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Ethernet-Based xDSL Multi-Pair Bonding (G.Bond/Ethernet) MIB

Abstract

This document defines a Management Information Base (MIB) module for use with network management protocols in TCP/IP-based internets. This document defines an extension to the GBOND-MIB module with a set of objects for managing Ethernet-based multi-pair bonded Digital Subscriber Line (xDSL) interfaces, as defined in ITU-T Recommendation G.998.2.

Status of This Memo

This is an Internet Standards Track document.

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

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at http://www.rfc-editor.org/info/rfc6767.

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1. Introduction

Ethernet-based xDSL Multi-Pair Bonding, a.k.a. G.Bond/Ethernet, is specified in ITU-T Recommendation G.998.2 [G.998.2], which defines a method for bonding (or aggregating) multiple xDSL lines (or individual bearer channels in multiple xDSL lines) into a single bidirectional logical link carrying 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 the GBOND-MIB module [RFC6765].

2. The Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to section 7 of RFC 3410 [RFC3410].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB

module that is compliant to the SMIv2, which is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580 [RFC2580].

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

3. The Broadband Forum Management Framework for xDSL Bonding

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

4. Relationship to Other MIB Modules

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

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

Both the GBOND-MIB [RFC6765] and G9982-MIB (this document) 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 Generic Bonding Sub-layer (GBS) ports of a generic

G.998 multi-port Central Office (CO) device, using 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 pseudocode 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, as well as the IF-CAP-STACK-MIB [RFC5066] 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].g9982OperCp == 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].g9982BceEligibleGroupID;
      rgid =
        ifStackTable[gbs[i]].bce[0].g9982BcePeerEligibleGroupID;

      // 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].g9982BcePeerEligibleGroupID;
        IF ( r == rgid AND gbs[i].NumBCEs < gbs[i].BondCapacity )
        { // The Remote Terminal device (RT) connected via BCE[j] is
          // a peer for GBS[i], and there is room for another BCE in
          // the GBS[i] aggregation group (max. Bonding capacity is
          // not reached yet).
          // Connect this BCE to the GBS (via the ifStackTable; the
          // ifInvStackTable, which is the inverse of the
          // 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 that
        // are physically connected to the same RT
        // and have 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 the ifCapStackTable and its inverse -- the ifInvCapStackTable -- on device initialization, according to the cross-connect capabilities of the device. When BACP is used, the g9982BceConfEligibleGroupID object identifying bonding eligibility MUST be automatically updated whenever the ifCapStackTable/ifInvCapStackTable are changed.

4.3. Relationship to EFM Copper MIB Module

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

The 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 High-level Data Link Control (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 complete (within the scope of the 802.3 standard) management of the SHDSL/VDSL lines. The GBOND-MIB and G9982-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 + G9982-MIB + HDSL2-SHDSL-LINE-MIB/VDSL-LINE-MIB

(The EtherLike-MIB, HDSL2-SHDSL-LINE-MIB, and VDSL-LINE-MIB modules are found in [RFC3635], [RFC4319], and [RFC3728], respectively.)

Note also that while EFM-CU-MIB relies on the ifMauMediaAvailable object from MAU-MIB [RFC4836] for the additional bonded xDSL-specific operational states, GBOND-MIB provides these indications via the gBondPortStatFltStatus object, complementing the ifOperStatus object from the IF-MIB.

Finally, the EFM-CU-MIB does not include historical Performance Monitoring (PM), while the GBOND-MIB/G9982-MIB/xDSL-LINE-MIB combination provides full PM functionality for a bonded link and individual xDSL lines.

4.4. Relationship to IEEE 802.3.1 MIB Modules

The IEEE 802.3 working group chartered a task force [IEEE802.3.1], which continues the development of standard Ethernet-related MIB modules based on the initial work done in the IETF. Future projects resulting from the work of this task force may include and possibly extend the work done in the IETF.

5. MIB Structure

5.1. Overview

The main management objects defined in the G9982-MIB module are split into 2 groups, structured as recommended by RFC 4181 [RFC4181]:

- g9982Port - containing objects for configuration, capabilities, status, and PM of G.Bond/Eth ports. Note that the rest of the objects for the Generic Bonding Sub-layer (GBS) port configuration, capabilities, status, notifications, and PM are located in the GBOND-MIB module.

- g9982Bce - 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 are 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 interval SHOULD be aligned with the start of a day.

Counters are not reset when a GBS is re-initialized, but rather only when the agent is reset or re-initialized.

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 the managed objects defined in this document.

TR-159 Managed Object	Corresponding SNMP Object
oBondEth - Basic Package (Mandatory)	
aEthBACPSupported	g9982PortCapBacpSupported
aEthTcAdminType	g9982PortConfTcAdminType
aEthTcOperType	g9982PortStatTcOperType
aEthTcTypesSupported	g9982PortCapTcTypesSupported
aEthRxErrors	g9982PortStatRxErrors
aEthRxSmallFragments	g9982PortStatRxSmallFragments
aEthRxLargeFragments	g9982PortStatRxLargeFragments
aEthRxBadFragments	g9982PortStatRxBadFragments

aEthRxLostFragments	g9982PortStatRxLostFragments
aEthRxLostStarts	g9982PortStatRxLostStarts
aEthRxLostEnds	g9982PortStatRxLostEnds
aEthRxOverflows	g9982PortStatRxOverflows
oBondEth - BACP Package (Optional)	
aEthAdminCP	g9982PortConfAdminCp
aEthOperCP	g9982PortStatOperCp
oChannel - BACP Package (Optional)	
aChannelEligibleGroupID	g9982BceConfEligibleGroupID
aChannelEligibleStreamID	g9982BceConfPeerEligibleGroupID
oChannel - PM Package (Optional)	
aChannelPtmTcRxCodingViolations	g9982BceStatTcInCodingErrors
aChannelPtmTcRxCrcErrors	g9982BceStatTcInCrcErrors

Table 1: Mapping of TR-159 Managed Objects

Note that some of the mapping between the objects defined in TR-159 and the ones defined in this MIB module is not one-to-one; for example, while TR-159 PM attributes aGroupPerf* map to the corresponding gBondPortPm* objects of the GBOND-MIB module, there are no dedicated PM attributes for the g9982PortPm* objects introduced in this MIB module. However, since their definition is identical to the definition of gBondPortPm* objects of the GBOND-MIB module, we can map g9982PortPm* to the relevant aGroupPerf* attributes of TR-159 and use the term 'partial mapping' to denote the fact that this mapping is not one-to-one.

