Managed Objects for ATM over Packet Switched Networks (PSNs)

Abstract

   This memo defines a portion of the Management Information Base (MIB)
   for use with network management protocols in the Internet community.
   In particular, it describes managed objects for modeling ATM
   Pseudowire (PW) carrying ATM cells over Packet Switched Networks
   (PSNs).

Status of This Memo

   This document specifies an Internet standards track protocol for the
   Internet community, and requests discussion and suggestions for
   improvements. Please refer to the current edition of the "Internet
   Official Protocol Standards" (STD 1) for the standardization state
   and status of this protocol. Distribution of this memo is unlimited.

Table of Contents

1. Introduction

    This document describes a model for managing "emulated" ATM services
    over a Packet Switched Network (PSN).

    The document follows the requirements for Pseudowire Emulation Edge-
    to-Edge [PWREQ]; it is closely related to [ATMENCAP] and [ATMTRANS],
    which describe the encapsulation of ATM signals and provide the
    Emulation Service over a Packet Switched Network.

    The ATM management model consists of several MIB modules, following
    the layering model described in the PWE3 Architecture [PWARCH]
    document. The ATM MIB module described in this document works
    closely with the MIB modules described in [AToMTC], [AToM], [IFMIB],
    [PWMIB], and the textual conventions defined in [PWTC]. The
    conceptual layering and relationship among all of those is described
    in Figure 1 and in the "Relation to Other PW-MIB Modules" section
    listed below. An ATM connection will be a pseudowire (PW)
    connection. It will not be treated as an interface and will
    therefore not be represented in the ifTable.

Figure 1: Conceptual Layering

```
                    +-------------------+
                    |      ATM MIB      |   ATM-TC-MIB,
                    +-------------------+   ATMMIB
                              |
                    +-------------------+
       Service      |     ATM PW MIB    |   PW-ATM-MIB
        Layer       +-------------------+

   - - - - - - - - - - - | - - - - - - - - - - - - - - - -
       Generic      +-------------------+
         PW         |  Generic PW MIBS  |   PW-TC-MIB,
        Layer       +-------------------+   PW-STD-MIB
   - - - - - - - - - - - -| - - - - - - - - - - - - - - - -
                    +-------------------+
       PSN VC       |   MPLS VC MIBS    |   PW-MPLS-MIB
        Layer       +-------------------+
   - - - - - - - - - - - -| - - - - - - - - - - - - - - - -
                    +-------------------+
        PSN         |     MPLS MIBs     |   MPLS-TE-STD-MIB,
       Layer        +-------------------+   MPLS-LSR-STD-MIB
```
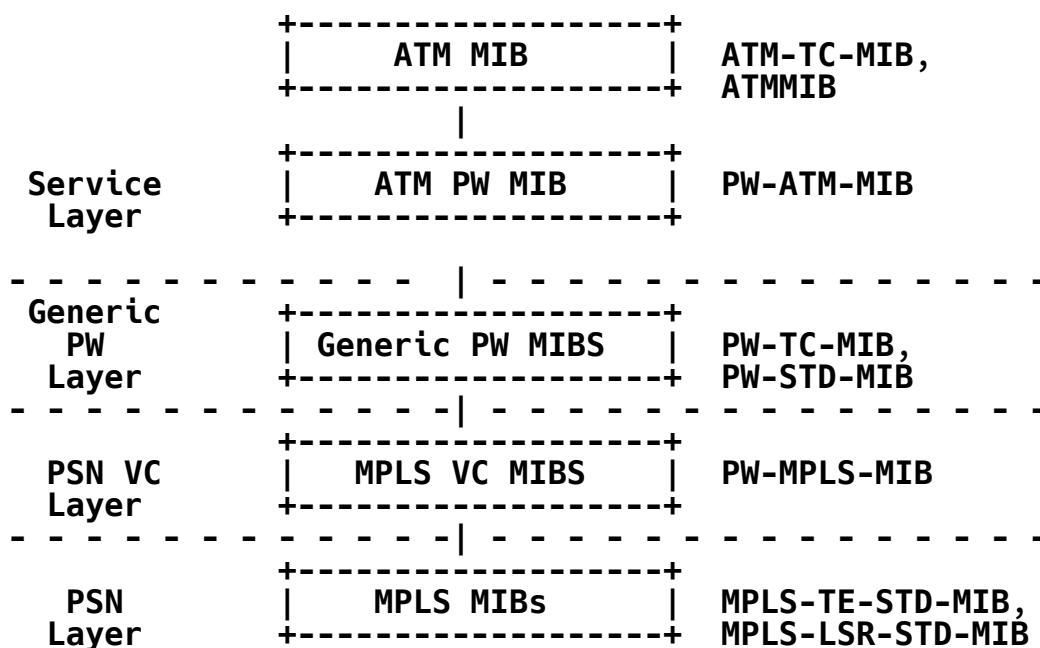
Figure 1

2.   Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
"SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this
document are to be interpreted as described in RFC 2119 [BCP14].

3. Terminology

This document follows the terminology used in PW Architecture
[PWARCH].

PSN-bound   References the traffic direction where an ATM Cell
                      is received, adapted to the packet, assigned a PW
                      label, and sent into the PSN. Within the MIB
                      objects, it is called outbound.

CE-bound   The direction where packets are received
                  from the PSN, cells are reconstructed from the
                  packet payloads, and are sent into the ATM network
                  as cells. Within the MIB objects, it is called
                  inbound.

Adaptation   Refers to the method of adapting a "foreign"
                  communications protocol such that it can be
                  carried by a packet switched net (the PSN). For
                  example, in an ATM service, the foreign protocol
                  is ATM. The PSN may be MPLS.

PSN   Packet Switched Network.

PSN Tunnel   A general term indicating a virtual connection
                  between the two PW edge devices. In practice,
                  this connection is not limited to path-oriented
                  types of PSNs such as MPLS. An example of a non-
                  path-oriented PSN is an IP PSN.

4. 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].

5. Overview

   This MIB module is designed to satisfy the following requirements and
   constraints:

   o Fit within the architecture defined by [PWARCH] and [PWMIB].

   o Fit within the model for Virtual Path/Virtual Circuit (VP/VC)
      definitions and management concept as defined in the [AToM] MIB.

   o Support manually configured ATM PWs.

o Support automatically configured ATM PWs.

o Enable the use of any PSN type.

o Support point-to-point ATM PW connections. Point-to-multipoint
   and multipoint-to-point connections are for future study.

o Allow configuration of all the parameters needed to establish a PW
   to carry ATM cells.

o Report ATM performance metrics for the ATM PW. This includes
   cells transmit, Cells dropped, Cells received, and unknownCells.
   In addition, it reports performance metrics at packet level.

o Support ATM Operations, Administration, and Management (OAM)
   cells.

o Do not consider Integrated Local Management Interface (ILMI)
   support.

6. Relation to Other PW-MIB Modules

The MIB structure for defining a PW service is composed of three
layers of MIB modules functioning together. This general model is
defined in the PWE3 Architecture [PWARCH]. The layering model is
intended to sufficiently isolate PW services from the underlying PSN
layer that carries the emulated service. This is done at the same
time as providing a standard means for connecting any supported
services to any supported PSNs.

The first layer, known as the service layer, contains service-
specific modules such as the one defined in this document. These
modules define service-specific management objects that interface or
collaborate with existing MIB modules for the native version of the
service. The service-specific module "glues" the standard module to
the PWE MIB framework.

