A SNMP MIB to manage black-link optical interface parameters of DWDM applications
draft-galimbe-kunze-g-698-2-snmp-mib-02

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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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-mgnt-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.

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

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 retrieved with a GET, when (S) it can be provisioned by a SET, (G,S) can be either GET and SET.

To support the management of these parameters, the SNMP MIB in RFC 3591 [RFC3591] is extended with a new MIB module defined in section 6 of this document. This new MIB module includes the definition of new configuration table of the OCh Level 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 propriatory 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 gives 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 reports 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 connectors (G)
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 specify 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:
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 Seconds (es):
It is a one-second period in which one or more bits are in error or during which Loss of Signal (LOS) or Alarm Indication Signal (AIS) is detected (G)

Severely Errored Seconds (ses):
It is a one-second period which has a bit-error ratio = 1x10Eminus3 or during which Loss of Signal (LOS) or Alarm Indication Signal (AIS) is detected (G)

Unavailable Seconds (uas):
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 Words Error:
The number of Words 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.
Each opticalChannel IfEntry may be mapped to m opticalPhysicalSection IfEntries, where \( m \) is greater than or equal to 1. Conversely, each opticalTransPhysicalSection 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.

<table>
<thead>
<tr>
<th>ifTable Object</th>
<th>Use for OTN OPS Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>ifIndex</td>
<td>The interface index.</td>
</tr>
<tr>
<td>ifDescr</td>
<td>Optical Transport Network (OTN) Optical Physical Section (OPS)</td>
</tr>
<tr>
<td>ifType</td>
<td>opticalPhysicalSection (xxx)</td>
</tr>
</tbody>
</table>

<<<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 ifTable

Use of ifStackTable

EDITOR NOTE: more to be provided (similar to RFC 3591 Section 2.5)
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

<table>
<thead>
<tr>
<th>HigherLayer</th>
<th>LowerLayer</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>j</td>
</tr>
<tr>
<td>0</td>
<td>k</td>
</tr>
<tr>
<td>j</td>
<td>i</td>
</tr>
<tr>
<td>k</td>
<td>i</td>
</tr>
<tr>
<td>i</td>
<td>0</td>
</tr>
</tbody>
</table>

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

OptIfChannelSpacing ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION
"Channel spacing
  1 - 6.25GHz
  2 - 12.5GHz
  3 - 25GHz
  4 - 50GHz
  5 - 100 Ghz
"
SYNTAX  INTEGER {
    spacing6-25Ghz(1),
    spacing12-5Ghz(2),
    spacing25Ghz(3),
    spacing50Ghz(4),
    spacing100Ghz(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 {
    rate2-5G(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)
}
OptIfOTNType ::= 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 layers, we include it 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 {
  OTUKLayer(1),
  ODUkLayer(2),
  TCMSubLayer(3)
}

-- Alarm for the OCh and OTUk sublayer

OptIfOTNOCChAlarms ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION

"This is the possible alarms from the OCh and OTUk layer."

SYNTAX INTEGER {
  optIfOtnLosAlarm(1), -- OTN Loss of signal alarm
  optIfOtnLofAlarm(2), -- OTN Loss of frame alarm
  optIfOtnLomAlarm(3), -- OTN Loss of multi frame alarm
  optIfOtnOtuSsfAlarm(4), -- OTN SSF alarm
  optIfOtnOtuBdiAlarm(5), -- OTN OTU BDI alarm
  optIfOtnOtuTtimAlarm(6), -- OTN OTU Trail termination mismatch alarm
  optIfOtnOtuIaeAlarm(7), -- OTN OTU IAE alarm
  optIfOtnOtuDegAlarm(8), -- OTN OTU signal degrade alarm
  optIfOptIfOtnOtuFecExcessiveErrsAlarm(9), -- OTN OTU Fec Excessive
Errors alarm

optIf15MinThreshBBETCA(10), -- OTN OTU BBE Threshold alarm
optIf15MinThreshESTCA(11), -- OTN OTU ES Threshold alarm
optIf15MinThreshSESTCA(12), -- OTN OTU SES Threshold alarm
optIf15MinThreshUASTCA(13), -- OTN OTU UAS Threshold alarm
optIf15MinThreshFcsTCA(14), -- OTN OTU Fcs Threshold alarm
optIf15MinThreshFECUnCorrectedWordsTCA(15), -- OTN FEC uncorrected words -- TCA
optIf15MinThreshPreFECBERTCA(16) -- OTN Pre FEC BER TCA

OptIfOTNODUkTcmAlarms ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION " This is the alarms from the ODUk and TCM layer."
SYNTAX INTEGER {
  optIfOTNOdukTcmOciAlarm(1), -- OTN ODU/TCM OCI alarm
  optIfOTNOdukTcmLckAlarm(2), -- OTN ODU/TCM LCK alarm
  optIfOTNOdukTcmBdiAlarm(3), -- OTN ODU/TCM BDI alarm
  optIfOTNOdukTcmTtimAlarm(4), -- OTN ODU/TCM TTIM alarm
  optIfOTNOdukTcmDegAlarm(5), -- OTN ODU/TCM Signal
degrade alarm,
optIfOTNOdukTcmSSfAlarm(6), -- OTN ODU/TCM SSF alarm,
optIfOTNOdukTcm15MinThreshBBETCA(7), -- OTN OTU BBE Threshold alarm
  optIfOTNOdukTcm15MinThreshESTCA(8), -- OTN OTU ES Threshold alarm
  optIfOTNOdukTcm15MinThreshSESTCA(9), -- OTN OTU SES Threshold alarm
  optIfOTNOdukTcm15MinThreshUASTCA(10), -- OTN OTU UAS Threshold alarm
  optIfOTNOdukTcm15MinThreshFcsTCA(11), -- OTN OTU Fcs Threshold alarm
}

