      Synchronous Optical Network/Synchronous Digital Hierarchy (SONET/SDH)
             Circuit Emulation over Packet (CEP) MIB Using SMIv2

Abstract

   This memo defines a portion of the Management Information Base (MIB)
   for use with network management protocols in the Internet community.
   In particular, it describes managed objects for modeling Synchronous
   Optical Network/Synchronous Digital Hierarchy (SONET/SDH) circuits
   over a Packet Switch Network (PSN).

Status of This Memo

   This is an Internet Standards Track document.

   This document is a product of the Internet Engineering Task Force
   (IETF). It represents the consensus of the IETF community. It has
   received public review and has been approved for publication by the
   Internet Engineering Steering Group (IESG). Further information on
   Internet Standards is available in Section 2 of RFC 5741.

   Information about the current status of this document, any errata,
   and how to provide feedback on it may be obtained at
   http://www.rfc-editor.org/info/rfc6240.

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1. Introduction

   This document describes a model for managing encapsulated SONET/SDH
   Time Division Multiplexed (TDM) digital signals for transmission over
   a Packet Switched Network (PSN).

   This document is closely related to [RFC4842], which describes the
   technology to encapsulate TDM signals and provides the Circuit
   Emulation Service over a Packet Switched Network (PSN).

   The model for Circuit Emulation over Packet (CEP) management is a MIB
   module. The PW-CEP-STD-MIB module described in this document works
   closely with the MIB modules described in [RFC5601] and the textual
   conventions defined in [RFC5542]. In the spirit of [RFC2863], a CEP
   connection will be a pseudowire (PW) and will therefore not be
   represented in the ifTable.

   CEP is currently specified to carry "structured" SONET/SDH paths,
   meaning that each SONET/SDH path or Virtual Tributary (VT) within the
   section/line/path can be processed separately. The SONET/SDH
   section/line/path interface stack is modeled within [RFC3592].

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

2. Conventions Used in This Document

   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 [RFC2119].

3. Terminology

   CEP terminology comes from [RFC4842], which describes a mechanism for
   transporting SONET/SDH Time Division Multiplexed (TDM) digital
   signals over a packet-oriented network. The mechanism for structured
   emulation (as outlined in [RFC4842]) terminates the SONET/SDH section
   and line overhead and then breaks the SONET/SDH path's Synchronous
   Payload Envelope (SPE) into fragments for transmission over a PSN.
   Mechanisms for terminating the SONET/SDH path overhead and extracting
   SONET VTs are also described in [RFC4842]. Mechanisms for fractional
   SONET/SDH SPE emulation are described in [RFC4842]. A CEP header
   that contains a sequence number and pointer adjustment information is
   appended at the beginning of each fragment to provide information
   regarding where the SPE begins within the packet stream (see
   [RFC4842]).

"Outbound" references the traffic direction in which a SONET/SDH
path's payload (SPE) is received, adapted to packet, assigned a PW
label, and sent into the PSN.

Conversely, "inbound" is the direction in which packets are received
from the PSN and packet payloads are reassembled back into an SPE and
inserted as a SONET/SDH path into the SONET/SDH section and line.

Since a SONET/SDH path is bidirectional and symmetrical, CEP uses the
same SONET/SDH timeslot, SONET/SDH width, and packet size. Inbound
and outbound PW labels may differ.

4. The Internet-Standard Management Framework

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

Managed objects are accessed via a virtual information store, termed
the Management Information Base or MIB. MIB objects are generally
accessed through the Simple Network Management Protocol (SNMP).
Objects in the MIB are defined using the mechanisms defined in the
Structure of Management Information (SMI). This memo specifies a MIB
module that is compliant to the SMIv2, which is described in STD 58,
RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580
[RFC2580].

5. Feature Checklist

The PW-CEP-STD-MIB module is designed to satisfy the following
requirements and constraints:

- The MIB module is designed to work with the PW-STD-MIB [RFC5601]
   module.

- The MIB module is independent of the PSN type.

- The MIB module supports all the signal types as defined in
   [RFC4842]: SPE, fractional SPE, VT, both SONET and SDH mapping.
   The MIB module also supports all the optional features as defined
   in [RFC4842].

- The MIB module reports all the statistics as defined by [RFC4842].

6. MIB Module Description and Usage

   For clarity of the description below, in most cases, we refer to the
   SONET path signal configuration only, but the same examples are
   applicable for SDH signals and VT-level processing as well, as
   described in [RFC3985].

6.1. PW-CEP-STD-MIB Summary

   - The CEP PW Table (pwCepTable) contains the SONET/SDH path/VT
      ifIndex, SONET/SDH path timeslot, the pwCepCfgTable index, config
      error indications, and various status indications.

   - The CEP PW Configuration Parameter Table (pwCepCfgTable) has
      objects for CEP PW configuration. In situations where sets of
      config objects are common amongst more than one CEP PW, a single
      entry here may be referenced by many pwCepTable entries.

   - The CEP PW Performance Current Interval Table
      (pwCepPerfCurrentTable) contains CEP stats for the current
      15-minute period.

   - The CEP Performance 15-Minute Interval Table
      (pwCepPerfIntervalTable) is similar to the pwCepPerfCurrentTable.
      It contains historical intervals (usually 96 15-minute entries to
      cover a 24-hour period).

      Note: the performance interval statistics are supported by CEP due
      to the very function of CEP, that is, processing SONET/SDH. See
      [RFC3592].

   - The CEP Performance 1-Day Table (pwCepPerf1DayIntervalTable)
      contains statistics accumulated during the current day and
      contains previous days' historical statistics.

   - The CEP Fractional Table (pwCepFracTable) adds configuration and
      monitoring parameters for fractional SPE PWs.

6.2. MIB Modules Required for IMPORTS

   The PW-CEP-STD-MIB IMPORTS objects from SNMPv2-SMI [RFC2578],
   SNMPv2-TC [RFC2579], SNMPv2-CONF [RFC2580], SNMP-FRAMEWORK-MIB
   [RFC3411], PerfHist-TC-MIB [RFC3593], HC-PerfHist-TC-MIB [RFC3705],
   IF-MIB [RFC2863], PW-STD-MIB [RFC5601], and PW-TC-STD-MIB [RFC5542].

6.3. PW-STD-MIB Module Usage

   The MIB module structure for defining a PW service is composed of
   three layers of MIB modules functioning together. This general model
   is defined in the Pseudowire Emulation Edge-to-Edge (PWE3)
   architecture [RFC3985]. The layering model is intended to
   sufficiently isolate PW services from the underlying PSN layer that
   carries the emulated service. This is done at the same time as
   providing a standard means for connecting any supported services to
   any supported PSNs.

   The first layer, known as the service layer, contains service-
   specific modules such as the one defined in this document. These
   modules define service-specific management objects that interface or
   collaborate with existing MIB modules for the native version of the
   service. The service-specific module "glues" the standard modules to
   the PWE3 MIB modules. The PW-CEP-STD-MIB module defined in this memo
   serves as one of the PW-type-specific MIB modules.

   The next layer of the PWE3 MIB framework is the PW-STD-MIB module
   [RFC5601]. This module is used to configure general parameters of
   PWs that are common to all types of emulated services and PSNs. This
   layer is connected to the service-specific layer above and the PSN
   layer below.

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

6.4. PW-CEP-STD-MIB Module Usage

   Configuring a CEP PW involves the following steps.

   (1) First, create an entry in the pwTable:

        - Follow steps as defined in [RFC5601].

   (2) Configure the PSN tunnel in the respective PSN-specific PWE3 PSN
        glue MIB modules and the respective PSN-specific MIB modules.
        Configure the SONET path parameters:

        - Set the SONET path width in the sonetPathCurrentTable
           [RFC3592].

        - Set the SONET path index and the SONET path starting timeslot
           in the pwCepTable.

NOTE: The agent creates an entry in the pwCepTable based on the
entry created in the pwTable.

(3) Configure the CEP PW:

   - If necessary, create an entry in the pwCepCfgTable (a
      suitable entry may already exist). Set packet length, etc.

   - Set the index of this pwCepCfgTable entry in the pwCepTable.

(4) Observe the CEP PW:

   - Once a CEP PW is operational, the pwCepPerfCurrentTable,
      pwCepPerfIntervalTable, and pwCepPerf1DayIntervalTable can be
      used to monitor the various counts, indicators, and
      conditions of the PW.

6.5. Example of PW-CEP-STD-MIB Usage

   In this section, we provide an example of using the MIB objects
   described in Section 7 to set up a CEP PW. 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. See [RFC5601] for an
   example of setting up PSN tunnels.

   First, configure the SONET path width, starting timeslot, and
   associated CEP PW. In this case, an Synchronous Transport Signal 3c
   (STS-3c) starts at SONET timeslot 1 (and is distributed normally
   within the SONET frame). In the following example, the ifIndex for
   the sonetPathCurrentEntry is 23, while the pwCepCfgTable index is 9.