The next layer of the PWE MIB framework is comprised of the PW-MIB
module [PWMIB]. This module is used to configure general parameters
of PW connections that are common to all types of emulated services
and PSNs. This layer is connected to the service-specific layer
above, and the PSN layer below.

The PSN layer provides PSN-specific modules for each type of PSN.
These modules associate the PW with one or more "tunnels" that carry
the service over the PSN. These modules are defined in other
documents. This module is used to "glue" the PW service to the

underlying PSN-specific MIB modules. In the case of MPLS, for
example, the PW-MPLS MIB [PWMPLSMIB] is used to connect the PW
service to either the MPLS-LDP [LDPMIB] or MPLS-TE [TEMIB] MIBs.

[PWTC] defines some of the object types used in these modules.

7. ATM-PW MIB Usage

This section provides an example of using the MIB objects described
in section 9 to set up an ATM PW. While this example is not meant to
illustrate every permutation of the MIB, it is intended as an aid in
the understanding of some key concepts. It is meant to be read after
going through the MIB itself. See [PWMIB] for an example of setting
up a PSN Tunnel.

The following example illustrates how a user will set up an ATM
Adaptation Layer 5 (AAL5) ATM PW on a switch/router with cells
entering the switch/router through ATM Interface with IfIndex 1000
[IFMIB], Virtual Path Identifier (VPI) 1 and Virtual Circuit
Identifier (VCI) 100 (from an ATM network to a PSN -- outbound
direction) and on the way back, it goes out of the switch/router
through ATM Interface 1000 with VPI 1 and VCI 100 (PSN to ATM network
-- inbound direction).

First create an entry in the PW MIB with pwType atmAal5SduVcc(2),
then create entries in the pwAtmCfg table, inbound and outbound
tables.

```
      In PW ATM MIB
      In pwAtmCfgTable:

      pwAtmCfgMaxCellConcatenation 29
      pwAtmCfgTimeoutMode enabled(3)
      pwAtmClpQosMapping false(0) --CLP will not be mapped to QoS
      pwAtmOamCellSupported true(1)  --OAM cells will be supported

      In pwAtmOutboundTable:
      {
       pwAtmOutboundAtmIf              1000     --Outbound AtmIf
       pwAtmOutboundVpi               1        --Outbound VPI
       pwAtmOutboundVci               100      --Outbound VCI
       pwAtmOutboundTrafficParamDescr 0.0      --Best Effort
       pwAtmOutboundRowStatus         createAndGo
      }

      In pwAtmInboundTable
      {
       pwAtmInboundAtmIf              1000 --Inbound AtmIf
       pwAtmInboundVpi               1    --Inbound VPI
       pwAtmInboundVci               100  --Inbound VCI
       pwAtmInboundTrafficParamDescr 0.0  --Best Effort
       pwAtmInboundRowStatus         createAndGo
      }
```

8. Structure of the MIB Module

   This MIB consists of 4 types of tables;

   It is important to note that the TrafficParamDescr Table is not
   defined as part of this MIB, although an object pointing to such a
   table entry exists in all configuration tables of this MIB module.
   Users can refer to any ATM TrafficDescr (TD) Table if there is a need
   to overwrite the TD assigned to the ATM endpoint in the ATM service
   MIB [AToM].

   o PW ATM Cfg Table: A table for generic parameters for ATM PW
      configuration that is applicable for each ATM PW.

   o PW ATM Outbound Table: There are two tables to configure an
      outbound ATM PW depending on the type of service. One table for
      1:1 service, and the other for N:1 service and transparent cell
      mode [ATMTRANS].

    o PW ATM Inbound Table: There are two tables to configure an inbound
       ATM PW depending on the type of service. One table for 1:1
       service, and the other for N:1 service and transparent cell mode.

    o PW ATM Perf Table: There are three tables; each contains the
       relevant time-dependent statistics for an ATM PW Entry. There is
       a current table, a 15-minute interval table, and a one-day
       interval table. The tables are aligned with statistic models of
       other PW services.

9.   Object Definition

PW-ATM-MIB DEFINITIONS ::= BEGIN

    IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE,
    Counter32, Unsigned32, mib-2
          FROM SNMPv2-SMI

    MODULE-COMPLIANCE, OBJECT-GROUP
          FROM SNMPv2-CONF

    TruthValue, RowStatus, RowPointer
          FROM SNMPv2-TC

    PerfCurrentCount, PerfIntervalCount
          FROM PerfHist-TC-MIB

    InterfaceIndex
          FROM IF-MIB

    pwIndex
          FROM PW-STD-MIB

    AtmVpIdentifier, AtmVcIdentifier
          FROM ATM-TC-MIB;

       pwAtmMIB MODULE-IDENTITY
       LAST-UPDATED "200906160000Z" -- 16 June 2009
       ORGANIZATION "Pseudowire Emulation Edge-to-Edge (PWE3)
                      Working Group"
       CONTACT-INFO
           "Thomas D. Nadeau
            Postal: BT
                    BT Centre
                    81 Newgate Street
                    London   EC1A 7AJ
                    United Kingdom

          Email: tom.nadeau@bt.com

          Orly Nicklass
          Postal: RADVISION Ltd.
                  24 Raul Wallenberg
                  Tel Aviv, Israel
          Email: orlyn@radvision.com

          Discussion and general questions should be posed to
          the PWE3 Working Group (pwe3@ietf.org)."

     DESCRIPTION
          "This MIB contains managed object definitions for
          pseudowire emulation of ATM over Packet Switched
          Networks (PSNs).

          This MIB supplements the PW-STD-MIB module.
          The PW-STD-MIB contains structures and MIB associations
          generic to pseudowire (PW) emulation. PW-specific
          MIBs (such as this) contain config and stats for specific
          PW types.

        -- Revision history.

        REVISION "200906160000Z" -- 16 June 2009
        DESCRIPTION "Initial version published as RFC 5605."

            ::= { mib-2 183 }

    -- Top-level components of this MIB

    pwAtmNotifications OBJECT IDENTIFIER ::= { pwAtmMIB 0 }
    pwAtmObjects   OBJECT IDENTIFIER ::= { pwAtmMIB 1 }
    pwAtmConformance   OBJECT IDENTIFIER ::= { pwAtmMIB 2 }