-- Addition to the RFC 3591 objects
optIfOPSmConfigTable OBJECT IDENTIFIER ::= { optIfObjects 10 }
optIfOTNPMObjets OBJECT-TYPE ::= { optIfObjects 11 }
optIfOTNAlarm OBJECT IDENTIFIER ::= { optIfObjects 12 }
optIfOTNNotifications OBJECT IDENTIFIER ::= { optIfObjects 13 }
optIfOChConfigTable OBJECT IDENTIFIER ::= { optIfCh 1 } // Extended the optIfOChConfigTable
optIfOChSinkCurrentTable OBJECT IDENTIFIER ::= { optIfCh 1 } // Extended this table to add OSNR/CD/Q
optIfOChSrcConfigTable OBJECT IDENTIFIER ::= { optIfOCh 10 }
optIfOChSrcSinkConfigTable OBJECT IDENTIFIER ::= { optIfOCh 11 }
optIfOChSinkConfigTable OBJECT IDENTIFIER ::= { optIfOCh 12 }
optIfOTNPMConfigTable OBJECT IDENTIFIER ::= { optIfOTNP0bjects 1 }
optIfOTNPMCurrentTable OBJECT IDENTIFIER ::= { optIfOTNP0bjects 2 }
optIfOTNPMIntervalTable OBJECT IDENTIFIER ::= { optIfOTNP0bjects 3 }
optIfOTNPMCurrentDayTable OBJECT IDENTIFIER ::= { optIfOTNP0bjects 4 }
optIfOTNPMPrevDayTable OBJECT IDENTIFIER ::= { optIfOTNP0bjects 5 }
optIfOTNPMFECConfigTable OBJECT IDENTIFIER ::= { optIfOTNPMObjects 6 }
optIfOTNPMFECCurrentTable OBJECT IDENTIFIER ::= { optIfOTNPMObjects 7 }
optIfOTNPMFECIntervalTable OBJECT IDENTIFIER ::= { optIfOTNPMObjects 8 }
optIfOTNPMFECCurrentDayTable OBJECT IDENTIFIER ::= { optIfOTNPMObjects 9 }
optIfOTNPMFECPrevDayTable OBJECT IDENTIFIER ::= { optIfOTNPMObjects 10 }

-- OPS - Optical Phyical 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,
    optIfOPSmWavelengthsUsed           Unsigned32
}

optIfOPSmDirectionality OBJECT-TYPE
SYNTAX OptIfDirectionality
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Indicates the directionality of the entity."
::= { optIfOPSmConfigEntry 1 }

optIfOPSmFiberTypeRecommendation OBJECT-TYPE
SYNTAX OptIfFiberTypeRecommendation
MAX-ACCESS read-write
Internet-Draft  draft-galimbe-kunze-g-698-2-snmp-mib-02  March 2012

STATUS  current
DESCRIPTION
"Fiber type as per fibre types are chosen from those defined in
::= { 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
The categories are A, B, C, D and E."
::= { optIfOPSmConfigEntry  3 }

optIfOPSmWavelengthsUsed  OBJECT-TYPE
SYNTAX    Unsigned32
MAX-ACCESS read-write
STATUS    current
DESCRIPTION
"Number of wavelengths used currently."
::= { optIfOPSmConfigEntry  4 }

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

optIfOChConfigTable OBJECT-TYPE
SYNTAX    SEQUENCE OF OptIfOChConfigEntry
MAX-ACCESS not-accessible
STATUS    current
DESCRIPTION
"A table of Och General config parameters"
::= { optIfOCh 1 }

optIfOChConfigEntry OBJECT-TYPE
SYNTAX    OptIfOChConfigEntry
MAX-ACCESS not-accessible
STATUS    current
DESCRIPTION
" A conceptual row that contains OCh configuration information
of an interface. "
INDEX    { ifIndex }
::= { optIfOChConfigTable 1 }
OptIfOChConfigEntry ::= SEQUENCE {
    optIfOChMinimumChannelSpacing              OptIfChannelSpacing,
    optIfOChBitRateLineCoding                 OptIfBitRateLineCoding,
    optIfOChFEC                               Integer32,
    optIfOChSinkMaximumBERMantisa             Integer32,
    optIfOChSinkMaximumBERExponent            Integer32,
    optIfOChMinWavelength                     Integer32,
    optIfOChMaxWavelength                     Integer32,
    optIfOChVendorTransceiverClass            OCTET STRING,
    optIfOChOpticalInterfaceApplicationCode   OCTET STRING,
    optIfOChLaserAdminState                   Integer,
    optIfOChLaserOperationalState             TruthValue,
    optIfOChAdminState                        Integer,
    optIfOChOperationalState                  Integer
}

optIfOChMinimumChannelSpacing OBJECT-TYPE
SYNTAX OptIfChannelSpacing
UNITS "Gigahertz"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"A minimum nominal difference in frequency (GHz) between two adjacent channels."
 ::= { optIfOChConfigEntry 3 }

optIfOChBitRateLineCoding 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)
"
 ::= { optIfOChConfigEntry 4 }

optIfOChFEC OBJECT-TYPE
SYNTAX Integer32
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
11 - 40G FEC (for new applications under study)
12 - 40G EFEC (for new applications under study)
13 - 100G FEC (for new applications under study)
14 - 100G EFEC (for new applications under study)
99 - Vendor Specific

::= { optIfOChConfigEntry 5 }

optIfOChSinkMaximumBERMantisa  OBJECT-TYPE
SYNTAX  Integer32
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 ."

::= { optIfOChConfigEntry 6 }

optIfOChSinkMaximumBERExponent  OBJECT-TYPE
SYNTAX  Integer32
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 ."

::= { optIfOChConfigEntry 7 }

optIfOChMinWavelength  OBJECT-TYPE
SYNTAX  Integer32
UNITS "hertz"
MAX-ACCESS  read-only
STATUS  current
DESCRIPTION
" This parameter indicate minimum wavelength spectrum in a
definite wavelength Band (L, C and S)

::= { optIfOChConfigEntry 8}

optIfOChMaxWavelength OBJECT-TYPE
SYNTAX  Integer32
UNITS "hertz"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
" This parameter indicate maximum wavelength spectrum in a
definite wavelength Band (L, C and S)
"
 ::= { optIfOChConfigEntry 9}

optIfOChWavelength OBJECT-TYPE
SYNTAX  Integer32
UNITS "hertz"
MAX-ACCESS read-write
STATUS current
DESCRIPTION
" This parameter indicates the wavelength value.
"
 ::= { optIfOChConfigEntry 10}

optIfOChVendorTransceiverClass 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)
"
 ::= { optIfOChConfigEntry 11}

optIfOChOpticalInterfaceApplicationCode OBJECT-TYPE
SYNTAX  OCTET STRING
MAX-ACCESS  read-write
STATUS  current
DESCRIPTION
"   This parameter indicates the transceiver application code at Ss
   and Rs as defined in [ITU.G698.2] Chapter 5.3"
" ::= { optIfOChConfigEntry  12}

optIfOChLaserAdminState  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"
" ::= { optIfOChConfigEntry  13}