6. G.Bond/Ethernet MIB Definitions

The G9982-MIB module IMPORTS objects from SNMPv2-SMI [RFC2578], SNMPv2-TC [RFC2579], SNMPv2-CONF [RFC2580], IF-MIB [RFC2863], and HC-PerfHist-TC-MIB [RFC3705]. The module has been structured as recommended by [RFC4181].

```
G9982-MIB DEFINITIONS ::= BEGIN

  IMPORTS
    MODULE-IDENTITY,
    OBJECT-TYPE,
    Counter32,
    mib-2,
    Unsigned32
      FROM SNMPv2-SMI           -- RFC 2578
    TEXTUAL-CONVENTION,
    TruthValue,
    PhysAddress
      FROM SNMPv2-TC            -- RFC 2579
    MODULE-COMPLIANCE,
    OBJECT-GROUP
      FROM SNMPv2-CONF          -- RFC 2580
    ifIndex
      FROM IF-MIB               -- RFC 2863
    HCPerfCurrentCount,
    HCPerfValidIntervals,
    HCPerfInvalidIntervals,
    HCPerfTimeElapsed
      FROM  HC-PerfHist-TC-MIB  -- RFC 3705
    ;
-------------------------------------------------------------------------
  g9982MIB MODULE-IDENTITY
    LAST-UPDATED "201302200000Z"  -- 20 February 2013
    ORGANIZATION "IETF ADSL MIB Working Group"
    CONTACT-INFO
      "WG charter:
        http://datatracker.ietf.org/wg/adslmib/charter/

      Mailing Lists:
        General Discussion: adslmib@ietf.org
        To Subscribe: adslmib-request@ietf.org
        In Body: subscribe your_email_address
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    DESCRIPTION
      "The objects in this MIB module are used to manage the
      Ethernet-based multi-pair bonded xDSL interfaces, as defined in
      ITU-T Recommendation G.998.2 (G.Bond/Ethernet).

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

      The following references are used throughout this MIB module:

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

      [G.998.2-Amd2] refers to:
        ITU-T Recommendation 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
        BTU    - Bonding Terminating Unit
        BTU-C  - Bonding Terminating Unit, CO side
        BTU-R  - Bonding Terminating Unit, Remote Terminal (CPE) side
        CO     - Central Office
        CPE    - Customer Premises Equipment
        GBS    - Generic Bonding Sub-layer
        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

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      (http://trustee.ietf.org/license-info)."

     REVISION    "201302200000Z"  -- 20 February 2013
     DESCRIPTION "Initial version, published as RFC 6767."

     ::= { mib-2 264 }

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

   g9982Objects     OBJECT IDENTIFIER ::= { g9982MIB 1 }

   g9982Conformance OBJECT IDENTIFIER ::= { g9982MIB 2 }
```

```
   -- Groups in the module

   g9982Port        OBJECT IDENTIFIER ::= { g9982Objects 1 }

   g9982Bce         OBJECT IDENTIFIER ::= { g9982Objects 2 }

   -------------------------------
   -- Textual Conventions
   -------------------------------

   G9982PtmTcType ::= 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)
     }

   G9982CpType ::= 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
   -------------------------------

   g9982PortConfTable OBJECT-TYPE
     SYNTAX      SEQUENCE OF G9982PortConfEntry
     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."
     ::= { g9982Port 1 }

   g9982PortConfEntry OBJECT-TYPE
     SYNTAX      G9982PortConfEntry
     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 the ifIndex."
     INDEX  { ifIndex }
     ::= { g9982PortConfTable 1 }

   G9982PortConfEntry ::=
     SEQUENCE {
       g9982PortConfTcAdminType         G9982PtmTcType,
       g9982PortConfAdminCp             G9982CpType
     }

   g9982PortConfTcAdminType  OBJECT-TYPE
     SYNTAX      G9982PtmTcType
     MAX-ACCESS  read-write
     STATUS      current
     DESCRIPTION
       "Administrative (desired) PTM-TC encapsulation type of a
       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 g9982PortCapTcTypesSupported) SHALL be rejected
       (with the error inconsistentValue).
```

```
      Changing g9982PortConfTcAdminType is a traffic-disruptive
      operation and as such SHALL be done when the link (GBS) is
      administratively 'down', as indicated by the ifAdminStatus object
      in the IF-MIB.
      Attempts to change this object SHALL be rejected (with the error
      inconsistentValue) if the link is 'up' or initializing.

      This object maps to the TR-159 attribute aEthTcAdminType."
    REFERENCE
      "[TR-159], Section 5.5.3.4; RFC 2863, IF-MIB, ifAdminStatus"
    ::= { g9982PortConfEntry 1 }

  g9982PortConfAdminCp  OBJECT-TYPE
    SYNTAX      G9982CpType
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
      "Administrative (desired) bonding control protocol of a
      G.Bond/Eth port (GBS).  Possible values are:
        cpHS(1)    - use G.hs-based protocol (default)
        cpBACP(2)  - use frame-based BACP

      Note that 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
      g9982PortCapBacpSupported is false) SHALL be rejected
      (with the error inconsistentValue).

      Changing g9982PortConfAdminCp is a traffic-disruptive
      operation and as such SHALL be done when the link (GBS) is
      administratively 'down', as indicated by the ifAdminStatus
      object in the IF-MIB.
      Attempts to change this object SHALL be rejected (with the error
      inconsistentValue) if the link is 'up' or initializing.

      This object maps to the TR-159 attribute aEthAdminCP."
    REFERENCE
      "[TR-159], Section 5.5.3.2; RFC 2863, IF-MIB, ifAdminStatus"
    DEFVAL { cpHS }
    ::= { g9982PortConfEntry 2 }


  g9982PortCapTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF G9982PortCapEntry
    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."
    ::= { g9982Port 2 }

  g9982PortCapEntry OBJECT-TYPE
    SYNTAX      G9982PortCapEntry
    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 the ifIndex."
    INDEX  { ifIndex }
    ::= { g9982PortCapTable 1 }

  G9982PortCapEntry ::=
    SEQUENCE {
      g9982PortCapTcTypesSupported         BITS,
      g9982PortCapBacpSupported            TruthValue
    }

  g9982PortCapTcTypesSupported  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
      g9982PortConfTcAdminType, while g9982PortStatTcOperType
      reflects the current operating mode.

      This object maps to the TR-159 attribute aEthTcTypesSupported."
    REFERENCE
      "[TR-159], Section 5.5.3.6"
    ::= { g9982PortCapEntry 1 }

  g9982PortCapBacpSupported  OBJECT-TYPE
    SYNTAX      TruthValue
```

```
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "Indicates whether the Bonding Aggregation Control Protocol
      (BACP) -- the 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 BACP is supported.
      A value of false(2) indicates that BACP is unsupported.

      The BACP functionality, if supported, can be enabled or
      disabled via g9982AdminCP, while g9982OperCP
      reflects the current BACP operating mode.

      This object maps to the TR-159 attribute aEthBACPSupported."
    REFERENCE
      "[TR-159], Section 5.5.3.1; [G.998.2-Amd2], Annex C"
    ::= { g9982PortCapEntry 2 }


