

## ATM-Based xDSL Bonded Interfaces MIB

### Abstract

This document defines a Management Information Base (MIB) module for use with network management protocols in TCP/IP-based internets. This document proposes an extension to the GBOND-MIB module with a set of objects for managing ATM-based multi-pair bonded xDSL interfaces, as defined in ITU-T Recommendation G.998.1.

### Status of This Memo

This is an Internet Standards Track document.

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## 1. Introduction

ATM-Based Multi-Pair Bonding, a.k.a. G.Bond/ATM, is specified in ITU-T Recommendation G.998.1 [G.998.1], which defines a method for bonding (or aggregating) multiple xDSL lines (or individual bearer channels in multiple xDSL lines) into a single bidirectional logical link carrying an ATM stream.

This specification can be viewed as an evolution of the legacy Inverse Multiplexing for ATM (IMA) technology [AF-PHY-0086], applied to xDSL with variable rates on each line/bearer channel. As with the other bonding schemes, ATM bonding also allows bonding of up to 32 individual sub-layers with variable rates, providing common functionality for the configuration, initialization, operation, and monitoring of the bonded link.

The MIB module defined in this document defines a set of managed objects for the management of G.998.1 bonded interfaces, extending the common objects specified in the GBOND-MIB module [RFC6765].

## 2. The Internet-Standard Management Framework

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

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIV2, which is described in STD 58, [RFC 2578 \[RFC2578\]](#), STD 58, [RFC 2579 \[RFC2579\]](#) and STD 58, [RFC 2580 \[RFC2580\]](#).

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

## 3. The Broadband Forum Management Framework for xDSL Bonding

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

## 4. Relationship to Other MIB Modules

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

### 4.1. Relationship to Interfaces Group MIB Module

A G.Bond/ATM port is a private case of a bonded multi-pair xDSL interface and as such is managed using generic interface management objects defined in the IF-MIB [[RFC2863](#)]. In particular, an interface index (ifIndex) is used to index instances of G.Bond/ATM ports, as well as xDSL lines/channels, in a managed system.

### 4.2. Relationship to G.Bond MIB Module

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

Both the GBOND-MIB and G9981-MIB modules are REQUIRED to manage a G.Bond/ATM port.

#### 4.3. Relationship to ATM MIB Module

The ATM-MIB [RFC2515] module defines management objects for an ATM interface.

The ATM-MIB module can be used to manage the ATM aspects of a G.Bond/ATM port.

### 5. MIB Structure

#### 5.1. Overview

All management objects defined in the G9981-MIB module are contained in a single group g9981Port. This group is further split into 4 sub-groups, structured as recommended by RFC 4181 [RFC4181]:

- o g9981PortNotifications - containing notifications (Up/Downstream Differential Delay Tolerance Exceeded).
- o g9981PortConfTable - containing objects for configuration of a G.Bond/ATM port.
- o g9981PortStatusTable - containing objects providing overall status information of a G.Bond/ATM port, complementing the generic status information from the ifTable of the IF-MIB and the gBondFltStatus of the GBOND-MIB.
- o g9981PM - containing objects providing historical Performance Monitoring (PM) information of a G.Bond/ATM port, complementing the PM information from the gBondPortPM of the GBOND-MIB.

Note that the rest of the objects for the Generic Bonding Sub-layer (GBS) port configuration, capabilities, status, notifications, and Performance Monitoring are located in the GBOND-MIB module.

#### 5.2. Performance Monitoring

The OPTIONAL Performance Monitoring counters, thresholds, and history buckets (interval-counters) 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 the PerfHist-TC-MIB [RFC3593].

The agent SHOULD align the beginning of each interval to a fifteen-minute boundary of a wall clock. Likewise, the beginning of each one-day interval SHOULD be aligned with the start of a day.

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

Note that the accumulation of certain performance events for a monitored entity is inhibited (counting stops) during periods of service unavailability on that entity. The DESCRIPTION clause of Performance Monitoring counters in this MIB module specifies which of the counters are inhibited during periods of service unavailability.

### 5.3. Mapping of Broadband Forum TR-159 Managed Objects

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

TR-159 Managed Object	Corresponding SNMP Object
oBondATM - Basic Package (Mandatory)	
aIMARxLostCells	g9981PortStatRxLostCells
aIMAPeerRxLostCells	g9981PortStatTxLostCells
aIMAMaxUpDiffDelay	g9981PortStatMaxUpDiffDelay
aIMAMaxDownDiffDelay	g9981PortStatMaxDnDiffDelay
aIMAUppDiffDelayTolerance	g9981PortConfUpDiffDelayTolerance
aIMADownDiffDelayTolerance	g9981PortConfDnDiffDelayTolerance
aIMADiffDelayToleranceExceededEnable	g9981PortConfDiffDelayToleranceExceededEnable
nIMAUppDiffDelayToleranceExceeded	g9981UpDiffDelayToleranceExceeded
nIMADownDiffDelayToleranceExceeded	g9981DnDiffDelayToleranceExceeded

Table 1: Mapping of TR-159 Managed Objects

Note that some of the mapping between the objects defined in TR-159 and the ones defined in this MIB module is not one-to-one; for example, while TR-159 PM attributes aGroupPerf\* map to the corresponding gBondPortPm\* objects of the GBOND-MIB module, there are no dedicated PM attributes for the g9981PortPm\* objects introduced in this MIB module. However, since their definition is identical to the definition of gBondPortPm\* objects of the GBOND-MIB module, we can map g9981PortPm\* to the relevant aGroupPerf\* attributes of TR-159 and use the term 'partial mapping' to denote the fact that this mapping is not one-to-one.