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

optIfOChAdminState  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.
"
::= { optIfOChConfigEntry 15}

optIfOChOperationalState 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
"
::= { optIfOChConfigEntry 16}

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

optIfOChSrcConfigTable OBJECT-TYPE
SYNTAX  SEQUENCE OF OptIfOChSrcConfigEntry
MAX-ACCESS  not-accessible
STATUS  current
DESCRIPTION
"A configuration table of OCh Src (Ss) parameters."
::= { optIfOCh 10 }

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

OptIfOChSrcConfigEntry ::= SEQUENCE {
optIfOChMinimumMeanChannelOutputPower  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."
::= { optIfOChSrcConfigEntry  1}

optIfOChMaximumMeanChannelOutputPower  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."
::= { optIfOChSrcConfigEntry  2}

optIfOChMinimumCentralFrequency  OBJECT-TYPE
SYNTAX  Integer32
UNITS   "0.01 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 19150"
::= { optIfOChSrcConfigEntry  3}

optIfOChMaximumCentralFrequency  OBJECT-TYPE
SYNTAX  Integer32
UNITS   "0.01 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 19150
"
::= { optIfOChSrcConfigEntry  4}

optIfOChMaximumSpectralExcursion OBJECT-TYPE
SYNTAX  Integer32
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.
"
::= { optIfOChSrcConfigEntry  5}

optIfOChMaximumTxDispersionOSNRPenalty 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
"
::= { optIfOChSrcConfigEntry  6}

-- Optical Path from Point Src (Ss) to Sink (Rs)
-- Alternatively this can be optIfOChSsRsTable

optIfOChSrcSinkConfigTable OBJECT-TYPE
SYNTAX  SEQUENCE OF OptIfOChSrcSinkConfigEntry
MAX-ACCESS  not-accessible
STATUS  current
A table of parameters for the optical path from Src to Sink (Ss to Rs).

DEFINITIONS

::= { optIfOCh 11 }

optIfOChSrcSinkConfigEntry OBJECT-TYPE
SYNTAX OptIfOChSrcSinkConfigEntry
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 }
 ::= { optIfOChSrcSinkConfigTable 1 }

OptIfOChSrcSinkConfigEntry ::= SEQUENCE {
    optIfOChSrcSinkMinimumChromaticDispersion              Integer32,
    optIfOChSrcSinkMaximumChromaticDispersion              Integer32,
    optIfOChSrcSinkMinimumOpticalReturnLoss               Integer32,
    optIfOChSrcSinkMaximumDiscreteReflectanceSrcToSink     Integer32,
    optIfOChSrcSinkMaximumDifferentialGroupDelay           Integer32,
    optIfOChSrcSinkMaximumPolarisationDependentLoss        Integer32,
    optIfOChSrcSinkMaximumInterChannelCrosstalk           Integer32,
    optIfOChSrcSinkMinimumInterferometricCrosstalk        Integer32,
    optIfOChSrcSinkOpticalPathOSNRPenalty                  Integer32
}

optIfOChSrcSinkMinimumChromaticDispersion 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."
 ::= { optIfOChSrcSinkConfigEntry 1 }

optIfOChSrcSinkMaximumChromaticDispersion 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."
::= { optIfOChSrcSinkConfigEntry 2 }

optIfOChSrcSinkMinimumSsOpticalReturnLoss OBJECT-TYPE
SYNTAX Integer32
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."
::= { optIfOChSrcSinkConfigEntry 3 }

optIfOChSrcSinkMaximumDiscreteReflectanceSrcToSink 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 presented at a point, to the optical power incident to that point. Control of reflections is discussed extensively in ITU-T Rec. G.957."
::= { optIfOChSrcSinkConfigEntry 4 }

optIfOChSrcSinkMaximumDifferentialGroupDelay 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."
::= { optIfOChSrcSinkConfigEntry 5 }

optIfOChSrcSinkMaximumPolarisationDependentLoss OBJECT-TYPE
SYNTAX Integer32
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.

::= { optIfOChSrcSinkConfigEntry 6}

optIfOChSrcSinkMaximumInterChannelCrosstalk 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 specify 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."
::= { optIfOChSrcSinkConfigEntry 7}

optIfOChSrcSinkInterferometricCrosstalk 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."
::= { optIfOChSrcSinkConfigEntry 8}

optIfOChSrcSinkOpticalPathOSNRPenalty 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."::= { optIfOChSrcSinkConfigEntry 9}

-- Parameters at Sink (Rs)
-- optIfOChSinkConfigTable
  optIfOChSinkConfigTable OBJECT-TYPE
  SYNTAX  SEQUENCE OF OptIfOChSinkConfigEntry
  MAX-ACCESS not-accessible
  STATUS  current
  DESCRIPTION
    "A table of OCh Sink (Rs) configuration parameters."::= { optIfOCh 12 }

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

OptIfOChSinkConfigEntry ::= SEQUENCE {
  optIfOChSinkMinimumMeanInputPower            Integer32,  
  optIfOChSinkMaximumMeanInputPower            Integer32,  
  optIfOChSinkMinimumOSNR                       Integer32,  
  optIfOChSinkOSNRTolerance                     Integer32
}

optIfOChSinkMinimumMeanInputPower 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)."
::= { optIfOChSinkConfigEntry 1}

optIfOChSinkMaximumMeanInputPower 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)."
::= { optIfOChSinkConfigEntry 2}

optIfOChSinkMinimumOSNR 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."
::= { optIfOChSinkConfigEntry 3}

optIfOChSinkMinimumOSNRTolerance 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)."
::= { optIfOChSinkConfigEntry 4}

-- The OptIfOChSinkCurrentEntry table has been enhanced to add the following optional parameters
-- For current status
-- OptIfOChSinkCurrentEntry

optIfOChSinkCurrentTable OBJECT-TYPE
SYNTAX SEQUENCE OF OptIfOChSinkCurrentEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"A table of OCh sink performance monitoring information for the current 15-minute interval."
::= { optIfOCh 2}
optIfOChSinkCurrentEntry OBJECT-TYPE
SYNTAX OptIfOChSinkCurrentEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "A conceptual row that contains OCh sink performance monitoring information for an interface for the current 15-minute interval."
INDEX { ifIndex }
 ::= { optIfOChSinkCurrentTable 1 }

