Network Working Group
Internet-Draft
Intended status: Standards Track
Expires: May 12, 2011

E. Beili
Actelis Networks
M. Morgenstern
ECI Telecom

November 08, 2010

Ethernet-based xDSL multi-pair bonding (G.Bond/Ethernet) MIB
draft-ietf-adslmib-gbond-eth-mib-02.txt

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 Ethernet-based multi-pair bonded xDSL interfaces, defined in ITU-T recommendation G.998.2.

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1. Introduction

The Ethernet-based xDSL Multi-Pair Bonding, a.k.a. G.Bond/Ethernet, is specified in ITU-T G.998.2 recommendation [G.998.2], 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 an Ethernet traffic.

The MIB module, defined in this document, provides G.Bond/Ethernet specific objects for the management of G.998.2 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. Relation 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), G.Bond MIB (GBOND-MIB), and EFM Copper MIB (EFM-CU-MIB).

4.1. Relationship to Interfaces Group MIB module

A G.Bond/Ethernet 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/Ethernet 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, G.994.1 handshake-based discovery, initialization sequence etc.

Both GBOND-MIB and GBOND-ETH-MIB modules are REQUIRED to manage a G.Bond/Ethernet port.

4.2.1. BACP-based Discovery

All G.998 protocols share a G.handshake-based remote Bonding Channel Entity (BCE) discovery. The GBOND-MIB module provides and example of an automatic BCE connection to the corresponding GPS ports of a generic G.998 multi-port Central Office (CO) device, using the G.handshake-based discovery. Ammendment 2 to the ITU-T G.998.2 specification [G.998.2-Amd2], provides an alternative optional Bonding Aggregation Control Protocol (BACP) for in-service discovery, aggregation and pair management.

The following pseudo-code gives the same example of the Discovery and automatic BCE assignment for a multi-GBS G.Bond/Eth CO device, using BACP objects defined in this MIB module, IF-CAP-STACK-MIB and IF-MIB modules [Note that automatic BCE assignment is only shown here for the purposes of the example. Fixed BCE pre-assignment, manual assignment or auto-assignment using an alternative internal algorithm may be chosen by a particular implementation]:

```
   // Go over all GBS ports in the CO device
   FOREACH gbs[i] IN CO_device
   { // Perform discovery and auto-assignment on GBS ports
     // with room for more Channels
     IF ( gbs[i].NumBCEs < gbs[i].BondCapacity )
     { IF ( gbs[i].gBondEthOperCp == cpBACP )
       { // Using BACP

         // Get Eligible Group ID and Remote Group ID
         // from a connected BCE (during BACP
         // initialization each BCE is connected to its own GBS)
         gid = ifStackTable[gbs[i]].bce[0].gBondEthBceEligibleGroupID;
         rgid =
           ifStackTable[gbs[i]].bce[0].gBondEthBcePeerEligibleGroupID;

         // Go over all disconnected Channels, which can
         // pottentially be connected to the GBS
         FOREACH bce[j] IN ifCapStackTable[gbs[i]] AND
                     NOT IN ifStackTable[gbs[i]]  // not connected
         { // Read the Remote Group ID for the selected BCE
           // and compare if with the Remote Group ID of the connected
           // BCE.
           r = bce[j].gBondEthBcePeerEligibleGroupID;
           IF ( r == rgid AND gbs[i].NumBCEs < gbs[i].BondCapacity)
           { // Remote RT_device connected via BCE[j] is a peer
             // for GBS[i] and there room for another BCE in the
             // GBS[i] aggregation group (max. Bonding capacity is
             // not reached yet).
             // Connect this BCE to the GBS (via ifStackTable,
             // ifInvStackTable being inverse of ifStackTable is
             // updated automatically, i.e., gbs[i] is auto-added
             // to ifInvStackTable[bce[j]])
             ADD bce[j] TO ifStackTable[gbs[i]];
             gbs[i].NumBCEs = gbs[i].NumBCEs + 1;
           }
         }
         // At this point we have discovered all local BCEs which
         // are physically connected to the same remote RT_device
         // and connected them to GBS[i]. Go to the next GBS.
         BREAK;
       }
       ELSE
       { // Use default G.HS discovery protocol
         ...
       }
     }
   }
```

An SNMP Agent for a G.Bond device builds ifCapStackTable and its inverse ifInvCapStackTable on device initialiation, according to the cross-connect capabilities of the device. When BACP is used, the gBondEthBceEligibleGroupID object identifying bonding eligibility MUST be automatically updated, whenever the ifCapStackTable/ ifInvCapStackTable are changed.

4.3. Relationship to EFM Copper MIB module

EFM-CU-MIB [RFC5066] module defines objects for managing Ethernet in the First Mile Copper (EFMCu) interfaces 10PASS-TS and 2BASE-TL, defined in IEEE Std 802.3-2005 [802.3]. These interfaces are based on Single-pair High-speed Digital Subscriber Line (SHDSL) [G.991.2] and Very High speed Digital Subscriber Line (VDSL) [G.993.1] technology respectively, and can be optionally aggregated (bonded).

ITU-T G.998.2 specification extends the IEEE 802.3 Clause 61 bonding to work over any xDSL technology, providing the ability to bond individual channels as well as physical lines. It also allows the use of alternative HDLC encapsulation instead of the default 64/ 65-octet encapsulation and adds a new optional Bonding Aggregation Control Protocol (BACP) for in-service discovery, aggregation and pair management instead of the default G.handshake-based bonding protocol, which can not be used in-service, while the link is up.

EFM-CU-MIB can be used to manage all aspects of the EFMCu physical interfaces (PHYs), including a complete (within the scope of the 802.3 standard) management of the SHDSL/VDSL lines. GBOND-MIB and GBOND-ETH-MIB modules on the other hand, provide management objects only for the bonding part, leaving the management of the individual xDSL interfaces (lines/channels) to the respective xDSL-LINE-MIB modules.

Therefore an IEEE 802.3 2BASE-TL/10PASS-TS interface can be managed by either combination of the following MIB modules:

IF-MIB + IF-CAP-STACK-MIB + EtherLike-MIB + MAU-MIB + EFM-CU-MIB

IF-MIB + IF-CAP-STACK-MIB + GBOND-MIB + GBOND-ETH-MIB + HDSL2-SHDSL-LINE-MIB/VDSL-LINE-MIB

Finally, EFM-CU-MIB does not include historical Performance Monitoring (PM), while GBOND-MIB/GBOND-MIB-ETH/xDSL-LINE-MIB combination provides full PM functionality for a bonded link and individual xDSL lines.

5. MIB Structure

5.1. Overview

The main management objects defined in the GBOND-ETH-MIB module are split into 2 groups, structured as recommended by RFC 4181 [RFC4181]:

- gBondEthPort - containing objects for configuration, capabilities, status and PM of G.Bond/Eth ports. Note that the rest of the objects for the Generic Bonded Sub-layer (GBS) port configuration, capabilities, status, notifications and PM, is located in the GBOND-MIB module.

- gBondEthBce - containing objects representing OPTIONAl status information and BACP configuration for each Bonding Channel Entity (BCE). Note that the rest of the objects for the BCE configuration, capabilities, status and notifications, is located in relevant xDSL line MIB modules as well as in the GBOND-MIB module.

5.2. 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 GBS is reinitialized, but rather only when the agent is reset or reinitialized (or under specific request outside the scope of this MIB module).

5.3. Mapping of Broadband Forum TR-159 Managed Objects

This section contains the mapping between relevant managed objects (attributes) defined in [TR-159] and managed objects defined in this document.

