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**xDSL multi-pair bonding (G.Bond) MIB**  
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Abstract

This document defines Management Information Base (MIB) module for use with network management protocols in TCP/IP-based internets. This document proposes an extension to the Interfaces Group MIB with a set of common objects for managing multi-pair bonded Digital Subscriber Line (xDSL) interfaces, defined in ITU-T recommendations G.998.1, G.998.2 and G.998.3. The MIB modules specific to each bonding technology are defined in GBOND-ATM-MIB, GBOND-ETH-MIB and GBOND-TDIM-MIB respectively.

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## Table of Contents

<a href="#">1.</a>	Introduction . . . . .	<a href="#">3</a>
<a href="#">2.</a>	The Internet-Standard Management Framework . . . . .	<a href="#">4</a>
<a href="#">3.</a>	The DSL Forum Management Framework for xDSL Bonding . . . . .	<a href="#">4</a>
<a href="#">4.</a>	Relationship to Other MIB modules . . . . .	<a href="#">4</a>
<a href="#">4.1.</a>	Relationship to Interfaces Group MIB module . . . . .	<a href="#">5</a>
<a href="#">4.1.1.</a>	Layering Model . . . . .	<a href="#">5</a>
<a href="#">4.1.2.</a>	xDSL Bonding . . . . .	<a href="#">7</a>
<a href="#">4.1.3.</a>	Discovery Operation . . . . .	<a href="#">7</a>
<a href="#">4.1.4.</a>	G.Bond ports initialization . . . . .	<a href="#">9</a>
<a href="#">4.1.5.</a>	Usage of ifTable . . . . .	<a href="#">10</a>
<a href="#">4.2.</a>	Relationship to G.Bond ATM, ETH and TDIM MIB modules . . . . .	<a href="#">11</a>
<a href="#">4.3.</a>	Relationship to xDSL MIB modules . . . . .	<a href="#">11</a>
<a href="#">5.</a>	MIB Structure . . . . .	<a href="#">12</a>
<a href="#">5.1.</a>	Overview . . . . .	<a href="#">12</a>
<a href="#">5.2.</a>	Performance Monitoring . . . . .	<a href="#">12</a>
<a href="#">5.3.</a>	Mapping of DSL Forum TR-159 Managed Objects . . . . .	<a href="#">12</a>
<a href="#">6.</a>	xDSL Multi-pair Bonding MIB Definitions . . . . .	<a href="#">17</a>
<a href="#">7.</a>	Security Considerations . . . . .	<a href="#">60</a>
<a href="#">8.</a>	IANA Considerations . . . . .	<a href="#">62</a>
<a href="#">9.</a>	Acknowledgments . . . . .	<a href="#">62</a>
<a href="#">10.</a>	References . . . . .	<a href="#">62</a>
<a href="#">10.1.</a>	Normative References . . . . .	<a href="#">62</a>
<a href="#">10.2.</a>	Informative References . . . . .	<a href="#">63</a>



## 1. Introduction

The xDSL Multi-Pair Bonding, allows a service provider to provide high bandwidth services to business and residential customers over multiple xDSL lines, with greater speed and resiliency, than the service over a single xDSL line, bridging the gap between xDSL and fiber-based transport.

There are three xDSL Multi-Pair Bonding schemes, also known under collective name G.Bond:

- o The ATM-Based Multi-Pair Bonding, specified in ITU-T G.998.1 recommendation [[G.998.1](#)], 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 ATM stream. This specification can be viewed as an evolution of the legacy Inverse Multiplexing over ATM (IMA) technology [[af-phy-0086](#)], applied to xDSL with variable rates on each line/bearer channel.
- o The Ethernet-Based Multi-Pair Bonding, 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 stream. This specification can be viewed as IEEE 802.3-2005 [[802.3](#)] Clause 61 Physical Medium Entity (PME) Aggregation, generalized to work over any xDSL technology. (2Base-TL and 10Pass-TS interfaces defined by IEEE use G.SHDSL and VDSL technology respectively).
- o The Multi-pair bonding using time-division inverse multiplexing (TDIM), specified in ITU-T G.998.3 recommendation [[G.998.3](#)], which defines a method for bonding (or aggregating) of multiple xDSL lines into a single bi-directional logical link carrying a mix of various traffic streams (e.g., Ethernet, ATM, TDM).

Architecturally all three bonding schemes define a new "bonded" Transport Protocol Specific - Transmission Convergence (TPS-TC) sub-layer, stacked above multiple ATM-TC, Ethernet/PTM-TC or STM-TC (clear channel) sub-layers for the ATM, Ethernet or TDIM bonding respectively. Each underlying TPS-TC sub-layer represents a protocol specific gamma-interface to an xDSL line or an individual bearer channel of an xDSL line. Bonding of multiple bearer channels in the same xDSL line is not allowed.

All schemes allow bonding of up to 32 individual line/channel sub-layers with variable rates, providing common functionality for the configuration, initialization, operation and monitoring of the bonded



link.

This document defines a MIB module common to all 3 schemes. Additional managed objects, specific to each bonding technology, are defined in GBOND-ATM-MIB [[I-D.ietf-adslmib-gbond-atm-mib](#)], GBOND-ETH-MIB [[I-D.ietf-adslmib-gbond-eth-mib](#)] and GBOND-TDIM-MIB [[I-D.ietf-adslmib-gbond-tdim-mib](#)] modules.

## **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 document specifies a MIB module that is compliant to the SMIV2, which is described in STD 58, [RFC 2578](#) [[RFC2578](#)], STD 58, [RFC 2579](#) [[RFC2579](#)] and STD 58, [RFC 2580](#) [[RFC2580](#)].

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

## **3. The DSL Forum Management Framework for xDSL Bonding**

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

## **4. Relationship to Other MIB modules**

This section outlines the relationship of the MIB modules defined in this document with other MIB modules described in the relevant RFCs. Specifically, the following MIB modules are discussed: Interfaces Group MIB (IF-MIB), Inverse Stack Table MIB (IF-INVERTED-STACK-MIB) Interface Stack Capability MIB (IF-CAP-STACK-MIB), G.Bond scheme specific modules: G.Bond/ATM (GBOND-ATM-MIB), G.Bond/Ethernet (GBOND-ETH-MIB) and G.Bond/TDIM (GBOND-TDIM-MIB), and DSL specific MIB modules: ADSL (ADSL-LINE-EXT-MIB), ADSL2 (ADSL2-LINE-MIB), SHDSL (HDSL2-SHDSL-LINE-MIB), VDSL (VDSL-LINE-MIB) and VDSL2 (VDSL2-LINE-MIB).



#### **4.1. Relationship to Interfaces Group MIB module**

A bonded xDSL port is a stacked (a.k.a. aggregated or bonded) interface and as such is managed using generic interface management objects defined in the IF-MIB [[RFC2863](#)].

The stack management, i.e., actual connection of the sub-layers to the top layer interface, is done via the ifStackTable, as defined in the IF-MIB [[RFC2863](#)] and its inverse ifInvStackTable, as defined in the IF-INVERTED-STACK-MIB [[RFC2864](#)].

The ifCapStackTable and its inverse ifInvCapStackTable defined in the IF-CAP-STACK-MIB [[RFC5066](#)], extend the stack management with an ability to describe possible connections or cross-connect capability, when a flexible cross-connect matrix is present between the interface layers.

##### **4.1.1. Layering Model**

A G.Bond interface can aggregate up to 32 channel sub-layers, with each channel representing an xDSL line or an xDSL bearer channel. For the purpose of brevity we will refer to the bonded interface as Generic Bonded Sub-layer (GBS) and to the channel sub-layer as Bonding Channel Entity (BCE).

A generic G.Bond device can have a number of GBS ports, each connected to a particular upper layer (e.g., Media Access Control (MAC) interface for G.998.2 scheme), while simultaneously cross-connected to a number of underlying BCEs, with a single GBS per BCE relationship.

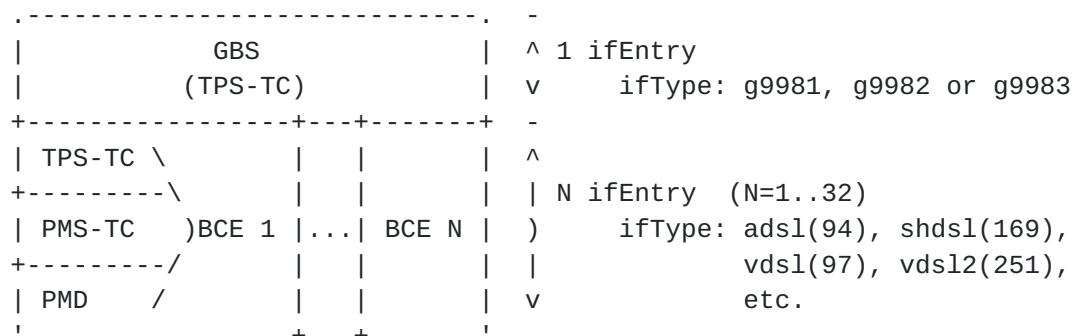
A GBS port is represented in the Interface table (ifTable) as a separate interface with an ifType of g9981, g9982 or g9983 for a particular bonding scheme.

Each BCE in the aggregated GBS port is represented in the ifTable as a separate interface with an ifType relevant to a particular xDSL technology, e.g., shdsl(169) or vdsl(97). The ifType values are defined in [[IANAifType-MIB](#)].





The following figure shows the layering diagram and corresponding use of ifTable for the bonded xDSL interfaces:



BCE - Bonding Channel Entity  
 GBS - Generic Bonded Sub-layer  
 PMD - Physical Medium Dependent  
 TPS-TC - Transport Protocol Specific - Transmission Convergence  
 PMS-TC - Physical Media Specific - Transmission Convergence

Figure 1: Use of ifTable for bonded xDSL interfaces

The ifStackTable is indexed by the ifIndex values of the aggregated G.Bond port (GBS) and the BCEs connected to it. ifStackTable allows a Network Management application to determine which BCEs are connected to a particular GBS and change connections (if supported by the application). The ifInvStackTable, being an inverted version of the ifStackTable, provides an efficient means for a Network Management application to read a subset of the ifStackTable and thereby determine which GBS runs on top of a particular BCE.

The ifCapStackTable defined in the IF-CAP-STACK-MIB module, specifies for each higher-layer interface (e.g., GBS port) a list of lower-layer interfaces (e.g., BCEs), which can possibly be cross-connected to that higher-layer interface, determined by the cross-connect capability of the device. This table, modeled after ifStackTable, is read only, reflecting current cross-connect capability of a stacked interface, which can be dynamic in some implementations (e.g., if xDSL lines are located on a pluggable module and the module is pulled out). Note that BCE availability per GBS, described by ifCapStackTable, can be constrained by other parameters, for example by aggregation capacity of a GBS or by the BCE in question being already connected to another GBS. So, in order to ensure that a particular BCE can be connected to the GBS, all respective parameters (e.g., ifCapStackTable, ifStackTable and gBondCapacity) SHALL be inspected.

The ifInvCapStackTable, also defined in the IF-CAP-STACK-MIB module,



describes which higher-layer interfaces (e.g., GBS ports) can possibly be connected to a particular lower-layer interface (e.g., BCE), providing inverted mapping of ifCapStackTable. While it contains no additional information beyond that already contained in the ifCapStackTable, the ifInvCapStackTable has the ifIndex values in its INDEX clause in the reverse order, i.e., the lower-layer interface first, and the higher-layer interface second, providing an efficient means for a Network Management application to read a subset of the ifCapStackTable and thereby determine which interfaces can be connected to run on top of a particular interface.

#### **4.1.2. xDSL Bonding**

The G.998.x Bonding allows a number of BCEs to be aggregated onto a single logical GBS port, by splitting the incoming traffic into multiple streams, transmitting each stream over a specific BCE and combining the streams at the remote GBS port, preserving the original traffic order.

Big Ethernet frames MAY be fragmented before the transmission and reassembled at the remote end to minimize transportation delay.

The Bonding is OPTIONAL, meaning that a device with a single BCE MAY perform fragmentation and re-assembly if this function is supported by the device. The agent is REQUIRED to report on the Bonding capability for all types of G.Bond ports (ATM, Ethernet and TDIM).

The GBOND-MIB module allows a Network Management application to query Bonding capability and enable/disable it if supported. Note that enabling Bonding effectively turns on fragmentation and re-assembly, even on a single-BCE port.