  g9982PortStatTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF G9982PortStatEntry
    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 the 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."
    ::= { g9982Port 3 }

  g9982PortStatEntry OBJECT-TYPE
    SYNTAX      G9982PortStatEntry
    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 the ifIndex."
    INDEX  { ifIndex }
    ::= { g9982PortStatTable 1 }
```

```
   G9982PortStatEntry ::=
     SEQUENCE {
       g9982PortStatTcOperType            G9982PtmTcType,
       g9982PortStatOperCp                G9982CpType,
       g9982PortStatRxErrors              Counter32,
       g9982PortStatRxSmallFragments      Counter32,
       g9982PortStatRxLargeFragments      Counter32,
       g9982PortStatRxBadFragments        Counter32,
       g9982PortStatRxLostFragments       Counter32,
       g9982PortStatRxLostStarts          Counter32,
       g9982PortStatRxLostEnds            Counter32,
       g9982PortStatRxOverflows           Counter32
     }

   g9982PortStatTcOperType  OBJECT-TYPE
     SYNTAX      G9982PtmTcType
     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 g9982PortConfTcAdminType.

       This object maps to the TR-159 attribute aEthTcOperType."
     REFERENCE
       "[TR-159], Section 5.5.3.5"
     ::= { g9982PortStatEntry 1 }

   g9982PortStatOperCp  OBJECT-TYPE
     SYNTAX      G9982CpType
     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 the g9982PortConfAdminCp variable.
```

```
      This object maps to the TR-159 attribute aEthOperCP."
    REFERENCE
      "[TR-159], Section 5.5.3.3"
    ::= { g9982PortStatEntry 2 }

  g9982PortStatRxErrors OBJECT-TYPE
    SYNTAX      Counter32
    UNITS       "fragments"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A number of Ethernet frame fragments that have been received
      by the bonding function and discarded due to various errors.

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

      This object maps to the TR-159 attribute aEthRxErrors."
    REFERENCE
      "[TR-159], Section 5.5.3.7"
    ::= { g9982PortStatEntry 3 }

  g9982PortStatRxSmallFragments OBJECT-TYPE
    SYNTAX      Counter32
    UNITS       "fragments"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A number of fragments smaller than minFragmentSize (64 bytes)
      that have been received by the bonding function 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, as
      defined in the IF-MIB.

      This object maps to the TR-159 attribute aEthRxSmallFragments."
    REFERENCE
      "[TR-159], Section 5.5.3.8"
    ::= { g9982PortStatEntry 4 }

  g9982PortStatRxLargeFragments OBJECT-TYPE
    SYNTAX      Counter32
    UNITS       "fragments"
    MAX-ACCESS  read-only
    STATUS      current
```

```
    DESCRIPTION
      "A number of fragments larger than maxFragmentSize (512 bytes)
      that have been received by the bonding function 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, as
      defined in the IF-MIB.

      This object maps to the TR-159 attribute aEthRxLargeFragments."
    REFERENCE
      "[TR-159], Section 5.5.3.9"
    ::= { g9982PortStatEntry 5 }

  g9982PortStatRxBadFragments OBJECT-TYPE
    SYNTAX      Counter32
    UNITS       "fragments"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A number of fragments that do not fit into the sequence
      expected by the frame assembly function and that have been
      received and discarded by the bonding function (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, as
      defined in the IF-MIB.

      This object maps to the TR-159 attribute aEthRxBadFragments."
    REFERENCE
      "[TR-159], Section 5.5.3.10"
    ::= { g9982PortStatEntry 6 }

  g9982PortStatRxLostFragments OBJECT-TYPE
    SYNTAX      Counter32
    UNITS       "fragments"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A number of gaps in the sequence of fragments that have
      been received by the bonding function (the frame buffer is
      flushed to the next valid frame start, when a fragment or
      fragments expected by the frame assembly function 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, as
      defined in the IF-MIB.

      This object maps to the TR-159 attribute aEthRxLostFragments."
    REFERENCE
      "[TR-159], Section 5.5.3.11"
    ::= { g9982PortStatEntry 7 }

  g9982PortStatRxLostStarts 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, as
      defined in the IF-MIB.

      This object maps to the TR-159 attribute aEthRxLostStarts."
    REFERENCE
      "[TR-159], Section 5.5.3.12"
    ::= { g9982PortStatEntry 8 }

  g9982PortStatRxLostEnds 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, as
      defined in the IF-MIB.

      This object maps to the TR-159 attribute aEthRxLostEnds."
    REFERENCE
      "[TR-159], Section 5.5.3.13"
    ::= { g9982PortStatEntry 9 }

  g9982PortStatRxOverflows OBJECT-TYPE
    SYNTAX      Counter32
```

```
    UNITS       "fragments"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A number of fragments, received and discarded by the bonding
      function, that 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, as
      defined in the IF-MIB.

      This object maps to the TR-159 attribute aEthRxOverflows."
    REFERENCE
      "[TR-159], Section 5.5.3.14"
    ::= { g9982PortStatEntry 10 }

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

  g9982PM   OBJECT IDENTIFIER ::= { g9982Port 4 }

  g9982PortPmCurTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF G9982PortPmCurEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
      "This table contains current Performance Monitoring information
      for a G.Bond/Eth port.  This table contains live data from the
      equipment and as such is NOT persistent."
    ::= { g9982PM 1 }

  g9982PortPmCurEntry OBJECT-TYPE
    SYNTAX      G9982PortPmCurEntry
    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 }
    ::= { g9982PortPmCurTable 1 }
```

```
   G9982PortPmCurEntry ::=
     SEQUENCE {
       g9982PortPm15MinValidIntervals      HCPerfValidIntervals,
       g9982PortPm15MinInvalidIntervals    HCPerfInvalidIntervals,
       g9982PortPmCur15MinTimeElapsed      HCPerfTimeElapsed,
       g9982PortPmCur15MinRxErrors         HCPerfCurrentCount,
       g9982PortPmCur15MinRxSmallFragments HCPerfCurrentCount,
       g9982PortPmCur15MinRxLargeFragments HCPerfCurrentCount,
       g9982PortPmCur15MinRxBadFragments   HCPerfCurrentCount,
       g9982PortPmCur15MinRxLostFragments  HCPerfCurrentCount,
       g9982PortPmCur15MinRxLostStarts     HCPerfCurrentCount,
       g9982PortPmCur15MinRxLostEnds       HCPerfCurrentCount,
       g9982PortPmCur15MinRxOverflows      HCPerfCurrentCount,
       g9982PortPm1DayValidIntervals       Unsigned32,
       g9982PortPm1DayInvalidIntervals     Unsigned32,
       g9982PortPmCur1DayTimeElapsed       HCPerfTimeElapsed,
       g9982PortPmCur1DayRxErrors          HCPerfCurrentCount,
       g9982PortPmCur1DayRxSmallFragments  HCPerfCurrentCount,
       g9982PortPmCur1DayRxLargeFragments  HCPerfCurrentCount,