## 6. G.Bond/ATM MIB Definitions

The G9981-MIB module IMPORTS objects from SNMPv2-SMI [RFC2578], SNMPv2-TC [RFC2579], SNMPv2-CONF [RFC2580], IF-MIB [RFC2863], and HC-PerfHist-TC-MIB [RFC3705]. The module has been structured as recommended by [RFC4181].

G9981-MIB DEFINITIONS ::= BEGIN

IMPORTS

```
MODULE-IDENTITY,
OBJECT-TYPE,
NOTIFICATION-TYPE,
mib-2,
Unsigned32,
Counter32
    FROM SNMPv2-SMI          -- RFC 2578
TEXTUAL-CONVENTION,
TruthValue
    FROM SNMPv2-TC          -- RFC 2579
MODULE-COMPLIANCE,
OBJECT-GROUP,
NOTIFICATION-GROUP
    FROM SNMPv2-CONF        -- RFC 2580
ifIndex
    FROM IF-MIB              -- RFC 2863
HCPperfCurrentCount,
HCPperfIntervalCount,
HCPperfValidIntervals,
HCPperfInvalidIntervals,
HCPperfTimeElapsed
    FROM HC-PerfHist-TC-MIB -- RFC 3705
;
```

-----  
g9981MIB MODULE-IDENTITY

```
LAST-UPDATED "201302200000Z" -- 20 February 2013
ORGANIZATION "IETF ADSL MIB Working Group"
CONTACT-INFO
    "WG charter:
     http://datatracker.ietf.org/wg/adslmib/charter/
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#### DESCRIPTION

"The objects in this MIB module are used to manage the multi-pair bonded xDSL interfaces using ATM inverse multiplexing, as defined in ITU-T Recommendation G.998.1 (G.Bond/ATM).

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

The following references are used throughout this MIB module:

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

[TR-159] refers to:  
Broadband Forum Technical Report: 'Management Framework for  
xDSL Bonding', December 2008.

#### Naming Conventions:

- ATM - Asynchronous Transfer Mode
- BCE - Bonding Channel Entity
- BTU - Bonding Terminating Unit
- CO - Central Office
- CPE - Customer Premises Equipment
- GBS - Generic Bonding Sub-layer
- GBS-C - Generic Bonding Sub-layer, CO side
- GBS-R - Generic Bonding Sub-layer, RT (or CPE) side
- PM - Performance Monitoring
- RT - Remote Terminal



SNR     - Signal to Noise Ratio  
SES     - Severely Errored Seconds  
UAS     - Unavailable Seconds

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REVISION     "201302200000Z"   -- 20 February 2013  
DESCRIPTION "Initial version, published as [RFC 6768](#)."

::= { mib-2 208 }

-- Sections of the module  
-- Structured as recommended by [RFC 4181, Appendix D](#)

g9981Objects       OBJECT IDENTIFIER ::= { g9981MIB 1 }

g9981Conformance OBJECT IDENTIFIER ::= { g9981MIB 2 }

-- Groups in the module

g9981Port           OBJECT IDENTIFIER ::= { g9981Objects 1 }

-- Textual Conventions

MilliSeconds ::= TEXTUAL-CONVENTION  
    DISPLAY-HINT "d"  
    STATUS       current  
    DESCRIPTION  
        "Represents time unit value in milliseconds."  
    SYNTAX       Unsigned32

-- Port Notifications group

g9981PortNotifications OBJECT IDENTIFIER  
    ::= { g9981Port 0 }

## g9981UpDiffDelayToleranceExceeded NOTIFICATION-TYPE

```
OBJECTS {
    -- ifIndex is not needed here, since we are under specific GBS
    g9981PortConfUpDiffDelayTolerance,
    g9981PortStatMaxUpDiffDelay
}
STATUS      current
DESCRIPTION
```

"This notification indicates that the maximum upstream differential delay has exceeded the max upstream differential delay threshold, specified by g9981PortConfUpDiffDelayTolerance.

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

Generation of this notification is controlled by the g9981PortConfDiffDelayToleranceExceededEnable attribute.

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

## REFERENCE

"[[TR-159](#)], Section 5.5.2.8"  
 ::= { g9981PortNotifications 1 }

## g9981DnDiffDelayToleranceExceeded NOTIFICATION-TYPE

