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xDSL multi-pair bonding using Time-Division Inverse Multiplexing (G.Bond/TDIM) MIB
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Abstract

This document defines 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), defined in ITU-T recommendation G.998.3.

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1. Introduction

The Multi-pair bonding using time-division inverse multiplexing (TDIM), a.k.a. G.Bond/TDIM, is specified in ITU-T G.998.3 recommendation [G.998.3], which defines a method for bonding (or aggregating) of multiple xDSL lines (or individual bearer channels in multiple xDSL lines) into a single bi-directional 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 GBOND-MIB [I-D.ietf-adslmib-gbond-mib] 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", "MAY", and "OPTIONAL" in this document are to be interpreted as described in 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: Interfaces Group MIB (IF-MIB) and G.Bond MIB (GBOND-MIB).

4.1. Relationship to 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 G.Bond MIB module

GBOND-MIB [I-D.ietf-adslmib-gbond-mib] module 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 GBOND-MIB and GBOND-TDIM-MIB modules are REQUIRED to manage a G.Bond/TDIM port.

5. MIB Structure

5.1. Overview

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

- gBondTdimPortNotifications - containing notifications (TDIM Service Down/Up).
- gBondTdimPortConfTable - containing objects for configuration of a G.Bond/TDIM port.
- gBondTdimPortCapabilityTable - containing objects reflecting capability of a G.Bond/TDIM port.
- gBondTdimPortStatusTable - containing objects providing overall status information of a G.Bond/TDIM port, complementing the generic status information from the ifTable of IF-MIB and gBondFltStatus of GBOND-MIB.
- gBondTdimServiceTable - containing objects for configuration and status of the services in a G.Bond/TDIM port.
- gBondTdimPM - containing objects for an OPTIONAL Historical Performance Monitoring (PM) of a G.Bond/TDIM port.

5.2. Link Protection Configuration

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 gBondTdimPortConfTable can be used to configure and quiery 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 gBondTdimPortConfTable (gBondTdimAdminServices), gBondTdimServiceTable and gBondTdimOperServiceTable can be used to configure and quiery the configuration of services transported via the G.Bond/TDIM link. The services may be configured independently of the link state (i.e. in- 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 gBondTdimServiceTable, with each row representing a possible service, and then set the actual service configuration using the gBondTdimAdminServices object (a byte-vector of service indices), listing the active services in 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 read-only gBondTdimOperServiceTable, 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 gBondTdimAdminServices object).

The service configuration can only be changed on a BTU-C side.

When configuring the services, please bear in mind that the sum of all the services' bandwidth SHOULD be less 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 to the downstream data rate.

5.3.1. Management of TDM Services and service drop priority during bandwidth degradation

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) positioned in the beginning of the G.Bond/TDIM frame, have higher priority than asynchronous services (Ethernet, ATM, GFP encapsulated), positioned farther away. Within the services of the same type, those with lower position (index) have higher priority.

5.3.2. Service Notifications

This MIB module provides specific Up/Down notifications (gBondTdimServiceUp/gBondTdimServiceDown) 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 (gBondTdimServiceType 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 gBondTdimServicePosition value of 1 would be dropped, while the Ethernet service with a gBondTdimServicePosition value of 2 would remain up.

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 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 intervals SHOULD be aligned with the start of a day.

Counters are not reset when a G.Bond TDIM port is reinitialized, but rather only when the agent is reset or reinitialized (or under specific request outside the scope of this MIB module).

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 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	gBondTdimCrc4Errors
aCRC6Errors	gBondTdimCrc6Errors
aCRC8Errors	gBondTdimCrc8Errors
aFECSupported	gBondTdimFecSupported
oBondTDIM - FEC Package (Optional)	
aFECAdminState	gBondTdimFecAdminState
aFECOperState	gBondTdimFecOperState
aFECWordSize	gBondTdimFecWordSize
aFECRedundancySize	gBondTdimFecRedundancySize
aFECInterleaverType	gBondTdimFecInterleaverType
aFECInterleaverDepth	gBondTdimFecInterleaverDepth
aFECMaxWordSize	gBondTdimFecMaxWordSize
aFECMaxRedundancySize	gBondTdimFecMaxRedundancySize

aFECInterleaverTypesSupported	gBondTdimFecInterleaverTypeSupported
aFECMaxInterleaverDepth	gBondTdimFecMaxInterleaverDepth
oTDIMService - Basic Package (Mandatory)	
aServiceID	gBondTdimServicePosition
aServiceIfIdx	gBondTdimServiceIfIdx
aServiceType	gBondTdimServiceType
aServiceSize	gBondTdimServiceSize
aServiceOperState	gBondTdimServiceOperState
aServiceUpDownEnable	gBondTdimServiceUpDownEnable
nServiceUp	gBondTdimServiceUp
nServiceDown	gBondTdimServiceDown