   In [RFC3592], sonetPathCurrentEntry (ifIndex = 23):

   {
      sonetPathCurrentWidth   = 3,
      sonetPathCurrentStatus
      ...
      ...
   }

   Create an entry in the pwCepCfgTable (index = 9):

   {
      pwCepCfgSonetPaylaodLength   = 783 -- payload bytes
      pwCepCfgMinPktLength   = 0   -- no minimum
      pwCepCfgPktReorder   = true
      pwCepCfgEnableDBA   = unequipped

```
      pwCepCfgRtpHdrSuppress       = false
      pwCepCfgJtrBfrDepth          = 500 -- micro-seconds

      pwCepCfgConsecPktsInsync     = 2   -- Exit Loss of Packet
                                         -- Synchronization (LOPS)
                                         -- state
      pwCepCfgConsecMissingOutSync = 10  -- Enter LOPS state

      pwCepCfgPktErrorPlayOutValue = 0xFF -- All ones

      pwCepCfgMissingPktsToSes     =  3  -- packets
      pwCepCfgSesToUas             =  2  -- seconds
      pwCepCfgSecsToExitUas        = 10  -- seconds

      pwCepCfgRowStatus            = createAndGo
   }
```

   In the PW-STD-MIB module: Get a new index and create a new pwTable
   entry using pwIndexNext (here, the PW index = 83) and pwRowStatus.
   In this new entry, set pwType to 'cep'. The agent will create a new
   entry in the pwCepTable. Set the SONET path ifIndex, SONET path
   timeslot, and Cfg Table indexes within this new pwCep table entry:

```
   {
      pwCepSonetIfIndex    = 23 -- Index of associated entry
                                -- in sonetPathCurrent table

      pwCepCfgIndex        = 9  -- Index of associated entry
                                -- in pwCepCfg table (above)
   }
```

7. Object Definitions

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

   IMPORTS
      MODULE-IDENTITY, OBJECT-TYPE,
      Integer32, Counter32, Unsigned32, Counter64, mib-2
         FROM SNMPv2-SMI               -- [RFC2578]

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

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

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

    InterfaceIndexOrZero, InterfaceIndex
        FROM IF-MIB                 -- [RFC2863]

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

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

    pwIndex
        FROM PW-STD-MIB             -- [RFC5601]

    PwCfgIndexOrzero
        FROM PW-TC-STD-MIB          -- [RFC5542]
;

-- The PW CEP MIB

pwCepStdMIB MODULE-IDENTITY
    LAST-UPDATED "201105160000Z"  -- 16 May 2011 00:00:00 GMT
    ORGANIZATION "Pseudowire Emulation Edge-to-Edge (PWE3)
                  Working Group"
    CONTACT-INFO
        "David Zelig (Ed.)
         Email: david_zelig@pmc-sierra.com

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         Email: ronc@resolutenetworks.com

         Thomas D. Nadeau (Ed.)
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         The PWE3 Working Group
         Email: pwe3@ietf.org (email distribution)
         http://www.ietf.org/html.charters/pwe3-charter.html"

    DESCRIPTION
        "This MIB module contains managed object definitions for
         Circuit Emulation over Packet (CEP) as in [RFC4842]:  Malis,
         A., Prayson, P., Cohen, R., and D. Zelig. 'Synchronous
         Optical Network/Synchronous Digital Hierarchy (SONET/SDH)
         Circuit Emulation over Packet (CEP)', RFC 4842.
```

    -- Revision history

    REVISION "201105160000Z" -- 16 May 2011 00:00:00 GMT
    DESCRIPTION "This MIB module published as part of RFC 6240."

    ::= { mib-2 200 }

-- Local textual conventions

    PwCepSonetEbm ::= TEXTUAL-CONVENTION
        STATUS   current
        DESCRIPTION
            "Equipped Bit Mask (EBM) used for fractional STS-1/Virtual
             Circuit 3 (VC-3). The EBM bits are the 28 least
             significant bits out of the 32-bit value."
        SYNTAX Unsigned32

    PwCepSdhVc4Ebm ::= TEXTUAL-CONVENTION
        STATUS   current
        DESCRIPTION
            "Equipped Bit Mask (EBM) used for each Tributary Unit Group
             3 (TUG-3) in fractional VC-4 circuits. The EBM bits are
             the 30 least significant bits out of the 32-bit value."
        SYNTAX Unsigned32

    PwCepSonetVtgMap ::= TEXTUAL-CONVENTION
        STATUS   current
        DESCRIPTION
            "The VT/VC types carried in the 7 VT groups (VTGs)/TUG-2s.
             The format is 28 bits in the form of an Equipped Bit Mask
             (EBM) for fractional STS-1/VC-3. The mapping specifies the
             maximal occupancies of VT/VC within each VTG/TUG-2. For
             example, all four bits are set to 1 in this object to
             represent a VTG carrying VT1.5/VC11s, while only three
             are set when VT2/VC12s are carried within this VTG.
             The relevant bits are the 28 least significant bits out of
             the 32-bit value."
        SYNTAX Unsigned32

```
PwCepFracAsyncMap ::= TEXTUAL-CONVENTION
   STATUS      current
   DESCRIPTION
       "The type of asynchronous mapping carried inside STS-1,
        VC-3, or TUG-3 containing TU-3 circuit."

   SYNTAX INTEGER {
           other ( 1),
           ds3   ( 2),
           e3    ( 3)
         }

-- Top-level components of this MIB module

-- Tables, Scalars
pwCepObjects      OBJECT IDENTIFIER
                             ::= { pwCepStdMIB 1 }
-- Conformance
pwCepConformance  OBJECT IDENTIFIER
                             ::= { pwCepStdMIB 2 }

-- CEP PW Table

pwCepTable OBJECT-TYPE
   SYNTAX       SEQUENCE OF PwCepEntry
   MAX-ACCESS   not-accessible
   STATUS       current
   DESCRIPTION
       "This table contains objects and parameters for managing and
        monitoring the CEP PW."
   ::= { pwCepObjects 1 }

pwCepEntry OBJECT-TYPE
   SYNTAX       PwCepEntry
   MAX-ACCESS   not-accessible
   STATUS       current
   DESCRIPTION
       "Each entry represents the association of a SONET/SDH path or
        VT to a PW.  This table is indexed by the pwIndex of the
        applicable PW entry in the pwTable.

        An entry is created in this table by the agent for every
        entry in the pwTable with a pwType equal to 'cep'.

        All read-write objects in this table MAY be changed at any
        time; however, change of some objects (for example
        pwCepCfgIndex) during PW forwarding state may cause
        traffic disruption.
```

           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 }

         ::= { pwCepTable 1 }

    PwCepEntry ::= SEQUENCE {

         pwCepType   INTEGER,
         pwCepSonetIfIndex   InterfaceIndexOrZero,
         pwCepSonetConfigErrorOrStatus BITS,
         pwCepCfgIndex   PwCfgIndexOrzero,
         pwCepTimeElapsed   HCPerfTimeElapsed,
         pwCepValidIntervals   HCPerfValidIntervals,
         pwCepIndications   BITS,
         pwCepLastEsTimeStamp   TimeStamp,
         pwCepPeerCepOption   Unsigned32
         }

    pwCepType OBJECT-TYPE
       SYNTAX INTEGER {
            spe   (1),
            vt   (2),
            fracSpe (3)
       }
       MAX-ACCESS   read-write
       STATUS   current
       DESCRIPTION
          "Specifies the sub-type of CEP PW. Currently only
           structured types are supported:

           'spe'(1)   : SONET STS-Nc signals.
           'vt' (2)   : SONET VT-x (x=1.5,2,3,6) signals.
           'fracSpe' (3) : SONET fractional STS-1 or SDH fractional
                           VC-3 or VC-4 carrying tributaries or
                           asynchronous signals.

           Support of 'vt' mode or 'fracSpe' mode is optional."
       DEFVAL
          { spe }

       ::= { pwCepEntry 1 }

     pwCepSonetIfIndex OBJECT-TYPE
        SYNTAX   InterfaceIndexOrZero
        MAX-ACCESS   read-write
        STATUS   current
        DESCRIPTION
            "This is a unique index within the ifTable. It represents
             the interface index for the SONET path for SPE emulation
             ([RFC3592], Section 3.3), an interface index for the SONET
             VT ([RFC3592], Section 3.4) if the VT to be emulated is
             extracted from a SONET signal or locally mapped from a
             physical interface.

             A value of zero indicates an interface index that has yet
             to be determined.

             Once set, if the SONET ifIndex is (for some reason) later
             removed, the agent MAY delete the associated PW rows
             (e.g., this pwCepTableEntry). If the agent does not
             delete the rows, it is RECOMMENDED that the agent set this
             object to zero."

        ::= { pwCepEntry 2 }

     pwCepSonetConfigErrorOrStatus OBJECT-TYPE
        SYNTAX BITS {
             other   (0),
             timeslotInUse   (1),
             timeslotMisuse   (2),
             peerDbaIncompatible   (3), -- Status only
             peerEbmIncompatible   (4),
             peerRtpIncompatible   (5),
             peerAsyncIncompatible (6),
             peerDbaAsymmetric   (7), -- Status only
             peerEbmAsymmetric   (8),
             peerRtpAsymmetric   (9),
             peerAsyncAsymmetric   (10)
        }
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION
            "This object reports a configuration mismatch inside
             the local node or between the local node and the peer node.
             Some bits indicate an error, and some are simply status
             reports that do not affect the forwarding process.

             'timeslotInUse'(1) is set when another CEP PW has already
             reserved a timeslot (or timeslots) that this CEP PW is
             attempting to reserve.

```
                'timeslotMisuse'(2) is set when the stated timeslot this
                PW is trying to use is not legal, for example, if
                specifying a starting timeslot of 45 for a SONET path of
                an STS-12c width.

                The peerZZZIncompatible bits are set if the local
                configuration is not compatible with the peer configuration
                as available from the CEP option received from the peer
                through the signaling process and the local node cannot
                support such asymmetric configuration.

                The peerZZZAsymmetric bits are set if the local
                configuration is not compatible with the peer configuration
                as available from the CEP option received from the peer
                through the signaling process, but the local node can
                support such asymmetric configuration."

          REFERENCE
              "Malis, A., et al., 'Synchronous Optical Network/Synchronous
               Digital Hierarchy (SONET/SDH) Circuit Emulation over Packet
               (CEP)', RFC 4842, Section 12."
          ::= { pwCepEntry 3 }

       pwCepCfgIndex OBJECT-TYPE
          SYNTAX        PwCfgIndexOrzero
          MAX-ACCESS    read-write
          STATUS        current
          DESCRIPTION
              "Index to CEP configuration table below.  Multiple CEP PWs
               MAY share a single pwCepCfgEntry.