TR-159 Managed Object	Corresponding SNMP Object
oBondEth - Basic Package (Mandatory)	
aEthBACPSupported	gBondEthBacpSupported
aEthTcAdminType	gBondEthTcAdminType
aEthTcOperType	gBondEthTcOperType
aEthTcTypesSupported	gBondEthTcTypesSupported
aEthRxErrors	gBondEthRxErrors
aEthRxSmallFragments	gBondEthRxSmallFragments
aEthRxLargeFragments	gBondEthRxLargeFragments
aEthRxBadFragments	gBondEthRxBadFragments
aEthRxLostFragments	gBondEthRxLostFragments
aEthRxLostStarts	gBondEthRxLostStarts
aEthRxLostEnds	gBondEthRxLostEnds
aEthRxOverflows	gBondEthRxOverflows
oBondEth - BACP Package (Optional)	
aEthAdminCP	gBondEthAdminCp
aEthOperCP	gBondEthOperCp
oChannel - BACP package (Optional)	
aChannelEligibleGroupID	gBondEthBceEligibleGroupID
aChannelEligibleStreamID	gBondEthBcePeerEligibleGroupID
oChannel - PM package (Optional)	
aChannelPtmTcRxCodingViolations	gBondEthBceTcInCodingErrors

aChannelPtmTcRxCrcErrors	gBondEthBceTcInCrcErrors

Table 1: Mapping of TR-159 Managed Objects

6. G.Bond/Ethernet MIB Definitions

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

  IMPORTS
    MODULE-IDENTITY,
    OBJECT-TYPE,
    Counter32,
    mib-2,
    Unsigned32
      FROM SNMPv2-SMI         -- [RFC2578]
    TEXTUAL-CONVENTION,
    TruthValue,
    PhysAddress
      FROM SNMPv2-TC          -- [RFC2579]
    MODULE-COMPLIANCE,
    OBJECT-GROUP
      FROM SNMPv2-CONF        -- [RFC2580]
    ifIndex
      FROM IF-MIB             -- [RFC2863]
    HCPerfCurrentCount,
    HCPerfValidIntervals,
    HCPerfInvalidIntervals,
    HCPerfTimeElapsed
      FROM  HC-PerfHist-TC-MIB  -- [RFC3705]
    ;
-------------------------------------------------------------------------
  gBondEthMIB MODULE-IDENTITY
    LAST-UPDATED "201011030000Z"  -- Nov 03, 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
        To Subscribe: adslmib-request@ietf.org
        In Body: subscribe your_email_address

       Chair: Menachem Dodge
      Postal: ECI Telecom, Ltd.
              30 Hasivim St.,
```

Petach-Tikva 49517
Israel
Phone: +972-3-926-8421
EMail: menachem.dodge@ecitele.com

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

Editor: Moti Morgenstern
Postal: ECI Telecom
30 Hasivim St.
Petach-Tikva 49517
Israel
Phone: +972-3-926-6258
EMail: moti.morgenstern@ecitele.com"

```
DESCRIPTION
  "The objects in this MIB module are used to manage the
  Ethernet-based multi-pair bonded xDSL Interfaces, defined in
  ITU-T recommendation G.998.2 (G.Bond/Ethernet).

  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.998.2] refers to:
    ITU-T Recommendation G.998.2: 'Ethernet-based multi-pair
    bonding', January 2005.

  [G.998.2-Amd2] refers to:
    ITU-T G.998.2 Amendment 2, December 2007

  [802.3] refers to:
    IEEE Std 802.3-2005: 'IEEE Standard for Information
    technology - Telecommunications and information exchange
    between systems - Local and metropolitan area networks -
    Specific requirements -
    Part 3: Carrier Sense Multiple Access with Collision
    Detection (CSMA/CD) Access Method and Physical Layer
    Specifications', December 2005.

  [TR-159] refers to:
```

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

      Naming Conventions:
        BACP   - Bonding Aggregation Control Protocol
        BCE    - Bonding Channel Entity
        CO     - Central Office
        CPE    - Customer Premises Equipment
        GBS    - Generic Bonding Sublayer
        HDLC   - High-level Data Link Control
        PTM-TC - Packet Transfer Mode Transmission Convergence
                 (sub-layer)
        SNR    - Signal to Noise Ratio
        TC     - Transmission Convergence (sub-layer)
        UAS    - Unavailable Seconds

      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    "201011030000Z"  -- Nov 03, 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

   gBondEthObjects     OBJECT IDENTIFIER ::= { gBondEthMIB 1 }

   gBondEthConformance OBJECT IDENTIFIER ::= { gBondEthMIB 2 }

   -- Groups in the module

   gBondEthPort        OBJECT IDENTIFIER ::= { gBondEthObjects 1 }

   gBondEthBce         OBJECT IDENTIFIER ::= { gBondEthObjects 2 }

   -------------------------------
   -- Textual Conventions
   -------------------------------
```

```
   GBondEthPtmTcType ::= TEXTUAL-CONVENTION
     STATUS       current
     DESCRIPTION
       "This textual convention represents possible PTM-TC types in
       G.bond/Eth ports. The following values are defined:
         tc6465         - 64/65-octet encapsulation, as defined in
                          [802.3] Clause 61.3.3
         tcHDLC         - HDLC encapsulation, as defined in [G.998.2]
                          Annex B"
     SYNTAX      INTEGER {
       tc6465(1),
       tcHDLC(2)
     }

   GBondEthCpType ::= TEXTUAL-CONVENTION
     STATUS       current
     DESCRIPTION
       "This textual convention represents possible Control Protocol
       types in G.bond/Eth ports. The following values are defined:
         unknown      - the Control Protocol cannot be determined.
         cpHS         - G.handshake-based discovery and aggregation,
                        as specified in [G.998.2]
         cpBACP       - Bonding Aggregation Control Protocol (BACP) -
                        a frame-based discovery, aggregation and link
                        management protocol, as specified in
                        [G.998.2-Amd2] Annex C."
     SYNTAX      INTEGER {
       unknown(0),
       cpHS(1),
       cpBACP(2)
     }

   -------------------------------
   -- GBS Notifications group
   -------------------------------

     -- empty --

   -------------------------------
   -- GBS group
   -------------------------------

   gBondEthPortConfTable OBJECT-TYPE
     SYNTAX      SEQUENCE OF GBondEthPortConfEntry
     MAX-ACCESS  not-accessible
     STATUS      current
     DESCRIPTION
       "Table for Configuration of G.Bond/Eth GBS ports. Entries in
```

```
      this table MUST be maintained in a persistent manner"
    ::= { gBondEthPort 1 }

  gBondEthPortConfEntry OBJECT-TYPE
    SYNTAX      GBondEthPortConfEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
      "An entry in the G.Bond/Eth Port Configuration table.
      Each entry represents an G.Bond Ethernet port indexed by the
      ifIndex.
      Note that an G.Bond/Eth GBS port runs on top of a single
      or multiple BCE port(s), which are also indexed by ifIndex."
    INDEX  { ifIndex }
    ::= { gBondEthPortConfTable 1 }

  GBondEthPortConfEntry ::=
    SEQUENCE {
      gBondEthTcAdminType         GBondEthPtmTcType,
      gBondEthAdminCp             GBondEthCpType
    }

  gBondEthTcAdminType  OBJECT-TYPE
    SYNTAX      GBondEthPtmTcType
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
      "Administrative (desired) PTM-TC encapsulation type of
      G.Bond/Eth port (GBS).
      Possible values are:
        tc6465(1)  - 64/65-octet encapsulation
        tcHDLC(2)  - HDLC encapsulation
      Attempts to set a port to a non-supported PTM-TC encapsulation
      type (see gBondEthTcTypesSupported) SHALL be rejected.

      Changing gBondEthTcAdminType is a traffic disruptive
      operation and as such SHALL be done when the link is Down.
      Attempts to cange this object SHALL be rejected if the link
      is Up or Initializing.

      This object MUST be maintained in a persistent manner.

      This object maps to the TR-159 attribute aEthTcAdminType."
    REFERENCE
      "[TR-159] 5.5.3.4"
    ::= { gBondEthPortConfEntry 1 }

  gBondEthAdminCp  OBJECT-TYPE
```

```
      SYNTAX      GBondEthCpType
      MAX-ACCESS  read-write
      STATUS      current
      DESCRIPTION
        "Administrative (desired) bonding control protocol of
        G.Bond/Eth port (GBS). Possible values are:
          cpHS(1)    - use G.hs-based protocol (default)
          cpBACP(2)  - use frame-based BACP
        Note G.hs-based protocol support is mandatory, according to
        [G.998.2]. Attempts to set a port to a non-supported bonding
        control protocol (e.g. BACP if the value of
        gBondEthBacpSupported is false) SHALL be rejected.

        Changing gBondEthAdminCp is a traffic disruptive operation and
        as such SHALL be done when the link is Down.
        Attempts to cange this object SHALL be rejected if the link
        is Up or Initializing.

        This object MUST be maintained in a persistent manner.

        This object maps to the TR-159 attribute aEthAdminCP."
      REFERENCE
        "[TR-159] 5.5.3.2"
      DEFVAL { 1 }
      ::= { gBondEthPortConfEntry 2 }


    gBondEthPortCapabilityTable OBJECT-TYPE
      SYNTAX      SEQUENCE OF GBondEthPortCapabilityEntry
      MAX-ACCESS  not-accessible
      STATUS      current
      DESCRIPTION
        "Table for Capabilities of G.Bond/Eth Ports. Entries in this
        table MUST be maintained in a persistent manner"
      ::= { gBondEthPort 2 }

    gBondEthPortCapabilityEntry OBJECT-TYPE
      SYNTAX      GBondEthPortCapabilityEntry
      MAX-ACCESS  not-accessible
      STATUS      current
      DESCRIPTION
        "An entry in the G.Bond/Eth Port Capability table.
        Each entry represents an G.Bond 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 ifIndex."
      INDEX  { ifIndex }
      ::= { gBondEthPortCapabilityTable 1 }
```

```
   GBondEthPortCapabilityEntry ::=
     SEQUENCE {
       gBondEthTcTypesSupported         BITS,
       gBondEthBacpSupported            TruthValue
     }

   gBondEthTcTypesSupported  OBJECT-TYPE
     SYNTAX      BITS {
       tc6465(0),
       tcHDLC(1)
     }
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
       "PTM-TC Encapsulation types supported by the G.Bond/Eth port.
       This is a bitmap of possible encapsulation types. The various
       bit positions are:
         tc6465   - GBS is capable of 64/65-octet encapsulation
         tcHDLC   - GBS is capable of HDLC encapsulation

       A desired encapsulation is determined by
       gBondEthTcAdminType, while gBondEthTcOperType reflects the
       current operating mode.

       This object maps to the TR-159 attribute
       aEthTcTypesSupported."
     REFERENCE
       "[TR-159] 5.5.3.6"
     ::= { gBondEthPortCapabilityEntry 1 }

   gBondEthBacpSupported  OBJECT-TYPE
     SYNTAX      TruthValue
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
       "Indicates whether Bonding Aggregation Control Protocol
       (BACP) - frame-based discovery, aggregation and link management
       protocol specified in [G.998.2-Amd2]) is supported by the
       G.Bond/Ethernet port.
       A value of true(1) indicates that the BACP is supported.
       A value of false(2) indicates that the BACP is unsupported.

       The BACP functionality, if supported, can be enabled or
       disabled via gBondEthAdminCP, while gBondEthOperCP
       reflects the current BACP operating mode.

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