-- ATM PW PSN Bound(Outbound) Table for 1 to 1 connection

pwAtmOutboundTable OBJECT-TYPE
    SYNTAX   SEQUENCE OF PwAtmOutboundEntry
    MAX-ACCESS   not-accessible
    STATUS   current
    DESCRIPTION
        "This table specifies the information for an ATM PW to
        be carried over the PSN in the outbound direction. An
        entry is created in this table for every entry in
        the pwTable with a pwType equal to one of the following:
        atmAal5SduVcc(2), atmCell1to1Vcc(12), atmCell1to1Vpc(13)
        or atmAal5PduVcc(14), or atmTransparent(3)."
    ::= { pwAtmObjects 1 }

pwAtmOutboundEntry OBJECT-TYPE
    SYNTAX   PwAtmOutboundEntry
    MAX-ACCESS   not-accessible
    STATUS   current
    DESCRIPTION
        "A row in this table represents an ATM PW that needs to be
         adapted and carried over the PSN. This table is indexed by

```
        pwIndex from pwTable.  Unless otherwise specified, all
        writeable objects in this table MUST NOT be changed after
        row activation in the generic pwTable, and values must
        persist after reboot."
    REFERENCE
      "See [PWMIB]."

    INDEX { pwIndex }
    ::= { pwAtmOutboundTable 1 }

PwAtmOutboundEntry ::= SEQUENCE {
    pwAtmOutboundAtmIf               InterfaceIndex,
    pwAtmOutboundVpi                 AtmVpIdentifier,
    pwAtmOutboundVci                 AtmVcIdentifier,
    pwAtmOutboundTrafficParamDescr   RowPointer,
    pwAtmOutboundRowStatus           RowStatus
    }

pwAtmOutboundAtmIf OBJECT-TYPE
    SYNTAX          InterfaceIndex
    MAX-ACCESS      read-create
    STATUS          current
    DESCRIPTION
        "The ATM Interface that receives cells from the ATM
        network."
    ::= { pwAtmOutboundEntry 1 }

pwAtmOutboundVpi OBJECT-TYPE
    SYNTAX          AtmVpIdentifier
    MAX-ACCESS      read-create
    STATUS          current
    DESCRIPTION
        "VPI value of this ATM PW.  The value may indicate the
        translated value when egress generates new VPI."
    ::= { pwAtmOutboundEntry 2 }

pwAtmOutboundVci OBJECT-TYPE
    SYNTAX          AtmVcIdentifier
    MAX-ACCESS      read-create
    STATUS          current
    DESCRIPTION
        "VCI value of this ATM PW.  The value may indicate the
        translated value when egress generates new VCI."
    ::= { pwAtmOutboundEntry 3 }

pwAtmOutboundTrafficParamDescr OBJECT-TYPE
    SYNTAX          RowPointer
    MAX-ACCESS      read-create
```

```
        STATUS          current
        DESCRIPTION
            "This object represents a pointer to an ATM
             traffic-parameter-specific row in either a private or
             standard table that will be employed while receiving
             cells from the ATM network.  This row should contain a
             set of self-consistent ATM traffic parameters including
             the ATM traffic service category.
             A value of 0.0 indicates Best Effort."
        ::= { pwAtmOutboundEntry 4 }

pwAtmOutboundRowStatus OBJECT-TYPE
        SYNTAX          RowStatus
        MAX-ACCESS      read-create
        STATUS          current
        DESCRIPTION
            "This object is used to create, modify, or delete a row in
             this table.  Unless otherwise specified, all writeable
             objects in this table MUST NOT be changed after row
             activation as explained in the pwAtmOutboundEntry. "
        ::= { pwAtmOutboundEntry 5 }

-- End of ATM PW Outbound Table

-- ATM PW CE Bound(Inbound) Table for 1 to 1 mode

pwAtmInboundTable OBJECT-TYPE
        SYNTAX     SEQUENCE OF PwAtmInboundEntry
        MAX-ACCESS          not-accessible
        STATUS              current
        DESCRIPTION
            "This table specifies the information for an ATM PW in the
             inbound direction."
        ::= { pwAtmObjects 3 }

pwAtmInboundEntry OBJECT-TYPE
        SYNTAX     PwAtmInboundEntry
        MAX-ACCESS    not-accessible
        STATUS          current
        DESCRIPTION
            "A row in this table represents an ATM PW that needs to be
             sent into the ATM network after reconstructing cells from
             packets received from a PSN.  This table is indexed by
             pwIndex from pwTable.  An entry is created in this table
             for every entry in the pwTable with a
             pwType equal to one of the following:
             atmAal5SduVcc(2), atmCell1to1Vcc(12), atmCell1to1Vpc(13),
             atmAal5PduVcc(14), or atmTransparent(3).  Unless otherwise
```

          specified, all writeable objects in this table MUST NOT
          be changed after row activation in the generic pwTable,
          and values must persist after reboot."
     REFERENCE
       "See [PWMIB]."

     INDEX { pwIndex }
     ::= { pwAtmInboundTable 1 }

PwAtmInboundEntry ::= SEQUENCE {
      pwAtmInboundAtmIf   InterfaceIndex,
      pwAtmInboundVpi   AtmVpIdentifier,
      pwAtmInboundVci   AtmVcIdentifier,
      pwAtmInboundTrafficParamDescr   RowPointer,
      pwAtmInboundRowStatus   RowStatus
          }

pwAtmInboundAtmIf OBJECT-TYPE
     SYNTAX   InterfaceIndex
     MAX-ACCESS   read-create
     STATUS   current
     DESCRIPTION
         "The ATM Interface that sends cells into the ATM network
         after reconstructing cells from packets received from
         a PSN."
     ::= { pwAtmInboundEntry 1 }

pwAtmInboundVpi OBJECT-TYPE
     SYNTAX   AtmVpIdentifier
     MAX-ACCESS   read-create
     STATUS   current
     DESCRIPTION
         "VPI value of this ATM PW.
          If the pwType is atmTransparent, then the value will
          be set to zero."
         ::= { pwAtmInboundEntry 2 }

pwAtmInboundVci OBJECT-TYPE
     SYNTAX   AtmVcIdentifier
     MAX-ACCESS   read-create
     STATUS   current
     DESCRIPTION
         "VCI value of this ATM PW.
          If the pwType is atmTransparent, atmCell1to1Vpc, or
          atmCellNto1Vpc, then the value will be set to zero."
         ::= { pwAtmInboundEntry 3 }

pwAtmInboundTrafficParamDescr OBJECT-TYPE

```
     SYNTAX          RowPointer
     MAX-ACCESS      read-create
     STATUS          current
     DESCRIPTION
         "This object represents a pointer to an ATM traffic-parameter-
          specific row in either a private or standard table that will
          be employed while transmitting into the ATM network.  This
          table contains a set of self-consistent ATM traffic parameters
          including the ATM traffic service category.  A value of 0.0
          indicates Best Effort."

         ::= { pwAtmInboundEntry 4 }

pwAtmInboundRowStatus OBJECT-TYPE
     SYNTAX          RowStatus
     MAX-ACCESS      read-create
     STATUS          current
         DESCRIPTION
         "This object is used to create, modify, or delete a row in
          this table.  Unless otherwise specified, all writeable
          objects in this table MUST NOT be changed after row
          activation as explained in the pwAtmInboundEntry. "
         ::= { pwAtmInboundEntry 5 }

-- End of ATM PW Inbound Table

--Generic ATM PW table for all types of ATM PW connection.

pwAtmCfgTable OBJECT-TYPE
     SYNTAX     SEQUENCE OF PwAtmCfgEntry
     MAX-ACCESS      not-accessible
     STATUS          current
     DESCRIPTION
         "This table specifies generic information for an ATM PW
          to be carried over PSN in any mode."
     ::= { pwAtmObjects 5 }

     pwAtmCfgEntry OBJECT-TYPE
     SYNTAX          PwAtmCfgEntry
     MAX-ACCESS      not-accessible
     STATUS          current
     DESCRIPTION
         "This table contains a set of parameters for
          the ATM PW that needs to be adapted and carried
          over the PSN.  This table is indexed by pwIndex from
          pwTable.  An entry is created for every new ATM
          type associated pwIndex in the pwTable.  Unless
          otherwise specified, all read-write objects in
```

                 this table MAY be changed when the PW is defined
                 as not active, and all RW objects values must
                 persist after reboot."
          REFERENCE
            "See [PWMIB]."