       g9982PortPmCur1DayRxBadFragments    HCPerfCurrentCount,
       g9982PortPmCur1DayRxLostFragments   HCPerfCurrentCount,
       g9982PortPmCur1DayRxLostStarts      HCPerfCurrentCount,
       g9982PortPmCur1DayRxLostEnds        HCPerfCurrentCount,
       g9982PortPmCur1DayRxOverflows       HCPerfCurrentCount
     }

   g9982PortPm15MinValidIntervals  OBJECT-TYPE
     SYNTAX      HCPerfValidIntervals
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
       "A read-only number of 15-minute intervals for which the
       performance data was collected.  The value of this object will
       be 96 or the maximum number of 15-minute history intervals
       collected by the implementation, unless the measurement was
       (re)started recently, in which case the value will be the
       number of complete 15-minute intervals for which there are at
       least some data.
       In certain cases, it is possible that some intervals are
       unavailable.  In this case, this object reports the maximum
       interval number for which data is available.

       This object partially maps to the TR-159 attribute
       aGroupPerf15MinValidIntervals."
     REFERENCE
       "[TR-159], Section 5.5.1.32"
     ::= { g9982PortPmCurEntry 1 }
```

```
   g9982PortPm15MinInvalidIntervals  OBJECT-TYPE
     SYNTAX      HCPerfInvalidIntervals
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
       "A read-only number of 15-minute intervals for which the
       performance data was not always available.  The value will
       typically be zero, except in cases where the data for some
       intervals are not available.

       This object partially maps to the TR-159 attribute
       aGroupPerf15MinInvalidIntervals."
     REFERENCE
       "[TR-159], Section 5.5.1.33"
     ::= { g9982PortPmCurEntry 2 }

   g9982PortPmCur15MinTimeElapsed  OBJECT-TYPE
     SYNTAX      HCPerfTimeElapsed
     UNITS       "seconds"
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
       "A read-only count of seconds that have elapsed since the
       beginning of the current 15-minute performance interval.

       This object partially maps to the TR-159 attribute
       aGroupPerfCurr15MinTimeElapsed."
     REFERENCE
       "[TR-159], Section 5.5.1.34"
     ::= { g9982PortPmCurEntry 3 }

   g9982PortPmCur15MinRxErrors  OBJECT-TYPE
     SYNTAX      HCPerfCurrentCount
     UNITS       "fragments"
     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 g9982PortStatRxErrors object.

       This object is inhibited during Unavailable Seconds (UAS)."
     REFERENCE
       "[TR-159], Section 5.5.3.7"
     ::= { g9982PortPmCurEntry 4}
```

```
   g9982PortPmCur15MinRxSmallFragments  OBJECT-TYPE
     SYNTAX      HCPerfCurrentCount
     UNITS       "fragments"
     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 g9982PortStatRxSmallFragments object.

       This object is inhibited during Unavailable Seconds (UAS)."
     REFERENCE
       "[TR-159], Section 5.5.3.8"
     ::= { g9982PortPmCurEntry 5}

   g9982PortPmCur15MinRxLargeFragments  OBJECT-TYPE
     SYNTAX      HCPerfCurrentCount
     UNITS       "fragments"
     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 g9982PortStatRxLargeFragments object.

       This object is inhibited during Unavailable Seconds (UAS)."
     REFERENCE
       "[TR-159], Section 5.5.3.9"
     ::= { g9982PortPmCurEntry 6}

   g9982PortPmCur15MinRxBadFragments  OBJECT-TYPE
     SYNTAX      HCPerfCurrentCount
     UNITS       "fragments"
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
       "A read-only count of fragments that do not fit into the
       sequence expected by the frame assembly function and 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 bad fragments is indicated by
      the g9982PortStatRxBadFragments object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159], Section 5.5.3.10"
    ::= { g9982PortPmCurEntry 7}

  g9982PortPmCur15MinRxLostFragments  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    UNITS       "fragments"
    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 these lost fragments is indicated
      by the g9982PortStatRxLostFragments object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159], Section 5.5.3.11"
    ::= { g9982PortPmCurEntry 8}

  g9982PortPmCur15MinRxLostStarts  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 g9982PortStatRxLostStarts object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159], Section 5.5.3.12"
    ::= { g9982PortPmCurEntry 9}

  g9982PortPmCur15MinRxLostEnds  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 g9982PortStatRxLostEnds object.

        This object is inhibited during Unavailable Seconds (UAS)."
      REFERENCE
        "[TR-159], Section 5.5.3.13"
      ::= { g9982PortPmCurEntry 10}

    g9982PortPmCur15MinRxOverflows  OBJECT-TYPE
      SYNTAX      HCPerfCurrentCount
      UNITS       "fragments"
      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 that would have caused
        the frame assembly buffer to overflow is indicated by the
        g9982PortStatRxOverflows object.

        This object is inhibited during Unavailable Seconds (UAS)."
      REFERENCE
        "[TR-159], Section 5.5.3.14"
      ::= { g9982PortPmCurEntry 11}

    g9982PortPm1DayValidIntervals  OBJECT-TYPE
      SYNTAX      Unsigned32 (0..7)
      UNITS       "days"
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
        "A read-only number of 1-day intervals for which data was
        collected.  The value of this object will be 7 or the maximum
        number of 1-day history intervals collected by the
        implementation, unless the measurement was (re)started recently,
        in which case the value will be the number of complete 1-day
        intervals for which there are at least some data.
        In certain cases, it is possible that some intervals are
        unavailable.  In this case, this object reports the maximum
        interval number for which data is available."
```

```
    REFERENCE
      "[TR-159], Section 5.5.1.45"
    ::= { g9982PortPmCurEntry 12 }

  g9982PortPm1DayInvalidIntervals  OBJECT-TYPE
    SYNTAX      Unsigned32 (0..7)
    UNITS       "days"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only number of 1-day intervals for which data was not
      always available.  The value will typically be zero, except in
      cases where the data for some intervals are not available."
    REFERENCE
      "[TR-159], Section 5.5.1.46"
    ::= { g9982PortPmCurEntry 13 }

  g9982PortPmCur1DayTimeElapsed  OBJECT-TYPE
    SYNTAX      HCPerfTimeElapsed
    UNITS       "seconds"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of seconds that have elapsed since the
      beginning of the current 1-day performance interval."
    REFERENCE
      "[TR-159], Section 5.5.1.47"
    ::= { g9982PortPmCurEntry 14 }

  g9982PortPmCur1DayRxErrors  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    UNITS       "fragments"
    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 g9982PortStatRxErrors object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159], Section 5.5.3.7"
