        Ethernet-based xDSL multi-pair bonding (G.Bond/Ethernet) MIB
                draft-ietf-adslmib-gbond-eth-mib-04.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", "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, 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 remote Bonding Channel Entity (BCE)
   discovery, using the [G.994.1] handshake (G.hs). The GBOND-MIB
   module provides an 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.hs-based BCE discovery. Amendment 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
          // potentially 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 it 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 initialization, 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.hs-based bonding protocol,
which cannot 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]:

   o 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.

   o 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 "201105260000Z"  -- May 26, 2011
    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
   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 (2011).
       This version of this MIB module is part of RFC YYYY;
       see the RFC itself for full legal notices."

      REVISION   "201105260000Z" -- May 26, 2011
      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.hs-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 a G.Bond Ethernet port indexed by the
        ifIndex.
        Note that a 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 change 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 change 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 a 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 a G.Bond/Eth 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 }
      ::= { 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 a 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 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
        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
        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
        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
      received and discarded by a G.Bond/Eth port, during the current
      15-minute performance 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 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 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 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 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 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

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 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 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
           received and discarded by a G.Bond/Eth port, during the current
           1-day performance 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 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 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 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 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
       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 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 7 days 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
       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 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 a 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:

   o Changing of gBondEthPortConfTable configuration parameters (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.

   o Changing of gBondEthBceConfTable configuration parameters (e.g.
      gBondEthBceEligibleGroupID) MAY lead to preventing a non-bonded
      BCE from being bonded in any bonding group or false advertisement
      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.

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