```
      "[TR-159] 5.5.3.1, [G.998.2-Amd2] Annex C"
    ::= { gBondEthPortCapabilityEntry 2 }


  gBondEthPortStatusTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF GBondEthPortStatusEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
      "This table provides overall status information of G.Bond
      ports, complementing the generic status information from the
      ifTable of IF-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."
    ::= { gBondEthPort 3 }

  gBondEthPortStatusEntry OBJECT-TYPE
    SYNTAX      GBondEthPortStatusEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
      "An entry in the G.Bond/Eth Port Status table.
      Each entry represents an G.Bond/Eth 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 }
    ::= { gBondEthPortStatusTable 1 }

  GBondEthPortStatusEntry ::=
    SEQUENCE {
      gBondEthTcOperType            GBondEthPtmTcType,
      gBondEthOperCp                GBondEthCpType,
      gBondEthRxErrors              Counter32,
      gBondEthRxSmallFragments      Counter32,
      gBondEthRxLargeFragments      Counter32,
      gBondEthRxBadFragments        Counter32,
      gBondEthRxLostFragments       Counter32,
      gBondEthRxLostStarts          Counter32,
      gBondEthRxLostEnds            Counter32,
      gBondEthRxOverflows           Counter32
    }

  gBondEthTcOperType  OBJECT-TYPE
    SYNTAX      GBondEthPtmTcType
    MAX-ACCESS  read-only
```

```
      STATUS      current
      DESCRIPTION
        "Current operational encapsulation type of the G.Bond/Eth
        port.
        Possible values are:
          tc6465(1)   - GBS uses 64/65-octet encapsulation
          tcHDLC(2)   - GBS uses HDLC encapsulation

        The operational PTM-TC encapsulation type can be configured
        via gBondEthTcAdminType.

        This objects maps to the TR-159 attribute aEthTcOperType."
      REFERENCE
        "[TR-159] 5.5.3.5"
      ::= { gBondEthPortStatusEntry 1 }

    gBondEthOperCp  OBJECT-TYPE
      SYNTAX      GBondEthCpType
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
        "Current operational bonding discovery and aggregation control
        protocol of the G.Bond/Eth port.
        Possible values are:
          unknown(0)  - the protocol cannot be determined, e.g. when
                        the GBS is down
          cpHS(1)     - GBS uses G.hs-based protocol
          cpBACP(2)   - GBS uses frame-based BACP

        The operational discovery and aggregation control protocol can
        be configured via gBondEthAdminCp variable.

        This objects maps to the TR-159 attribute aEthOperCP."
      REFERENCE
        "[TR-159] 5.5.3.3"
      ::= { gBondEthPortStatusEntry 2 }

    gBondEthRxErrors OBJECT-TYPE
      SYNTAX      Counter32
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
        "A number of fragments that have been received across the
        gamma interface and discarded.

        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 the TR-159 attribute aEthRxErrors."
    REFERENCE
      "[TR-159] 5.5.3.7"
    ::= { gBondEthPortStatusEntry 3 }

  gBondEthRxSmallFragments OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A number of fragments smaller than minFragmentSize
      (64 Bytes), that have been received across the gamma
      interface and discarded.

      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 the TR-159 attribute aEthRxSmallFragments."
    REFERENCE
      "[TR-159] 5.5.3.8"
    ::= { gBondEthPortStatusEntry 4 }

  gBondEthRxLargeFragments OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A number of fragments larger than maxFragmentSize
      (512 Bytes), which have been received across the gamma
      interface and discarded.

      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 the TR-159 attribute aEthRxLargeFragments."
    REFERENCE
      "[TR-159] 5.5.3.9"
    ::= { gBondEthPortStatusEntry 5 }

  gBondEthRxBadFragments OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
```

```
      STATUS      current
      DESCRIPTION
        "A number of fragments which do not fit into the sequence
        expected by the frame assembly function, that have been
        received across the gamma interface and discarded (the
        frame buffer is flushed to the next valid frame start).

        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 the TR-159 attribute aEthRxBadFragments."
      REFERENCE
        "[TR-159] 5.5.3.10"
      ::= { gBondEthPortStatusEntry 6 }

    gBondEthRxLostFragments OBJECT-TYPE
      SYNTAX      Counter32
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
        "A number of gaps in the sequence of fragments, which have
        been received across the gamma interface (the frame buffer is
        flushed to the next valid frame start, when fragment/fragments
        expected by the frame assembly function is/are not received).

        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 the TR-159 attribute aEthRxLostFragments."
      REFERENCE
        "[TR-159] 5.5.3.11"
      ::= { gBondEthPortStatusEntry 7 }

    gBondEthRxLostStarts OBJECT-TYPE
      SYNTAX      Counter32
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
        "A number of missing StartOfPacket indicators expected by the
        frame assembly function.

        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 the TR-159 attribute aEthRxLostStarts."
    REFERENCE
      "[TR-159] 5.5.3.12"
    ::= { gBondEthPortStatusEntry 8 }

  gBondEthRxLostEnds OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A number of missing EndOfPacket indicators expected by the
      frame assembly function.