    ::= { g9982PortPmCurEntry 15 }
```

```
   g9982PortPmCur1DayRxSmallFragments  OBJECT-TYPE
     SYNTAX      HCPerfCurrentCount
     UNITS       "fragments"
     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 g9982PortStatRxSmallFragments object.

       This object is inhibited during Unavailable Seconds (UAS)."
     REFERENCE
       "[TR-159], Section 5.5.3.8"
     ::= { g9982PortPmCurEntry 16}

   g9982PortPmCur1DayRxLargeFragments  OBJECT-TYPE
     SYNTAX      HCPerfCurrentCount
     UNITS       "fragments"
     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 g9982PortStatRxLargeFragments object.

       This object is inhibited during Unavailable Seconds (UAS)."
     REFERENCE
       "[TR-159], Section 5.5.3.9"
     ::= { g9982PortPmCurEntry 17}

   g9982PortPmCur1DayRxBadFragments  OBJECT-TYPE
     SYNTAX      HCPerfCurrentCount
     UNITS       "fragments"
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
       "A read-only count of fragments that do not fit into the
       sequence expected by the frame assembly function and 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 bad fragments is indicated by
      the g9982PortStatRxBadFragments object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159], Section 5.5.3.10"
    ::= { g9982PortPmCurEntry 18}

  g9982PortPmCur1DayRxLostFragments  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    UNITS       "fragments"
    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 these lost fragments is indicated
      by the g9982PortStatRxLostFragments object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159], Section 5.5.3.11"
    ::= { g9982PortPmCurEntry 19}

  g9982PortPmCur1DayRxLostStarts  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 g9982PortStatRxLostStarts object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159], Section 5.5.3.12"
    ::= { g9982PortPmCurEntry 20}

  g9982PortPmCur1DayRxLostEnds  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 g9982PortStatRxLostEnds object.

        This object is inhibited during Unavailable Seconds (UAS)."
      REFERENCE
        "[TR-159], Section 5.5.3.13"
      ::= { g9982PortPmCurEntry 21}

    g9982PortPmCur1DayRxOverflows  OBJECT-TYPE
      SYNTAX      HCPerfCurrentCount
      UNITS       "fragments"
      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 that would have caused
        the frame assembly buffer to overflow is indicated by the
        g9982PortStatRxOverflows object.

        This object is inhibited during Unavailable Seconds (UAS)."
      REFERENCE
        "[TR-159], Section 5.5.3.14"
      ::= { g9982PortPmCurEntry 22}

    -- Port PM history: 15-min buckets

    g9982PortPm15MinTable OBJECT-TYPE
      SYNTAX      SEQUENCE OF G9982PortPm15MinEntry
      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."
      ::= { g9982PM 2 }

    g9982PortPm15MinEntry OBJECT-TYPE
      SYNTAX      G9982PortPm15MinEntry
```

```
    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 the ifIndex, collected during a
      particular 15-minute interval, indexed by the
      g9982PortPm15MinIntervalIndex."
    INDEX  { ifIndex, g9982PortPm15MinIntervalIndex }
    ::= { g9982PortPm15MinTable 1 }

  G9982PortPm15MinEntry ::=
    SEQUENCE {
      g9982PortPm15MinIntervalIndex            Unsigned32,
      g9982PortPm15MinIntervalMoniTime         HCPerfTimeElapsed,
      g9982PortPm15MinIntervalRxErrors         HCPerfCurrentCount,
      g9982PortPm15MinIntervalRxSmallFragments HCPerfCurrentCount,
      g9982PortPm15MinIntervalRxLargeFragments HCPerfCurrentCount,
      g9982PortPm15MinIntervalRxBadFragments   HCPerfCurrentCount,
      g9982PortPm15MinIntervalRxLostFragments  HCPerfCurrentCount,
      g9982PortPm15MinIntervalRxLostStarts     HCPerfCurrentCount,
      g9982PortPm15MinIntervalRxLostEnds       HCPerfCurrentCount,
      g9982PortPm15MinIntervalRxOverflows      HCPerfCurrentCount,
      g9982PortPm15MinIntervalValid            TruthValue
    }

  g9982PortPm15MinIntervalIndex  OBJECT-TYPE
    SYNTAX      Unsigned32 (1..96)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
      "Performance Data Interval number.  1 is the most recent
      previous interval; interval 96 is 24 hours ago.
      Intervals 2..96 are OPTIONAL.

      This object partially maps to the TR-159 attribute
      aGroupPerf15MinIntervalNumber."
    REFERENCE
      "[TR-159], Section 5.5.1.57"
    ::= { g9982PortPm15MinEntry 1 }

  g9982PortPm15MinIntervalMoniTime  OBJECT-TYPE
    SYNTAX      HCPerfTimeElapsed
    UNITS       "seconds"
    MAX-ACCESS  read-only
    STATUS      current
```

```
      DESCRIPTION
        "A read-only count of seconds over which the performance data
        was actually monitored.  This value will be the same as the
        interval duration (900 seconds), except in a situation where
        performance data could not be collected for any reason."
      ::= { g9982PortPm15MinEntry 2 }

   g9982PortPm15MinIntervalRxErrors  OBJECT-TYPE
      SYNTAX      HCPerfCurrentCount
      UNITS       "fragments"
      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 g9982PortStatRxErrors object.

        This object is inhibited during Unavailable Seconds (UAS)."
      REFERENCE
        "[TR-159], Section 5.5.3.7"
      ::= { g9982PortPm15MinEntry 3}

   g9982PortPm15MinIntervalRxSmallFragments  OBJECT-TYPE
      SYNTAX      HCPerfCurrentCount
      UNITS       "fragments"
      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 g9982PortStatRxSmallFragments object.

        This object is inhibited during Unavailable Seconds (UAS)."
      REFERENCE
        "[TR-159], Section 5.5.3.8"
      ::= { g9982PortPm15MinEntry 4}

   g9982PortPm15MinIntervalRxLargeFragments  OBJECT-TYPE
      SYNTAX      HCPerfCurrentCount
      UNITS       "fragments"
      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 g9982PortStatRxLargeFragments object.

        This object is inhibited during Unavailable Seconds (UAS)."
      REFERENCE
        "[TR-159], Section 5.5.3.9"
      ::= { g9982PortPm15MinEntry 5}

    g9982PortPm15MinIntervalRxBadFragments  OBJECT-TYPE
      SYNTAX      HCPerfCurrentCount
      UNITS       "fragments"
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
        "A read-only count of fragments that do not fit into the
        sequence expected by the frame assembly function and 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 bad fragments is indicated by
        the g9982PortStatRxBadFragments object.

        This object is inhibited during Unavailable Seconds (UAS)."
      REFERENCE
        "[TR-159], Section 5.5.3.10"
      ::= { g9982PortPm15MinEntry 6}

    g9982PortPm15MinIntervalRxLostFragments  OBJECT-TYPE
      SYNTAX      HCPerfCurrentCount
      UNITS       "fragments"
      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 these lost fragments is indicated
        by the g9982PortStatRxLostFragments object.

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

