                        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.

   This document is a product of the Internet Engineering Task Force
   (IETF). It represents the consensus of the IETF community. It has
   received public review and has been approved for publication by the
   Internet Engineering Steering Group (IESG). Further information on
   Internet Standards is available in Section 2 of RFC 5741.

   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.

Table of Contents

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 ds1,
   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/

      Mailing Lists:
        General Discussion: adslmib@ietf.org
        To Subscribe: adslmib-request@ietf.org
        In Body: subscribe your_email_address

```
   Chair: Menachem Dodge
  Postal: ECI Telecom, Ltd.
          30 Hasivim St.
          Petach-Tikva  4951169
          Israel
   Phone: +972-3-926-8421
   EMail: menachemdodge1@gmail.com

  Editor: Edward Beili
  Postal: Actelis Networks, Inc.
          25 Bazel St., P.O.B. 10173
          Petach-Tikva  49103
          Israel
   Phone: +972-3-924-3491
   EMail: edward.beili@actelis.com"

 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
```

     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   HCPerfValidIntervals,
          g9983PortPmCur15MinInvalidIntervals HCPerfInvalidIntervals,
          g9983PortPmCur15MinTimeElapsed      HCPerfTimeElapsed,
          g9983PortPmCur15MinCrc4s            HCPerfCurrentCount,
          g9983PortPmCur15MinCrc6s            HCPerfCurrentCount,
          g9983PortPmCur15MinCrc8s            HCPerfCurrentCount,
          g9983PortPmCur1DayValidIntervals    Unsigned32,
          g9983PortPmCur1DayInvalidIntervals  Unsigned32,
          g9983PortPmCur1DayTimeElapsed       HCPerfTimeElapsed,
          g9983PortPmCur1DayCrc4s             HCPerfCurrentCount,
          g9983PortPmCur1DayCrc6s             HCPerfCurrentCount,
          g9983PortPmCur1DayCrc8s             HCPerfCurrentCount
        }

    g9983PortPmCur15MinValidIntervals  OBJECT-TYPE
        SYNTAX      HCPerfValidIntervals
        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   HCPerfInvalidIntervals
     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   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"
     ::= { g9983PortPmCurEntry 3 }

   g9983PortPmCur15MinCrc4s OBJECT-TYPE
     SYNTAX   HCPerfCurrentCount
     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}

```
   g9983PortPmCur1DayValidIntervals  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 }

   g9983PortPmCur1DayInvalidIntervals  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 }

   g9983PortPmCur1DayTimeElapsed  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 }

   g9983PortPmCur1DayCrc4s  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   HCPerfTimeElapsed,
          g9983PortPm1DayIntervalCrc4s   HCPerfIntervalCount,
          g9983PortPm1DayIntervalCrc6s   HCPerfIntervalCount,
          g9983PortPm1DayIntervalCrc8s   HCPerfIntervalCount,
          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"
      ::= { g9983PortPm1DayEntry 1 }

   g9983PortPm1DayIntervalMoniTime 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"
      ::= { g9983PortPm1DayEntry 2 }

   g9983PortPm1DayIntervalCrc4s 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 1-day performance history interval.

        This object is inhibited during Severely Errored Seconds (SES)
        and Unavailable Seconds (UAS)."
      ::= { g9983PortPm1DayEntry 3 }

   g9983PortPm1DayIntervalCrc6s 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 1-day performance history interval.

        This object is inhibited during Unavailable Seconds (UAS)."
      ::= { g9983PortPm1DayEntry 4 }

```
g9983PortPm1DayIntervalCrc8s  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 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   HCPerfValidIntervals,
       g9983SvcPmCur15MinInvalidIntervals HCPerfInvalidIntervals,
       g9983SvcPmCur15MinTimeElapsed      HCPerfTimeElapsed,
       g9983SvcPmCur15MinDowns            HCPerfCurrentCount,
       g9983SvcPmCur1DayValidIntervals    Unsigned32,
       g9983SvcPmCur1DayInvalidIntervals  Unsigned32,
       g9983SvcPmCur1DayTimeElapsed       HCPerfTimeElapsed,
       g9983SvcPmCur1DayDowns             HCPerfCurrentCount
     }

   g9983SvcPmCur15MinValidIntervals  OBJECT-TYPE
     SYNTAX      HCPerfValidIntervals
     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      HCPerfInvalidIntervals
     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   HCPerfTimeElapsed,
      g9983SvcPm1DayIntervalDowns   HCPerfIntervalCount,

```
     g9983SvcPm1DayIntervalValid       TruthValue
   }

g9983SvcPm1DayIntervalIndex  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"
  ::= { g9983SvcPm1DayEntry 1 }

g9983SvcPm1DayIntervalMoniTime  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"
  ::= { g9983SvcPm1DayEntry 2 }

g9983SvcPm1DayIntervalDowns  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)."
  ::= { g9983SvcPm1DayEntry 3 }
```

```
   g9983SvcPm1DayIntervalValid  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"
     ::= { g9983SvcPm1DayEntry 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 {
        g9983PortPmCur15MinValidIntervals,
        g9983PortPmCur15MinInvalidIntervals,
        g9983PortPmCur15MinTimeElapsed,
        g9983PortPmCur15MinCrc4s,
        g9983PortPmCur15MinCrc6s,
        g9983PortPmCur15MinCrc8s,
        g9983PortPmCur1DayValidIntervals,
        g9983PortPmCur1DayInvalidIntervals,
        g9983PortPmCur1DayTimeElapsed,
        g9983PortPmCur1DayCrc4s,
        g9983PortPmCur1DayCrc6s,
        g9983PortPmCur1DayCrc8s,
        g9983SvcPmCur15MinValidIntervals,
        g9983SvcPmCur15MinInvalidIntervals,
        g9983SvcPmCur15MinTimeElapsed,
        g9983SvcPmCur15MinDowns,
        g9983SvcPmCur1DayValidIntervals,
        g9983SvcPmCur1DayInvalidIntervals,
        g9983SvcPmCur1DayTimeElapsed,
        g9983SvcPmCur1DayDowns
      }
      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

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   text.

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Author's Address

    Edward Beili
    Actelis Networks
    25 Bazel St.
    Petach-Tikva   49103
    Israel

    Phone: +972-3-924-3491
    EMail: edward.beili@actelis.com