Table 1: Mapping of TR-159 Managed Objects

6. G.Bond/TDIM MIB Definitions

```
GBOND-TDIM-MIB DEFINITIONS ::= BEGIN

  IMPORTS
    MODULE-IDENTITY,
    OBJECT-TYPE,
    NOTIFICATION-TYPE,
    mib-2,
    Unsigned32,
    Counter32
      FROM SNMPv2-SMI         -- [RFC2578]
    TEXTUAL-CONVENTION,
    RowStatus,
    TruthValue
      FROM SNMPv2-TC          -- [RFC2579]
    MODULE-COMPLIANCE,
    OBJECT-GROUP,
    NOTIFICATION-GROUP
      FROM SNMPv2-CONF        -- [RFC2580]
```

```
    ifIndex,
    InterfaceIndex
      FROM IF-MIB             -- [RFC2863]
    HCPerfCurrentCount,
    HCPerfIntervalCount,
    HCPerfValidIntervals,
    HCPerfInvalidIntervals,
    HCPerfTimeElapsed
      FROM  HC-PerfHist-TC-MIB  -- [RFC3705]
    ;
-----------------------------------------------------------------------
  gBondTdimMIB MODULE-IDENTITY
    LAST-UPDATED "201011270000Z"  -- Nov 27, 2010
    ORGANIZATION "IETF ADSL MIB Working Group"
    CONTACT-INFO
      "WG charter:
        http://www.ietf.org/html.charters/adslmib-charter.html

      Mailing Lists:
        General Discussion: adslmib@ietf.org
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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), defined in ITU-T recommendation G.998.3
      (G.Bond/TDIM).

      This MIB module MUST be used in conjunction with 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
        CO    - Central Office
        CPE   - Customer Premises Equipment
        GBS   - Generic Bonding Sublayer
        GBS-C - Generic Bonded Sub-layer, CO side
        GBS-R - Generic Bonded Sub-layer, RT (or CPE) side
        SNR   - Signal to Noise Ratio

      Copyright (C) The IETF Trust (2010).
      This version of this MIB module is part of RFC YYYY;
      see the RFC itself for full legal notices."

    REVISION    "201011270000Z"  -- Nov 27, 2010
    DESCRIPTION "Initial version, published as RFC YYYY."

      -- EdNote: Replace YYYY with the actual RFC number &
      -- remove this note

    ::= { mib-2 ZZZ }

      -- EdNote: Replace ZZZ with a real OID once it is
      -- allocated & remove this note.

   -- Sections of the module
   -- Structured as recommended by [RFC4181], Appendix D

   gBondTdimObjects     OBJECT IDENTIFIER ::= { gBondTdimMIB 1 }

   gBondTdimConformance OBJECT IDENTIFIER ::= { gBondTdimMIB 2 }

   -- Groups in the module

   gBondTdimPort        OBJECT IDENTIFIER ::= { gBondTdimObjects 1 }

   -- Textual Conventions

   GBondTdimServiceIndex ::= 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 are assigned contiguously
      starting from 1. The value for each Service MUST remain
      constant at least from one re-initialization of the entity's
      network management system to the next re-initialization."
    SYNTAX       Unsigned32 (1..255)

  GBondTdimServiceIndexList ::= TEXTUAL-CONVENTION
    DISPLAY-HINT "1d:"
    STATUS       current
    DESCRIPTION
      "This textual convention represents a continuous ordered list of
      all the servies 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
      GBondTdimServiceIndex value, identifying a particular service.
      An octet's position reflects the associated service position
      and its priority in the G.Bond/TDIM frame, with 1st octet being
      the 1st 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 that no services have been defined for this port."
    SYNTAX       OCTET STRING (SIZE(0..60))

  GBondTdimServiceOrderIndex ::= 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

  gBondTdimPortNotifications OBJECT IDENTIFIER
    ::= { gBondTdimPort 0 }

  gBondTdimServiceUp NOTIFICATION-TYPE
    OBJECTS {
```

```
      -- ifIndex is not needed here since we are under specific GBS
      gBondTdimServicePosition,
      gBondTdimServiceIfIdx,
      gBondTdimServiceOperState
    }
    STATUS      current
    DESCRIPTION
      "This notification indicates that a service indicated by the
      gBondTdimServicePosition (mapped to a particular interface
      indicated by the gBondTdimServiceIfIdx) in a particular
      G.Bond/TDIM port' is passing traffic.

      This notification MAY be send for the G.Bond/TDIM port, while
      the port is Up, when the gBondTdimServiceOperState object has
      left the Down state.

      Generation of this notification is controlled by the
      gBondTdimServiceUpDownEnable object.

      This object maps to the TR-159 notification nServiceUp."
    REFERENCE
      "[TR-159] 5.5.5.7"
    ::= { gBondTdimPortNotifications 1 }

  gBondTdimServiceDown NOTIFICATION-TYPE
    OBJECTS {
      -- ifIndex is not needed here since we are under specific GBS
      gBondTdimServicePosition,
      gBondTdimServiceIfIdx,
      gBondTdimServiceOperState
    }
    STATUS      current
    DESCRIPTION
      "This notification indicates that a service indicated by the
      gBondTdimServicePosition (mapped to a particular interface
      indicated by the gBondTdimServiceIfIdx) in a particular
      G.Bond/TDIM port' has  stopped passing the traffic.

      This notification MAY be send for the G.Bond/TDIM port, while
      the port is Up, when the gBondTdimServiceOperState object has
      entered the Down state.

      Generation of this notification is controlled by the
      gBondTdimServiceUpDownEnable object.

      This object maps to the TR-159 notification nServiceDown."
    REFERENCE
      "[TR-159] 5.5.5.8"
```

```
    ::= { gBondTdimPortNotifications 2 }

  -- G.Bond/TDIM Port group

  gBondTdimPortConfTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF GBondTdimPortConfEntry
    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"
    ::= { gBondTdimPort 1 }

  gBondTdimPortConfEntry OBJECT-TYPE
    SYNTAX      GBondTdimPortConfEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
      "An entry in the G.Bond/TDIM Port Configuration table.
      Each entry represents an G.Bond/TDIM port indexed by the
      ifIndex. Additional conifguration parameters are available
      via the gBondPortConfEntry of GBOND-MIB.
      Note that an G.Bond/TDIM port runs on top of a single or
      multiple BCE port(s), which are also indexed by ifIndex."
    INDEX  { ifIndex }
    ::= { gBondTdimPortConfTable 1 }

  GBondTdimPortConfEntry ::=
    SEQUENCE {
      gBondTdimFecAdminState        TruthValue,
      gBondTdimFecWordSize          Unsigned32,
      gBondTdimFecRedundancySize    Unsigned32,
      gBondTdimFecInterleaverType   INTEGER,
      gBondTdimFecInterleaverDepth  Unsigned32,
      gBondTdimAdminServices        GBondTdimServiceIndexList,
      gBondTdimServiceUpDownEnable  TruthValue
    }

  gBondTdimFecAdminState  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 SHALL be
```

```
      enabled, if supported by the G.Bond/TDIM port, as indicated
      by the gBondTdimFecSupported object.
      The gBondTdimFecOperState object indicates 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
      writing operation on the gBondTdimFecSupported 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 an GBS-R.

      This object MUST be maintained in a persistent manner.

      This object maps to TR-159/G.998.3 attribute aFECAdminState."
    REFERENCE
      "[TR-159] 5.5.4.5; [G.998.3] Appendix II, B-X"
    ::= { gBondTdimPortConfEntry 1 }

  gBondTdimFecWordSize  OBJECT-TYPE
    SYNTAX      Unsigned32(0|20..255)
    UNITS       "octets"
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
      "A FEC code word size in octets for the G.Bond/TDIM ports
      supporting 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 is disabled
      (via gBondTdimFecAdminState) 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 the
      FEC function is disabled/not supported.

      This object MUST be maintained in a persistent manner.

      This object maps to TR-159/G.998.3 attribute aFECWordSize."
    REFERENCE
      "[TR-159] 5.5.4.7; [G.998.3] Appendix II, B-XI"
    ::= { gBondTdimPortConfEntry 2 }
```

```
