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Pseudowire (PW) Management Information Base (MIB)

Abstract

This memo defines a Standards Track portion of the Management Information Base for use with network management protocols in the Internet community. In particular, it describes managed objects for modeling of Pseudowire Edge-to-Edge services carried over a general Packet Switched Network.

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 memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it defines a MIB module that can be used to manage pseudowire (PW) services for transmission over a Packet Switched Network (PSN) [RFC3931] [RFC4447]. This MIB module provides generic management of PWs that is common to all types of PSN and PW services defined by the IETF PWE3 Working Group.

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].

3. 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].

This document adopts the definitions, acronyms, and mechanisms described in [RFC3985] and [RFC3916]. Unless otherwise stated, the mechanisms of [RFC3985] apply and will not be re-described here.

4. Overview

The PWE3 MIB modules architecture provides a layered modular model into which any supported emulated service can be connected to any supported PSN type. This specific MIB module provides the glue for mapping between the emulated service onto the native PSN service. As such, the defining of a PW emulated service requires the use of at least three types of MIB modules.

Starting from the emulated service, the first type is a service-specific module, which is dependent on the emulated signal type. These modules are defined in other documents.

The second type is this module, the PW-STD-MIB module, which configures general parameters of the PW that are common to all types of emulated services and PSN types.

The third type of module is a PSN-specific module. There is a different module 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.

5. Structure of the MIB Module

The MIB module consists of six tables:

- The generic configuration and status monitoring objects that are common to all service types and PSN types (pwTable).

- The PW Performance Current Table (pwPerfCurrentTable) contains PW statistics for the current 15-minute period.

- The PW Performance Interval Table (pwPerfIntervalTable) contains PW statistics for historical intervals (usually 96 15-minute entries to cover a 24-hour period).

- The PW Performance 1-day Interval Table (pwPerf1DayIntervalTable) contains PW statistics for historical intervals accumulated per day. Usually 30 1-day entries to cover a monthly period.

- The mapping table (pwIndexMappingTable) enables the reverse mapping of the unique PWid parameters [peer IP, PW type, and PW ID] and the pwIndex.

- The mapping table (pwGenFecIndexMappingTable) enables the reverse mapping of unique PWid parameters used in genFecSignaling [pwGroupAttachmentID, pwLocalAttachmentID, and pwPeerAttachmentID] and the pwIndex.

This MIB module uses Textual Conventions from [RFC2578], [RFC2579], [RFC2580], [RFC2863], [RFC3411], [RFC3593], [RFC3705], [RFC4001], and [RFC5542], and references [RFC3413], [RFC4623], and [RFC4720].

6. PW-STD-MIB Module Usage

An entry in the PW table (pwTable) MUST exist for all PW types (ATM, FR, Ethernet, SONET, etc.). This table holds generic parameters related to the PW creation and monitoring.

A conceptual row can be created in the pwTable in one of the following ways:

1) The operator creates a row in the pwTable when configuring the node for a new service. This mode MUST be supported by the agent, and MUST be used when creating a non-signaled (manually assigned) PW.

2) The agent MAY create a row in the pwTable if a signaling message has been received from a peer node with signaling identification parameters that are not already known to the local node (i.e., there is no related entry created by the operator with matching parameters). This mode is OPTIONAL.

3) The agent MAY create a row in the pwTable automatically due to some auto-discovery application, or based on configuration that is done through non-SNMP applications. This mode is OPTIONAL.

   - The agent then creates the rows in the (locally supported) performance tables and reverse-mapping tables in PW-STD-MIB module.

7. Relations to Other PWE3 MIB Modules

- Based on the PSN type defined for the PW, a row is created in the PSN-specific module (for example, [RFC5602]) and associated to the PW table by the common pwIndex.

- Based on the PW type defined for the PW, a row is created in the service-specific module (for example, [CEPMIB]) and associated to the PW table by the common pwIndex.

- Unless all the necessary entries in the applicable tables have been created and all the parameters have been consistently configured in those tables, signaling cannot be performed from the local node, and the pwVcOperStatus should report 'notPresent'.

8. Relations to the IF-MIB

The PW in general is not an ifIndex [RFC2863] on its own, for agent scalability reasons. The PW is typically associated via the PWE3 MIB modules to an ifIndex the PW is emulating. This ifIndex may represent a physical entity -- for example, a PW emulating a SONET path as in Circuit Emulation Service over Packet (CEP). In that case, the PW itself is not an ifIndex; however, the PW-STD-CEP-MIB module associates the PW to the ifIndex of the path to be emulated. In some cases, the PW will be associated to an ifIndex representing a virtual interface. An example is Virtual Private LAN Service (VPLS) where the PW emulates a logical interface of a (logical) bridge. The physical ports' association to the VPLS instance is defined in the non-PW MIB modules in this case.

Exception to the above MAY exist in some implementations where it is convenient to manage the PW as an ifIndex in the ifTable. A special ifType to represent a PW virtual interface (246) will be used in the ifTable in this case.

When the PW is managed as an ifIndex, by default it SHOULD NOT be stacked, i.e., this ifIndex SHOULD NOT be layered above the respective PSN tunnel ifIndex or the attachment circuit ifIndex or the interface carrying the attachment circuit.

Note that the ifIndex that carries the PW toward/from the PSN is not explicitly configured via PWE3 MIB modules except in rare cases. In most cases, the PW is carried inside a PSN tunnel, and the interfaces carrying the tunnel are specified in the related MIB modules that control the PSN tunnels.

9. PW Notifications

This MIB module includes notifications for PW entering the up or down state, in accordance with the guidelines for interface notifications as described in [RFC2863]. Implementers should be aware that in many systems, it is desired to correlate notifications, such that notifications will not be emitted if notifications from a higher level (such as ports or tunnels) are already in effect. Specifically for PWs, it is anticipated that most network's equipment failures turn into lowerLayerDown state at the PW level, where a notification has already been emitted from a higher level.

When a PW is represented as an ifIndex, it is RECOMMENDED that PW notifications be turned off, to avoid duplication with the ifIndex status change notifications.

10. Example of the PW MIB Modules Usage

In this section, we provide an example of using the MIB objects described in section 7 to set up a CEP PW over Multiprotocol Label Switching (MPLS) PSN. While this example is not meant to illustrate every permutation of the MIB, it is intended as an aid to understanding some of the key concepts. It is meant to be read after going through the MIB itself.

In this example, a PW service for CEP is configured over an MPLS PSN (MPLS-TE tunnel). It uses LDP as in [RFC4447] for service setup.

For the operation in the service-specific MIB modules and the PSN-specific MIB modules, see the specific MIB module memo. This example is continued in the memo describing the PW-CEP-STD-MIB module (for example, [CEPMIB]) and the PW-MPLS-STD-MIB module [RFC5602].

In the PW-STD-MIB module:

```
In pwTable:
{
   pwIndex               5,

   pwType                cep,
   pwOwner               pwIdFecSignaling,
   pwPsnType             mpls,
   pwSetUpPriority       0, -- Highest
   pwHoldingPriority     0, -- Highest
   pwInboundMode         loose,

   pwPeerAddrType        ipv4,
   pwPeerAddr            192.0.2.5, -- In this case, equal to the
                                    -- peer LDP entity IP addr
   pwID                  10,
   pwLocalGroupID        12,
   ..

   pwCwPreference        true,   -- Actually ignored for CEP
   pwLocalIfMtu          0,      -- Do not send ifMtu parameter
   pwLocalIfString       false,  -- Do not send interface string
   pwCapabAdvert         0,      -- Does not support status
                                 -- report to the peer.
   pwRemoteGroupID       0xFFFF, -- Will be received by
                                 -- signaling protocol
   pwRemoteCwStatus      notKnownYet,
   pwRemoteIfMtu         0,
   pwRemoteIfString      "",
   pwRemoteCapabilities  notYetKnown,
   ..
   pwOutboundVcLabel     0xFFFF, -- Will be received by
                                 -- signaling protocol
   pwInboundVcLabel      0xFFFF, -- Will be set by signaling
                                 -- protocol
   pwName                "Example of CEP PW",
   pwDescr               "",
   ..

   pwAdminStatus         up,
   ..
    }
```

11. IANA PWE3 MIB Module

This section contains the initial version of the IANA-PWE3-MIB. IANA has updated this MIB module based on expert review as defined in [RFC5226]. Each new assignment of PW type or PW PSN type made by IANA based on the procedures described in [RFC4446] should be documented in the online version of IANA-PWE3-MIB. The current IANA-PWE3-MIB contains PW types as requested in [RFC4446] and [RFC4863].

```
IANA-PWE3-MIB DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY, mib-2
       FROM SNMPv2-SMI -- [RFC2578]

    TEXTUAL-CONVENTION
       FROM SNMPv2-TC; -- [RFC2579]

ianaPwe3MIB  MODULE-IDENTITY
    LAST-UPDATED "200906110000Z"  -- 11 June 2009 00:00:00 GMT
    ORGANIZATION "IANA"
    CONTACT-INFO
         "Internet Assigned Numbers Authority
         Internet Corporation for Assigned Names and Numbers
         4676 Admiralty Way, Suite 330
         Marina del Rey, CA 90292-6601

         Phone: +1 310 823 9358
         EMail: iana@iana.org"
    DESCRIPTION
        "This MIB module defines the IANAPwTypeTC and
        IANAPwPsnTypeTC textual conventions for use in PWE3
        MIB modules.

        Any additions or changes to the contents of this MIB
        module require either publication of an RFC, Designated
        Expert Review as defined in RFC 5226, Guidelines for
        Writing an IANA Considerations Section in RFCs, and should
        be based on the procedures defined in [RFC4446].  The
        Designated Expert will be selected by the IESG Area
        Director(s) of the internet Area.

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      REVISION     "200906110000Z"  -- 11 June 2009 00:00:00 GMT
      DESCRIPTION  "Original version, published as part of RFC 5601."
      ::= { mib-2 174 }

   IANAPwTypeTC ::= TEXTUAL-CONVENTION
      STATUS     current
      DESCRIPTION
         "Indicates the PW type (i.e., the carried service). "
    SYNTAX   INTEGER {
       other(0),
       frameRelayDlciMartiniMode(1),
       atmAal5SduVcc(2),
       atmTransparent(3),
       ethernetTagged(4),
       ethernet(5),
       hdlc(6),
       ppp(7),
```

```
       cem(8),  -- Historic type
       atmCellNto1Vcc(9),
       atmCellNto1Vpc(10),
       ipLayer2Transport(11),
       atmCell1to1Vcc(12),
       atmCell1to1Vpc(13),
       atmAal5PduVcc(14),
       frameRelayPortMode(15),
       cep(16),
       e1Satop(17),
       t1Satop(18),
       e3Satop(19),
       t3Satop(20),
       basicCesPsn(21),
       basicTdmIp(22),
       tdmCasCesPsn(23),
       tdmCasTdmIp(24),
       frDlci(25),
       wildcard (32767)
        }

   IANAPwPsnTypeTC ::= TEXTUAL-CONVENTION
      STATUS      current
      DESCRIPTION
         "Identifies the PSN type that the PW will use over the
          network."
      SYNTAX   INTEGER {
         mpls        (1),
         l2tp        (2),
         udpOverIp   (3),
         mplsOverIp  (4),
         mplsOverGre (5),
         other       (6)
         }

   IANAPwCapabilities ::= TEXTUAL-CONVENTION
      STATUS      current
      DESCRIPTION
         "This TC describes a collection of capabilities related to
          a specific PW.
          Values may be added in the future based on new capabilities
          introduced in IETF documents.
         "
     SYNTAX   BITS {
       pwStatusIndication (0), -- Applicable only if maintenance
                               -- protocol is in use.
       pwVCCV             (1)
     }
```

```
   END
```

