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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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Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at http://www.rfc-editor.org/info/rfc6768.

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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]:

- g9981PortNotifications - containing notifications (Up/Downstream Differential Delay Tolerance Exceeded).
- g9981PortConfTable - containing objects for configuration of a G.Bond/ATM port.
- 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.
- 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
aIMADiffDelayToleranceExcedEnable	g9981PortConfDiffDelayToleranceExcededEnable
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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      (http://trustee.ietf.org/license-info)."

     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
        aIMAUpDiffDelayTolerance."
      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   HCPerfValidIntervals,
      g9981PortPmCur15MinInvalidIntervals HCPerfInvalidIntervals,
      g9981PortPmCur15MinTimeElapsed      HCPerfTimeElapsed,
      g9981PortPmCur15MinRxLostCells      HCPerfCurrentCount,
      g9981PortPmCur15MinTxLostCells      HCPerfCurrentCount,
      g9981PortPmCur15MinUpDiffDelay      HCPerfCurrentCount,
      g9981PortPmCur15MinDnDiffDelay      HCPerfCurrentCount,
      g9981PortPmCur1DayValidIntervals    Unsigned32,
      g9981PortPmCur1DayInvalidIntervals  Unsigned32,
      g9981PortPmCur1DayTimeElapsed       HCPerfTimeElapsed,
      g9981PortPmCur1DayRxLostCells       HCPerfCurrentCount,
      g9981PortPmCur1DayTxLostCells       HCPerfCurrentCount,
      g9981PortPmCur1DayUpDiffDelay       HCPerfCurrentCount,
      g9981PortPmCur1DayDnDiffDelay       HCPerfCurrentCount
    }

  g9981PortPmCur15MinValidIntervals  OBJECT-TYPE
    SYNTAX      HCPerfValidIntervals
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "A read-only number of 15-minute intervals for which the
      performance data was collected.  The value of this object will
      be 96 or the maximum number of 15-minute history intervals
      collected by the implementation, unless the measurement was
      (re)started recently, in which case the value will be the
      number of complete 15-minute intervals for which there are at
      least some data.
```

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

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

  g9981PortPmCur15MinRxLostCells  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}

  g9981PortPmCur15MinDnDiffDelay  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}

  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 }

  g9981PortPmCur1DayRxLostCells  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      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 }

   g9981PortPmCur1DayDnDiffDelay  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"
    ::= { 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

   g9981PortPm1DayTable OBJECT-TYPE
     SYNTAX      SEQUENCE OF G9981PortPm1DayEntry
     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 }

   g9981PortPm1DayEntry OBJECT-TYPE
     SYNTAX      G9981PortPm1DayEntry
     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 g9981PortPm1DayIntervalIndex."
     INDEX  { ifIndex, g9981PortPm1DayIntervalIndex }
     ::= { g9981PortPm1DayTable 1 }

   G9981PortPm1DayEntry ::=
     SEQUENCE {
       g9981PortPm1DayIntervalIndex        Unsigned32,
       g9981PortPm1DayIntervalMoniTime     HCPerfTimeElapsed,
       g9981PortPm1DayIntervalRxLostCells  HCPerfIntervalCount,
       g9981PortPm1DayIntervalTxLostCells  HCPerfIntervalCount,
       g9981PortPm1DayIntervalUpDiffDelay  HCPerfIntervalCount,
       g9981PortPm1DayIntervalDnDiffDelay  HCPerfIntervalCount,
       g9981PortPm1DayIntervalValid        TruthValue
     }

   g9981PortPm1DayIntervalIndex  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      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"
    ::= { g9981PortPm1DayEntry 2 }

  g9981PortPm1DayIntervalRxLostCells  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)."
    ::= { g9981PortPm1DayEntry 3 }

  g9981PortPm1DayIntervalTxLostCells  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)."
    ::= { g9981PortPm1DayEntry 4 }
```

```
   g9981PortPm1DayIntervalUpDiffDelay  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)."
     ::= { g9981PortPm1DayEntry 5 }

   g9981PortPm1DayIntervalDnDiffDelay  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)."
     ::= { g9981PortPm1DayEntry 6 }

   g9981PortPm1DayIntervalValid  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"
     ::= { g9981PortPm1DayEntry 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:

- 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.

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