```
      REFERENCE
        "[TR-159], Section 5.5.3.11"
      ::= { g9982PortPm15MinEntry 7}

   g9982PortPm15MinIntervalRxLostStarts  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 g9982PortStatRxLostStarts object.

        This object is inhibited during Unavailable Seconds (UAS)."
      REFERENCE
        "[TR-159], Section 5.5.3.12"
      ::= { g9982PortPm15MinEntry 8}

   g9982PortPm15MinIntervalRxLostEnds  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 g9982PortStatRxLostEnds object.

        This object is inhibited during Unavailable Seconds (UAS)."
      REFERENCE
        "[TR-159], Section 5.5.3.13"
      ::= { g9982PortPm15MinEntry 9}

   g9982PortPm15MinIntervalRxOverflows  OBJECT-TYPE
      SYNTAX      HCPerfCurrentCount
      UNITS       "fragments"
      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 that would have caused
      the frame assembly buffer to overflow is indicated by the
      g9982PortStatRxOverflows object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159], Section 5.5.3.14"
    ::= { g9982PortPm15MinEntry 10}

  g9982PortPm15MinIntervalValid  OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only object indicating whether or not this history
      bucket contains valid data.  A valid bucket is reported as
      true(1) and an invalid bucket as false(2).
      If this history bucket is invalid, the BTU MUST NOT produce
      notifications based upon the value of the counters in this
      bucket.
      Note that an implementation may decide not to store invalid
      history buckets in its database.  In such a case, this object
      is not required, as only valid history buckets are available
      while invalid history buckets are simply not in the database.

      This object partially maps to the TR-159 attribute
      aGroupPerf15MinIntervalValid."
    REFERENCE
      "[TR-159], Section 5.5.1.58"
    ::= { g9982PortPm15MinEntry 11 }

  -- Port PM history: 1-day buckets

  g9982PortPm1DayTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF G9982PortPm1DayEntry
    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."
    ::= { g9982PM 3 }

  g9982PortPm1DayEntry OBJECT-TYPE
    SYNTAX      G9982PortPm1DayEntry
    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 a
      port, indexed by the ifIndex, collected during a particular
      1-day interval, indexed by the g9982PortPm1DayIntervalIndex."
    INDEX  { ifIndex, g9982PortPm1DayIntervalIndex }
    ::= { g9982PortPm1DayTable 1 }

  G9982PortPm1DayEntry ::=
    SEQUENCE {
      g9982PortPm1DayIntervalIndex             Unsigned32,
      g9982PortPm1DayIntervalMoniTime          HCPerfTimeElapsed,
      g9982PortPm1DayIntervalRxErrors          HCPerfCurrentCount,
      g9982PortPm1DayIntervalRxSmallFragments  HCPerfCurrentCount,
      g9982PortPm1DayIntervalRxLargeFragments  HCPerfCurrentCount,
      g9982PortPm1DayIntervalRxBadFragments    HCPerfCurrentCount,
      g9982PortPm1DayIntervalRxLostFragments   HCPerfCurrentCount,
      g9982PortPm1DayIntervalRxLostStarts      HCPerfCurrentCount,
      g9982PortPm1DayIntervalRxLostEnds        HCPerfCurrentCount,
      g9982PortPm1DayIntervalRxOverflows       HCPerfCurrentCount,
      g9982PortPm1DayIntervalValid             TruthValue
    }

  g9982PortPm1DayIntervalIndex  OBJECT-TYPE
    SYNTAX      Unsigned32 (1..7)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
      "Performance Data Interval number.  1 is the most recent
      previous interval; interval 7 is 7 days ago.
      Intervals 2..7 are OPTIONAL.

      This object partially maps to the TR-159 attribute
      aGroupPerf1DayIntervalNumber."
    REFERENCE
      "[TR-159], Section 5.5.1.62"
    ::= { g9982PortPm1DayEntry 1 }

  g9982PortPm1DayIntervalMoniTime  OBJECT-TYPE
    SYNTAX      HCPerfTimeElapsed
    UNITS       "seconds"
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only count of seconds over which the performance data
      was actually monitored.  This value will be the same as the
      interval duration (86400 seconds), except in a situation where
      performance data could not be collected for any reason.
```

```
      This object partially maps to the TR-159 attribute
      aGroupPerf1DayIntervalMoniSecs."
    REFERENCE
      "[TR-159], Section 5.5.1.64"
    ::= { g9982PortPm1DayEntry 2 }

  g9982PortPm1DayIntervalRxErrors  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    UNITS       "fragments"
    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 g9982PortStatRxErrors object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159], Section 5.5.3.7"
    ::= { g9982PortPm1DayEntry 3 }

  g9982PortPm1DayIntervalRxSmallFragments  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    UNITS       "fragments"
    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 g9982PortStatRxSmallFragments object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159], Section 5.5.3.8"
    ::= { g9982PortPm1DayEntry 4}

  g9982PortPm1DayIntervalRxLargeFragments  OBJECT-TYPE
    SYNTAX      HCPerfCurrentCount
    UNITS       "fragments"
    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 g9982PortStatRxLargeFragments object.

        This object is inhibited during Unavailable Seconds (UAS)."
      REFERENCE
        "[TR-159], Section 5.5.3.9"
      ::= { g9982PortPm1DayEntry 5}

    g9982PortPm1DayIntervalRxBadFragments  OBJECT-TYPE
      SYNTAX      HCPerfCurrentCount
      UNITS       "fragments"
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
        "A read-only count of fragments that do not fit into the
        sequence expected by the frame assembly function and 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 bad fragments is indicated by
        the g9982PortStatRxBadFragments object.