12. Object Definitions

```
  PW-STD-MIB DEFINITIONS ::= BEGIN

  IMPORTS
     NOTIFICATION-TYPE, MODULE-IDENTITY, OBJECT-TYPE,
     Integer32, Unsigned32, Counter32, Counter64, TimeTicks,
     transmission
        FROM SNMPv2-SMI                    -- [RFC2578]

     MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP
        FROM SNMPv2-CONF                   -- [RFC2580]

     TruthValue, RowStatus, StorageType,
     TimeStamp
        FROM SNMPv2-TC                     -- [RFC2579]

     SnmpAdminString
        FROM SNMP-FRAMEWORK-MIB            -- [RFC3411]

     InterfaceIndexOrZero
        FROM IF-MIB                        -- [RFC2863]

     InetAddressType, InetAddress
        FROM INET-ADDRESS-MIB              -- [RFC4001]

     PerfCurrentCount, PerfIntervalCount
        FROM PerfHist-TC-MIB               -- [RFC3593]

     HCPerfCurrentCount, HCPerfIntervalCount, HCPerfTimeElapsed,
     HCPerfValidIntervals
        FROM HC-PerfHist-TC-MIB            -- [RFC3705]

     PwIndexType, PwIndexOrZeroType, PwGroupID, PwIDType,
     PwOperStatusTC, PwAttachmentIdentifierType, PwCwStatusTC,
     PwStatus, PwFragSize, PwFragStatus, PwGenIdType
        FROM PW-TC-STD-MIB                 -- [RFC5542]
     IANAPwTypeTC, IANAPwPsnTypeTC, IANAPwCapabilities
        FROM IANA-PWE3-MIB                 -- [RFC5601]
  ;

  pwStdMIB MODULE-IDENTITY
     LAST-UPDATED "200906110000Z"  -- 11 June 2009 00:00:00 GMT
     ORGANIZATION "Pseudowire Edge-to-Edge Emulation (PWE3) Working
                   Group"
     CONTACT-INFO
```

```
        "David Zelig
         Email: davidz@oversi.com

         Thomas D. Nadeau
         Email: tom.nadeau@bt.com

         The PWE3 Working Group (email distribution pwe3@ietf.org,
         http://www.ietf.org/html.charters/pwe3-charter.html)
         "

      DESCRIPTION
         "This MIB module contains managed object definitions for
          pseudowire operation as in Bryant, S. and P. Pate, 'Pseudo
          Wire Emulation Edge-to-Edge (PWE3) Architecture' [RFC3985],
          Martini, L., et al, 'Pseudowire Setup and Maintenance Using
          the Label Distribution Protocol (LDP)' [RFC4447], and
          Townsley, M., et al, 'Layer Two Tunneling Protocol
          (Version 3)' [RFC3931].

          This MIB module enables the use of any underlying packet
          switched network (PSN).  MIB nodules that will support
          PW operations over specific PSN types are defined in
          separate memos.

          The indexes for this MIB module are also used to index the
          PSN-specific tables and the PW-specific tables.  The PW Type
          dictates which PW-specific MIB module to use.

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        This version of this MIB module is part of RFC 5601;
        see the RFC itself for full legal notices.
        "

    -- Revision history.
    REVISION
        "200906110000Z"  -- 11 June 2009 00:00:00 GMT
    DESCRIPTION "Initial version published as part of RFC 5601."
       ::= { transmission 246 }

-- Top-level components of this MIB.

-- Notifications
pwNotifications OBJECT IDENTIFIER
                               ::= { pwStdMIB 0 }
-- Tables, Scalars
pwObjects       OBJECT IDENTIFIER
                               ::= { pwStdMIB 1 }
-- Conformance
pwConformance   OBJECT IDENTIFIER
                               ::= { pwStdMIB 2 }

-- PW Virtual Connection Table

pwIndexNext OBJECT-TYPE
   SYNTAX            Unsigned32
   MAX-ACCESS        read-only
   STATUS            current
   DESCRIPTION
       "This object contains an appropriate value to be used for
        pwIndex when creating entries in the pwTable.  The value 0
        indicates that no unassigned entries are available.  To
        obtain the value of pwIndex for a new entry in the pwTable,
```

```
          the manager issues a management protocol retrieval
          operation.  The agent will determine through its local policy
          when this index value will be made available for reuse."
      ::= { pwObjects 1 }

  pwTable   OBJECT-TYPE
      SYNTAX        SEQUENCE OF PwEntry
      MAX-ACCESS    not-accessible
      STATUS        current
      DESCRIPTION
          "This table specifies information for configuring and
           status monitoring that is common to all service types
           and PSN types."
      ::= { pwObjects 2 }

  pwEntry   OBJECT-TYPE
      SYNTAX        PwEntry
      MAX-ACCESS    not-accessible
      STATUS        current
      DESCRIPTION
           "A row in this table represents a pseudowire (PW) virtual
            connection across a packet network.  It is indexed by
            pwIndex, which uniquely identifies a singular
            connection.
            A row can be created by an operator command from a
            management plan of a PE, by signaling, or due to auto-
            discovery process.  An operator's command can be issued via
            a non-SNMP application; in such case, a row will be created
            implicitly by the agent.
            The read-create objects in this table are divided into
            three categories:
            1) Objects that MUST NOT be changed after row activation.
               These are objects that define basic properties of the
               PW (for example type, destination, etc.).
            2) Objects that MAY be changed when the PW is
               defined as not active.  A change of these objects involves
               re-signaling of the PW or it might be traffic affecting.
               PW not active is defined as one of the following
               conditions:
                   a) The pwRowStatus is notInService(2).
                   b) The pwRowStatus is notReady(3).
                   c) The pwAdminStatus is down(2).
            If the operator needs to change one of the values for an
            active row, the operator can either set the pwRowStatus to
            notInService(2) or set pwAdminStatus to down(2).
            Signaling (or traffic) is initiated again upon setting
            the pwRowStatus to active(1) or setting the pwAdminStatus
            to up(1) or testing(3), respectively.
```

```
            3) Objects that MAY be changed at any time.

            A PW MAY have an entry in the ifTable in addition to the
            entry in this table.  In this case, a special ifType for PW
            will be set in the ifTable, and the ifIndex in the ifTable
            of the PW will be set in the pwIfIndex object in this table.

            By default, all the read-create objects MUST NOT be
            changed after row activation, unless specifically indicated
            in the individual object description.

            Manual entries in this table SHOULD be preserved after a
            reboot; the agent MUST ensure the integrity of those
            entries.  If the set of entries of a specific row are found
            to be inconsistent after reboot, the PW pwOperStatus MUST
            be declared as notPresent(5).
            "
        INDEX  { pwIndex }

            ::= { pwTable 1 }

    PwEntry ::= SEQUENCE {
            pwIndex                 PwIndexType,
            pwType                  IANAPwTypeTC,
            pwOwner                 INTEGER,
            pwPsnType               IANAPwPsnTypeTC,
            pwSetUpPriority         Integer32,
            pwHoldingPriority       Integer32,
            pwPeerAddrType          InetAddressType,
            pwPeerAddr              InetAddress,
            pwAttachedPwIndex       PwIndexOrZeroType,
            pwIfIndex               InterfaceIndexOrZero,

            pwID                    PwIDType,
            pwLocalGroupID          PwGroupID,
            pwGroupAttachmentID     PwAttachmentIdentifierType,
            pwLocalAttachmentID     PwAttachmentIdentifierType,
            pwRemoteAttachmentID    PwAttachmentIdentifierType,

            pwCwPreference          TruthValue,
            pwLocalIfMtu            Unsigned32,


            pwLocalIfString         TruthValue,
            pwLocalCapabAdvert      IANAPwCapabilities,
            pwRemoteGroupID         PwGroupID,
            pwCwStatus              PwCwStatusTC,
            pwRemoteIfMtu           Unsigned32,
```

```
        pwRemoteIfString      SnmpAdminString,
        pwRemoteCapabilities  IANAPwCapabilities,

        pwFragmentCfgSize     PwFragSize,
        pwRmtFragCapability   PwFragStatus,
        pwFcsRetentionCfg     INTEGER,
        pwFcsRetentionStatus  BITS,

        pwOutboundLabel       Unsigned32,
        pwInboundLabel        Unsigned32,

        pwName                SnmpAdminString,
        pwDescr               SnmpAdminString,
        pwCreateTime          TimeStamp,
        pwUpTime              TimeTicks,
        pwLastChange          TimeTicks,
        pwAdminStatus         INTEGER,
        pwOperStatus          PwOperStatusTC,
        pwLocalStatus         PwStatus,
        pwRemoteStatusCapable INTEGER,
        pwRemoteStatus        PwStatus,
        pwTimeElapsed         HCPerfTimeElapsed,
        pwValidIntervals      HCPerfValidIntervals,
        pwRowStatus           RowStatus,
        pwStorageType         StorageType,
        pwOamEnable           TruthValue,
        pwGenAGIType          PwGenIdType,
        pwGenLocalAIIType     PwGenIdType,
        pwGenRemoteAIIType    PwGenIdType
    }

  pwIndex OBJECT-TYPE
     SYNTAX        PwIndexType
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
         "A unique index for the conceptual row identifying a PW within
          this table."
     ::= { pwEntry 1 }

  pwType OBJECT-TYPE
     SYNTAX        IANAPwTypeTC
     MAX-ACCESS    read-create
     STATUS        current
     DESCRIPTION
         "This value indicates the emulated service to be carried over
          this PW.
         "
```

```
    ::= { pwEntry 2 }

  pwOwner OBJECT-TYPE
     SYNTAX   INTEGER {
            manual                (1),
            pwIdFecSignaling      (2), -- PW signaling with PW ID FEC
            genFecSignaling       (3), -- Generalized attachment FEC
            l2tpControlProtocol   (4),
            other                 (5)
                   }
     MAX-ACCESS    read-create
     STATUS        current
     DESCRIPTION
          "This object is set by the operator to indicate the protocol
           responsible for establishing this PW.
           'manual' is used in all cases where no maintenance
           protocol (PW signaling) is used to set up the PW, i.e.,
           configuration of entries in the PW tables including
           PW labels, etc., is done by setting the MIB fields manually.
           'pwIdFecSignaling' is used in case of signaling with the
           Pwid FEC element with LDP signaling.
           'genFecSignaling' is used in case of LDP signaling with
           the generalized FEC.
           'l2tpControlProtocol' indicates the use of the L2TP
           control protocol.
           'other' is used for other types of signaling."
     ::= { pwEntry 3 }

  pwPsnType OBJECT-TYPE
     SYNTAX   IANAPwPsnTypeTC
     MAX-ACCESS    read-create
     STATUS        current
     DESCRIPTION
          "This object is set by the operator to indicate the PSN type.
           Based on this object, the relevant PSN table's entry is
           created in the PSN-specific MIB modules.
          "
     ::= { pwEntry 4 }

  pwSetUpPriority  OBJECT-TYPE
     SYNTAX         Integer32 (0..7)
     MAX-ACCESS     read-create
     STATUS         current
     DESCRIPTION
          "This object defines the relative priority of the PW
           during set-up in a lowest-to-highest fashion, where 0
           is the highest priority.  PWs with the same priority
           are treated with equal priority.  PWs that have not yet
```

```
            completed setup will report 'dormant' in the
            pwOperStatus.
            This value is significant if there are competing resources
            among PWs and the implementation supports this feature.
            Equal priority handling with competing resources is
            implementation specific.
            This object MAY be changed at any time."
       DEFVAL { 0 }
       ::= { pwEntry 5 }

    pwHoldingPriority  OBJECT-TYPE
       SYNTAX         Integer32 (0..7)
       MAX-ACCESS     read-create
       STATUS         current
       DESCRIPTION
            "This object defines the relative holding priority of the
            PW in a lowest-to-highest fashion, where 0 is the highest
            priority.  PWs with the same priority are treated equally.
            This value is significant if there are competing resources
            among PWs and the implementation supports this feature.
            Equal priority handling with competing resources is
            implementation specific.
            This object MAY be changed only if the PW is not active."
       DEFVAL { 0 }
       ::= { pwEntry 6 }

    pwPeerAddrType OBJECT-TYPE
       SYNTAX        InetAddressType
       MAX-ACCESS    read-create
       STATUS        current
       DESCRIPTION
            "Denotes the address type of the peer node.  It should be
            set to 'unknown' if PE/PW maintenance protocol is not used
            and the address is unknown."
       DEFVAL { ipv4 }
       ::= { pwEntry 8 }

    pwPeerAddr OBJECT-TYPE
       SYNTAX        InetAddress
       MAX-ACCESS    read-create
       STATUS        current
       DESCRIPTION
            "This object contains the value of the peer node address
            of the PW/PE maintenance protocol entity.  This object
            SHOULD contain a value of all zeroes if not applicable
            (pwPeerAddrType is 'unknown')."
       ::= { pwEntry 9 }
```

```
  pwAttachedPwIndex OBJECT-TYPE
     SYNTAX        PwIndexOrZeroType
     MAX-ACCESS    read-create
     STATUS        current
     DESCRIPTION
         "If the PW is attached to another PW instead of a local
          native service, this item indicates the pwIndex of the
          attached PW.  Otherwise, this object MUST
          be set to zero.  Attachment to another PW will have no
          PW specific entry in any of the service MIB modules."
     DEFVAL { 0 }
     ::= { pwEntry 10 }

  pwIfIndex OBJECT-TYPE
     SYNTAX        InterfaceIndexOrZero
     MAX-ACCESS    read-create
     STATUS        current
     DESCRIPTION
         "This object indicates the ifIndex of the PW if the PW is
          represented in the ifTable.  Otherwise, it MUST be set
          to zero."
     DEFVAL { 0 }
     ::= { pwEntry 11 }

  pwID OBJECT-TYPE
