

Internet Engineering Task Force (IETF)
Request for Comments: 6766
Category: Standards Track
ISSN: 2070-1721

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February 2013

xDSL Multi-Pair Bonding
Using Time-Division Inverse Multiplexing (G.Bond/TDIM) MIB

Abstract

This document defines a Management Information Base (MIB) module for use with network management protocols in TCP/IP-based internets. This document proposes an extension to the GBOND-MIB module with a set of objects for managing multi-pair bonded xDSL interfaces using Time-Division Inverse Multiplexing (TDIM), as defined in ITU-T Recommendation G.998.3.

Status of This Memo

This is an Internet Standards Track document.

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Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at <http://www.rfc-editor.org/info/rfc6766>.

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1. Introduction

Multi-pair bonding using Time-Division Inverse Multiplexing (TDIM), a.k.a. G.Bond/TDIM, is specified in ITU-T Recommendation G.998.3 [G.998.3], which defines a method for bonding (or aggregating) multiple xDSL lines (or individual bearer channels in multiple xDSL lines) into a single bidirectional logical link carrying a mix of various traffic streams, e.g., Ethernet, Asynchronous Transfer Mode (ATM), Time-Division Multiplexing (TDM).

The MIB module defined in this document provides G.Bond/TDIM-specific objects for the management of G.998.3 bonded interfaces, extending the common bonding objects specified in the GBOND-MIB [RFC6765] module.

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].

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14, RFC 2119 [RFC2119].

3. The Broadband Forum Management Framework for xDSL Bonding

This document makes use of the Broadband Forum technical report "Management Framework for xDSL Bonding" [TR-159], defining a management model and a hierarchy of management objects for the bonded xDSL interfaces.

4. Relationship to Other MIB Modules

This section outlines the relationship of the MIB modules defined in this document with other MIB modules described in the relevant RFCs. Specifically, the following MIB modules are discussed: the Interfaces Group MIB (IF-MIB) and the G.Bond MIB (GBOND-MIB).

4.1. Relationship to the Interfaces Group MIB Module

A G.Bond/TDIM port is a private case of a bonded multi-pair xDSL interface and as such is managed using generic interface management objects defined in the IF-MIB [RFC2863]. In particular, an interface index (ifIndex) is used to index instances of G.Bond/TDIM ports, as well as xDSL lines/channels, in a managed system.

4.2. Relationship to the G.Bond MIB Module

The GBOND-MIB module [RFC6765] defines management objects common for all bonded multi-pair xDSL interfaces. In particular, it describes the bonding management, bonded port and channel configuration, initialization sequence, etc.

Both the GBOND-MIB and G9983-MIB modules are REQUIRED to manage a G.Bond/TDIM port.

5. MIB Structure

5.1. Overview

All management objects defined in the G9983-MIB module are contained in a single group g9983Port. This group is further split into 6 sub-groups, structured as recommended by RFC 4181 [RFC4181]:

- o g9983PortNotifications - containing notifications (TDIM Service 'down'/'up').
- o g9983PortConfTable - containing objects for configuration of a G.Bond/TDIM port.
- o g9983PortCapTable - containing objects reflecting capabilities of a G.Bond/TDIM port.
- o g9983PortStatTable - containing objects providing overall status information of a G.Bond/TDIM port, complementing the generic status information from the ifTable of the IF-MIB and the gBondPortStatFltStatus of GBOND-MIB.
- o g9983SvcTable - containing objects for configuration and status of the services in a G.Bond/TDIM port.
- o g9983PM - containing objects for OPTIONAL historical Performance Monitoring (PM) of a G.Bond/TDIM port.

5.2. Link Protection Configuration

The G.Bond/TDIM specification allows an optional Forward Error Correction (FEC) and Interleaver block, which if supported and enabled provides a degree of protection against micro-interruptions, alien noise, and even individual Bonding Channel Entity (BCE) failures, a.k.a. cut-line protection.

Management objects in the g9983PortConfTable can be used to configure and query the FEC and Interleaver function of the G.Bond/TDIM port.

5.3. Service Configuration

Unlike the other two xDSL Multi-Pair Bonding schemes (G.Bond/ATM and G.Bond/Ethernet), which send the information required for reassembly of the fragmented data along with the data, G.Bond/TDIM is a synchronous scheme, requiring both ends to know the data distribution tables before any actual data transfer can happen.

Management objects in the g9983PortConfTable (g9983PortConfAdminServices), g9983SvcTable, and g9983OperSvcTable can be used to configure and query the configuration of services transported via the G.Bond/TDIM link. The services may be configured independently of the link state (i.e., in-service and out-of-service), as G.998.3 communicates changes in the service configuration via specific Bonding Communication Channel (BCC) messages, switching both ends of the link to the new configuration synchronously.

There can be up to 60 active services defined on a G.Bond/TDIM link. This MIB module provides an ability to define up to 255 services via the g9983SvcTable, with each row representing a possible service, and then set the actual service configuration using the g9983PortConfAdminServices object (a byte-vector of service indices), listing the active services in the order of their position in the G.Bond/TDIM frame. This design allows one to easily modify service drop priority, which directly corresponds to the service position.

The actual list of services is provided via the read-only g9983OperSvcTable, where each entry's index corresponds to the service position, starting from index 1 for the first entry, 2 for the second entry, etc., providing an easy service navigation for a management application using GET-NEXT (instead of counting bytes in the g9983PortConfAdminServices object).

The service configuration can only be changed on a Bonding Terminating Unit at the Central Office (BTU-C).

When configuring the services, please bear in mind that the sum of all the services' bandwidth SHOULD be less than or equal to the target data rate of the bonded link. Note that G.Bond/TDIM links are symmetrical; i.e., their upstream data rate equals the downstream data rate.

5.3.1. Management of TDM Services and Service Drop Priority during Bandwidth Degradation

The G.Bond/TDIM protocol provides an ability to map TDM services into the TDIM bonded link directly, without any additional overhead. It addresses only structure-agnostic TDM transport, disregarding any structure that may be imposed on these streams, in particular, the structure imposed by the standard TDM framing [G.704].

During bandwidth degradation, services with a lower priority are impaired or dropped first. Synchronous services (fractional DS1/E1, clear channel E1/T1, T3/E3, clock) that are positioned in the beginning of the G.Bond/TDIM frame have higher priority than asynchronous services (Ethernet, ATM, Generic Framing Procedure (GFP) encapsulated) that are positioned farther away. Within the services of the same type, those with a lower position (index) have higher priority.

5.3.2. Service Notifications

This MIB module provides specific 'up'/'down' notifications (g9983SvcUp/g9983SvcDown) for each of the configured services. During bandwidth degradation, a number of services may be suspended (dropped) simultaneously, according to their drop priority (position in the service list). Please note that it is possible for a higher-priority service to be dropped before a lower-priority one. For example, suppose there are two services configured on a 2-Mbps G.Bond/TDIM link: a T1 service (g9983SvcType with a value of dsl, with a bandwidth requirement of 1.5 Mbps), and an Ethernet service with a size of 0.5 Mbps. When the actual link bandwidth is reduced to 1.4 Mbps, the T1 service with a g9983OperSvcPosition value of 1 would be dropped, while the Ethernet service with a g9983OperSvcPosition value of 2 would remain up.

Notifications SHOULD be rate-limited (throttled) such that there is an implementation-specific gap between the generation of consecutive notifications of the same event. This mechanism prevents "notification flooding" in cases where g9983OperSvcState oscillates between the 'up' and 'down' states. When notifications are rate-limited, they are dropped and not queued for sending at a future time. This is intended to be a general rate-limiting statement for notifications that otherwise have no explicit rate-limiting assertions in this document.

5.4. Performance Monitoring

The OPTIONAL Performance Monitoring counters, thresholds, and history buckets (interval-counters), similar to those defined in [TR-159], are implemented using the textual conventions defined in the HC-PerfHist-TC-MIB [RFC3705]. The HC-PerfHist-TC-MIB defines 64-bit versions of the textual conventions found in the PerfHist-TC-MIB [RFC3593].

The agent SHOULD align the beginning of each interval to a fifteen-minute boundary of a wall clock. Likewise, the beginning of each one-day interval SHOULD be aligned with the start of a day.

Counters are not reset when a G.Bond TDIM port is re-initialized, but rather only when the agent is reset or re-initialized.

Note that the accumulation of certain performance events for a monitored entity is inhibited (counting stops) during periods of service unavailability on that entity. The DESCRIPTION clause of Performance Monitoring counters in this MIB module specifies which of the counters are inhibited during periods of service unavailability.

5.5. Mapping of Broadband Forum TR-159 and ITU-T G.998.3 Managed Objects

This section contains the mapping between relevant managed objects (attributes) defined in [TR-159] and the managed objects defined in this document. Note that all management objects defined in [G.998.3] have corresponding objects in [TR-159].

