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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
aIMAUpDiffDelayTolerance	g9981PortConfUpDiffDelayTolerance
aIMADownDiffDelayTolerance	g9981PortConfDnDiffDelayTolerance
aIMADiffDelayToleranceExceededEnable	g9981PortConfDiffDelayToleranceExceededEnable
nIMAUpDiffDelayToleranceExceeded	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
    HCPerfCurrentCount,
    HCPerfIntervalCount,
    HCPerfValidIntervals,
    HCPerfInvalidIntervals,
    HCPerfTimeElapsed
        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/

        Mailing Lists:
        General Discussion: adslmib@ietf.org
        To Subscribe: adslmib-request@ietf.org
        In Body: subscribe your_email_address
```

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DESCRIPTION

"The objects in this MIB module are used to manage the 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
  nIMAUpDiffDelayToleranceExceeded."
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 {

g9981PortStatRxLostCells 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 aGroupPerf15MinValidIntervals."

REFERENCE

"[TR-159], Section 5.5.1.32"
 ::= { g9981PortPmCurEntry 1 }

g9981PortPmCur15MinInvalidIntervals OBJECT-TYPE

SYNTAX HCPperfInvalidIntervals

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 HCPperfTimeElapsed

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 }

g9981PortPmCur15MinRxLostCells OBJECT-TYPE

SYNTAX HCPperfCurrentCount

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 g9981PortStatRxBestCells 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 }

g9981PortPmCur15MinDnDiffDelay OBJECT-TYPE

SYNTAX HCPperfCurrentCount
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 }

g9981PortPmCur1DayValidIntervals 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 }

g9981PortPmCur1DayInvalidIntervals 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 }

g9981PortPmCur1DayTimeElapsed 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 }

g9981PortPmCur1DayRxDroppedCells 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 }

g9981PortPmCur1DayTxLostCells 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 }

```
g9981PortPmCur1DayUpDiffDelay OBJECT-TYPE
    SYNTAX      HCPperfCurrentCount
    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 }
```

```
g9981PortPmCur1DayDnDiffDelay OBJECT-TYPE
    SYNTAX      HCPperfCurrentCount
    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   HCPperfTimeElapsed,
    g9981PortPm15MinIntervalRxBstCells HCPperfIntervalCount,
    g9981PortPm15MinIntervalTxLostCells HCPperfIntervalCount,
    g9981PortPm15MinIntervalUpDiffDelay HCPperfIntervalCount,
    g9981PortPm15MinIntervalDnDiffDelay HCPperfIntervalCount,
    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      HCPperfTimeElapsed
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 }

g9981PortPm15MinIntervalRxBstCells OBJECT-TYPE
SYNTAX      HCPperfIntervalCount
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"
 ::= { g9981PortPm15MinEntry 5 }

g9981PortPm15MinIntervalDnDiffDelay 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"
 ::= { g9981PortPm15MinEntry 6 }

g9981PortPm15MinIntervalValid 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"
 ::= { g9981PortPm15MinEntry 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   HCPerfTimeElapsed,
    g9981PortPmlDayIntervalRxBtLostCells HCPerfIntervalCount,
    g9981PortPmlDayIntervalTxLostCells HCPerfIntervalCount,
    g9981PortPmlDayIntervalUpDiffDelay HCPerfIntervalCount,
    g9981PortPmlDayIntervalDnDiffDelay HCPerfIntervalCount,
    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"
 ::= { g9981PortPm1DayEntry 1 }

g9981PortPm1DayIntervalMoniTime OBJECT-TYPE

SYNTAX HCPperfTimeElapsed
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"
 ::= { g9981PortPm1DayEntry 2 }

g9981PortPm1DayIntervalRxLostCells OBJECT-TYPE

SYNTAX HCPperfIntervalCount
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)."

::= { g9981PortPm1DayEntry 3 }

g9981PortPm1DayIntervalTxLostCells OBJECT-TYPE

SYNTAX HCPperfIntervalCount
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)."

::= { g9981PortPm1DayEntry 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 {
    g9981PortPmCur15MinValidIntervals,
    g9981PortPmCur15MinInvalidIntervals,
    g9981PortPmCur15MinTimeElapsed,
    g9981PortPmCur15MinRxLostCells,
    g9981PortPmCur15MinTxLostCells,
    g9981PortPmCur15MinUpDiffDelay,
    g9981PortPmCur15MinDnDiffDelay,
    g9981PortPmCur1DayValidIntervals,
    g9981PortPmCur1DayInvalidIntervals,
    g9981PortPmCur1DayTimeElapsed,
    g9981PortPmCur1DayRxLostCells,
    g9981PortPmCur1DayTxLostCells,
    g9981PortPmCur1DayUpDiffDelay,
    g9981PortPmCur1DayDnDiffDelay
}
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

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10. References

10.1. Normative References

- [G.998.1] ITU-T, "ATM-based multi-pair bonding", ITU-T Recommendation G.998.1, January 2005, <<http://www.itu.int/rec/T-REC-G.998.1/en>>.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.
- [RFC2578] McCloghrie, K., Ed., Perkins, D., Ed., and J. Schoenwaelder, Ed., "Structure of Management Information Version 2 (SMIv2)", STD 58, RFC 2578, April 1999.
- [RFC2579] McCloghrie, K., Ed., Perkins, D., Ed., and J. Schoenwaelder, Ed., "Textual Conventions for SMIv2", STD 58, RFC 2579, April 1999.
- [RFC2580] McCloghrie, K., Perkins, D., and J. Schoenwaelder, "Conformance Statements for SMIv2", STD 58, RFC 2580, April 1999.
- [RFC2863] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB", RFC 2863, June 2000.
- [RFC3414] Blumenthal, U. and B. Wijnen, "User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)", STD 62, RFC 3414, December 2002.

- [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.
- [RFC3826] Blumenthal, U., Maino, F., and K. McCloghrie, "The Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model", RFC 3826, June 2004.
- [RFC5591] Harrington, D. and W. Hardaker, "Transport Security Model for the Simple Network Management Protocol (SNMP)", RFC 5591, June 2009.
- [RFC5592] Harrington, D., Salowey, J., and W. Hardaker, "Secure Shell Transport Model for the Simple Network Management Protocol (SNMP)", RFC 5592, June 2009.
- [RFC6353] Hardaker, W., "Transport Layer Security (TLS) Transport Model for the Simple Network Management Protocol (SNMP)", RFC 6353, July 2011.
- [RFC6765] Beili, E. and M. Morgenstern, "xDSL Multi-Pair Bonding (G.Bond) MIB", RFC 6765, February 2013.
- [TR-159] Beili, E. and M. Morgenstern, "Management Framework for xDSL Bonding", Broadband Forum Technical Report TR-159, December 2008, <<http://www.broadband-forum.org/technical/download/TR-159.pdf>>.

10.2. Informative References

- [ADSLMIB] IETF, "ADSL MIB (adslmib) Charter", <<http://datatracker.ietf.org/wg/adslmib/charter/>>.
- [AF-PHY-0086] ATM Forum, "Inverse Multiplexing for ATM (IMA) Specification Version 1.1", ATM Forum specification af-phy-0086.001, March 1999, <<http://www.broadband-forum.org/ftp/pub/approved-specs/af-phy-0086.001.pdf>>.
- [RFC2515] Tesink, K., "Definitions of Managed Objects for ATM Management", RFC 2515, February 1999.
- [RFC3410] Case, J., Mundy, R., Partain, D., and B. Stewart, "Introduction and Applicability Statements for Internet-Standard Management Framework", RFC 3410, December 2002.

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

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

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