#### **4.1.3. Discovery Operation**

The G.Bond ports may optionally support discovery operation, whereby BCEs, during initialization, exchange information about their respective aggregation groups (GBS), via xDSL handshake protocol. This information can then be used to detect copper misconnections or for an automatic assignment of the local BCEs into aggregation groups instead of a fixed pre-configuration.

The MIB module defined in this document allow a Network Management application to control G.Bond Discovery mechanism and query its results.

Two tables are used by the G.Bond Discovery mechanism: ifStackTable and ifCapStackTable. The following pseudo-code gives an example of the Discovery and automatic BCE assignment for a generic multi-GBS



G.Bond device, located at Central Office (CO), using 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 )
  { // Assign a unique 6-octets local discovery code to the GBS
    // e.g., MAC address
    dc = gbs[i].DiscoveryCode = MAC[i];
    // 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
    { // Try to grab the remote RT_device, by writing the value
      // of the local 6 Byte discovery code to the remote
      // discovery code register (via handshake mechanism).
      // This operation is atomic Set-if-Clear action, i.e., it
      // would succeed only if the remote discovery register was
      // zero. Read the remote discovery code register via Get
      // operation to see if the RT_device, attached via the BCE
      // is indeed marked as being the CO_device peer.
      bce[j].RemoteDiscoveryCode = dc; // Set-if-Clear
      r = bce[j].RemoteDiscoveryCode; // Get
      IF ( r == dc AND gbs[i].NumBCEs < gbs[i].BondCapacity )
      { // Remote RT_device connected via BCE[j] is/was 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;
        // Discover all other disconnected BCEs,
        // attached to the same RT_device and connect them to
        // the GBS provided there is enough room for more BCEs.
        FOREACH bce[k] IN ifCapStackTable[gbs[i]] and
          NOT IN ifStackTable[gbs[i]]
        { // Get Remote Discovery Code from the BCE to see if
          // it belongs to a connected RT_device "grabbed" by
          // the CO_device.
```



```
        r = bce[k].RemoteDiscoveryCode;
        IF ( r == dc AND gbs[i].NumBCEs < gbs[i].BondCapacity)
        { // Physically connect the BCE to the GBS
          // (gbs[i] is auto-added TO ifInvStackTable[bce[k]])
          ADD bce[k] 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;
  }
}
```

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.

Adding a BCE to the ifStackTable row for a specific GBS, involves actual connection of the BCE to the GBS.

Note that GBS port does not have to be operationally 'down' for the connection to succeed. In fact, a dynamic BCE addition (and removal) MAY be implemented with an available BCE being initialized first (by setting its ifAdminStatus to 'up') and then added to an operationally 'up' GBS port, by modifying a respective ifStackTable (and respective ifInvStackTable) entry.

It is RECOMMENDED that a removal of the last operationally 'up' BCE from an operationally 'up' GBS would be rejected by the implementation, as this action would completely drop the link.

In addition to the standard handshake-based discovery described above, [\[G.998.2\]](#) defines an optional frame-based discovery and pair management. These frame-based methods are discussed in [\[I-D.ietf-ads1mib-gbond-eth-mib\]](#).

#### **4.1.4. G.Bond ports initialization**

G.Bond ports being built on top of xDSL technology, require a lengthy initialization or 'training' process, before any data can pass. During this initialization both ends of a link (peers) work cooperatively to achieve required data rate on a particular copper pair. Sometimes, when the copper line is too long or the noise on the line is too high, that 'training' process may fail to achieve a





specific target rate with required characteristics.

The ifAdminStatus object from the IF-MIB, controls the desired state of a GBS with all the BCEs connected to it or of an individual BCE port. Setting this object to 'up' instructs a particular GBS or a BCE to start initialization process, which may take tens of seconds for G.Bond ports. The ifOperStatus object shows the operational state of an interface (extended by ifMauMediaAvailable object from MAU-MIB [[RFC4836](#)] for GBS and \*Status object from a relevant line MIB for BCE interfaces).

A disconnected BCE may be initialized by changing the ifAdminState from 'down' to 'up'. Changing the ifAdminState to 'up' on the GBS initializes all BCEs connected to that particular GBS. Note that in case of bonding some interfaces may fail to initialize while others succeed. The GBS is considered operationally 'up' if at least one bonded BCE is operationally 'up'. When all BCEs connected to the GBS are 'down' the GBS SHALL be considered operationally 'lowerLayerDown'. The GBS SHALL be considered operationally 'notPresent' if it is not connected to any BCE. The GBS/BCE interface SHALL remain operationally 'down' during initialization.

#### [4.1.5. Usage of ifTable](#)

Both BCE and GBS interfaces are managed using interface specific management objects defined in the GBOND-MIB module and generic interface objects from the ifTable of IF-MIB, with all management table entries referenced by the interface index ifIndex.

The following table summarizes G.Bond specific interpretations for some of the ifTable objects specified by the mandatory ifGeneralInformationGroup:

IF-MIB object	G.Bond interpretation
ifIndex	Interface index. Note that each BCE and each GBS in the G.Bond PHY MUST have a unique index, as there some GBS and BCE specific attributes accessible only on the GBS or BCE level.
ifType	g9981, g9982 or g9982 for the ATM, Ethernet or TDIM GBS respectively, shdsl(169) for G.SHDSL BCE, vdsl(97) for VDSL BCE, etc.



ifSpeed	Operating data rate for the BCE. For the GBS it is the sum of the current operating data rates of all BCEs in the aggregation group, without the encapsulation overhead and G.Bond overhead, but accounting for the Inter-Frame Gaps (IFG). When a GBS or a BCE is operating in an assymetrical fashion (upstream data rate differs from the downstream one) the lowest of the values is shown.	
ifAdminStatus	Setting this object to 'up' instructs a particular GBS (with all BCEs connected to it) or a BCE to start initialization process	
ifOperStatus	a relevant *Status object from a particular line MIB supplements the 'down' value of ifOperStatus for BCEs.	

Table 1: G.Bond interpretation of IF-MIB objects

#### 4.2. Relationship to G.Bond ATM, ETH and TDIM MIB modules

This MIB module defined in this document is common to all three G.998 bonding schemes. It MUST be used in conjunction with a bonding scheme-specific MIB module:

- o GBOND-ATM-MIB [[I-D.ietf-adslmib-gbond-atm-mib](#)] for a G.998.1 bonded interface.
- o GBOND-ETH-MIB [[I-D.ietf-adslmib-gbond-eth-mib](#)] for a G.998.2 bonded interface.
- o GBOND-TDIM-MIB [[I-D.ietf-adslmib-gbond-tdim-mib](#)] for a G.998.3 bonded interface.

#### 4.3. Relationship to xDSL MIB modules

Each xDSL technology is described in a relevant xDSL line MIB module: e.g., HDSL2-SHDSL-LINE-MIB [[RFC4319](#)] for G.SHDSL, ADSL-LINE-EXT-MIB [[RFC3440](#)] for ADSL, ADSL2-LINE-MIB [[RFC4706](#)] for ADSL2, VDSL-LINE-MIB [[RFC3728](#)] for VDSL or VDSL2-LINE-MIB [[RFC5650](#)] for VDSL2.

These MIBs are used to manage individual xDSL lines/channels (BCEs).



## 5. MIB Structure

### 5.1. Overview

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

- o gBondPort - containing objects for configuration, capabilities, status, historical performance monitoring and notifications, common to all G.Bond ports (GBS).
- o gBondBce - containing a single common object for configuration of the remote discovery code per BCE. Note that the rest of the objects for BCE configuration, capabilities, status and notifications, is located in relevant xDSL line MIB modules as well as in the bonding scheme specific MIB modules.

### 5.2. Performance Monitoring

The OPTIONAL performance monitoring counters, thresholds and history buckets (interval-counters) 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 DSL 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 and in associated MIB modules, i.e., the IF-MIB [[RFC2863](#)].

+-----+-----+	+-----+-----+	+-----+-----+
G.Bond Managed Object	Corresponding SNMP Object	
+-----+-----+	+-----+-----+	+-----+-----+
oBondingGroup - Basic Package		
(Mandatory)		
+-----+-----+	+-----+-----+	+-----+-----+
aGroupID	ifIndex (IF-MIB)	
+-----+-----+	+-----+-----+	+-----+-----+
aGroupBondSchemesSupported	gBondSchemesSupported	



aGroupPeerBondSchemesSupported	gBondPeerSchemesSupported	
+-----+	+-----+	+-----+
aGroupAdminBondScheme	gBondAdminScheme	
+-----+	+-----+	+-----+
aGroupPeerAdminBondScheme	gBondPeerAdminScheme	
+-----+	+-----+	+-----+
aGroupOperBondScheme	gBondOperScheme	
+-----+	+-----+	+-----+
aGroupPeerOperBondScheme	gBondPeerOperScheme	
+-----+	+-----+	+-----+
aGroupEnd	gBondPortSide	
+-----+	+-----+	+-----+
aGroupOperState	ifOperStatus (IF-MIB)	
+-----+	+-----+	+-----+
aGroupAdminState	ifAdminStatus (IF-MIB)	
+-----+	+-----+	+-----+
aGroupStatus	gBondFltStatus	
+-----+	+-----+	+-----+
aGroupCapacity	gBondCapacity	
+-----+	+-----+	+-----+
aGroupPeerCapacity	gBondPeerCapacity	
+-----+	+-----+	+-----+
aGroupNumChannels	gBondNumBCEs	
+-----+	+-----+	+-----+
aGroupName	ifName (IF-MIB)	
+-----+	+-----+	+-----+
aGroupDiscoveryCode	gBondDiscoveryCode	
+-----+	+-----+	+-----+
aGroupUpRate	gBondUpDataRate	
+-----+	+-----+	+-----+
aGroupDownRate	gBondDnDataRate	
+-----+	+-----+	+-----+
aGroupTargetUpRate	gBondTargetUpDataRate	
+-----+	+-----+	+-----+
aGroupTargetDownRate	gBondTargetDnDataRate	
+-----+	+-----+	+-----+
aGroupThreshLowUpRate	gBondThreshLowUpRate	
+-----+	+-----+	+-----+
aGroupThreshLowDownRate	gBondThreshLowDnRate	
+-----+	+-----+	+-----+
aGroupLowRateCrossingEnable	gBondLowRateCrossingEnable	
+-----+	+-----+	+-----+
nGroupLowUpRateCrossing	gBondLowUpRateCrossing	
+-----+	+-----+	+-----+
nGroupLowDownRateCrossing	gBondLowDnRateCrossing	
+-----+	+-----+	+-----+





aGroupLinkUpDownEnable	_EdNote: Currently IF-MIB	
	doesn't provide a control for	
	the linkUp/linkDown	
	notifications. Can we define a	
	control in one MIB module while	
	the notifications are in	
	another?_	
nGroupLinkUp	linkDown (IF-MIB)	
nGroupLinkDown	linkUp (IF-MIB)	
oBondingGroup - PM Package		
(Optional)		
aGroupPerfES	gBondPerfES	
aGroupPerfSES	gBondPerfSES	
aGroupPerfUAS	gBondPerfUAS	
aGroupPerf15MinValidIntervals	gBondPerf15MinValidIntervals	
aGroupPerf15MinInvalidIntervals	gBondPerf15MinInvalidIntervals	
aGroupPerfCurr15MinTimeElapsed	gBondPerfCurr15MinTimeElapsed	
aGroupPerfCurr15MinES	gBondPerfCurr15MinES	
aGroupPerfCurr15MinSES	gBondPerfCurr15MinSES	
aGroupPerfCurr15MinUAS	gBondPerfCurr15MinUAS	
aGroupPerfTcaEnable	gBondPerfTcaEnable	
aGroupPerfThreshold15MinES	gBondPerfThreshold15MinES	
aGroupPerfThreshold15MinSES	gBondPerfThreshold15MinSES	
aGroupPerfThreshold15MinUAS	gBondPerfThreshold15MinUAS	
nGroupPerfTca15MinES	gBondPerfTca15MinESCrossing	
nGroupPerfTca15MinSES	gBondPerfTca15MinSESCrossing	
nGroupPerfTca15MinUAS	gBondPerfTca15MinUASCrossing	



+-----+-----+		
aGroupPerf1DayValidIntervals	gBondPerf1DayValidIntervals	
+-----+-----+		
aGroupPerf1DayInvalidIntervals	gBondPerf1DayInvalidIntervals	
+-----+-----+		
aGroupPerfCurr1DayTimeElapsed	gBondPerfCurr1DayTimeElapsed	
+-----+-----+		
aGroupPerfCurr1DayES	gBondPerf1DayIntervalES	
+-----+-----+		
aGroupPerfCurr1DaySES	gBondPerf1DayIntervalSES	
+-----+-----+		
aGroupPerfCurr1DayUAS	gBondPerf1DayIntervalUAS	
+-----+-----+		
aGroupPerfThreshold1DayES	gBondPerfThreshold1DayES	
+-----+-----+		
aGroupPerfThreshold1DaySES	gBondPerfThreshold1DaySES	
+-----+-----+		
aGroupPerfThreshold1DayUAS	gBondPerfThreshold1DayUAS	
+-----+-----+		
nGroupPerfTca1DayES	gBondPerfTca1DayESCrossing	
+-----+-----+		
nGroupPerfTca1DaySES	gBondPerfTca1DaySESCrossing	
+-----+-----+		
nGroupPerfTca1DayUAS	gBondPerfTca1DayUASCrossing	
+-----+-----+		
aGroupPerf15MinIntervalNumber	gBondPerf15MinIntervalIndex	
+-----+-----+		
aGroupPerf15MinIntervalValid	gBondPerf15MinIntervalValid	
+-----+-----+		
aGroupPerf15MinIntervalES	gBondPerf15MinIntervalES	
+-----+-----+		
aGroupPerf15MinIntervalSES	gBondPerf15MinIntervalSES	
+-----+-----+		
aGroupPerf15MinIntervalUAS	gBondPerf15MinIntervalUAS	
+-----+-----+		
aGroupPerf1DayIntervalNumber	gBondPerf1DayIntervalIndex	
+-----+-----+		
aGroupPerf1DayIntervalValid	gBondPerf1DayIntervalValid	
+-----+-----+		
aGroupPerf1DayIntervalMoniSecs	gBondPerf1DayIntervalMoniTime	
+-----+-----+		
aGroupPerf1DayIntervalES	gBondPerf1DayIntervalES	
+-----+-----+		
aGroupPerf1DayIntervalSES	gBondPerf1DayIntervalSES	
+-----+-----+		
aGroupPerf1DayIntervalUAS	gBondPerf1DayIntervalUAS	
+-----+-----+		



+-----+-----+		
oLine - Basic Package		
(Mandatory)		
+-----+-----+		
aLineID	ifIndex (IF-MIB)	
+-----+-----+		
aLineType	ifType (IF-MIB)	
+-----+-----+		
aLineOperState	ifOperStatus (IF-MIB)	
+-----+-----+		
aLineStatus	*dsl*CurrStatus (*DSL-LINE-MIB)	
+-----+-----+		
aLineEnd	*dsl*Side (*DSL-LINE-MIB)	
+-----+-----+		
aLineAdminState	ifAdminStatus (IF-MIB)	
+-----+-----+		
aLineRemoteDiscoveryCode	gBondBceRemoteDiscoveryCode	
+-----+-----+		
aLineUpDownEnable	_EdNote: Currently IF-MIB	
	doesn't provide a control for	
	the linkUp/linkDown	
	notifications. Can we define a	
	control in one MIB module while	
	the notifications are in	
	another?_	
+-----+-----+		
nLineUp	linkUp (IF-MIB)	
+-----+-----+		
nLineDown	linkDown (IF-MIB)	
+-----+-----+		
oChannel - Basic Package		
(Mandatory)		
+-----+-----+		
aChannelID	ifIndex (IF-MIB)	
+-----+-----+		
aChannelGroupID		
+-----+-----+		
aChannelType	ifType (IF-MIB)	
+-----+-----+		
aChannelOperState	ifOperStatus (IF-MIB)	
+-----+-----+		
aChannelStatus	*dsl*CurrStatus	
	(*DSL-LINE-MIB),	
	xdsl2ChStatus*Status	
	(VDSL2-LINE-MIB)	
+-----+-----+		

Table 2: Mapping of TR-159 Managed Objects



## 6. xDSL Multi-pair Bonding MIB Definitions

GBOND-MIB DEFINITIONS ::= BEGIN

### IMPORTS