     SYNTAX        PwIDType
     MAX-ACCESS    read-create
     STATUS        current
     DESCRIPTION
         "Pseudowire identifier.

          If the pwOwner object is 'pwIdFecSignaling' or
          'l2tpControlProtocol', then this object is signaled in the
          outgoing PW ID field within the 'Virtual Circuit FEC
          Element'.  For other values of pwOwner, this object is not
          signaled and it MAY be set to zero.

          For implementations that support the pwIndexMappingTable,
          a non-zero value is RECOMMENDED, even if this
          identifier is not signaled.  This is so that reverse
          mappings can be provided by pwIndexMappingTable and
          pwPeerMappingTable.  It is therefore RECOMMENDED that the
          value of this pwID be unique (or if pwPeerAddrType is not
          'unknown', at least [pwType, pwID, pwPeerAddrType, pwPeerAddr]
          is unique.)"
      REFERENCE
         "Martini, et al, 'Pseudowire Setup and Maintenance using
          the Label Distribution Protocol', RFC 4447."
```

```
    ::= { pwEntry 12 }

  pwLocalGroupID OBJECT-TYPE
     SYNTAX        PwGroupID
     MAX-ACCESS    read-create
     STATUS        current
     DESCRIPTION
         "Used in the Group ID field sent to the peer PW End Service
          within the maintenance protocol used for PW setup.
          It SHOULD be set to zero if a maintenance protocol is
          not used."
     REFERENCE
         "Martini, et al, 'Pseudowire Setup and Maintenance using
          the Label Distribution Protocol', RFC 4447."
     ::= { pwEntry 13 }

  pwGroupAttachmentID OBJECT-TYPE
     SYNTAX        PwAttachmentIdentifierType
     MAX-ACCESS    read-create
     STATUS        current
     DESCRIPTION
         "This object is an octet string representing the attachment
          group identifier (AGI) that this PW belongs to, which
          typically identifies the VPN ID.
          Applicable if pwOwner equals 'genFecSignaling'."
     REFERENCE
         "Martini, et al, 'Pseudowire Setup and Maintenance using
          the Label Distribution Protocol', RFC 4447."
     ::= { pwEntry 14 }

  pwLocalAttachmentID   OBJECT-TYPE
     SYNTAX        PwAttachmentIdentifierType
     MAX-ACCESS    read-create
     STATUS        current
     DESCRIPTION
         "This object is an octet string representing the local
          forwarder attachment individual identifier (AII) to be
          used by this PW.  It is used as the Source AII (SAII) for
          outgoing signaling messages and the Target AII (TAII) in
          the incoming messages from the peer.  Applicable if
          pwOwner equal 'genFecSignaling'."
      REFERENCE
         "Martini, et al, 'Pseudowire Setup and Maintenance using
          the Label Distribution Protocol', RFC 4447."
     ::= { pwEntry 15 }
```

```
  pwRemoteAttachmentID   OBJECT-TYPE
     SYNTAX        PwAttachmentIdentifierType
     MAX-ACCESS    read-create
     STATUS        current
     DESCRIPTION
         "This object is an octet string representing the remote
          forwarder attachment individual identifier (AII) to be
          used by this PW.  It is used as the TAII for outgoing
          signaling messages and the SAII in the incoming messages
          from the peer.
          Applicable if pwOwner equals 'genFecSignaling'."
      REFERENCE
         "Martini, et al, 'Pseudowire Setup and Maintenance using
          the Label Distribution Protocol', RFC 4447."
     ::= { pwEntry 16 }

  pwCwPreference OBJECT-TYPE
     SYNTAX        TruthValue
     MAX-ACCESS    read-create
     STATUS        current
     DESCRIPTION
         "Defines if the control word will be sent with each packet
          by the local node.  Some PW types mandate the use of a
          control word, and in such cases, the value configured for
          this object has no effect on the existence of the control
          word.
          This object MAY be changed only if the PW is not active."
     REFERENCE
         "Martini, et al, 'Pseudowire Setup and Maintenance using
          the Label Distribution Protocol.', RFC 4447."
     DEFVAL { false }
     ::= { pwEntry 17 }

  pwLocalIfMtu OBJECT-TYPE
     SYNTAX        Unsigned32 (0..65535)
     MAX-ACCESS    read-create
     STATUS        current
     DESCRIPTION
         "If not equal to zero, the optional IfMtu object in the
          signaling protocol will be sent with this value, which
          represents the locally supported MTU size over the
          interface (or the virtual interface) associated with the
          PW.
          This object MAY be changed only if the PW is not active."
     REFERENCE
         "Martini, et al, 'Pseudowire Setup and Maintenance using
          the Label Distribution Protocol', RFC 4447."
     DEFVAL { 0 }
```

```
    ::= { pwEntry 18 }

  pwLocalIfString OBJECT-TYPE
     SYNTAX        TruthValue
     MAX-ACCESS    read-create
     STATUS        current
     DESCRIPTION
         "A PW MAY be associated to an interface (or a virtual
          interface) in the ifTable of the node as part of the
          service configuration.  This object defines if the
          maintenance protocol will send the interface's name
          (ifAlias) as it appears in the ifTable.  If set to false,
          the optional element will not be sent.
          This object MAY be changed only if the PW is not active."
     REFERENCE
         "Martini, et al, 'Pseudowire Setup and Maintenance using
          the Label Distribution Protocol', RFC 4447, section 5.5."
     DEFVAL { false }
     ::= { pwEntry 19 }

  pwLocalCapabAdvert OBJECT-TYPE
     SYNTAX        IANAPwCapabilities
     MAX-ACCESS    read-create
     STATUS        current
     DESCRIPTION
         "If a maintenance protocol is used, it indicates the
          capabilities the local node will advertise to the peer.  The
          operator MAY selectively assign a partial set of
          capabilities.  In case of manual configuration of the PW, the
          operator SHOULD set non-conflicting options (for example,
          only a single type of Operations, Administration, and
          Management (OAM)) out of the available options in the
          implementation.  It is possible to change the value of
          this object when the PW is not active.  The agent MUST
          reject any attempt to set a capability that is not
          supported.

          The default value MUST be the full set of local node
          capabilities."
     REFERENCE
         "Martini, et al, 'Pseudowire Setup and Maintenance using
          the Label Distribution Protocol', RFC 4447."
     ::= { pwEntry 20 }

  pwRemoteGroupID OBJECT-TYPE
     SYNTAX        PwGroupID
     MAX-ACCESS    read-only
     STATUS        current
```

```
      DESCRIPTION
          "This object is obtained from the Group ID field as
           received via the maintenance protocol used for PW setup.
           Value of zero will be reported if not used.
           Value of 0xFFFFFFFF shall be used if the object is yet to be
           defined by the PW maintenance protocol."
      REFERENCE
          "Martini, et al, 'Pseudowire Setup and Maintenance using
           the Label Distribution Protocol', RFC 4447."
      ::= { pwEntry 21 }

   pwCwStatus OBJECT-TYPE
      SYNTAX        PwCwStatusTC
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
          "If signaling is used for PW establishment, this object
           indicates the status of the control word negotiation.
           For either signaling or manual configuration, it indicates
           if the control word (CW) is to be present for this PW."
      REFERENCE
          "Martini, et al, 'Pseudowire Setup and Maintenance using
           the Label Distribution Protocol', RFC 4447."
      ::= { pwEntry 22 }

   pwRemoteIfMtu OBJECT-TYPE
      SYNTAX        Unsigned32
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
          "The remote interface MTU as (optionally) received from the
           remote node via the maintenance protocol.  The object SHOULD
           report zero if the MTU is not available."
      REFERENCE
          "Martini, et al, 'Pseudowire Setup and Maintenance using
           the Label Distribution Protocol', RFC 4447."
      ::= { pwEntry 23 }

   pwRemoteIfString OBJECT-TYPE
      SYNTAX        SnmpAdminString (SIZE (0..80))
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
          "Indicates the interface description string as received by
           the maintenance protocol.  It MUST be a NULL string if a
           maintenance protocol is not used or the value is not known
           yet."
```

```
      REFERENCE
          "Martini, et al, 'Pseudowire Setup and Maintenance using
           the Label Distribution Protocol', RFC 4447, section 5.5."
      ::= { pwEntry 24 }

   pwRemoteCapabilities OBJECT-TYPE
      SYNTAX        IANAPwCapabilities
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
          "Indicates the capabilities as received from the peer."
      REFERENCE
          "Martini, et al, 'Pseudowire Setup and Maintenance using
           the Label Distribution Protocol', RFC 4447."
      ::= { pwEntry 25 }

   pwFragmentCfgSize OBJECT-TYPE
      SYNTAX        PwFragSize
      UNITS         "bytes"
      MAX-ACCESS    read-create
      STATUS        current
      DESCRIPTION
          "If set to a value other than zero, indicates that
           fragmentation is desired for this PW.
           This object MAY be changed only if the PW is not active."
      REFERENCE
          "Malis A., Townsley M., 'PWE3 Fragmentation and Reassembly',
           RFC 4623."
      DEFVAL { 0 } -- i.e., fragmentation not desired
      ::= { pwEntry 26 }

   pwRmtFragCapability OBJECT-TYPE
      SYNTAX        PwFragStatus
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
          "The status of the fragmentation based on the local
           configuration and the peer capabilities as received from
           the peer when a control protocol is used."
      REFERENCE
          "Malis A., Townsley M., 'PWE3 Fragmentation and Reassembly',
           RFC 4623."
      ::= { pwEntry 27 }

   pwFcsRetentionCfg OBJECT-TYPE
      SYNTAX        INTEGER {
                    fcsRetentionDisable  (1),
                    fcsRetentionEnable   (2)
```

```
    }
    MAX-ACCESS    read-create
    STATUS        current
    DESCRIPTION
        "The local configuration of Frame Check Sequence (FCS)
         retention for this PW.  FCS retention can be configured for
         PW types High-Level Data Link Control (HDLC), Point-to-Point
         Protocol (PPP), and Ethernet only.  If the implementation
         does not support FCS retention, an error MUST be reported in
         pwFcsRetentionStatus.  This object MAY be changed only if
         the PW is not active."
    REFERENCE
        "Malis A., et al., 'PWE3 Frame Check Sequence Retention',
         RFC 4720."
    DEFVAL { fcsRetentionDisable }
    ::= { pwEntry 28 }

  pwFcsRetentionStatus OBJECT-TYPE
    SYNTAX   BITS {
             remoteIndicationUnknown     (0),
             remoteRequestFcsRetention   (1),
             fcsRetentionEnabled         (2),
             fcsRetentionDisabled        (3),
             localFcsRetentionCfgErr     (4),
             fcsRetentionFcsSizeMismatch (5)
             }
    MAX-ACCESS    read-only
    STATUS        current
    DESCRIPTION
       "The status of the FCS retention negotiation process based on
        local configuration and the remote advertisement.

        remoteIndicationUnknown - set if a FEC has not been received
           from the remote.

        remoteRequestFcsRetention - indicates that the peer has
           requested FCS retention.  FCS retention will be used if
           the local node is capable and configured to use it for
           this PW.

        fcsRetentionEnabled - FCS retention is enabled (both peers
           were configured for FCS retention for signaled PW, or the
           local node is configured and capable of FCS retention for
           manually assigned PWs).

        fcsRetentionDisabled - FCS retention is disabled (not
           configured locally or not advertised by the peer).
```

```
          localFcsRetentionCfgErr - set if the local node has been
             configured for FCS retention but is not capable to support
             it.

          fcsRetentionFcsSizeMismatch - set if there is an FCS size
             mismatch between the local and the peer node.
        "
      REFERENCE
          "Malis A., et al., 'PWE3 Frame Check Sequence Retention',
           RFC 4720"
      ::= { pwEntry 29 }

   pwOutboundLabel OBJECT-TYPE
      SYNTAX        Unsigned32
      MAX-ACCESS    read-create
      STATUS        current
      DESCRIPTION
          "The PW label used in the outbound direction (i.e., toward
           the PSN).  It might be set manually if pwOwner is 'manual';
           otherwise, it is set automatically.
           For MPLS, MPLS over IP, or MPLS over Generic Routing
           Encapsulation (GRE) PSN, it represents the 20-bit PW tag;
           for L2TP, it represents the 32-bit Session ID; and for
           IP PSN, it represents the destination UDP port number.
           If the label is not yet known (signaling in process), the
           object SHOULD return a value of 0xFFFFFFFF.
           For manual configuration, this object MAY be changed only
           if the PW is not active."
      ::= { pwEntry 30 }

   pwInboundLabel OBJECT-TYPE
      SYNTAX        Unsigned32
      MAX-ACCESS    read-create
      STATUS        current
      DESCRIPTION
          "The PW label used in the inbound direction (i.e., packets
           received from the PSN).  It may be set manually if pwOwner
           is 'manual'; otherwise, it is set automatically.
           For MPLS, MPLS over IP, or MPLS over GRE PSN, it represents
           the 20-bit PW tag; for L2TP, it represents the 32-bit
           Session ID; and for IP PSN, it represents the source
           UDP port number.
           If the label is not yet known (signaling in process), the
           object SHOULD return a value of 0xFFFFFFFF.
           For manual configuration, this object MAY be changed only
           if the PW is not active."
      ::= { pwEntry 31 }
```

```
  pwName  OBJECT-TYPE
     SYNTAX        SnmpAdminString
     MAX-ACCESS    read-create
     STATUS        current
     DESCRIPTION
         "The canonical name assigned to the PW.  This object MAY be
          changed at any time."
     ::= { pwEntry 32 }

  pwDescr OBJECT-TYPE