TR-159 Managed Object	Corresponding SNMP Object
oBondTDIM - Basic Package (Mandatory)	
aCRC4Errors	g9983PortStatCrc4Errors
aCRC6Errors	g9983PortStatCrc6Errors
aCRC8Errors	g9983PortStatCrc8Errors
aFECSupported	g9983PortCapFecSupported

oBondTDIM - FEC Package (Optional)	
aFECAdminState	g9983PortConfFecAdminState
aFECOperState	g9983PortStatFecOperState
aFECWordSize	g9983PortConfFecWordSize
aFECRedundancySize	g9983PortConfFecRedundancySize
aFECInterleaverType	g9983PortConfFecInterleaverType
aFECInterleaverDepth	g9983PortConfFecInterleaverDepth
aFECMaxWordSize	g9983PortCapFecMaxWordSize
aFECMaxRedundancySize	g9983PortCapFecMaxRedundancySize
aFECInterleaverTypesSupported	g9983PortCapFecInterleaverTypeSupported
aFECMaxInterleaverDepth	g9983PortCapFecMaxInterleaverDepth
oTDIMService - Basic Package (Mandatory)	
aServiceID	g9983OperSvcPosition
aServiceIfIdx	g9983SvcIfIdx
aServiceType	g9983SvcType
aServiceSize	g9983SvcSize
aServiceOperState	g9983OperSvcState
aServiceUpDownEnable	g9983PortConfSvcUpDownEnable
nServiceUp	g9983SvcUp
nServiceDown	g9983SvcDown

Table 1: Mapping of TR-159 Managed Objects

Note that some of the mapping between the objects defined in TR-159 and the ones defined in this MIB module is not one-to-one; for example, while TR-159 PM attributes aGroupPerf* map to the corresponding gBondPortPm* objects of the GBOND-MIB module, there are no dedicated PM attributes for the g9983PortPm* and g9983SvcPm* objects introduced in this MIB module. However, since their definition is identical to the definition of gBondPortPm* objects of the GBOND-MIB module, we can map g9983PortPm* and g9983SvcPm* to the relevant aGroupPerf* attributes of TR-159 and use the term 'partial mapping' to denote the fact that this mapping is not one-to-one.

6. G.Bond/TDIM MIB Definitions

The G9983-MIB module IMPORTS objects from SNMPv2-SMI [RFC2578], SNMPv2-TC [RFC2579], SNMPv2-CONF [RFC2580], IF-MIB [RFC2863], and HC-PerfHist-TC-MIB [RFC3705]. The module has been structured as recommended by [RFC4181].

```
G9983-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
MODULE-IDENTITY,
OBJECT-TYPE,
NOTIFICATION-TYPE,
mib-2,
Unsigned32,
Counter32
    FROM SNMPv2-SMI          -- RFC 2578
TEXTUAL-CONVENTION,
RowStatus,
TruthValue
    FROM SNMPv2-TC          -- RFC 2579
MODULE-COMPLIANCE,
OBJECT-GROUP,
NOTIFICATION-GROUP
    FROM SNMPv2-CONF        -- RFC 2580
ifIndex,
InterfaceIndex
    FROM IF-MIB             -- RFC 2863
HCPerfCurrentCount,
HCPerfIntervalCount,
HCPerfValidIntervals,
HCPerfInvalidIntervals,
HCPerfTimeElapsed
    FROM HC-PerfHist-TC-MIB -- RFC 3705
;
```

```
-----
g9983MIB MODULE-IDENTITY
```

```
LAST-UPDATED "201302200000Z" -- 20 February 2013
ORGANIZATION "IETF ADSL MIB Working Group"
CONTACT-INFO
    "WG charter:
    http://datatracker.ietf.org/wg/adslmib/charter/
```

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DESCRIPTION

"The objects in this MIB module are used to manage the multi-pair bonded xDSL interfaces using time-division inverse multiplexing (TDIM), as defined in ITU-T Recommendation G.998.3 (G.Bond/TDIM).

This MIB module MUST be used in conjunction with the GBOND-MIB module, common to all G.Bond technologies.

The following references are used throughout this MIB module:

[G.998.3] refers to:

ITU-T Recommendation G.998.3: 'Multi-pair bonding using time-division inverse multiplexing', January 2005.

[TR-159] refers to:

Broadband Forum Technical Report: 'Management Framework for xDSL Bonding', December 2008.

Naming Conventions:

BCE - Bonding Channel Entity
BTU - Bonding Terminating Unit
BTU-C - Bonding Terminating Unit, CO side
BTU-R - Bonding Terminating Unit, Remote Terminal (CPE) side
CO - Central Office
CPE - Customer Premises Equipment
GBS - Generic Bonding Sub-layer
GBS-C - Generic Bonding Sub-layer, CO side
GBS-R - Generic Bonding Sub-layer, Remote Terminal (CPE) side
SNR - Signal to Noise Ratio

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REVISION "201302200000Z" -- 20 February 2013
DESCRIPTION "Initial version, published as RFC 6766."

::= { mib-2 210 }

-- Sections of the module
-- Structured as recommended by RFC 4181, Appendix D

g9983Objects OBJECT IDENTIFIER ::= { g9983MIB 1 }

g9983Conformance OBJECT IDENTIFIER ::= { g9983MIB 2 }

-- Groups in the module

g9983Port OBJECT IDENTIFIER ::= { g9983Objects 1 }

-- Textual Conventions

G9983SvcIndex ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION

"A unique value, greater than zero, for each service defined in the managed G.Bond/TDIM port.

It is RECOMMENDED that values be assigned contiguously starting from 1. The value for each service MUST remain constant at least from one re-initialization of the local management subsystem to the next re-initialization."

SYNTAX Unsigned32 (1..255)

G9983SvcIndexList ::= TEXTUAL-CONVENTION

DISPLAY-HINT "1d:"

STATUS current

DESCRIPTION

"This textual convention represents a continuous ordered list of all the services defined for the managed G.Bond/TDIM port.

The value of this object is a concatenation of zero or more (up to 60) octets, where each octet contains an 8-bit G9983SvcIndex value, identifying a particular service.

An octet's position reflects the associated service position and its priority in the G.Bond/TDIM frame, with the first octet being the first service of highest priority.

A zero-length octet string is object-specific and MUST therefore be defined as part of the description of any object that uses this syntax. Examples of the usage of a zero-length value might include situations where an object using this textual convention is irrelevant for a specific G.Bond/TDIM port type or where no services have been defined for this port."

SYNTAX OCTET STRING (SIZE (0..60))

G9983SvcOrderIndex ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION

"A unique value, greater than zero, for each service defined in the managed G.Bond/TDIM port, showing its relative position inside the G.Bond/TDIM frame."

SYNTAX Unsigned32 (1..60)

-- Port Notifications group

g9983PortNotifications OBJECT IDENTIFIER

::= { g9983Port 0 }

g9983SvcUp NOTIFICATION-TYPE

OBJECTS {

-- ifIndex and g9983OperSvcPosition would be part of the trap OID

g9983OperSvcIdx,

g9983SvcIfIdx

}

STATUS current

DESCRIPTION

"This notification indicates that a service, indicated by the g9983OperSvcIdx (mapped to a particular interface indicated by the g9983SvcIfIdx), in a particular G.Bond/TDIM port is passing traffic.

This notification is generated (unless disabled or dropped by the rate-limiting mechanism) when the g9983OperSvcState object has left the 'down' state, while the G.Bond/TDIM port state (the ifOperStatus of the IF-MIB) is 'up'.

Generation of this notification is controlled by the g9983PortConfSvcUpDownEnable object.

This object maps to the TR-159 notification nServiceUp."

REFERENCE

"[TR-159], Section 5.5.5.7"
 ::= { g9983PortNotifications 1 }

g9983SvcDown NOTIFICATION-TYPE

OBJECTS {
 -- ifIndex and g9983OperSvcPosition would be part of the trap OID
 g9983OperSvcIdx,
 g9983SvcIfIdx
 }

STATUS current

DESCRIPTION

"This notification indicates that a service indicated by the g9983OperSvcIdx (mapped to a particular interface indicated by the g9983SvcIfIdx) in a particular G.Bond/TDIM port has stopped passing traffic.

This notification is generated (unless disabled or dropped by the rate-limiting mechanism), when the g9983OperSvcState object has entered the 'down' state, while the G.Bond/TDIM port state (the ifOperStatus of the IF-MIB) is 'up'.

Generation of this notification is controlled by the g9983PortConfSvcUpDownEnable object.

This object maps to the TR-159 notification nServiceDown."

REFERENCE

"[TR-159], Section 5.5.5.8"
 ::= { g9983PortNotifications 2 }

-- G.Bond/TDIM Port group

g9983PortConfTable OBJECT-TYPE

SYNTAX SEQUENCE OF G9983PortConfEntry
 MAX-ACCESS not-accessible
 STATUS current

DESCRIPTION

"Table for configuration of G.Bond/TDIM ports. Entries in this table MUST be maintained in a persistent manner."

::= { g9983Port 1 }

g9983PortConfEntry OBJECT-TYPE

SYNTAX G9983PortConfEntry
 MAX-ACCESS not-accessible
 STATUS current

DESCRIPTION

"An entry in the G.Bond/TDIM Port Configuration table. Each entry represents a G.Bond/TDIM port indexed by the

ifIndex. Additional configuration parameters are available via the gBondPortConfEntry of the GBOND-MIB.

Note that a G.Bond/TDIM port runs on top of a single or multiple BCE port(s), which are also indexed by the ifIndex."

```
INDEX { ifIndex }
 ::= { g9983PortConfTable 1 }
```

G9983PortConfEntry ::=

```
SEQUENCE {
  g9983PortConfFecAdminState      TruthValue,
  g9983PortConfFecWordSize        Unsigned32,
  g9983PortConfFecRedundancySize  Unsigned32,
  g9983PortConfFecInterleaverType INTEGER,
  g9983PortConfFecInterleaverDepth Unsigned32,
  g9983PortConfAdminServices      G9983SvcIndexList,
  g9983PortConfSvcUpDownEnable    TruthValue
}
```

g9983PortConfFecAdminState OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"A desired state of the OPTIONAL Forward Error Correction (FEC) function of the G.Bond/TDIM port.

A value of 'false' indicates that the FEC function SHALL be disabled. A value of 'true' indicates that the FEC function SHALL be enabled, if supported by the G.Bond/TDIM port, as indicated by the g9983PortCapFecSupported object.

The g9983PortStatFecOperState object indicates the current operational state of the FEC function.

For the GBS-R ports, the value of this object cannot be changed directly. This value may be changed as a result of a write operation on the g9983PortCapFecSupported object of a remote GBS-C.

Modifications of this object MUST be performed when the link is 'down'.