```
MODULE-IDENTITY,
OBJECT-TYPE,
NOTIFICATION-TYPE,
mib-2,
Unsigned32,
Gauge32
    FROM SNMPv2-SMI          -- [RFC2578]
TEXTUAL-CONVENTION,
TruthValue,
RowStatus,
PhysAddress
    FROM SNMPv2-TC          -- [RFC2579]
MODULE-COMPLIANCE,
OBJECT-GROUP,
NOTIFICATION-GROUP
    FROM SNMPv2-CONF        -- [RFC2580]
SnmpAdminString
    FROM SNMP-FRAMEWORK-MIB -- [RFC3411]
ifIndex
    FROM IF-MIB             -- [RFC2863]
HCPperfCurrentCount,
HCPperfIntervalCount,
HCPperfIntervalThreshold,
HCPperfValidIntervals,
HCPperfInvalidIntervals,
HCPperfTimeElapsed,
HCPperfTotalCount
    FROM HC-PerfHist-TC-MIB -- [RFC3705]
;
```

---

### gBondMIB MODULE-IDENTITY

LAST-UPDATED "201011270000Z" -- Nov 27, 2010

ORGANIZATION "IETF ADSL MIB Working Group"

#### CONTACT-INFO

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<http://www.ietf.org/html.charters/adslmib-charter.html>

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#### DESCRIPTION

"The objects in this MIB module are used to manage the multi-pair bonded xDSL Interfaces, defined in ITU-T recommendations G.998.1, G.998.2 and G.998.3.

This MIB module MUST be used in conjunction with a bonding scheme specific MIB module, that is, GBOND-ATM-MIB, GBOND-ETH-MIB or GBOND-TDIM-MIB.

The following references are used throughout this MIB module:

[G.998.1] refers to:  
ITU-T Recommendation G.998.1: 'ATM-based multi-pair bonding',  
January 2005.

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

[G.998.3] refers to:  
ITU-T Recommendation G.998.3: 'Multi-pair bonding using time-division inverse multiplexing', January 2005.

[TR-159] refers to:  
Broadband Forum Technical Report: 'Management Framework for



xDSL Bonding', December 2008.

Naming Conventions:

BCE - Bonding Channel Entity  
BTU - Bonding Transmission Unit  
CO - Central Office  
CPE - Customer Premises Equipment  
GBS - Generic Bonding Sublayer  
PM - Performance Monitoring  
SNR - Signal to Noise Ratio  
TCA - Threshold Crossing Alert

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This version of this MIB module is part of RFC XXXX;  
see the RFC itself for full legal notices."

REVISION "201011270000Z" -- Nov 27, 2010

DESCRIPTION "Initial version, published as RFC XXXX."

-- EdNote: Replace XXXX 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](#)

gBondObjects OBJECT IDENTIFIER ::= { gBondMIB 1 }

gBondConformance OBJECT IDENTIFIER ::= { gBondMIB 2 }

-- Groups in the module

gBondPort OBJECT IDENTIFIER ::= { gBondObjects 1 }

gBondBce OBJECT IDENTIFIER ::= { gBondObjects 2 }

-- Textual Conventions

GBondSchemeList ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This textual convention defines a bitmap of possible ITU-T  
G.998 (G.Bond) bonding schemes. Currently there are 3 bonding  
schemes defined: G.998.1, G.998.2 and G.998.3, identified by



bit values g9981(1), g9982(2) and g9983(3), respectively.  
An additional value of unknown(0), can be returned as a result  
of GET operation, when an value of the object cannot be  
determined, for example a peer GBS cannot be reached or it  
does not support any kind of bonding."

```
SYNTAX      BITS {
    unknown(0),
    g9981(1),
    g9982(2),
    g9983(3)
}
```

GBondScheme ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This textual convention defines ITU-T G.998 bonding scheme  
values. Possible values are:  
unknown(0) - undefined or unknown  
g9981(1) - G.998.1 (G.Bond/ATM)  
g9982(2) - G.998.2 (G.Bond/Ethernt)  
g9983(3) - G.998.3 (G.Bond/TDIM)."

```
SYNTAX      INTEGER {
    unknown(0),
    g9981(1),
    g9982(2),
    g9983(3)
}
```

GBondPerf1DayIntervalThreshold ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION

"This textual convention defines a range of values that may be  
set in a fault threshold alarm control for a 1-day interval.  
As the number of seconds in a 1-day interval numbers at most  
86400, objects of this type may have a range of 0...86400,  
where the value of 0 disables the alarm."

```
SYNTAX      Unsigned32 (0..86400)
```

-- Port Notifications Group

gBondPortNotifications OBJECT IDENTIFIER ::= { gBondPort 0 }

gBondLowUpRateCrossing NOTIFICATION-TYPE

OBJECTS {

-- ifIndex is not needed here since we are under specific GBS  
gBondUpDataRate,



```
    gBondThreshLowUpRate
  }
```

```
STATUS      current
```

#### DESCRIPTION

"This notification indicates that the G.Bond port' upstream data rate has reached/dropped below or exceeded the low upstream rate threshold, specified by gBondThreshLowUpRate.

This notification MAY be sent for the -O subtype ports while the port is up, on the crossing event in both directions: from normal (rate is above the threshold) to low (rate equals the threshold or below it) and from low to normal. This notification is not applicable to the -R subtypes.

It is RECOMMENDED that a small debouncing period of 2.5 sec, between the detection of the condition and notification, is implemented to prevent simultaneous LinkUp/LinkDown and gBondLowUpRateCrossing notifications to be sent.

The adaptive nature of the G.Bond technology allows the port to adapt itself to the changes in the copper environment, e.g., an impulse noise, alien crosstalk, or a micro-interruption may temporarily drop one or more BCEs in the aggregation group, causing a rate degradation of the aggregated G.Bond link. The dropped BCEs would then try to re-initialize, possibly at a lower rate than before, adjusting the rate to provide required target SNR margin.

Generation of this notification is controlled by the gBondLowRateCrossingEnable object.

This object maps to the TR-159 notification nGroupLowUpRateCrossing."

#### REFERENCE

"[[TR-159](#)] 5.5.1.24"

```
::= { gBondPortNotifications 1 }
```

#### gBondLowDnRateCrossing NOTIFICATION-TYPE

```
OBJECTS {
```

```
-- ifIndex is not needed here since we are under specific GBS
  gBondDnDataRate,
  gBondThreshLowDnRate
```