               The value 0 indicates that no entries are available."
          ::= { pwCepEntry 4 }

       pwCepTimeElapsed OBJECT-TYPE
           SYNTAX  HCPerfTimeElapsed
           UNITS      "seconds"
           MAX-ACCESS  read-only
           STATUS  current
           DESCRIPTION
              "The number of seconds, including partial seconds,
               that have elapsed since the beginning of the current
               measurement period.  If, for some reason such as an
               adjustment in the system's time-of-day clock, the
               current interval exceeds the maximum value, the
               agent will return the maximum value."
           ::= { pwCepEntry 5 }
```

     pwCepValidIntervals OBJECT-TYPE
        SYNTAX   HCPerfValidIntervals
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION
           "The number (n) of previous 15-minute intervals for which
            data was collected.

            An agent with CEP capability MUST be capable of supporting
            at least 4 intervals. The RECOMMENDED default value for
            n is 32, and n MUST NOT exceed 96."
        ::= { pwCepEntry 6 }

     pwCepIndications OBJECT-TYPE
        SYNTAX BITS {
              missingPkt (0),
              ooRngDropped(1),
              jtrBfrUnder (2),
              pktMalformed(3),
              lops   (4),
              cepRdi   (5),
              cepAis   (6),
              badHdrStack (7),
              cepNeFailure(8),
              cepFeFailure(9)
        }
        MAX-ACCESS   read-write
        STATUS   current
        DESCRIPTION
           "Definitions:

            'missingPkt'(0) - While playing out a sequence of packets,
            at least one packet was determined to be missing based on a
            gap in the CEP sequence number. Note: If the implementation
            supports packet reordering, detecting gaps SHOULD take
            place as they are played out, not as they arrive. This
            provides time for misordered packets to arrive late.

            'ooRngDropped'(1) - At least one packet arrived outside the
            range of the jitter buffer. This may be because the
            jitter buffer is full or the sequence number addresses
            a buffer outside the current jitter buffer range or
            an already occupied buffer within range. Whether or not
            packet reordering is supported by the implementation, this
            indication MUST be supported.

'jtrBfrUnder'(2) - The jitter buffer underflowed because
not enough packets arrived as packets were being
played out.

'pktMalformed'(3) - Any error related to unexpected
packet format (except bad header stack) or unexpected
length.

'lops'(4) - Loss of Packet Synchronization.

'cepRdi'(5) - Circuit Emulation over Packet Remote Defect
Indication. Remote Defect Indication (RDI) is generated by
the remote CEP de-packetizer when LOPS is detected.

'cepAis'(6) - Remote CEP packetizer has detected an Alarm
Indication Signal (AIS) on its incoming SONET stream.
cepAis MUST NOT (in itself) cause a CEP PW down
notification.

'badHdrStack'(7) - Set when the number of
CEP header extensions detected in incoming packets does
not match the expected number.

'cepNeFailure'(8) - Set when CEP-NE failure is currently
declared.

'cepFeFailure'(8) - Set when CEP-FE failure is currently
declared.

This object MUST hold the accumulated indications until the
next SNMP write that clear the indication(s).

Writing a non-zero value MUST fail.

Currently, there is no hierarchy of CEP defects.

The algorithm used to capture these indications
is implementation specific."

    ::= { pwCepEntry 7 }

```
    pwCepLastEsTimeStamp OBJECT-TYPE
       SYNTAX       TimeStamp
       MAX-ACCESS   read-only
       STATUS       current
       DESCRIPTION
           "The value of sysUpTime on the most recent occasion at which
            the CEP PW entered the Errored Seconds (ES) or Severely
            Errored Seconds (SES) state."

        ::= { pwCepEntry 8 }

    pwCepPeerCepOption OBJECT-TYPE
       SYNTAX       Unsigned32
       MAX-ACCESS   read-only
       STATUS       current
       DESCRIPTION
           "The value of the CEP option parameter as received from the
            peer by the PW signaling protocol."

        ::= { pwCepEntry 9 }

    -- End of CEP PW Table

    -- Obtain index for PW CEP Configuration Table entries

    pwCepCfgIndexNext OBJECT-TYPE
       SYNTAX          PwCfgIndexOrzero
       MAX-ACCESS      read-only
       STATUS          current
       DESCRIPTION
           "This object contains an appropriate value to be used
            for pwCepCfgIndex when creating entries in the
            pwCepCfgTable.  The value 0 indicates that no
            unassigned entries are available.  To obtain the
            value of pwCepCfgIndex for a new entry in the
            pwCepCfgTable, the manager issues a management
            protocol retrieval operation to obtain the current
            value of pwCepCfgIndex.  After each retrieval
            operation, the agent should modify the value to
            reflect the next unassigned index.  After a manager
            retrieves a value, the agent will determine through
            its local policy when this index value will be made
            available for reuse."

        ::= { pwCepObjects 2 }
```

     -- CEP PW Configuration Table

     pwCepCfgTable   OBJECT-TYPE
        SYNTAX   SEQUENCE OF PwCepCfgEntry
        MAX-ACCESS   not-accessible
        STATUS   current
        DESCRIPTION
            "This table contains a set of parameters that may be
             referenced by one or more CEP PWs by pwCepTable."

        ::= { pwCepObjects 3 }

     pwCepCfgEntry   OBJECT-TYPE

        SYNTAX   PwCepCfgEntry
        MAX-ACCESS   not-accessible
        STATUS   current
        DESCRIPTION
            "These parameters define the characteristics of a
             CEP PW. They are grouped here to ease Network Management
             System (NMS) burden. Once an entry is created here, it may
             be reused by many PWs.

             By default, all the read-create objects MUST NOT be
             changed after row activation unless specifically indicated
             in the individual object description. If the operator
             wishes to change value of a read-create object, the
             pwCepCfgRowStatus MUST be set to notInService(2).

             The agent MUST NOT allow the change of the
             pwCepCfgRowStatus from the active(1) state for
             pwCepCfgEntry, which is in use by at least one active PW.

             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 affected PWs'
             pwOperStatus MUST be declared as notPresent(5)."

        INDEX { pwCepCfgTableIndex }

           ::= { pwCepCfgTable 1 }

     PwCepCfgEntry ::= SEQUENCE {
           pwCepCfgTableIndex   Unsigned32,
           pwCepSonetPayloadLength   Unsigned32,
           pwCepCfgMinPktLength   Unsigned32,
           pwCepCfgPktReorder   TruthValue,

```
        pwCepCfgEnableDBA           BITS,
        pwCepCfgRtpHdrSuppress      TruthValue,

        pwCepCfgJtrBfrDepth         Unsigned32,

        pwCepCfgConsecPktsInsync    Unsigned32,
        pwCepCfgConsecMissingOutSync Unsigned32,

        pwCepCfgPktErrorPlayOutValue Unsigned32,

        pwCepCfgMissingPktsToSes    Unsigned32,
        pwCepCfgSesToUas            Unsigned32,
        pwCepCfgSecsToExitUas       Unsigned32,

        pwCepCfgName                SnmpAdminString,

        pwCepCfgRowStatus           RowStatus,
        pwCepCfgStorageType         StorageType
        }

   pwCepCfgTableIndex   OBJECT-TYPE
      SYNTAX       Unsigned32 (1..4294967295)
      MAX-ACCESS   not-accessible
      STATUS       current
      DESCRIPTION
         "Primary index to this table."
      ::= { pwCepCfgEntry 1 }

   pwCepSonetPayloadLength OBJECT-TYPE
      SYNTAX       Unsigned32
      MAX-ACCESS   read-create
      STATUS       current
      DESCRIPTION
         "The number of SONET bytes of the Path or VT carried as
          payload within one packet.  For example, for STS-1/VC-3 SPE
          circuits, a value of 783 bytes indicates that each packet
          carries the payload equivalent to one frame.  For VT1.5/VC11
          circuits, a payload length of 104 bytes indicates that each
          packet carries payload equivalent to one VT1.5 super-frame.
          The actual payload size may be different due to bandwidth
          reduction modes, e.g., Dynamic Bandwidth Allocation (DBA)
          mode or dynamically assigned fractional SPE.  This length
          applies to inbound and outbound packets carrying user
          payload.  Although there is no control over inbound packets,
          those of illegal length are discarded and accounted for (see
          pwCepPerf...Malformed.)
```

          The default values are determined by the pwCepType:
          783 for pwCepType equal to spe(2) or fracSpe(3).
          For vt(3) modes, the applicable super-frame payload size
          is the default value."
     REFERENCE
          "Malis, A., et al., 'Synchronous Optical Network/Synchronous
          Digital Hierarchy (SONET/SDH) Circuit Emulation over Packet
          (CEP)', RFC 4842, Sections 5.1 and 12.1"
     ::= { pwCepCfgEntry 2 }

 pwCepCfgMinPktLength OBJECT-TYPE
     SYNTAX   Unsigned32
     MAX-ACCESS   read-create
     STATUS   current
     DESCRIPTION
          "This object defines the minimum CEP packet length in
          number of bytes (including CEP header and payload).
          It applies to CEP's bandwidth-savings packets. Currently,
          DBA is the only bandwidth-savings packet type (in the
          future, CEP may support compression). Minimum packet
          length is necessary in some systems or networks.

          Setting zero here indicates that there is no minimum
          packet restriction."

     DEFVAL { 0 }

     ::= { pwCepCfgEntry 3 }

 pwCepCfgPktReorder OBJECT-TYPE
     SYNTAX   TruthValue
     MAX-ACCESS   read-only
     STATUS   current
     DESCRIPTION
          "This object defines if reordering is applied for incoming
          packets.

          If set 'true', as inbound packets are queued in the
          jitter buffer, out-of-order packets are reordered. The
          maximum sequence number differential (i.e., the range in
          which resequencing can occur) is dependant on the depth
          of the jitter buffer.

          If the local agent supports packet reordering, the default
          value SHOULD be set to 'true'; otherwise, this value
          SHOULD be set to 'false'."

     ::= { pwCepCfgEntry 4 }

```
pwCepCfgEnableDBA OBJECT-TYPE
    SYNTAX BITS {
          ais        (0),
          unequipped (1)
    }

    MAX-ACCESS    read-create
    STATUS        current
    DESCRIPTION
        "This object defines when DBA is applied for packets sent
         toward the PSN.

         Setting 'ais' MUST cause CEP packet payload suppression
         when AIS is detected on the associated SONET path.
         Similarly, 'unequipped' MUST cause payload suppression
         when an unequipped condition is detected on the SONET/SDH
         PATH/VT.