     SYNTAX        SnmpAdminString
     MAX-ACCESS    read-create
     STATUS        current
     DESCRIPTION
         "A textual string containing information about the PW.
          If there is no description, this object contains a zero-
          length string.  This object MAY be changed at any time."
     ::= { pwEntry 33 }

  pwCreateTime OBJECT-TYPE
     SYNTAX        TimeStamp
     MAX-ACCESS    read-only
     STATUS        current
     DESCRIPTION
         "The value of sysUpTime at the time this PW was created."
     ::= { pwEntry 34 }

  pwUpTime  OBJECT-TYPE
     SYNTAX        TimeTicks
     MAX-ACCESS    read-only
     STATUS        current
     DESCRIPTION
         "Specifies the time since last change of pwOperStatus to
          Up(1)."
     ::= { pwEntry 35 }

  pwLastChange OBJECT-TYPE
     SYNTAX        TimeTicks
     MAX-ACCESS    read-only
     STATUS        current
     DESCRIPTION
        "The value of sysUpTime at the time the PW entered
         its current operational state.  If the current state was
         entered prior to the last re-initialization of the local
         network management subsystem, then this object contains a
         zero value."
     ::= { pwEntry 36 }
```

```
  pwAdminStatus OBJECT-TYPE
     SYNTAX   INTEGER {
                 up(1),     -- ready to pass packets
                 down(2),
                 testing(3) -- in a test mode
     }
     MAX-ACCESS    read-create
     STATUS        current
     DESCRIPTION
         "The desired operational status of this PW.  This object MAY
          be set at any time."
     ::= { pwEntry 37 }

  pwOperStatus OBJECT-TYPE
     SYNTAX        PwOperStatusTC
     MAX-ACCESS    read-only
     STATUS        current
     DESCRIPTION
          "This object indicates the operational status of the PW; it
           does not reflect the status of the Customer Edge (CE) bound
           interface.  It is set to down only if pwNotForwarding,
           psnFacingPwRxFault, or psnFacingPwTxFault indications are
           set in pwLocalStatus or pwRemoteStatus.
           It indicates 'lowerLayerDown' if the only reason for
           not being in the 'up' state is that either the outer tunnel
           or physical layer of the network side is in the 'down'
           state.
           All other states are declared based on the description
           of the PwOperStatusTC.
           "
     ::= { pwEntry 38 }

  pwLocalStatus OBJECT-TYPE
     SYNTAX        PwStatus
     MAX-ACCESS    read-only
     STATUS        current
     DESCRIPTION
          "Indicates the status of the PW in the local node.
           The various indications in this object SHOULD be
           available independent of the ability of the local node to
           advertise them or the remote node to accept these status
           indications through the control protocol.
          "
     ::= { pwEntry 39 }

  pwRemoteStatusCapable OBJECT-TYPE
     SYNTAX        INTEGER {
            notApplicable    (1),
```

```
            notYetKnown      (2),
            remoteCapable    (3),
            remoteNotCapable (4)
        }
        MAX-ACCESS    read-only
        STATUS        current
        DESCRIPTION
             "Indicates the remote node capability to advertise the
              PW status notification.
              notApplicable SHOULD be reported for a manually set PW, or
              if the local node is not capable of accepting the status
              notification object.
              notYetKnown SHOULD be reported if the signaling protocol
              has not yet finished the process of capability
              determination.
              remoteCapable and remoteNotcapable SHOULD be reported
              based on the initial signaling exchange that has
              determined the remote node capability.
            "
        ::= { pwEntry 40 }

    pwRemoteStatus OBJECT-TYPE
        SYNTAX        PwStatus
        MAX-ACCESS    read-only
        STATUS        current
        DESCRIPTION
             "Indicates the status of the PW as was advertised by the
              remote.  If the remote is not capable of advertising the
              status object, or the local node is not able to accept
              the status object through signaling, then the applicable
              bit is 'pwNotForwarding', which is set if the remote has
              sent label release or label withdraw for this PW.
            "
        ::= { pwEntry 41 }

    pwTimeElapsed OBJECT-TYPE
        SYNTAX  HCPerfTimeElapsed
        MAX-ACCESS  read-only
        STATUS  current
        DESCRIPTION
             "The number of seconds, including partial seconds,
              that have elapsed since the beginning of the current
              interval measurement period."
        ::= { pwEntry 42 }

    pwValidIntervals OBJECT-TYPE
        SYNTAX  HCPerfValidIntervals
        MAX-ACCESS  read-only
```

```
      STATUS  current
      DESCRIPTION
         "The number of previous 15-minute intervals
         for which data was collected."
      ::= { pwEntry 43 }

  pwRowStatus OBJECT-TYPE
      SYNTAX        RowStatus
      MAX-ACCESS    read-create
      STATUS        current
      DESCRIPTION
          "For creating, modifying, and deleting this row.
           This object MAY be changed at any time."
      ::= { pwEntry 44 }

  pwStorageType OBJECT-TYPE
      SYNTAX        StorageType
      MAX-ACCESS    read-create
      STATUS        current
      DESCRIPTION
          "This variable indicates the storage type for this
           object."
      DEFVAL { nonVolatile }
      ::= { pwEntry 45 }

  pwOamEnable  OBJECT-TYPE
      SYNTAX        TruthValue
      MAX-ACCESS    read-create
      STATUS        current
      DESCRIPTION
          "This variable indicates if OAM is enabled for this
           PW.  It MAY be changed at any time."
      DEFVAL { true }
      ::= { pwEntry 46 }

  pwGenAGIType OBJECT-TYPE
      SYNTAX        PwGenIdType
      MAX-ACCESS    read-create
      STATUS        current
      DESCRIPTION
          "This variable indicates the AGI type if generalized FEC
           (129) is used for PW signaling or configuration.  It SHOULD
           return the value of zero otherwise."
      DEFVAL { 0 }
      ::= { pwEntry 47 }

  pwGenLocalAIIType OBJECT-TYPE
      SYNTAX        PwGenIdType
```

```
      MAX-ACCESS    read-create
      STATUS        current
      DESCRIPTION
          "This object is the type of the local forwarder
           attachment individual identifier (AII) to be used
           by this PW if generalized FEC (129) is used for PW
           signaling or configuration."
      DEFVAL { 0 }
      ::= { pwEntry 48 }

   pwGenRemoteAIIType OBJECT-TYPE
      SYNTAX        PwGenIdType
      MAX-ACCESS    read-create
      STATUS        current
      DESCRIPTION
          "This object is the type of the remote forwarder
           attachment individual identifier (AII) to be used
           by this PW if generalized FEC (129) is used for PW
           signaling or configuration."
      DEFVAL { 0 }
      ::= { pwEntry 49 }

   -- End of the PW Virtual Connection Table

   -- PW Performance Table

   pwPerfCurrentTable  OBJECT-TYPE
      SYNTAX        SEQUENCE OF PwPerfCurrentEntry
      MAX-ACCESS    not-accessible
      STATUS        current
      DESCRIPTION
           "This table provides per-PW performance information for
            the current interval."
      ::= { pwObjects 3 }

   pwPerfCurrentEntry OBJECT-TYPE
      SYNTAX        PwPerfCurrentEntry
      MAX-ACCESS    not-accessible
      STATUS        current
      DESCRIPTION
           "An entry in this table is created by the agent for
            every PW."
      INDEX  { pwIndex }
      ::= { pwPerfCurrentTable 1 }

   PwPerfCurrentEntry ::= SEQUENCE {
         pwPerfCurrentInHCPackets         HCPerfCurrentCount,
         pwPerfCurrentInHCBytes           HCPerfCurrentCount,
```

```
        pwPerfCurrentOutHCPackets       HCPerfCurrentCount,
        pwPerfCurrentOutHCBytes         HCPerfCurrentCount,
        pwPerfCurrentInPackets          PerfCurrentCount,
        pwPerfCurrentInBytes            PerfCurrentCount,
        pwPerfCurrentOutPackets         PerfCurrentCount,
        pwPerfCurrentOutBytes           PerfCurrentCount
        }

  pwPerfCurrentInHCPackets OBJECT-TYPE
     SYNTAX        HCPerfCurrentCount
     MAX-ACCESS    read-only
     STATUS        current
     DESCRIPTION
          "High-capacity counter for number of packets received by
           the PW (from the PSN) in the current 15-minute
           interval.  This is the 64-bit version of
           pwPerfCurrentInPackets, if pwPerfCurrentInHCPackets
           is supported according to the rules spelled out
           in RFC 2863."
     ::= { pwPerfCurrentEntry 1 }

  pwPerfCurrentInHCBytes OBJECT-TYPE
     SYNTAX        HCPerfCurrentCount
     MAX-ACCESS    read-only
     STATUS        current
     DESCRIPTION
          "High-capacity counter for number of bytes received by the
           PW (from the PSN) in the current 15-minute interval.
           This is the 64-bit version of pwPerfCurrentInBytes, if
           pwPerfCurrentInHCBytes is supported according to the
           rules spelled out in RFC 2863."
     ::= { pwPerfCurrentEntry 2 }

  pwPerfCurrentOutHCPackets OBJECT-TYPE
     SYNTAX        HCPerfCurrentCount
     MAX-ACCESS    read-only
     STATUS        current
     DESCRIPTION
          "High-capacity counter for number of packets forwarded by
           the PW (to the PSN) in the current 15-minute interval.
           This is the 64-bit version of pwPerfCurrentOutPackets,
           if pwPerfCurrentOutHCPackets is supported according to
           the rules spelled out in RFC 2863."
     ::= { pwPerfCurrentEntry 3 }

  pwPerfCurrentOutHCBytes OBJECT-TYPE
     SYNTAX        HCPerfCurrentCount
     MAX-ACCESS    read-only
```

```
      STATUS        current
      DESCRIPTION
           "High-capacity counter for number of bytes forwarded by
            the PW (to the PSN) in the current 15-minute interval.
            This is the 64-bit version of pwPerfCurrentOutBytes,
            if pwPerfCurrentOutHCBytes is supported according to
            the rules spelled out in RFC 2863."
      ::= { pwPerfCurrentEntry 4 }

   pwPerfCurrentInPackets OBJECT-TYPE
      SYNTAX        PerfCurrentCount
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
           "The counter for number of packets received by the PW (from
            the PSN) in the current 15-minute interval.
            This is the 32-bit version of pwPerfCurrentInHCPackets,
            if pwPerfCurrentInHCPackets is supported according to
            the rules spelled out in RFC 2863."
      ::= { pwPerfCurrentEntry 5 }

   pwPerfCurrentInBytes OBJECT-TYPE
      SYNTAX        PerfCurrentCount
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
           "The counter for number of bytes received by the
            PW (from the PSN) in the current 15-minute interval.
            It MUST be equal to the least significant 32 bits of
            pwPerfCurrentInHCBytes, if pwPerfCurrentInHCBytes is
            supported according to the rules spelled out in RFC 2863."
      ::= { pwPerfCurrentEntry 6 }

   pwPerfCurrentOutPackets OBJECT-TYPE
      SYNTAX        PerfCurrentCount
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
           "The counter for number of packets forwarded by
            the PW (to the PSN) in the current 15-minute interval.
            It MUST be equal to the least significant 32 bits of
            pwPerfCurrentOutHCPackets, if
            pwPerfCurrentOutHCPackets is supported according to the
            rules spelled out in RFC 2863."
      ::= { pwPerfCurrentEntry 7 }

   pwPerfCurrentOutBytes OBJECT-TYPE
      SYNTAX        PerfCurrentCount
```

```
     MAX-ACCESS    read-only
     STATUS        current
     DESCRIPTION
          "The counter for number of bytes forwarded by
           the PW (to the PSN) in the current 15-minute interval.
           It MUST be equal to the least significant 32 bits of
           pwPerfCurrentOutHCBytes, if pwPerfCurrentOutHCBytes is
           supported according to the rules spelled out in RFC 2863."
     ::= { pwPerfCurrentEntry 8 }

  -- End of the PW Performance Current Table

  -- PW Performance Interval Table

  pwPerfIntervalTable  OBJECT-TYPE
     SYNTAX        SEQUENCE OF PwPerfIntervalEntry
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
          "This table provides per-PW performance information for
           each interval."
     ::= { pwObjects 4 }

  pwPerfIntervalEntry OBJECT-TYPE
     SYNTAX        PwPerfIntervalEntry
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
          "An entry in this table is created by the agent for every
           PW."
     INDEX  { pwIndex, pwPerfIntervalNumber }
     ::= { pwPerfIntervalTable 1 }

  PwPerfIntervalEntry ::= SEQUENCE {
        pwPerfIntervalNumber               Integer32,
        pwPerfIntervalValidData            TruthValue,
        pwPerfIntervalTimeElapsed          HCPerfTimeElapsed,
        pwPerfIntervalInHCPackets          HCPerfIntervalCount,
        pwPerfIntervalInHCBytes            HCPerfIntervalCount,
        pwPerfIntervalOutHCPackets         HCPerfIntervalCount,
        pwPerfIntervalOutHCBytes           HCPerfIntervalCount,
        pwPerfIntervalInPackets            PerfIntervalCount,
        pwPerfIntervalInBytes              PerfIntervalCount,
        pwPerfIntervalOutPackets           PerfIntervalCount,
        pwPerfIntervalOutBytes             PerfIntervalCount
                          }

  pwPerfIntervalNumber OBJECT-TYPE
```

```
      SYNTAX  Integer32 (1..96)
      MAX-ACCESS  not-accessible
      STATUS  current
      DESCRIPTION
           "A number N, between 1 and 96, which 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 to 32.  The maximum range of N is 1 through 96."
      REFERENCE
          "Tesink, K. 'Definitions of Managed Objects for the
           SONET/SDH Interface Type', RFC 2558"
      ::= { pwPerfIntervalEntry 1 }

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

   pwPerfIntervalTimeElapsed OBJECT-TYPE
      SYNTAX      HCPerfTimeElapsed
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
         "The duration of this interval in seconds."
      ::= { pwPerfIntervalEntry 3 }

   pwPerfIntervalInHCPackets OBJECT-TYPE
      SYNTAX        HCPerfIntervalCount
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
           "High-capacity counter for number of packets received by