      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 the TR-159 attribute aEthRxLostEnds."
    REFERENCE
      "[TR-159] 5.5.3.13"
    ::= { gBondEthPortStatusEntry 9 }

  gBondEthRxOverflows OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A number of fragments, received across the gamma interface
      and discarded, which would have caused the frame assembly
      buffer to overflow.

      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 the TR-159 attribute aEthRxOverflows."
    REFERENCE
      "[TR-159] 5.5.3.14"
    ::= { gBondEthPortStatusEntry 10 }

  ------------------------------
  -- GBS Performance Monitoring group
  ------------------------------
```

```
   gBondEthPM   OBJECT IDENTIFIER ::= { gBondEthPort 4 }

   gBondEthPortPerfCurrTable OBJECT-TYPE
     SYNTAX      SEQUENCE OF GBondEthPortPerfCurrEntry
     MAX-ACCESS  not-accessible
     STATUS      current
     DESCRIPTION
       "This table contains current Performance Monitoring information
       for a G.Bond/ETth port. This table contains live data from the
       equipment and as such is NOT persistent."
     ::= { gBondEthPM 1 }

   gBondEthPortPerfCurrEntry OBJECT-TYPE
     SYNTAX      GBondEthPortPerfCurrEntry
     MAX-ACCESS  not-accessible
     STATUS      current
     DESCRIPTION
       "An entry in the G.Bond/Eth Port PM table.
       Each entry represents an G.Bond/Eth port indexed by the
       ifIndex."
     INDEX  { ifIndex }
     ::= { gBondEthPortPerfCurrTable 1 }

   GBondEthPortPerfCurrEntry ::=
     SEQUENCE {
       gBondEthPortPerf15MinValidIntervals       HCPerfValidIntervals,
       gBondEthPortPerf15MinInvalidIntervals     HCPerfInvalidIntervals,
       gBondEthPortPerfCurr15MinTimeElapsed      HCPerfTimeElapsed,
       gBondEthPortPerfCurr15MinRxErrors         HCPerfCurrentCount,
       gBondEthPortPerfCurr15MinRxSmallFragments HCPerfCurrentCount,
       gBondEthPortPerfCurr15MinRxLargeFragments HCPerfCurrentCount,
       gBondEthPortPerfCurr15MinRxBadFragments   HCPerfCurrentCount,
       gBondEthPortPerfCurr15MinRxLostFragments  HCPerfCurrentCount,
       gBondEthPortPerfCurr15MinRxLostStarts     HCPerfCurrentCount,
       gBondEthPortPerfCurr15MinRxLostEnds       HCPerfCurrentCount,
       gBondEthPortPerfCurr15MinRxOverflows      HCPerfCurrentCount,
       gBondEthPortPerf1DayValidIntervals        Unsigned32,
       gBondEthPortPerf1DayInvalidIntervals      Unsigned32,
       gBondEthPortPerfCurr1DayTimeElapsed       HCPerfTimeElapsed,
       gBondEthPortPerfCurr1DayRxErrors          HCPerfCurrentCount,
       gBondEthPortPerfCurr1DayRxSmallFragments  HCPerfCurrentCount,
       gBondEthPortPerfCurr1DayRxLargeFragments  HCPerfCurrentCount,
       gBondEthPortPerfCurr1DayRxBadFragments    HCPerfCurrentCount,
       gBondEthPortPerfCurr1DayRxLostFragments   HCPerfCurrentCount,
       gBondEthPortPerfCurr1DayRxLostStarts      HCPerfCurrentCount,
       gBondEthPortPerfCurr1DayRxLostEnds        HCPerfCurrentCount,
       gBondEthPortPerfCurr1DayRxOverflows       HCPerfCurrentCount
     }
```

```
   gBondEthPortPerf15MinValidIntervals  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"
     ::= { gBondEthPortPerfCurrEntry 1 }

   gBondEthPortPerf15MinInvalidIntervals  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"
     ::= { gBondEthPortPerfCurrEntry 2 }

   gBondEthPortPerfCurr15MinTimeElapsed  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"
      ::= { gBondEthPortPerfCurrEntry 3 }

    gBondEthPortPerfCurr15MinRxErrors  OBJECT-TYPE
      SYNTAX      HCPerfCurrentCount
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
        "A read-only count of errored fragments received and discarded
        by a G.Bond/Eth port, during the current 15-minute performance
        history interval.

        Note that the total number of errored fragments is indicated by
        the gBondEthRxErrors object.

        This object is inhibited during Unavailable Seconds (UAS)."
      REFERENCE
        "[TR-159] 5.5.3.7"
      ::= { gBondEthPortPerfCurrEntry 4}

    gBondEthPortPerfCurr15MinRxSmallFragments  OBJECT-TYPE
      SYNTAX      HCPerfCurrentCount
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
        "A read-only count of fragments smaller than minFragmentSize
        (64 Bytes), that have been received and discarded by a
         G.Bond/Eth port, during the current 15-minute performance
         history interval.

        Note that the total number of small fragments is indicated by
        the gBondEthRxSmallFragments object.

        This object is inhibited during Unavailable Seconds (UAS)."
      REFERENCE
        "[TR-159] 5.5.3.8"
      ::= { gBondEthPortPerfCurrEntry 5}

    gBondEthPortPerfCurr15MinRxLargeFragments  OBJECT-TYPE
      SYNTAX      HCPerfCurrentCount
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
        "A read-only count of fragments larger than maxFragmentSize
        (512 Bytes), that have been received and discarded by a
        G.Bond/Eth port, during the current 15-minute performance
        history interval.
```

```
      Note that the total number of large fragments is indicated by
      the gBondEthRxLargeFragments object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.9"
    ::= { gBondEthPortPerfCurrEntry 6}

  gBondEthPortPerfCurr15MinRxBadFragments  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of fragments which do not fit into the
      sequence expected by the frame assembly function, that have been
      receivedand discarded by a G.Bond/Eth port, during the current
      15-minute performance history interval.

      Note that the total number of small fragments is indicated by
      the gBondEthRxBadFragments object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.10"
    ::= { gBondEthPortPerfCurrEntry 7}

  gBondEthPortPerfCurr15MinRxLostFragments  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of gaps in the sequence of fragments,
      expected by the frame assembly function of a G.Bond/Eth port,
      during the current 15-minute performance history interval.

      Note that the total number of the lost fragments is indicated by
      the gBondEthRxLostFragments object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.11"
    ::= { gBondEthPortPerfCurrEntry 8}

  gBondEthPortPerfCurr15MinRxLostStarts  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
```

```
      "A read-only count of missing StartOfPacket indicators expected
      by the frame assembly function of a G.Bond/Eth port, during the
      current 15-minute performance history interval.

      Note that the total number of missing StartOfPacket indicators
      is indicated by the gBondEthRxLostStarts object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.12"
    ::= { gBondEthPortPerfCurrEntry 9}

  gBondEthPortPerfCurr15MinRxLostEnds  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of missing EndOfPacket indicators expected
      by the frame assembly function of a G.Bond/Eth port, during the
      current 15-minute performance history interval.

      Note that the total number of missing EndOfPacket indicators
      is indicated by the gBondEthRxLostEnds object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.13"
    ::= { gBondEthPortPerfCurrEntry 10}

  gBondEthPortPerfCurr15MinRxOverflows  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of fragments that have been received and
      discarded by a G.Bond/Eth port, which would have caused the
      frame assembly buffer to overflow, during the current 15-minute
      performance history interval.