```
OBJECTS {
    -- ifIndex is not needed here, since we are under specific GBS
    g9981PortConfDnDiffDelayTolerance,
    g9981PortStatMaxDnDiffDelay
}
STATUS      current
DESCRIPTION
```

"This notification indicates that the maximum downstream differential delay has exceeded the max downstream differential delay threshold, specified by g9981PortConfDnDiffDelayTolerance.

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

Generation of this notification is controlled by the g9981PortConfDiffDelayToleranceExceededEnable attribute.

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

REFERENCE

"[[TR-159](#)], Section 5.5.2.9"

::= { g9981PortNotifications 2 }

-- G.Bond/ATM Port group

g9981PortConfTable OBJECT-TYPE

SYNTAX SEQUENCE OF G9981PortConfEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Table for configuration of G.Bond/ATM ports. Entries in this table MUST be maintained in a persistent manner."

::= { g9981Port 1 }

g9981PortConfEntry OBJECT-TYPE

SYNTAX G9981PortConfEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the G.Bond/ATM Port Configuration table. Each entry represents a G.Bond/ATM port indexed by the ifIndex. Additional configuration parameters are available via the gBondPortConfEntry of the GBOND-MIB. Note that a G.Bond/ATM port runs on top of a single or multiple BCE port(s), which are also indexed by the ifIndex."

INDEX { ifIndex }

::= { g9981PortConfTable 1 }

G9981PortConfEntry ::=

SEQUENCE {

g9981PortConfUpDiffDelayTolerance MilliSeconds,

g9981PortConfDnDiffDelayTolerance MilliSeconds,

g9981PortConfDiffDelayToleranceExceededEnable TruthValue

}

g9981PortConfUpDiffDelayTolerance OBJECT-TYPE

SYNTAX MilliSeconds (0..2047)

UNITS "milliseconds"

MAX-ACCESS read-write

STATUS current

## DESCRIPTION

"A maximum tolerated upstream differential delay (among the member BCEs) of a G.Bond/ATM port, expressed in ms.

This object is read-write for the GBS-C ports.  
It is irrelevant for the GBS-R ports -- an attempt to read or change this object MUST be rejected (in the case of SNMP, with the error inconsistentValue).

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

## REFERENCE

"[[TR-159](#)], Section 5.5.2.5; [[G.998.1](#)], Section 11.4.1 (6)"  
 ::= { g9981PortConfEntry 1 }

## g9981PortConfDnDiffDelayTolerance OBJECT-TYPE

SYNTAX        MilliSeconds (0..2047)

UNITS         "milliseconds"

MAX-ACCESS   read-write

STATUS        current

## DESCRIPTION

"A maximum tolerated downstream differential delay (among the member BCEs) of a G.Bond/ATM port, expressed in ms.

This object is read-write for the GBS-C ports.  
It is irrelevant for the GBS-R ports -- an attempt to read or change this object MUST be rejected (in the case of SNMP, with the error inconsistentValue).

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

## REFERENCE

"[[TR-159](#)], Section 5.5.2.6; [[G.998.1](#)], Section 11.4.1 (6)"  
 ::= { g9981PortConfEntry 2 }

## g9981PortConfDiffDelayToleranceExceededEnable OBJECT-TYPE

SYNTAX        TruthValue

MAX-ACCESS   read-write

STATUS        current

## DESCRIPTION

"Indicates whether g9981UpDiffDelayToleranceExceeded and g9981DnDiffDelayToleranceExceeded notifications should be generated for G.Bond/ATM port.

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

This object is read-write for the GBS-C.  
 It is irrelevant for the GBS-R ports -- an attempt to read or change this object MUST be rejected (in the case of SNMP, with the error inconsistentValue).

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

## REFERENCE

"[[TR-159](#)], Section 5.5.5.7"  
 ::= { g9981PortConfEntry 3 }

## g9981PortStatTable OBJECT-TYPE

SYNTAX SEQUENCE OF G9981PortStatEntry

MAX-ACCESS not-accessible

STATUS current

## DESCRIPTION

"This table provides overall status information of G.Bond/ATM ports, complementing the generic status information from the ifTable of the IF-MIB and the gBondFltStatus of the GBOND-MIB. Additional status information about connected BCEs is available from the relevant line MIBs.

This table contains live data from the equipment. As such, it is NOT persistent."

::= { g9981Port 2 }

## g9981PortStatEntry OBJECT-TYPE

SYNTAX G9981PortStatEntry

MAX-ACCESS not-accessible

STATUS current

## DESCRIPTION

"An entry in the G.Bond/ATM Port Status table.  
 Each entry represents a G.Bond/ATM port indexed by the ifIndex.

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

INDEX { ifIndex }

::= { g9981PortStatTable 1 }

## G9981PortStatEntry ::=

SEQUENCE {

g9981PortStatRxBstCells	Counter32,
g9981PortStatTxLostCells	Counter32,
g9981PortStatMaxUpDiffDelay	Unsigned32,
g9981PortStatMaxDnDiffDelay	Unsigned32

}

**g9981PortStatRxLostCells** OBJECT-TYPE

SYNTAX Counter32

UNITS "cells"

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"The number of lost ATM cells detected by the G.Bond/ATM port in the receive direction (e.g., upstream direction for a GBS-C port).

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

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

## REFERENCE

"[[TR-159](#)], Section 5.5.2.1; [[G.998.1](#)], Section 11.4.2 (4)"  
 ::= { g9981PortStatEntry 1 }

**g9981PortStatTxLostCells** OBJECT-TYPE

SYNTAX Counter32

UNITS "cells"