            the PW (from the PSN) during the interval.  This is the
            64-bit version of pwPerfIntervalInPackets, if
            pwPerfIntervalInHCPackets is supported according to the
            rules spelled out in RFC 2863."
      ::= { pwPerfIntervalEntry 4 }

   pwPerfIntervalInHCBytes OBJECT-TYPE
      SYNTAX        HCPerfIntervalCount
```

```
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
           "High-capacity counter for number of bytes received by the
            PW (from the PSN) during the interval.
            This is the 64-bit version of pwPerfIntervalInBytes, if
            pwPerfIntervalInHCBytes is supported according to the
            rules spelled out in RFC 2863."
      ::= { pwPerfIntervalEntry 5 }

   pwPerfIntervalOutHCPackets OBJECT-TYPE
      SYNTAX        HCPerfIntervalCount
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
           "High-capacity counter for number of packets forwarded by
            the PW (to the PSN) during the interval.
            This is the 64-bit version of pwPerfIntervalOutPackets,
            if pwPerfIntervalOutHCPackets is supported according to
            the rules spelled out in RFC 2863."
      ::= { pwPerfIntervalEntry 6 }

   pwPerfIntervalOutHCBytes OBJECT-TYPE
      SYNTAX        HCPerfIntervalCount
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
           "High-capacity counter for number of bytes forwarded by
            the PW (to the PSN) during the interval.
            This is the 64-bit version of pwPerfIntervalOutBytes,
            if pwPerfIntervalOutHCBytes is supported according to
            the rules spelled out in RFC 2863."
      ::= { pwPerfIntervalEntry 7 }

   pwPerfIntervalInPackets OBJECT-TYPE
      SYNTAX        PerfIntervalCount
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
          "This value represents the number of packets received
           by this PW during the interval.
           It MUST be equal to the least significant 32 bits of
           pwPerfIntervalInHCPackets, if pwPerfIntervalInHCPackets
           is supported according to the rules spelled out in
           RFC 2863."
      ::= { pwPerfIntervalEntry 8 }

   pwPerfIntervalInBytes OBJECT-TYPE
```

```
     SYNTAX        PerfIntervalCount
     MAX-ACCESS    read-only
     STATUS        current
     DESCRIPTION
          "This value represents the number of bytes received by
          this PW during the interval.  It MUST be equal to the
          least significant 32 bits of pwPerfIntervalInHCBytes, if
          pwPerfIntervalInHCBytes is supported according to the
          rules spelled out in RFC 2863."
     ::= { pwPerfIntervalEntry 9 }

  pwPerfIntervalOutPackets OBJECT-TYPE
     SYNTAX        PerfIntervalCount
     MAX-ACCESS    read-only
     STATUS        current
     DESCRIPTION
         "This value represents the number of packets sent by this
          PW during the interval.
          It MUST be equal to the least significant 32 bits of
          pwPerfIntervalOutHCPackets, if
          pwPerfIntervalOutHCPackets is supported according to the
          rules spelled out in RFC 2863."
     ::= { pwPerfIntervalEntry 10 }

  pwPerfIntervalOutBytes OBJECT-TYPE
     SYNTAX        PerfIntervalCount
     MAX-ACCESS    read-only
     STATUS        current
     DESCRIPTION
         "This value represents the number of bytes sent by this
          PW during the interval.
          It MUST be equal to the least significant 32
          bits of pwPerfIntervalOutHCBytes,
          if pwPerfIntervalOutHCBytes is supported according to
          the rules spelled out in RFC 2863."
     ::= { pwPerfIntervalEntry 11 }

  -- End of the PW Performance Interval Table

  -- PW Performance 1-day Interval Table

  pwPerf1DayIntervalTable  OBJECT-TYPE
     SYNTAX        SEQUENCE OF PwPerf1DayIntervalEntry
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
          "This table provides per-PW performance information for
           the current day's measurement and the previous day's
```

```
           interval."
      ::= { pwObjects 5 }

  pwPerf1DayIntervalEntry OBJECT-TYPE
     SYNTAX        PwPerf1DayIntervalEntry
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
          "An entry in this table is created by the agent for every
           PW."
     INDEX  { pwIndex, pwPerf1DayIntervalNumber }

     ::= { pwPerf1DayIntervalTable 1 }

  PwPerf1DayIntervalEntry ::= SEQUENCE {
        pwPerf1DayIntervalNumber               Unsigned32,
        pwPerf1DayIntervalValidData            TruthValue,
        pwPerf1DayIntervalTimeElapsed          HCPerfTimeElapsed,
        pwPerf1DayIntervalInHCPackets          Counter64,
        pwPerf1DayIntervalInHCBytes            Counter64,
        pwPerf1DayIntervalOutHCPackets         Counter64,
        pwPerf1DayIntervalOutHCBytes           Counter64
        }

  pwPerf1DayIntervalNumber OBJECT-TYPE
     SYNTAX      Unsigned32(1..31)
     MAX-ACCESS  not-accessible
     STATUS      current
     DESCRIPTION
       "History Data Interval number.  Interval 1 is the current day's
        measurement period, interval 2 is the most recent previous
        day, and interval 30 is 31 days ago.  Intervals 3..31 are
        optional."
     ::= { pwPerf1DayIntervalEntry 1 }

  pwPerf1DayIntervalValidData OBJECT-TYPE
     SYNTAX        TruthValue
     MAX-ACCESS    read-only
     STATUS        current
     DESCRIPTION
         "This variable indicates if the data for this interval
          is valid."
     ::= { pwPerf1DayIntervalEntry 2 }

  pwPerf1DayIntervalTimeElapsed OBJECT-TYPE
     SYNTAX       HCPerfTimeElapsed
     UNITS        "seconds"
     MAX-ACCESS   read-only
```

```
      STATUS       current
      DESCRIPTION
        "The number of seconds in the 1-day interval over which the
         performance monitoring information is actually counted.
         This value will be the same as the interval duration except
         in a situation where performance monitoring data could not
         be collected for any reason or where agent clock adjustments
         have been made."
      ::= { pwPerf1DayIntervalEntry 3 }

   pwPerf1DayIntervalInHCPackets OBJECT-TYPE
      SYNTAX        Counter64
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
           "High-capacity counter for the total number of packets
            received by the PW (from the PSN)."
      ::= { pwPerf1DayIntervalEntry 4 }

   pwPerf1DayIntervalInHCBytes OBJECT-TYPE
      SYNTAX        Counter64
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
           "High-capacity counter for the total number of bytes
            received by the PW (from the PSN)."
      ::= { pwPerf1DayIntervalEntry 5 }

   pwPerf1DayIntervalOutHCPackets OBJECT-TYPE
      SYNTAX        Counter64
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
           "High-capacity counter for the total number of packets
            forwarded by the PW (to the PSN)."
      ::= { pwPerf1DayIntervalEntry 6 }

   pwPerf1DayIntervalOutHCBytes OBJECT-TYPE
      SYNTAX        Counter64
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
           "High-capacity counter for the total number of bytes
            forwarded by the PW (to the PSN)."
      ::= { pwPerf1DayIntervalEntry 7 }

   -- End of the PW Performance 1-day Interval Table
```

```
  -- Error counter scalar

  pwPerfTotalErrorPackets OBJECT-TYPE
     SYNTAX        Counter32
     MAX-ACCESS    read-only
     STATUS        current
     DESCRIPTION
          "Counter for number of errors at the PW processing level,
           for example, packets received with unknown PW label."
     ::= { pwObjects 6 }

  -- Reverse mapping tables

  -- The PW ID mapping table
  pwIndexMappingTable  OBJECT-TYPE
     SYNTAX        SEQUENCE OF PwIndexMappingEntry
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
          "This table enables the reverse mapping of the unique
           PWid parameters [peer IP, PW type, and PW ID] and the
           pwIndex.  The table is not applicable for PWs created
           manually or by using the generalized FEC."
     ::= { pwObjects 7 }

  pwIndexMappingEntry OBJECT-TYPE
     SYNTAX        PwIndexMappingEntry
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
          "An entry in this table MUST be created by the agent for
           every PW created by the pwTable for which pwOwner
           equals pwIdFecSignaling and pwID is not zero.

           Implementers need to be aware that if the value of
           the pwIndexMappingPeerAddr (an OID) has more than
           113 sub-identifiers, then OIDs of column instances
           in this table will have more than 128 sub-identifiers
           and cannot be accessed using SNMPv1, SNMPv2c, or SNMPv3."
     INDEX  { pwIndexMappingPwType, pwIndexMappingPwID,
              pwIndexMappingPeerAddrType, pwIndexMappingPeerAddr
              }
     ::= { pwIndexMappingTable 1 }

  PwIndexMappingEntry ::= SEQUENCE {
        pwIndexMappingPwType        IANAPwTypeTC,
        pwIndexMappingPwID          PwIDType,
        pwIndexMappingPeerAddrType  InetAddressType,
```

```
        pwIndexMappingPeerAddr      InetAddress,
        pwIndexMappingPwIndex       PwIndexType
                        }

  pwIndexMappingPwType OBJECT-TYPE
     SYNTAX        IANAPwTypeTC
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
          "The PW type (indicates the service) of this PW."
     ::= { pwIndexMappingEntry 1 }

  pwIndexMappingPwID OBJECT-TYPE
     SYNTAX        PwIDType
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
          "The PW ID of this PW.  Zero if the PW is configured
           manually."
     ::= { pwIndexMappingEntry 2 }

  pwIndexMappingPeerAddrType OBJECT-TYPE
     SYNTAX        InetAddressType
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
          "IP address type of the peer node."
     ::= { pwIndexMappingEntry 3 }

  pwIndexMappingPeerAddr OBJECT-TYPE
     SYNTAX        InetAddress
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
          "IP address of the peer node."
     ::= { pwIndexMappingEntry 4 }

  pwIndexMappingPwIndex  OBJECT-TYPE
     SYNTAX        PwIndexType
     MAX-ACCESS    read-only
     STATUS        current
     DESCRIPTION
          "The value that represents the PW in the pwTable."
     ::= { pwIndexMappingEntry 5 }

  -- End of the PW ID mapping table

  -- The peer mapping table
```

```
  pwPeerMappingTable  OBJECT-TYPE
     SYNTAX        SEQUENCE OF PwPeerMappingEntry
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
          "This table provides reverse mapping of the existing PW
           based on PW type and PW ID ordering.  This table is
           typically useful for the element management system (EMS)
           ordered query of existing PWs."
     ::= { pwObjects 8 }

  pwPeerMappingEntry OBJECT-TYPE
     SYNTAX        PwPeerMappingEntry
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
          "An entry in this table is created by the agent for every
           PW entry in the pwTable.

          Implementers need to be aware that if the value of the
          pwPeerMappingPeerAddr (an OID) has more than 113
          sub-identifiers, then OIDs of column instances in this
          table will have more than 128 sub-identifiers and cannot
          be accessed using SNMPv1, SNMPv2c, or SNMPv3."
     INDEX  { pwPeerMappingPeerAddrType, pwPeerMappingPeerAddr,
              pwPeerMappingPwType,  pwPeerMappingPwID }

     ::= { pwPeerMappingTable 1 }

  PwPeerMappingEntry ::= SEQUENCE {
        pwPeerMappingPeerAddrType         InetAddressType,
        pwPeerMappingPeerAddr             InetAddress,
        pwPeerMappingPwType               IANAPwTypeTC,
        pwPeerMappingPwID                 PwIDType,
        pwPeerMappingPwIndex              PwIndexType
                         }

  pwPeerMappingPeerAddrType OBJECT-TYPE
     SYNTAX        InetAddressType
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
          "IP address type of the peer node."
     ::= { pwPeerMappingEntry 1 }

  pwPeerMappingPeerAddr OBJECT-TYPE
     SYNTAX        InetAddress
     MAX-ACCESS    not-accessible
```

```
      STATUS        current
      DESCRIPTION
           "IP address of the peer node."
      ::= { pwPeerMappingEntry 2 }

   pwPeerMappingPwType OBJECT-TYPE
      SYNTAX        IANAPwTypeTC
      MAX-ACCESS    not-accessible
      STATUS        current
      DESCRIPTION
           "The PW type (indicates the emulated service) of this PW."
      ::= { pwPeerMappingEntry 3 }

   pwPeerMappingPwID OBJECT-TYPE
      SYNTAX        PwIDType
      MAX-ACCESS    not-accessible
      STATUS        current
      DESCRIPTION
           "The PW ID of this PW.  Zero if the PW is configured
            manually."
      ::= { pwPeerMappingEntry 4 }

   pwPeerMappingPwIndex  OBJECT-TYPE
      SYNTAX        PwIndexType
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
          "The value that represents the PW in the pwTable."
      ::= { pwPeerMappingEntry 5 }

   -- End of the peer mapping table

   -- End of the reverse mapping tables

   pwUpDownNotifEnable  OBJECT-TYPE
      SYNTAX      TruthValue
      MAX-ACCESS  read-write
      STATUS      current
      DESCRIPTION
         "If this object is set to true(1), then it enables
          the emission of pwUp and pwDown
          notifications; otherwise, these notifications are not
          emitted."
      REFERENCE
         "See also [RFC3413] for explanation that
          notifications are under the ultimate control of the
          MIB module in this document."
      DEFVAL { false }
```

```
     ::= { pwObjects 9 }

  pwDeletedNotifEnable  OBJECT-TYPE
     SYNTAX      TruthValue
     MAX-ACCESS  read-write
     STATUS      current
     DESCRIPTION
        "If this object is set to true(1), then it enables the
         emission of pwDeleted notification; otherwise, this
         notification is not emitted."
     REFERENCE
        "See also [RFC3413] for explanation that
         notifications are under the ultimate control of the
         MIB module in this document."
     DEFVAL { false }
     ::= { pwObjects 10 }

  pwNotifRate  OBJECT-TYPE
     SYNTAX      Unsigned32
     MAX-ACCESS  read-write
     STATUS      current
     DESCRIPTION
        "This object defines the maximum number of PW notifications
         that can be emitted from the device per second."
     ::= { pwObjects 11 }

  -- The Gen Fec PW ID mapping table

  pwGenFecIndexMappingTable  OBJECT-TYPE
     SYNTAX        SEQUENCE OF PwGenFecIndexMappingEntry
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