          INDEX { pwIndex }
          ::= { pwAtmCfgTable 1 }

     PwAtmCfgEntry ::= SEQUENCE {
             pwAtmCfgMaxCellConcatenation   Unsigned32,
             pwAtmCfgFarEndMaxCellConcatenation Unsigned32,
             pwAtmCfgTimeoutMode   INTEGER,
             pwAtmClpQosMapping   TruthValue
                     }

     pwAtmCfgMaxCellConcatenation OBJECT-TYPE
             SYNTAX   Unsigned32 (1..29)
             MAX-ACCESS   read-write
             STATUS   current
             DESCRIPTION
                 "The maximum number of ATM cells that can be
                  concatenated into one PW packet towards the PSN.
                  In a non-LDP or other signaling protocol environment,
                  this object MAY be changed at anytime, but traffic
                  might be interrupted; otherwise, it may be changed
                  when PW is not active."
          ::= { pwAtmCfgEntry 1 }

     pwAtmCfgFarEndMaxCellConcatenation OBJECT-TYPE
             SYNTAX   Unsigned32 (1..29)
             MAX-ACCESS   read-write
             STATUS   current
             DESCRIPTION
                 "The maximum number of ATM cells that can be
                  concatenated into one PW packet towards PSN as reported by
                  the far end. If there is no LDP in use, the object will
                  either return a value of 0 or allow setting it for calculating
                  protocol overhead."
          ::= { pwAtmCfgEntry 2 }

     pwAtmCfgTimeoutMode OBJECT-TYPE
             SYNTAX   INTEGER
                                 {
                                  notApplicable (1),
                                  disabled   (2),
                                  enabled   (3)
                                 }

```
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
            "This object determines whether or not a packet can be
             transmitted to the PSN based on timeout expiration
             for collecting cells.  The actual handling of the
             timeout is implementation-specific; as such,
             this object may be changed at any time under proper
             consideration of the traffic interruption effect."
        ::= { pwAtmCfgEntry 3 }

pwAtmClpQosMapping OBJECT-TYPE
        SYNTAX          TruthValue
        MAX-ACCESS      read-write
        STATUS          current
        DESCRIPTION
            "This object indicates whether the Cell Loss Priority
             (CLP) bits should be considered when setting the
             value in the Quality-of-Service fields of the
             encapsulating protocol (e.g., EXP fields of the
             MPLS Label Stack).  Selecting True allows the drop
             precedence to be preserved across the PSN.  In
             transparent cell transport, the value of this object
             MUST be false(2); in other cases, it can be changed
             at any time."
        REFERENCE
          "See section 12 of [ATMENCAP]."
        ::= { pwAtmCfgEntry 4 }

-- Device capable of implementing N:1, 1:1, and transparent cell
-- mode assumes to support the N:1 table for all
-- modes with respective applicable setting.
-- In such implementation, user can create an entry for either
-- 1:1 or transparent cell transport modes only
-- in pwAtmInboundNto1Table. The side effect of such
-- will be an automatic create of the respective line in the
-- pwAtmOutboundNto1Table.

-- ATM PW Outbound Table for N to 1 connection

pwAtmOutboundNto1Table OBJECT-TYPE
        SYNTAX      SEQUENCE OF PwAtmOutboundNto1Entry
        MAX-ACCESS          not-accessible
        STATUS              current
        DESCRIPTION
            "This table specifies the information for an ATM PW to
             be carried over the PSN in the outbound direction.  Up to
             N entries can be created in this table for every
```

         entry in the pwTable with a pwType equal to:
         atmCellNto1Vcc(9) or atmCellNto1Vpc(10).
         An entry can be created only when the VP/VC are known.
         A single entry will be created in this table for every
         entry in the pwTable with a pwType equal to
         one of the following: atmCell1to1Vcc(12),
         atmCell1to1Vpc(13), atmAal5PduVcc(14),
         atmAal5SduVcc(2), or atmTransparent(3).
         "
    ::= { pwAtmObjects 6 }

pwAtmOutboundNto1Entry OBJECT-TYPE
    SYNTAX   PwAtmOutboundNto1Entry
    MAX-ACCESS   not-accessible
    STATUS   current
    DESCRIPTION
        "A row in this table represents an ATM PW that needs to be
         adapted and carried over PSN. This table is indexed by
         pwIndex from pwTable and the ATM interface with VPL/VCLs.
         In atmTransparent(3), Vpi and VCi will be 0xFFFF
         during set operation.
         Unless otherwise specified, all read-create objects in this
         table MUST NOT be changed after row activation
         and SHOULD remain unchanged after reboot."
    INDEX { pwIndex, pwAtmOutboundNto1AtmIf ,
                     pwAtmOutboundNto1Vpi,
                     pwAtmOutboundNto1Vci }
    ::= { pwAtmOutboundNto1Table 1 }

PwAtmOutboundNto1Entry ::= SEQUENCE {
    pwAtmOutboundNto1AtmIf   InterfaceIndex,
    pwAtmOutboundNto1Vpi   AtmVpIdentifier,
    pwAtmOutboundNto1Vci   AtmVcIdentifier,
    pwAtmOutboundNto1RowStatus   RowStatus,
    pwAtmOutboundNto1TrafficParamDescr   RowPointer,
    pwAtmOutboundNto1MappedVpi   AtmVpIdentifier,
    pwAtmOutboundNto1MappedVci   AtmVcIdentifier
   }

pwAtmOutboundNto1AtmIf OBJECT-TYPE
    SYNTAX   InterfaceIndex
    MAX-ACCESS   not-accessible
    STATUS   current
    DESCRIPTION
        "The ATM Interface that receives cells from the ATM network."
    ::= { pwAtmOutboundNto1Entry 1 }

pwAtmOutboundNto1Vpi OBJECT-TYPE

```
        SYNTAX          AtmVpIdentifier
        MAX-ACCESS      not-accessible
        STATUS          current
        DESCRIPTION
            "VPI value of this ATM PW.  In atmTransparent(3),
             Vpi will be the equivalent of 0xFFFF."
        ::= { pwAtmOutboundNto1Entry 2 }

    pwAtmOutboundNto1Vci OBJECT-TYPE
        SYNTAX          AtmVcIdentifier
        MAX-ACCESS      not-accessible
        STATUS          current
        DESCRIPTION
            "VCI value of this ATM PW.  In atmTransparent(3), or
             the VP case, the value will be the equivalent of
             0xFFFF."
        ::= { pwAtmOutboundNto1Entry 3 }

    pwAtmOutboundNto1RowStatus OBJECT-TYPE
        SYNTAX          RowStatus
        MAX-ACCESS      read-create
        STATUS          current
        DESCRIPTION
            "This object is used to create, modify or delete a row in
             this table."
        ::= { pwAtmOutboundNto1Entry 4 }

    pwAtmOutboundNto1TrafficParamDescr OBJECT-TYPE
        SYNTAX          RowPointer
        MAX-ACCESS      read-create
        STATUS          current
        DESCRIPTION
            "This object represents a pointer to an ATM traffic-parameter-
             specific row in either private or standard table that will
             be employed while receiving cells from the ATM network.
             This table should contain a set
             of self-consistent ATM traffic parameters including the ATM
             traffic service category.  A value of 0.0 indicates Best
             Effort."

        ::= { pwAtmOutboundNto1Entry 5 }

    pwAtmOutboundNto1MappedVpi          OBJECT-TYPE
        SYNTAX          AtmVpIdentifier
        MAX-ACCESS      read-create
        STATUS          current
        DESCRIPTION
            "The egress-generated VPI value of this ATM PW.  The
```