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"The number of lost ATM cells detected by the peer G.Bond/ATM port in the receive direction, i.e., downstream direction for a GBS-C port.

This object is irrelevant for the GBS-R ports -- an attempt to read it MUST be rejected (in the case of SNMP, with the error inconsistentValue).

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

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

## REFERENCE

"[[TR-159](#)], Section 5.5.2.2; [[G.998.1](#)], Section 11.4.2 (4)"  
 ::= { g9981PortStatEntry 2 }

**g9981PortStatMaxUpDiffDelay** OBJECT-TYPE

SYNTAX Unsigned32

UNITS "0.1 ms"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Current maximum upstream differential delay between all operational BCEs in the G.Bond/ATM bonding group, measured in units of 0.1 ms.

This object is read-only for the GBS-C ports.

It is irrelevant for the GBS-R ports -- an attempt to read this object MUST be rejected (in the case of SNMP, with the error inconsistentValue).

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

REFERENCE

"[TR-159], Section 5.5.2.3"

::= { g9981PortStatEntry 3 }

g9981PortStatMaxDnDiffDelay OBJECT-TYPE

SYNTAX Unsigned32

UNITS "0.1 ms"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Current maximum downstream differential delay between all operational BCEs in the G.Bond/ATM bonding group, measured in units of 0.1 ms.

This object is read-only for the GBS-C ports.

It is irrelevant for the GBS-R ports -- an attempt to read this object MUST be rejected (in the case of SNMP, with the error inconsistentValue).

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

REFERENCE

"[TR-159], Section 5.5.2.4"

::= { g9981PortStatEntry 4 }

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

g9981PM OBJECT IDENTIFIER ::= { g9981Port 3 }

g9981PortPmCurTable OBJECT-TYPE

SYNTAX SEQUENCE OF G9981PortPmCurEntry

MAX-ACCESS not-accessible

STATUS current

## DESCRIPTION

"This table contains current Performance Monitoring information for a G.Bond/ATM port. This table contains live data from the equipment and as such is NOT persistent."

::= { g9981PM 1 }

## g9981PortPmCurEntry OBJECT-TYPE

SYNTAX G9981PortPmCurEntry

MAX-ACCESS not-accessible

STATUS current

## DESCRIPTION

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

Each entry represents a G.Bond/ATM port indexed by the ifIndex."

INDEX { ifIndex }

::= { g9981PortPmCurTable 1 }

## G9981PortPmCurEntry ::=

## SEQUENCE {

g9981PortPmCur15MinValidIntervals	HCPperfValidIntervals,
g9981PortPmCur15MinInvalidIntervals	HCPperfInvalidIntervals,
g9981PortPmCur15MinTimeElapsed	HCPperfTimeElapsed,
g9981PortPmCur15MinRxLostCells	HCPperfCurrentCount,
g9981PortPmCur15MinTxLostCells	HCPperfCurrentCount,
g9981PortPmCur15MinUpDiffDelay	HCPperfCurrentCount,
g9981PortPmCur15MinDnDiffDelay	HCPperfCurrentCount,
g9981PortPmCur1DayValidIntervals	Unsigned32,
g9981PortPmCur1DayInvalidIntervals	Unsigned32,
g9981PortPmCur1DayTimeElapsed	HCPperfTimeElapsed,
g9981PortPmCur1DayRxLostCells	HCPperfCurrentCount,
g9981PortPmCur1DayTxLostCells	HCPperfCurrentCount,
g9981PortPmCur1DayUpDiffDelay	HCPperfCurrentCount,
g9981PortPmCur1DayDnDiffDelay	HCPperfCurrentCount

}

## g9981PortPmCur15MinValidIntervals OBJECT-TYPE

SYNTAX HCPperfValidIntervals

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A read-only number of 15-minute intervals for which the performance data was collected. The value of this object will be 96 or the maximum number of 15-minute history intervals collected by the implementation, unless the measurement was (re)started recently, in which case the value will be the number of complete 15-minute intervals for which there are at least some data."



In certain cases, it is possible that some intervals are unavailable. In this case, this object reports the maximum interval number for which data is available.

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

## REFERENCE

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

::= { g9981PortPmCurEntry 1 }

## g9981PortPmCur15MinInvalidIntervals OBJECT-TYPE

SYNTAX HCPerfInvalidIntervals

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A read-only number of 15-minute intervals for which the performance data was not always available. The value will typically be zero, except in cases where the data for some intervals are not available.

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

## REFERENCE

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

::= { g9981PortPmCurEntry 2 }

## g9981PortPmCur15MinTimeElapsed OBJECT-TYPE

SYNTAX HCPerfTimeElapsed

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

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

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

## REFERENCE

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

::= { g9981PortPmCurEntry 3 }

## g9981PortPmCur15MinRxBLostCells OBJECT-TYPE

SYNTAX HCPerfCurrentCount

UNITS "cells"

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A read-only count of lost ATM cells detected by a G.Bond/ATM port (e.g., the GBS-C) in the receive direction, during the current 15-minute performance history interval.

Note that the total number of lost ATM cells is indicated by the g9981PortStatRxLostCells object.