   gBondTdimFecRedundancySize  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 the G.Bond/TDIM
       ports supporting 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 is disabled
       (via gBondTdimFecAdminState) 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
       the FEC function is disabled/not supported.

       This object MUST be maintained in a persistent manner.

       This object maps to TR-159/G.998.3 attribute
       aFECRedundancySize."
     REFERENCE
       "[TR-159] 5.5.4.8; [G.998.3] Appendix II, B-XII"
     ::= { gBondTdimPortConfEntry 3 }

   gBondTdimFecInterleaverType  OBJECT-TYPE
     SYNTAX      INTEGER {
       none(0),
       block(1),
       convolution(2)
     }
     MAX-ACCESS  read-write
     STATUS      current
     DESCRIPTION
       "An Interleaver type for the G.Bond/TDIM ports supporting
       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 is disabled
       (via gBondTdimFecAdminState) 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 the FEC
      function is disabled/not supported.

      This object MUST be maintained in a persistent manner.

      This object maps to TR-159/G.998.3 attribute
      aFECInterleaverType."
    REFERENCE
      "[TR-159] 5.5.4.9; [G.998.3] Appendix II, B-XIII"
    ::= { gBondTdimPortConfEntry 4 }

  gBondTdimFecInterleaverDepth  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 the G.Bond/TDIM ports supporting
      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 is disabled
      (via gBondTdimFecAdminState) 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 the FEC
      function is disabled/not supported.

      This object MUST be maintained in a persistent manner.

      This object maps to TR-159/G.998.3 attribute
      aFECInterleaverDepth."
    REFERENCE
      "[TR-159] 5.5.4.10; [G.998.3] Appendix II, B-XIV"
    ::= { gBondTdimPortConfEntry 5 }

  gBondTdimAdminServices  OBJECT-TYPE
    SYNTAX      GBondTdimServiceIndexList
    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 gBondTdimServiceTable.

      The value of this object is a continuous ordered list of up to
      60 indices (gBondTdimServiceIdx) of the active services carried
```

```
       via the G.Bond/TDIM link.

       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 gBondTdimOperServiceTable object.

       This object for a GBS-C port MAY be modified independently of
       the link's state, i.e. in- 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 gBondTdimServiceTable table MUST be rejected.

       This object MUST be maintained in a persistent manner."
     REFERENCE
       "[G.998.3] 10.2.3, 13.3.4.6-13.3.4.11"
     ::= { gBondTdimPortConfEntry 6 }

   gBondTdimServiceUpDownEnable  OBJECT-TYPE
     SYNTAX      TruthValue
     MAX-ACCESS  read-write
     STATUS      current
     DESCRIPTION
       "Indicates whether gBondTdimServiceUp and gBondTdimServiceDown
       notifications should be generated for this interface.

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

       This object MUST be maintained in a persistent manner.

       This object maps to the TR-159 attribute
       aServiceUpDownEnable."
     REFERENCE
       "[TR-159] 5.5.5.6"
     ::= { gBondTdimPortConfEntry 7 }


   gBondTdimPortCapabilityTable OBJECT-TYPE
     SYNTAX      SEQUENCE OF GBondTdimPortCapabilityEntry
     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."
    ::= { gBondTdimPort 2 }

  gBondTdimPortCapabilityEntry OBJECT-TYPE
    SYNTAX      GBondTdimPortCapabilityEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
      "An entry in the G.Bond/TDIM port Capability table.
      Each entry represents an G.Bond/TDIM port indexed by the
      ifIndex. Additional capabilities are available via the
      gBondPortCapabilityEntry of 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 ifIndex."
    INDEX  { ifIndex }
    ::= { gBondTdimPortCapabilityTable 1 }

  GBondTdimPortCapabilityEntry ::=
    SEQUENCE {
      gBondTdimFecSupported            TruthValue,
      gBondTdimFecMaxWordSize          Unsigned32,
      gBondTdimFecMaxRedundancySize    Unsigned32,
      gBondTdimFecInterleaverTypeSupported   INTEGER,
      gBondTdimFecMaxInterleaverDepth  Unsigned32
    }

  gBondTdimFecSupported  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] 5.5.4.4; [G.998.3] Appendix II, B-VI"
    ::= { gBondTdimPortCapabilityEntry 1 }

  gBondTdimFecMaxWordSize  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 the
      G.Bond/TDIM ports with FEC function.

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

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

  gBondTdimFecMaxRedundancySize  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
      the G.Bond/TDIM ports with FEC function.

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

      This object maps to TR-159 attribute
      aFECMaxRedundancySize."
    REFERENCE
      "[TR-159] 5.5.4.12; [G.998.3] Appendix II, B-XII"
    ::= { gBondTdimPortCapabilityEntry 3 }

  gBondTdimFecInterleaverTypeSupported  OBJECT-TYPE
    SYNTAX      INTEGER {
      none(0),
      block(1),
      convolution(2),
      blockConvolution(3)
    }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "Suported Interleaver types for the G.Bond/TDIM ports with
      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 and
                           Convolution Interleaver
```

```
      This object partially maps to TR-159 attribute
      aFECInterleaverTypesSupported."
    REFERENCE
      "[TR-159] 5.5.4.13; [G.998.3] Appendix II, B-XIII"
    ::= { gBondTdimPortCapabilityEntry 4 }

  gBondTdimFecMaxInterleaverDepth  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 the G.Bond/TDIM ports with
      FEC function.

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

      This object partially maps to TR-159 attribute
      aFECMaxInterleaverDepth."
    REFERENCE
      "[TR-159] 5.5.4.14; [G.998.3] Appendix II, B-XIV"
    ::= { gBondTdimPortCapabilityEntry 5 }


  gBondTdimPortStatusTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF GBondTdimPortStatusEntry
    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 IF-MIB and gBondFltStatus of 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."
    ::= { gBondTdimPort 3 }

  gBondTdimPortStatusEntry OBJECT-TYPE
    SYNTAX      GBondTdimPortStatusEntry
    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 an G.Bond GBS port runs on top of a single
```

```
      or multiple BCE port(s), which are also indexed by ifIndex."
    INDEX  { ifIndex }
    ::= { gBondTdimPortStatusTable 1 }

  GBondTdimPortStatusEntry ::=
    SEQUENCE {
      gBondTdimFecOperState           TruthValue,
      gBondTdimFltStatus              BITS,
      gBondTdimCrc4Errors             Counter32,
      gBondTdimCrc6Errors             Counter32,
      gBondTdimCrc8Errors             Counter32
    }

  gBondTdimFecOperState  OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only value, indicating 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 TR-159 attribute aFECOperState."
    REFERENCE
      "[TR-159] 5.5.4.6"
    ::= { gBondTdimPortStatusEntry 1 }

  gBondTdimFltStatus  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 ifOperStatus object
      in IF-MIB and gBondFltStatus in GBOND-MIB."
```

```
      REFERENCE
        "G.998.3 Section 6.3;
         IF-MIB, ifOperStatus; GBOND-MIB, gBondFltStatus"
      ::= { gBondTdimPortStatusEntry 2 }

    gBondTdimCrc4Errors  OBJECT-TYPE
      SYNTAX      Counter32
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
        "The total number of CRC-4 errors (frame header error) 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,
        defined in IF-MIB.

        This object maps to TR-159/G.998.3 attribute aCRC4Errors."
      REFERENCE
        "[TR-159] 5.5.4.1; [G.998.3] Appendix II, B-VII"
      ::= { gBondTdimPortStatusEntry 3 }

    gBondTdimCrc6Errors  OBJECT-TYPE
      SYNTAX      Counter32
