
    SYNTAX Unsigned32
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "
        The Pre FEC BER (exponent) by the interface within any
        given 15 minutes performance data collection period, which causes the
        SNMP agent to send optIf15MinThreshPreFECBERTCA. One notification
        will be sent per interval per interface. A value of `0' will disable
        the notification.
        "
    ::= {optIf0TNPMFECConfigEntry 5}

--
-- FEC PM Table
--
optIf0TNPMFECCurrentTable OBJECT-TYPE
    SYNTAX SEQUENCE OF OptIf0TNPMFECCurrentEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "A Performance monitoring FEC Current Table.
        "
    ::= { optIf0TNPMGroup 8 }

optIf0TNPMFECCurrentEntry OBJECT-TYPE
    SYNTAX OptIf0TNPMFECCurrentEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        " A conceptual entry in the Near end or Far End performance
        monitoring FEC current table.
        "
    INDEX { ifIndex, optIf0TNPMFECCurrentType}
    ::= { optIf0TNPMFECCurrentTable 1 }

OptIf0TNPMFECCurrentEntry ::=
    SEQUENCE {
        optIf0TNPMFECCurrentType          OptIfPerformanceDataType,
        optIf0TNPMFECCurrentSuspectedFlag TruthValue,
        optIf0TNPMCurrentFECCorrectedErr  Unsigned32,
```

optIfOTNPMCurrentFECUncorrectedWords Unsigned32,  
optIfOTNPMCurrentFECBERMantissa Unsigned32,

optIfOTNPMCurrentFECBERExponent Unsigned32  
}

optIfOTNPMFECCurrentType OBJECT-TYPE

SYNTAX OptIfPerformanceDataType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

This parameter indicates the parameters for the table are for the  
Near End or Far End performance data.

1 - Near End

2 - Far End

"

::= { optIfOTNPMFECCurrentEntry 1}

optIfOTNPMFECCurrentSuspectedFlag OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

If true, the data in this entry may be unreliable.

"

::= { optIfOTNPMFECCurrentEntry 2}

optIfOTNPMCurrentFECCorrectedErr OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

The number of bits corrected by the FEC are counted in the  
interval.

"

::= { optIfOTNPMFECCurrentEntry 3}

optIfOTNPMCurrentFECUncorrectedWords OBJECT-TYPE

```
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
    The number of un-corrected words by the FEC are counted over the
    interval.
"
 ::= { optIfOTNPMFECCurrentEntry 4}
```

```
optIfOTNPMCurrentFECBERMantissa OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
    The number of Errored bits at receiving side before the FEC
    function counted over one second .. mantisa.
"
 ::= { optIfOTNPMFECCurrentEntry 5}
```

```
optIfOTNPMCurrentFECBERExponent OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
    The number of Errored bits at receiving side before the FEC
    function counted over one second .. exponent (eg -1).
"
 ::= { optIfOTNPMFECCurrentEntry 6}
```

--

-- FEC PM Interval Table

--

```
optIfOTNPMFECIntervalTable OBJECT-TYPE
SYNTAX SEQUENCE OF OptIfOTNPMFECIntervalEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
    "A Performance monitoring FEC Interval Table.
"
```

```
::= { optIfOTNPMGroup 9 }
```

```
optIfOTNPMFECIntervalEntry OBJECT-TYPE
```

```
SYNTAX      OptIfOTNPMFECIntervalEntry
```

```
MAX-ACCESS  not-accessible
```

```
STATUS      current
```

```
DESCRIPTION
```

```
"A conceptual entry in the Near end or Far End performance  
monitoring FEC interval table.
```