Attempts to change this object MUST be rejected if the link is 'up' or initializing, or if it is a GBS-R.

This object maps to the TR-159/G.998.3 attribute aFECAdminState."

REFERENCE

"[TR-159], Section 5.5.4.5; [G.998.3], Appendix II, B-X"

```
::= { g9983PortConfEntry 1 }
```

g9983PortConfFecWordSize OBJECT-TYPE

SYNTAX Unsigned32 (0|20..255)

UNITS "octets"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"A FEC code word size, in octets, for G.Bond/TDIM ports supporting the FEC function.

This object is read-write for the GBS-C ports and read-only for the GBS-R.

A value of zero SHALL be returned if the FEC function is disabled (via g9983PortConfFecAdminState) or not supported.

Changing of the FEC code word size MUST be performed when the FEC-enabled link is 'down'. Attempts to change this object MUST be rejected if the link is 'up' or initializing or if the FEC function is disabled/not supported.

This object maps to the TR-159/G.998.3 attribute aFECWordSize."

REFERENCE

"[TR-159], Section 5.5.4.7; [G.998.3], Appendix II, B-XI"

::= { g9983PortConfEntry 2 }

g9983PortConfFecRedundancySize OBJECT-TYPE

SYNTAX Unsigned32 (0|2|4|8|16|20)

UNITS "octets"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"A FEC redundancy word size, in octets, for G.Bond/TDIM ports supporting the FEC function.

This object is read-write for the GBS-C ports and read-only for the GBS-R.

A value of zero SHALL be returned if the FEC function is disabled (via g9983PortConfFecAdminState) or not supported.

Changing of the FEC redundancy word size MUST be performed when the FEC-enabled link is 'down'. Attempts to change this object MUST be rejected if the link is 'up' or initializing or if the FEC function is disabled/not supported.

This object maps to the TR-159/G.998.3 attribute aFECRedundancySize."

REFERENCE

"[TR-159], Section 5.5.4.8; [G.998.3], Appendix II, B-XII"
 ::= { g9983PortConfEntry 3 }

g9983PortConfFecInterleaverType OBJECT-TYPE

SYNTAX INTEGER {
 none(0),
 block(1),
 convolution(2)
 }

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"An Interleaver type for G.Bond/TDIM ports supporting the FEC function.

This object is read-write for the GBS-C ports and read-only for the GBS-R.

A value of none(0) SHALL be returned if the FEC function is disabled (via g9983PortConfFecAdminState) or not supported.

Changing of the Interleaver type MUST be performed when the FEC-enabled link is 'down'. Attempts to change this object MUST be rejected if the link is 'up' or initializing or if the FEC function is disabled/not supported.

This object maps to the TR-159/G.998.3 attribute aFECInterleaverType."

REFERENCE

"[TR-159], Section 5.5.4.9; [G.998.3], Appendix II, B-XIII"
 ::= { g9983PortConfEntry 4 }

g9983PortConfFecInterleaverDepth OBJECT-TYPE

SYNTAX Unsigned32 (0|1|2|3|4|6|8|12|16|24|32|48|96)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"An Interleaver depth for G.Bond/TDIM ports supporting the FEC function.

This object is read-write for the GBS-C ports and read-only for the GBS-R.

A value of zero SHALL be returned if the FEC function is disabled (via g9983PortConfFecAdminState) or not supported.

Changing of the Interleaver depth MUST be performed when the FEC-enabled link is 'down'. Attempts to change this object MUST be rejected if the link is 'up' or initializing or if the FEC function is disabled/not supported.

This object maps to the TR-159/G.998.3 attribute aFECInterleaverDepth."

REFERENCE

"[TR-159], Section 5.5.4.10; [G.998.3], Appendix II, B-XIV"
 ::= { g9983PortConfEntry 5 }

g9983PortConfAdminServices OBJECT-TYPE

SYNTAX G9983SvcIndexList

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Desired list of services for a G.Bond/TDIM port. This object is a list of pointers to entries in the g9983SvcTable.

The value of this object is a continuous ordered list of up to 60 indices (g9983SvcIdx) of the active services carried via the G.Bond/TDIM link. The position of a service in the list determines its relative priority in cases of bandwidth degradation -- the priority decreases towards the end of the list, which means that the last service in the list would be suspended first when the bandwidth degrades.

This object is writable and readable for the GBS-C ports. It is irrelevant for the GBS-R ports -- a zero-length octet string SHALL be returned on an attempt to read this object, and an attempt to change this object MUST be rejected in this case.

Note that the current operational service list is available via the g9983OperSvcTable object.

This object for a GBS-C port MAY be modified independently of the link's state, i.e., in-service and out-of-service. Attempts to set this object to a list with a member value that is not the value of the index for an active entry in the corresponding g9983SvcTable table MUST be rejected."

REFERENCE

"[G.998.3], Sections 10.2.3, 13.3.4.6-13.3.4.11"
 ::= { g9983PortConfEntry 6 }

g9983PortConfSvcUpDownEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Indicates whether g9983SvcUp and g9983SvcDown notifications should be generated for this interface.

A value of true(1) indicates that the notifications are enabled.
A value of false(2) indicates that the notifications are disabled.

This object maps to the TR-159 attribute aServiceUpDownEnable."

REFERENCE

"[TR-159], Section 5.5.5.6"
 ::= { g9983PortConfEntry 7 }

g9983PortCapTable OBJECT-TYPE

SYNTAX SEQUENCE OF G9983PortCapEntry
MAX-ACCESS not-accessible
STATUS current

DESCRIPTION

"Table for capabilities of G.Bond/TDIM ports. Entries in this table MUST be maintained in a persistent manner."

::= { g9983Port 2 }

g9983PortCapEntry OBJECT-TYPE

SYNTAX G9983PortCapEntry
MAX-ACCESS not-accessible
STATUS current

DESCRIPTION

"An entry in the G.Bond/TDIM Port Capability table. Each entry represents a G.Bond/TDIM port indexed by the ifIndex. Additional capabilities are available via the gBondPortCapabilityEntry of the GBOND-MIB. Note that a G.Bond/TDIM port runs on top of a single or multiple BCE port(s), which are also indexed by the ifIndex."

INDEX { ifIndex }
 ::= { g9983PortCapTable 1 }

G9983PortCapEntry ::=

```
SEQUENCE {
    g9983PortCapFecSupported          TruthValue,
    g9983PortCapFecMaxWordSize       Unsigned32,
    g9983PortCapFecMaxRedundancySize Unsigned32,
    g9983PortCapFecInterleaverTypeSupported INTEGER,
    g9983PortCapFecMaxInterleaverDepth Unsigned32
}
```

```

g9983PortCapFecSupported OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "FEC and Interleaver capability of the G.Bond/TDIM port.
        This object has a value of true(1) when the port supports the
        FEC and Interleaver function.
        A value of false(2) is returned when the port does not
        support the FEC and Interleaver function.

        This object maps to the TR-159/G.998.3 attribute
        aFECSupported."
    REFERENCE
        "[TR-159], Section 5.5.4.4; [G.998.3], Appendix II, B-VI"
        ::= { g9983PortCapEntry 1 }

```

```

g9983PortCapFecMaxWordSize OBJECT-TYPE
    SYNTAX      Unsigned32 (0|20..255)
    UNITS       "octets"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "A maximum supported FEC code word size, in octets, for
        G.Bond/TDIM ports supporting the FEC function.

        A value of zero SHALL be returned if the FEC function is not
        supported.

        This object maps to the TR-159 attribute aFECWordSize."
    REFERENCE
        "[TR-159], Section 5.5.4.11; [G.998.3], Appendix II, B-XI"
        ::= { g9983PortCapEntry 2 }

```

```

g9983PortCapFecMaxRedundancySize OBJECT-TYPE
    SYNTAX      Unsigned32 (0|2|4|8|16|20)
    UNITS       "octets"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "A maximum supported FEC redundancy word size, in octets, for
        G.Bond/TDIM ports supporting the FEC function.

        A value of zero SHALL be returned if the FEC function is not
        supported.

        This object maps to the TR-159 attribute
        aFECMaxRedundancySize."

```

REFERENCE

"[TR-159], Section 5.5.4.12; [G.998.3], Appendix II, B-XII"
 ::= { g9983PortCapEntry 3 }

g9983PortCapFecInterleaverTypeSupported OBJECT-TYPE

SYNTAX INTEGER {
 none(0),
 block(1),
 convolution(2),
 blockConvolution(3)
 }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Supported Interleaver types for G.Bond/TDIM ports supporting the FEC function.

Possible values are:

none	- the port does not support interleaving
block	- the port supports Block Interleaver
convolution	- the port supports Convolution Interleaver
blockConvolution	- the port supports both Block Interleaver and Convolution Interleaver

This object maps to the TR-159 attribute

aFecInterleaverTypesSupported."

REFERENCE

"[TR-159], Section 5.5.4.13; [G.998.3], Appendix II, B-XIII"
 ::= { g9983PortCapEntry 4 }

g9983PortCapFecMaxInterleaverDepth OBJECT-TYPE

SYNTAX Unsigned32 (0|1|2|3|4|6|8|12|16|24|32|48|96)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A maximum Interleaver depth for G.Bond/TDIM ports supporting the FEC function.

A value of zero SHALL be returned if the Interleaver is not supported.

This object maps to the TR-159 attribute

aFecMaxInterleaverDepth."

REFERENCE

"[TR-159], Section 5.5.4.14; [G.998.3], Appendix II, B-XIV"
 ::= { g9983PortCapEntry 5 }

g9983PortStatTable OBJECT-TYPE

SYNTAX SEQUENCE OF G9983PortStatEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table provides overall status information of G.Bond TDIM ports, complementing the generic status information from the ifTable of the IF-MIB and the gBondPortStatFltStatus of the GBOND-MIB. Additional status information about connected BCEs is available from the relevant line MIBs.