         During DBA condition, CEP packets will continue
         to be sent, but with indicators set in the CEP header
         instructing the remote to play all ones (for AIS) or all
         zeros (for unequipped) onto its SONET/SDH path.

         NOTE: Some implementations may not support this feature.
         In these cases, this object should be read-only."

    REFERENCE
        "Malis, A., et al., 'Synchronous Optical Network/Synchronous
         Digital Hierarchy (SONET/SDH) Circuit Emulation over Packet
         (CEP)', RFC 4842, Section 11.1."

    ::= { pwCepCfgEntry 5 }

pwCepCfgRtpHdrSuppress OBJECT-TYPE
    SYNTAX        TruthValue
    MAX-ACCESS    read-create
    STATUS        current
    DESCRIPTION
        "If this object is set to 'true', an RTP header is not
         prepended to the CEP packet."
    REFERENCE
        "Malis, A., et al., 'Synchronous Optical Network/Synchronous
         Digital Hierarchy (SONET/SDH) Circuit Emulation over Packet
         (CEP)', RFC 4842, Section 5.3."
    DEFVAL
        { true }

    ::= { pwCepCfgEntry 6 }
```

    pwCepCfgJtrBfrDepth OBJECT-TYPE
       SYNTAX   Unsigned32
       UNITS   "micro-seconds"
       MAX-ACCESS   read-create
       STATUS   current
       DESCRIPTION
           "This object defines the number of microseconds
            of expected packet delay variation for this CEP PW
            over the PSN.

            The actual jitter buffer MUST be at least twice this
            value for proper operation.

            If configured to a value not supported by the
            implementation, the agent MUST reject the SNMP Set
            operation."
       REFERENCE
           "The control of jitter and wander within digital
            networks which are based on the synchronous digital
            hierarchy (SDH), ITU-T Recommendation G.825."
       ::= { pwCepCfgEntry 7 }

    --
    -- The following counters work together to integrate (filter)
    -- errors and the lack of errors on the CEP PW. An error is
    -- caused by a missing packet. Missing packets can be a result
    -- of packet loss in the network, (uncorrectable) packet out
    -- of sequence, packet-length error, jitter-buffer overflow,
    -- and jitter-buffer underflow. The result declares whether
    -- or not the CEP PW is in Loss of Packet Sync (LOPS) state.
    --

    pwCepCfgConsecPktsInsync   OBJECT-TYPE
       SYNTAX   Unsigned32
       MAX-ACCESS   read-create
       STATUS   current
       DESCRIPTION
           "Consecutive packets with sequential sequence
            numbers required to exit the LOPS state."
       REFERENCE
           "Malis, A., et al., 'Synchronous Optical Network/Synchronous
            Digital Hierarchy (SONET/SDH) Circuit Emulation over Packet
            (CEP)', RFC 4842, Section 6.2.2."
       DEFVAL
           { 2 }

       ::= { pwCepCfgEntry 8 }

    pwCepCfgConsecMissingOutSync OBJECT-TYPE
       SYNTAX   Unsigned32
       MAX-ACCESS   read-create
       STATUS   current
       DESCRIPTION
           "Consecutive missing packets required to enter
            the LOPS state."
       REFERENCE
           "Malis, A., et al., 'Synchronous Optical Network/Synchronous
            Digital Hierarchy (SONET/SDH) Circuit Emulation over Packet
            (CEP)', RFC 4842, Section 6.2.2."
       DEFVAL
           { 10 }

       ::= { pwCepCfgEntry 9 }

    pwCepCfgPktErrorPlayOutValue OBJECT-TYPE
       SYNTAX   Unsigned32 (0..255)
       MAX-ACCESS   read-create
       STATUS   current
       DESCRIPTION
           "This object defines the value played when inbound packets
            have over/underflowed the jitter buffer or are missing
            for any reason. This byte pattern is sent (played) on
            the SONET path."
       DEFVAL
           { 255 } -- Play all ones, equal to AIS indications
       ::= { pwCepCfgEntry 10 }

    pwCepCfgMissingPktsToSes OBJECT-TYPE
       SYNTAX   Unsigned32
       UNITS   "seconds"
       MAX-ACCESS   read-create
       STATUS   current
       DESCRIPTION
           "The number of missing packets detected (consecutive or not)
            within a 1-second window to cause a Severely Errored
            Second (SES) to be counted."
       REFERENCE
           "Malis, A., et al., 'Synchronous Optical Network/Synchronous
            Digital Hierarchy (SONET/SDH) Circuit Emulation over Packet
            (CEP)', RFC 4842, Section 10.1."
       DEFVAL
           { 3 }
       ::= { pwCepCfgEntry 11 }

```
   pwCepCfgSesToUas OBJECT-TYPE
      SYNTAX         Unsigned32
      UNITS          "seconds"
      MAX-ACCESS     read-create
      STATUS         current
      DESCRIPTION
          "The number of consecutive SESs before declaring PW in
           Unavailable Seconds (UAS) state (at which point
           pwCepPerfUASs starts counting).  The SesToUas default value
           is 10 seconds.

           NOTE: Similar to [RFC3592], if the agent chooses to update
           the various performance statistics in real time, it MUST
           be prepared to retroactively reduce the ES and SES counts by
           this value and increase the UAS count by this value when it
           determines that UAS state has been entered.

           NOTE: See pwCepPerfSESs and pwCepPerfUASs."
      REFERENCE
          "Malis, A., et al., 'Synchronous Optical Network/Synchronous
           Digital Hierarchy (SONET/SDH) Circuit Emulation over Packet
           (CEP)', RFC 4842, Section 10.1."
      DEFVAL
          { 10 }
      ::= { pwCepCfgEntry 12 }

   pwCepCfgSecsToExitUas OBJECT-TYPE
      SYNTAX         Unsigned32
      UNITS          "seconds"
      MAX-ACCESS     read-create
      STATUS         current
      DESCRIPTION
          "The number of consecutive nonSESs before declaring PW is NOT
           in UAS state (at which point pwCepPerfUASs stops counting)."
      REFERENCE
          "Malis, A., et al., 'Synchronous Optical Network/Synchronous
           Digital Hierarchy (SONET/SDH) Circuit Emulation over Packet
           (CEP)', RFC 4842, Section 10.1."
      DEFVAL { 10 }
      ::= { pwCepCfgEntry 13 }

   pwCepCfgName OBJECT-TYPE
      SYNTAX         SnmpAdminString
      MAX-ACCESS     read-create
      STATUS         current
```

       DESCRIPTION
           "This variable contains the name of the Configuration entry.
            This name may be used to help the NMS to display the
            purpose of the entry."
       ::= { pwCepCfgEntry 14 }

    pwCepCfgRowStatus   OBJECT-TYPE
       SYNTAX   RowStatus
       MAX-ACCESS   read-create
       STATUS   current
       DESCRIPTION
           "For creating, modifying, and deleting this row.

            None of the read-create objects' values can be changed
            when pwCepCfgRowStatus is in the active(1) state. Changes
            are allowed when the pwRowStatus is in notInService(2) or
            notReady(3) states only.

            If the operator needs to change one of the values for an
            active row (for example, in order to fix a mismatch in
            configuration between the local node and the peer), the
            pwCepCfgRowStatus should be first changed to
            notInService(2). The objects may be changed now and later
            changed to active(1) in order to re-initiate the signaling
            process with the new values in effect.

            Change of status from the active(1) state or deleting a row
            SHOULD be blocked by the local agent if the row is
            referenced by any pwCepEntry those pwRowStatus
            is in the active(1) state."

       ::= { pwCepCfgEntry 15 }

    pwCepCfgStorageType OBJECT-TYPE
       SYNTAX   StorageType
       MAX-ACCESS   read-create
       STATUS   current
       DESCRIPTION
           "This object indicates the storage type for this row."
       DEFVAL { nonVolatile }

       ::= { pwCepCfgEntry 16 }

    -- End of CEP PW Configuration Parameter Table

-- CEP Fractional Table

```
pwCepFracTable    OBJECT-TYPE
   SYNTAX                    SEQUENCE OF PwCepFracEntry
   MAX-ACCESS                not-accessible
   STATUS                    current
   DESCRIPTION
       "This table contains a set of parameters for CEP PWs with
        pwCepType FRAC type."
   ::= { pwCepObjects 4 }

pwCepFracEntry    OBJECT-TYPE
   SYNTAX            PwCepFracEntry
   MAX-ACCESS        not-accessible
   STATUS            current
   DESCRIPTION
       "There are two options for creating an entry in this table:

        - By the Element Management System (EMS) in advance for
          creating the PW.
        - By the agent automatically when the PW is set up.

        The first option is typically used when there is a native
        service processing (NSP) cross-connect option between the
        physical ports and the emulated (virtual ports), while the
        second MAY be used when there is a one-to-one mapping
        between the emulated signal and the physical signal."

   INDEX  { pwCepFracIndex }

     ::= { pwCepFracTable 1 }

PwCepFracEntry ::= SEQUENCE {

     pwCepFracIndex               InterfaceIndex,
     pwCepFracMode                INTEGER,
     pwCepFracConfigError         BITS,
     pwCepFracAsync               PwCepFracAsyncMap,
     pwCepFracVtgMap              PwCepSonetVtgMap,
     pwCepFracEbm                 PwCepSonetEbm,
     pwCepFracPeerEbm             PwCepSonetEbm,
     pwCepFracSdhVc4Mode          INTEGER,
     pwCepFracSdhVc4Tu3Map1       PwCepFracAsyncMap,
     pwCepFracSdhVc4Tu3Map2       PwCepFracAsyncMap,
     pwCepFracSdhVc4Tu3Map3       PwCepFracAsyncMap,
     pwCepFracSdhVc4Tug2Map1      PwCepSonetVtgMap,
     pwCepFracSdhVc4Tug2Map2      PwCepSonetVtgMap,
     pwCepFracSdhVc4Tug2Map3      PwCepSonetVtgMap,
```

```
        pwCepFracSdhVc4Ebm1            PwCepSdhVc4Ebm,
        pwCepFracSdhVc4Ebm2            PwCepSdhVc4Ebm,
        pwCepFracSdhVc4Ebm3            PwCepSdhVc4Ebm,
        pwCepFracSdhVc4PeerEbm1        PwCepSdhVc4Ebm,
        pwCepFracSdhVc4PeerEbm2        PwCepSdhVc4Ebm,
        pwCepFracSdhVc4PeerEbm3        PwCepSdhVc4Ebm,
        pwCepFracRowStatus            RowStatus,
        pwCepFracStorageType          StorageType
        }

pwCepFracIndex OBJECT-TYPE
   SYNTAX InterfaceIndex
   MAX-ACCESS    not-accessible
   STATUS        current
   DESCRIPTION
       "This is the index of this table.  It is a unique
        index within the ifTable.  It represents the interface index
        for the SONET path ([RFC3592], Section 3.3) for fractional
        SPE emulation.