```
"
```

```
INDEX { ifIndex, optIfOTNPMIntervalType, optIfOTNPMFECIntervalNumber }
```

```
::= { optIfOTNPMFECIntervalTable 1 }
```

```
OptIfOTNPMFECIntervalEntry ::=
```

```
SEQUENCE {
```

```
    optIfOTNPMFECIntervalType
```

```
    OptIfPerformanceDataType,
```

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```
    optIfOTNPMFECIntervalNumber      Unsigned32,  
    optIfOTNPMFECIntervalSuspectedFlag TruthValue,  
    optIfOTNPMIntervalFECCorrectedErr Unsigned32,  
    optIfOTNPMIntervalFECUncorrectedWords Unsigned32,  
    optIfOTNPMIntervalMinFECBERMantissa Unsigned32,  
    optIfOTNPMIntervalMinFECBERExponent Unsigned32,  
    optIfOTNPMIntervalMaxFECBERMantissa Unsigned32,  
    optIfOTNPMIntervalMaxFECBERExponent Unsigned32,  
    optIfOTNPMIntervalAvgFECBERMantissa Unsigned32,  
    optIfOTNPMIntervalAvgFECBERExponent Unsigned32
```

```
}
```

```
optIfOTNPMFECIntervalType OBJECT-TYPE
```

```
SYNTAX      OptIfPerformanceDataType
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
"
```

```
This parameter indicates the parameters for the table are for the  
Near End or Far End performance data.
```

```
1 - Near End
```

```
2 - Far End
```

```
"
```

```
::= { optIfOTNPMFECIntervalEntry 1 }
```

optIf0TNPMECIntervalNumber OBJECT-TYPE  
SYNTAX Unsigned32  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"  
A number between 1 and 96, where 1 is the most  
recently completed 15 minute interval and 96 is  
the 15 minutes interval completed 23 hours and 45  
minutes prior to interval 1.  
"  
 ::= { optIf0TNPMECIntervalEntry 2}

optIf0TNPMECIntervalSuspectedFlag OBJECT-TYPE  
SYNTAX TruthValue  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"  
If true, the data in this entry may be unreliable.  
"  
 ::= { optIf0TNPMECIntervalEntry 3}

optIf0TNPMECIntervalFECCorrectedErr OBJECT-TYPE  
SYNTAX Unsigned32  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"  
The number of bits corrected by the FEC are counted in the  
interval.  
"  
 ::= { optIf0TNPMECIntervalEntry 4}

optIf0TNPMECIntervalFECUncorrectedWords OBJECT-TYPE  
SYNTAX Unsigned32  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"  
The number of words un-corrected words by the FEC are counted over



the interval.

"

::= { optIf0TNPMFECIntervalEntry 5}

optIf0TNPMIntervalMinFECBERMantissa OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

The minimum bit error rate at receiving side before the FEC function counted over one second .. mantissa. This is the minimum Pre FEC BER in the current 24hour period.

"

::= { optIf0TNPMFECIntervalEntry 6}

optIf0TNPMIntervalMinFECBERExponent OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

The minimum bit error rate at receiving side before the FEC function counted over one second .. exponent. This is the minimum Pre FEC BER in the current 24hour period.

"

::= { optIf0TNPMFECIntervalEntry 7}

optIf0TNPMIntervalMaxFECBERMantissa OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

The maximum bit error rate at receiving side before the FEC function counted over one second .. mantissa. This is the maximum Pre FEC BER in the current 24hour period.

"

::= { optIf0TNPMFECIntervalEntry 8}

optIf0TNPMIntervalMaxFECBERExponent OBJECT-TYPE

```
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
    The maximum bit error rate at receiving side before the FEC
    function counted over one second .. exponent. This is the maximum Pre
    FEC BER in the current 24hour period.
"
 ::= { optIf0TNPMFECIntervalEntry 9}
```

```
optIf0TNPMIntervalAvgFECBERMantissa OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
    The average bit error rate at receiving side before the FEC
    function counted over one second .. mantissa. This is the average Pre
    FEC BER in the current 24hour period.
"
 ::= { optIf0TNPMFECIntervalEntry 10}
```

```
optIf0TNPMIntervalAvgFECBERExponent OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
    The average bit error rate at receiving side before the FEC
    function counted over one second .. exponent. This is the average Pre
    FEC BER in the current 24hour period.
"
 ::= { optIf0TNPMFECIntervalEntry 11}
```

```
--
-- FEC PM Current Day day Table
```

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```
--
optIf0TNPMFECCurrentDayTable OBJECT-TYPE
SYNTAX SEQUENCE OF OptIf0TNPMFECCurrentDayEntry
MAX-ACCESS not-accessible
```

```

STATUS current
DESCRIPTION
  "A Performance monitoring FEC current day table.
  "
 ::= { optIfOTNPMGroup 10 }

```

```

optIfOTNPMFECCurrentDayEntry OBJECT-TYPE
SYNTAX      OptIfOTNPMFECCurrentDayEntry
MAX-ACCESS not-accessible
STATUS      current
DESCRIPTION
  "A conceptual entry in the Near end or Far End performance
  monitoring FEC current day table.
  "
INDEX { ifIndex, optIfOTNPMFECCurrentDayType }
 ::= { optIfOTNPMFECCurrentDayTable 1 }

```