This object is inhibited during Severely Errored Seconds (SES) or Unavailable Seconds (UAS)."

## REFERENCE

"[[TR-159](#)], Section 5.5.2.1"  
::= { g9981PortPmCurEntry 4}

## g9981PortPmCur15MinTxLostCells OBJECT-TYPE

SYNTAX HCPerfCurrentCount

UNITS "cells"

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A read-only count of lost ATM cells detected by the peer G.Bond/ATM port (e.g., by the GBS-R for the GBS-C) during the current 15-minute performance history interval.

Note that the total number of lost ATM cells is indicated by the g9981PortStatTxLostCells object.

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

## REFERENCE

"[[TR-159](#)], Section 5.5.2.2"  
::= { g9981PortPmCurEntry 5}

## g9981PortPmCur15MinUpDiffDelay OBJECT-TYPE

SYNTAX HCPerfCurrentCount

UNITS "0.1 ms"

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A read-only value specifying the maximum upstream differential delay between all operational BCEs in the GBS-C, measured in units of 0.1 ms, during the current 15-minute performance interval.

Note that the current max upstream differential delay is indicated by the g9981PortStatMaxUpDiffDelay object.

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

## REFERENCE

"[[TR-159](#)], Section 5.5.2.3"  
 ::= { g9981PortPmCurEntry 6 }

## g9981PortPmCurl5MinDnDiffDelay OBJECT-TYPE

SYNTAX HCPerfCurrentCount

UNITS "0.1 ms"

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A read-only value specifying the maximum downstream differential delay between all operational BCEs in the GBS-C (as perceived by the GBS-R), measured in units of 0.1 ms, during the current 15-minute performance history interval.

Note that the current max downstream differential delay is indicated by the g9981PortStatMaxDnDiffDelay object.

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

## REFERENCE

"[[TR-159](#)], Section 5.5.2.4"  
 ::= { g9981PortPmCurEntry 7 }

## g9981PortPmCurlDayValidIntervals OBJECT-TYPE

SYNTAX Unsigned32 (0..7)

UNITS "days"

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

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

## REFERENCE

"[[TR-159](#)], Section 5.5.1.45"  
 ::= { g9981PortPmCurEntry 8 }

## g9981PortPmCurlDayInvalidIntervals OBJECT-TYPE

SYNTAX Unsigned32 (0..7)

UNITS "days"

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A read-only number of 1-day intervals for which data was not always available. The value will typically be zero, except in cases where the data for some intervals are not available."

## REFERENCE

"[[TR-159](#)], Section 5.5.1.46"

::= { g9981PortPmCurEntry 9 }

## g9981PortPmCurlDayTimeElapsed OBJECT-TYPE

SYNTAX HCPerfTimeElapsed

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

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

## REFERENCE

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

::= { g9981PortPmCurEntry 10 }

## g9981PortPmCurlDayRxLostCells OBJECT-TYPE

SYNTAX HCPerfCurrentCount

UNITS "cells"

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A read-only count of lost ATM cells detected by the G.Bond/ATM port (e.g., the GBS-C) during the current 1-day performance interval."

This object is inhibited during Severely Errored Seconds (SES) and Unavailable Seconds (UAS)."

::= { g9981PortPmCurEntry 11 }

## g9981PortPmCurlDayTxLostCells OBJECT-TYPE

SYNTAX HCPerfCurrentCount

UNITS "cells"

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A read-only count of lost ATM cells detected by the peer G.Bond/ATM port (e.g., by the GBS-R for the GBS-C) during the current 1-day performance history interval."

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

::= { g9981PortPmCurEntry 12 }

**g9981PortPmCurlDayUpDiffDelay OBJECT-TYPE**

SYNTAX HCPerfCurrentCount

UNITS "0.1 ms"

MAX-ACCESS read-only

STATUS current

**DESCRIPTION**

"A read-only value specifying the maximum upstream differential delay between all operational BCEs in the GBS-C, measured in units of 0.1 ms, during the current 1-day performance interval.

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

::= { g9981PortPmCurEntry 13 }

**g9981PortPmCurlDayDnDiffDelay OBJECT-TYPE**

SYNTAX HCPerfCurrentCount

UNITS "0.1 ms"

MAX-ACCESS read-only

STATUS current

**DESCRIPTION**

"A read-only value specifying the maximum downstream differential delay between all operational BCEs in the GBS-C, measured in units of 0.1 ms, during the current 1-day performance interval.

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

::= { g9981PortPmCurEntry 14 }

-- Port PM history: 15-min buckets

**g9981PortPm15MinTable OBJECT-TYPE**

SYNTAX SEQUENCE OF G9981PortPm15MinEntry

MAX-ACCESS not-accessible

STATUS current

**DESCRIPTION**

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

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

::= { g9981PM 2 }

**g9981PortPm15MinEntry OBJECT-TYPE**

SYNTAX G9981PortPm15MinEntry

MAX-ACCESS not-accessible

STATUS current

**DESCRIPTION**

"An entry in the G.Bond/ATM Port historical 15-minute PM table. Each entry represents Performance Monitoring data for a

G.Bond/ATM port, indexed by the ifIndex, collected during a particular 15-minute interval, indexed by the g9981PortPm15MinIntervalIndex."