OptIfOChSinkCurrentEntry ::= SEQUENCE {
  optIfOChSinkCurrentChromaticDispersion Integer32,
  optIfOChSinkCurrentOSNR Integer32,
  optIfOChSinkCurrentQ Integer32
}

optIfOChSinkCurrentChromaticDispersion OBJECT-TYPE
SYNTAX Integer32
UNITS "ps/nm"
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Residual Chromatic Dispersion measured at Rx Transceiver port."
 ::= { optIfOChSinkCurrentEntry 7}

optIfOChSinkCurrentOSNR 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."
 ::= { optIfOChSinkCurrentEntry 8}

optIfOChSinkCurrentQ OBJECT-TYPE
SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "'Q' factor estimated at Rx Transceiver port."
 ::= { optIfOChSinkCurrentEntry 9}

-- Performance Monitoring
-- OTN PM Config Table
optIfOTNPMConfigTable  OBJECT-TYPE
   SYNTAX  SEQUENCE OF OptIfOTNPMConfigEntry
   MAX-ACCESS not-accessible
   STATUS  current
   DESCRIPTION
      "A table of performance monitoring configuration for the type
       'optIfOTNPMConfigSublayer' layer."
   ::= { optIfOTNPMObjects 1 }

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

OptIfOTNPMConfigEntry ::= SEQUENCE {
   optIfOTNPMConfigType                   OptIfOTNType,
   optIfOTNPMConfigLayer                  OptIfOTNLayer,
   optIfOTNPMConfigTCMLevel               Unsigned32,
   optIfOTNPMESRInterval                  Integer32,
   optIfOTNPMESRInterval                 Integer32,
   optIfOTNPMTDNValidIntervals            Integer32,
   optIfOTNPMTDNThresh15MinFcs            Integer32,
   optIfOTNPMTDNThresh15MinESs            Integer32,
   optIfOTNPMTDNThresh15MinSESs           Integer32,
   optIfOTNPMTDNThresh15MinUASs           Integer32,
   optIfOTNPMTDNThresh15MinBBEs           Integer32,
}

optIfOTNPMConfigType  OBJECT-TYPE
   SYNTAX  OptIfOTNType
   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}

optIfOTNPMConfigSublayer 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 sublayer 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}

optIOTNPMESRInterval OBJECT-TYPE
SYNTAX   Integer32
UNITS "seconds"
MAX-ACCESS read-write
STATUS   current
DESCRIPTION "This parameter indicates the measurement interval for error seconds ratio."
::= {optIfOTNPMConfigEntry 4}

optIOTNPMSESRIInterval OBJECT-TYPE
SYNTAX   Integer32
UNITS "seconds"
MAX-ACCESS read-write
STATUS   current
DESCRIPTION
"This parameter indicates the measurement interval for severely error seconds ratio.
"
::= {optIfOTNPMConfigEntry  5}

optIfOTNPM15MinThreshFcs OBJECT-TYPE
SYNTAX    Integer32
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."
::= {optIfOTNPMConfigEntry  6}

optIfOTNPM15MinThreshES OBJECT-TYPE
SYNTAX    Integer32
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 sent per interval per interface. A value of '0' will disable the notification."
::= {optIfOTNPMConfigEntry  7}

optIfOTNPM15MinThreshSES OBJECT-TYPE
SYNTAX    Integer32
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. A value of '0' will disable the notification."
::= {optIfOTNPMConfigEntry  8}

optIfOTNPM15MinThreshUAS OBJECT-TYPE
SYNTAX   Integer32
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. A value of '0' will disable the
notification."

::= {optIfOTNPMConfigEntry  9}

optIfOTNPM15MinThreshBBE OBJECT-TYPE
SYNTAX   Integer32
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. A value of '0' will disable the
notification."

::= {optIfOTNPMConfigEntry  10}

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

optIfOTNPMCurrentTable OBJECT-TYPE
SYNTAX   SEQUENCE OF OptIfOTNPMCurrentEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION

"A table for the Performance monitoring Current Table."

::= {optIfOTNPMObjects 2}

optIfOTNPMCurrentEntry OBJECT-TYPE
SYNTAX OptIfOTNPMCurrentEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION

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

INDEX  { ifIndex, optIfOTNPMCurrentType, }
optIfOTNPMCurrentSublayer, optIfOTNPMCurrentTCMLevel ::= { optIfOTNPMCurrentTable 1 }

OptIfOTNPMCurrentEntry ::= SEQUENCE {
    optIfOTNPMCurrentType            OptIfOTNType,
    optIfOTNPMCurrentLayer           OptIfOTNLayer,
    optIfOTNPMCurrentTCMLevel        Unsigned32,
    optIfOTNPMCurrentSuspectedFlag   TruthValue,
    optIfOTNPMCurrentFcs             Integer32,
    optIfOTNPMCurrentESs             Integer32,
    optIfOTNPMCurrentSESs            Integer32,
    optIfOTNPMCurrentUASs            Integer32,
    optIfOTNPMCurrentBBEs            Integer32,
    optIfOTNPMCurrentESR             Integer32,
    optIfOTNPMCurrentSESR            Integer32,
    optIfOTNPMCurrentBBER            Integer32,
}

optIfOTNPMCurrentType OBJECT-TYPE
SYNTAX OptIfOTNType
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}

optIfOTNPMCurrentSublayer 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 sublayer 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."
::= { optIfOTNPMCurrentEntry 2}
optIfOTNPMCurrentTCMLevel 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.
"
::= { optIfOTNPMCurrentEntry 3}

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

optIfOTNPMCurrentFcs OBJECT-TYPE
SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Number of Failures occurred in an observation period.
"
::= { optIfOTNPMCurrentEntry 5}

optIfOTNPMCurrentESs OBJECT-TYPE
SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "This is the number of seconds in which one or more bits are in
error or during which Loss of Signal (LOS) or Alarm Indication
Signal (AIS) is detected.
"
::= { optIfOTNPMCurrentEntry 6}

optIfOTNPMCurrentSESs OBJECT-TYPE
SYNTAX Integer32
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 bit-error ratio =
1x10Eminus3 or during which Loss of Signal (LOS) or Alarm
Indication Signal (AIS) is detected.
"
::= { optIfOTNPMCurrentEntry 7}

optIfOTNPMCurrentUASs  OBJECT-TYPE
SYNTAX  Integer32
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.
"
::= { optIfOTNPMCurrentEntry 8}

optIfOTNPMCurrentBBEs  OBJECT-TYPE
SYNTAX  Integer32
MAX-ACCESS  read-only
STATUS  current
DESCRIPTION
"An errored block not occurring as part of an SES.
"
::= { optIfOTNPMCurrentEntry 9}

optIfOTNPMCurrentESR  OBJECT-TYPE
SYNTAX  Integer32
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.
"
::= { optIfOTNPMCurrentEntry 10}

optIfOTNPMCurrentSESr  OBJECT-TYPE
SYNTAX  Integer32
UNIT   ".001"
MAX-ACCESS  read-only
The ratio of SES in available time to total seconds in available time during a fixed measurement interval.