```

OptIfOTNPMFECCurrentDayEntry ::=
SEQUENCE {
  optIfOTNPMFECCurrentDayType           OptIfPerformanceDataType,
  optIfOTNPMFECCurrentDaySuspectedFlag TruthValue,
  optIfOTNPMCurrentDayFECCorrectedErr   Unsigned32,
  optIfOTNPMCurrentDayFECUncorrectedWords Unsigned32,
  optIfOTNPMCurrentDayMinFECBERMantissa Unsigned32,
  optIfOTNPMCurrentDayMinFECBERExponent Unsigned32,
  optIfOTNPMCurrentDayMaxFECBERMantissa Unsigned32,
  optIfOTNPMCurrentDayMaxFECBERExponent Unsigned32,
  optIfOTNPMCurrentDayAvgFECBERMantissa Unsigned32,
  optIfOTNPMCurrentDayAvgFECBERExponent Unsigned32
}

```

```

optIfOTNPMFECCurrentDayType OBJECT-TYPE
SYNTAX OptIfPerformanceDataType
MAX-ACCESS read-only
STATUS current
DESCRIPTION
  "
  This parameter indicates the parameters for the table are for the
  Near End or Far End performance data.
  1 - Near End
  2 - Far End
  "
 ::= { optIfOTNPMFECCurrentDayEntry 1}

```

```
optIf0TNPMFECCurrentDaySuspectedFlag    OBJECT-TYPE
    SYNTAX  TruthValue
    MAX-ACCESS  read-only
    STATUS  current
    DESCRIPTION
        "
            If true, the data in this entry may be unreliable.
        "
    ::= { optIf0TNPMFECCurrentDayEntry  2}

optIf0TNPMCurrentDayFECCorrectedErr    OBJECT-TYPE
    SYNTAX  Unsigned32
    MAX-ACCESS  read-only
    STATUS  current
    DESCRIPTION
        "
            The number of bits corrected by the FEC are counted in the
            interval.
        "
    ::= { optIf0TNPMFECCurrentDayEntry  3}

optIf0TNPMCurrentDayFECUncorrectedWords    OBJECT-TYPE
    SYNTAX  Unsigned32
    MAX-ACCESS  read-only
    STATUS  current
    DESCRIPTION
        "
            The number of words un-corrected by the FEC are counted over the
            Day.
        "
    ::= { optIf0TNPMFECCurrentDayEntry  4}

optIf0TNPMCurrentDayMinFECBERMantissa    OBJECT-TYPE
    SYNTAX  Unsigned32
    MAX-ACCESS  read-only
    STATUS  current
    DESCRIPTION
        "
            The minimum bit error rate at receiving side before the FEC
            function counted over one second .. mantissa. This is the minimum
            PreFEC BER in the current 24hour period.
        "
    ::= { optIf0TNPMFECCurrentDayEntry  5}

optIf0TNPMCurrentDayMinFECBERExponent    OBJECT-TYPE
    SYNTAX  Unsigned32
    MAX-ACCESS  read-only
```

STATUS current

---

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DESCRIPTION

"

The minimum bit error rate at receiving side before the FEC function counted over one second .. exponent. This is the minimum PreFEC BER in the current 24hour period.

"

::= { optIf0TNPMFECCurrentDayEntry 6}

optIf0TNPMCurrentDayMaxFECBERMantissa OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

The maximum bit error rate at receiving side before the FEC function counted over one second .. mantissa. This is the maximum PreFEC BER in the current 24hour period.

"

::= { optIf0TNPMFECCurrentDayEntry 7}

optIf0TNPMCurrentDayMaxFECBERExponent OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

The maximum bit error rate at receiving side before the FEC function counted over one second .. exponent. This is the maximum PreFEC BER in the current 24hour period..

"

::= { optIf0TNPMFECCurrentDayEntry 8}

optIf0TNPMCurrentDayAvgFECBERMantissa OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

The average bit error rate at receiving side before the FEC function counted over one second .. mantissa. This is the average

PreFEC BER in the current 24hour period. .

"

::= { optIfOTNPMFECCurrentDayEntry 9 }

optIfOTNPMCurrentDayAvgFECBERExponent OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

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DESCRIPTION

"

The average bit error rate at receiving side before the FEC function counted over one second .. exponent. This is the average PreFEC BER in the current 24hour period.

"

::= { optIfOTNPMFECCurrentDayEntry 10 }

--

-- FEC PM Prev day Table

--

optIfOTNPMFECPrevDayTable OBJECT-TYPE

SYNTAX SEQUENCE OF OptIfOTNPMFECPrevDayEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A Performance monitoring FEC previous day table.

"

::= { optIfOTNPMGroup 11 }

optIfOTNPMFECPrevDayEntry OBJECT-TYPE

SYNTAX OptIfOTNPMFECPrevDayEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A conceptual entry in the Near end or Far End performance monitoring FEC previous day table

"

INDEX { ifIndex, optIfOTNPMFECPrevDayType }

::= { optIfOTNPMFECPrevDayTable 1 }

OptIfOTNPMFECPrevDayEntry ::=

SEQUENCE {

optIfOTNPMFECPrevDayType

OptIfPerformanceDataType,