                entry is valid for PW type of atmCellNto1Vcc(9),
                atmCellNto1Vpc(10), atmCell1to1Vcc(12), or
                atmCell1to1Vpc(13). In other types, the value will be the
                equivalent of 0xFFFF. Value MAY be changed when the
                PW is defined as not active. "
        ::= { pwAtmOutboundNto1Entry 6 }

pwAtmOutboundNto1MappedVci   OBJECT-TYPE
        SYNTAX   AtmVcIdentifier
        MAX-ACCESS   read-create
        STATUS   current
        DESCRIPTION
                "The egress-generated VCI value of this ATM PW. The
                entry is valid for PW type of atmCellNto1Vcc(9),
                atmCellNto1Vpc(10), atmCell1to1Vcc(12), or
                atmCell1to1Vpc(13. In the VP case or other types, the
                value will be the equivalent of 0xFFFF.
                Value MAY be changed when the PW is defined
                as not active."
        ::= { pwAtmOutboundNto1Entry 7 }

-- ATM PW Inbound Table for N to 1 connection

pwAtmInboundNto1Table OBJECT-TYPE
        SYNTAX   SEQUENCE OF PwAtmInboundNto1Entry
        MAX-ACCESS   not-accessible
        STATUS   current
        DESCRIPTION
                "This table specifies the information for an ATM PW to
                be carried over PSN in the Inbound direction. Up to
                N entries can be created in this table for every
                entry in the pwTable with a pwType equal to:
                atmCellNto1Vcc(9) or atmCellNto1Vpc(10).
                An entry can be created only when the VP/VC are known.
                A single entry will be created in this table for every
                entry in the pwTable with a pwType equal to
                one of the following: atmCell1to1Vcc(12),
                atmCell1to1Vpc(13), atmAal5PduVcc(14),
                atmAal5SduVcc(2), or atmTransparent(3)."
        ::= { pwAtmObjects 7 }

pwAtmInboundNto1Entry OBJECT-TYPE
        SYNTAX   PwAtmInboundNto1Entry
        MAX-ACCESS   not-accessible
        STATUS   current
        DESCRIPTION
                "A row in this table represents an ATM PW that needs to be
                 adapted and carried over PSN. This table is indexed by

```
         pwIndex from pwTable and the ATM interface with VPL/VCLs.
         In atmTransparent(3), Vpi and VCi will be 0xFFFF
         during set operation.
         Unless otherwise specified, all Read-Create objects in this
         table MUST NOT be changed after row activation
         and SHOULD remain unchanged after reboot."
     INDEX { pwIndex, pwAtmInboundNto1AtmIf ,
                       pwAtmInboundNto1Vpi,
                       pwAtmInboundNto1Vci
                       }
     ::= { pwAtmInboundNto1Table 1 }

PwAtmInboundNto1Entry ::= SEQUENCE {
     pwAtmInboundNto1AtmIf               InterfaceIndex,
     pwAtmInboundNto1Vpi                 AtmVpIdentifier,
     pwAtmInboundNto1Vci                 AtmVcIdentifier,
     pwAtmInboundNto1RowStatus           RowStatus,
     pwAtmInboundNto1TrafficParamDescr   RowPointer,
     pwAtmInboundNto1MappedVpi           AtmVpIdentifier,
     pwAtmInboundNto1MappedVci           AtmVcIdentifier
     }

pwAtmInboundNto1AtmIf OBJECT-TYPE
     SYNTAX          InterfaceIndex
     MAX-ACCESS      not-accessible
     STATUS          current
     DESCRIPTION
         "The ATM Interface that receives cells from the ATM network."
     ::= { pwAtmInboundNto1Entry 1 }

pwAtmInboundNto1Vpi OBJECT-TYPE
     SYNTAX          AtmVpIdentifier
     MAX-ACCESS      not-accessible
     STATUS          current
     DESCRIPTION
         "VPI value of this ATM PW.  In atmTransparent(3),
         Vpi will be the equivalent of 0xFFFF."
     ::= { pwAtmInboundNto1Entry 2 }

pwAtmInboundNto1Vci OBJECT-TYPE
     SYNTAX          AtmVcIdentifier
     MAX-ACCESS      not-accessible
     STATUS          current
     DESCRIPTION
         "VCI value of this ATM PW.  In atmTransparent(3), or
         the VP case, the value will be the equivalent of
         0xFFFF."
     ::= { pwAtmInboundNto1Entry 3 }
```

pwAtmInboundNto1RowStatus OBJECT-TYPE
     SYNTAX   RowStatus
     MAX-ACCESS   read-create
     STATUS   current
     DESCRIPTION
         "This object is used to create, modify, or delete a row in
         this table."
     ::= { pwAtmInboundNto1Entry 4 }

pwAtmInboundNto1TrafficParamDescr OBJECT-TYPE
     SYNTAX   RowPointer
     MAX-ACCESS   read-create
     STATUS   current
     DESCRIPTION
         "This object represents a pointer to an ATM traffic-parameter-
          specific row in either a private or standard table that will
          be employed while receiving cells from the ATM network.
          This table should contain a set
          of self-consistent ATM traffic parameters including the ATM
          traffic service category. A value of 0.0 indicates Best
          Effort."

     ::= { pwAtmInboundNto1Entry 5 }

pwAtmInboundNto1MappedVpi   OBJECT-TYPE
     SYNTAX   AtmVpIdentifier
     MAX-ACCESS   read-create
     STATUS   current
     DESCRIPTION
         "The generated VPI value of this ATM PW. The
         entry is valid for PW type of atmCellNto1Vcc(9),
         atmCellNto1Vpc(10), atmCell1to1Vcc(12), or
         atmCell1to1Vpc(13). In other types, the value will be the
         equivalent of 0xFFFF. Value MAY be changed when the
         PW is defined as not active."
     ::= { pwAtmInboundNto1Entry 6 }

pwAtmInboundNto1MappedVci   OBJECT-TYPE
     SYNTAX   AtmVcIdentifier
     MAX-ACCESS   read-create
     STATUS   current
     DESCRIPTION
         "The generated VCI value of this ATM PW. The
         entry is valid for PW type of atmCellNto1Vcc(9),
         atmCellNto1Vpc(10), atmCell1to1Vcc(12), or
         atmCell1to1Vpc(13. In the VP case or other types, the
         value will be the equivalent of 0xFFFF.
         Value MAY be changed when the

```
         PW is defined as not active."
    ::= { pwAtmInboundNto1Entry 7 }

-- ATM PW Outbound Perf Table

-- The following supplement the counters presented in the
-- PW generic MIB

-- ATM PW Performance Current Table.

pwAtmPerfCurrentTable OBJECT-TYPE
   SYNTAX          SEQUENCE OF PwAtmPerfCurrentEntry
   MAX-ACCESS      not-accessible
   STATUS          current
   DESCRIPTION
       "The current 15-minute interval counts are in
        this table.
        This table provides performance information per ATM PW."
   ::= { pwAtmObjects 8 }

pwAtmPerfCurrentEntry OBJECT-TYPE
   SYNTAX          PwAtmPerfCurrentEntry
   MAX-ACCESS      not-accessible
   STATUS          current
   DESCRIPTION
       "An entry in this table is created by the agent for every
        pwAtmCfgTable entry.  After 15 minutes, the contents of this
        table entry are copied to a new entry in the
        pwAtmPerfInterval table and the counts in this entry
        are reset to zero."
   INDEX  { pwIndex }
   ::= { pwAtmPerfCurrentTable 1 }

PwAtmPerfCurrentEntry ::= SEQUENCE {
    pwAtmPerfCurrentMissingPkts    PerfCurrentCount,
    pwAtmPerfCurrentPktsReOrder    PerfCurrentCount,
    pwAtmPerfCurrentPktsMisOrder   PerfCurrentCount,
    pwAtmPerfCurrentPktsTimeout    PerfCurrentCount,
    pwAtmPerfCurrentCellsXmit      PerfCurrentCount,
    pwAtmPerfCurrentCellsDropped   PerfCurrentCount,
    pwAtmPerfCurrentCellsReceived  PerfCurrentCount,
    pwAtmPerfCurrentUnknownCells   PerfCurrentCount
  }

pwAtmPerfCurrentMissingPkts OBJECT-TYPE
   SYNTAX          PerfCurrentCount
   MAX-ACCESS      read-only
   STATUS          current
```