      Note that the total number of fragments which would have caused
      the frame assembly buffer to overflow is indicated by the
      gBondEthRxOverflows object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.14"
    ::= { gBondEthPortPerfCurrEntry 11}
```

```
   gBondEthPortPerf1DayValidIntervals  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"
     ::= { gBondEthPortPerfCurrEntry 12 }

   gBondEthPortPerf1DayInvalidIntervals  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"
     ::= { gBondEthPortPerfCurrEntry 13 }

   gBondEthPortPerfCurr1DayTimeElapsed  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"
     ::= { gBondEthPortPerfCurrEntry 14 }

   gBondEthPortPerfCurr1DayRxErrors  OBJECT-TYPE
     SYNTAX      HCPerfCurrentCount
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
       "A read-only count of errored fragments received and discarded
       by a G.Bond/Eth port, during the current 1-day performance
```

```
      history interval.

      Note that the total number of errored fragments is indicated by
      the gBondEthRxErrors object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.7"
    ::= { gBondEthPortPerfCurrEntry 15 }

  gBondEthPortPerfCurr1DayRxSmallFragments  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of fragments smaller than minFragmentSize
      (64 Bytes), that have been received and discarded by a
      G.Bond/Eth port, during the current 1-day performance history
      interval.

      Note that the total number of small fragments is indicated by
      the gBondEthRxSmallFragments object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.8"
    ::= { gBondEthPortPerfCurrEntry 16}

  gBondEthPortPerfCurr1DayRxLargeFragments  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of fragments larger than maxFragmentSize
      (512 Bytes), that have been received and discarded by a
      G.Bond/Eth port, during the current 1-day performance history
      interval.

      Note that the total number of large fragments is indicated by
      the gBondEthRxLargeFragments object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.9"
    ::= { gBondEthPortPerfCurrEntry 17}

  gBondEthPortPerfCurr1DayRxBadFragments  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
```

```
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of fragments which do not fit into the
      sequence expected by the frame assembly function, that have been
      receivedand discarded by a G.Bond/Eth port, during the current
      1-day performance history interval.

      Note that the total number of small fragments is indicated by
      the gBondEthRxBadFragments object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.10"
    ::= { gBondEthPortPerfCurrEntry 18}

  gBondEthPortPerfCurr1DayRxLostFragments  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of gaps in the sequence of fragments,
      expected by the frame assembly function of a G.Bond/Eth port,
      during the current 1-day performance history interval.

      Note that the total number of the lost fragments is indicated by
      the gBondEthRxLostFragments object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.11"
    ::= { gBondEthPortPerfCurrEntry 19}

  gBondEthPortPerfCurr1DayRxLostStarts  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of missing StartOfPacket indicators expected
      by the frame assembly function of a G.Bond/Eth port, during the
      current 1-day performance history interval.

      Note that the total number of missing StartOfPacket indicators
      is indicated by the gBondEthRxLostStarts object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.12"
```

```
    ::= { gBondEthPortPerfCurrEntry 20}

  gBondEthPortPerfCurr1DayRxLostEnds  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of missing EndOfPacket indicators expected
      by the frame assembly function of a G.Bond/Eth port, during the
      current 1-day performance history interval.

      Note that the total number of missing EndOfPacket indicators
      is indicated by the gBondEthRxLostEnds object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.13"
    ::= { gBondEthPortPerfCurrEntry 21}

  gBondEthPortPerfCurr1DayRxOverflows  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of fragments that have been received and
      discarded by a G.Bond/Eth port, which would have caused the
      frame assembly buffer to overflow, during the current 1-day
      performance history interval.

      Note that the total number of fragments which would have caused
      the frame assembly buffer to overflow is indicated by the
      gBondEthRxOverflows object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.14"
    ::= { gBondEthPortPerfCurrEntry 22}

  -- Port PM history: 15-min buckets

  gBondEthPortPerf15MinTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF GBondEthPortPerf15MinEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
      "This table contains historical 15-minute buckets of Performance
      Monitoring information for a G.Bond/Eth port (a row for each
      15-minute interval, up to 96 intervals).
```

```
      Entries in this table MUST be maintained in a persistent manner."
    ::= { gBondEthPM 2 }

  gBondEthPortPerf15MinEntry OBJECT-TYPE
    SYNTAX      GBondEthPortPerf15MinEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
      "An entry in the G.Bond/Eth Port historical 15-minute PM table.
      Each entry represents performance monitoring data for a
      G.Bond/Eth port, indexed by ifIndex, collected during a
      particular 15-minute interval, indexed by
      gBondEthPortPerf15MinIntervalIndex."
    INDEX  { ifIndex, gBondEthPortPerf15MinIntervalIndex }
    ::= { gBondEthPortPerf15MinTable 1 }

  GBondEthPortPerf15MinEntry ::=
    SEQUENCE {
      gBondEthPortPerf15MinIntervalIndex            Unsigned32,
      gBondEthPortPerf15MinIntervalMoniTime         HCPerfTimeElapsed,
      gBondEthPortPerf15MinIntervalRxErrors         HCPerfCurrentCount,
      gBondEthPortPerf15MinIntervalRxSmallFragments HCPerfCurrentCount,
      gBondEthPortPerf15MinIntervalRxLargeFragments HCPerfCurrentCount,
      gBondEthPortPerf15MinIntervalRxBadFragments   HCPerfCurrentCount,
      gBondEthPortPerf15MinIntervalRxLostFragments  HCPerfCurrentCount,
      gBondEthPortPerf15MinIntervalRxLostStarts     HCPerfCurrentCount,
      gBondEthPortPerf15MinIntervalRxLostEnds       HCPerfCurrentCount,
      gBondEthPortPerf15MinIntervalRxOverflows      HCPerfCurrentCount,
      gBondEthPortPerf15MinIntervalValid            TruthValue
    }

  gBondEthPortPerf15MinIntervalIndex  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"
    ::= { gBondEthPortPerf15MinEntry 1 }

  gBondEthPortPerf15MinIntervalMoniTime  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."
    ::= { gBondEthPortPerf15MinEntry 2 }

  gBondEthPortPerf15MinIntervalRxErrors  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of errored fragments received and discarded
      by a G.Bond/Eth port, during the 15-minute performance history
      interval.

      Note that the total number of errored fragments is indicated by
      the gBondEthRxErrors object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.7"
    ::= { gBondEthPortPerf15MinEntry 3}

  gBondEthPortPerf15MinIntervalRxSmallFragments  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of fragments smaller than minFragmentSize
      (64 Bytes), that have been received and discarded by a
       G.Bond/Eth port, during the 15-minute performance history
       interval.

      Note that the total number of small fragments is indicated by
      the gBondEthRxSmallFragments object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.8"
    ::= { gBondEthPortPerf15MinEntry 4}

  gBondEthPortPerf15MinIntervalRxLargeFragments  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
```

```
    DESCRIPTION
      "A read-only count of fragments larger than maxFragmentSize
      (512 Bytes), that have been received and discarded by a
      G.Bond/Eth port, during the 15-minute performance history
      interval.

      Note that the total number of large fragments is indicated by
      the gBondEthRxLargeFragments object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.9"
    ::= { gBondEthPortPerf15MinEntry 5}

  gBondEthPortPerf15MinIntervalRxBadFragments  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of fragments which do not fit into the
      sequence expected by the frame assembly function, that have been
      receivedand discarded by a G.Bond/Eth port, during the 15-minute
      performance history interval.

      Note that the total number of small fragments is indicated by
      the gBondEthRxBadFragments object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.10"
    ::= { gBondEthPortPerf15MinEntry 6}

  gBondEthPortPerf15MinIntervalRxLostFragments  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of gaps in the sequence of fragments,
      expected by the frame assembly function of a G.Bond/Eth port,
      during the 15-minute performance history interval.

      Note that the total number of the lost fragments is indicated by
      the gBondEthRxLostFragments object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.11"
    ::= { gBondEthPortPerf15MinEntry 7}
```

```
   gBondEthPortPerf15MinIntervalRxLostStarts  OBJECT-TYPE
     SYNTAX      HCPerfCurrentCount
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
       "A read-only count of missing StartOfPacket indicators expected
       by the frame assembly function of a G.Bond/Eth port, during the
       15-minute performance history interval.

       Note that the total number of missing StartOfPacket indicators
       is indicated by the gBondEthRxLostStarts object.