This table contains live data from the equipment. As such, it is NOT persistent."

::= { g9983Port 3 }

g9983PortStatEntry OBJECT-TYPE

SYNTAX G9983PortStatEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the G.Bond/TDIM Port Status table. Each entry represents a G.Bond/TDIM port indexed by the ifIndex.

Note that a G.Bond GBS port runs on top of a single or multiple BCE port(s), which are also indexed by the ifIndex."

INDEX { ifIndex }

::= { g9983PortStatTable 1 }

G9983PortStatEntry ::=

```
SEQUENCE {
    g9983PortStatFecOperState      TruthValue,
    g9983PortStatFltStatus        BITS,
    g9983PortStatCrc4Errors       Counter32,
    g9983PortStatCrc6Errors       Counter32,
    g9983PortStatCrc8Errors       Counter32
}
```

g9983PortStatFecOperState OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only value indicating the current operational state of the OPTIONAL Forward Error Correction (FEC) function for the G.998.3 port.

A value of 'false' indicates that the FEC function is disabled. A value of 'true' indicates that the FEC function is enabled (and supported).

This object maps to the TR-159 attribute aFECOperState."

REFERENCE

"[TR-159], Section 5.5.4.6"

::= { g9983PortStatEntry 1 }

g9983PortStatFltStatus OBJECT-TYPE

SYNTAX BITS {
serviceDown(0),
wrongConfig(1)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"G.Bond/TDIM port fault status. This is a bitmap of possible conditions. The various bit positions are:

- | | |
|-------------|--|
| serviceDown | - at least one of the services defined for this aggregation group is down (due to low rate). |
| wrongConfig | - at least one BCE at the remote GBS-R is already connected to another GBS. |

This object is intended to supplement the ifOperStatus object in the IF-MIB and the gBondPortStatFltStatus object in the GBOND-MIB."

REFERENCE

"[G.998.3], Section 6.3; RFC 2863, IF-MIB, ifOperStatus;

RFC 6765, GBOND-MIB, gBondPortStatFltStatus"

::= { g9983PortStatEntry 2 }

g9983PortStatCrc4Errors OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of CRC-4 errors (frame header errors) on all pairs in the G.Bond/TDIM port. Simultaneous errors on M lines SHOULD be counted M times.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime as defined in the IF-MIB.

This object maps to the TR-159/G.998.3 attribute aCRC4Errors."

REFERENCE

"[TR-159], Section 5.5.4.1; [G.998.3], Appendix II, B-VII"

::= { g9983PortStatEntry 3 }

g9983PortStatCrc6Errors OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of CRC-6 errors (super-frame errors) on all pairs in the G.Bond/TDIM port. Simultaneous errors on M lines SHOULD be counted 1 time.

Discontinuities in the value of this counter can occur at re-initialization of the local management subsystem, and at other times as indicated by the value of ifCounterDiscontinuityTime as defined in the IF-MIB.

This object maps to the TR-159/G.998.3 attribute aCRC6Errors."

REFERENCE

"[TR-159], Section 5.5.4.2; [G.998.3], Appendix II, B-VIII"

::= { g9983PortStatEntry 4 }

g9983PortStatCrc8Errors OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of CRC-8 errors (event/message errors) on all pairs in the G.Bond/TDIM port. Simultaneous errors on M lines SHOULD be counted M times.

Discontinuities in the value of this counter can occur at re-initialization of the local management subsystem, and at other times as indicated by the value of ifCounterDiscontinuityTime as defined in the IF-MIB.

This object maps to the TR-159/G.998.3 attribute aCRC8Errors."

REFERENCE

"[TR-159], Section 5.5.4.3; [G.998.3], Appendix II, B-IX"

::= { g9983PortStatEntry 5 }

g9983OperSvcTable OBJECT-TYPE

SYNTAX SEQUENCE OF G9983OperSvcEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Table of the operational services configured on a G.Bond/TDIM port. This table reflects current actual service configuration, set by the g9983PortConfAdminServices object. The number of entries (services) in this table therefore can vary between

0, when no services are configured, and 60, for the maximum number of services.

This table contains live data from the equipment. As such, it is NOT persistent."

```
::= { g9983Port 4 }
```

g9983OperSvcEntry OBJECT-TYPE

SYNTAX G9983OperSvcEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the G.Bond/TDIM Port Operational Service table, containing the index of an active service entry in the g9983SvcTable. The entry is indexed by the ifIndex, indicating a corresponding G.Bond/TDIM port, and by g9983OperSvcPosition (1..60), indicating the corresponding service position in the G.Bond/TDIM frame."

INDEX { ifIndex, g9983OperSvcPosition }

```
::= { g9983OperSvcTable 1 }
```

G9983OperSvcEntry ::=

```
SEQUENCE {
    g9983OperSvcPosition          G9983SvcOrderIndex,
    g9983OperSvcIdx              G9983SvcIndex,
    g9983OperSvcState            INTEGER
}
```

g9983OperSvcPosition OBJECT-TYPE

SYNTAX G9983SvcOrderIndex

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"G.Bond/TDIM operational service position -- a unique index, indicating relative placement of the associated service pointed to by g9983OperSvcIdx, within the G.Bond/TDIM frame.

There can be up to 60 services defined over a TDIM bonded facility. Services with lower indices have higher priority in cases of bandwidth degradation.

The value of g9983OperSvcPosition for the first g9983OperSvcEntry is always 1, incrementing sequentially for each consecutive entry, i.e., 2 for the second entry, 3 for the third, etc.

This objects maps to the TR-159/G.998.3 attribute aServiceID."

REFERENCE

"[TR-159], Section 5.5.5.1; [G.998.3], Appendix II, C-I"

::= { g9983OperSvcEntry 1 }

g9983OperSvcIdx OBJECT-TYPE

SYNTAX G9983SvcIndex

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"G.Bond/TDIM operational service index -- a read-only pointer to an existing entry in the g9983SvcTable (value of g9983SvcIdx) describing a particular service."

::= { g9983OperSvcEntry 2 }

g9983OperSvcState OBJECT-TYPE

SYNTAX INTEGER {

up(1),

down(2)

}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"G.Bond/TDIM service operational state.

Possible values are:

- up - Service is up and passing traffic.
- down - Service is down, due to a variety of reasons, e.g., G.Bond/TDIM port is down, current link bandwidth is too low to support a particular service, etc.

This objects maps to the TR-159 attribute aServiceOperState."

REFERENCE

"[TR-159], Section 5.5.5.5"

::= { g9983OperSvcEntry 3 }

g9983SvcTable OBJECT-TYPE

SYNTAX SEQUENCE OF G9983SvcEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Table of possible services for G.Bond/TDIM ports.

Entries in this table MUST be maintained in a persistent manner."

::= { g9983Port 5 }

```

g9983SvcEntry OBJECT-TYPE
  SYNTAX      G9983SvcEntry
  MAX-ACCESS  not-accessible
  STATUS      current
  DESCRIPTION
    "An entry in the G.Bond/TDIM Port Service table, containing
    the management information applicable to a particular service,
    indexed by the g9983SvcIdx, on a G.Bond/TDIM port,
    indexed by the ifIndex."
  INDEX       { ifIndex, g9983SvcIdx }
  ::= { g9983SvcTable 1 }

G9983SvcEntry ::=
  SEQUENCE {
    g9983SvcIdx          G9983SvcIndex,
    g9983SvcIfIdx       InterfaceIndex,
    g9983SvcType         INTEGER,
    g9983SvcSize         Unsigned32,
    g9983SvcRowStatus   RowStatus
  }

g9983SvcIdx OBJECT-TYPE
  SYNTAX      G9983SvcIndex
  MAX-ACCESS  not-accessible
  STATUS      current
  DESCRIPTION
    "G.Bond/TDIM service index -- a unique index associated with
    a particular service entry."
  ::= { g9983SvcEntry 1 }

g9983SvcIfIdx OBJECT-TYPE
  SYNTAX      InterfaceIndex
  MAX-ACCESS  read-create
  STATUS      current
  DESCRIPTION
    "This is a unique index within the ifTable.  It represents
    the interface index of a service to be transmitted over the
    G.Bond/TDIM service instance.

    This objects maps to the TR-159 attribute aServiceIfIndex."
  REFERENCE
    "[TR-159], Section 5.5.5.2"
  ::= { g9983SvcEntry 2 }

g9983SvcType OBJECT-TYPE
  SYNTAX      INTEGER {
    ds1(0),
    e1(1),

```

```

    nxds0(2),
    nxe0(3),
    ds3(4),
    e3(5),
    clock(6),
    ethernet(7),
    atm(8),
    gfpNoFCS(9),
    gfp(10)
}
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
    "G.Bond/TDIM service type.

```

Possible values are:

```

    ds1          - Clear Channel DS1 (synchronous)
    e1           - Clear Channel E1 (synchronous)
    nxds0       - Fractional DS1 (synchronous)
    nxe0        - Fractional E1 (synchronous)
    ds3         - DS3 (synchronous)
    e3          - E3 (synchronous)
    clock       - Clock transfer (synchronous)
    ethernet    - Ethernet (asynchronous)
    atm         - ATM (asynchronous)
    gfpNoFCS    - GFP encapsulated without FCS (asynchronous)
    gfp         - GFP encapsulated with FCS (asynchronous)

```

For the GBS-R ports, the value of this object cannot be changed directly. This value may be changed as a result of a write operation on the g9983SvcType object of a remote GBS-C.

Attempts to change this object MUST be rejected for the GBS-R ports.

This object maps to the TR-159/G.998.3 attribute aServiceType."