          "This table enables the reverse mapping of the unique
           PWid parameters [GroupAttachmentID, LocalAttachmentID,
           and PeerAttachmentID] and the pwIndex.  The table is
           only applicable for PW using the generalized FEC."
     ::= { pwObjects 12 }

  pwGenFecIndexMappingEntry OBJECT-TYPE
     SYNTAX        PwGenFecIndexMappingEntry
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
          "An entry in this table MUST be created by the agent for
           every PW created by the pwTable for which pwOwner
           equals genFecSignaling.
```

```
            Implementers need to be aware that if the combined value
            of pwGenFecIndexMappingAGI, pwGenFecIndexMappingLocalAII,
            and pwGenFecIndexMappingRemoteAII (OIDs) has more than
            113 sub-identifiers, then OIDs of column instances
            in this table will have more than 128 sub-identifiers
            and cannot be accessed using SNMPv1, SNMPv2c, or SNMPv3."
        INDEX  { pwGenFecIndexMappingAGIType,
                 pwGenFecIndexMappingAGI,
                 pwGenFecIndexMappingLocalAIIType,
                 pwGenFecIndexMappingLocalAII,
                 pwGenFecIndexMappingRemoteAIIType,
                 pwGenFecIndexMappingRemoteAII
                 }
        ::= { pwGenFecIndexMappingTable 1 }

    PwGenFecIndexMappingEntry ::= SEQUENCE {
        pwGenFecIndexMappingAGIType        PwGenIdType,
        pwGenFecIndexMappingAGI            PwAttachmentIdentifierType,
        pwGenFecIndexMappingLocalAIIType   PwGenIdType,
        pwGenFecIndexMappingLocalAII       PwAttachmentIdentifierType,
        pwGenFecIndexMappingRemoteAIIType  PwGenIdType,
        pwGenFecIndexMappingRemoteAII      PwAttachmentIdentifierType,
        pwGenFecIndexMappingPwIndex        PwIndexType
    }

    pwGenFecIndexMappingAGIType OBJECT-TYPE
        SYNTAX        PwGenIdType
        MAX-ACCESS    not-accessible
        STATUS        current
        DESCRIPTION
             "This object is the type of the attachment
              group identifier (AGI) that this PW belongs to."
        ::= { pwGenFecIndexMappingEntry 1 }

    pwGenFecIndexMappingAGI OBJECT-TYPE
        SYNTAX        PwAttachmentIdentifierType
        MAX-ACCESS    not-accessible
        STATUS        current
        DESCRIPTION
             "This object is an octet string representing the attachment
              group identifier (AGI) that this PW belongs to,
              which typically identifies the VPN ID."
        ::= { pwGenFecIndexMappingEntry 2 }

    pwGenFecIndexMappingLocalAIIType OBJECT-TYPE
        SYNTAX        PwGenIdType
        MAX-ACCESS    not-accessible
        STATUS        current
```

```
      DESCRIPTION
           "This object is the type of the local forwarder
            attachment individual identifier (AII) to be used
            by this PW."
      ::= { pwGenFecIndexMappingEntry 3 }

   pwGenFecIndexMappingLocalAII OBJECT-TYPE
      SYNTAX        PwAttachmentIdentifierType
      MAX-ACCESS    not-accessible
      STATUS        current
      DESCRIPTION
           "This object is an octet string representing the local
            forwarder attachment individual identifier (AII) to be used
            by this PW.  It is used as the SAII for outgoing signaling
            messages and the TAII in the incoming messages from the
            peer."
      ::= { pwGenFecIndexMappingEntry 4 }

   pwGenFecIndexMappingRemoteAIIType OBJECT-TYPE
      SYNTAX        PwGenIdType
      MAX-ACCESS    not-accessible
      STATUS        current
      DESCRIPTION
           "This object is the type of the remote forwarder
            attachment individual identifier (AII) to be used
            by this PW."
      ::= { pwGenFecIndexMappingEntry 5 }

   pwGenFecIndexMappingRemoteAII OBJECT-TYPE
      SYNTAX        PwAttachmentIdentifierType
      MAX-ACCESS    not-accessible
      STATUS        current
      DESCRIPTION
           "This object is an octet string representing the peer
            forwarder attachment individual identifier (AII) to be used
            by this PW.  It is used as the TAII for outgoing signaling
            messages and the SAII in the incoming messages from the
            peer."
      ::= { pwGenFecIndexMappingEntry 6 }

   pwGenFecIndexMappingPwIndex  OBJECT-TYPE
      SYNTAX        PwIndexType
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
           "The value that represents the PW in the pwTable."
      ::= { pwGenFecIndexMappingEntry 7 }
```

```
  -- End of the Gen Fec PW ID mapping table

  -- Notifications - PW

  pwDown NOTIFICATION-TYPE
     OBJECTS { pwOperStatus, --start of range
               pwOperStatus  --end of range
     }
     STATUS  current
     DESCRIPTION
         "This notification is generated when the pwOperStatus
          object for one or more contiguous entries in the pwTable are
          about to enter the down(2) or lowerLayerDown(6) state from
          any other state, except for transition from the
          notPresent(5) state.  For the purpose of deciding when
          these notifications occur, the lowerLayerDown(6) state
          and the down(2) state are considered to be equivalent;
          i.e., there is no notification on transition from
          lowerLayerDown(6) into down(2), and there is a trap on
          transition from any other state except down(2) (and
          notPresent) into lowerLayerDown(6).

          The included values of pwOperStatus MUST each be equal to
          down(2) or lowerLayerDown(6).  The two instances of
          pwOperStatus in this notification indicate the range of
          indexes that are affected.  Note that all the indexes of
          the two ends of the range can be derived from the
          instance identifiers of these two objects.  For cases
          where a contiguous range of cross-connects have
          transitioned into the down(2) and lowerLayerDown(6) states
          at roughly the same time, the device SHOULD issue a single
          notification for each range of contiguous indexes in an
          effort to minimize the emission of a large number of
          notifications.  If a notification has to be issued for
          just a single cross-connect entry, then the instance
          identifier (and values) of the two pwOperStatus objects
          MUST be identical."
     ::= { pwNotifications  1 }

  pwUp NOTIFICATION-TYPE
     OBJECTS { pwOperStatus, --start of range
               pwOperStatus  --end of range
     }
     STATUS  current
     DESCRIPTION
         "This notification is generated when the pwOperStatus
          object for one or more contiguous entries in the pwTable are
          about to enter the up(1) state from some other state
```

```
          except the notPresent(5) state and given that the pwDown
          notification been issued for these entries.  The included
          values of pwOperStatus MUST both be set equal to this
          new state (i.e., up(1)).  The two instances of pwOperStatus
          in this notification indicate the range of indexes that
          are affected.  Note that all the indexes of the two ends
          of the range can be derived from the instance identifiers
          of these two objects.  For cases where a contiguous range
          of cross-connects have transitioned into the up(1) state
          at roughly the same time, the device SHOULD issue a single
          notification for each range of contiguous indexes in an
          effort to minimize the emission of a large number of
          notifications.  If a notification has to be issued for
          just a single cross-connect entry, then the instance
          identifier (and values) of the two pwOperStatus objects
          MUST be identical."
     ::= { pwNotifications 2 }

  pwDeleted NOTIFICATION-TYPE
     OBJECTS { pwType,
               pwID,
               pwPeerAddrType,
               pwPeerAddr
     }
     STATUS  current
     DESCRIPTION
         "This notification is generated when the PW has been
          deleted, i.e., when the pwRowStatus has been set to
          destroy(6) or the PW has been deleted by a non-MIB
          application or due to an auto-discovery process.
         "
     ::= { pwNotifications  3 }

  -- End of notifications.

  -- Conformance information

  pwGroups      OBJECT IDENTIFIER ::= { pwConformance   1 }
  pwCompliances OBJECT IDENTIFIER ::= { pwConformance   2 }

  -- Compliance requirement for fully compliant implementations

  pwModuleFullCompliance MODULE-COMPLIANCE
      STATUS  current
      DESCRIPTION
              "The compliance statement for agents that provide full
               support for the PW MIB module.  Such devices can
               then be monitored and configured using
```

```
            this MIB module."

       MODULE  -- this module
           MANDATORY-GROUPS { pwBasicGroup,
                              pwPerformanceGeneralGroup
                            }

      GROUP pwNotificationGroup
      DESCRIPTION "This group is only mandatory for implementations
                   that can efficiently implement the notifications
                   contained in this group.
                  "

      GROUP        pwPwIdGroup
      DESCRIPTION "This group is only mandatory for implementations
                   that support the PW ID FEC.
                  "

      GROUP        pwGeneralizedFecGroup
      DESCRIPTION "This group is only mandatory for implementations
                   that support the generalized PW FEC.
                  "

      GROUP        pwFcsGroup
      DESCRIPTION "This group is only mandatory for implementations
                   that support FCS retention."

      GROUP        pwFragGroup
      DESCRIPTION "This group is only mandatory for implementations
                   that support PW fragmentation.
                  "

      GROUP        pwPwStatusGroup
      DESCRIPTION "This group is only mandatory for implementations
                   that support PW status notification.
                  "

      GROUP        pwGetNextGroup
      DESCRIPTION "This group is only mandatory for implementations
                   where the pwIndex may be any arbitrary value
                   and the EMS would require retrieval of the next
                   free index."

      GROUP        pwPriorityGroup
      DESCRIPTION "This group is only mandatory for implementations
                   that support the controlling the PW setup and
                   holding priority."
```

```
     GROUP        pwAttachmentGroup
     DESCRIPTION "This group is only mandatory for implementations
                  that support attachment of two PWs (PW stitching)."

     GROUP        pwPeformance1DayIntervalGroup
     DESCRIPTION "This group is only mandatory for implementations
                  that support PW performance gathering in 1-day
                  intervals."

     GROUP        pwPerformanceIntervalGeneralGroup
     DESCRIPTION "This group is only mandatory for implementations
                  that support PW performance gathering in 15-
                  minute intervals."

     GROUP        pwPeformanceIntervalGroup
     DESCRIPTION "This group is only mandatory for implementations
                  that support PW performance gathering in 15-
                  minute intervals."

     GROUP        pwHCPeformanceIntervalGroup
     DESCRIPTION "This group is only mandatory for implementations
                  where at least one of the interval performance
                  counters wraps around too quickly based on the
                  criteria specified in RFC 2863 for high-capacity
                  counters."

     GROUP        pwMappingTablesGroup
     DESCRIPTION "This group is only mandatory for implementations
                  that support reverse mapping of PW indexes to
                  the pwIndex and the peer mapping table."

     GROUP        pwSignalingGroup
     DESCRIPTION "This group is only mandatory for implementations
                  that support the PW signaling."

     GROUP        pwNotificationControlGroup
     DESCRIPTION "This group is only mandatory for implementations
                  that support the PW notifications."

     OBJECT       pwAdminStatus
     SYNTAX       INTEGER { up(1), down(2) }
     DESCRIPTION "Support of the value testing(3) is not
                  required."

     OBJECT       pwOperStatus
     SYNTAX       INTEGER { up(1), down(2), notPresent(5),
                  lowerLayerDown(6) }
     DESCRIPTION "Support of the values testing(3) and dormant(4)
```

```
                is not required."

      OBJECT       pwRowStatus
      SYNTAX       RowStatus { active(1), notInService(2),
                               notReady(3) }
      WRITE-SYNTAX RowStatus { active(1), notInService(2),
                               createAndGo(4), destroy(6)
                             }
      DESCRIPTION "Support for createAndWait is not required.  Support
                   of notReady is not required for implementations
                   that do not support signaling, or if it is
                   guaranteed that the conceptual row has all the
                   required information to create the PW when the
                   row has been created by the agent or written by
                   the operator."

      OBJECT       pwPeerAddrType
      SYNTAX       InetAddressType { unknown(0), ipv4(1) }
      MIN-ACCESS   read-only
      DESCRIPTION "Only unknown(0) and ipv4(1) are required.
                   Implementations that support only IPv4 MAY support
                   read-only access."

      OBJECT       pwPeerAddr
      SYNTAX       InetAddress (SIZE(0|4))
      DESCRIPTION "An implementation is only required to support
                   0, 4 address sizes."

      OBJECT       pwStorageType
      MIN-ACCESS   read-only
      DESCRIPTION "Write access is not required."

      OBJECT       pwNotifRate
      MIN-ACCESS   read-only
      DESCRIPTION "Write access is not required."

        ::= { pwCompliances 1 }

  -- Compliance requirement for read-only compliant implementations

  pwModuleReadOnlyCompliance MODULE-COMPLIANCE
      STATUS  current
      DESCRIPTION
              "The compliance statement for agents that provide read-
               only support for the PW MIB module.  Such devices can
               then be monitored but cannot be configured using this
               MIB module."
```

```
      MODULE  -- this module
          MANDATORY-GROUPS { pwBasicGroup