```
}
```

```
STATUS      current
```

#### DESCRIPTION

"This notification indicates that the G.Bond port' downstream data rate has reached/dropped below or exceeded the low





downstream rate threshold, specified by  
gBondThreshLowDnRate.

This notification MAY be sent for the -O subtype ports while the port is up, on the crossing event in both directions: from normal (rate is above the threshold) to low (rate equals the threshold or below it) and from low to normal. This notification is not applicable to the -R subtypes.

It is RECOMMENDED that a small debouncing period of 2.5 sec, between the detection of the condition and notification, is implemented to prevent simultaneous LinkUp/LinkDown and gBondLowDnRateCrossing notifications to be sent.

The adaptive nature of the G.Bond technology allows the port to adapt itself to the changes in the copper environment, e.g., an impulse noise, alien crosstalk, or a micro-interruption may temporarily drop one or more BCEs in the aggregation group, causing a rate degradation of the aggregated G.Bond link. The dropped BCEs would then try to re-initialize, possibly at a lower rate than before, adjusting the rate to provide required target SNR margin.

Generation of this notification is controlled by the  
gBondLowRateCrossingEnable object.

This object maps to the TR-159 notification  
nGroupLowDownRateCrossing."

#### REFERENCE

"[[TR-159](#)] 5.5.1.25"  
::= { gBondPortNotifications 2}

#### gBondPerfTca15MinESCrossing NOTIFICATION-TYPE

##### OBJECTS {

-- ifIndex is not needed here since we are under specific GBS  
gBondPerfCurr15MinES,  
gBondPerfThreshold15MinES

}

STATUS current

##### DESCRIPTION

"This notification indicates that the Errored Seconds threshold, specified by gBondPerfThreshold15MinES, has been reached or exceeded for the GPS port.

Generation of this notification is controlled by  
gBondPerfTcaEnable and gBondPerfThreshold15MinES objects.



This object maps to the TR-159 notification  
nGroupPerfTca15MinES."

## REFERENCE

"[[TR-159](#)] 5.5.1.42"

::= { gBondPortNotifications 3}

## gBondPerfTca15MinSESCrossing NOTIFICATION-TYPE

## OBJECTS {

-- ifIndex is not needed here since we are under specific GBS  
gBondPerfCurr15MinSES,  
gBondPerfThreshold15MinSES

}

STATUS current

## DESCRIPTION

"This notification indicates that the Severely Errored Seconds  
threshold, specified by gBondPerfThreshold15MinSES, has been  
reached or exceeded for the GPS port.

Generation of this notification is controlled by  
gBondPerfTcaEnable and gBondPerfThreshold15MinSES objects.

This object maps to the TR-159 notification  
nGroupPerfTca15MinSES."

## REFERENCE

"[[TR-159](#)] 5.5.1.43"

::= { gBondPortNotifications 4}

## gBondPerfTca15MinUASCrossing NOTIFICATION-TYPE

## OBJECTS {

-- ifIndex is not needed here since we are under specific GBS  
gBondPerfCurr15MinUAS,  
gBondPerfThreshold15MinUAS

}

STATUS current

## DESCRIPTION

"This notification indicates that the Unavailable Seconds  
threshold, specified by gBondPerfThreshold15MinES, has been  
reached or exceeded for the GPS port.

Generation of this notification is controlled by  
gBondPerfTcaEnable and gBondPerfThreshold15MinUAS objects.

This object maps to the TR-159 notification  
nGroupPerfTca15MinUAS."

## REFERENCE

"[[TR-159](#)] 5.5.1.44"

::= { gBondPortNotifications 5}



## gBondPerfTca1DayESCrossing NOTIFICATION-TYPE

## OBJECTS {

-- ifIndex is not needed here since we are under specific GBS

gBondPerfCurr1DayES,

gBondPerfThreshold1DayES

}

STATUS current

## DESCRIPTION

"This notification indicates that the Errored Seconds threshold, specified by gBondPerfThreshold1DayES, has been reached or exceeded for the GPS port.

Generation of this notification is controlled by gBondPerfTcaEnable and gBondPerfThreshold1DayES objects.

This object maps to the TR-159 notification nGroupPerfTca1DayES."

## REFERENCE

"[[TR-159](#)] 5.5.1.54"

::= { gBondPortNotifications 6}

## gBondPerfTca1DaySESCrossing NOTIFICATION-TYPE

## OBJECTS {

-- ifIndex is not needed here since we are under specific GBS

gBondPerfCurr1DaySES,

gBondPerfThreshold1DaySES

}

STATUS current

## DESCRIPTION

"This notification indicates that the Severely Errored Seconds threshold, specified by gBondPerfThreshold1DaySES, has been reached or exceeded for the GPS port.

Generation of this notification is controlled by gBondPerfTcaEnable and gBondPerfThreshold1DaySES objects.

This object maps to the TR-159 notification nGroupPerfTca1DaySES."

## REFERENCE

"[[TR-159](#)] 5.5.1.55"

::= { gBondPortNotifications 7}

## gBondPerfTca1DayUASCrossing NOTIFICATION-TYPE

## OBJECTS {

-- ifIndex is not needed here since we are under specific GBS

gBondPerfCurr1DayUAS,

gBondPerfThreshold1DayUAS

}



STATUS current

DESCRIPTION

"This notification indicates that the Unavailable Seconds threshold, specified by gBondPerfThreshold1DayUAS, has been reached or exceeded for the GPS port.

Generation of this notification is controlled by gBondPerfTcaEnable and gBondPerfThreshold1DayUAS objects.

This object maps to the TR-159 notification nGroupPerfTca1DayUAS."

REFERENCE

"[[TR-159](#)] 5.5.1.56"

::= { gBondPortNotifications 8}

-- G.Bond Port (GBS) group

gBondPortConfTable OBJECT-TYPE

SYNTAX SEQUENCE OF GBondPortConfEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Table for Configuration of G.Bond GBS ports. Entries in this table MUST be maintained in a persistent manner"

::= { gBondPort 1 }

gBondPortConfEntry OBJECT-TYPE

SYNTAX GBondPortConfEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the G.Bond Port Configuration table.  
Each entry represents an G.Bond port indexed by the ifIndex.  
Note that an G.Bond GBS port runs on top of a single  
or multiple BCE port(s), which are also indexed by ifIndex."

INDEX { ifIndex }

::= { gBondPortConfTable 1 }

GBondPortConfEntry ::=

SEQUENCE {

gBondAdminScheme	GBondScheme,
gBondPeerAdminScheme	GBondScheme,
gBondDiscoveryCode	PhysAddress,
gBondTargetUpDataRate	Unsigned32,
gBondTargetDnDataRate	Unsigned32,
gBondThreshLowUpRate	Unsigned32,
gBondThreshLowDnRate	Unsigned32,
gBondLowRateCrossingEnable	TruthValue,





```
    gBondPerfTcaConfProfile      SnmpAdminString,
    gBondPerfTcaEnable           TruthValue
}
```

#### gBondAdminScheme OBJECT-TYPE

SYNTAX GBondScheme

MAX-ACCESS read-write

STATUS current

##### DESCRIPTION

"A desired bonding scheme for a G.Bond GBS port.

The following values instruct the port to use corresponding bonding scheme if supported:

- g9981(1) - instructs the port to use G.998.1 bonding
- g9982(2) - instructs the port to use G.998.2 bonding
- g9983(3) - instructs the port to use G.998.3 bonding

Changing of the gBondAdminScheme MUST be performed when the link is Down. Attempts to change this object MUST be rejected (in case of SNMP with the error inconsistentValue), if the link is Up or Initializing. Attempts to change this object to an unsupported bonding scheme (see gBondSchemesSupported) SHALL be rejected (in case of SNMP with the error wrongValue).

This object MUST be maintained in a persistent manner.

This object maps to the TR-159 attribute  
aGroupAdminBondScheme."

##### REFERENCE

"[[TR-159](#)] 5.5.1.6"

::= { gBondPortConfEntry 1 }

#### gBondPeerAdminScheme OBJECT-TYPE

SYNTAX GBondScheme

MAX-ACCESS read-write

STATUS current

##### DESCRIPTION

"A desired bonding scheme for a peer (link partner) G.Bond port (GBS).

The following values instruct the peer port to use corresponding bonding scheme if supported:

- g9981(1) - instructs the port to use G.998.1 bonding
- g9982(2) - instructs the port to use G.998.2 bonding
- g9983(3) - instructs the port to use G.998.3 bonding

Changing of the gBondAdminScheme MUST be performed when the link is Down. Attempts to change this object MUST be rejected (in case of SNMP with the error inconsistentValue), if the link is Up or Initializing. Attempts to change this object to



an unsupported bonding scheme (see gBondPeerSchemesSupported)  
SHALL be rejected (in case of SNMP with the error wrongValue).

This object MUST be maintained in a persistent manner.

This object maps to the TR-159 attribute  
aGroupPeerAdminBondScheme."

REFERENCE

"[[TR-159](#)] 5.5.1.7"  
::= { gBondPortConfEntry 2 }

gBondDiscoveryCode OBJECT-TYPE

SYNTAX PhysAddress (SIZE(6))  
MAX-ACCESS read-write  
STATUS current

DESCRIPTION

"A Discovery Code of the G.Bond port (GBS).  
A unique 6 octet long code used by the Discovery function.  
This object MUST be instantiated for the -0 subtype GBS before  
writing operations on the gBondBceRemoteDiscoveryCode  
(Set\_if\_Clear and Clear\_if\_Same) are performed by BCEs  
associated with the GBS.  
The initial value of this object for -R subtype ports after  
reset is all zeroes. For -R subtype ports, the value of this  
object cannot be changed directly. This value may be changed  
as a result of writing operation on the  
gBondBceRemoteDiscoveryCode object of remote BCE of -0  
subtype, connected to one of the local BCEs associated with  
the GBS.

Discovery MUST be performed when the link is Down.  
Attempts to change this object MUST be rejected (in case of  
SNMP with the error inconsistentValue), if the link is Up or  
Initializing.

This object maps to the TR-159 attribute  
aGroupDiscoveryCode."

REFERENCE

"[[TR-159](#)] 5.5.1.20; [[802.3](#)] 61.2.2.8.3, 61.2.2.8.4,  
45.2.6.6.1, 45.2.6.8, 61A.2"  
::= { gBondPortConfEntry 3 }

gBondTargetUpDataRate OBJECT-TYPE

SYNTAX Unsigned32(0|1..10000000)  
UNITS "Kbps"  
MAX-ACCESS read-write  
STATUS current

DESCRIPTION



"A desired G.Bond port Data Rate in the upstream direction, in Kbps, to be achieved during initialization, under restrictions placed upon the member BCEs by their respective configuration settings.

This object represents a sum of individual BCE upstream data rates, modified to compensate for fragmentation and encapsulation overhead (e.g., for an Ethernet service, the target data rate of 10Mbps SHALL allow lossless transmission of full-duplex 10Mbps Ethernet frame stream with minimal inter-frame gap).

Note that the target upstream data rate may not be achieved during initialization (e.g., due to unavailability of required BCEs) or the initial bandwidth could deteriorate, so that the actual upstream data rate (gBondUpDataRate) could be less than gBondTargetUpDataRate.

The value is limited above by 10 Gbps, to accomodate very high speed bonded xDSL interfaces (e.g. 32 x 100Mbps).

The value between 1 and 10000000 indicates that the total upstream data rate of the G.Bond port after initialization SHALL be equal to the target data rate or less, if the target upstream data rate cannot be achieved under the restrictions configured for BCEs. In case the copper environment allows to achieve higher upstream data rate than that specified by this object, the excess capability SHALL be either converted to additional SNR margin or reclaimed by minimizing transmit power.

The value of 0 means that the target data rate is not fixed and SHALL be set to the maximum attainable rate during initialization (Best Effort), under specified spectral restrictions and with desired SNR Margin per BCE.

This object is read-write for the -O subtype G.Bond ports and irrelevant for the -R subtypes.

Changing of the Target Upstream Data Rate MUST be performed when the link is Down. Attempts to change this object MUST be rejected (In case of SNMP with the error inconsistentValue), if the link is Up or Initializing.

This object MUST be maintained in a persistent manner.

This object maps to the TR-159 attribute  
aGroupTargetUpRate."

#### REFERENCE

"[[TR-159](#)] 5.5.1.17"



::= { gBondPortConfEntry 4 }

gBondTargetDnDataRate OBJECT-TYPE

SYNTAX Unsigned32(0|1..10000000)

UNITS "Kbps"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"A desired G.Bond port Data Rate in the downstream direction, in Kbps, to be achieved during initialization, under restrictions placed upon the member BCEs by their respective configuration settings.

This object represents a sum of individual BCE downstream data rates, modified to compensate for fragmentation and encapsulation overhead (e.g., for an Ethernet service, the target data rate of 10Mbps SHALL allow lossless transmission of full-duplex 10Mbps Ethernet frame stream with minimal inter-frame gap).

Note that the target downstream data rate may not be achieved during initialization (e.g., due to unavailability of required BCEs) or the initial bandwidth could deteriorate, so that the actual downstream data rate (gBondDnDataRate) could be less than gBondTargetDnDataRate.

The value is limited above by 10 Gbps, to accomodate very high speed bonded xDSL interfaces (e.g. 32 x 100Mbps).

The value between 1 and 10000000 indicates that the total downstream data rate of the G.Bond port after initialization SHALL be equal to the target data rate or less, if the target downstream data rate cannot be achieved under the restrictions configured for BCEs. In case the copper environment allows to achieve higher downstream data rate than that specified by this object, the excess capability SHALL be either converted to additional SNR margin or reclaimed by minimizing transmit power.

The value of 0 means that the target data rate is not fixed and SHALL be set to the maximum attainable rate during initialization (Best Effort), under specified spectral restrictions and with desired SNR Margin per BCE.

This object is read-write for the -O subtype G.Bond ports and irrelevant for the -R subtypes.

Changing of the Target Downstream Data Rate MUST be performed when the link is Down. Attempts to change this object MUST be rejected (In case of SNMP with the error inconsistentValue),





if the link is Up or Initializing.

This object MUST be maintained in a persistent manner.

This object maps to the TR-159 attribute  
aGroupTargetDownRate."

REFERENCE

"[[TR-159](#)] 5.5.1.18"

::= { gBondPortConfEntry 5 }

gBondThreshLowUpRate OBJECT-TYPE

SYNTAX Unsigned32(1..10000000)

UNITS "Kbps"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This object configures the G.Bond port low upstream rate crossing alarm threshold. When the current value of gBondUpDataRate for this port reaches/drops below or exceeds this threshold, an gBondLowUpRateCrossing notification MAY be generated if enabled by gBondLowRateCrossingEnable.

This object is read-write for the -O subtype G.Bond ports and irrelevant for the -R subtypes.

This object MUST be maintained in a persistent manner.

This object maps to the TR-159 attribute  
aGroupthreshLowUpRate."

REFERENCE

"[[TR-159](#)] 5.5.1.21"

::= { gBondPortConfEntry 6 }

gBondThreshLowDnRate OBJECT-TYPE

SYNTAX Unsigned32(1..10000000)

UNITS "Kbps"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This object configures the G.Bond port low downstream rate crossing alarm threshold. When the current value of gBondDnDataRate for this port reaches/drops below or exceeds this threshold, an gBondLowDnRateCrossing notification MAY be generated if enabled by gBondLowRateCrossingEnable.

This object is read-write for the -O subtype G.Bond ports and irrelevant for the -R subtypes.



This object MUST be maintained in a persistent manner.

This object maps to the TR-159 attribute  
aGroupThreshDownUpRate."

REFERENCE

"[[TR-159](#)] 5.5.1.22"

::= { gBondPortConfEntry 7 }

gBondLowRateCrossingEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Indicates whether gBondLowUpRateCrossing and  
gBondLowDnRateCrossing notifications should be generated  
for this interface.

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

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

This object is read-write for the -O subtype G.Bond ports  
and irrelevant for the -R subtypes.

This object MUST be maintained in a persistent manner.

This object maps to the TR-159 attribute  
aGroupLowRateCrossingEnable."

REFERENCE

"[[TR-159](#)] 5.5.1.23"

::= { gBondPortConfEntry 8 }

gBondPerfTcaConfProfile OBJECT-TYPE

SYNTAX SnmpAdminString (SIZE(1..32))

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The value of this object is the index of the row in the GBS  
port Alarm Configuration Profile Table for Performance Monitoring  
Threshold Crossing Alerts - gBondPortAlarmConfProfileTable,  
which applies to this GBS port.

This object MUST be maintained in a persistent manner."

DEFVAL { "DEFVAL" }

::= { gBondPortConfEntry 9 }

gBondPerfTcaEnable OBJECT-TYPE

SYNTAX TruthValue



MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Indicates whether gBondPerfTca\*Crossing set of notifications should be generated for this interface.

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

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

This object MUST be maintained in a persistent manner.

This object maps to the TR-159 attribute aGroupPerfTcaEnable."

REFERENCE

"[[TR-159](#)] 5.5.1.38"

::= { gBondPortConfEntry 10 }

gBondPortCapabilityTable OBJECT-TYPE

SYNTAX SEQUENCE OF GBondPortCapabilityEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Table for Capabilities of G.Bond Ports. Entries in this table MUST be maintained in a persistent manner"

::= { gBondPort 2 }

gBondPortCapabilityEntry OBJECT-TYPE

SYNTAX GBondPortCapabilityEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the G.Bond Port Capability table.

Each entry represents an G.Bond port indexed by the ifIndex.

Note that a G.Bond GBS port runs on top of a single or multiple BCE port(s), which are also indexed by ifIndex."

INDEX { ifIndex }

::= { gBondPortCapabilityTable 1 }

GBondPortCapabilityEntry ::=

SEQUENCE {

gBondSchemesSupported GBondSchemeList,

gBondPeerSchemesSupported GBondSchemeList,

gBondCapacity Unsigned32,

gBondPeerCapacity Unsigned32

}



**gBondSchemesSupported OBJECT-TYPE**

SYNTAX GBondSchemeList

MAX-ACCESS read-only

STATUS current

**DESCRIPTION**

"Bonding Capability of the G.Bond port (GBS). This is a read-only bitmap of the possible bonding schemes supported by the GBS. The various bit-positions are:

g9981(1) - GBS is capable of G.998.1 bonding

g9982(2) - GBS is capable of G.998.2 bonding

g9983(3) - GBS is capable of G.998.3 bonding

Note that for ports supporting multiple bonding schemes the actual administrative scheme is set via gBondAdminScheme object. The current operating bonding scheme is reflected in the gBondOperScheme.

This object maps to the TR-159 attribute  
aGroupBondSchemesSupported."

**REFERENCE**

"[[TR-159](#)] 5.5.1.2"

::= { gBondPortCapabilityEntry 1 }

**gBondPeerSchemesSupported OBJECT-TYPE**

SYNTAX GBondSchemeList

MAX-ACCESS read-only

STATUS current

**DESCRIPTION**

"Bonding Capability of the peer G.Bond port (GBS). This is a read-only bitmap of the possible bonding schemes supported by the link partner GBS. The various bit-positions are:

unknown(0) - GBS does not support bonding or  
the peer unit could not be reached.

g9981(1) - GBS is capable of G.998.1 bonding

g9982(2) - GBS is capable of G.998.2 bonding

g9983(3) - GBS is capable of G.998.3 bonding

Note that for ports supporting multiple bonding schemes the actual administrative scheme is set via gBondPeerAdminScheme object. The current operating bonding scheme is reflected in the gBondPeerOperScheme.

This object maps to the TR-159 attribute  
aGroupBondPeerSchemesSupported."

**REFERENCE**

"[[TR-159](#)] 5.5.1.3"

::= { gBondPortCapabilityEntry 2 }





**gBondCapacity** OBJECT-TYPE

SYNTAX Unsigned32 (1..32)

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"Number of BCEs that can be aggregated by the local GBS.

The number of BCEs currently assigned to a particular G.Bond port (gBondNumBCEs) is never greater than gBondCapacity.

This object maps to the TR-159 attribute aGroupCapacity."

## REFERENCE

"[[TR-159](#)] 5.5.1.12"

::= { gBondPortCapabilityEntry 3 }

**gBondPeerCapacity** OBJECT-TYPE

SYNTAX Unsigned32 (0|1..32)

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"Number of BCEs that can be aggregated by the peer GBS port.

Value of 0 is returned when peer Bonding Capacity is unknown (peer cannot be reached).

This object maps to the TR-159 attribute aGroupPeerCapacity."

## REFERENCE

"[[TR-159](#)] 5.5.1.13"

::= { gBondPortCapabilityEntry 4 }

**gBondPortStatusTable** OBJECT-TYPE

SYNTAX SEQUENCE OF GBondPortStatusEntry

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."

::= { gBondPort 3 }

**gBondPortStatusEntry** OBJECT-TYPE

SYNTAX GBondPortStatusEntry

MAX-ACCESS not-accessible

STATUS current

## DESCRIPTION



"An entry in the G.Bond Port Status table.

Each entry represents an G.Bond port indexed by the ifIndex.

Note that an G.Bond GBS port runs on top of a single or multiple BCE port(s), which are also indexed by ifIndex."

INDEX { ifIndex }

::= { gBondPortStatusTable 1 }

GBondPortStatusEntry ::=