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
        "The total number of CRC-6 errors (super-frame error) 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 management system, and at other times
        as indicated by the value of ifCounterDiscontinuityTime,
        defined in IF-MIB.

        This object maps to TR-159/G.998.3 attribute aCRC6Errors."
      REFERENCE
        "[TR-159] 5.5.4.2; [G.998.3] Appendix II, B-VIII"
      ::= { gBondTdimPortStatusEntry 4 }

    gBondTdimCrc8Errors  OBJECT-TYPE
      SYNTAX      Counter32
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
```

```
      "The total number of CRC-8 errors (event/message error) 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,
      defined in IF-MIB.

      This object maps to TR-159/G.998.3 attribute aCRC8Errors."
    REFERENCE
      "[TR-159] 5.5.4.3; [G.998.3] Appendix II, B-IX"
    ::= { gBondTdimPortStatusEntry 5 }


  gBondTdimOperServiceTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF GBondTdimOperServiceEntry
    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 gBondTdimAdminServices object. The number of entries
      (services) in this table is 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."
    ::= { gBondTdimPort 4 }

  gBondTdimOperServiceEntry OBJECT-TYPE
    SYNTAX      GBondTdimOperServiceEntry
    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
      gBondTdimServiceTable. The entry is indexed by ifIndex,
      indicating corresponding G.Bond/TDIM port, and by
      gBondTdimServicePosition (1..60), indicating the corresponding
      service position in the G.Bond/TDIM frame."
    INDEX  { ifIndex, gBondTdimServicePosition }
    ::= { gBondTdimOperServiceTable 1 }

  GBondTdimOperServiceEntry ::=
    SEQUENCE {
      gBondTdimServicePosition      GBondTdimServiceOrderIndex,
      gBondTdimServiceOperIdx       GBondTdimServiceIndex,
```

```
      gBondTdimServiceOperState     INTEGER
    }

  gBondTdimServicePosition OBJECT-TYPE
    SYNTAX      GBondTdimServiceOrderIndex
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "G.Bond/TDIM operational Service position - a unique index,
      indicating relative placement of the associated service
      pointed by gBondTdimServiceOperIdx, within the G.Bond/TDIM frame.

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

      The value of gBondTdimServicePosition for the first
      gBondTdimOperServiceEntry is always 1, incrementing sequentially
      for each consequtive entry, i.e. 2 for the second entry, 3 for
      the third etc.

      This objects maps to TR-159/G.998.3 attribute aServiceID."
    REFERENCE
      "[TR-159] 5.5.5.1; [G.998.3] Appendix II, C-I"
    ::= { gBondTdimOperServiceEntry 1 }

  gBondTdimServiceOperIdx OBJECT-TYPE
    SYNTAX      GBondTdimServiceIndex
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "G.Bond/TDIM operational Service index - a read-only pointer to
      an existing entry in the gBondTdimServiceTable (value of
      gBondTdimServiceIdx), describing a particular service."
    REFERENCE
      ""
    ::= { gBondTdimOperServiceEntry 2 }

  gBondTdimServiceOperState  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 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 TR-159 attribute aServiceOperState."
    REFERENCE
      "[TR-159] 5.5.5.5"
    ::= { gBondTdimOperServiceEntry 3 }


  gBondTdimServiceTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF GBondTdimServiceEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
      "Table of possible Services for a G.Bond/TDIM ports.
      Entries in this table MUST be maintained in a persistent
      manner"
    ::= { gBondTdimPort 5 }

  gBondTdimServiceEntry OBJECT-TYPE
    SYNTAX      GBondTdimServiceEntry
    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 gBondTdimServiceIdx, on a G.Bond/TDIM port,
      indexed by the ifIndex."
    INDEX  { ifIndex, gBondTdimServiceIdx }
    ::= { gBondTdimServiceTable 1 }

  GBondTdimServiceEntry ::=
    SEQUENCE {
      gBondTdimServiceIdx           GBondTdimServiceIndex,
      gBondTdimServiceIfIdx         InterfaceIndex,
      gBondTdimServiceType          INTEGER,
      gBondTdimServiceSize          Unsigned32,
      gBondTdimServiceRowStatus     RowStatus
    }

  gBondTdimServiceIdx OBJECT-TYPE
    SYNTAX      GBondTdimServiceIndex
    MAX-ACCESS  not-accessible
    STATUS      current
```

```
    DESCRIPTION
      "G.Bond/TDIM Service index - a unique index associated with
      a particular service entry."
    REFERENCE
      ""
    ::= { gBondTdimServiceEntry 1 }

  gBondTdimServiceIfIdx OBJECT-TYPE
    SYNTAX      InterfaceIndex
    MAX-ACCESS  read-write
    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 TR-159 attribute aServiceIfIndex."
    REFERENCE
      "[TR-159] 5.5.5.2"
    ::= { gBondTdimServiceEntry 2 }

  gBondTdimServiceType  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-write
    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
      writing operation on the gBondTdimServiceType object of a
      remote GBS-C.

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

      This object MUST be maintained in a persistent manner.

      This object maps to TR-159/G.998.3 attribute aServiceType."
    REFERENCE
      "[TR-159] 5.5.5.3; [G.998.3] Appendix II, C-II"
    ::= { gBondTdimServiceEntry 3 }

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

      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 max. 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 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 (gBondTdimServiceType is nxds0, nxe0,
      ds1, e1, ds3, e3 or clock), the operation MUST be rejected.

      This object MUST be maintained in a persistent manner.

      This object maps to TR-159/G.998.3 attribute aServiceSize."
    REFERENCE
      "[TR-159] 5.5.5.4; [G.998.3] Appendix II, C-III"
```

```
    ::= { gBondTdimServiceEntry 4 }

  gBondTdimServiceRowStatus  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 gBondTdimServiceTable per the
      semantics of RowStatus.

      If an 'active' entry is referenced via gBondTdimServiceOperIdx
      or gBondTdimAdminServices instance or indexes a
      gBondTdimServicePerf*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 'active'
      again."
    ::= { gBondTdimServiceEntry 5 }


  -------------------------------
  -- Performance Monitoring group
  -------------------------------

  gBondTdimPM   OBJECT IDENTIFIER ::= { gBondTdimPort 6 }

  gBondTdimPortPerfCurrTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF GBondTdimPortPerfCurrEntry
    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."
    ::= { gBondTdimPM 1 }

  gBondTdimPortPerfCurrEntry OBJECT-TYPE
    SYNTAX      GBondTdimPortPerfCurrEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
      "An entry in the G.Bond/TDIM Port PM table.
      Each entry represents an G.Bond/TDIM port indexed by the
      ifIndex."
    INDEX  { ifIndex }
```

```
    ::= { gBondTdimPortPerfCurrTable 1 }

  GBondTdimPortPerfCurrEntry ::=
    SEQUENCE {
      gBondTdimPortPerf15MinValidIntervals   HCPerfValidIntervals,
      gBondTdimPortPerf15MinInvalidIntervals HCPerfInvalidIntervals,
      gBondTdimPortPerfCurr15MinTimeElapsed  HCPerfTimeElapsed,
      gBondTdimPortPerfCurr15MinCrc4s        HCPerfCurrentCount,
      gBondTdimPortPerfCurr15MinCrc6s        HCPerfCurrentCount,
      gBondTdimPortPerfCurr15MinCrc8s        HCPerfCurrentCount,
      gBondTdimPortPerf1DayValidIntervals    Unsigned32,
      gBondTdimPortPerf1DayInvalidIntervals  Unsigned32,
      gBondTdimPortPerfCurr1DayTimeElapsed   HCPerfTimeElapsed,
      gBondTdimPortPerfCurr1DayCrc4s         HCPerfCurrentCount,
      gBondTdimPortPerfCurr1DayCrc6s         HCPerfCurrentCount,
      gBondTdimPortPerfCurr1DayCrc8s         HCPerfCurrentCount
    }

  gBondTdimPortPerf15MinValidIntervals  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 minutes 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] 5.5.1.32"