```

    optIfOTNPMFECPrevDaySuspectedFlag      TruthValue,
    optIfOTNMPPrevDayFECCorrectedErr      Unsigned32,
    optIfOTNMPPrevDayFECUncorrectedWords  Unsigned32,
    optIfOTNMPPrevDayMinFECBERMantissa    Unsigned32,
    optIfOTNMPPrevDayMinFECBERExponent    Unsigned32,
    optIfOTNMPPrevDayMaxFECBERMantissa    Unsigned32,
    optIfOTNMPPrevDayMaxFECBERExponent    Unsigned32,
    optIfOTNMPPrevDayAvgFECBERMantissa    Unsigned32,
    optIfOTNMPPrevDayAvgFECBERExponent    Unsigned32
}

```

```

optIfOTNPMFECPrevDayType      OBJECT-TYPE
    SYNTAX  OptIfPerformanceDataType
    MAX-ACCESS  read-only
    STATUS   current

```

DESCRIPTION

```

"
    This parameter indicates the parameters for the table are for the
    Near End or Far End performance data.
    1 - Near End
    2 - Far End
"
 ::= { optIfOTNPMFECPrevDayEntry 1}

```

```

optIfOTNPMFECPrevDaySuspectedFlag      OBJECT-TYPE
    SYNTAX  TruthValue
    MAX-ACCESS  read-only
    STATUS   current

```

DESCRIPTION

```

"
    If true, the data in this entry may be unreliable.
"
 ::= { optIfOTNPMFECPrevDayEntry 2}

```

```

optIfOTNMPPrevDayFECCorrectedErr      OBJECT-TYPE
    SYNTAX  Unsigned32
    MAX-ACCESS  read-only
    STATUS   current

```

DESCRIPTION

```

"

```

The number of bits corrected by the FEC are counted in the previous day.

"

::= { optIf0TNPMECPrevDayEntry 3}

optIf0TNPMPPrevDayFECUncorrectedWords OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

The number of un-corrected words by the FEC are counted over the previous Day.

"

::= { optIf0TNPMECPrevDayEntry 4}

optIf0TNPMPPrevDayMinFECBERMantissa OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

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The maximum bit error rate at receiving side before the FEC function counted over one second .. mantissa. This is the maximum Pre FEC BER in the previous 24hour period.

"

::= { optIf0TNPMECPrevDayEntry 5}

optIf0TNPMPPrevDayMinFECBERExponent OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"

The minimum bit error rate at receiving side before the FEC function counted over one second .. exponent. This is the maximum Pre FEC BER in the previous 24hour period

"

::= { optIf0TNPMECPrevDayEntry 6}

optIf0TNPMPPrevDayMaxFECBERMantissa OBJECT-TYPE



```
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
    The maximum bit error rate at receiving side before the FEC
    function counted over one second .. mantissa. This is the maximum Pre
    FEC BER in the previous 24hour period (mantissa).
"
 ::= { optIf0TNPMFECPrevDayEntry 7}
```

```
optIf0TNPMPrevDayMaxFECBERExponent OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
    The maximum bit error rate at receiving side before the FEC
    function counted over one second .. exponent (eg -3).
    This is the maximum Pre FEC BER in the previous 24hour period.
"
 ::= { optIf0TNPMFECPrevDayEntry 8}
```