```
SEQUENCE {
    gBondOperScheme          GBondScheme,
    gBondPeerOperScheme      GBondScheme,
    gBondUpDataRate          Gauge32,
    gBondDnDataRate          Gauge32,
    gBondFltStatus           BITS,
    gBondPortSide            INTEGER,
    gBondNumBCEs             Unsigned32
}
```

gBondOperScheme OBJECT-TYPE

SYNTAX GBondScheme

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Current operating bonding scheme of a G.Bond port.

The possible values are:

```
g9981(1)      - G.998.1 bonding
g9982(2)      - G.998.2 bonding
g9983(3)      - G.998.3 bonding
```

This object maps to the TR-159 attribute  
aGroupOperBondScheme."

REFERENCE

"[[TR-159](#)] 5.5.1.4"

::= { gBondPortStatusEntry 1 }

gBondPeerOperScheme OBJECT-TYPE

SYNTAX GBondScheme

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Curent operating bonding scheme of a G.Bond port link  
partner.

The possible values are:

```
unknown(0)    - peer cannot be reached due to the link
                state
g9981(1)      - G.998.1 bonding
g9982(2)      - G.998.2 bonding
g9983(3)      - G.998.3 bonding
```



This object maps to the TR-159 attribute  
aGroupPeerOperBondScheme."

## REFERENCE

"[[TR-159](#)] 5.5.1.5"

::= { gBondPortStatusEntry 2 }

## gBondUpDataRate OBJECT-TYPE

SYNTAX Gauge32

UNITS "bps"

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A current G.Bond port operational Data Rate in the upstream  
direction, in bps.

This object represents an estimation of the sum of individual  
BCE upstream data rates, modified to compensate for  
fragmentation and encapsulation overhead (e.g., for an  
Ethernet service, the target data rate of 10Mbps SHALL allow  
lossless transmission of full-duplex 10Mbps Ethernet frame  
stream with minimal inter-frame gap).

Note that for symmetrical interfaces gBondUpDataRate ==  
gBondDnDataRate == ifSpeed.

This object maps to the TR-159 attribute aGroupUpRate."

## REFERENCE

"[[TR-159](#)] 5.5.1.15"

::= { gBondPortStatusEntry 3 }

## gBondDnDataRate OBJECT-TYPE

SYNTAX Gauge32

UNITS "bps"

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A current G.Bond port operational Data Rate in the downstream  
direction, in bps.

This object represents an estimation of the sum of individual  
BCE downstream data rates, modified to compensate for  
fragmentation and encapsulation overhead (e.g., for an  
Ethernet service, the target data rate of 10Mbps SHALL allow  
lossless transmission of full-duplex 10Mbps Ethernet frame  
stream with minimal inter-frame gap).

Note that for symmetrical interfaces gBondUpDataRate ==  
gBondDnDataRate == ifSpeed.

This object maps to the TR-159 attribute aGroupDownRate."



## REFERENCE

"[[TR-159](#)] 5.5.1.16"  
 ::= { gBondPortStatusEntry 4 }

## gBondFltStatus OBJECT-TYPE

SYNTAX BITS {  
     noPeer(0),  
     peerPowerLoss(1),  
     peerBondSchemeMismatch(2),  
     bceSubTypeMismatch(3),  
     lowRate(4)  
 }

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"G.Bond (GBS) port Fault Status. This is a bitmap of possible conditions. The various bit positions are:

- noPeer - peer GBS cannot be reached (e.g., no BCEs attached, all BCEs are Down etc.).
- peerPowerLoss - peer GBS has indicated impending unit failure due to loss of local power ('Dying Gasp').
- peerBondSchemeMismatch - operating bonding scheme of a peer GBS is different from the local one.
- bceSubTypeMismatch - local BCEs in the aggregation group are not of the same sub-type, e.g., some BCEs in the local device are -0 while others are -R subtype.
- lowRate - gBondUpRate/gBondDnRate of the port has reached or dropped below gBondThreshLowUpRate/gBondThreshLowUpRate.

This object is intended to supplement ifOperStatus object in IF-MIB and ifMauMediaAvailable in MAU-MIB.

This object maps to the TR-159 attribute aGroupStatus."

## REFERENCE

"[[TR-159](#)] 5.5.1.9; IF-MIB, ifOperStatus; MAU-MIB, ifMauMediaAvailable"  
 ::= { gBondPortStatusEntry 5 }

## gBondPortSide OBJECT-TYPE

SYNTAX INTEGER {  
     subscriber(1),  
     office(2),





```
        unknown(3)
    }
    MAX-ACCESS    read-only
    STATUS        current
    DESCRIPTION
        "G.Bond port mode of operation (subtype).
        The value of 'subscriber' indicates the port is designated as
        '-R' subtype (all BCEs assigned to this port are of subtype
        '-R').
        The value of the 'office' indicates that the port is
        designated as '-O' subtype (all BCEs assigned to this port are
        of subtype '-O').
        The value of 'unknown' indicates that the port has no assigned
        BCEs yet or that the assigned BCEs are not of the same side
        (subTypeBCEMismatch).

        This object maps to the TR-159 attribute aGroupEnd."
    REFERENCE
        "[TR-159] 5.5.1.11"
    ::= { gBondPortStatusEntry 6 }

gBondNumBCEs    OBJECT-TYPE
    SYNTAX        Unsigned32 (0..32)
    MAX-ACCESS    read-only
    STATUS        current
    DESCRIPTION
        "Number of BCEs that is currently aggregated by the local GBS
        (assigned to the G.Bond port using ifStackTable).
        This number is never greater than gBondCapacity.