    ::= { gBondTdimPortPerfCurrEntry 1 }

  gBondTdimPortPerf15MinInvalidIntervals  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] 5.5.1.33"
    ::= { gBondTdimPortPerfCurrEntry 2 }

  gBondTdimPortPerfCurr15MinTimeElapsed  OBJECT-TYPE
    SYNTAX      HCPerfTimeElapsed
    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 history interval.

      This object partially maps to the TR-159 attribute
      aGroupPerfCurr15MinTimeElapsed."
    REFERENCE
      "[TR-159] 5.5.1.34"
    ::= { gBondTdimPortPerfCurrEntry 3 }

  gBondTdimPortPerfCurr15MinCrc4s  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 history interval.
      Simultaneous errors on M lines SHOULD be counted M times.

      Note that the total number of CRC-4 errors is indicated by the
      gBondTdimCrc4Errors object.

      This object is inhibited during Severely Errored Seconds (SES)
      or Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.4.1"
    ::= { gBondTdimPortPerfCurrEntry 4}

  gBondTdimPortPerfCurr15MinCrc6s  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 history interval.
      Simultaneous errors on M lines SHOULD be counted 1 time.

      Note that the total number of CRC-6 errors is indicated by the
      gBondTdimCrc6Errors object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.4.2"
    ::= { gBondTdimPortPerfCurrEntry 5}

  gBondTdimPortPerfCurr15MinCrc8s  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 history interval.
      Simultaneous errors on M lines SHOULD be counted M times.

      Note that the total number of CRC-8 errors is indicated by the
      gBondTdimCrc8Errors object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.4.3"
    ::= { gBondTdimPortPerfCurrEntry 6}

  gBondTdimPortPerf1DayValidIntervals  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] 5.5.1.45"
    ::= { gBondTdimPortPerfCurrEntry 7 }

  gBondTdimPortPerf1DayInvalidIntervals  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] 5.5.1.46"
    ::= { gBondTdimPortPerfCurrEntry 8 }

  gBondTdimPortPerfCurr1DayTimeElapsed  OBJECT-TYPE
    SYNTAX      HCPerfTimeElapsed
    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 history interval."
    REFERENCE
      "[TR-159] 5.5.1.47"
    ::= { gBondTdimPortPerfCurrEntry 9 }

  gBondTdimPortPerfCurr1DayCrc4s  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 history interval.

      This object is inhibited during Severely Errored Seconds (SES)
      and Unavailable Seconds (UAS)."
    REFERENCE
      ""
    ::= { gBondTdimPortPerfCurrEntry 10 }

  gBondTdimPortPerfCurr1DayCrc6s  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 history interval.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      ""
    ::= { gBondTdimPortPerfCurrEntry 11 }
```

```
   gBondTdimPortPerfCurr1DayCrc8s  OBJECT-TYPE
     SYNTAX      HCPerfCurrentCount
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
       "A read-only count ofCRC-8 on the G.Bond/TDIM port in
       the current 1-day performance history interval.

       This object is inhibited during Unavailable Seconds (UAS)."
     REFERENCE
       ""
     ::= { gBondTdimPortPerfCurrEntry 12 }

   -- Port PM history: 15-min buckets

   gBondTdimPortPerf15MinTable OBJECT-TYPE
     SYNTAX      SEQUENCE OF GBondTdimPortPerf15MinEntry
     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."
     ::= { gBondTdimPM 2 }

   gBondTdimPortPerf15MinEntry OBJECT-TYPE
     SYNTAX      GBondTdimPortPerf15MinEntry
     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 ifIndex, collected during a particular
       15-minute interval, indexed by
       gBondTdimPortPerf15MinIntervalIndex."
     INDEX  { ifIndex, gBondTdimPortPerf15MinIntervalIndex }
     ::= { gBondTdimPortPerf15MinTable 1 }

   GBondTdimPortPerf15MinEntry ::=
     SEQUENCE {
       gBondTdimPortPerf15MinIntervalIndex      Unsigned32,
       gBondTdimPortPerf15MinIntervalMoniTime   HCPerfTimeElapsed,
       gBondTdimPortPerf15MinIntervalCrc4s      HCPerfIntervalCount,
       gBondTdimPortPerf15MinIntervalCrc6s      HCPerfIntervalCount,
       gBondTdimPortPerf15MinIntervalCrc8s      HCPerfIntervalCount,
       gBondTdimPortPerf15MinIntervalValid      TruthValue
     }
```

```
   gBondTdimPortPerf15MinIntervalIndex  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] 5.5.1.57"
     ::= { gBondTdimPortPerf15MinEntry 1 }

   gBondTdimPortPerf15MinIntervalMoniTime  OBJECT-TYPE
     SYNTAX      HCPerfTimeElapsed
     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."
     ::= { gBondTdimPortPerf15MinEntry 2 }

   gBondTdimPortPerf15MinIntervalCrc4s  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)."
     REFERENCE
       ""
     ::= { gBondTdimPortPerf15MinEntry 3 }

   gBondTdimPortPerf15MinIntervalCrc6s  OBJECT-TYPE
     SYNTAX      HCPerfIntervalCount
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
       "A read-only count of CRC-6 erorrs on the G.Bond/TDIM port
       during the 15-minute performance history interval.
```

```
      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      ""
    ::= { gBondTdimPortPerf15MinEntry 4 }

  gBondTdimPortPerf15MinIntervalCrc8s  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 history interval.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      ""
    ::= { gBondTdimPortPerf15MinEntry 5 }

  gBondTdimPortPerf15MinIntervalValid  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. Valid bucket is reported as true(1)
      and 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 data base. In such case this object is
      not required as only valid history buckets are available while
      invalid history buckets are simply not in the data base.

      This object partially maps to the TR-159 attribute
      aGroupPerf15MinIntervalValid."
    REFERENCE
      "[TR-159] 5.5.1.58"
    ::= { gBondTdimPortPerf15MinEntry 6 }

  -- Port PM history: 1-day buckets

  gBondTdimPortPerf1DayTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF GBondTdimPortPerf1DayEntry
    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."
    ::= { gBondTdimPM 3 }

  gBondTdimPortPerf1DayEntry OBJECT-TYPE
    SYNTAX      GBondTdimPortPerf1DayEntry
    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 port,
      indexed by ifIndex, collected during a particular 1-day
      interval, indexed by gBondTdimPortPerf1DayIntervalIndex."
    INDEX  { ifIndex, gBondTdimPortPerf1DayIntervalIndex }
    ::= { gBondTdimPortPerf1DayTable 1 }

  GBondTdimPortPerf1DayEntry ::=
    SEQUENCE {
      gBondTdimPortPerf1DayIntervalIndex       Unsigned32,
      gBondTdimPortPerf1DayIntervalMoniTime    HCPerfTimeElapsed,
      gBondTdimPortPerf1DayIntervalCrc4s       HCPerfIntervalCount,
      gBondTdimPortPerf1DayIntervalCrc6s       HCPerfIntervalCount,
      gBondTdimPortPerf1DayIntervalCrc8s       HCPerfIntervalCount,
      gBondTdimPortPerf1DayIntervalValid       TruthValue
    }

  gBondTdimPortPerf1DayIntervalIndex  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 24 hours ago.
      Intervals 2..7 are OPTIONAL.

      This object partially maps to the TR-159 attribute
      aGroupPerf1DayIntervalNumber."
    REFERENCE
      "[TR-159] 5.5.1.62"
    ::= { gBondTdimPortPerf1DayEntry 1 }

  gBondTdimPortPerf1DayIntervalMoniTime  OBJECT-TYPE
    SYNTAX      HCPerfTimeElapsed
    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] 5.5.1.64"
    ::= { gBondTdimPortPerf1DayEntry 2 }

  gBondTdimPortPerf1DayIntervalCrc4s  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)."
    REFERENCE
      ""
    ::= { gBondTdimPortPerf1DayEntry 3 }

  gBondTdimPortPerf1DayIntervalCrc6s  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)."
    REFERENCE
      ""
    ::= { gBondTdimPortPerf1DayEntry 4 }

  gBondTdimPortPerf1DayIntervalCrc8s  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 current 1-day performance history interval.

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