::= { optIfOTNPMCurrentEntry 11}

--
-- 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."

::= { optIfOTNPMObjects 3}

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 'optIfOTNPMIntervalSublayer' layer."

INDEX  { ifIndex, optIfOTNPMIntervalType, optIfOTNPMIntervalSublayer, optIfOTNPMIntervalTCMLevel, optIfOTNPMIntervalNumber }

::= { optIfOTNPMIntervalTable 1 }

OptIfOTNPMIntervalEntry ::= SEQUENCE {
    optIfOTNPMIntervalType                      OptIfOTNType,
    optIfOTNPMIntervalLayer                     OptIfOTNLayer,
    optIfOTNPMTIntervalTCMLevel                 Unsigned32,
    optIfOTNPMIntervalNumber                    OptIfIntervalNumber,
    optIfOTNPMIntervalSuspectedFlag             TruthValue,
    optIfOTNPMIntervalFcs                       Integer32,
    optIfOTNPMIntervalEses                     Integer32,
    optIfOTNPMIntervalSESs                      Integer32,
    optIfOTNPMIntervalUas                      Integer32,
    optIfOTNPMIntervalBBEs                     Integer32,
    optIfOTNPMIntervalESR                     Integer32,
    optIfOTNPMIntervalSESR                     Integer32,
    optIfOTNPMIntervalBBER                     Integer32,
}
optIfOTNPMIntervalType OBJECT-TYPE
SYNTAX  OptIfOTNType
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}

optIfOTNPMIntervalSublayer 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 sublayer 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
"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  OptIfIntervalNumber
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}
```

```optIfOTNPMIntervalFcs   OBJECT-TYPE
SYNTAX  Integer32
MAX-ACCESS read-only
STATUS  current
DESCRIPTION
" Number of Failures occurred in an observation period."
```

```
::= { optIfOTNPMIntervalEntry  6}
```

```optIfOTNPMIntervalESs   OBJECT-TYPE
SYNTAX  Integer32
MAX-ACCESS read-only
STATUS  current
DESCRIPTION
" It is a one-second period in which one or more bits are in error or during which Loss of Signal (LOS) or Alarm Indication Signal (AIS) is detected."
```