```
INDEX { ifIndex, g9981PortPm15MinIntervalIndex }
 ::= { g9981PortPm15MinTable 1 }
```

G9981PortPm15MinEntry ::=

```
SEQUENCE {
    g9981PortPm15MinIntervalIndex      Unsigned32,
    g9981PortPm15MinIntervalMoniTime   HCPerfTimeElapsed,
    g9981PortPm15MinIntervalRxLostCells HCPerfIntervalCount,
    g9981PortPm15MinIntervalTxLostCells HCPerfIntervalCount,
    g9981PortPm15MinIntervalUpDiffDelay HCPerfIntervalCount,
    g9981PortPm15MinIntervalDnDiffDelay HCPerfIntervalCount,
    g9981PortPm15MinIntervalValid      TruthValue
}
```

g9981PortPm15MinIntervalIndex OBJECT-TYPE

SYNTAX Unsigned32 (1..96)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Performance data interval number. 1 is the most recent previous interval; interval 96 is 24 hours ago. Intervals 2..96 are OPTIONAL.

This object partially maps to the TR-159 attribute aGroupPerf15MinIntervalNumber."

REFERENCE

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

```
::= { g9981PortPm15MinEntry 1 }
```

g9981PortPm15MinIntervalMoniTime OBJECT-TYPE

SYNTAX HCPerfTimeElapsed

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