```
optIf0TNPMPrevDayAvgFECBERMantissa OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
```

```
    The average bit error rate at receiving side before the FEC
    function counted over one second .. mantissa. This is the average Pre
    FEC BER during the previous 24hour period (mantissa).
"
```

```
 ::= { optIf0TNPMFECPrevDayEntry 9}
```

```
optIf0TNPMPrevDayAvgFECBERExponent OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"
```

The average bit error rate at receiving side before the FEC function counted over one second .. exponent (eg -3). This is the average Pre FEC BER during the previous 24hour period.  
"

```
::= { optIfOTNPMFECPrevDayEntry 10}
```

```
--
```

```
-- OTN Alarm Table
```

```
--
```

```
optIfOTNAlarmTable OBJECT-TYPE  
    SYNTAX      SEQUENCE OF OptIfOTNAlarmEntry  
    MAX-ACCESS  not-accessible  
    STATUS      current  
    DESCRIPTION  
        "A table of alarm entries."
```

```
::= { optIfOTNAlarm 1 }
```

```
optIfOTNAlarmEntry OBJECT-TYPE  
    SYNTAX      OptIfOTNAlarmEntry  
    MAX-ACCESS  not-accessible  
    STATUS      current  
    DESCRIPTION  
        "A conceptual entry in the alarm table."  
    INDEX { ifIndex, optIfOTNAlarmIndex }  
    ::= { optIfOTNAlarmTable 1 }
```

```
OptIfOTNAlarmEntry ::= SEQUENCE {  
    optIfOTNAlarmIndex      Unsigned32,  
    optIfOTNAlarmLayer      OptIfOTNLayer,  
    optIfOTNAlarmTCMLevel   Unsigned32,  
    optIfOTNAlarmType       Unsigned32,  
    optIfOTNAlarmDate       DateAndTime,  
    optIfOTNAlarmStatus     TruthValue  
}
```

```
optIfOTNAlarmIndex OBJECT-TYPE  
    SYNTAX      Unsigned32  
    MAX-ACCESS  read-only  
    STATUS      current  
    DESCRIPTION
```

"An index that uniquely identifies an entry in the alarm table."  
 ::= { optIfOTNAlarmEntry 1 }

optIfOTNAlarmLayer OBJECT-TYPE  
SYNTAX OptIfOTNLayer  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"This specifies which layer this alarm is for."  
 ::= { optIfOTNAlarmEntry 2 }

optIfOTNAlarmTCMLevel OBJECT-TYPE  
SYNTAX Unsigned32  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"TCM level 1-6 of the alarm. It will be 0 if alarm layer is OCh, OTUk or ODUk."  
 ::= { optIfOTNAlarmEntry 3 }

optIfOTNAlarmType OBJECT-TYPE  
SYNTAX Unsigned32  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"This specifies the type of alarm of the layer 'optIfOTNAlarmLayer' ."  
 ::= { optIfOTNAlarmEntry 4 }

optIfOTNAlarmDate OBJECT-TYPE  
SYNTAX DateAndTime  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"This specifies the date and time when this alarm occurred."  
 ::= { optIfOTNAlarmEntry 5 }

optIfOTNAlarmStatus OBJECT-TYPE  
SYNTAX TruthValue  
MAX-ACCESS read-only  
STATUS current

```

        DESCRIPTION
        "This specifies the state of the alarm -- cleared(0) or set(1) ."
        ::= { optIfOTNAlarmEntry 6 }

--
-- OTN Notifications
--

optIfOTNAlarmSet NOTIFICATION-TYPE
    OBJECTS { optIfOTNAlarmLayer,
              optIfOTNAlarmTCMLLevel,
              optIfOTNAlarmType,
              optIfOTNAlarmDate }
    STATUS current
    DESCRIPTION
        "Notification of a recently set OTN alarm of layer
        and Type."
    ::= { optIfOTNNotifications 1 }

optIfOTNAlarmClear NOTIFICATION-TYPE
    OBJECTS { optIfOTNAlarmLayer,
              optIfOTNAlarmTCMLLevel,
              optIfOTNAlarmType,
              optIfOTNAlarmDate }
    STATUS current
    DESCRIPTION
        "Notification of a recently clear OTN alarm of layer
        and Type."
    ::= { optIfOTNNotifications 2 }

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:

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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 placeholders (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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## 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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