        This object is inhibited during Unavailable Seconds (UAS)."
      REFERENCE
        "[TR-159], Section 5.5.3.10"
      ::= { g9982PortPm1DayEntry 6}

    g9982PortPm1DayIntervalRxLostFragments  OBJECT-TYPE
      SYNTAX      HCPerfCurrentCount
      UNITS       "fragments"
      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 these lost fragments is indicated
        by the g9982PortStatRxLostFragments object.

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

```
      REFERENCE
        "[TR-159], Section 5.5.3.11"
      ::= { g9982PortPm1DayEntry 7}

   g9982PortPm1DayIntervalRxLostStarts  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 g9982PortStatRxLostStarts object.

        This object is inhibited during Unavailable Seconds (UAS)."
      REFERENCE
        "[TR-159], Section 5.5.3.12"
      ::= { g9982PortPm1DayEntry 8}

   g9982PortPm1DayIntervalRxLostEnds  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 g9982PortStatRxLostEnds object.

        This object is inhibited during Unavailable Seconds (UAS)."
      REFERENCE
        "[TR-159], Section 5.5.3.13"
      ::= { g9982PortPm1DayEntry 9}

   g9982PortPm1DayIntervalRxOverflows  OBJECT-TYPE
      SYNTAX      HCPerfCurrentCount
      UNITS       "fragments"
      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 that would have caused
      the frame assembly buffer to overflow is indicated by the
      g9982PortStatRxOverflows object.

      This object is inhibited during Unavailable Seconds (UAS)."
    REFERENCE
      "[TR-159], Section 5.5.3.14"
    ::= { g9982PortPm1DayEntry 10}

  g9982PortPm1DayIntervalValid  OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only object indicating whether or not this history
      bucket contains valid data.  A valid bucket is reported as
      true(1) and an invalid bucket as false(2).
      If this history bucket is invalid, the BTU MUST NOT produce
      notifications based upon the value of the counters in this
      bucket.
      Note that an implementation may decide not to store invalid
      history buckets in its database.  In such a case, this object
      is not required, as only valid history buckets are available
      while invalid history buckets are simply not in the database.

      This object partially maps to the TR-159 attribute
      aGroupPerf1DayIntervalValid."
    REFERENCE
      "[TR-159], Section 5.5.1.63"
    ::= { g9982PortPm1DayEntry 11 }

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

  g9982BceConfTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF G9982BceConfEntry
    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."
    ::= { g9982Bce 1 }
```

```
   g9982BceConfEntry OBJECT-TYPE
     SYNTAX      G9982BceConfEntry
     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 the ifIndex."
     INDEX  { ifIndex }
     ::= { g9982BceConfTable 1 }

   G9982BceConfEntry ::=
     SEQUENCE {
       g9982BceConfEligibleGroupID      PhysAddress,
       g9982BceConfPeerEligibleGroupID  PhysAddress
     }

   g9982BceConfEligibleGroupID  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 g9982BceConfEligibleGroupID 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
       g9982BceConfEligibleGroupID, to assert that all of the BCEs
       should be in the same bonded group.  BCEs with different
       g9982BceConfEligibleGroupID values MUST NOT be connected to
       the same GBS.
       BCEs with the same g9982BceConfEligibleGroupID 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 (with the error inconsistentValue), 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 different line cards, or BCEs are the channels of
       the same line).
```

```
      Note that bonding eligibility is reflected in the
      ifCapStackTable and its inverse, the ifInvCapStackTable;
      as such, any modification of g9982BceConfEligibleGroupID 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
      g9982PortCapBacpSupported for the connected GBS is false).

      This object maps to the TR-159 attribute
      aChannelEligibleGroupID."
    REFERENCE
      "[TR-159], Section 5.5.7.3"
    ::= { g9982BceConfEntry 1 }

  g9982BceConfPeerEligibleGroupID  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 a 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 g9982BceConfPeerEligibleGroupID values
      MUST NOT be connected to the same GBS.
      BCEs with the same g9982BceConfPeerEligibleGroupID 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
      g9982PortCapBacpSupported for the connected GBS is false)
      or when no BACPDUs have been received from the peer BCE.

      This object maps to the G.998.2-Amd2 attribute
      Remote Group ID."
    REFERENCE
      "[G.998.2-Amd2], Appendix C.3.1.6"
    ::= { g9982BceConfEntry 2 }

  g9982BceStatTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF G9982BceStatEntry
    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."
    ::= { g9982Bce 2 }

  g9982BceStatEntry OBJECT-TYPE
    SYNTAX      G9982BceStatEntry
    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 the ifIndex,
      possibly together with other BCE ports."
    INDEX  { ifIndex }
    ::= { g9982BceStatTable 1 }

  G9982BceStatEntry ::=
    SEQUENCE {
      g9982BceStatTcInCodingErrors        Counter32,
      g9982BceStatTcInCrcErrors           Counter32
    }

  g9982BceStatTcInCodingErrors 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, as
      defined in the IF-MIB.

      This object maps to the TR-159 attribute
      aChannelPtmTcRxCodingViolations."
    REFERENCE
      "[TR-159], Section 5.5.7.8"
    ::= { g9982BceStatEntry 1 }

  g9982BceStatTcInCrcErrors 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, as
      defined in the IF-MIB.

      This object maps to the TR-159 attribute
      aChannelPtmTcRxCrcErrors."
    REFERENCE
      "[TR-159], Section 5.5.7.9"
    ::= { g9982BceStatEntry 2 }


  -------------------------------
  -- Conformance Statements
  -------------------------------

   g9982Groups      OBJECT IDENTIFIER
     ::= { g9982Conformance 1 }

   g9982Compliances OBJECT IDENTIFIER
     ::= { g9982Conformance 2 }

   -- Object groups

   g9982BasicGroup OBJECT-GROUP
     OBJECTS {
       g9982PortCapTcTypesSupported,
       g9982PortCapBacpSupported,
       g9982PortConfTcAdminType,
       g9982PortStatTcOperType,
       g9982PortStatRxErrors,
       g9982PortStatRxSmallFragments,
       g9982PortStatRxLargeFragments,
       g9982PortStatRxBadFragments,
       g9982PortStatRxLostFragments,
       g9982PortStatRxLostStarts,
       g9982PortStatRxLostEnds,
       g9982PortStatRxOverflows,
       g9982BceStatTcInCodingErrors,
       g9982BceStatTcInCrcErrors
     }
     STATUS      current
```

```
    DESCRIPTION
      "A collection of objects representing management information
      for G.Bond/Eth GBS ports."
    ::= { g9982Groups 1 }

  g9982BacpGroup OBJECT-GROUP
    OBJECTS {
      g9982PortConfAdminCp,
      g9982PortStatOperCp,
      g9982BceConfEligibleGroupID,
      g9982BceConfPeerEligibleGroupID

    }
    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."
    ::= { g9982Groups 2 }

  g9982BceGroup OBJECT-GROUP
    OBJECTS {
      g9982BceStatTcInCodingErrors,
      g9982BceStatTcInCrcErrors
    }
    STATUS      current
    DESCRIPTION
      "A collection of objects representing OPTIONAL management
      information for G.Bond/Eth BCE ports."
    ::= { g9982Groups 3 }

  g9982PerfCurrGroup OBJECT-GROUP
    OBJECTS {
      g9982PortPm15MinValidIntervals,
      g9982PortPm15MinInvalidIntervals,
      g9982PortPmCur15MinTimeElapsed,
      g9982PortPmCur15MinRxErrors,
      g9982PortPmCur15MinRxSmallFragments,
      g9982PortPmCur15MinRxLargeFragments,
      g9982PortPmCur15MinRxBadFragments,
      g9982PortPmCur15MinRxLostFragments,
      g9982PortPmCur15MinRxLostStarts,
      g9982PortPmCur15MinRxLostEnds,
      g9982PortPmCur15MinRxOverflows,
      g9982PortPm1DayValidIntervals,
      g9982PortPm1DayInvalidIntervals,
      g9982PortPmCur1DayTimeElapsed,
```

```
      g9982PortPmCur1DayRxErrors,
      g9982PortPmCur1DayRxSmallFragments,
      g9982PortPmCur1DayRxLargeFragments,
      g9982PortPmCur1DayRxBadFragments,
      g9982PortPmCur1DayRxLostFragments,
      g9982PortPmCur1DayRxLostStarts,
      g9982PortPmCur1DayRxLostEnds,
      g9982PortPmCur1DayRxOverflows
    }
    STATUS      current
    DESCRIPTION
      "A collection of objects supporting OPTIONAL current Performance
      Monitoring information for G.Bond/Eth ports."
    ::= { g9982Groups 4 }

  g9982Perf15MinGroup OBJECT-GROUP
    OBJECTS {
      g9982PortPm15MinIntervalMoniTime,
      g9982PortPm15MinIntervalRxErrors,
      g9982PortPm15MinIntervalRxSmallFragments,
      g9982PortPm15MinIntervalRxLargeFragments,
      g9982PortPm15MinIntervalRxBadFragments,
      g9982PortPm15MinIntervalRxLostFragments,
      g9982PortPm15MinIntervalRxLostStarts,
      g9982PortPm15MinIntervalRxLostEnds,
      g9982PortPm15MinIntervalRxOverflows,
      g9982PortPm15MinIntervalValid
    }
    STATUS      current
    DESCRIPTION
      "A collection of objects supporting OPTIONAL historical
      Performance Monitoring information for G.Bond/Eth ports, during
      previous 15-minute intervals."
    ::= { g9982Groups 5 }

  g9982Perf1DayGroup OBJECT-GROUP
    OBJECTS {
      g9982PortPm1DayIntervalMoniTime,
      g9982PortPm1DayIntervalRxErrors,
      g9982PortPm1DayIntervalRxSmallFragments,
      g9982PortPm1DayIntervalRxLargeFragments,
      g9982PortPm1DayIntervalRxBadFragments,
      g9982PortPm1DayIntervalRxLostFragments,
      g9982PortPm1DayIntervalRxLostStarts,
      g9982PortPm1DayIntervalRxLostEnds,
      g9982PortPm1DayIntervalRxOverflows,
      g9982PortPm1DayIntervalValid
    }
```

```
    STATUS      current
    DESCRIPTION
      "A collection of objects supporting OPTIONAL historical
      Performance Monitoring information for G.Bond/Eth ports, during
      previous 1-day intervals."
    ::= { g9982Groups 6 }

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

   g9982Compliance 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 {
         g9982BasicGroup
       }

       GROUP       g9982BceGroup
       DESCRIPTION
         "Support for this group is OPTIONAL."

       GROUP       g9982BacpGroup
       DESCRIPTION
         "Support for this group is OPTIONAL and only required for
         implementations supporting BACP."

       GROUP       g9982PerfCurrGroup
       DESCRIPTION
         "Support for this group is only required for implementations
         supporting Performance Monitoring."

       GROUP       g9982Perf15MinGroup
       DESCRIPTION
         "Support for this group is only required for implementations
         supporting 15-minute historical Performance Monitoring."
```

```
        GROUP       g9982Perf1DayGroup
        DESCRIPTION
          "Support for this group is only required for implementations
          supporting 1-day historical Performance Monitoring."

        OBJECT      g9982PortCapTcTypesSupported
        SYNTAX      BITS {
          tc6465(0),
          tcHDLC(1)
        }
        DESCRIPTION
          "Support for all TC types is not required.  However, at least
          one value SHALL be supported."

        OBJECT      g9982PortCapBacpSupported
        SYNTAX      TruthValue
        DESCRIPTION
          "Support for BACP is OPTIONAL; therefore, a value of false(2)
          SHALL be supported."

        OBJECT      g9982PortConfTcAdminType
        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      g9982PortConfAdminCp
        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)."

      ::= { g9982Compliances 1 }
END
```