        It may represent an internal (virtual) interface if an NSP
        function exists between the physical interface and the
        emulation process."

   ::= { pwCepFracEntry 1 }

pwCepFracMode OBJECT-TYPE
   SYNTAX INTEGER {
           notApplicable ( 1),
           dynamic       ( 2),
           static        ( 3),
           staticWithEbm ( 4),
           staticAsync   ( 5)
   }
   MAX-ACCESS    read-create
   STATUS        current
   DESCRIPTION
       "Fractional mode for STS-1/VC-3 or VC-4 circuits:

        notApplicable - When this object is not applicable.
        dynamic - EBM carried within the CEP header.  Unequipped
                  VTs are removed from the payload on the fly.
        static  - EBM not carried within the CEP header.  Only VTs
                  defined in the EBM are carried within the payload.
        staticWithEbm - EBM carried within the CEP header.  Only
                  VTs defined in the EBM are carried within the
                  payload.
        staticAsync - Asynchronous E3/T3 fixed byte removal only."
```

```
      DEFVAL
          { dynamic }

      ::= { pwCepFracEntry 2 }


  pwCepFracConfigError OBJECT-TYPE
     SYNTAX BITS {
            other               ( 0),
            vtgMapEbmConflict   ( 1),
            vtgMapAsyncConflict ( 2)
     }
     MAX-ACCESS     read-only
     STATUS         current
     DESCRIPTION
         "vtgMapEbmConflict(1) is set when the configured static EBM
          does not match the configured vtgMap for fractional
          STS-1/VC-3 circuits or when the TUG2Map is in conflict with
          the static EBM for VC-4 circuits, for example, if the vtgMap
          specifies that VTG#1 carries VT2 VTs while the EBM indicate
          that four VTs are equipped within VTG#1.

          vtgMapAsyncConflict(2) is set when there is a conflict
          between the mode, the async indication, and the vtgMap
          fields.  For example, fractional mode is set to staticAsync
          while the VtgMap indicates that the STS-1/VC-3 carries VTs,
          or both async1 and Tug2Map are set in fractional VC-4
          circuits."

      ::= { pwCepFracEntry 3 }


  pwCepFracAsync OBJECT-TYPE
     SYNTAX PwCepFracAsyncMap
     MAX-ACCESS     read-create
     STATUS         current
         DESCRIPTION
           "This object defines the asynchronous payload carried
            within the STS-1/VC-3.  This object is applicable when
            pwCepFracMode equals 'staticAsync' and MUST equal to
            'other' otherwise."

      DEFVAL { other }

      ::= { pwCepFracEntry 4 }


  pwCepFracVtgMap OBJECT-TYPE
     SYNTAX         PwCepSonetVtgMap
     MAX-ACCESS     read-create
     STATUS         current
```

        DESCRIPTION
            "This object defines the VT/VC types of the seven
             VTG/TUG-2 within the STS-1/VC-3.

             This variable should be set when 'dynamic', 'static',
             or 'staticWithEbm' fractional STS-1/VC-3 pwCepFracMode
             is selected."

        ::= { pwCepFracEntry 5 }

    pwCepFracEbm OBJECT-TYPE
        SYNTAX   PwCepSonetEbm
        MAX-ACCESS   read-create
        STATUS   current
        DESCRIPTION
            "This object holds the static Equipped Bit Mask (EBM)
             for STS-1/VC-3 channel.

             This variable MAY be set when 'static' or
             'staticWithEbm' fractional STS-1/VC-3 pwCepFracMode is
             selected.

             It is possible that the configuration of other MIB modules
             will define the EBM value; in these cases, this object is
             read-only and reflects the actual EBM that would be used."

        ::= { pwCepFracEntry 6 }

    pwCepFracPeerEbm OBJECT-TYPE
        SYNTAX   PwCepSonetEbm
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION
            "This object reports the Equipped Bit Mask (EBM) for
             STS-1/VC-3 channel as received from the peer within
             the CEP extension header."

        ::= { pwCepFracEntry 7 }

    pwCepFracSdhVc4Mode OBJECT-TYPE
        SYNTAX INTEGER {
                notApplicable (1),
                dynamic   (2),
                static   (3),
                staticWithEbm (4)
        }
        MAX-ACCESS   read-create

```
        STATUS          current
        DESCRIPTION
            "Fractional mode for VC-4 circuits:

             notApplicable - When this is not VC-4 circuit.
             dynamic - EBM carried within the CEP header.  Unequipped
                       VTs are removed from the payload on the fly.
             static  - EBM not carried within the CEP header.  Only VTs
                       defined in the EBM are carried within the payload.
             staticWithEbm - EBM carried within the CEP header.  Only
                       VTs defined in the EBM are carried within the
                       payload."

        DEFVAL { notApplicable }

        ::= { pwCepFracEntry 8 }

    pwCepFracSdhVc4Tu3Map1 OBJECT-TYPE
        SYNTAX PwCepFracAsyncMap
        MAX-ACCESS      read-create
        STATUS          current
        DESCRIPTION
            "The type of asynchronous mapping carried inside STS-1,
             VC-3, or TUG-3 containing TU-3 circuit."

        DEFVAL { other }
        ::= { pwCepFracEntry 9 }


    pwCepFracSdhVc4Tu3Map2 OBJECT-TYPE
        SYNTAX PwCepFracAsyncMap
        MAX-ACCESS      read-create
        STATUS          current
        DESCRIPTION
            "If the second TUG-3 within the VC-4 contains a TU-3, this
             variable must be set."

        DEFVAL { other }
        ::= { pwCepFracEntry 10 }

    pwCepFracSdhVc4Tu3Map3 OBJECT-TYPE
        SYNTAX PwCepFracAsyncMap
        MAX-ACCESS      read-create
        STATUS          current
        DESCRIPTION
            "If the third TUG-3 within the VC-4 contains a TU-3, this
             variable must be set."
```

```
   DEFVAL { other }

   ::= { pwCepFracEntry 11 }


pwCepFracSdhVc4Tug2Map1 OBJECT-TYPE
   SYNTAX        PwCepSonetVtgMap
   MAX-ACCESS    read-create
   STATUS        current
   DESCRIPTION
        "The VC types of the seven TUG-2s within the first
         TUG-3 of the VC-4."

   ::= { pwCepFracEntry 12 }

pwCepFracSdhVc4Tug2Map2 OBJECT-TYPE
   SYNTAX        PwCepSonetVtgMap
   MAX-ACCESS    read-create
   STATUS        current
   DESCRIPTION
        "The VC types of the seven TUG-2s within the second
         TUG-3 of the VC-4."

   ::= { pwCepFracEntry 13 }

pwCepFracSdhVc4Tug2Map3 OBJECT-TYPE
   SYNTAX        PwCepSonetVtgMap
   MAX-ACCESS    read-create
   STATUS        current
   DESCRIPTION
        "The VC types of the seven TUG-2s within the third
         TUG-3 of the VC-4."

   ::= { pwCepFracEntry 14 }

pwCepFracSdhVc4Ebm1 OBJECT-TYPE
   SYNTAX        PwCepSdhVc4Ebm
   MAX-ACCESS    read-create
   STATUS        current
   DESCRIPTION
        "Static Equipped Bit Mask (EBM) for the first TUG-3
         within the VC-4.

         This variable should be set when 'static' or
         'staticWithEbm' fractional VC-4 pwCepFracMode is
         selected.
```

              It is possible that the EBM that would be used is
              available based on configuration of other MIB modules.
              In these cases, this object is read-only and reflects the
              actual EBM that would be used."

         ::= { pwCepFracEntry 15 }

     pwCepFracSdhVc4Ebm2 OBJECT-TYPE
         SYNTAX   PwCepSdhVc4Ebm
         MAX-ACCESS   read-create
         STATUS   current
         DESCRIPTION
              "Static Equipped Bit Mask (EBM) for the second TUG-3
              within the VC-4.

              This variable should be set when 'static' or
              'staticWithEbm' fractional VC-4 pwCepFracMode is
              selected.

              It is possible that the EBM that would be used is
              available based on configuration of other MIB modules.
              In these cases, this object is read-only and reflects the
              actual EBM that would be used."

         ::= { pwCepFracEntry 16 }

     pwCepFracSdhVc4Ebm3 OBJECT-TYPE
         SYNTAX   PwCepSdhVc4Ebm
         MAX-ACCESS   read-create
         STATUS   current
         DESCRIPTION
              "Static Equipped Bit Mask (EBM) for the third TUG-3 within
              the VC-4.

              This variable should be set when 'Static' or
              'staticWithEbm' fractional VC-4 pwCepFracMode is
              selected.

              It is possible that the EBM that would be used is
              available based on configuration of other MIB modules.
              In these cases, this object is read-only and reflects the
              actual EBM that would be used."

         ::= { pwCepFracEntry 17 }

     pwCepFracSdhVc4PeerEbm1 OBJECT-TYPE
         SYNTAX   PwCepSdhVc4Ebm
         MAX-ACCESS   read-only

```
      STATUS          current
      DESCRIPTION
          "Equipped Bit Mask (EBM) for the first TUG-3 within
           the fractional VC-4 channel received from the peer
           within the CEP extension header."

      ::= { pwCepFracEntry 18 }

   pwCepFracSdhVc4PeerEbm2 OBJECT-TYPE
      SYNTAX          PwCepSdhVc4Ebm
      MAX-ACCESS      read-only
      STATUS          current
      DESCRIPTION
          "Equipped Bit Mask (EBM) for the second TUG-3 within
           the fractional VC-4 channel received from the peer
           within the CEP extension header."