```
::= { g9981PortPm15MinEntry 2 }
```

g9981PortPm15MinIntervalRxLostCells OBJECT-TYPE

SYNTAX HCPerfIntervalCount

UNITS "cells"

MAX-ACCESS read-only

STATUS current  
DESCRIPTION

"A read-only count of lost ATM cells detected by a G.Bond/ATM port (e.g., the GBS-C) in the receive direction, during the 15-minute performance history interval.

Note that the total number of lost ATM cells is indicated by the g9981PortStatRxLostCells object.

This object is inhibited during Severely Errored Seconds (SES) or Unavailable Seconds (UAS)."

REFERENCE

"[[TR-159](#)], Section 5.5.2.1"  
::= { g9981PortPm15MinEntry 3 }

g9981PortPm15MinIntervalTxLostCells OBJECT-TYPE

SYNTAX HCPerfIntervalCount  
UNITS "cells"  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION

"A read-only count of lost ATM cells detected by the peer G.Bond/ATM port (e.g., by the GBS-R for the GBS-C) during the 15-minute performance history interval.

Note that the total number of lost ATM cells is indicated by the g9981PortStatTxLostCells object.

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

REFERENCE

"[[TR-159](#)], Section 5.5.2.2"  
::= { g9981PortPm15MinEntry 4 }

g9981PortPm15MinIntervalUpDiffDelay OBJECT-TYPE

SYNTAX HCPerfIntervalCount  
UNITS "0.1 ms"  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION

"A read-only value specifying the maximum upstream differential delay between all operational BCEs in the GBS, measured in units of 0.1 ms, during the 15-minute performance history interval.

Note that the current max upstream differential delay is indicated by the g9981PortStatMaxUpDiffDelay object.

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

## REFERENCE

"[[TR-159](#)], Section 5.5.2.3"  
::= { g9981PortPml5MinEntry 5 }

## g9981PortPml5MinIntervalDnDiffDelay OBJECT-TYPE

SYNTAX HCPerfIntervalCount

UNITS "0.1 ms"

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A read-only value specifying the maximum downstream differential delay between all operational BCEs in the GBS, as perceived by its peer port, measured in units of 0.1 ms, during the 15-minute performance history interval.

Note that the current max downstream differential delay is indicated by the g9981PortStatMaxDnDiffDelay object.

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

## REFERENCE

"[[TR-159](#)], Section 5.5.2.4"  
::= { g9981PortPml5MinEntry 6 }

## g9981PortPml5MinIntervalValid OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

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

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

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

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

## REFERENCE

"[[TR-159](#)], Section 5.5.1.58"  
::= { g9981PortPml5MinEntry 7 }



-- Port PM history: 1-day buckets

g9981PortPmlDayTable OBJECT-TYPE

SYNTAX SEQUENCE OF G9981PortPmlDayEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

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

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

::= { g9981PM 3 }

g9981PortPmlDayEntry OBJECT-TYPE

SYNTAX G9981PortPmlDayEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

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

Each entry represents Performance Monitoring data for such a port, indexed by the ifIndex, collected during a particular 1-day interval, indexed by the g9981PortPmlDayIntervalIndex."

INDEX { ifIndex, g9981PortPmlDayIntervalIndex }

::= { g9981PortPmlDayTable 1 }

G9981PortPmlDayEntry ::=

SEQUENCE {

g9981PortPmlDayIntervalIndex	Unsigned32,
g9981PortPmlDayIntervalMoniTime	HCPperfTimeElapsed,
g9981PortPmlDayIntervalRxLostCells	HCPperfIntervalCount,
g9981PortPmlDayIntervalTxLostCells	HCPperfIntervalCount,
g9981PortPmlDayIntervalUpDiffDelay	HCPperfIntervalCount,
g9981PortPmlDayIntervalDnDiffDelay	HCPperfIntervalCount,
g9981PortPmlDayIntervalValid	TruthValue

}

g9981PortPmlDayIntervalIndex OBJECT-TYPE

SYNTAX Unsigned32 (1..7)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

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

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

## REFERENCE

"[[TR-159](#)], Section 5.5.1.62"  
::= { g9981PortPmlDayEntry 1 }

## g9981PortPmlDayIntervalMoniTime OBJECT-TYPE

SYNTAX HCPerfTimeElapsed

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A count of seconds over which the performance data was actually monitored. This value will be the same as the interval duration (86400 seconds), except in a situation where performance data could not be collected for any reason.

This object partially maps to the TR-159 attribute  
aGroupPerf1DayIntervalMoniSecs."

## REFERENCE

"[[TR-159](#)], Section 5.5.1.64"  
::= { g9981PortPmlDayEntry 2 }

## g9981PortPmlDayIntervalRxBstCells OBJECT-TYPE

SYNTAX HCPerfIntervalCount

UNITS "cells"

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A count of lost ATM cells detected by the G.Bond/ATM port (e.g., the GBS-C) during the 1-day performance history interval.

This object is inhibited during Severely Errored Seconds (SES) and Unavailable Seconds (UAS)."

::= { g9981PortPmlDayEntry 3 }

## g9981PortPmlDayIntervalTxLostCells OBJECT-TYPE

SYNTAX HCPerfIntervalCount

UNITS "cells"

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A count of lost ATM cells detected by the peer G.Bond/ATM port (e.g., by the GBS-R for the GBS-C) during the 1-day performance history interval.

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

::= { g9981PortPmlDayEntry 4 }

g9981PortPmlDayIntervalUpDiffDelay OBJECT-TYPE  
SYNTAX HCPerfIntervalCount  
UNITS "0.1 ms"  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"A read-only value specifying the maximum upstream differential delay between all operational BCEs in the GBS-C, measured in units of 0.1 ms, during the 1-day performance history interval.  
  
This object is inhibited during Unavailable Seconds (UAS)."  
::= { g9981PortPmlDayEntry 5 }

g9981PortPmlDayIntervalDnDiffDelay OBJECT-TYPE  
SYNTAX HCPerfIntervalCount  
UNITS "0.1 ms"  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"A read-only value specifying the maximum downstream differential delay between all operational BCEs in the GBS-C, measured in units of 0.1 ms, during the 1-day performance history interval.  
  
This object is inhibited during Unavailable Seconds (UAS)."  
::= { g9981PortPmlDayEntry 6 }

g9981PortPmlDayIntervalValid OBJECT-TYPE  
SYNTAX TruthValue  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"A read-only object indicating whether or not this history bucket contains valid data. A valid bucket is reported as true(1) and an invalid bucket as false(2).  
If this history bucket is invalid, the BTU MUST NOT produce notifications based upon the value of the counters in this bucket.  
Note that an implementation may decide not to store invalid history buckets in its database. In such a case, this object is not required, as only valid history buckets are available while invalid history buckets are simply not in the database.  
  
This object partially maps to the TR-159 attribute aGroupPerf1DayIntervalValid."  
REFERENCE  
"[[TR-159](#)], Section 5.5.1.63"  
::= { g9981PortPmlDayEntry 7 }

```
--
-- Conformance Statements
--

g9981Groups      OBJECT IDENTIFIER
    ::= { g9981Conformance 1 }

g9981Compliances OBJECT IDENTIFIER
    ::= { g9981Conformance 2 }

-- Object Groups

g9981BasicGroup OBJECT-GROUP
    OBJECTS {
        g9981PortStatRxLostCells,
        g9981PortStatTxLostCells,
        g9981PortStatMaxUpDiffDelay,
        g9981PortStatMaxDnDiffDelay
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects representing management information
        for a G.Bond/ATM port."
    ::= { g9981Groups 1 }

g9981AlarmConfGroup OBJECT-GROUP
    OBJECTS {
        g9981PortConfUpDiffDelayTolerance,
        g9981PortConfDnDiffDelayTolerance,
        g9981PortConfDiffDelayToleranceExceededEnable
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects required for configuration of alarm
        thresholds and notifications in G.Bond/ATM ports."
    ::= { g9981Groups 2 }

g9981NotificationGroup NOTIFICATION-GROUP
    NOTIFICATIONS {
        g9981UpDiffDelayToleranceExceeded,
        g9981DnDiffDelayToleranceExceeded
    }
    STATUS      current
    DESCRIPTION
        "This group supports notifications of significant conditions
        associated with G.Bond/ATM ports."
    ::= { g9981Groups 3 }
```