                           }

      GROUP        pwNotificationGroup
      DESCRIPTION "This group is only mandatory for implementations
                   that can efficiently implement the notifications
                   contained in this group."

      GROUP        pwPwIdGroup
      DESCRIPTION "This group is only mandatory for implementations
                   that support the PW ID FEC.
                  "

      GROUP        pwGeneralizedFecGroup
      DESCRIPTION "This group is only mandatory for implementations
                   that support the generalized PW FEC.
                  "

      GROUP        pwFcsGroup
      DESCRIPTION "This group is only mandatory for implementations
                   that support FCS retention."

      GROUP        pwFragGroup
      DESCRIPTION "This group is only mandatory for implementations
                   that support PW fragmentation.
                  "

      GROUP        pwPwStatusGroup
      DESCRIPTION "This group is only mandatory for implementations
                   that support PW status notification.
                  "

      GROUP        pwGetNextGroup
      DESCRIPTION "This group is only mandatory for implementations
                   where the pwIndex may be any arbitrary value
                   and the EMS would require retrieval of the next
                   free index."

      GROUP        pwPriorityGroup
      DESCRIPTION "This group is only mandatory for implementations
                   that support the controlling the PW setup and
                   holding priority."

      GROUP        pwAttachmentGroup
      DESCRIPTION "This group is only mandatory for implementations
                   that support attachment of two PWs (PW stitching)."
```

```
     GROUP        pwPeformance1DayIntervalGroup
     DESCRIPTION "This group is only mandatory for implementations
                  that support PW performance gathering in 1-day
                  intervals."

     GROUP        pwPerformanceIntervalGeneralGroup
     DESCRIPTION "This group is only mandatory for implementations
                  that support PW performance gathering in 15-
                  minute intervals."

     GROUP        pwPeformanceIntervalGroup
     DESCRIPTION "This group is only mandatory for implementations
                  that support PW performance gathering in 15-
                  minute intervals."

     GROUP        pwHCPeformanceIntervalGroup
     DESCRIPTION "This group is only mandatory for implementations
                  where at least one of the interval performance
                  counters wraps around too quickly based on the
                  criteria specified in RFC 2863 for high-capacity
                  counters."

     GROUP        pwMappingTablesGroup
     DESCRIPTION "This group is only mandatory for implementations
                  that support reverse mapping of PW indexes to
                  the pwIndex and the peer mapping table."

     GROUP        pwSignalingGroup
     DESCRIPTION "This group is only mandatory for implementations
                  that support the PW signaling."

     GROUP        pwNotificationControlGroup
     DESCRIPTION "This group is only mandatory for implementations
                  that support the PW notifications."

     OBJECT       pwType
     MIN-ACCESS   read-only
     DESCRIPTION "Write access is not required."

     OBJECT       pwOwner
     MIN-ACCESS   read-only
     DESCRIPTION "Write access is not required."

     OBJECT       pwPsnType
     MIN-ACCESS   read-only
     DESCRIPTION "Write access is not required."

     OBJECT       pwSetUpPriority
```

```
     MIN-ACCESS   read-only
     DESCRIPTION "Write access is not required."

     OBJECT       pwHoldingPriority
     MIN-ACCESS   read-only
     DESCRIPTION "Write access is not required."

     OBJECT       pwPeerAddrType
     SYNTAX       InetAddressType { unknown(0), ipv4(1) }
     MIN-ACCESS   read-only
     DESCRIPTION "Write access is not required.  Only unknown(0) and
                  ipv4(1) are required."

     OBJECT       pwPeerAddr
     SYNTAX       InetAddress (SIZE(0|4))
     MIN-ACCESS   read-only
     DESCRIPTION "Write access is not required.  An implementation
                  is only required to support 0, 4 address sizes."

     OBJECT       pwAttachedPwIndex
     MIN-ACCESS   read-only
     DESCRIPTION "Write access is not required."

     OBJECT       pwIfIndex
     MIN-ACCESS   read-only
     DESCRIPTION "Write access is not required."

     OBJECT       pwID
     MIN-ACCESS   read-only
     DESCRIPTION "Write access is not required."

     OBJECT       pwLocalGroupID
     MIN-ACCESS   read-only
     DESCRIPTION "Write access is not required."

     OBJECT       pwGroupAttachmentID
     MIN-ACCESS   read-only
     DESCRIPTION "Write access is not required."

     OBJECT       pwLocalAttachmentID
     MIN-ACCESS   read-only
     DESCRIPTION "Write access is not required."

     OBJECT       pwRemoteAttachmentID
     MIN-ACCESS   read-only
     DESCRIPTION "Write access is not required."

     OBJECT       pwCwPreference
```

```
    MIN-ACCESS   read-only
    DESCRIPTION "Write access is not required."

    OBJECT       pwLocalIfMtu
    MIN-ACCESS   read-only
    DESCRIPTION "Write access is not required."

    OBJECT       pwLocalIfString
    MIN-ACCESS   read-only
    DESCRIPTION "Write access is not required."

    OBJECT       pwLocalCapabAdvert
    MIN-ACCESS   read-only
    DESCRIPTION "Write access is not required."

    OBJECT       pwFragmentCfgSize
    MIN-ACCESS   read-only
    DESCRIPTION "Write access is not required."

    OBJECT       pwFcsRetentionCfg
    MIN-ACCESS   read-only
    DESCRIPTION "Write access is not required."

    OBJECT       pwOutboundLabel
    MIN-ACCESS   read-only
    DESCRIPTION "Write access is not required."

    OBJECT       pwInboundLabel
    MIN-ACCESS   read-only
    DESCRIPTION "Write access is not required."

    OBJECT       pwName
    MIN-ACCESS   read-only
    DESCRIPTION "Write access is not required."

    OBJECT       pwDescr
    MIN-ACCESS   read-only
    DESCRIPTION "Write access is not required."

    OBJECT       pwAdminStatus
    SYNTAX       INTEGER { up(1), down(2) }
    MIN-ACCESS   read-only
    DESCRIPTION "Write access is not required.  The support of value
                 testing(3) is not required."

    OBJECT       pwOperStatus
    SYNTAX       INTEGER { up(1), down(2), notPresent(5),
                 lowerLayerDown(6) }
```

```
      DESCRIPTION "The support of the values testing(3) and dormant(4)
                   is not required."

      OBJECT       pwRowStatus
      SYNTAX       RowStatus { active(1) }
      MIN-ACCESS   read-only
      DESCRIPTION "Write access is not required."

      OBJECT       pwStorageType
      MIN-ACCESS   read-only
      DESCRIPTION "Write access is not required."

      OBJECT       pwOamEnable
      MIN-ACCESS   read-only
      DESCRIPTION "Write access is not required."

      OBJECT       pwGenAGIType
      MIN-ACCESS   read-only
      DESCRIPTION "Write access is not required."

      OBJECT       pwGenLocalAIIType
      MIN-ACCESS   read-only
      DESCRIPTION "Write access is not required."

      OBJECT       pwGenRemoteAIIType
      MIN-ACCESS   read-only
      DESCRIPTION "Write access is not required."

      OBJECT       pwUpDownNotifEnable
      MIN-ACCESS   read-only
      DESCRIPTION "Write access is not required."

      OBJECT       pwDeletedNotifEnable
      MIN-ACCESS   read-only
      DESCRIPTION "Write access is not required."

      OBJECT       pwNotifRate
      MIN-ACCESS   read-only
      DESCRIPTION "Write access is not required."

        ::= { pwCompliances 2 }

  -- Units of conformance.

  pwBasicGroup   OBJECT-GROUP
      OBJECTS {
                pwType,
                pwOwner,
```

```
              pwPsnType,
              pwIfIndex,
              pwCwPreference,
              pwLocalIfMtu,
              pwOutboundLabel,
              pwInboundLabel,
              pwName,
              pwDescr,
              pwCreateTime,
              pwUpTime,
              pwLastChange,
              pwAdminStatus,
              pwOperStatus,
              pwLocalStatus,
              pwRowStatus,
              pwStorageType,
              pwOamEnable
            }

    STATUS  current
    DESCRIPTION
        "Collection of objects that are required in all
         implementations that support the PW MIB module."
    ::= { pwGroups 1 }

  pwPwIdGroup   OBJECT-GROUP
    OBJECTS {
             pwID
            }

    STATUS  current
    DESCRIPTION
        "Collection of objects required for PW ID configuration
         and signaling."
    ::= { pwGroups 2 }

  pwGeneralizedFecGroup   OBJECT-GROUP
    OBJECTS {
             pwGroupAttachmentID,
             pwLocalAttachmentID,
             pwRemoteAttachmentID,
             pwGenAGIType,
             pwGenLocalAIIType,
             pwGenRemoteAIIType
            }
    STATUS  current
    DESCRIPTION
        "Collection of objects required for generalized FEC
```

```
          configuration and signaling."
     ::= { pwGroups 3 }

  pwFcsGroup   OBJECT-GROUP
     OBJECTS {
               pwFcsRetentionCfg,
               pwFcsRetentionStatus
             }

     STATUS  current
     DESCRIPTION
         "Collection of objects required for FCS retention
          configuration and signaling."
     ::= { pwGroups 4 }

  pwFragGroup   OBJECT-GROUP
     OBJECTS {
               pwFragmentCfgSize,
               pwRmtFragCapability
             }

     STATUS  current
     DESCRIPTION
         "Collection of objects required for fragmentation
          configuration and signaling."
     ::= { pwGroups 5 }

  pwPwStatusGroup   OBJECT-GROUP
     OBJECTS {
               pwRemoteCapabilities,
               pwRemoteStatusCapable,
               pwRemoteStatus
             }

     STATUS  current
     DESCRIPTION
         "Collection of objects required for PW status configuration
          and signaling."
     ::= { pwGroups 6 }


  pwGetNextGroup   OBJECT-GROUP
     OBJECTS {
               pwIndexNext
               }
     STATUS  current
     DESCRIPTION
         "Collection of objects for getting the next available
```

```
          index."
     ::= { pwGroups 7 }

  pwPriorityGroup   OBJECT-GROUP
     OBJECTS {
              pwSetUpPriority,
              pwHoldingPriority
              }

     STATUS  current
     DESCRIPTION
         "Collection of objects for controlling the PW setup and
          holding priority."
     ::= { pwGroups 8 }

  pwAttachmentGroup   OBJECT-GROUP
     OBJECTS {
              pwAttachedPwIndex
              }

     STATUS  current
     DESCRIPTION
         "Collection of objects for PW configuration as ifIndex."
     ::= { pwGroups 9 }

  pwPerformanceGeneralGroup OBJECT-GROUP
     OBJECTS {
              pwPerfTotalErrorPackets
            }

     STATUS  current
     DESCRIPTION
         "Collection of general objects needed for managing the
          total running performance parameters."
     ::= { pwGroups 10 }

  pwPeformance1DayIntervalGroup OBJECT-GROUP
     OBJECTS {
              pwPerf1DayIntervalValidData,
              pwPerf1DayIntervalTimeElapsed,
              pwPerf1DayIntervalInHCPackets,
              pwPerf1DayIntervalInHCBytes,
              pwPerf1DayIntervalOutHCPackets,
              pwPerf1DayIntervalOutHCBytes
            }
     STATUS  current
     DESCRIPTION
         "Collection of objects needed for a PW running 1-day
```

```
          interval performance collection."
     ::= { pwGroups 11 }

  pwPerformanceIntervalGeneralGroup OBJECT-GROUP
     OBJECTS {
               pwTimeElapsed,
               pwValidIntervals,
               pwPerfIntervalValidData,
               pwPerfIntervalTimeElapsed
             }

     STATUS  current
     DESCRIPTION
         "Collection of general objects needed for managing the
          interval performance parameters."
     ::= { pwGroups 12 }

  pwPeformanceIntervalGroup OBJECT-GROUP
     OBJECTS {
               pwPerfCurrentInPackets,
               pwPerfCurrentInBytes,
               pwPerfCurrentOutPackets,
               pwPerfCurrentOutBytes,

               pwPerfIntervalInPackets,
               pwPerfIntervalInBytes,
               pwPerfIntervalOutPackets,
               pwPerfIntervalOutBytes
             }

     STATUS  current
     DESCRIPTION
         "Collection of 32-bit objects needed for PW performance
          collection in 15-minute intervals."
     ::= { pwGroups 13 }

  pwHCPeformanceIntervalGroup OBJECT-GROUP
     OBJECTS {
               pwPerfCurrentInHCPackets,
               pwPerfCurrentInHCBytes,
               pwPerfCurrentOutHCPackets,
               pwPerfCurrentOutHCBytes,

               pwPerfIntervalInHCPackets,
               pwPerfIntervalInHCBytes,
               pwPerfIntervalOutHCPackets,
               pwPerfIntervalOutHCBytes
             }
```

```
      STATUS  current
      DESCRIPTION
          "Collection of HC objects needed for PW performance
           collection in 15-minute intervals."
      ::= { pwGroups 14 }

   pwMappingTablesGroup OBJECT-GROUP
      OBJECTS {
                pwIndexMappingPwIndex,
                pwPeerMappingPwIndex,
                pwGenFecIndexMappingPwIndex
              }

      STATUS  current
      DESCRIPTION
          "Collection of objects contained in the reverse
           mapping tables."
      ::= { pwGroups 15 }

   pwNotificationControlGroup OBJECT-GROUP
      OBJECTS {
                pwUpDownNotifEnable,
                pwDeletedNotifEnable,
                pwNotifRate
              }

      STATUS  current
      DESCRIPTION
          "Collection of objects for controlling the PW
           notifications."
      ::= { pwGroups 16 }

   pwNotificationGroup NOTIFICATION-GROUP
      NOTIFICATIONS {
                pwUp,
                pwDown,
                pwDeleted
              }

      STATUS  current
      DESCRIPTION
          "Collection of PW notifications objects."
      ::= { pwGroups 17 }

   pwSignalingGroup OBJECT-GROUP
      OBJECTS {
                pwPeerAddrType,
                pwPeerAddr,
```

```
              pwLocalGroupID,
              pwLocalIfString,
              pwLocalCapabAdvert,
              pwRemoteGroupID,
              pwCwStatus,
              pwRemoteIfMtu,
              pwRemoteIfString
            }

    STATUS  current
    DESCRIPTION
        "Collection of objects for use in implementations that
         support the PW signaling."
    ::= { pwGroups 18 }

  END
```