      ::= { pwCepFracEntry 19 }

   pwCepFracSdhVc4PeerEbm3 OBJECT-TYPE
      SYNTAX          PwCepSdhVc4Ebm
      MAX-ACCESS      read-only
      STATUS          current
      DESCRIPTION
          "Equipped Bit Mask (EBM) for the third TUG-3 within
           the fractional VC-4 channel received from the peer
           within the CEP extension header."

      ::= { pwCepFracEntry 20 }

   pwCepFracRowStatus 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."

      ::= { pwCepFracEntry 21 }

   pwCepFracStorageType OBJECT-TYPE
      SYNTAX          StorageType
      MAX-ACCESS      read-create
      STATUS          current
      DESCRIPTION
          "This variable indicates the storage type for this
           object."
```

        DEFVAL { nonVolatile }
        ::= { pwCepFracEntry 22 }

    -- End CEP Fractional Table

    -- CEP PW Performance Current Interval Table

    pwCepPerfCurrentTable OBJECT-TYPE
        SYNTAX   SEQUENCE OF PwCepPerfCurrentEntry
        MAX-ACCESS   not-accessible
        STATUS   current
        DESCRIPTION
            "CEP bridges the SONET and packet worlds. In the packet
             world, counts typically start from the time of service
             creation and do not stop. In the SONET world, counts are
             kept in 15-minute intervals. The PW CEP MIB supports both
             methods. The current 15-minute interval counts are in
             this table. The interval and total stats are in tables
             following this.

             This table provides per-CEP PW performance information.
             High capacity (HC) counters are required for some counts
             due to the high speeds expected with CEP services. A SONET
             path of width 48 (STS-48c) can rollover non-HC counters in
             a few minutes."

        ::= { pwCepObjects 5 }

    pwCepPerfCurrentEntry OBJECT-TYPE
        SYNTAX   PwCepPerfCurrentEntry
        MAX-ACCESS   not-accessible
        STATUS   current
        DESCRIPTION
            "An entry in this table is created by the agent for every
             pwCep entry. After 15 minutes, the contents of this table
             entry are copied to a new entry in the pwCepPerfInterval
             table, and the counts in this entry are reset to zero."

        INDEX { pwIndex }

        ::= { pwCepPerfCurrentTable 1 }

    PwCepPerfCurrentEntry ::= SEQUENCE {
        pwCepPerfCurrentDbaInPacketsHC   HCPerfCurrentCount,
        pwCepPerfCurrentDbaOutPacketsHC   HCPerfCurrentCount,

        pwCepPerfCurrentInNegPtrAdjust   PerfCurrentCount,
        pwCepPerfCurrentInPosPtrAdjust   PerfCurrentCount,

```
        pwCepPerfCurrentInPtrAdjustSecs      PerfCurrentCount,
        pwCepPerfCurrentOutNegPtrAdjust      PerfCurrentCount,
        pwCepPerfCurrentOutPosPtrAdjust      PerfCurrentCount,
        pwCepPerfCurrentOutPtrAdjustSecs     PerfCurrentCount,
        pwCepPerfCurrentAbsPtrAdjust         Integer32,

        pwCepPerfCurrentMissingPkts          PerfCurrentCount,
        pwCepPerfCurrentPktsOoseq            PerfCurrentCount,
        pwCepPerfCurrentPktsOoRngDropped     PerfCurrentCount,
        pwCepPerfCurrentJtrBfrUnderruns      PerfCurrentCount,
        pwCepPerfCurrentPktsMalformed        PerfCurrentCount,
        pwCepPerfCurrentSummaryErrors        PerfCurrentCount,

        pwCepPerfCurrentESs                  PerfCurrentCount,
        pwCepPerfCurrentSESs                 PerfCurrentCount,
        pwCepPerfCurrentUASs                 PerfCurrentCount,
        pwCepPerfCurrentFC                   PerfCurrentCount
    }

pwCepPerfCurrentDbaInPacketsHC OBJECT-TYPE
    SYNTAX          HCPerfCurrentCount
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "Number of DBA packets received."
    ::= { pwCepPerfCurrentEntry 1 }

pwCepPerfCurrentDbaOutPacketsHC OBJECT-TYPE
    SYNTAX          HCPerfCurrentCount
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "Number of DBA packets sent."
    ::= { pwCepPerfCurrentEntry 2 }


-- Pointer adjustment stats

pwCepPerfCurrentInNegPtrAdjust OBJECT-TYPE
    SYNTAX          PerfCurrentCount
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "Number of negative pointer adjustments sent on the
         SONET path based on CEP pointer adjustments received."
    ::= { pwCepPerfCurrentEntry 3 }
```

```
   pwCepPerfCurrentInPosPtrAdjust OBJECT-TYPE
      SYNTAX         PerfCurrentCount
      MAX-ACCESS     read-only
      STATUS         current
      DESCRIPTION
          "Number of positive pointer adjustments sent on the
           SONET path based on CEP pointer adjustments received."
      ::= { pwCepPerfCurrentEntry 4 }

   pwCepPerfCurrentInPtrAdjustSecs OBJECT-TYPE
      SYNTAX         PerfCurrentCount
      UNITS          "seconds"
      MAX-ACCESS     read-only
      STATUS         current
      DESCRIPTION
          "Number of seconds in which a positive or negative pointer
           adjustment was sent on the SONET path."
      ::= { pwCepPerfCurrentEntry 5 }

   pwCepPerfCurrentOutNegPtrAdjust OBJECT-TYPE
      SYNTAX         PerfCurrentCount
      MAX-ACCESS     read-only
      STATUS         current
      DESCRIPTION
          "Number of negative pointer adjustments seen on the
           SONET path and encoded onto sent CEP packets."
      ::= { pwCepPerfCurrentEntry 6 }

   pwCepPerfCurrentOutPosPtrAdjust OBJECT-TYPE
      SYNTAX         PerfCurrentCount
      MAX-ACCESS     read-only
      STATUS         current
      DESCRIPTION
          "Number of positive pointer adjustments seen on the
           SONET path and encoded onto sent CEP packets."
      ::= { pwCepPerfCurrentEntry 7 }

   pwCepPerfCurrentOutPtrAdjustSecs OBJECT-TYPE
      SYNTAX         PerfCurrentCount
      UNITS          "seconds"
      MAX-ACCESS     read-only
      STATUS         current
      DESCRIPTION
          "Number of seconds in which a positive or negative pointer
           adjustment was seen on the SONET path."
      ::= { pwCepPerfCurrentEntry 8 }
```

    pwCepPerfCurrentAbsPtrAdjust OBJECT-TYPE
       SYNTAX   Integer32
       MAX-ACCESS   read-only
       STATUS   current
       DESCRIPTION
           "Indicates the relative adjustment drift between
            inbound and outbound streams.

            It is calculated as absolute value of:
                (InPosPtrAdjust -   InNegPtrAdjust) -
                (OutPosPtrAdjust -   OutNegPtrAdjust)"
       ::= { pwCepPerfCurrentEntry 9 }

    pwCepPerfCurrentMissingPkts OBJECT-TYPE
       SYNTAX   PerfCurrentCount
       MAX-ACCESS   read-only
       STATUS   current
       DESCRIPTION
           "Number of missing packets (as detected via CEP header
            sequence number gaps)."
       ::= { pwCepPerfCurrentEntry 10 }

    pwCepPerfCurrentPktsOoseq OBJECT-TYPE
       SYNTAX   PerfCurrentCount
       MAX-ACCESS   read-only
       STATUS   current
       DESCRIPTION
           "Number of packets detected out of sequence (via CEP
            header sequence numbers) but successfully reordered.
            Note: Some implementations may not support this
            feature (see pwCepCfgPktReorder)."
       ::= { pwCepPerfCurrentEntry 11 }

    pwCepPerfCurrentPktsOoRngDropped OBJECT-TYPE
       SYNTAX   PerfCurrentCount
       MAX-ACCESS   read-only
       STATUS   current
       DESCRIPTION
           "Number of packets detected out of range (via CEP header
            sequence numbers) and could not be reordered or could not
            fit in the jitter buffer."
       ::= { pwCepPerfCurrentEntry 12 }

    pwCepPerfCurrentJtrBfrUnderruns OBJECT-TYPE
       SYNTAX   PerfCurrentCount
       MAX-ACCESS   read-only
       STATUS   current

```
      DESCRIPTION
          "Number of times a packet needed to be played out and the
           jitter buffer was empty."
      ::= { pwCepPerfCurrentEntry 13 }

   pwCepPerfCurrentPktsMalformed OBJECT-TYPE
      SYNTAX          PerfCurrentCount
      MAX-ACCESS      read-only
      STATUS          current
      DESCRIPTION
          "Number of packets detected with unexpected size or bad
           headers stack."
      ::= { pwCepPerfCurrentEntry 14 }

   pwCepPerfCurrentSummaryErrors OBJECT-TYPE
      SYNTAX          PerfCurrentCount
      MAX-ACCESS      read-only
      STATUS          current
      DESCRIPTION
          "A summary of all the packet-error types above (from
           missing packets to bad length packets)."
      ::= { pwCepPerfCurrentEntry 15 }

   pwCepPerfCurrentESs OBJECT-TYPE
      SYNTAX          PerfCurrentCount
      UNITS           "seconds"
      MAX-ACCESS      read-only
      STATUS          current
      DESCRIPTION
         "The counter associated with the number of Errored
          Seconds encountered."
      ::= { pwCepPerfCurrentEntry 16 }

   pwCepPerfCurrentSESs OBJECT-TYPE
      SYNTAX          PerfCurrentCount
      UNITS           "seconds"
      MAX-ACCESS      read-only
      STATUS          current
      DESCRIPTION
         "The counter associated with the number of
          Severely Errored Seconds encountered."
      ::= { pwCepPerfCurrentEntry 17 }