```
::= { optIfOTNPMIntervalEntry  7}
```

```optIfOTNPMIntervalSESs   OBJECT-TYPE
SYNTAX  Integer32
MAX-ACCESS read-only
STATUS  current
DESCRIPTION
" The number of seconds which have a severe error. It is a one-second period which has a bit-error ratio = 1x10^(-3) or during which Loss of Signal (LOS) or Alarm Indication Signal (AIS) is detected."
```


Indication Signal (AIS) is detected.

::= { optIfOTNPMIntervalEntry 8}

optIfOTNPMIntervalUASs OBJECT-TYPE
SYNTAX Integer32
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."

::= { optIfOTNPMIntervalEntry 9}

optIfOTNPMIntervalBBEs OBJECT-TYPE
SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
" An errored block not occurring as part of an SES."

::= { optIfOTNPMIntervalEntry 10}

optIfOTNPMIntervalESR OBJECT-TYPE
SYNTAX Integer32
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."

::= { optIfOTNPMIntervalEntry 11}

optIfOTNPMIntervalSESr OBJECT-TYPE
SYNTAX Integer32
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."
::= { optIfOTNPMIntervalEntry 12}

optIfOTNPMIntervalBBER OBJECT-TYPE
SYNTAX   Integer32
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."
 ::= {optIfOTNPMObjects 4}

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 'optIfOTNPMCurrentDaySublayer’ layer."
 INDEX { ifIndex, optIfOTNPMCurrentDayType, optIfOTNPMCurrentDaySublayer, optIfOTNPMCurrentDayTCMLevel } 
 ::= { optIfOTNPMCurrentDayTable 1 }

OptIfOTNPMCurrentDayEntry ::= 
SEQUENCE {
  optIfOTNPMCurrentDayType OptIfOTNType,
  optIfOTNPMCurrentDayLayer OptIfOTNLayer,
  optIfOTNPMCurrentDayTCMLevel Unsigned32,
  optIfOTNPMNECurrentDaySuspectedFlag TruthValue,
  optIfOTNPMNECurrentDayFcs Integer32,
  optIfOTNPMNECurrentDayESs Integer32,
  optIfOTNPMNECurrentDaySESs Integer32,
  optIfOTNPMNECurrentDayUASs Integer32,
}
optIfOTNPMCurrentDayType OBJECT-TYPE
SYNTAX  OptIfOTNType
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}

optIfOTNPMCurrentDaySublayer 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 sublayer 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."
::= { optIfOTNPMCurrentDayEntry  3}

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

optIfOTNPMCurrentDayFcs OBJECT-TYPE
SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of Failures occurred in an observation period."
::= { optIfOTNPMCurrentDayEntry 5}

optIfOTNPMCurrentDayESs OBJECT-TYPE
SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The number of seconds which have an error. It is a one-second period in which one or more bits are in error or during which Loss of Signal (LOS) or Alarm Indication Signal (AIS) is detected."
::= { optIfOTNPMCurrentDayEntry 6}

optIfOTNPMCurrentDaySESs OBJECT-TYPE
SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The number of seconds which have a severe error. It is a one-second period which has a bit-error ratio = 1x10^{-3} or during which Loss of Signal (LOS) or Alarm Indication Signal (AIS) is detected."
::= { optIfOTNPMCurrentDayEntry 7}

optIfOTNPMCurrentDayUASs OBJECT-TYPE
SYNTAX Integer32
MAX-ACCESS read-only
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.

::= { optIfOTNPCurrentDayEntry 8}

optIfOTNPCurrentDayBBEs OBJECT-TYPE
SYNTAX  Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"An errored block not occurring as part of an SES."

::= { optIfOTNPCurrentDayEntry 9}

optIfOTNPCurrentDayESR OBJECT-TYPE
SYNTAX  Integer32
UNIT "/.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."

::= { optIfOTNPCurrentDayEntry 10}

optIfOTNPCurrentDaySESR OBJECT-TYPE
SYNTAX  Integer32
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."

::= { optIfOTNPCurrentDayEntry 11}

optIfOTNPCurrentDayBBER OBJECT-TYPE
SYNTAX  Integer32
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."

::= { optIfOTNPMCurrentDayEntry  12}

--
-- PM Prev Day Entry
--
optIfOTNMPPrevDayTable OBJECT-TYPE
SYNTAX  SEQUENCE OF OptIfOTNMPPrevDayEntry
MAX-ACCESS not-accessible
STATUS  current
DESCRIPTION
"A Performance monitoring Previous Day Table."

::= {optIfOTNMOBjects 5}

optIfOTNMPPrevDayEntry OBJECT-TYPE
SYNTAX OptIfOTNMPPrevDayEntry
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
‘optIfOTNMPPrevDaySublayer’ layer."

INDEX  { ifIndex, optIfOTNMPPrevDayType,
   optIfOTNMPPrevDaySublayer, optIfOTNMPPrevDayTCMLevel }

::= { optIfOTNMPPrevDayTable 1 }

OptIfOTNMPPrevDayEntry  ::==
SEQUENCE {
   optIfOTNMPPrevDayType                        OptIfOTNType,
   optIfOTNMPPrevDayLayer                       OptIfOTNLayer,
   optIfOTNMPPrevDayTCMLevel                    Unsigned32,
   optIfOTNMPNEPrevDaySuspectedFlag             TruthValue,
   optIfOTNMPNEPrevDayFcs                       Integer32,
   optIfOTNMPNEPrevDayESs                       Integer32,
   optIfOTNMPNEPrevDaySESs                      Integer32,
   optIfOTNMPNEPrevDayUASs                      Integer32,
   optIfOTNMPNEPrevDayBBEs                      Integer32,
   optIfOTNMPNEPrevDayESR                       Integer32,
   optIfOTNMPNEPrevDaySESR                      Integer32,
   optIfOTNMPNEPrevDayBBER                      Integer32,
}
This parameter indicates the parameters for the table are for the Near End or Far End performance data.
1 - Near End
2 - Far End

::= { optIfOTNPMPrevDayEntry  1}

This parameter indicates the parameters for the table are for OTUk, ODUk, TCMn performance data.
1 - OTUk
2 - ODUk
3 - TCM
The ODUk/TCM sublayer 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.

::= { optIfOTNPMPrevDayEntry  2}

This parameter indicates the TCM level (1-6) if the PM is of the type TCM.

::= { optIfOTNPMPrevDayEntry  3}

If true, the data in this entry may be unreliable.
::= { optIfOTNPMPrevDayEntry  4}

optIfOTNPMPrevDayFcs  OBJECT-TYPE
SYNTAX  Integer32
MAX-ACCESS  read-only
STATUS  current
DESCRIPTION
" Number of failures occurred in an observation period.
" ::= { optIfOTNPMPrevDayEntry  5}

optIfOTNPMPrevDayESs  OBJECT-TYPE
SYNTAX  Integer32
MAX-ACCESS  read-only
STATUS  current
DESCRIPTION
" The number of seconds which have an error.
It is a one-second period in which one or more bits are in error
or during which Loss of Signal (LOS) or Alarm Indication Signal
(AIS) is detected.
" ::= { optIfOTNPMPrevDayEntry  6}

optIfOTNPMPrevDaySESs  OBJECT-TYPE
SYNTAX  Integer32
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 which has
a bit-error ratio = 1x10Eminus3 or during which Loss of Signal (LOS)
or Alarm Indication Signal (AIS) is detected.
" ::= { optIfOTNPMPrevDayEntry  7}

optIfOTNPMPrevDayUASs  OBJECT-TYPE
SYNTAX  Integer32
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.
"
::= { optIfOTNPMPrevDayEntry 8}

optIfOTNPMPrevDayBBEs OBJECT-TYPE
SYNTAX   Integer32
MAX-ACCESS read-only
STATUS   current
DESCRIPTION
"
   An errored block not occurring as part of an SES.
"
::= { optIfOTNPMPrevDayEntry 9}

optIfOTNPMPrevDayESR OBJECT-TYPE
SYNTAX   Integer32
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.
"
::= { optIfOTNPMPrevDayEntry 10}

optIfOTNPMPrevDaySESR OBJECT-TYPE
SYNTAX   Integer32
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.
"
::= { optIfOTNPMPrevDayEntry 11}

optIfOTNPMPrevDayBBER OBJECT-TYPE
SYNTAX   Integer32
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.
"
::= { optIfOTNPMPrevDayEntry 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.

 ::= { optIfOTNPMMObjects 6 }

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       }
 ::= { optIfOTNPMMConfigTable 1 }

OptIfOTNPMMFECConfigEntry ::= SEQUENCE {
optIfOTNPMFECConfigType                      OptIfOTNType,
optIfOTNPMMFECValidIntervals                  Integer32,
optIfOTNPMMOTNThresh15MinFECUnCorrectedWords  Integer32,
optIfOTNPMMOTNThreshPreFECBERMantissa         Integer32,
optIfOTNPMMOTNThreshPreFECBERExponent         Integer32,

}

optIfOTNPMFECConfigType OBJECT-TYPE
SYNTAX  OptIfOTNType
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
"
 ::= { optIfOTNPMMFECConfigEntry 1}

optIfOTNPMMFECValidInterval OBJECT-TYPE
SYNTAX  Integer32
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.

::= {optIfOTNPMFECConfigEntry 2}

optIfOTNPM15MinThreshFECUnCorrectedWords OBJECT-TYPE
SYNTAX Integer32
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. A value of ‘0’ will disable the notification."

::= {optIfOTNPMFECConfigEntry 3}

optIfOTNPM15MinThreshPreFECBERMantissa OBJECT-TYPE
SYNTAX Integer32
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."

::= {optIfOTNPMFECConfigEntry 4}

optIfOTNPM15MinThreshPreFECBERExponent OBJECT-TYPE
SYNTAX Integer32
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."

::= {optIfOTNPMFECConfigEntry 5}
-- FEC PM Table
--
optIfOTNPMFECCurrentTable OBJECT-TYPE
SYNTAX  SEQUENCE OF OptIfOTNPMFECCurrentEntry
MAX-ACCESS not-accessible
STATUS  current
DESCRIPTION
"A Performance monitoring FEC Current Table."
::= {optIfOTNPMObjects 7}

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

OptIfOTNPMFECCurrentEntry ::= SEQUENCE {
    optIfOTNPMFECCurrentType OptIfOTNType,
    optIfOTNPMFECCurrentSuspectedFlag TruthValue,
    optIfOTNPMCurrentFECCorrectedErr Integer32,
    optIfOTNPMCurrentFECUncorrectedWords Integer32,
    optIfOTNPMCurrentFECBERMantissa Integer32,
    optIfOTNPMCurrentFECBERExponent Integer32,
}

optIfOTNPMFECCurrentType OBJECT-TYPE
SYNTAX OptIfOTNType
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
Internet-Draft     draft-galimbe-kunze-g-698-2-snmp-mib-02     March 2012

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  Integer32
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  Integer32
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  Integer32
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  Integer32
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).

::= { optIfOTNPMECCurrentEntry 6}

--
-- FEC PM Interval Table
--
OptIfOTNPWMFECIntervalTable OBJECT-TYPE
SYNTAX  SEQUENCE OF OptIfOTNPMFECIntervalEntry
MAX-ACCESS  not-accessible
STATUS  current
DESCRIPTION
"A Performance monitoring FEC Interval Table."
::= {optIfOTNPMOObjects 8}

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, optIfOTNPMIIntervalType, optIfOTNPMFECIntervalNumber }
::= { octIfOTNPMECIntervalTable 1 }

OptIfOTNPMFECIntervalEntry ::= SEQUENCE {
    optIfOTNPMFECIntervalType                OptIfOTNType,
    optIfOTNPMFECIntervalNumber              OptIfIntervalNumber,
    optIfOTNPMFECIntervalSuspectedFlag       TruthValue,
    optIfOTNPIntervalFECCorrectedErr         Integer32,
    optIfOTNPIntervalFECUncorrectedErr       Integer32,
    optIfOTNPIntervalMinFECBERMantissa       Integer32,
    optIfOTNPIntervalMinFECBERExponent       Integer32,
    optIfOTNPIntervalMaxFECBERMantissa       Integer32,
    optIfOTNPIntervalMaxFECBERExponent       Integer32,
    optIfOTNPIntervalAvgFECBERMantissa       Integer32,
    optIfOTNPIntervalAvgFECBERExponent       Integer32,
}

OptIfOTNPMFECIntervalType OBJECT-TYPE
SYNTAX  OptIfOTNType
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}```