```
    ::= { gBondTdimPortPerf1DayEntry 5 }

  gBondTdimPortPerf1DayIntervalValid  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. Valid bucket is reported as true(1)
      and 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 data base. In such case this object is
      not required as only valid history buckets are available while
      invalid history buckets are simply not in the data base.

      This object partially maps to the TR-159 attribute
      aGroupPerf1DayIntervalValid."
    REFERENCE
      "[TR-159] 5.5.1.63"
    ::= { gBondTdimPortPerf1DayEntry 6 }

  -- Services PM

  gBondTdimServicePerfCurrTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF GBondTdimServicePerfCurrEntry
    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."
    ::= { gBondTdimPM 4 }

  gBondTdimServicePerfCurrEntry OBJECT-TYPE
    SYNTAX      GBondTdimServicePerfCurrEntry
    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
      gBondTdimServiceIdx, in a G.Bond/TDIM port, indexed by the
      ifIndex."
    INDEX  { ifIndex, gBondTdimServiceIdx }
    ::= { gBondTdimServicePerfCurrTable 1 }
```

```
   GBondTdimServicePerfCurrEntry ::=
     SEQUENCE {
       gBondTdimServicePerf15MinValidIntervals   HCPerfValidIntervals,
       gBondTdimServicePerf15MinInvalidIntervals HCPerfInvalidIntervals,
       gBondTdimServicePerfCurr15MinTimeElapsed  HCPerfTimeElapsed,
       gBondTdimServicePerfCurr15MinDowns        HCPerfCurrentCount,
       gBondTdimServicePerf1DayValidIntervals    Unsigned32,
       gBondTdimServicePerf1DayInvalidIntervals  Unsigned32,
       gBondTdimServicePerfCurr1DayTimeElapsed   HCPerfTimeElapsed,
       gBondTdimServicePerfCurr1DayDowns         HCPerfCurrentCount
     }

   gBondTdimServicePerf15MinValidIntervals  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 minutes 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] 5.5.1.32"
     ::= { gBondTdimServicePerfCurrEntry 1 }

   gBondTdimServicePerf15MinInvalidIntervals  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] 5.5.1.33"
```

```
    ::= { gBondTdimServicePerfCurrEntry 2 }

  gBondTdimServicePerfCurr15MinTimeElapsed  OBJECT-TYPE
    SYNTAX      HCPerfTimeElapsed
    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 history interval.

      This object partially maps to the TR-159 attribute
      aGroupPerfCurr15MinTimeElapsed."
    REFERENCE
      "[TR-159] 5.5.1.34"
    ::= { gBondTdimServicePerfCurrEntry 3 }

  gBondTdimServicePerfCurr15MinDowns  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of seconds in the current 15-minute
      performance history interval, during which a particular TDIM
      Service was 'down', as indicated by the
      gBondTdimServiceOperState object.