       This object is inhibited during Unavailable Seconds (UAS)."
     REFERENCE
       "[TR-159] 5.5.3.12"
     ::= { gBondEthPortPerf15MinEntry 8}

   gBondEthPortPerf15MinIntervalRxLostEnds  OBJECT-TYPE
     SYNTAX      HCPerfCurrentCount
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
       "A read-only count of missing EndOfPacket indicators expected
       by the frame assembly function of a G.Bond/Eth port, during the
       15-minute performance history interval.

       Note that the total number of missing EndOfPacket indicators
       is indicated by the gBondEthRxLostEnds object.

       This object is inhibited during Unavailable Seconds (UAS)."
     REFERENCE
       "[TR-159] 5.5.3.13"
     ::= { gBondEthPortPerf15MinEntry 9}

   gBondEthPortPerf15MinIntervalRxOverflows  OBJECT-TYPE
     SYNTAX      HCPerfCurrentCount
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
       "A read-only count of fragments that have been received and
       discarded by a G.Bond/Eth port, which would have caused the
       frame assembly buffer to overflow, during the 15-minute
       performance history interval.

       Note that the total number of fragments which would have caused
       the frame assembly buffer to overflow is indicated by the
       gBondEthRxOverflows object.
```

```
      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.14"
    ::= { gBondEthPortPerf15MinEntry 10}

  gBondEthPortPerf15MinIntervalValid  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 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"
    ::= { gBondEthPortPerf15MinEntry 11 }

  -- Port PM history: 1-day buckets

  gBondEthPortPerf1DayTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF GBondEthPortPerf1DayEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
      "This table contains historical 1-day buckets of Performance
      Monitoring information for a G.Bond/Eth port (a row for each
      1-day interval, up to 7 intervals).
      Entries in this table MUST be maintained in a persistent manner."
    ::= { gBondEthPM 3 }

  gBondEthPortPerf1DayEntry OBJECT-TYPE
    SYNTAX      GBondEthPortPerf1DayEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
      "An entry in the G.Bond/Eth 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 gBondEthPortPerf1DayIntervalIndex."
    INDEX  { ifIndex, gBondEthPortPerf1DayIntervalIndex }
    ::= { gBondEthPortPerf1DayTable 1 }

  GBondEthPortPerf1DayEntry ::=
    SEQUENCE {
      gBondEthPortPerf1DayIntervalIndex             Unsigned32,
      gBondEthPortPerf1DayIntervalMoniTime          HCPerfTimeElapsed,
      gBondEthPortPerf1DayIntervalRxErrors          HCPerfCurrentCount,
      gBondEthPortPerf1DayIntervalRxSmallFragments  HCPerfCurrentCount,
      gBondEthPortPerf1DayIntervalRxLargeFragments  HCPerfCurrentCount,
      gBondEthPortPerf1DayIntervalRxBadFragments    HCPerfCurrentCount,
      gBondEthPortPerf1DayIntervalRxLostFragments   HCPerfCurrentCount,
      gBondEthPortPerf1DayIntervalRxLostStarts      HCPerfCurrentCount,
      gBondEthPortPerf1DayIntervalRxLostEnds        HCPerfCurrentCount,
      gBondEthPortPerf1DayIntervalRxOverflows       HCPerfCurrentCount,
      gBondEthPortPerf1DayIntervalValid             TruthValue
    }

  gBondEthPortPerf1DayIntervalIndex  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"
    ::= { gBondEthPortPerf1DayEntry 1 }

  gBondEthPortPerf1DayIntervalMoniTime  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"
```

```
    ::= { gBondEthPortPerf1DayEntry 2 }

  gBondEthPortPerf1DayIntervalRxErrors  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of errored fragments received and discarded
      by a G.Bond/Eth port, during the 1-day performance history
      interval.

      Note that the total number of errored fragments is indicated by
      the gBondEthRxErrors object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.7"
    ::= { gBondEthPortPerf1DayEntry 3 }

  gBondEthPortPerf1DayIntervalRxSmallFragments  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of fragments smaller than minFragmentSize
      (64 Bytes), that have been received and discarded by a
      G.Bond/Eth port, during the 1-day performance history interval.

      Note that the total number of small fragments is indicated by
      the gBondEthRxSmallFragments object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.8"
    ::= { gBondEthPortPerf1DayEntry 4}

  gBondEthPortPerf1DayIntervalRxLargeFragments  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of fragments larger than maxFragmentSize
      (512 Bytes), that have been received and discarded by a
      G.Bond/Eth port, during the 1-day performance history interval.

      Note that the total number of large fragments is indicated by
      the gBondEthRxLargeFragments object.
```

```
      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.9"
    ::= { gBondEthPortPerf1DayEntry 5}

  gBondEthPortPerf1DayIntervalRxBadFragments  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of fragments which do not fit into the
      sequence expected by the frame assembly function, that have been
      receivedand discarded by a G.Bond/Eth port, during the 1-day
      performance history interval.

      Note that the total number of small fragments is indicated by
      the gBondEthRxBadFragments object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.10"
    ::= { gBondEthPortPerf1DayEntry 6}

  gBondEthPortPerf1DayIntervalRxLostFragments  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of gaps in the sequence of fragments,
      expected by the frame assembly function of a G.Bond/Eth port,
      during the 1-day performance history interval.

      Note that the total number of the lost fragments is indicated by
      the gBondEthRxLostFragments object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.11"
    ::= { gBondEthPortPerf1DayEntry 7}

  gBondEthPortPerf1DayIntervalRxLostStarts  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of missing StartOfPacket indicators expected
      by the frame assembly function of a G.Bond/Eth port, during the
      1-day performance history interval.
```

```
      Note that the total number of missing StartOfPacket indicators
      is indicated by the gBondEthRxLostStarts object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.12"
    ::= { gBondEthPortPerf1DayEntry 8}

  gBondEthPortPerf1DayIntervalRxLostEnds  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of missing EndOfPacket indicators expected
      by the frame assembly function of a G.Bond/Eth port, during the
      1-day performance history interval.

      Note that the total number of missing EndOfPacket indicators
      is indicated by the gBondEthRxLostEnds object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.13"
    ::= { gBondEthPortPerf1DayEntry 9}

  gBondEthPortPerf1DayIntervalRxOverflows  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of fragments that have been received and
      discarded by a G.Bond/Eth port, which would have caused the
      frame assembly buffer to overflow, during the 1-day performance
      history interval.

      Note that the total number of fragments which would have caused
      the frame assembly buffer to overflow is indicated by the
      gBondEthRxOverflows object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159] 5.5.3.14"
    ::= { gBondEthPortPerf1DayEntry 10}

  gBondEthPortPerf1DayIntervalValid  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 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"
    ::= { gBondEthPortPerf1DayEntry 11 }

  -------------------------------
  -- BCE group
  -------------------------------

  gBondEthBceConfTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF GBondEthBceConfEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
      "Table for Configuration of G.Bond/Eth specific aspects for the
      Bonding Channel Entity (BCE) ports (modems/channels).

      Entries in this table MUST be maintained in a persistent
      manner."
    ::= { gBondEthBce 1 }

  gBondEthBceConfEntry OBJECT-TYPE
    SYNTAX      GBondEthBceConfEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
      "An entry in the G.Bond/Eth BCE Configuration table.
      Each entry represents G.998.2-specific aspects of a BCE port
      indexed by the ifIndex. Note that an G.Bond/Eth BCE port can be
      stacked below a single GBS port, also indexed by ifIndex."
    INDEX  { ifIndex }
    ::= { gBondEthBceConfTable 1 }

  GBondEthBceConfEntry ::=
    SEQUENCE {
```

```
      gBondEthBceEligibleGroupID      PhysAddress,
      gBondEthBcePeerEligibleGroupID  PhysAddress
    }

  gBondEthBceEligibleGroupID  OBJECT-TYPE
    SYNTAX      PhysAddress (SIZE(0|6))
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
      "BACP Eligible Group ID of a G.Bond/ETH BCE port.
      A universally unique 6-octet long identifier, used by the
      OPTIONAL BACP, to determine bonding eligibility. When two BCEs
      have the same gBondEthBceEligibleGroupID on a system, they are
      eligible to be aggregated on that system. Typically, all BCEs
      on a BTU-R device would be assigned the same
      gBondEthBceEligibleGroupID, to assert that all of the BCEs
      should be in the same bonded group. BCEs with different
      gBondEthBceEligibleGroupID values MUST NOT be connected to the
      same GBS.
      BCEs with the same gBondEthBceEligibleGroupID MAY be connected
      to different GBS ports.
      This object MUST be instantiated during BACP initialization,
      when every BCE belongs to its own GBS. Attempts to change this
      object MUST be rejected if the BCE is aggregated with other
      BCEs, i.e. more than one BCE is connected to the same GBS, or
      if the BCE in question is not eligible to be bonded with other
      BCEs having the same value (e.g. the bonding is limited to a
      single Line Card and BCEs are located on the different Line
      Cards, or BCEs are the channels of the same line).