```optIfOTNPMFECIntervalNumber OBJECT-TYPE
SYNTAX  OptIfIntervalNumber
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."
::= { optIfOTNPMFECIntervalEntry 2}```

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

```optIfOTNPMFECIntervalFECCorrectedErr OBJECT-TYPE
SYNTAX  Integer32
MAX-ACCESS  read-only
STATUS  current
DESCRIPTION
"The number of bits corrected by the FEC are counted in the interval."
::= { optIfOTNPMFECIntervalEntry 4}```

```optIfOTNPMFECIntervalFECUncorrectedWords OBJECT-TYPE
SYNTAX  Integer32
MAX-ACCESS  read-only
STATUS  current
DESCRIPTION
"
The number of words un-corrected words by the FEC are counted over the interval.

::= { optIfOTNPMFECIntervalEntry 5}

optIfOTNPMIntervalMinFECBERMantissa OBJECT-TYPE
SYNTAX Integer32
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."
::= { optIfOTNPMFECIntervalEntry 6}

optIfOTNPMIntervalMinFECBERExponent OBJECT-TYPE
SYNTAX Integer32
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."
::= { optIfOTNPMFECIntervalEntry 7}

optIfOTNPMIntervalMaxFECBERMantissa OBJECT-TYPE
SYNTAX Integer32
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."
::= { optIfOTNPMFECIntervalEntry 8}

optIfOTNPMCurrentMaxFECBERExponent OBJECT-TYPE
SYNTAX Integer32
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.
"
::= { optIfOTNPMFECIntervalEntry  9}

optIfOTNPMIntervalAvgFECBERMantissa OBJECT-TYPE
SYNTAX  Integer32
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.
"
::= { optIfOTNPMFECIntervalEntry  10}

optIfOTNPMIntervalAvgFECBERExponent OBJECT-TYPE
SYNTAX  Integer32
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.
"
::= { optIfOTNPMFECIntervalEntry  11}

-- FEC PM  Current Day day Table
--
optIfOTNPMFECCurrentDayTable OBJECT-TYPE
SYNTAX  SEQUENCE OF OptIfOTNPMFECCurrentDayEntry
MAX-ACCESS  not-accessible
STATUS  current
DESCRIPTION
"A Performance monitoring FEC current day table.
"
::= {optIfOTNPMObjects 9}

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                     OptIfOTNType,
  optIfOTNPMFECCurrentDaySuspectedFlag            TruthValue,
  optIfOTNPMCurrentDayFECCorrectedErr             Integer32,
  optIfOTNPMCurrentDayFECUncorrectedWords         Integer32,
  optIfOTNPMCurrentDayMinFECBERMantissa           Integer32,
  optIfOTNPMCurrentDayMinFECBERExponent           Integer32,
  optIfOTNPMCurrentDayMaxFECBERMantissa           Integer32,
  optIfOTNPMCurrentDayMaxFECBERExponent           Integer32,
  optIfOTNPMCurrentDayAvgFECBERMantissa           Integer32,
  optIfOTNPMCurrentDayAvgFECBERExponent           Integer32,
}

optIfOTNPMFECCurrentDayType        OBJECT-TYPE
SYNTAX  OptIfOTNType
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}

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

optIfOTNPMCurrentDayFECCorrectedErr   OBJECT-TYPE
SYNTAX  Integer32
MAX-ACCESS  read-only
STATUS  current
DESCRIPTION 
" The number of bits corrected by the FEC are counted in the
interval.

::= { optIfOTNPMFECCurrentDayEntry 3}

optIfOTNPMCurrentDayFECUncorrectedWords OBJECT-TYPE
SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION

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

::= { optIfOTNPMFECCurrentDayEntry 4}

optIfOTNPMCurrentDayMinFECBERMantissa OBJECT-TYPE
SYNTAX Integer32
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.