   pwCepPerfCurrentUASs OBJECT-TYPE
      SYNTAX          PerfCurrentCount
      UNITS           "seconds"
      MAX-ACCESS      read-only
      STATUS          current
```

            DESCRIPTION
                "The counter associated with the number of
                 Unavailable Seconds encountered."
            ::= { pwCepPerfCurrentEntry 18 }

    pwCepPerfCurrentFC OBJECT-TYPE
        SYNTAX   PerfCurrentCount
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION
            "CEP Failure Counts (FC-CEP). The number of CEP failure
             events. A failure event begins when the LOPS failure
             is declared and ends when the failure is cleared. A
             failure event that begins in one period and ends in
             another period is counted only in the period in which
             it begins."
        ::= { pwCepPerfCurrentEntry 19 }

    -- End CEP PW Performance Current Interval Table

    -- CEP Performance 15-Minute Interval Table

    pwCepPerfIntervalTable OBJECT-TYPE
        SYNTAX   SEQUENCE OF PwCepPerfIntervalEntry
        MAX-ACCESS   not-accessible
        STATUS   current
        DESCRIPTION
            "This table provides per-CEP PW performance information,
             much like the pwCepPerfCurrentTable above. However,
             these counts represent historical 15-minute intervals.
             Typically, this table will have a maximum of 96 entries
             for a 24-hour period but is not limited to this.

             NOTE: Counter64 objects are used here; Counter32 is
             too small for OC-768 CEP PWs."

        ::= { pwCepObjects 6 }

    pwCepPerfIntervalEntry OBJECT-TYPE
        SYNTAX   PwCepPerfIntervalEntry
        MAX-ACCESS   not-accessible
        STATUS   current
        DESCRIPTION
            "An entry in this table is created by the agent for
             every pwCepPerfCurrentEntry that is 15 minutes old.
             The contents of the Current entry are copied to the new

                entry here. The Current entry then resets its counts
                to zero for the next current 15-minute interval.
                pwCepIndex is found in the pwCepCfg table."

         INDEX { pwIndex, pwCepPerfIntervalNumber }

         ::= { pwCepPerfIntervalTable 1 }

      PwCepPerfIntervalEntry ::= SEQUENCE {

            pwCepPerfIntervalNumber   Integer32,
            pwCepPerfIntervalValidData   TruthValue,
            pwCepPerfIntervalReset   INTEGER,
            pwCepPerfIntervalTimeElapsed   HCPerfTimeElapsed,

            pwCepPerfIntervalDbaInPacketsHC   HCPerfIntervalCount,
            pwCepPerfIntervalDbaOutPacketsHC   HCPerfIntervalCount,

            pwCepPerfIntervalInNegPtrAdjust   PerfIntervalCount,
            pwCepPerfIntervalInPosPtrAdjust   PerfIntervalCount,
            pwCepPerfIntervalInPtrAdjustSecs   PerfIntervalCount,
            pwCepPerfIntervalOutNegPtrAdjust   PerfIntervalCount,
            pwCepPerfIntervalOutPosPtrAdjust   PerfIntervalCount,
            pwCepPerfIntervalOutPtrAdjustSecs PerfIntervalCount,
            pwCepPerfIntervalAbsPtrAdjust   Integer32,

            pwCepPerfIntervalMissingPkts   PerfIntervalCount,
            pwCepPerfIntervalPktsOoseq   PerfIntervalCount,
            pwCepPerfIntervalPktsOoRngDropped PerfIntervalCount,
            pwCepPerfIntervalJtrBfrUnderruns   PerfIntervalCount,
            pwCepPerfIntervalPktsMalformed   PerfIntervalCount,
            pwCepPerfIntervalSummaryErrors   PerfIntervalCount,

            pwCepPerfIntervalESs   PerfIntervalCount,
            pwCepPerfIntervalSESs   PerfIntervalCount,
            pwCepPerfIntervalUASs   PerfIntervalCount,
            pwCepPerfIntervalFC   PerfIntervalCount
            }

      pwCepPerfIntervalNumber OBJECT-TYPE
         SYNTAX   Integer32 (1..96)
         MAX-ACCESS   not-accessible
         STATUS   current
         DESCRIPTION
            "A number (between 1 and 96 to cover a 24-hour
             period) that identifies the interval for which the set
             of statistics is available. The interval identified by 1
             is the most recently completed 15-minute interval, and

```
      the interval identified by N is the interval immediately
      preceding the one identified by N-1.  The minimum range of
      N is 1 through 4.  The default range is 1 through 32.  The
      maximum range of N is 1 through 96."
   ::= { pwCepPerfIntervalEntry 1 }

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

pwCepPerfIntervalReset OBJECT-TYPE
   SYNTAX          INTEGER {
        reset (1),
        normal(2)
   }
   MAX-ACCESS      read-create
   STATUS          current
   DESCRIPTION
      "Used in cases where the user knows that the errors
       within this interval should not be counted.  Writing
       'reset' sets all error counts to zero.  The value of
       0 is not used here due to issues with
       implementations."
   ::= { pwCepPerfIntervalEntry 3 }

pwCepPerfIntervalTimeElapsed OBJECT-TYPE
    SYNTAX      HCPerfTimeElapsed
    UNITS       "seconds"
   MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
      "The duration of a particular interval in seconds.
       Adjustments in the system's time-of-day clock may
       cause the interval to be greater or less than the
       normal value.  Therefore, this actual interval value
       is provided."
    ::= { pwCepPerfIntervalEntry 4 }

pwCepPerfIntervalDbaInPacketsHC OBJECT-TYPE
   SYNTAX          HCPerfIntervalCount
   MAX-ACCESS      read-only
   STATUS          current
```

```
      DESCRIPTION
          "Number of DBA packets received."
      ::= { pwCepPerfIntervalEntry 5 }

  pwCepPerfIntervalDbaOutPacketsHC OBJECT-TYPE
      SYNTAX          HCPerfIntervalCount
      MAX-ACCESS      read-only
      STATUS          current
      DESCRIPTION
          "Number of DBA packets sent."
      ::= { pwCepPerfIntervalEntry 6 }

  -- Pointer adjustment stats
  pwCepPerfIntervalInNegPtrAdjust OBJECT-TYPE
      SYNTAX          PerfIntervalCount
      MAX-ACCESS      read-only
      STATUS          current
      DESCRIPTION
          "Number of negative pointer adjustments sent on the
           SONET path based on CEP pointer adjustments received."
      ::= { pwCepPerfIntervalEntry 7 }

  pwCepPerfIntervalInPosPtrAdjust OBJECT-TYPE
      SYNTAX          PerfIntervalCount
      MAX-ACCESS      read-only
      STATUS          current
      DESCRIPTION
          "Number of positive pointer adjustments sent on the
           SONET path based on CEP pointer adjustments received."
      ::= { pwCepPerfIntervalEntry 8 }

  pwCepPerfIntervalInPtrAdjustSecs OBJECT-TYPE
      SYNTAX          PerfIntervalCount
      UNITS           "seconds"
      MAX-ACCESS      read-only
      STATUS          current
      DESCRIPTION
          "Number of seconds in which a positive or negative
           pointer adjustment was sent on the SONET path."
      ::= { pwCepPerfIntervalEntry 9 }

  pwCepPerfIntervalOutNegPtrAdjust OBJECT-TYPE
      SYNTAX          PerfIntervalCount
      MAX-ACCESS      read-only
      STATUS          current
      DESCRIPTION
          "Number of negative pointer adjustments seen on the
           SONET path and encoded onto sent CEP packets."
```

```
      ::= { pwCepPerfIntervalEntry 10 }

   pwCepPerfIntervalOutPosPtrAdjust OBJECT-TYPE
      SYNTAX          PerfIntervalCount
      MAX-ACCESS      read-only
      STATUS          current
      DESCRIPTION
          "Number of positive pointer adjustments seen on the
           SONET path and encoded onto sent CEP packets."
      ::= { pwCepPerfIntervalEntry 11 }

   pwCepPerfIntervalOutPtrAdjustSecs OBJECT-TYPE
      SYNTAX          PerfIntervalCount
      UNITS           "seconds"
      MAX-ACCESS      read-only
      STATUS          current
      DESCRIPTION
          "Number of seconds in which a positive or negative
           pointer adjustment was seen on the SONET path."
      ::= { pwCepPerfIntervalEntry 12 }

   pwCepPerfIntervalAbsPtrAdjust OBJECT-TYPE
      SYNTAX          Integer32
      MAX-ACCESS      read-only
      STATUS          current
      DESCRIPTION
          "The relative adjustment drift between inbound
           and outbound streams.

           It is calculated as absolute value of:
              (InPosPtrAdjust  -   InNegPtrAdjust) -
              (OutPosPtrAdjust  -  OutNegPtrAdjust)"
      ::= { pwCepPerfIntervalEntry 13 }

   pwCepPerfIntervalMissingPkts OBJECT-TYPE
      SYNTAX          PerfIntervalCount
      MAX-ACCESS      read-only
      STATUS          current
      DESCRIPTION
          "Number of missing packets (as detected via CEP header
           sequence number gaps)."
      ::= { pwCepPerfIntervalEntry 14 }

   pwCepPerfIntervalPktsOoseq OBJECT-TYPE
      SYNTAX          PerfIntervalCount
      MAX-ACCESS      read-only
      STATUS          current
```