REFERENCE

```

    "[TR-159], Section 5.5.5.3; [G.998.3], Appendix II, C-II"
    ::= { g9983SvcEntry 3 }

```

```

g9983SvcSize  OBJECT-TYPE
SYNTAX       Unsigned32 (0|20..255)
UNITS        "octets"
MAX-ACCESS   read-create
STATUS       current
DESCRIPTION
    "Service size, in octets, per bonding sub-block for a specific
    service identified by g9983SvcIdx.

```

For TDM (synchronous) services with variable size (e.g., fractional DS1/E1), this object represents the number of DS0/E0 channels.

For asynchronous services (Ethernet, ATM, GFPnoFCS, or GFP), this object represents the maximum number of octets.

For non-fractional TDM services (i.e., DS1, E1, DS3, E3, and clock), the value of this object MUST be 0.

A GET operation returns the current value.

A SET operation, allowed on GBS-C ports, changes the service size to the indicated value. If the service type is a fixed-rate synchronous service (g9983SvcType is nxds0, nxe0, ds1, e1, ds3, e3, or clock), the operation MUST be rejected.

This object maps to the TR-159/G.998.3 attribute aServiceSize."

REFERENCE

"[TR-159], Section 5.5.5.4; [G.998.3], Appendix II, C-III"

::= { g9983SvcEntry 4 }

g9983SvcRowStatus OBJECT-TYPE

SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"This object controls the creation, modification, or deletion of the associated entry in the g9983SvcTable per the semantics of RowStatus.

If an 'active' entry is referenced via g9983OperSvcIdx or a g9983PortConfAdminServices instance, or indexes a g9983SvcPm*Entry, the entry MUST remain 'active'.

An 'active' entry SHALL NOT be modified. In order to modify an existing entry, it MUST be taken out of service (by setting this object to 'notInService'), modified, and set to 'active' again."

::= { g9983SvcEntry 5 }

-- Performance Monitoring group

g9983PM OBJECT IDENTIFIER ::= { g9983Port 6 }

g9983PortPmCurTable OBJECT-TYPE

SYNTAX SEQUENCE OF G9983PortPmCurEntry
MAX-ACCESS not-accessible

```

STATUS      current
DESCRIPTION
  "This table contains current Performance Monitoring information
  for a G.Bond/TDIM port.  This table contains live data from the
  equipment and as such is NOT persistent."
 ::= { g9983PM 1 }

g9983PortPmCurEntry OBJECT-TYPE
SYNTAX      G9983PortPmCurEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
  "An entry in the G.Bond/TDIM Port PM table.
  Each entry represents a G.Bond/TDIM port indexed by the
  ifIndex."
INDEX       { ifIndex }
 ::= { g9983PortPmCurTable 1 }

G9983PortPmCurEntry ::=
SEQUENCE {
  g9983PortPmCur15MinValidIntervals    HCPperfValidIntervals,
  g9983PortPmCur15MinInvalidIntervals  HCPperfInvalidIntervals,
  g9983PortPmCur15MinTimeElapsed       HCPperfTimeElapsed,
  g9983PortPmCur15MinCrc4s             HCPperfCurrentCount,
  g9983PortPmCur15MinCrc6s             HCPperfCurrentCount,
  g9983PortPmCur15MinCrc8s             HCPperfCurrentCount,
  g9983PortPmCur1DayValidIntervals     Unsigned32,
  g9983PortPmCur1DayInvalidIntervals   Unsigned32,
  g9983PortPmCur1DayTimeElapsed        HCPperfTimeElapsed,
  g9983PortPmCur1DayCrc4s              HCPperfCurrentCount,
  g9983PortPmCur1DayCrc6s              HCPperfCurrentCount,
  g9983PortPmCur1DayCrc8s              HCPperfCurrentCount
}

g9983PortPmCur15MinValidIntervals OBJECT-TYPE
SYNTAX      HCPperfValidIntervals
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
  "A read-only number of 15-minute intervals for which the
  performance data was collected.  The value of this object will
  be 96 or the maximum number of 15-minute history intervals
  collected by the implementation, unless the measurement was
  (re)started recently, in which case the value will be the
  number of complete 15-minute intervals for which there are at
  least some data."

```

In certain cases, it is possible that some intervals are unavailable. In this case, this object reports the maximum interval number for which data is available.

This object partially maps to the TR-159 attribute aGroupPerf15MinValidIntervals."

REFERENCE

"[TR-159], Section 5.5.1.32"

::= { g9983PortPmCurEntry 1 }

g9983PortPmCur15MinInvalidIntervals OBJECT-TYPE

SYNTAX HCPperfInvalidIntervals

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only number of 15-minute intervals for which the performance data was not always available. The value will typically be zero, except in cases where the data for some intervals are not available.

This object partially maps to the TR-159 attribute aGroupPerf15MinInvalidIntervals."

REFERENCE

"[TR-159], Section 5.5.1.33"

::= { g9983PortPmCurEntry 2 }

g9983PortPmCur15MinTimeElapsed OBJECT-TYPE

SYNTAX HCPperfTimeElapsed

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only count of seconds that have elapsed since the beginning of the current 15-minute performance interval.

This object partially maps to the TR-159 attribute aGroupPerfCurr15MinTimeElapsed."

REFERENCE

"[TR-159], Section 5.5.1.34"

::= { g9983PortPmCurEntry 3 }

g9983PortPmCur15MinCrc4s OBJECT-TYPE

SYNTAX HCPperfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only count of CRC-4 errors (frame header errors) on all active pairs in the G.Bond/TDIM port during the current

15-minute performance interval.
 Simultaneous errors on M lines SHOULD be counted M times.

Note that the total number of CRC-4 errors is indicated by the g9983PortStatCrc4Errors object.

This object is inhibited during Severely Errored Seconds (SES) or Unavailable Seconds (UAS)."

REFERENCE

"[TR-159], Section 5.5.4.1"
 ::= { g9983PortPmCurEntry 4 }

g9983PortPmCur15MinCrc6s OBJECT-TYPE

SYNTAX HCPerfCurrentCount
 MAX-ACCESS read-only
 STATUS current

DESCRIPTION

"A read-only count of CRC-6 errors (super-frame errors) on all active pairs in the G.Bond/TDIM port during the current 15-minute performance interval.
 Simultaneous errors on M lines SHOULD be counted 1 time.

Note that the total number of CRC-6 errors is indicated by the g9983PortStatCrc6Errors object.

This object is inhibited during Unavailable Seconds (UAS)."

REFERENCE

"[TR-159], Section 5.5.4.2"
 ::= { g9983PortPmCurEntry 5 }

g9983PortPmCur15MinCrc8s OBJECT-TYPE

SYNTAX HCPerfCurrentCount
 MAX-ACCESS read-only
 STATUS current

DESCRIPTION

"A read-only count of CRC-8 errors (event/message errors) on all active pairs in the G.Bond/TDIM port during the current 15-minute performance interval.
 Simultaneous errors on M lines SHOULD be counted M times.

Note that the total number of CRC-8 errors is indicated by the g9983PortStatCrc8Errors object.

This object is inhibited during Unavailable Seconds (UAS)."

REFERENCE

"[TR-159], Section 5.5.4.3"
 ::= { g9983PortPmCurEntry 6 }

g9983PortPmCurlDayValidIntervals OBJECT-TYPE

SYNTAX Unsigned32 (0..7)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only number of 1-day intervals for which data was collected. The value of this object will be 7 or the maximum number of 1-day history intervals collected by the implementation, unless the measurement was (re)started recently, in which case the value will be the number of complete 1-day intervals for which there are at least some data. In certain cases, it is possible that some intervals are unavailable. In this case, this object reports the maximum interval number for which data is available."

REFERENCE

"[TR-159], Section 5.5.1.45"

::= { g9983PortPmCurEntry 7 }

g9983PortPmCurlDayInvalidIntervals OBJECT-TYPE

SYNTAX Unsigned32 (0..7)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only number of 1-day intervals for which data was not always available. The value will typically be zero, except in cases where the data for some intervals are not available."

REFERENCE

"[TR-159], Section 5.5.1.46"

::= { g9983PortPmCurEntry 8 }

g9983PortPmCurlDayTimeElapsed OBJECT-TYPE

SYNTAX HCPerfTimeElapsed

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only count of seconds that have elapsed since the beginning of the current 1-day performance interval."

REFERENCE

"[TR-159], Section 5.5.1.47"

::= { g9983PortPmCurEntry 9 }

g9983PortPmCurlDayCrc4s OBJECT-TYPE

SYNTAX HCPerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only count of CRC-4 errors on the G.Bond/TDIM port in the current 1-day performance interval.

This object is inhibited during Severely Errored Seconds (SES) and Unavailable Seconds (UAS)."

```
::= { g9983PortPmCurEntry 10 }
```

g9983PortPmCur1DayCrc6s OBJECT-TYPE

SYNTAX HCPerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only count of CRC-6 errors on the G.Bond/TDIM port in the current 1-day performance interval.

This object is inhibited during Unavailable Seconds (UAS)."

```
::= { g9983PortPmCurEntry 11 }
```

g9983PortPmCur1DayCrc8s OBJECT-TYPE

SYNTAX HCPerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only count of CRC-8 errors on the G.Bond/TDIM port in the current 1-day performance interval.

This object is inhibited during Unavailable Seconds (UAS)."

```
::= { g9983PortPmCurEntry 12 }
```

-- Port PM history: 15-min buckets

g9983PortPm15MinTable OBJECT-TYPE

SYNTAX SEQUENCE OF G9983PortPm15MinEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains historical 15-minute buckets of Performance Monitoring information for a G.Bond/TDIM port (a row for each 15-minute interval, up to 96 intervals).