7. Security Considerations

There are a number of managed objects defined in this MIB module with a MAX-ACCESS clause of read-write and/or read-create. Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations. These are the tables and objects and their sensitivity/vulnerability:

- Changing of g9982PortConfTable configuration parameters (e.g., g9982PortConfTcAdminType) may lead to a complete service interruption in cases where the specified PTM-TC encapsulation type is not supported by the remote end.

- Changing of g9982BceConfTable configuration parameters (e.g., g9982BceConfEligibleGroupID) 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 that does not support cross-card bonding).

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

It is thus important to control even GET and/or NOTIFY access to these objects and possibly to even encrypt the values of these objects when sending them over the network via SNMP. These are the tables and objects and their sensitivity/vulnerability:

- g9982PortStatTable - objects in this table (e.g., g9982PortStatTcOperType) provide status information for the G.Bond port, which may aid in deciphering of the G.Bond/ETH transmissions.

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

Implementations SHOULD provide the security features described by the SNMPv3 framework (see [RFC3410]), and implementations claiming compliance to the SNMPv3 standard MUST include full support for authentication and privacy via the User-based Security Model (USM)

[RFC3414] with the AES cipher algorithm [RFC3826]. Implementations MAY also provide support for the Transport Security Model (TSM) [RFC5591] in combination with a secure transport such as SSH [RFC5592] or TLS/DTLS [RFC6353].

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

8. IANA Considerations

IANA has assigned 264 as the object identifier for the g9982MIB MODULE-IDENTITY in the MIB-2 transmission sub-tree <http://www.iana.org/>.

9. Acknowledgments

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