        This object SHALL be automatically incremented or decremented
        when a BCE is added or deleted to/from the G.Bond port using
        ifStackTable.

        This object maps to the TR-159 attribute aGroupNumChannels"
    REFERENCE
        "[TR-159] 5.5.1.14"
    ::= { gBondPortStatusEntry 7 }

-- Performance Monitoring group

gBondPortPM      OBJECT IDENTIFIER ::= { gBondPort 4 }

gBondPortPerfCurrTable OBJECT-TYPE
    SYNTAX        SEQUENCE OF GBondPortPerfCurrEntry
    MAX-ACCESS    not-accessible
    STATUS        current
```



## DESCRIPTION

"This table contains current Performance Monitoring (PM) information for a GBS port. This table contains live data from the equipment and as such is NOT persistent."

::= { gBondPortPM 1 }

## gBondPortPerfCurrEntry OBJECT-TYPE

SYNTAX GBondPortPerfCurrEntry

MAX-ACCESS not-accessible

STATUS current

## DESCRIPTION

"An entry in the G.Bond Port PM table.

Each entry represents an G.Bond port indexed by the ifIndex.

Note that a G.Bond GBS port runs on top of a single or multiple BCE port(s), which are also indexed by ifIndex."

INDEX { ifIndex }

::= { gBondPortPerfCurrTable 1 }

## GBondPortPerfCurrEntry ::=

SEQUENCE {

gBondPerfES	HCPperfTotalCount,
gBondPerfSES	HCPperfTotalCount,
gBondPerfUAS	HCPperfTotalCount,
gBondPerf15MinValidIntervals	HCPperfValidIntervals,
gBondPerf15MinInvalidIntervals	HCPperfInvalidIntervals,
gBondPerfCurr15MinTimeElapsed	HCPperfTimeElapsed,
gBondPerfCurr15MinES	HCPperfCurrentCount,
gBondPerfCurr15MinSES	HCPperfCurrentCount,
gBondPerfCurr15MinUAS	HCPperfCurrentCount,
gBondPerf1DayValidIntervals	Unsigned32,
gBondPerf1DayInvalidIntervals	Unsigned32,
gBondPerfCurr1DayTimeElapsed	HCPperfTimeElapsed,
gBondPerfCurr1DayES	HCPperfCurrentCount,
gBondPerfCurr1DaySES	HCPperfCurrentCount,
gBondPerfCurr1DayUAS	HCPperfCurrentCount

}

## gBondPerfES OBJECT-TYPE

SYNTAX HCPperfTotalCount

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A read-only count of Errored Seconds (ES) on the GBS since the BTU was last restarted.

An Errored Second for a G.998.x interface is defined as a count of 1-second intervals during which one or more GBS errors are declared. The errors are specific for each bonding scheme, e.g.



- lost cells for the ATM bonding;
- lost or discarded (due to an error or a buffer overflow) fragments for the Ethernet bonding;
- CRC4, CRC6 or CRC8 errors for the TDM bonding

This object is inhibited during Unavailable Seconds (UAS).

This object maps to the TR-159 attribute aGroupPerfES."

#### REFERENCE

"[[TR-159](#)] 5.5.1.29"

::= { gBondPortPerfCurrEntry 1 }

gBondPerfSES OBJECT-TYPE  
SYNTAX HCPerfTotalCount  
MAX-ACCESS read-only  
STATUS current

#### DESCRIPTION

"A read-only count of Severely Errored Seconds (SES) on the GBS since the BTU was last restarted.

A Severely Errored Second for a G.998.x interface is defined as a count of 1-second intervals during which GBS errors cause at least 1% traffic loss of the nominal bonded link rate or at least 12ms for the TDM traffic. The exact definition is specific for each bonding scheme, e.g.

- 234 lost cells for the ATM bonding with 10Mbps nominal link rate
- 60 lost/discarded fragments for the Ethernet bonding with 10Mbps nominal link rate and fixed 192 Byte-long fragment size.
- 6 or more CRC4, one or more CRC6 or one or more CRC8 errors for the TDM bonding

This object is inhibited during Unavailable Seconds (UAS).

This object maps to the TR-159 attribute aGroupPerfSES."

#### REFERENCE

"[[TR-159](#)] 5.5.1.30"

::= { gBondPortPerfCurrEntry 2 }

gBondPerfUAS OBJECT-TYPE  
SYNTAX HCPerfTotalCount  
MAX-ACCESS read-only  
STATUS current

#### DESCRIPTION

"A read-only count of Unavailable Seconds (UAS) on the GBS since the BTU was last restarted.

An Unavailable Second for a G.998.x interface is defined as a count of 1-second intervals during which the bonded link is



unavailable. The G.998.x link becomes unavailable at the onset of 10 contiguous SESSs. The 10 SESSs are included in the unavailable time. Once unavailable, the G.998.x line becomes available at the onset of 10 contiguous seconds with no SESSs. The 10 seconds with no SESSs are excluded from unavailable time.

This object maps to the TR-159 attribute aGroupPerfUAS."

## REFERENCE

"[[TR-159](#)] 5.5.1.31"

::= { gBondPortPerfCurrEntry 3 }

## gBondPerf15MinValidIntervals OBJECT-TYPE

SYNTAX HCPerfValidIntervals

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A read-only number of 15-minute intervals for which 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 maps to the TR-159 attribute  
aGroupPerf15MinValidIntervals."

## REFERENCE

"[[TR-159](#)] 5.5.1.32"

::= { gBondPortPerfCurrEntry 4 }

## gBondPerf15MinInvalidIntervals OBJECT-TYPE

SYNTAX HCPerfInvalidIntervals

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A read-only number of 15-minute 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.

This object maps to the TR-159 attribute  
aGroupPerf15MinInvalidIntervals."

## REFERENCE

"[[TR-159](#)] 5.5.1.33"

::= { gBondPortPerfCurrEntry 5 }

## gBondPerfCurr15MinTimeElapsed OBJECT-TYPE





SYNTAX        HCPperfTimeElapsed

MAX-ACCESS   read-only

STATUS        current

DESCRIPTION

"A read-only count of seconds that have elapsed since the beginning of the current 15-minute performance history interval.

This object maps to the TR-159 attribute  
aGroupPerfCurr15MinTimeElapsed."

REFERENCE

"[[TR-159](#)] 5.5.1.34"

::= { gBondPortPerfCurrEntry 6 }

gBondPerfCurr15MinES OBJECT-TYPE

SYNTAX        HCPperfCurrentCount

MAX-ACCESS   read-only

STATUS        current

DESCRIPTION

"A read-only count of Errored Seconds (ES) on the GBS in the current 15-minute performance history interval.

This object maps to the TR-159 attribute aGroupPerfCurr15MinES."

REFERENCE

"[[TR-159](#)] 5.5.1.35"

::= { gBondPortPerfCurrEntry 7 }

gBondPerfCurr15MinSES OBJECT-TYPE

SYNTAX        HCPperfCurrentCount

MAX-ACCESS   read-only

STATUS        current

DESCRIPTION

"A read-only count of Severely Errored Seconds (ES) on the GBS in the current 15-minute performance history interval.

This object maps to the TR-159 attribute aGroupPerfCurr15MinSES."

REFERENCE

"[[TR-159](#)] 5.5.1.36"

::= { gBondPortPerfCurrEntry 8 }

gBondPerfCurr15MinUAS OBJECT-TYPE

SYNTAX        HCPperfCurrentCount

MAX-ACCESS   read-only

STATUS        current

DESCRIPTION

"A read-only count of Unavailable Seconds (UAS) on the GBS in the current 15-minute performance history interval.

This object maps to the TR-159 attribute aGroupPerfCurr15MinUAS."



## REFERENCE

"[[TR-159](#)] 5.5.1.37"  
::= { gBondPortPerfCurrEntry 9 }

## gBondPerf1DayValidIntervals 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.

This object maps to the TR-159 attribute  
aGroupPerf1DayValidIntervals."

## REFERENCE

"[[TR-159](#)] 5.5.1.45"  
::= { gBondPortPerfCurrEntry 10 }

## gBondPerf1DayInvalidIntervals 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.

This object maps to the TR-159 attribute  
aGroupPerf1DayInvalidIntervals."

## REFERENCE

"[[TR-159](#)] 5.5.1.46"  
::= { gBondPortPerfCurrEntry 11 }

## gBondPerfCurr1DayTimeElapsed OBJECT-TYPE

SYNTAX HCPerfTimeElapsed

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A read-only count of seconds that have elapsed since the beginning of the current 1-day performance history interval.



This object maps to the TR-159 attribute  
aGroupPerfCurr1DayTimeElapsed."

## REFERENCE

"[[TR-159](#)] 5.5.1.47"

::= { gBondPortPerfCurrEntry 12 }

## gBondPerfCurr1DayES OBJECT-TYPE

SYNTAX HCPerfCurrentCount

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A read-only count of Errored Seconds (ES) on the GBS in the  
current 1-day performance history interval.

This object maps to the TR-159 attribute aGroupPerfCurr1DayES."

## REFERENCE

"[[TR-159](#)] 5.5.1.48"

::= { gBondPortPerfCurrEntry 13 }

## gBondPerfCurr1DaySES OBJECT-TYPE

SYNTAX HCPerfCurrentCount

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A read-only count of Severely Errored Seconds (ES) on the GBS  
in the current 1-day performance history interval.

This object maps to the TR-159 attribute aGroupPerfCurr1DaySES."

## REFERENCE

"[[TR-159](#)] 5.5.1.49"

::= { gBondPortPerfCurrEntry 14 }

## gBondPerfCurr1DayUAS OBJECT-TYPE

SYNTAX HCPerfCurrentCount

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A read-only count of Unavailable Seconds (UAS) on the GBS in  
the current 1-day performance history interval.

This object maps to the TR-159 attribute aGroupPerfCurr1DayUAS."

## REFERENCE

"[[TR-159](#)] 5.5.1.50"

::= { gBondPortPerfCurrEntry 15 }

-- PM history: 15-min buckets

## gBondPortPerf15MinTable OBJECT-TYPE



SYNTAX SEQUENCE OF GBondPortPerf15MinEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains historical 15-minute buckets of Performance Monitoring information for a GBS port (a row for each 15-minute interval, up to 96 intervals).

Entries in this table MUST be maintained in a persistent manner."

::= { gBondPortPM 2 }

gBondPortPerf15MinEntry OBJECT-TYPE

SYNTAX GBondPortPerf15MinEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the G.Bond Port historical 15-minute PM table.

Each entry represents performance monitoring data for a GBS port, indexed by ifIndex, collected during a particular 15-minute interval, indexed by gBondPerf15MinIntervalIndex."

INDEX { ifIndex, gBondPerf15MinIntervalIndex }

::= { gBondPortPerf15MinTable 1 }

GBondPortPerf15MinEntry ::=

SEQUENCE {

gBondPerf15MinIntervalIndex	Unsigned32,
gBondPerf15MinIntervalMoniTime	HCPperfTimeElapsed,
gBondPerf15MinIntervales	HCPperfIntervalCount,
gBondPerf15MinIntervalesES	HCPperfIntervalCount,
gBondPerf15MinIntervalUAS	HCPperfIntervalCount,
gBondPerf15MinIntervalValid	TruthValue

}

gBondPerf15MinIntervalIndex 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 maps to the TR-159 attribute  
aGroupPerf15MinIntervalNumber."

REFERENCE

"[[TR-159](#)] 5.5.1.57"

::= { gBondPortPerf15MinEntry 1 }

gBondPerf15MinIntervalMoniTime OBJECT-TYPE





SYNTAX        HCPperfTimeElapsed

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."

::= { gBondPortPerf15MinEntry 2 }

gBondPerf15MinIntervalES OBJECT-TYPE

SYNTAX        HCPperfIntervalCount

MAX-ACCESS   read-only

STATUS        current

DESCRIPTION

"A read-only count of Errored Seconds (ES) on the GBS in the 15-minute performance history interval.

This object maps to the TR-159 attribute  
aGroupPerf15MinIntervalES."

REFERENCE

"[[TR-159](#)] 5.5.1.59"

::= { gBondPortPerf15MinEntry 3 }

gBondPerf15MinIntervalSES OBJECT-TYPE

SYNTAX        HCPperfIntervalCount

MAX-ACCESS   read-only

STATUS        current

DESCRIPTION

"A read-only count of Severely Errored Seconds (ES) on the GBS in the 15-minute performance history interval.

This object maps to the TR-159 attribute  
aGroupPerf15MinIntervalSES."

REFERENCE

"[[TR-159](#)] 5.5.1.60"

::= { gBondPortPerf15MinEntry 4 }

gBondPerf15MinIntervalUAS OBJECT-TYPE

SYNTAX        HCPperfIntervalCount

MAX-ACCESS   read-only

STATUS        current

DESCRIPTION

"A read-only count of Unavailable Seconds (UAS) on the GBS in the current 15-minute performance history interval.

This object maps to the TR-159 attribute aGroupPerfCurr15MinUAS."

REFERENCE



```
"[TR-159] 5.5.1.61"  
::= { gBondPortPerf15MinEntry 5 }
```

gBondPerf15MinIntervalValid OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only object indicating whether or not this history bucket contains valid data. Valid bucket is reported as true(1) and invalid bucket as false(2).

If this history bucket is invalid the BTU-C MUST NOT produce notifications based upon the value of the counters in this bucket.

Note that an implementation may decide not to store invalid history buckets in its data base. In such case this object is not required as only valid history buckets are available while invalid history buckets are simply not in the data base.

This object maps to the TR-159 attribute  
aGroupPerf15MinIntervalValid."

REFERENCE

```
"[TR-159] 5.5.1.58"  
::= { gBondPortPerf15MinEntry 6 }
```

-- PM history: 1-day buckets

gBondPortPerf1DayTable OBJECT-TYPE

SYNTAX SEQUENCE OF GBondPortPerf1DayEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains historical 1-day buckets of Performance Monitoring information for a GBS port (a row for each 1-day interval, up to 7 intervals).

Entries in this table MUST be maintained in a persistent manner."