::= { optIfOTNPMFECCurrentDayEntry 5}

optIfOTNPMCurrentDayMinFECBERExponent OBJECT-TYPE
SYNTAX Integer32
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
   PreFEC BER in the current 24hour period.

::= { optIfOTNPMFECCurrentDayEntry 6}

optIfOTNPMCurrentDayMaxFECBERMantissa OBJECT-TYPE
SYNTAX Integer32
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.
::= { optIfOTNPMFECCurrentDayEntry  7}

optIfOTNPMCurrentDayMaxFECBERExponent OBJECT-TYPE
SYNTAX  Integer32
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 24-hour period..
"::= { optIfOTNPMFECCurrentDayEntry  8}

optIfOTNPMCurrentDayAvgFECBERMantissa OBJECT-TYPE
SYNTAX  Integer32
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 24-hour period.
"::= { optIfOTNPMFECCurrentDayEntry  9}

optIfOTNPMCurrentDayAvgFECBERExponent OBJECT-TYPE
SYNTAX  Integer32
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
PreFEC BER in the current 24-hour 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.
"
::= {optIfOTNMObsObjects 10}

optIfOTNMFECPrevDayEntry OBJECT-TYPE
SYNTAX OptIfOTNMFECPrevDayEntry
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, optIfOTNMFECPrevDayType }
 ::= { optIfOTNMFECPrevDayTable 1 }

OptIfOTNMFECPrevDayEntry ::= SEQUENCE {
    optIfOTNMFECPrevDayType                      OptIfOTNType,
    optIfOTNMFECPrevDaySuspectedFlag            TruthValue,
    optIfOTNMFECPrevDayFECCorrectedErr          Integer32,
    optIfOTNMFECPrevDayFECUncorrectedWords      Integer32,
    optIfOTNMFECPrevDayMinFECBERMantissa        Integer32,
    optIfOTNMFECPrevDayMinFECBERExponent        Integer32,
    optIfOTNMFECPrevDayMaxFECBERMantissa        Integer32,
    optIfOTNMFECPrevDayMaxFECBERExponent        Integer32,
    optIfOTNMFECPrevDayAvgFECBERMantissa        Integer32,
    optIfOTNMFECPrevDayAvgFECBERExponent        Integer32,
}

optIfOTNMFECPrevDayType OBJECT-TYPE
SYNTAX OptIfOTNType
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"
 ::= { optIfOTNMFECPrevDayEntry 1}

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

optIfOTNPMPrevDayFECCorrectedErr OBJECT-TYPE
SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
" The number of bits corrected by the FEC are counted in the previous day."
::= { optIfOTNPMFECPrevDayEntry 3}

optIfOTNPMPrevDayFECUncorrectedWords OBJECT-TYPE
SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
" The number of un-corrected words by the FEC are counted over the previous Day."
::= { optIfOTNPMFECPrevDayEntry 4}

optIfOTNPMPrevDayMinFECBERMantissa OBJECT-TYPE
SYNTAX Integer32
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."
::= { optIfOTNPMFECPrevDayEntry 5}

optIfOTNPMPrevDayMinFECBERExponent OBJECT-TYPE
SYNTAX Integer32
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"
::= { optIfOTNPMFECPrevDayEntry 6}
optIfOTNPMPrevDayMaxFECBERMantissa OBJECT-TYPE
SYNTAX   Integer32
MAX-ACCESS read-only
STATUS   current
DESCRIPTION
"The maximun 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).
"
 ::= { optIfOTNPMFECPrevDayEntry  7}

optIfOTNPMPrevDayMaxFECBERExponent OBJECT-TYPE
SYNTAX   Integer32
MAX-ACCESS read-only
STATUS   current
DESCRIPTION
"The maximun 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.
"
 ::= { optIfOTNPMFECPrevDayEntry  8}

optIfOTNPMPrevDayAvgFECBERMantissa OBJECT-TYPE
SYNTAX   Integer32
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).
"
 ::= { optIfOTNPMFECPrevDayEntry  9}

optIfOTNPMPrevdayAvgFECBERExponent OBJECT-TYPE
SYNTAX   Integer32
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}
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--
-- 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,
   optIfOTNAlarmSublayer                 OptIfOTNSublayer,
   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 }

optIfOTNAlarmSublayer OBJECT-TYPE
SYNTAX  OptIfOTNSublayer
MAX-ACCESS read-only
STATUS  current
DESCRIPTION
   "This specifies which sublayer 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 sublayer 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 sublayer
'optIfOTNAlarmSublayer'."
::= { 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 { optIfOTNAlarmSublayer,
          optIfOTNAlarmTCMLevel,
          optIfOTNAlarmType,
          optIfOTNAlarmDate }
STATUS      current
DESCRIPTION
"Notification of a recently set OTN alarm of Sublayer
and Type."
::= { optIfOTNNotifications 1 }

optIfOTNAAlarmClear NOTIFICATION-TYPE

OBJECTS { optIfOTNAAlarmSublayer,
    optIfOTNAAlarmTCMLevel,
    optIfOTNAAlarmType,
    optIfOTNAAlarmDate }

STATUS  current

DESCRIPTION
"Notification of a recently clear OTN alarm of Sublayer
and Type."

::= { optIfOTNNotifications 2 }

7. Relationship to Other MIB Modules

7.1. Relationship to the [TEMPLATE TODO] MIB

7.2. MIB modules required for IMPORTS

8. Definitions

[TEMPLATE TODO]: put your valid MIB module here.

A list of tools that can help automate the process of
checking MIB definitions can be found at
http://www.ops.ietf.org/mib-review-tools.html

9. Security Considerations

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

o

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

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

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

Further, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to enable cryptographic security. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an instance of this MIB module is properly configured to give access to the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

10. IANA Considerations

Option #1:

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

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>OBJECT IDENTIFIER value</th>
</tr>
</thead>
<tbody>
<tr>
<td>sampleMIB</td>
<td>{ mib-2 XXX }</td>
</tr>
</tbody>
</table>

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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12. References
12.1. Normative References


[ITU.G874] International Telecommunications Union, "Management

[ITU.G874.1]

[ITU.G959.1]

[ITU.G826]

[ITU.G8201]

[ITU.G694.1]

[ITU.G7710]

12.2.  Informative References


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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