         DESCRIPTION
             "Number of missing packets (as detected via control word
              sequence number gaps)."
         ::= { pwAtmPerfCurrentEntry 1 }

pwAtmPerfCurrentPktsReOrder OBJECT-TYPE
      SYNTAX   PerfCurrentCount
      MAX-ACCESS   read-only
      STATUS   current
      DESCRIPTION
             "Number of packets detected out of sequence (via control
              word sequence number), but successfully re-ordered.
              Note: some implementations may not support this feature."
         ::= { pwAtmPerfCurrentEntry 2 }

pwAtmPerfCurrentPktsMisOrder OBJECT-TYPE
      SYNTAX   PerfCurrentCount
      MAX-ACCESS   read-only
      STATUS   current
      DESCRIPTION
             "Number of packets detected out of order (via control word
              sequence numbers)."
          ::= { pwAtmPerfCurrentEntry 3 }

pwAtmPerfCurrentPktsTimeout OBJECT-TYPE
      SYNTAX   PerfCurrentCount
      MAX-ACCESS   read-only
      STATUS   current
      DESCRIPTION
             "Number of packets transmitted due to timeout expiration
              while attempting to collect cells."
          ::= { pwAtmPerfCurrentEntry 4 }

pwAtmPerfCurrentCellsXmit OBJECT-TYPE
      SYNTAX   PerfCurrentCount
      MAX-ACCESS   read-only
      STATUS   current
      DESCRIPTION
             "Number of transmitted cells."
          ::= { pwAtmPerfCurrentEntry 5 }