```
::= { gBondPortPM 3 }
```

gBondPortPerf1DayEntry OBJECT-TYPE

SYNTAX GBondPortPerf1DayEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the G.Bond Port historical 1-day PM table.

Each entry represents performance monitoring data for a GBS port, indexed by ifIndex, collected during a particular 1-day interval, indexed by gBondPerf1DayIntervalIndex."

```
INDEX { ifIndex, gBondPerf1DayIntervalIndex }
```



```
::= { gBondPortPerf1DayTable 1 }
```

```
GBondPortPerf1DayEntry ::=
```

```
SEQUENCE {  
    gBondPerf1DayIntervalIndex      Unsigned32,  
    gBondPerf1DayIntervalMoniTime   HCPperfTimeElapsed,  
    gBondPerf1DayIntervalES         HCPperfIntervalCount,  
    gBondPerf1DayIntervalSES        HCPperfIntervalCount,  
    gBondPerf1DayIntervalUAS        HCPperfIntervalCount,  
    gBondPerf1DayIntervalValid      TruthValue  
}
```

```
gBondPerf1DayIntervalIndex OBJECT-TYPE
```

```
SYNTAX      Unsigned32 (1..7)
```

```
MAX-ACCESS  not-accessible
```

```
STATUS      current
```

```
DESCRIPTION
```

"Performance Data Interval number. 1 is the most recent previous interval; interval 7 is 24 hours ago. Intervals 2..7 are OPTIONAL.

This object maps to the TR-159 attribute aGroupPerf1DayIntervalNumber."

```
REFERENCE
```

"[[TR-159](#)] 5.5.1.62"

```
::= { gBondPortPerf1DayEntry 1 }
```

```
gBondPerf1DayIntervalMoniTime OBJECT-TYPE
```

```
SYNTAX      HCPperfTimeElapsed
```

```
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 maps to the TR-159 attribute aGroupPerf1DayIntervalMoniSecs."

```
REFERENCE
```

"[[TR-159](#)] 5.5.1.64"

```
::= { gBondPortPerf1DayEntry 2 }
```

```
gBondPerf1DayIntervalES OBJECT-TYPE
```

```
SYNTAX      HCPperfIntervalCount
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```



"A read-only count of Errored Seconds (ES) on the GBS in the 1-day performance history interval.

This object maps to the TR-159 attribute  
aGroupPerf1DayIntervalES."

REFERENCE

"[[TR-159](#)] 5.5.1.65"

::= { gBondPortPerf1DayEntry 3 }

gBondPerf1DayIntervalSES OBJECT-TYPE

SYNTAX HCPerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only count of Severely Errored Seconds (ES) on the GBS in the 1-day performance history interval.

This object maps to the TR-159 attribute  
aGroupPerf1DayIntervalSES."

REFERENCE

"[[TR-159](#)] 5.5.1.66"

::= { gBondPortPerf1DayEntry 4 }

gBondPerf1DayIntervalUAS OBJECT-TYPE

SYNTAX HCPerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only count of Unavailable Seconds (UAS) on the GBS in the current 1-day performance history interval.

This object maps to the TR-159 attribute aGroupPerfCurr1DayUAS."

REFERENCE

"[[TR-159](#)] 5.5.1.67"

::= { gBondPortPerf1DayEntry 5 }

gBondPerf1DayIntervalValid OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A read-only object indicating whether or not this history bucket contains valid data. Valid bucket is reported as true(1) and invalid bucket as false(2).

If this history bucket is invalid the BTU-C MUST NOT produce notifications based upon the value of the counters in this bucket.

Note that an implementation may decide not to store invalid





history buckets in its data base. In such case this object is not required as only valid history buckets are available while invalid history buckets are simply not in the data base.

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

#### REFERENCE

"[[TR-159](#)] 5.5.1.63"  
::= { gBondPortPerf1DayEntry 6 }

### -- Performance Monitoring TCA Configuration profile

#### gBondPortPerfTcaConfProfileTable OBJECT-TYPE

SYNTAX SEQUENCE OF GBondPortPerfTcaConfProfileEntry

MAX-ACCESS not-accessible

STATUS current

#### DESCRIPTION

"This table supports definitions of Performance Monitoring (PM) Threshold Crossing Alerts (TCA) configuration profiles for GBS ports.

Entries in this table MUST be maintained in a persistent manner."

::= { gBondPortPM 4 }

#### gBondPortPerfTcaConfProfileEntry OBJECT-TYPE

SYNTAX GBondPortPerfTcaConfProfileEntry

MAX-ACCESS not-accessible

STATUS current

#### DESCRIPTION

"An entry in the GBS PM TCA Configuration table.

Each entry corresponds to a single TCA configuration profile.

Each profile contains a set of parameters for setting alarm thresholds for various performance attributes monitored at GBS ports. Profiles may be created/deleted using the row creation/deletion mechanism via

gBondPerfTcaConfProfileRowStatus. If an active entry is referenced via gBondPerfTcaConfProfile, the entry MUST remain active until all references are removed.

A default profile with an index of 'DEFVAL', will always exist and its parameters will be set to vendor specific values, unless otherwise specified in this document."

INDEX { gBondPerfTcaConfProfileName }

::= { gBondPortPerfTcaConfProfileTable 1 }

#### GBondPortPerfTcaConfProfileEntry ::=

#### SEQUENCE {

gBondPerfTcaConfProfileName	SnmpAdminString,
gBondPerfThreshold15MinES	HCPperfIntervalThreshold,



```

    gBondPerfThreshold15MinSES      HCPperfIntervalThreshold,
    gBondPerfThreshold15MinUAS      HCPperfIntervalThreshold,
    gBondPerfThreshold1DayES        GBondPerf1DayIntervalThreshold,
    gBondPerfThreshold1DaySES       GBondPerf1DayIntervalThreshold,
    gBondPerfThreshold1DayUAS       GBondPerf1DayIntervalThreshold,
    gBondPerfTcaConfProfileRowStatus RowStatus
}

```

gBondPerfTcaConfProfileName OBJECT-TYPE

SYNTAX SnmpAdminString (SIZE(1..32))

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This object is a unique index (name) associated with this  
GBS PM TCA profile."

::= { gBondPortPerfTcaConfProfileEntry 1 }

gBondPerfThreshold15MinES OBJECT-TYPE

SYNTAX HCPperfIntervalThreshold

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"A desired threshold for the number of Errored Seconds (ES)  
within any given 15-minute performance data collection interval.  
If the number of ESs in a particular 15-minute collection  
interval reaches or exceeds this value, a  
gBondPerfTca15MinESCrossing notification MAY be generated if  
enabled by gBondPerfTcaEnable.  
At most one notification can be sent per interval.  
Setting this attribute to zero (default) effectively disables  
gBondPerfTca15MinESCrossing notification.

This object maps to the TR-159 attribute  
aGroupPerfThreshold15MinES."

REFERENCE

"[[TR-159](#)] 5.5.1.39"

::= { gBondPortPerfTcaConfProfileEntry 2 }

gBondPerfThreshold15MinSES OBJECT-TYPE

SYNTAX HCPperfIntervalThreshold

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"A desired threshold for the number of Severely Errored Seconds  
(SES) within any given 15-minute performance data collection  
interval.  
If the number of SESs in a particular 15-minute collection  
interval reaches or exceeds this value, a



gBondPerfTca15MinSESCrossing notification MAY be generated if enabled by gBondPerfTcaEnable.

At most one notification can be sent per interval.

Setting this attribute to zero (default) effectively disables gBondPerfTca15MinSESCrossing notification.

This object maps to the TR-159 attribute  
aGroupPerfThreshold15MinSES."

REFERENCE

"[[TR-159](#)] 5.5.1.40"

::= { gBondPortPerfTcaConfProfileEntry 3 }

gBondPerfThreshold15MinUAS OBJECT-TYPE

SYNTAX HCPerfIntervalThreshold

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"A desired threshold for the number of Unavailable Seconds (UAS) within any given 15-minute performance data collection interval. If the number of UASs in a particular 15-minute collection interval reaches or exceeds this value, a gBondPerfTca15MinUASCrossing notification MAY be generated if enabled by gBondPerfTcaEnable. At most one notification can be sent per interval. Setting this attribute to zero (default) effectively disables gBondPerfTca15MinUASCrossing notification.

This object maps to the TR-159 attribute  
aGroupPerfThreshold15MinUAS."

REFERENCE

"[[TR-159](#)] 5.5.1.41"

::= { gBondPortPerfTcaConfProfileEntry 4 }

gBondPerfThreshold1DayES OBJECT-TYPE

SYNTAX GBondPerf1DayIntervalThreshold

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"A desired threshold for the number of Errored Seconds (ES) within any given 1-day performance data collection interval. If the number of ESs in a particular 1-day collection interval reaches or exceeds this value, a gBondPerfTca1DayESCrossing notification MAY be generated if enabled by gBondPerfTcaEnable. At most one notification can be sent per interval. Setting this attribute to zero (default) effectively disables gBondPerfTca1DayESCrossing notification.

This object maps to the TR-159 attribute



aGroupPerfThreshold1DayES."

## REFERENCE

"[[TR-159](#)] 5.5.1.51"

::= { gBondPortPerfTcaConfProfileEntry 5 }

## gBondPerfThreshold1DaySES OBJECT-TYPE

SYNTAX GBondPerf1DayIntervalThreshold

MAX-ACCESS read-create

STATUS current

## DESCRIPTION

"A desired threshold for the number of Severely Errored Seconds (SES) within any given 1-day performance data collection interval.

If the number of SESs in a particular 1-day collection interval reaches or exceeds this value, a gBondPerfTca1DaySESCrossing notification MAY be generated if enabled by gBondPerfTcaEnable. At most one notification can be sent per interval. Setting this attribute to zero (default) effectively disables gBondPerfTca1DaySESCrossing notification.

This object maps to the TR-159 attribute  
aGroupPerfThreshold1DaySES."

## REFERENCE

"[[TR-159](#)] 5.5.1.52"

::= { gBondPortPerfTcaConfProfileEntry 6 }

## gBondPerfThreshold1DayUAS OBJECT-TYPE

SYNTAX GBondPerf1DayIntervalThreshold

MAX-ACCESS read-create

STATUS current

## DESCRIPTION

"A desired threshold for the number of Unavailable Seconds (UAS) within any given 1-day performance data collection interval.

If the number of UASs in a particular 1-day collection interval reaches or exceeds this value, a gBondPerfTca1DayUASCrossing notification MAY be generated if enabled by gBondPerfTcaEnable. At most one notification can be sent per interval. Setting this attribute to zero (default) effectively disables gBondPerfTca1DayUASCrossing notification.

This object maps to the TR-159 attribute  
aGroupPerfThreshold1DayUAS."

## REFERENCE

"[[TR-159](#)] 5.5.1.53"

::= { gBondPortPerfTcaConfProfileEntry 7 }

## gBondPerfTcaConfProfileRowStatus OBJECT-TYPE

SYNTAX RowStatus





MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object controls the creation, modification, or deletion of the associated entry in the gBondPortPerfTcaConfProfileTable per the semantics of RowStatus.

If an 'active' entry is referenced via gBondPerfTcaConfProfile instance(s), the entry MUST remain 'active'.

An 'active' entry SHALL NOT be modified. In order to modify an existing entry, it MUST be taken out of service (by setting this object to 'notInService'), modified, and set 'active' again."

::= { gBondPortPerfTcaConfProfileEntry 8 }

-- The BCE group

gBondBceConfTable OBJECT-TYPE

SYNTAX SEQUENCE OF GBondBceConfEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Table for Configuration of G.Bond common aspects for the Bonding Channel Entity (BCE) ports (modems/channels).

Entries in this table MUST be maintained in a persistent manner."

::= { gBondBce 1 }

gBondBceConfEntry OBJECT-TYPE

SYNTAX GBondBceConfEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the G.Bond BCE Configuration table.

Each entry represents common aspects of a G.Bond BCE port indexed by the ifIndex. Note that an G.Bond BCE port can be stacked below a single GBS port, also indexed by ifIndex, possibly together with other BCE ports if GAF is enabled."

INDEX { ifIndex }

::= { gBondBceConfTable 1 }

GBondBceConfEntry ::=

SEQUENCE {

gBondBceRemoteDiscoveryCode PhysAddress

}