Entries in this table MUST be maintained in a persistent manner."

```
::= { g9983PM 2 }
```

g9983PortPm15MinEntry OBJECT-TYPE

SYNTAX G9983PortPm15MinEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the G.Bond/TDIM Port historical 15-minute PM table. Each entry represents Performance Monitoring data for a G.Bond TDIM port, indexed by the ifIndex, collected during a particular 15-minute interval, indexed by the g9983PortPm15MinIntervalIndex."

```
INDEX { ifIndex, g9983PortPm15MinIntervalIndex }
 ::= { g9983PortPm15MinTable 1 }
```

```
G9983PortPm15MinEntry ::=
```

```
SEQUENCE {
  g9983PortPm15MinIntervalIndex      Unsigned32,
  g9983PortPm15MinIntervalMoniTime   HCPerfTimeElapsed,
  g9983PortPm15MinIntervalCrc4s     HCPerfIntervalCount,
  g9983PortPm15MinIntervalCrc6s     HCPerfIntervalCount,
  g9983PortPm15MinIntervalCrc8s     HCPerfIntervalCount,
  g9983PortPm15MinIntervalValid     TruthValue
}
```

```
g9983PortPm15MinIntervalIndex OBJECT-TYPE
```

```
SYNTAX      Unsigned32 (1..96)
```

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

```
STATUS      current
```

DESCRIPTION

"Performance data interval number. 1 is the most recent previous interval; interval 96 is 24 hours ago. Intervals 2..96 are OPTIONAL."

This object partially maps to the TR-159 attribute aGroupPerf15MinIntervalNumber."

REFERENCE

"[TR-159], Section 5.5.1.57"

```
 ::= { g9983PortPm15MinEntry 1 }
```

```
g9983PortPm15MinIntervalMoniTime OBJECT-TYPE
```

```
SYNTAX      HCPerfTimeElapsed
```

```
UNITS       "seconds"
```

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

```
STATUS      current
```

DESCRIPTION

"A read-only count of seconds over which the performance data was actually monitored. This value will be the same as the interval duration (900 seconds), except in a situation where performance data could not be collected for any reason."

```
 ::= { g9983PortPm15MinEntry 2 }
```

```
g9983PortPm15MinIntervalCrc4s OBJECT-TYPE
```

```
SYNTAX      HCPerfIntervalCount
```

MAX-ACCESS read-only
 STATUS current
 DESCRIPTION

"A read-only count of CRC-4 errors on the G.Bond/TDIM port during the 15-minute performance history interval.

This object is inhibited during Severely Errored Seconds (SES) and Unavailable Seconds (UAS)."

::= { g9983PortPm15MinEntry 3 }

g9983PortPm15MinIntervalCrc6s OBJECT-TYPE

SYNTAX HCPerfIntervalCount
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION

"A read-only count of CRC-6 errors on the G.Bond/TDIM port during the 15-minute performance history interval.

This object is inhibited during Unavailable Seconds (UAS)."

::= { g9983PortPm15MinEntry 4 }

g9983PortPm15MinIntervalCrc8s OBJECT-TYPE

SYNTAX HCPerfIntervalCount
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION

"A read-only count of CRC-8 errors on the G.Bond/TDIM port during the current 15-minute performance interval.

This object is inhibited during Unavailable Seconds (UAS)."

::= { g9983PortPm15MinEntry 5 }

g9983PortPm15MinIntervalValid OBJECT-TYPE

SYNTAX TruthValue
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION

"A read-only object indicating whether or not this history bucket contains valid data. A valid bucket is reported as true(1) and an invalid bucket as false(2).

If this history bucket is invalid, the BTU-C MUST NOT produce notifications based upon the value of the counters in this bucket.

Note that an implementation may decide not to store invalid history buckets in its database. In such a case, this object is not required, as only valid history buckets are available while invalid history buckets are simply not in the database.

This object partially maps to the TR-159 attribute
aGroupPerf15MinIntervalValid."

REFERENCE

"[TR-159], Section 5.5.1.58"
 ::= { g9983PortPm15MinEntry 6 }

-- Port PM history: 1-day buckets

g9983PortPm1DayTable OBJECT-TYPE

SYNTAX SEQUENCE OF G9983PortPm1DayEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains historical 1-day buckets of Performance
Monitoring information for a G.Bond/TDIM port (a row for each
1-day interval, up to 7 intervals).

Entries in this table MUST be maintained in a persistent manner."

::= { g9983PM 3 }

g9983PortPm1DayEntry OBJECT-TYPE

SYNTAX G9983PortPm1DayEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the G.Bond/TDIM Port historical 1-day PM table.

Each entry represents Performance Monitoring data for such a
port, indexed by the ifIndex, collected during a particular
1-day interval, indexed by the g9983PortPm1DayIntervalIndex."

INDEX { ifIndex, g9983PortPm1DayIntervalIndex }

::= { g9983PortPm1DayTable 1 }

G9983PortPm1DayEntry ::=

```
SEQUENCE {
    g9983PortPm1DayIntervalIndex      Unsigned32,
    g9983PortPm1DayIntervalMoniTime  HCPperfTimeElapsed,
    g9983PortPm1DayIntervalCrc4s     HCPperfIntervalCount,
    g9983PortPm1DayIntervalCrc6s     HCPperfIntervalCount,
    g9983PortPm1DayIntervalCrc8s     HCPperfIntervalCount,
    g9983PortPm1DayIntervalValid     TruthValue
}
```

g9983PortPm1DayIntervalIndex OBJECT-TYPE

SYNTAX Unsigned32 (1..7)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Performance data interval number. 1 is the most recent
previous interval; interval 7 is 7 days ago.

Intervals 2..7 are OPTIONAL.

This object partially maps to the TR-159 attribute
aGroupPerf1DayIntervalNumber."

REFERENCE

"[TR-159], Section 5.5.1.62"
 ::= { g9983PortPmlDayEntry 1 }

g9983PortPmlDayIntervalMoniTime OBJECT-TYPE

SYNTAX HCPperfTimeElapsed

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only count of seconds over which the performance data was actually monitored. This value will be the same as the interval duration (86400 seconds), except in a situation where performance data could not be collected for any reason.

This object partially maps to the TR-159 attribute
aGroupPerf1DayIntervalMoniSecs."

REFERENCE

"[TR-159], Section 5.5.1.64"
 ::= { g9983PortPmlDayEntry 2 }

g9983PortPmlDayIntervalCrc4s OBJECT-TYPE

SYNTAX HCPperfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only count of CRC-4 errors on the G.Bond/TDIM port during the 1-day performance history interval.

This object is inhibited during Severely Errored Seconds (SES) and Unavailable Seconds (UAS)."

::= { g9983PortPmlDayEntry 3 }

g9983PortPmlDayIntervalCrc6s OBJECT-TYPE

SYNTAX HCPperfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only count of CRC-6 errors on the G.Bond/TDIM port during the 1-day performance history interval.

This object is inhibited during Unavailable Seconds (UAS)."

::= { g9983PortPmlDayEntry 4 }

```

g9983PortPm1DayIntervalCrc8s OBJECT-TYPE
    SYNTAX      HCPperfIntervalCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "A read-only count of CRC-8 errors on the G.Bond/TDIM port
        during the current 1-day performance interval.

        This object is inhibited during Unavailable Seconds (UAS).
        ::= { g9983PortPm1DayEntry 5 }

g9983PortPm1DayIntervalValid OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "A read-only object indicating whether or not this history
        bucket contains valid data. A valid bucket is reported as
        true(1) and an invalid bucket as false(2).
        If this history bucket is invalid, the BTU-C MUST NOT produce
        notifications based upon the value of the counters in this
        bucket.
        Note that an implementation may decide not to store invalid
        history buckets in its database. In such a case, this object
        is not required, as only valid history buckets are available
        while invalid history buckets are simply not in the database.

        This object partially maps to the TR-159 attribute
        aGroupPerf1DayIntervalValid."
    REFERENCE
        "[TR-159], Section 5.5.1.63"
    ::= { g9983PortPm1DayEntry 6 }

-- Services PM

g9983SvcPmCurTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF G9983SvcPmCurEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This table contains current Performance Monitoring information
        for the services of a G.Bond/TDIM port.
        This table contains live data from the equipment and as such is
        NOT persistent."
    ::= { g9983PM 4 }

g9983SvcPmCurEntry OBJECT-TYPE
    SYNTAX      G9983SvcPmCurEntry

```

```

MAX-ACCESS not-accessible
STATUS current
DESCRIPTION

```

```

    "An entry in the G.Bond/TDIM Services PM table.
    Each entry represents a service, indexed by the
    g9983SvcIdx, in a G.Bond/TDIM port, indexed by the
    ifIndex."

```

```

INDEX { ifIndex, g9983SvcIdx }
 ::= { g9983SvcPmCurTable 1 }

```

```

G9983SvcPmCurEntry ::=

```

```

SEQUENCE {
    g9983SvcPmCur15MinValidIntervals    HCPperfValidIntervals,
    g9983SvcPmCur15MinInvalidIntervals  HCPperfInvalidIntervals,
    g9983SvcPmCur15MinTimeElapsed      HCPperfTimeElapsed,
    g9983SvcPmCur15MinDowns            HCPperfCurrentCount,
    g9983SvcPmCur1DayValidIntervals     Unsigned32,
    g9983SvcPmCur1DayInvalidIntervals   Unsigned32,
    g9983SvcPmCur1DayTimeElapsed        HCPperfTimeElapsed,
    g9983SvcPmCur1DayDowns              HCPperfCurrentCount
}

```

```

g9983SvcPmCur15MinValidIntervals OBJECT-TYPE

```

```

SYNTAX      HCPperfValidIntervals
MAX-ACCESS  read-only
STATUS      current

```

```

DESCRIPTION

```

```

    "A read-only number of 15-minute intervals for which the
    performance data was collected. The value of this object will
    be 96 or the maximum number of 15-minute history intervals
    collected by the implementation, unless the measurement was
    (re)started recently, in which case the value will be the
    number of complete 15-minute intervals for which there are at
    least some data.