      Note that bonding eligibility is reflected in the
      ifCapStackTable and its inverse ifInvCapStackTable, and as such
      any modification of gBondEthBceEligibleGroupID MUST be reflected
      in these tables.

      A zero-length octet string SHALL be returned on an attempt to
      read this object on systems not supporting BACP (the value of
      gBondEthBacpSupported for the connected GBS is false).

      This object maps to the TR-159 attribute
      aChannelEligibleGroupID."
    REFERENCE
      "[TR-159] 5.5.7.3"
    ::= { gBondEthBceConfEntry 1 }

  gBondEthBcePeerEligibleGroupID  OBJECT-TYPE
    SYNTAX      PhysAddress (SIZE(0|6))
    MAX-ACCESS  read-only
```

```
      STATUS      current
      DESCRIPTION
        "BACP Eligible Group ID of a peer G.Bond/ETH BCE port, most
        recently received by the local BCE via Local info TLV BACPDU
        message from the peer BCE.
        A universally unique 6-octet long identifier, used by the
        OPTIONAL BACP, to determine bonding eligibility.
        BCEs with different gBondEthBcePeerEligibleGroupID values
        MUST NOT be connected to the same GBS.
        BCEs with the same gBondEthBcePeerEligibleGroupID MAY be
        connected to different GBS ports.

        A zero-length octet string SHALL be returned on an attempt to
        read this object on systems not supporting BACP (the value of
        gBondEthBacpSupported for the connected GBS is false) or when
        no BACPPDUs has been received from the peer BCE.

        This object maps to the G.998.2-Amd2 attribute
        Remote Group ID."
      REFERENCE
        "[G.998.2-Amd2] C.3.1.6"
      ::= { gBondEthBceConfEntry 2 }


    gBondEthBceStatusTable OBJECT-TYPE
      SYNTAX      SEQUENCE OF GBondEthBceStatusEntry
      MAX-ACCESS  not-accessible
      STATUS      current
      DESCRIPTION
        "This table provides common status information of G.Bond/Eth
        BCE ports.

        This table contains live data from the equipment. As such,
        it is NOT persistent."
      ::= { gBondEthBce 2 }

    gBondEthBceStatusEntry OBJECT-TYPE
      SYNTAX      GBondEthBceStatusEntry
      MAX-ACCESS  not-accessible
      STATUS      current
      DESCRIPTION
        "An entry in the G.Bond/Eth BCE Status table.
        Each entry represents common aspects of a G.Bond/Eth BCE port
        indexed by the ifIndex. Note that a BCE port can be stacked
        below a single GBS port, also indexed by ifIndex,
        possibly together with other BCE ports."
      INDEX  { ifIndex }
      ::= { gBondEthBceStatusTable 1 }
```

```
   GBondEthBceStatusEntry ::=
     SEQUENCE {
       gBondEthBceTcInCodingErrors        Counter32,
       gBondEthBceTcInCrcErrors           Counter32
     }

   gBondEthBceTcInCodingErrors OBJECT-TYPE
     SYNTAX      Counter32
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
       "A number of PTM-TC encapsulation errors. This counter is
       incremented for each encapsulation error detected by the
       PTM-TC receive function.

       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 attribute
       aChannelPtmTcRxCodingViolations."
     REFERENCE
       "[TR-159] 5.5.7.8"
     ::= { gBondEthBceStatusEntry 1 }

   gBondEthBceTcInCrcErrors OBJECT-TYPE
     SYNTAX      Counter32
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
       "A number of PTM-TC CRC errors. This counter is incremented
       for each CRC error detected by the PTM-TC receive function.

       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 attribute aChannelPtmTcRxCrcErrors."
     REFERENCE
       "[TR-159] 5.5.7.9"
     ::= { gBondEthBceStatusEntry 2 }


  ------------------------------
  -- Conformance Statements
  ------------------------------
```

```
   gBondEthGroups      OBJECT IDENTIFIER
     ::= { gBondEthConformance 1 }

   gBondEthCompliances OBJECT IDENTIFIER
     ::= { gBondEthConformance 2 }

   -- Object Groups

   gBondEthBasicGroup OBJECT-GROUP
     OBJECTS {
       gBondEthTcTypesSupported,
       gBondEthBacpSupported,
       gBondEthTcAdminType,
       gBondEthTcOperType,
       gBondEthRxErrors,
       gBondEthRxSmallFragments,
       gBondEthRxLargeFragments,
       gBondEthRxBadFragments,
       gBondEthRxLostFragments,
       gBondEthRxLostStarts,
       gBondEthRxLostEnds,
       gBondEthRxOverflows,
       gBondEthBceTcInCodingErrors,
       gBondEthBceTcInCrcErrors
     }
     STATUS      current
     DESCRIPTION
       "A collection of objects representing management information
       for G.Bond/Eth GBS ports."
     ::= { gBondEthGroups 1 }

   gBondEthBacpGroup OBJECT-GROUP
     OBJECTS {
       gBondEthAdminCp,
       gBondEthOperCp,
       gBondEthBceEligibleGroupID,
       gBondEthBcePeerEligibleGroupID

     }
     STATUS      current
     DESCRIPTION
       "A collection of objects representing management information
       for the OPTIONAL frame-based Bonding Aggregation Control
       Protocol (BACP) used by G.Bond/Eth GBS ports instead of the
       mandatory G.hs-based discovery and aggregation protocol."
     ::= { gBondEthGroups 2 }

   gBondEthBceGroup OBJECT-GROUP
```

```
    OBJECTS {
      gBondEthBceTcInCodingErrors,
      gBondEthBceTcInCrcErrors
    }
    STATUS      current
    DESCRIPTION
      "A collection of objects representing OPTIONAL management
      information for G.Bond/Eth BCE ports."
    ::= { gBondEthGroups 3 }

  gBondEthPerfCurrGroup OBJECT-GROUP
    OBJECTS {
      gBondEthPortPerf15MinValidIntervals,
      gBondEthPortPerf15MinInvalidIntervals,
      gBondEthPortPerfCurr15MinTimeElapsed,
      gBondEthPortPerfCurr15MinRxErrors,
      gBondEthPortPerfCurr15MinRxSmallFragments,
      gBondEthPortPerfCurr15MinRxLargeFragments,
      gBondEthPortPerfCurr15MinRxBadFragments,
      gBondEthPortPerfCurr15MinRxLostFragments,
      gBondEthPortPerfCurr15MinRxLostStarts,
      gBondEthPortPerfCurr15MinRxLostEnds,
      gBondEthPortPerfCurr15MinRxOverflows,
      gBondEthPortPerf1DayValidIntervals,
      gBondEthPortPerf1DayInvalidIntervals,
      gBondEthPortPerfCurr1DayTimeElapsed,
      gBondEthPortPerfCurr1DayRxErrors,
      gBondEthPortPerfCurr1DayRxSmallFragments,
      gBondEthPortPerfCurr1DayRxLargeFragments,
      gBondEthPortPerfCurr1DayRxBadFragments,
      gBondEthPortPerfCurr1DayRxLostFragments,
      gBondEthPortPerfCurr1DayRxLostStarts,
      gBondEthPortPerfCurr1DayRxLostEnds,
      gBondEthPortPerfCurr1DayRxOverflows
    }
    STATUS      current
    DESCRIPTION
      "A collection of objects supporting OPTIONAL current Performance
      Monitoring information for G.Bond/Eth ports."
    ::= { gBondEthGroups 4 }

  gBondEthPerf15MinGroup OBJECT-GROUP
    OBJECTS {
      gBondEthPortPerf15MinIntervalMoniTime,
      gBondEthPortPerf15MinIntervalRxErrors,
      gBondEthPortPerf15MinIntervalRxSmallFragments,
      gBondEthPortPerf15MinIntervalRxLargeFragments,
      gBondEthPortPerf15MinIntervalRxBadFragments,
```