13. Security Considerations

It is clear that this MIB module is potentially useful for monitoring PW-capable PEs. This MIB module can also be used for configuration of certain objects, and anything that can be configured can be incorrectly configured, with potentially disastrous results.

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 pwTable contains objects to configure PW parameters on a Provider Edge (PE) device. Unauthorized access to objects in this table could result in disruption of traffic on the network. The objects pwUpDownNotifEnable and pwNotifRate control the reports from the network element to the EMS. Unauthorized access to these objects could result in disruption of configuration and status change reporting, resulting mis-view of the network conditions. The use of stronger mechanisms such as SNMPv3 security should be considered where possible. Specifically, SNMPv3 VACM and USM MUST be used with any v3 agent that 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 pwTable, pwPerfCurrentTable, pwPerfIntervalTable, pwPerf1DayIntervalTable, pwIndexMappingTable, pwPeerMappingTable, and pwGenFecIndexMappingTable collectively show the 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.

14. IANA Considerations

14.1. ifType for PW

IANA has assigned a value (246) for PW in the IANAifType-MIB called ifPwType.

14.2. PW MIB Modules OBJECT IDENTIFIER Values

A PW may appear as ifIndex in the ifTable, and therefore the pwStdMIB OBJECT IDENTIFIER has been assigned under the 'transmission' subtree, as the common practice in assigning OBJECT IDENTIFIERs for MIB modules representing entities in the ifTable.

All other MIB modules related to PW management SHOULD be assigned under the 'mib-2' subtree; individual requests will appear in the MIB module memo's IANA Considerations section.

14.3. IANA Considerations for PW-STD-MIB

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

Descriptor	OBJECT IDENTIFIER value
pwStdMIB	{ transmission 246 }

14.4. IANA Considerations for IANA-PWE3-MIB

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

Descriptor	OBJECT IDENTIFIER value
ianaPwe3MIB	{ mib-2 174 }

15. Acknowledgments

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The individuals listed below contributed significantly to this document:

Dave Danenberg - Litchfield Communications
Sharon Mantin - Corrigent Systems

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