```
gBondBceRemoteDiscoveryCode OBJECT-TYPE
    SYNTAX      PhysAddress (SIZE(0|6))
    MAX-ACCESS   read-write
    STATUS       current
    DESCRIPTION
        "A Remote Discovery Code of the BCE port at C0.
        A 6 octet long Discovery Code of the peer GBS connected via
        the BCE.
        Reading this object results in a Discovery Get operation.
        Setting this object to all zeroes results in a Discovery
        Clear_if_Same operation (the value of gBondDiscoveryCode
        at the peer GBS SHALL be the same as gBondDiscoveryCode of
        the local GBS associated with the BCE for the operation to
        succeed).
        Writing a non-zero value to this object results in a
        Discovery Set_if_Clear operation.
        A zero-length octet string SHALL be returned on an attempt to
        read this object when GAF aggregation is not enabled.

        This object is irrelevant in BCE-R port subtypes (CPE side):
        in this case a zero length octet string SHALL be returned on
        an attempt to read this object, writing to this object SHALL
        be rejected.

        Discovery MUST be performed when the link is Down.
        Attempts to change this object MUST be rejected (in case of
        SNMP with the error inconsistentValue), if the link is Up or
        Initializing.

        This object maps to the TR-159 attribute
        aLineRemoteDiscoveryCode."
    REFERENCE
        "[TR-159] 5.5.6.7"
    ::= { gBondBceConfEntry 1 }

--
-- Conformance Statements
--

gBondGroups          OBJECT IDENTIFIER ::= { gBondConformance 1 }

gBondCompliances OBJECT IDENTIFIER ::= { gBondConformance 2 }

-- Object Groups

gBondBasicGroup OBJECT-GROUP
    OBJECTS {
        gBondOperScheme,
```



```
    gBondUpDataRate,
    gBondDnDataRate,
    gBondTargetUpDataRate,
    gBondTargetDnDataRate,
    gBondOperScheme,
    gBondCapacity,
    gBondNumBCEs,
    gBondPortSide,
    gBondFltStatus
}
STATUS      current
DESCRIPTION
    "A collection of objects representing management information
    common to all types of G.Bond ports."
::= { gBondGroups 1 }
```

```
gBondDiscoveryGroup OBJECT-GROUP
OBJECTS {
    gBondPeerOperScheme,
    gBondPeerCapacity,
    gBondDiscoveryCode,
    gBondBceRemoteDiscoveryCode
}
STATUS      current
DESCRIPTION
    "A collection of objects supporting OPTIONAL G.Bond discovery
    in G.Bond ports."
::= { gBondGroups 2 }
```

```
gBondMultiSchemeGroup OBJECT-GROUP
OBJECTS {
    gBondSchemesSupported,
    gBondPeerSchemesSupported,
    gBondAdminScheme,
    gBondPeerAdminScheme
}
STATUS      current
DESCRIPTION
    "A collection of objects providing OPTIONAL management
    information for G.Bond ports supporting multiple bonding
    schemes."
::= { gBondGroups 3 }
```

```
gBondTcaConfGroup OBJECT-GROUP
OBJECTS {
    gBondThreshLowUpRate,
    gBondThreshLowDnRate,
    gBondLowRateCrossingEnable
}
```



```
}
STATUS      current
DESCRIPTION
    "A collection of objects required for configuration of alarm
    thresholds and notifications in G.Bond ports."
::= { gBondGroups 4 }
```

```
gBondTcaNotificationGroup NOTIFICATION-GROUP
NOTIFICATIONS {
    gBondLowUpRateCrossing,
    gBondLowDnRateCrossing
}
STATUS      current
DESCRIPTION
    "This group supports notifications of significant conditions
    (non-PM threshold crossing alerts) associated with G.Bond ports."
::= { gBondGroups 5 }
```

```
gBondPerfCurrGroup OBJECT-GROUP
OBJECTS {
    gBondPerfES,
    gBondPerfSES,
    gBondPerfUAS,
    gBondPerf15MinValidIntervals,
    gBondPerf15MinInvalidIntervals,
    gBondPerfCurr15MinTimeElapsed,
    gBondPerfCurr15MinES,
    gBondPerfCurr15MinSES,
    gBondPerfCurr15MinUAS,
    gBondPerf1DayValidIntervals,
    gBondPerf1DayInvalidIntervals,
    gBondPerfCurr1DayTimeElapsed,
    gBondPerfCurr1DayES,
    gBondPerfCurr1DaySES,
    gBondPerfCurr1DayUAS
}
STATUS      current
DESCRIPTION
    "A collection of objects supporting OPTIONAL current Performance
    Monitoring information for G.Bond ports."
::= { gBondGroups 6 }
```

```
gBondPerf15MinGroup OBJECT-GROUP
OBJECTS {
    gBondPerf15MinIntervalMoniTime,
    gBondPerf15MinIntervalES,
    gBondPerf15MinIntervalSES,
    gBondPerf15MinIntervalUAS,
```





```
    gBondPerf15MinIntervalValid
}
STATUS      current
DESCRIPTION
    "A collection of objects supporting OPTIONAL historical
    Performance Monitoring information for G.Bond ports, during
    previous 15-minute intervals ."
 ::= { gBondGroups 7 }
```

gBondPerf1DayGroup OBJECT-GROUP

```
OBJECTS {
    gBondPerf1DayIntervalMoniTime,
    gBondPerf1DayIntervalES,
    gBondPerf1DayIntervalSES,
    gBondPerf1DayIntervalUAS,
    gBondPerf1DayIntervalValid
}
STATUS      current
DESCRIPTION
    "A collection of objects supporting OPTIONAL historical
    Performance Monitoring information for G.Bond ports, during
    previous 1-day intervals ."
 ::= { gBondGroups 8 }
```

gBondPerfTcaConfGroup OBJECT-GROUP

```
OBJECTS {
    gBondPerfTcaConfProfile,
    gBondPerfTcaEnable,
    gBondPerfThreshold15MinES,
    gBondPerfThreshold15MinSES,
    gBondPerfThreshold15MinUAS,
    gBondPerfThreshold1DayES,
    gBondPerfThreshold1DaySES,
    gBondPerfThreshold1DayUAS,
    gBondPerfTcaConfProfileRowStatus
}
STATUS      current
DESCRIPTION
    "A collection of objects required for configuration of
    Performance Monitoring Threshold Crossing Alert notifications
    in G.Bond ports."
 ::= { gBondGroups 9 }
```

gBondPerfTcaNotificationGroup NOTIFICATION-GROUP

```
NOTIFICATIONS {
    gBondPerfTca15MinESCrossing,
    gBondPerfTca15MinSESCrossing,
    gBondPerfTca15MinUASCrossing,
```



```

    gBondPerfTca1DayESCrossing,
    gBondPerfTca1DaySESCrossing,
    gBondPerfTca1DayUASCrossing
}
STATUS      current
DESCRIPTION
    "This group supports notifications of performance monitoring
    thresholds crossing alerts associated with G.Bond ports."
 ::= { gBondGroups 10 }

-- Compliance Statements

gBondCompliance MODULE-COMPLIANCE
STATUS      current
DESCRIPTION
    "The compliance statement for G.Bond interfaces.
    Compliance with the following external compliance statements
    is REQUIRED:

    MIB Module          Compliance Statement
    -----
    IF-MIB               ifCompliance3

    Compliance with the following external compliance statements
    is OPTIONAL for implementations supporting bonding with
    flexible cross-connect between the GBS and BCE ports:

    MIB Module          Compliance Statement
    -----
    IF-INVERTED-STACK-MIB  ifInvCompliance
    IF-CAP-STACK-MIB       ifCapStackCompliance"

MODULE -- this module
MANDATORY-GROUPS {
    gBondBasicGroup,
    gBondTcaConfGroup,
    gBondTcaNotificationGroup
}

GROUP      gBondDiscoveryGroup
DESCRIPTION
    "Support for this group is only required for implementations
    supporting G.Bond Discovery function."

GROUP      gBondMultiSchemeGroup
DESCRIPTION
    "Support for this group is only required for implementations
    supporting multiple bonding schemes."

```



GROUP           gBondPerfCurrGroup

DESCRIPTION

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

GROUP           gBondPerf15MinGroup

DESCRIPTION

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

GROUP           gBondPerf1DayGroup

DESCRIPTION

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

GROUP           gBondPerfTcaConfGroup

DESCRIPTION

"Support for this group is only required for implementations supporting Performance Monitoring Threshold Crossing Alert notifications."

GROUP           gBondPerfTcaNotificationGroup

DESCRIPTION

"Support for this group is only required for implementations supporting Performance Monitoring Threshold Crossing Alert notifications."

::= { gBondCompliances 1 }

END

## **7. Security Considerations**

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

- o Changing of gBondAdminScheme MAY lead to a potential locking of the link, if the peer device does not support desired bonding scheme.
- o Changing of gBondDiscoveryCode, before the discovery operation, MAY lead to a wrongful discovery, for example when two CO ports are connected to the same multi-channel RT port, while both CO ports have the same Discovery register value.



- o Changing GBS configuration parameters (e.g., profile of a GBS via gBondAdminProfile) MAY lead to anything from link quality and rate degradation to a complete link initialization failure, as ability of an G.Bond port to support a particular configuration depends on the copper environment.
- o Activation of a specific line/channel MAY cause a severe degradation of service for another G.Bond port, whose channel(s) MAY be affected by the cross-talk from the newly activated channel.
- o Removal of a channel from an operationally 'up' G.Bond port, aggregating several channels, MAY cause port's rate degradation

The user of the GBOND-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-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 particular, since a bonded xDSL port can be comprised of multiple Unshielded Twisted Pair (UTP) voice grade copper, located in the same bundle with other pairs belonging to another operator/customer, it is theoretically possible to evasdrop to a G.Bond transmission, simply by "listening" to a cross-talk from the bonded pairs, especially if the parameters of the G.Bond link in question are known.

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**

Three new values of IANAifType: g9981, g9982 and g9982 SHALL be defined by the IANA [[1](#)] in the IANAifType-MIB module [[IANAifType-MIB](#)], before this document is published as an RFC.

Additionally, an object identifier for gBondMIB MODULE-IDENTITY SHALL be allocated by IANA in the MIB-2 transmission sub-tree, before this document is published.

## **9. Acknowledgments**

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

## **10. References**

### **10.1. Normative References**

- |           |   |
|-----------|---|
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- [RFC3705] Ray, B. and R. Abbi, "High Capacity Textual Conventions for MIB Modules Using Performance History Based on 15 Minute Intervals", [RFC 3705](#), February 2004.
- [TR-159] Beili, E. and M. Morgenstern, "Management Framework for xDSL Bonding", Broadband Forum technical report TR-159, December 2008.

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