pwAtmPerfCurrentCellsDropped OBJECT-TYPE
      SYNTAX   PerfCurrentCount
      MAX-ACCESS   read-only
      STATUS   current
      DESCRIPTION
             "Number of dropped cells."
          ::= { pwAtmPerfCurrentEntry 6 }

```
pwAtmPerfCurrentCellsReceived OBJECT-TYPE
   SYNTAX          PerfCurrentCount
   MAX-ACCESS      read-only
   STATUS          current
   DESCRIPTION
       "Number of received cells."
    ::= { pwAtmPerfCurrentEntry 7 }

pwAtmPerfCurrentUnknownCells OBJECT-TYPE
   SYNTAX          PerfCurrentCount
   MAX-ACCESS      read-only
   STATUS          current
   DESCRIPTION
       "Number of cells received from the PSN with unknown VPI or
       VCI values.  This object is relevant only in N:1 mode."
    ::= { pwAtmPerfCurrentEntry 8 }

-- End ATM PW Performance Current Interval Table

-- ATM PW Performance Interval Table.

pwAtmPerfIntervalTable OBJECT-TYPE
   SYNTAX          SEQUENCE OF PwAtmPerfIntervalEntry
   MAX-ACCESS      not-accessible
   STATUS          current
   DESCRIPTION
       "This table provides performance information per ATM PW
        similar to the pwAtmPerfCurrentTable above.  However,
        these counts represent historical 15 minute intervals.
        Typically, this table will have a maximum of 96 entries
        for a 24 hour period. "
    ::= { pwAtmObjects 9 }

pwAtmPerfIntervalEntry OBJECT-TYPE
   SYNTAX          PwAtmPerfIntervalEntry
   MAX-ACCESS      not-accessible
   STATUS          current
   DESCRIPTION
       "An entry in this table is created by the agent for
        every pwAtmPerfCurrentEntry that is 15 minutes old.
        The contents of the Current entry are copied to the new
        entry here.  The Current entry then resets its counts
        to zero for the next current 15 minute interval. "
   INDEX  { pwIndex, pwAtmPerfIntervalNumber }
    ::= { pwAtmPerfIntervalTable 1 }

PwAtmPerfIntervalEntry ::= SEQUENCE {
    pwAtmPerfIntervalNumber          Unsigned32,
```

```
        pwAtmPerfIntervalValidData      TruthValue,
        pwAtmPerfIntervalDuration       Unsigned32,
        pwAtmPerfIntervalMissingPkts    PerfIntervalCount,
        pwAtmPerfIntervalPktsReOrder    PerfIntervalCount,
        pwAtmPerfIntervalPktsMisOrder   PerfIntervalCount,
        pwAtmPerfIntervalPktsTimeout    PerfIntervalCount,
        pwAtmPerfIntervalCellsXmit      PerfIntervalCount,
        pwAtmPerfIntervalCellsDropped   PerfIntervalCount,
        pwAtmPerfIntervalCellsReceived  PerfIntervalCount,
        pwAtmPerfIntervalUnknownCells   PerfIntervalCount
        }

pwAtmPerfIntervalNumber OBJECT-TYPE
    SYNTAX        Unsigned32 (1..96)
    MAX-ACCESS    not-accessible
    STATUS        current
    DESCRIPTION
        "A number (normally between 1 and 96 to cover a 24 hour
         period) that identifies the interval for which the set
         of statistics is available.  The interval identified by 1
         is the most recently completed 15 minute interval, and
         the interval identified by N is the interval immediately
         preceding the one identified by N-1.  The minimum range of
         N is 1 through 4.  The default range is 1 through 32.  The
         maximum value of N is 96."
    ::= { pwAtmPerfIntervalEntry 1 }

pwAtmPerfIntervalValidData OBJECT-TYPE
    SYNTAX        TruthValue
    MAX-ACCESS    read-only
    STATUS        current
    DESCRIPTION
        "This variable indicates if the data for this interval
         is valid."
    ::= { pwAtmPerfIntervalEntry 2 }

pwAtmPerfIntervalDuration OBJECT-TYPE
    SYNTAX        Unsigned32
    MAX-ACCESS    read-only
    STATUS        current
    DESCRIPTION
      "The duration of a particular interval in seconds.
       Adjustments in the system's time-of-day clock, may
       cause the interval to be greater or less than the
       normal value.  Therefore, this actual interval value
       is provided."
     ::= { pwAtmPerfIntervalEntry 3 }
```

```
pwAtmPerfIntervalMissingPkts OBJECT-TYPE
   SYNTAX          PerfIntervalCount
   MAX-ACCESS      read-only
   STATUS          current
   DESCRIPTION
       "Number of missing packets (as detected via control
        word sequence number gaps)."
   ::= { pwAtmPerfIntervalEntry 4 }

pwAtmPerfIntervalPktsReOrder OBJECT-TYPE
   SYNTAX          PerfIntervalCount
   MAX-ACCESS      read-only
   STATUS          current
   DESCRIPTION
       "Number of packets detected out of sequence (via control
        word sequence number), but successfully re-ordered.
        Note: some implementations may not support this
        feature."
   ::= { pwAtmPerfIntervalEntry 5 }

 pwAtmPerfIntervalPktsMisOrder OBJECT-TYPE
   SYNTAX          PerfIntervalCount
   MAX-ACCESS      read-only
   STATUS          current
   DESCRIPTION
       "Number of packets detected out of order (via control word
        sequence numbers)."
   ::= { pwAtmPerfIntervalEntry 6 }

pwAtmPerfIntervalPktsTimeout OBJECT-TYPE
   SYNTAX          PerfIntervalCount
   MAX-ACCESS      read-only
   STATUS          current
   DESCRIPTION
      "Number of packets transmitted due to timeout expiration."
    ::= { pwAtmPerfIntervalEntry 7 }

pwAtmPerfIntervalCellsXmit OBJECT-TYPE
   SYNTAX          PerfIntervalCount
   MAX-ACCESS      read-only
   STATUS          current
   DESCRIPTION
      "Number of transmitted cells."
    ::= { pwAtmPerfIntervalEntry 8 }

pwAtmPerfIntervalCellsDropped OBJECT-TYPE
   SYNTAX          PerfIntervalCount
   MAX-ACCESS      read-only
```

```
        STATUS          current
        DESCRIPTION
            "Number of dropped cells."
        ::= { pwAtmPerfIntervalEntry 9 }

pwAtmPerfIntervalCellsReceived OBJECT-TYPE
        SYNTAX          PerfIntervalCount
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
            "Number of received cells."
        ::= { pwAtmPerfIntervalEntry 10 }

pwAtmPerfIntervalUnknownCells OBJECT-TYPE
        SYNTAX          PerfIntervalCount
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
            "Number of cells received from the PSN with unknown VPI or
             VCI values.  This object is relevant only in N:1 mode."
        ::= { pwAtmPerfIntervalEntry 11 }

-- End ATM PW Performance Interval Table

-- ATM PW 1day Performance Table

pwAtmPerf1DayIntervalTable OBJECT-TYPE
        SYNTAX          SEQUENCE OF PwAtmPerf1DayIntervalEntry
        MAX-ACCESS      not-accessible
        STATUS          current
        DESCRIPTION
            "This table provides performance information per ATM PW
             similar to the pwAtmPerfIntervalTable above.  However,
             these counters represent historical one-day intervals up to
             one full month."
        ::= { pwAtmObjects 10 }

pwAtmPerf1DayIntervalEntry OBJECT-TYPE
        SYNTAX          PwAtmPerf1DayIntervalEntry
        MAX-ACCESS      not-accessible
        STATUS          current
        DESCRIPTION
            "An entry is created in this table by the agent
             for every entry in the pwAtmCfgTable table."
        INDEX  { pwIndex,pwAtmPerf1DayIntervalNumber }
        ::= { pwAtmPerf1DayIntervalTable 1 }

PwAtmPerf1DayIntervalEntry ::= SEQUENCE {
```

```
        pwAtmPerf1DayIntervalNumber            Unsigned32,
        pwAtmPerf1DayIntervalValidData         TruthValue,
        pwAtmPerf1DayIntervalDuration          Unsigned32,
        pwAtmPerf1DayIntervalMissingPkts       Counter32,
        pwAtmPerf1DayIntervalPktsReOrder       Counter32,
        pwAtmPerf1DayIntervalPktsMisOrder      Counter32,
        pwAtmPerf1DayIntervalPktsTimeout       Counter32,
        pwAtmPerf1DayIntervalCellsXmit         Counter32,
        pwAtmPerf1DayIntervalCellsDropped      Counter32,
        pwAtmPerf1DayIntervalCellsReceived     Counter32,
        pwAtmPerf1DayIntervalUnknownCells      Counter32
        }

pwAtmPerf1DayIntervalNumber OBJECT-TYPE
   SYNTAX        Unsigned32 (1..365)
   MAX-ACCESS    not-accessible
   STATUS        current
   DESCRIPTION
       "The number of intervals, where 1 indicates current day
        measured period and 2 and above indicate previous days,
        respectively."
   ::= { pwAtmPerf1DayIntervalEntry 1 }

pwAtmPerf1DayIntervalValidData OBJECT-TYPE
   SYNTAX        TruthValue
   MAX-ACCESS    read-only
   STATUS        current
   DESCRIPTION
       "This object indicates if the data for this interval
        is valid."
   ::= { pwAtmPerf1DayIntervalEntry 2 }

pwAtmPerf1DayIntervalDuration OBJECT-TYPE
   SYNTAX        Unsigned32
   MAX-ACCESS    read-only
   STATUS        current
   DESCRIPTION
     "The duration of a particular interval in seconds.
      Adjustments in the system's time-of-day clock may
      cause the interval to be greater or less than the
      normal value.  Therefore, this actual interval value
      is provided."
   ::= { pwAtmPerf1DayIntervalEntry 3 }

pwAtmPerf1DayIntervalMissingPkts OBJECT-TYPE
   SYNTAX        Counter32
   MAX-ACCESS    read-only
   STATUS        current
```

      DESCRIPTION
        "Number of missing packets (as detected via control word
         sequence number gaps)."
      ::= { pwAtmPerf1DayIntervalEntry 4 }

pwAtmPerf1DayIntervalPktsReOrder OBJECT-TYPE
   SYNTAX   Counter32
   MAX-ACCESS   read-only
   STATUS   current
   DESCRIPTION
        "Number of packets detected out of sequence (via control
         word sequence number), but successfully re-ordered.
         Note: some implementations may not support this
         feature."
      ::= { pwAtmPerf1DayIntervalEntry 5 }

pwAtmPerf1DayIntervalPktsMisOrder OBJECT-TYPE
   SYNTAX   Counter32
   MAX-ACCESS   read-only
   STATUS   current
   DESCRIPTION
        "Number of packets detected out of order (via control word
         sequence numbers) and that could not be re-ordered."
      ::= { pwAtmPerf1DayIntervalEntry 6 }

pwAtmPerf1DayIntervalPktsTimeout OBJECT-TYPE
   SYNTAX   Counter32
   MAX-ACCESS   read-only
   STATUS   current
   DESCRIPTION
        "Number of packets transmitted due to timeout expiration."
       ::= { pwAtmPerf1DayIntervalEntry 7 }

pwAtmPerf1DayIntervalCellsXmit OBJECT-TYPE
   SYNTAX   Counter32
   MAX-ACCESS   read-only
   STATUS   current
   DESCRIPTION
        "Number of transmitted cells."
       ::= { pwAtmPerf1DayIntervalEntry 8 }