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

  gBondTdimServicePerf1DayValidIntervals  OBJECT-TYPE
    SYNTAX      Unsigned32 (0..7)
    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] 5.5.1.45"
    ::= { gBondTdimServicePerfCurrEntry 5 }
```

```
   gBondTdimServicePerf1DayInvalidIntervals  OBJECT-TYPE
     SYNTAX      Unsigned32 (0..7)
     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] 5.5.1.46"
     ::= { gBondTdimServicePerfCurrEntry 6 }

   gBondTdimServicePerfCurr1DayTimeElapsed  OBJECT-TYPE
     SYNTAX      HCPerfTimeElapsed
     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 history interval."
     REFERENCE
       "[TR-159] 5.5.1.47"
     ::= { gBondTdimServicePerfCurrEntry 7 }

   gBondTdimServicePerfCurr1DayDowns  OBJECT-TYPE
     SYNTAX      HCPerfCurrentCount
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
       "A read-only count of seconds in the current 1-day performance
       history interval, during which a particular TDIM Service was
       'down', as indicated by the gBondTdimServiceOperState object.

       This object is inhibited during Unavailable Seconds (UAS)."
     REFERENCE
       ""
     ::= { gBondTdimServicePerfCurrEntry 8 }

   -- Service PM history: 15-min buckets

   gBondTdimServicePerf15MinTable OBJECT-TYPE
     SYNTAX      SEQUENCE OF GBondTdimServicePerf15MinEntry
     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."
    ::= { gBondTdimPM 5 }

  gBondTdimServicePerf15MinEntry OBJECT-TYPE
    SYNTAX      GBondTdimServicePerf15MinEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
      "An entry in the G.Bond/TDIM Services historical 15-minute PM
      table.
      Each entry represents performance monitoring data for a
      particular Service, indexed by gBondTdimServiceIdx, in a G.Bond
      TDIM port, indexed by ifIndex, collected during a particular
      15-minute interval, indexed by
      gBondTdimServicePerf15MinIntervalIndex."
    INDEX  { ifIndex, gBondTdimServiceIdx,
             gBondTdimServicePerf15MinIntervalIndex }
    ::= { gBondTdimServicePerf15MinTable 1 }

  GBondTdimServicePerf15MinEntry ::=
    SEQUENCE {
      gBondTdimServicePerf15MinIntervalIndex      Unsigned32,
      gBondTdimServicePerf15MinIntervalMoniTime   HCPerfTimeElapsed,
      gBondTdimServicePerf15MinIntervalDowns      HCPerfIntervalCount,
      gBondTdimServicePerf15MinIntervalValid      TruthValue
    }

  gBondTdimServicePerf15MinIntervalIndex  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] 5.5.1.57"
    ::= { gBondTdimServicePerf15MinEntry 1 }

  gBondTdimServicePerf15MinIntervalMoniTime  OBJECT-TYPE
    SYNTAX      HCPerfTimeElapsed
    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."
    ::= { gBondTdimServicePerf15MinEntry 2 }

  gBondTdimServicePerf15MinIntervalDowns  OBJECT-TYPE
    SYNTAX      HCPerfIntervalCount
    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 gBondTdimServiceOperState object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      ""
    ::= { gBondTdimServicePerf15MinEntry 3 }

  gBondTdimServicePerf15MinIntervalValid  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. Valid bucket is reported as true(1)
      and 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 data base. In such case this object is
      not required as only valid history buckets are available while
      invalid history buckets are simply not in the data base.

      This object partially maps to the TR-159 attribute
      aGroupPerf15MinIntervalValid."
    REFERENCE
      "[TR-159] 5.5.1.58"
    ::= { gBondTdimServicePerf15MinEntry 4 }

  -- Service PM history: 1-day buckets

  gBondTdimServicePerf1DayTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF GBondTdimServicePerf1DayEntry
    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."
    ::= { gBondTdimPM 6 }

  gBondTdimServicePerf1DayEntry OBJECT-TYPE
    SYNTAX      GBondTdimServicePerf1DayEntry
    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 gBondTdimServiceIdx, defined in a
      G.Bond/TDIM port, indexed by ifIndex, collected during a
      particular 1-day interval, indexed by
      gBondTdimServicePerf1DayIntervalIndex."
    INDEX  { ifIndex, gBondTdimServiceIdx,
             gBondTdimServicePerf1DayIntervalIndex }
    ::= { gBondTdimServicePerf1DayTable 1 }

  GBondTdimServicePerf1DayEntry ::=
    SEQUENCE {
      gBondTdimServicePerf1DayIntervalIndex       Unsigned32,
      gBondTdimServicePerf1DayIntervalMoniTime    HCPerfTimeElapsed,
      gBondTdimServicePerf1DayIntervalDowns       HCPerfIntervalCount,
      gBondTdimServicePerf1DayIntervalValid       TruthValue
    }

  gBondTdimServicePerf1DayIntervalIndex  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 24 hours ago.
      Intervals 2..7 are OPTIONAL.

      This object partially maps to the TR-159 attribute
      aGroupPerf1DayIntervalNumber."
    REFERENCE
      "[TR-159] 5.5.1.62"
    ::= { gBondTdimServicePerf1DayEntry 1 }

  gBondTdimServicePerf1DayIntervalMoniTime  OBJECT-TYPE
```

```
    SYNTAX      HCPerfTimeElapsed
    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] 5.5.1.64"
    ::= { gBondTdimServicePerf1DayEntry 2 }

  gBondTdimServicePerf1DayIntervalDowns  OBJECT-TYPE
    SYNTAX      HCPerfIntervalCount
    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 gBondTdimServiceOperState object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      ""
    ::= { gBondTdimServicePerf1DayEntry 3 }

  gBondTdimServicePerf1DayIntervalValid  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. Valid bucket is reported as true(1)
      and 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 data base. In such case this object is
      not required as only valid history buckets are available while
      invalid history buckets are simply not in the data base.

      This object partially maps to the TR-159 attribute
      aGroupPerf1DayIntervalValid."
    REFERENCE
```

```
      "[TR-159] 5.5.1.63"
    ::= { gBondTdimServicePerf1DayEntry 4 }


  --
  -- Conformance Statements
  --

   gBondTdimGroups      OBJECT IDENTIFIER
     ::= { gBondTdimConformance 1 }

   gBondTdimCompliances OBJECT IDENTIFIER
     ::= { gBondTdimConformance 2 }

   -- Object Groups

   gBondTdimBasicGroup OBJECT-GROUP
     OBJECTS {
       gBondTdimAdminServices,
       gBondTdimCrc4Errors,
       gBondTdimCrc6Errors,
       gBondTdimCrc8Errors,
       gBondTdimFecSupported,
       gBondTdimServicePosition,
       gBondTdimServiceOperIdx,
       gBondTdimServiceOperState,
       gBondTdimServiceIfIdx,
       gBondTdimServiceType,
       gBondTdimServiceSize,
       gBondTdimServiceRowStatus,
       gBondTdimFltStatus
     }
     STATUS      current
     DESCRIPTION
       "A collection of objects representing management information
       for G.Bond/TDIM ports."
     ::= { gBondTdimGroups 1 }

   gBondTdimFecGroup OBJECT-GROUP
     OBJECTS {
       gBondTdimFecSupported,
       gBondTdimFecAdminState,
       gBondTdimFecOperState,
       gBondTdimFecWordSize,
       gBondTdimFecRedundancySize,
       gBondTdimFecInterleaverType,
       gBondTdimFecInterleaverDepth,
       gBondTdimFecMaxWordSize,
```