```
      gBondEthPortPerf15MinIntervalRxLostFragments,
      gBondEthPortPerf15MinIntervalRxLostStarts,
      gBondEthPortPerf15MinIntervalRxLostEnds,
      gBondEthPortPerf15MinIntervalRxOverflows,
      gBondEthPortPerf15MinIntervalValid
    }
    STATUS      current
    DESCRIPTION
      "A collection of objects supporting OPTIONAL historical
      Performance Monitoring information for G.Bond/Eth ports, during
      previous 15-minute intervals ."
    ::= { gBondEthGroups 5 }

  gBondEthPerf1DayGroup OBJECT-GROUP
    OBJECTS {
      gBondEthPortPerf1DayIntervalMoniTime,
      gBondEthPortPerf1DayIntervalRxErrors,
      gBondEthPortPerf1DayIntervalRxSmallFragments,
      gBondEthPortPerf1DayIntervalRxLargeFragments,
      gBondEthPortPerf1DayIntervalRxBadFragments,
      gBondEthPortPerf1DayIntervalRxLostFragments,
      gBondEthPortPerf1DayIntervalRxLostStarts,
      gBondEthPortPerf1DayIntervalRxLostEnds,
      gBondEthPortPerf1DayIntervalRxOverflows,
      gBondEthPortPerf1DayIntervalValid
    }
    STATUS      current
    DESCRIPTION
      "A collection of objects supporting OPTIONAL historical
      Performance Monitoring information for G.Bond/Eth ports, during
      previous 1-day intervals ."
    ::= { gBondEthGroups 6 }

  -------------------------------
  -- Compliance Statements
  -------------------------------

  gBondEthCompliance MODULE-COMPLIANCE
    STATUS      current
    DESCRIPTION
      "The compliance statement for G.Bond Ethernet 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 {
         gBondEthBasicGroup
       }

       GROUP       gBondEthBceGroup
       DESCRIPTION
         "Support for this group is OPTIONAL"

       GROUP       gBondEthBacpGroup
       DESCRIPTION
         "Support for this group is OPTIONAL and only required for
         implementations supporting BACP."

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

       GROUP       gBondEthPerf15MinGroup
       DESCRIPTION
         "Support for this group is only required for implementations
         supporting historical Performance Monitoring."

       GROUP       gBondEthPerf1DayGroup
       DESCRIPTION
         "Support for this group is only required for implementations
         supporting 1-day historical Performance Monitoring."

       OBJECT      gBondEthTcTypesSupported
       SYNTAX      BITS {
         tc6465(0),
         tcHDLC(1)
       }
       DESCRIPTION
         "Support for all TC types is not required. However at least
         one value SHALL be supported"

       OBJECT      gBondEthBacpSupported
       SYNTAX      TruthValue
       DESCRIPTION
         "Support for BACP is OPTIONAL, therefore a value of false(2)
         SHALL be supported."

       OBJECT      gBondEthTcAdminType
       MIN-ACCESS  read-only
       DESCRIPTION
         "Write access is not required (needed only for GBS
```

```
          supporting more than a single TC encapsulation type, i.e.
          tc6465 and tcHDLC."

        OBJECT      gBondEthAdminCp
        MIN-ACCESS  read-only
        DESCRIPTION
          "Write access is not required (needed only for GBS
          supporting BACP in addition to mandatory G.hs-based bonding
          discovery and aggregation protocol."

     ::= { gBondEthCompliances 1 }
END
```

7. Security Considerations

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

- Changing of gBondEthPortConfTable configuration paratemers (e.g. gBondEthTcAdminType) MAY lead to a complete service interruption, in case the specified PTM-TC encapsulation type is not supported by the remote end.

- Changing of gBondEthBceConfTable configuration paratemers (e.g. gBondEthBceEligibleGroupID) MAY lead to preventing a non-bonded BCE from being bonded in any bonding group or false advertizement of bonding eligibility (e.g. between BCEs residing on different line cards in an application which does not support cross-card bonding).

The user of the GBOND-ETH-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-ETH-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 gBondEthMIB 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

10.1. Normative References

[802.3] IEEE, "IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications", IEEE Std 802.3-2005, December 2005.

[G.998.2] ITU-T, "Ethernet-based multi-pair bonding", ITU-T Recommendation G.998.2, January 2005, <http://www.itu.int/rec/T-REC-G.998.2/en>.

[G.998.2-Amd2] ITU-T, "Ethernet-based multi-pair bonding Amendement 2", ITU-T

Recommendation G.998.2/Amd.2, December 2007, <http://www.itu.int/rec/T-REC-G.998.2-200712-I!Amd2/en>.

[I-D.ietf-adslmib-gbond-mib] Beili, E. and M. Morgenstern, "xDSL multi-pair bonding (G.Bond) MIB", draft-ietf-adslmib-gbond-mib-04 (work in progress), May 2009.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC2578] McCloghrie, K., Ed., Perkins, D., Ed., and J. Schoenwaelder, Ed., "Structure of Management Information Version 2 (SMIv2)", STD 58, RFC 2578, April 1999.

[RFC2579] McCloghrie, K., Ed., Perkins, D., Ed., and J. Schoenwaelder, Ed., "Textual Conventions for SMIv2", STD 58, RFC 2579, April 1999.

[RFC2580] McCloghrie, K., Perkins, D., and J. Schoenwaelder, "Conformance Statements for SMIv2", STD 58, RFC 2580, April 1999.

[RFC2863] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB", RFC 2863, June 2000.

[RFC3705] Ray, B. and R. Abbi, "High Capacity Textual Conventions for MIB Modules Using Performance History Based on 15 Minute Intervals", RFC 3705, February 2004.

[TR-159] Beili, E. and M. Morgenstern, "Management Framework for xDSL Bonding", Broadband Forum technical report TR-159, December 2008.

10.2. Informative References

[ADSLMIB] IETF, "ADSL MIB (adslmib) Charter", <http://www.ietf.org/html.charters/adslmib-charter.html>.

[G.991.2] ITU-T, "Single-pair High-speed Digital Subscriber Line (SHDSL) transceivers", ITU-T Recommendation G.991.2, December 2003, <http://www.itu.int/rec/T-REC-G.991.2/en>.

[G.993.1] ITU-T, "Very High speed Digital Subscriber Line transceivers", ITU-T Recommendation G.993.1, June 2004, <http://www.itu.int/rec/T-REC-G.993.1/en>.

[RFC3410] Case, J., Mundy, R., Partain, D., and B. Stewart, "Introduction and Applicability Statements for Internet-Standard Management Framework", RFC 3410, December 2002.

[RFC3593] Tesink, K., "Textual Conventions for MIB Modules Using Performance History Based on 15 Minute Intervals", RFC 3593, September 2003.

[RFC4181] Heard, C., "Guidelines for Authors and Reviewers of MIB Documents", BCP 111, RFC 4181, September 2005.

[RFC5066] Beili, E., "Ethernet in the First Mile Copper (EFMCu) Interfaces MIB", RFC 5066, November 2007.

URIs

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

Authors' Addresses

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

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

Moti Morgenstern
ECI Telecom
30 Hasivim St.
Petach-Tikva 49517
Israel

Phone: +972-3-926-6258
EMail: moti.morgenstern@ecitele.com