pwAtmPerf1DayIntervalCellsDropped OBJECT-TYPE
   SYNTAX   Counter32
   MAX-ACCESS   read-only
   STATUS   current
   DESCRIPTION
        "Number of dropped cells."
       ::= { pwAtmPerf1DayIntervalEntry 9 }

```
pwAtmPerf1DayIntervalCellsReceived OBJECT-TYPE
  SYNTAX        Counter32
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION
      "Number of received cells."
   ::= { pwAtmPerf1DayIntervalEntry 10 }

pwAtmPerf1DayIntervalUnknownCells OBJECT-TYPE
  SYNTAX        Counter32
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION
      "Number of cells received from the PSN with unknown VPI
       or VCI values.  This object is relevant only in N:1 mode."
   ::= { pwAtmPerf1DayIntervalEntry 11 }

-- End of ATM PW Performance table

    pwAtmCompliances OBJECT IDENTIFIER ::= { pwAtmConformance 1 }
    pwAtmGroups       OBJECT IDENTIFIER ::= { pwAtmConformance 2 }
    pwAtmCompliance MODULE-COMPLIANCE
    STATUS  current
    DESCRIPTION
            "The compliance statement for agents that support
             ATM PW."
    MODULE  -- this module
       MANDATORY-GROUPS { pwAtmCfgGroup,
                          pwAtmPerfGroup
                        }

      OBJECT pwAtmCfgFarEndMaxCellConcatenation
      MIN-ACCESS read-only
      DESCRIPTION
       "The ability to set this object
        is not required."

      GROUP         pwAtmOutbound1to1Group
      DESCRIPTION "This group is mandatory only for implementations
                   that support the ATM PW 1:1 mode and not using
                   the Nto1 table."

      GROUP         pwAtmInbound1to1Group
      DESCRIPTION "This group is mandatory only for implementations
                   that support the ATM PW 1:1 mode and not using
                   the Nto1 table."

      GROUP         pwAtmOutboundNto1Group
```

```
      DESCRIPTION "This group is mandatory only for implementations
                   that support the ATM PW N:1 and transparent mode."

      GROUP         pwAtmInboundNto1Group
      DESCRIPTION "This group is mandatory only for implementations
                   that support the ATM PW N:1 and transparent mode."

   ::= { pwAtmCompliances 2 }

-- Units of conformance.

   pwAtmCfgGroup OBJECT-GROUP
   OBJECTS {pwAtmCfgMaxCellConcatenation,
           pwAtmCfgFarEndMaxCellConcatenation,
           pwAtmCfgTimeoutMode,
           pwAtmClpQosMapping
                   }

   STATUS  current
   DESCRIPTION
              "Collection of objects for basic ATM PW
               configuration."
   ::= { pwAtmGroups 5 }

   pwAtmPerfGroup OBJECT-GROUP
   OBJECTS {pwAtmPerfCurrentMissingPkts,
           pwAtmPerfCurrentPktsReOrder,
           pwAtmPerfCurrentPktsMisOrder,
           pwAtmPerfCurrentPktsTimeout,
           pwAtmPerfCurrentCellsXmit,
           pwAtmPerfCurrentCellsDropped,
           pwAtmPerfCurrentCellsReceived,
           pwAtmPerfCurrentUnknownCells,
           pwAtmPerfIntervalValidData,
           pwAtmPerfIntervalDuration,
           pwAtmPerfIntervalMissingPkts,
           pwAtmPerfIntervalPktsReOrder,
           pwAtmPerfIntervalPktsMisOrder,
           pwAtmPerfIntervalPktsTimeout,
           pwAtmPerfIntervalCellsXmit,
           pwAtmPerfIntervalCellsDropped,
           pwAtmPerfIntervalCellsReceived,
           pwAtmPerfIntervalUnknownCells,
           pwAtmPerf1DayIntervalValidData,
           pwAtmPerf1DayIntervalDuration,
           pwAtmPerf1DayIntervalMissingPkts,
           pwAtmPerf1DayIntervalPktsReOrder,
           pwAtmPerf1DayIntervalPktsMisOrder,
```

```
                    pwAtmPerf1DayIntervalPktsTimeout,
                    pwAtmPerf1DayIntervalCellsXmit,
                    pwAtmPerf1DayIntervalCellsDropped,
                    pwAtmPerf1DayIntervalCellsReceived,
                    pwAtmPerf1DayIntervalUnknownCells
                           }
      STATUS current
      DESCRIPTION
                "Collection of objects for basic ATM PW Performance."
      ::= { pwAtmGroups 6 }

      pwAtmOutbound1to1Group OBJECT-GROUP
      OBJECTS {pwAtmOutboundAtmIf,
              pwAtmOutboundVpi,
              pwAtmOutboundVci,
              pwAtmOutboundTrafficParamDescr,
              pwAtmOutboundRowStatus
              }
      STATUS  current
      DESCRIPTION
                "Collection of objects for basic 1:1 ATM PW outbound
                 configuration."
      ::= { pwAtmGroups 7 }

      pwAtmInbound1to1Group OBJECT-GROUP
      OBJECTS {pwAtmInboundAtmIf,
              pwAtmInboundVpi,
              pwAtmInboundVci,
              pwAtmInboundTrafficParamDescr,
              pwAtmInboundRowStatus
              }
      STATUS  current
      DESCRIPTION
            "Collection of objects for basic 1:1 ATM PW inbound
             configuration."
      ::= { pwAtmGroups 8 }

      pwAtmOutboundNto1Group OBJECT-GROUP
      OBJECTS {pwAtmOutboundNto1RowStatus,
              pwAtmOutboundNto1TrafficParamDescr,
              pwAtmOutboundNto1MappedVpi,
              pwAtmOutboundNto1MappedVci
                      }
      STATUS  current
      DESCRIPTION
            "Collection of objects for N:1, 1:1, or transparent
             ATM PW outbound configuration."
      ::= { pwAtmGroups 9 }
```

```
       pwAtmInboundNto1Group OBJECT-GROUP
       OBJECTS {pwAtmInboundNto1RowStatus,
               pwAtmInboundNto1TrafficParamDescr,
               pwAtmInboundNto1MappedVpi,
               pwAtmInboundNto1MappedVci
                   }
       STATUS current
       DESCRIPTION
            "Collection of objects for N:1, 1:1, or transparent
             ATM PW inbound configuration."
       ::= { pwAtmGroups 10 }

END
```

10. Security Considerations

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

The pwAtmOutboundTable, pwAtmInboundTable, pwAtmCfgTable,
pwAtmOutboundNto1Table, and pwAtmInboundNto1Table contain objects of
ATM PW parameters on a Provider Edge (PE) device. Unauthorized
access to objects in these tables could result in disruption of
traffic on the network.

The use of stronger mechanisms such as SNMPv3 security should be
considered where possible. Specifically, SNMPv3 VACM and USM MUST be
used with any SNMPV3 agent, which implements this MIB module.
Administrators should consider whether read access to these objects
should be allowed, since read access may be undesirable under certain
circumstances.

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

The pwATMCfgTable, pwAtmPerfCurrentTable, pwAtmPerfIntervalTable, and
pwAtmPerf1DayIntervalTable collectively show the ATM pseudowire
connectivity topology and its performance characteristics.

If an Administrator does not want to reveal this information, then
these tables should be considered sensitive/vulnerable.

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

It is RECOMMENDED that implementers consider the security features as
provided by the SNMPv3 framework (see [RFC3410], section 8),
including full support for the SNMPv3 cryptographic mechanisms (for
authentication and privacy).

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

11. IANA Considerations

The MIB module in this document uses the following IANA-assigned
OBJECT IDENTIFIER values recorded in the SMI Numbers registry:

Descriptor OBJECT IDENTIFIER value
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pwATMMIB   { mib-2 183 }

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13. Acknowledgements

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