```

```

    In certain cases, it is possible that some intervals are
    unavailable. In this case, this object reports the maximum
    interval number for which data is available.

```

```

    This object partially maps to the TR-159 attribute
    aGroupPerf15MinValidIntervals."

```

```

REFERENCE

```

```

    "[TR-159], Section 5.5.1.32"

```

```

 ::= { g9983SvcPmCurEntry 1 }

```

```

g9983SvcPmCur15MinInvalidIntervals OBJECT-TYPE

```

```

SYNTAX      HCPperfInvalidIntervals
MAX-ACCESS  read-only
STATUS      current

```


DESCRIPTION

"A read-only number of 15-minute intervals for which the performance data was not always available. The value will typically be zero, except in cases where the data for some intervals are not available.

This object partially maps to the TR-159 attribute aGroupPerf15MinInvalidIntervals."

REFERENCE

"[TR-159], Section 5.5.1.33"
 ::= { g9983SvcPmCurEntry 2 }

g9983SvcPmCur15MinTimeElapsed OBJECT-TYPE

SYNTAX HCPerfTimeElapsed

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only count of seconds that have elapsed since the beginning of the current 15-minute performance interval.

This object partially maps to the TR-159 attribute aGroupPerfCurr15MinTimeElapsed."

REFERENCE

"[TR-159], Section 5.5.1.34"
 ::= { g9983SvcPmCurEntry 3 }

g9983SvcPmCur15MinDowns OBJECT-TYPE

SYNTAX HCPerfCurrentCount

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only count of seconds in the current 15-minute performance interval during which a particular TDIM service was 'down', as indicated by the g9983OperSvcState object.

This object is inhibited during Unavailable Seconds (UAS)."
 ::= { g9983SvcPmCurEntry 4 }

g9983SvcPmCur1DayValidIntervals OBJECT-TYPE

SYNTAX Unsigned32 (0..7)

UNITS "days"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only number of 1-day performance history intervals for which the data was collected. The value of this object will be 7 or the maximum number of 1-day history intervals collected by the implementation, unless the measurement was (re)started recently, in which case the value will be the number of complete 1-day intervals for which there are at least some data. In certain cases, it is possible that some intervals are unavailable. In this case, this object reports the maximum interval number for which data is available."

REFERENCE

"[TR-159], Section 5.5.1.45"
 ::= { g9983SvcPmCurEntry 5 }

g9983SvcPmCur1DayInvalidIntervals OBJECT-TYPE

SYNTAX Unsigned32 (0..7)
 UNITS "days"
 MAX-ACCESS read-only
 STATUS current

DESCRIPTION

"A read-only number of 1-day performance history intervals for which the performance data was not always available. The value will typically be zero, except in cases where the data for some intervals are not available."

REFERENCE

"[TR-159], Section 5.5.1.46"
 ::= { g9983SvcPmCurEntry 6 }

g9983SvcPmCur1DayTimeElapsed OBJECT-TYPE

SYNTAX HCPerfTimeElapsed
 UNITS "seconds"
 MAX-ACCESS read-only
 STATUS current

DESCRIPTION

"A read-only count of seconds that have elapsed since the beginning of the current 1-day performance interval."

REFERENCE

"[TR-159], Section 5.5.1.47"
 ::= { g9983SvcPmCurEntry 7 }

g9983SvcPmCur1DayDowns OBJECT-TYPE

SYNTAX HCPerfCurrentCount
 UNITS "seconds"
 MAX-ACCESS read-only
 STATUS current

DESCRIPTION

"A read-only count of seconds in the current 1-day performance interval during which a particular TDIM service was 'down', as indicated by the g9983OperSvcState object.

This object is inhibited during Unavailable Seconds (UAS)."

```
::= { g9983SvcPmCurEntry 8 }
```

```
-- Service PM history: 15-min buckets
```

g9983SvcPm15MinTable OBJECT-TYPE

```
SYNTAX SEQUENCE OF G9983SvcPm15MinEntry
```

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

```
STATUS current
```

DESCRIPTION

"This table contains historical 15-minute buckets of Performance Monitoring information for the services of a G.Bond/TDIM port (a multi-dimensional row for each 15-minute interval, up to 96 intervals).

Entries in this table MUST be maintained in a persistent manner."

```
::= { g9983PM 5 }
```

g9983SvcPm15MinEntry OBJECT-TYPE

```
SYNTAX G9983SvcPm15MinEntry
```

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

```
STATUS current
```

DESCRIPTION

"An entry in the G.Bond/TDIM Service historical 15-minute PM table.

Each entry represents Performance Monitoring data for a particular service, indexed by the g9983SvcIdx, in a G.Bond TDIM port, indexed by the ifIndex, collected during a particular 15-minute interval, indexed by the g9983SvcPm15MinIntervalIndex."

```
INDEX { ifIndex, g9983SvcIdx,
        g9983SvcPm15MinIntervalIndex }
```

```
::= { g9983SvcPm15MinTable 1 }
```

G9983SvcPm15MinEntry ::=

```
SEQUENCE {
    g9983SvcPm15MinIntervalIndex      Unsigned32,
    g9983SvcPm15MinIntervalMoniTime   HCPerfTimeElapsed,
    g9983SvcPm15MinIntervalDowns     HCPerfIntervalCount,
    g9983SvcPm15MinIntervalValid     TruthValue
}
```

```

g9983SvcPm15MinIntervalIndex OBJECT-TYPE
    SYNTAX      Unsigned32 (1..96)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Performance data interval number. 1 is the most recent
        previous interval; interval 96 is 24 hours ago.
        Intervals 2..96 are OPTIONAL.

        This object partially maps to the TR-159 attribute
        aGroupPerf15MinIntervalNumber."
    REFERENCE
        "[TR-159], Section 5.5.1.57"
    ::= { g9983SvcPm15MinEntry 1 }

g9983SvcPm15MinIntervalMoniTime OBJECT-TYPE
    SYNTAX      HCPerfTimeElapsed
    UNITS       "seconds"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "A read-only count of seconds over which the performance data
        was actually monitored. This value will be the same as the
        interval duration (900 seconds), except in a situation where
        performance data could not be collected for any reason."
    ::= { g9983SvcPm15MinEntry 2 }

g9983SvcPm15MinIntervalDowns OBJECT-TYPE
    SYNTAX      HCPerfIntervalCount
    UNITS       "seconds"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "A read-only count of seconds in the 15-minute performance
        history interval during which a particular TDIM service was
        'down', as indicated by the g9983OperSvcState object.

        This object is inhibited during Unavailable Seconds (UAS)."
    ::= { g9983SvcPm15MinEntry 3 }

g9983SvcPm15MinIntervalValid OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "A read-only object indicating whether or not this history
        bucket contains valid data. A valid bucket is reported as
        true(1) and an invalid bucket as false(2).

```

If this history bucket is invalid, the BTU-C MUST NOT produce notifications based upon the value of the counters in this bucket.

Note that an implementation may decide not to store invalid history buckets in its database. In such a case, this object is not required, as only valid history buckets are available while invalid history buckets are simply not in the database.

This object partially maps to the TR-159 attribute aGroupPerf15MinIntervalValid."

REFERENCE

"[TR-159], Section 5.5.1.58"
 ::= { g9983SvcPm15MinEntry 4 }

-- Service PM history: 1-day buckets

g9983SvcPm1DayTable OBJECT-TYPE

SYNTAX SEQUENCE OF G9983SvcPm1DayEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains historical 1-day buckets of Performance Monitoring information for the services of a G.Bond/TDIM port (a multi-dimensional row for each 1-day interval, up to 7 intervals).

Entries in this table MUST be maintained in a persistent manner."

::= { g9983PM 6 }

g9983SvcPm1DayEntry OBJECT-TYPE

SYNTAX G9983SvcPm1DayEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the G.Bond/TDIM Service historical 1-day PM table. Each entry represents Performance Monitoring data for a particular service, indexed by the g9983SvcIdx, defined in a G.Bond/TDIM port, indexed by the ifIndex, collected during a particular 1-day interval, indexed by the g9983SvcPm1DayIntervalIndex."

INDEX { ifIndex, g9983SvcIdx,
 g9983SvcPm1DayIntervalIndex }

::= { g9983SvcPm1DayTable 1 }

G9983SvcPm1DayEntry ::=

SEQUENCE {
 g9983SvcPm1DayIntervalIndex Unsigned32,
 g9983SvcPm1DayIntervalMoniTime HCPperfTimeElapsed,
 g9983SvcPm1DayIntervalDowns HCPperfIntervalCount,

```

    g9983SvcPmlDayIntervalValid      TruthValue
  }

g9983SvcPmlDayIntervalIndex  OBJECT-TYPE
SYNTAX      Unsigned32 (1..7)
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "Performance data interval number. 1 is the most recent
    previous interval; interval 7 is 7 days ago.
    Intervals 2..7 are OPTIONAL.

    This object partially maps to the TR-159 attribute
    aGroupPerf1DayIntervalNumber."
REFERENCE
    "[TR-159], Section 5.5.1.62"
 ::= { g9983SvcPmlDayEntry 1 }

g9983SvcPmlDayIntervalMoniTime  OBJECT-TYPE
SYNTAX      HCPerfTimeElapsed
UNITS       "seconds"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "A read-only count of seconds over which the performance data
    was actually monitored. This value will be the same as the
    interval duration (86400 seconds), except in a situation where
    performance data could not be collected for any reason.

    This object partially maps to the TR-159 attribute
    aGroupPerf1DayIntervalMoniSecs."
REFERENCE
    "[TR-159], Section 5.5.1.64"
 ::= { g9983SvcPmlDayEntry 2 }

g9983SvcPmlDayIntervalDowns  OBJECT-TYPE
SYNTAX      HCPerfIntervalCount
UNITS       "seconds"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "A read-only count of seconds in the 1-day performance history
    interval during which a particular TDIM service was 'down',
    as indicated by the g9983OperSvcState object.

    This object is inhibited during Unavailable Seconds (UAS)."
 ::= { g9983SvcPmlDayEntry 3 }