```
g9981PerfCurrGroup OBJECT-GROUP
  OBJECTS {
    g9981PortPmCurl5MinValidIntervals,
    g9981PortPmCurl5MinInvalidIntervals,
    g9981PortPmCurl5MinTimeElapsed,
    g9981PortPmCurl5MinRxLostCells,
    g9981PortPmCurl5MinTxLostCells,
    g9981PortPmCurl5MinUpDiffDelay,
    g9981PortPmCurl5MinDnDiffDelay,
    g9981PortPmCurlDayValidIntervals,
    g9981PortPmCurlDayInvalidIntervals,
    g9981PortPmCurlDayTimeElapsed,
    g9981PortPmCurlDayRxLostCells,
    g9981PortPmCurlDayTxLostCells,
    g9981PortPmCurlDayUpDiffDelay,
    g9981PortPmCurlDayDnDiffDelay
  }
  STATUS      current
  DESCRIPTION
    "A collection of objects supporting OPTIONAL current Performance
    Monitoring information for G.Bond/ATM ports."
    ::= { g9981Groups 4 }

g9981Perf15MinGroup OBJECT-GROUP
  OBJECTS {
    g9981PortPm15MinIntervalMoniTime,
    g9981PortPm15MinIntervalRxLostCells,
    g9981PortPm15MinIntervalTxLostCells,
    g9981PortPm15MinIntervalUpDiffDelay,
    g9981PortPm15MinIntervalDnDiffDelay,
    g9981PortPm15MinIntervalValid
  }
  STATUS      current
  DESCRIPTION
    "A collection of objects supporting OPTIONAL historical
    Performance Monitoring information for G.Bond/ATM ports, during
    previous 15-minute intervals."
    ::= { g9981Groups 5 }

g9981Perf1DayGroup OBJECT-GROUP
  OBJECTS {
    g9981PortPm1DayIntervalMoniTime,
    g9981PortPm1DayIntervalRxLostCells,
    g9981PortPm1DayIntervalTxLostCells,
    g9981PortPm1DayIntervalUpDiffDelay,
    g9981PortPm1DayIntervalDnDiffDelay,
    g9981PortPm1DayIntervalValid
  }
```

```

STATUS      current
DESCRIPTION
    "A collection of objects supporting OPTIONAL historical
    Performance Monitoring information for G.Bond/ATM ports, during
    previous 1-day intervals."
 ::= { g9981Groups 6 }

-- Compliance Statements

g9981Compliance MODULE-COMPLIANCE
STATUS      current
DESCRIPTION
    "The compliance statement for G.Bond/ATM interfaces.
    Compliance with the following external compliance statements
    is REQUIRED:

MIB Module           Compliance Statement
-----
IF-MIB               ifCompliance3
GBOND-MIB            gBondCompliance"

MODULE -- this module
MANDATORY-GROUPS {
    g9981BasicGroup,
    g9981AlarmConfGroup,
    g9981NotificationGroup
}

GROUP      g9981PerfCurrGroup
DESCRIPTION
    "Support for this group is only required for implementations
    supporting Performance Monitoring."

GROUP      g9981Perf15MinGroup
DESCRIPTION
    "Support for this group is only required for implementations
    supporting historical Performance Monitoring."

GROUP      g9981Perf1DayGroup
DESCRIPTION
    "Support for this group is only required for implementations
    supporting 1-day historical Performance Monitoring."

 ::= { g9981Compliances 1 }
END

```

## 7. Security Considerations

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

- o Changing of g9981PortConfTable configuration parameters MAY lead to a potential Service Level Agreement (SLA) breach, for example, if a traffic delay is increased as a result of the higher delay tolerance (increased g9981PortConfUpDiffDelayTolerance and/or g9981PortConfDnDiffDelayTolerance), or the differential delay tolerance notifications are disabled by manipulating the g9981PortConfDiffDelayToleranceExceededEnable parameter.

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

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

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

Implementations SHOULD provide the security features described by the SNMPv3 framework (see [RFC3410]), and implementations claiming compliance to the SNMPv3 standard MUST include full support for authentication and privacy via the User-based Security Model (USM) [RFC3414] with the AES cipher algorithm [RFC3826]. Implementations MAY also provide support for the Transport Security Model (TSM) [RFC5591] in combination with a secure transport such as SSH [RFC5592] or TLS/DTLS [RFC6353].

Further, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to enable cryptographic security. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an

instance of this MIB module is properly configured to give access to the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

## 8. IANA Considerations

IANA has assigned 208 as the object identifier for g9981MIB MODULE-IDENTITY in the MIB-2 transmission sub-tree <<http://www.iana.org/>>.

## 9. Acknowledgments

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

Special thanks to Dan Romascanu for his meticulous review of this text.

## 10. References

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