```
      gBondTdimFecMaxRedundancySize,
      gBondTdimFecInterleaverTypeSupported,
      gBondTdimFecMaxInterleaverDepth
    }
    STATUS      current
    DESCRIPTION
      "A collection of objects supporting OPTIONAL Forward Error
      Correction (FEC) and Interleaver function in G.Bond/TDIM
      ports."
    ::= { gBondTdimGroups 2 }

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

  gBondTdimNotificationGroup NOTIFICATION-GROUP
    NOTIFICATIONS {
      gBondTdimServiceUp,
      gBondTdimServiceDown
    }
    STATUS      current
    DESCRIPTION
      "This group supports notifications of significant conditions
      associated with G.Bond/TDIM ports."
    ::= { gBondTdimGroups 4 }

  gBondTdimPerfCurrGroup OBJECT-GROUP
    OBJECTS {
      gBondTdimPortPerf15MinValidIntervals,
      gBondTdimPortPerf15MinInvalidIntervals,
      gBondTdimPortPerfCurr15MinTimeElapsed,
      gBondTdimPortPerfCurr15MinCrc4s,
      gBondTdimPortPerfCurr15MinCrc6s,
      gBondTdimPortPerfCurr15MinCrc8s,
      gBondTdimPortPerf1DayValidIntervals,
      gBondTdimPortPerf1DayInvalidIntervals,
      gBondTdimPortPerfCurr1DayTimeElapsed,
      gBondTdimPortPerfCurr1DayCrc4s,
      gBondTdimPortPerfCurr1DayCrc6s,
      gBondTdimPortPerfCurr1DayCrc8s,
      gBondTdimServicePerf15MinValidIntervals,
      gBondTdimServicePerf15MinInvalidIntervals,
```

```
      gBondTdimServicePerfCurr15MinTimeElapsed,
      gBondTdimServicePerfCurr15MinDowns,
      gBondTdimServicePerf1DayValidIntervals,
      gBondTdimServicePerf1DayInvalidIntervals,
      gBondTdimServicePerfCurr1DayTimeElapsed,
      gBondTdimServicePerfCurr1DayDowns
    }
    STATUS      current
    DESCRIPTION
      "A collection of objects supporting OPTIONAL current Performance
      Monitoring information for G.Bond/TDIM ports."
    ::= { gBondTdimGroups 5 }

  gBondTdimPerf15MinGroup OBJECT-GROUP
    OBJECTS {
      gBondTdimPortPerf15MinIntervalMoniTime,
      gBondTdimPortPerf15MinIntervalCrc4s,
      gBondTdimPortPerf15MinIntervalCrc6s,
      gBondTdimPortPerf15MinIntervalCrc8s,
      gBondTdimPortPerf15MinIntervalValid,
      gBondTdimServicePerf15MinIntervalMoniTime,
      gBondTdimServicePerf15MinIntervalDowns,
      gBondTdimServicePerf15MinIntervalValid
    }
    STATUS      current
    DESCRIPTION
      "A collection of objects supporting OPTIONAL historical
      Performance Monitoring information for G.Bond/TDIM ports, during
      previous 15-minute intervals ."
    ::= { gBondTdimGroups 6 }

  gBondTdimPerf1DayGroup OBJECT-GROUP
    OBJECTS {
      gBondTdimPortPerf1DayIntervalMoniTime,
      gBondTdimPortPerf1DayIntervalCrc4s,
      gBondTdimPortPerf1DayIntervalCrc6s,
      gBondTdimPortPerf1DayIntervalCrc8s,
      gBondTdimPortPerf1DayIntervalValid,
      gBondTdimServicePerf1DayIntervalMoniTime,
      gBondTdimServicePerf1DayIntervalDowns,
      gBondTdimServicePerf1DayIntervalValid
    }
    STATUS      current
    DESCRIPTION
      "A collection of objects supporting OPTIONAL historical
      Performance Monitoring information for G.Bond/TDIM ports, during
      previous 1-day intervals ."
    ::= { gBondTdimGroups 7 }
```

```
  -- Compliance Statements

   gBondTdimCompliance 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 {
         gBondTdimBasicGroup,
         gBondTdimAlarmConfGroup,
         gBondTdimNotificationGroup
       }

       GROUP       gBondTdimFecGroup
       DESCRIPTION
         "Support for this group is only required for implementations
         supporting G.Bond FEC and Interleaver function."

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

       GROUP       gBondTdimPerf15MinGroup
       DESCRIPTION
         "Support for this group is only required for implementations
         supporting historical Performance Monitoring."

       GROUP       gBondTdimPerf1DayGroup
       DESCRIPTION
         "Support for this group is only required for implementations
         supporting historical Performance Monitoring."

     ::= { gBondTdimCompliances 1 }
END
```

7. Security Considerations

There is a number of managed objects defined in the GBOND-TDIM-MIB module that have a MAX-ACCESS clause of read-write or read-create. Most objects are writeable only when the link is down. Writing to these objects can have potentially disruptive effects on network operation, for example:

- Changing of gBondTdimAdminServices object MAY lead to a potential service disruption, by changing a particular service' position (therefore changing its drop priority) or even removing the service from the link alltogether.

- Changing of gBondTdimServiceTable configuration paratemers (e.g. gBondTdimServiceType or gBondTdimServiceSize) 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.

- Changing of gBondTdimPortConfTable configuration parameters (e.g. gBondTdimFecAdminState) MAY lead to anything from link quality and rate degradation to a complete link initialization failure.

The user of the GBOND-TDIM-MIB module must therefore be aware that support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations.

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

In such environments it is important to control also GET and NOTIFY access to these objects and possibly even to encrypt their values when sending them over the network via SNMP.

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

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

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

8. IANA Considerations

An object identifier for gBondTdimMIB MODULE-IDENTITY SHALL be allocated by IANA [1] in the MIB-2 transmission sub-tree, before this document is published as an RFC.

9. Acknowledgments

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

10. References

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URIs

[1] <http://www.iana.org/>

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