```

```

g9983SvcPmlDayIntervalValid OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "A read-only object indicating whether or not this history
        bucket contains valid data.  A valid bucket is reported as
        true(1) and an invalid bucket as false(2).
        If this history bucket is invalid, the BTU-C MUST NOT produce
        notifications based upon the value of the counters in this
        bucket.
        Note that an implementation may decide not to store invalid
        history buckets in its database.  In such a case, this object
        is not required, as only valid history buckets are available
        while invalid history buckets are simply not in the database.

        This object partially maps to the TR-159 attribute
        aGroupPerf1DayIntervalValid."
    REFERENCE
        "[TR-159], Section 5.5.1.63"
        ::= { g9983SvcPmlDayEntry 4 }

```

```

--
-- Conformance Statements
--

```

```

g9983Groups          OBJECT IDENTIFIER
    ::= { g9983Conformance 1 }

```

```

g9983Compliances    OBJECT IDENTIFIER
    ::= { g9983Conformance 2 }

```

```

-- Object Groups

```

```

g9983BasicGroup     OBJECT-GROUP
    OBJECTS {
        g9983PortConfAdminServices,
        g9983PortStatCrc4Errors,
        g9983PortStatCrc6Errors,
        g9983PortStatCrc8Errors,
        g9983PortCapFecSupported,
        g9983OperSvcIdx,
        g9983OperSvcState,
        g9983SvcIfIdx,
        g9983SvcType,
    }

```

```

    g9983SvcSize,
    g9983SvcRowStatus,
    g9983PortStatFltStatus
}
STATUS          current
DESCRIPTION
    "A collection of objects representing management information
    for G.Bond/TDIM ports."
 ::= { g9983Groups 1 }

g9983FecGroup OBJECT-GROUP
OBJECTS {
    g9983PortCapFecSupported,
    g9983PortConfFecAdminState,
    g9983PortStatFecOperState,
    g9983PortConfFecWordSize,
    g9983PortConfFecRedundancySize,
    g9983PortConfFecInterleaverType,
    g9983PortConfFecInterleaverDepth,
    g9983PortCapFecMaxWordSize,
    g9983PortCapFecMaxRedundancySize,
    g9983PortCapFecInterleaverTypeSupported,
    g9983PortCapFecMaxInterleaverDepth
}
STATUS          current
DESCRIPTION
    "A collection of objects supporting the OPTIONAL Forward Error
    Correction (FEC) and Interleaver function in G.Bond/TDIM
    ports."
 ::= { g9983Groups 2 }

g9983AlarmConfGroup OBJECT-GROUP
OBJECTS {
    g9983PortConfSvcUpDownEnable
}
STATUS          current
DESCRIPTION
    "A collection of objects required for configuration of alarm
    thresholds and notifications in G.Bond/TDIM ports."
 ::= { g9983Groups 3 }

g9983NotificationGroup NOTIFICATION-GROUP
NOTIFICATIONS {
    g9983SvcUp,
    g9983SvcDown
}
STATUS          current

```


DESCRIPTION

"This group supports notifications of significant conditions associated with G.Bond/TDIM ports."

```
::= { g9983Groups 4 }
```

g9983PerfCurrGroup OBJECT-GROUP

```
OBJECTS {
  g9983PortPmCurl5MinValidIntervals,
  g9983PortPmCurl5MinInvalidIntervals,
  g9983PortPmCurl5MinTimeElapsed,
  g9983PortPmCurl5MinCrc4s,
  g9983PortPmCurl5MinCrc6s,
  g9983PortPmCurl5MinCrc8s,
  g9983PortPmCurl1DayValidIntervals,
  g9983PortPmCurl1DayInvalidIntervals,
  g9983PortPmCurl1DayTimeElapsed,
  g9983PortPmCurl1DayCrc4s,
  g9983PortPmCurl1DayCrc6s,
  g9983PortPmCurl1DayCrc8s,
  g9983SvcPmCurl5MinValidIntervals,
  g9983SvcPmCurl5MinInvalidIntervals,
  g9983SvcPmCurl5MinTimeElapsed,
  g9983SvcPmCurl5MinDowns,
  g9983SvcPmCurl1DayValidIntervals,
  g9983SvcPmCurl1DayInvalidIntervals,
  g9983SvcPmCurl1DayTimeElapsed,
  g9983SvcPmCurl1DayDowns
}
```

```
STATUS current
```

DESCRIPTION

"A collection of objects supporting OPTIONAL current Performance Monitoring information for G.Bond/TDIM ports."

```
::= { g9983Groups 5 }
```

g9983Perf15MinGroup OBJECT-GROUP

```
OBJECTS {
  g9983PortPm15MinIntervalMoniTime,
  g9983PortPm15MinIntervalCrc4s,
  g9983PortPm15MinIntervalCrc6s,
  g9983PortPm15MinIntervalCrc8s,
  g9983PortPm15MinIntervalValid,
  g9983SvcPm15MinIntervalMoniTime,
  g9983SvcPm15MinIntervalDowns,
  g9983SvcPm15MinIntervalValid
}
```

```
STATUS current
```

DESCRIPTION

"A collection of objects supporting OPTIONAL historical Performance Monitoring information for G.Bond/TDIM ports, during previous 15-minute intervals."

::= { g9983Groups 6 }

g9983Perf1DayGroup OBJECT-GROUP

OBJECTS {
 g9983PortPm1DayIntervalMoniTime,
 g9983PortPm1DayIntervalCrc4s,
 g9983PortPm1DayIntervalCrc6s,
 g9983PortPm1DayIntervalCrc8s,
 g9983PortPm1DayIntervalValid,
 g9983SvcPm1DayIntervalMoniTime,
 g9983SvcPm1DayIntervalDowns,
 g9983SvcPm1DayIntervalValid
}

STATUS current

DESCRIPTION

"A collection of objects supporting OPTIONAL historical Performance Monitoring information for G.Bond/TDIM ports, during previous 1-day intervals."

::= { g9983Groups 7 }

-- Compliance Statements

g9983Compliance MODULE-COMPLIANCE

STATUS current

DESCRIPTION

"The compliance statement for G.Bond/TDIM interfaces. Compliance with the following external compliance statements is REQUIRED:

MIB Module	Compliance Statement
-----	-----
IF-MIB	ifCompliance3
GBOND-MIB	gBondCompliance"

MODULE -- this module

MANDATORY-GROUPS {
 g9983BasicGroup,
 g9983AlarmConfGroup,
 g9983NotificationGroup
}

GROUP g9983FecGroup

DESCRIPTION

"Support for this group is only required for implementations supporting the G.Bond/TDIM FEC and Interleaver function."

GROUP g9983PerfCurrGroup

DESCRIPTION

"Support for this group is only required for implementations supporting Performance Monitoring."

GROUP g9983Perf15MinGroup

DESCRIPTION

"Support for this group is only required for implementations supporting historical Performance Monitoring."

GROUP g9983Perf1DayGroup

DESCRIPTION

"Support for this group is only required for implementations supporting historical Performance Monitoring."

::= { g9983Compliances 1 }

END

7. Security Considerations

There are a number of managed 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 Changing of the g9983PortConfAdminServices object may lead to a potential service disruption, by changing a particular service's position (therefore changing its drop priority) or even removing the service from the link altogether.
- o Changing of g9983SvcTable configuration parameters (e.g., g9983SvcType or g9983SvcSize) may lead to a potential service impairment; for example, a TDM service would be dropped if there is not enough actual bandwidth on the bonded link to support this service.
- o Changing of g9983PortConfTable configuration parameters (e.g., g9983PortConfFecAdminState) may lead to anything from link quality and rate degradation to a complete link initialization failure.

Some of the readable objects in this MIB module (i.e., those with MAX-ACCESS other than not-accessible) may be considered sensitive or vulnerable in some network environments since, collectively, they provide information about the performance of network interfaces and can reveal some aspects of their configuration.

In particular, since a bonded xDSL port can be comprised of multiple Unshielded Twisted Pair (UTP) voice-grade copper, located in the same bundle with other pairs belonging to another operator/customer, it is theoretically possible to eavesdrop on a G.Bond transmission, simply by "listening" to cross-talk from the bonded pairs, especially if the operating parameters of the G.Bond link in question are known.

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. These are the tables and objects and their sensitivity/vulnerability:

- o g9983PortStatFecOperState in the g9983PortStatTable indicates whether the FEC function is enabled, which may aid in deciphering the G.Bond/TDIM transmissions.
- o The g9983OperSvcTable provides current operational service configuration, which may aid in deciphering the G.Bond/TDIM transmissions.

SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secure (for example by using IPsec), 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.

Implementations SHOULD provide the security features described by the SNMPv3 framework (see [RFC3410]), and implementations claiming compliance to the SNMPv3 standard MUST include full support for authentication and privacy via the User-based Security Model (USM) [RFC3414] with the AES cipher algorithm [RFC3826]. Implementations MAY also provide support for the Transport Security Model (TSM) [RFC5591] in combination with a secure transport such as SSH [RFC5592] or TLS/DTLS [RFC6353].

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.

8. IANA Considerations

IANA has allocated value 210 as the Object identifier for g9983MIB MODULE-IDENTITY <<http://www.iana.org/>> in the MIB-2 transmission sub-tree.

9. Acknowledgments

This document was produced by the [ADSLMIB] working group.

Special thanks to Dan Romascanu for his meticulous review of this text.

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