```
         DESCRIPTION
             "Number of packets detected out of sequence (via CEP
              header sequence numbers) but successfully reordered.
              Note: Some implementations mat not support this
              feature (see pwCepCfgPktReorder)."
         ::= { pwCepPerfIntervalEntry 15 }

    pwCepPerfIntervalPktsOoRngDropped OBJECT-TYPE
         SYNTAX          PerfIntervalCount
         MAX-ACCESS      read-only
         STATUS          current
         DESCRIPTION
             "Number of packets detected out of range (via CEP
              header sequence numbers) and could not be reordered
              or could not fit in the jitter buffer."
         ::= { pwCepPerfIntervalEntry 16 }

    pwCepPerfIntervalJtrBfrUnderruns OBJECT-TYPE
         SYNTAX          PerfIntervalCount
         MAX-ACCESS      read-only
         STATUS          current
         DESCRIPTION
             "Number of times a packet needed to be played
              out and the jitter buffer was empty."
         ::= { pwCepPerfIntervalEntry 17 }

    pwCepPerfIntervalPktsMalformed OBJECT-TYPE
         SYNTAX          PerfIntervalCount
         MAX-ACCESS      read-only
         STATUS          current
         DESCRIPTION
             "Number of packets detected with unexpected size or bad
              headers stack."
         ::= { pwCepPerfIntervalEntry 18 }

    pwCepPerfIntervalSummaryErrors OBJECT-TYPE
         SYNTAX          PerfIntervalCount
         MAX-ACCESS      read-only
         STATUS          current
         DESCRIPTION
             "A summary of all the packet-error types above (from
              missing packets to bad length packets)."
         ::= { pwCepPerfIntervalEntry 19 }

    pwCepPerfIntervalESs OBJECT-TYPE
         SYNTAX          PerfIntervalCount
         UNITS           "seconds"
         MAX-ACCESS      read-only
```

```
      STATUS         current
      DESCRIPTION
          "The counter associated with the number of Errored
           Seconds encountered."
      ::= { pwCepPerfIntervalEntry 20 }

   pwCepPerfIntervalSESs OBJECT-TYPE
      SYNTAX         PerfIntervalCount
      UNITS          "seconds"
      MAX-ACCESS     read-only
      STATUS         current
      DESCRIPTION
          "The counter associated with the number of
           Severely Errored Seconds encountered."
      ::= { pwCepPerfIntervalEntry 21 }

   pwCepPerfIntervalUASs OBJECT-TYPE
      SYNTAX         PerfIntervalCount
      UNITS          "seconds"
      MAX-ACCESS     read-only
      STATUS         current
      DESCRIPTION
          "The counter associated with the number of
           Unavailable Seconds encountered."
      ::= { pwCepPerfIntervalEntry 22 }

   pwCepPerfIntervalFC OBJECT-TYPE
      SYNTAX         PerfIntervalCount
      MAX-ACCESS     read-only
      STATUS         current
      DESCRIPTION
          "CEP Failure Counts (FC-CEP).  The number of CEP failure
           events.  A failure event begins when the LOPS failure
           is declared and ends when the failure is cleared.  A
           failure event that begins in one period and ends in
           another period is counted only in the period in which
           it begins."
      ::= { pwCepPerfIntervalEntry 23 }

   -- End CEP Performance 15-Minute Interval Table

   -- CEP Performance 1-Day Table

   pwCepPerf1DayIntervalTable OBJECT-TYPE
      SYNTAX         SEQUENCE OF PwCepPerf1DayIntervalEntry
      MAX-ACCESS     not-accessible
      STATUS         current
```

         DESCRIPTION
             "This table provides per CEP PW performance information,
              the current day's measurement, and the previous day's
              interval.

              In the extreme case where one of the error counters has
              overflowed during the one-day interval, the error counter
              MUST NOT wrap around and MUST return the maximum value."
         ::= { pwCepObjects 7 }

     pwCepPerf1DayIntervalEntry OBJECT-TYPE
         SYNTAX   PwCepPerf1DayIntervalEntry
         MAX-ACCESS   not-accessible
         STATUS   current
         DESCRIPTION
             "An entry is created in this table by the agent for
              every entry in the pwCepTable and for each day
              interval up to the number of supported historical
              intervals."

         INDEX { pwIndex, pwCepPerf1DayIntervalNumber }

           ::= { pwCepPerf1DayIntervalTable 1 }

     PwCepPerf1DayIntervalEntry ::= SEQUENCE {

         pwCepPerf1DayIntervalNumber   Unsigned32,
         pwCepPerf1DayIntervalValidData   TruthValue,
         pwCepPerf1DayIntervalMoniSecs   HCPerfTimeElapsed,

         pwCepPerf1DayIntervalDbaInPacketsHC   Counter64,
         pwCepPerf1DayIntervalDbaOutPacketsHC   Counter64,

         pwCepPerf1DayIntervalInNegPtrAdjust   Counter32,
         pwCepPerf1DayIntervalInPosPtrAdjust   Counter32,
         pwCepPerf1DayIntervalInPtrAdjustSecs   Counter32,
         pwCepPerf1DayIntervalOutNegPtrAdjust   Counter32,
         pwCepPerf1DayIntervalOutPosPtrAdjust   Counter32,
         pwCepPerf1DayIntervalOutPtrAdjustSecs   Counter32,
         pwCepPerf1DayIntervalAbsPtrAdjust   Integer32,

         pwCepPerf1DayIntervalMissingPkts   Counter32,
         pwCepPerf1DayIntervalPktsOoseq   Counter32,
         pwCepPerf1DayIntervalPktsOoRngDropped   Counter32,
         pwCepPerf1DayIntervalJtrBfrUnderruns   Counter32,
         pwCepPerf1DayIntervalPktsMalformed   Counter32,
         pwCepPerf1DayIntervalSummaryErrors   Counter32,

```
      pwCepPerf1DayIntervalESs                     Counter32,
      pwCepPerf1DayIntervalSESs                    Counter32,
      pwCepPerf1DayIntervalUASs                    Counter32,
      pwCepPerf1DayIntervalFC                      Counter32
      }
```

```
pwCepPerf1DayIntervalNumber OBJECT-TYPE
   SYNTAX      Unsigned32(1..31)
   MAX-ACCESS  not-accessible
   STATUS      current
   DESCRIPTION
       "History Data Interval number.  Interval 1 is the current day
        measurement period; interval 2 is the most recent previous
        day; and interval 30 is 31 days ago."
   ::= { pwCepPerf1DayIntervalEntry 1 }
```

```
pwCepPerf1DayIntervalValidData OBJECT-TYPE
   SYNTAX       TruthValue
   MAX-ACCESS   read-only
   STATUS       current
   DESCRIPTION
       "This variable indicates if the data for this interval
        is valid."
   ::= { pwCepPerf1DayIntervalEntry 2 }
```

```
pwCepPerf1DayIntervalMoniSecs OBJECT-TYPE
   SYNTAX       HCPerfTimeElapsed
   UNITS        "seconds"
   MAX-ACCESS   read-only
   STATUS       current
   DESCRIPTION
       "The amount of time 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 situations where performance monitoring data could not
        be collected for any reason or the agent clock was
        adjusted."
   ::= { pwCepPerf1DayIntervalEntry 3 }
```

```
pwCepPerf1DayIntervalDbaInPacketsHC OBJECT-TYPE
   SYNTAX       Counter64
   MAX-ACCESS   read-only
   STATUS       current
   DESCRIPTION
       "Number of DBA packets received."
   ::= { pwCepPerf1DayIntervalEntry 4 }
```

```
   pwCepPerf1DayIntervalDbaOutPacketsHC OBJECT-TYPE
      SYNTAX        Counter64
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
          "Number of DBA packets sent."
      ::= { pwCepPerf1DayIntervalEntry 5 }

   -- Pointer adjustment stats

   pwCepPerf1DayIntervalInNegPtrAdjust OBJECT-TYPE
      SYNTAX        Counter32
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
          "Number of negative pointer adjustments sent on the
           SONET path based on CEP pointer adjustments received."
      ::= { pwCepPerf1DayIntervalEntry 6 }

   pwCepPerf1DayIntervalInPosPtrAdjust OBJECT-TYPE
      SYNTAX        Counter32
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
          "Number of positive pointer adjustments sent on the
           SONET path based on CEP pointer adjustments received."
      ::= { pwCepPerf1DayIntervalEntry 7 }

   pwCepPerf1DayIntervalInPtrAdjustSecs OBJECT-TYPE
      SYNTAX        Counter32
      UNITS         "seconds"
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
          "Number of seconds in which a positive or negative pointer
           adjustment was sent on the SONET path."
      ::= { pwCepPerf1DayIntervalEntry 8 }

   pwCepPerf1DayIntervalOutNegPtrAdjust OBJECT-TYPE
      SYNTAX        Counter32
      MAX-ACCESS    read-only
      STATUS        current
      DESCRIPTION
          "Number of negative pointer adjustments seen on the
           SONET path and encoded onto sent CEP packets."
      ::= { pwCepPerf1DayIntervalEntry 9 }
```

```
   pwCepPerf1DayIntervalOutPosPtrAdjust OBJECT-TYPE
      SYNTAX         Counter32
      MAX-ACCESS     read-only
      STATUS         current
      DESCRIPTION
          "Number of positive pointer adjustments seen on the
           SONET path and encoded onto sent CEP packets."
      ::= { pwCepPerf1DayIntervalEntry 10 }

   pwCepPerf1DayIntervalOutPtrAdjustSecs OBJECT-TYPE
      SYNTAX         Counter32
      UNITS          "seconds"
      MAX-ACCESS     read-only
      STATUS         current
      DESCRIPTION
          "Number of seconds in which a positive or negative pointer
           adjustment was seen on the SONET path."
      ::= { pwCepPerf1DayIntervalEntry 11 }

   pwCepPerf1DayIntervalAbsPtrAdjust OBJECT-TYPE
      SYNTAX         Integer32
      MAX-ACCESS     read-only
      STATUS         current
      DESCRIPTION
          "The relative adjustment of drift between inbound
           and outbound streams.  It is calculated as absolute
           value of:
              (InPosPtrAdjust  -   InNegPtrAdjust) -
              (OutPosPtrAdjust  -  OutNegPtrAdjust)"
      ::= { pwCepPerf1DayIntervalEntry 12 }

   pwCepPerf1DayIntervalMissingPkts OBJECT-TYPE
      SYNTAX         Counter32
      MAX-ACCESS     read-only
      STATUS         current
      DESCRIPTION
          "Number of missing packets (as detected via CEP header
           sequence number gaps)."
      ::= { pwCepPerf1DayIntervalEntry 13 }

   pwCepPerf1DayIntervalPktsOoseq OBJECT-TYPE
      SYNTAX         Counter32
      MAX-ACCESS     read-only
      STATUS         current
```

        DESCRIPTION
            "Number of packets detected out of sequence (via CEP
             header sequence numbers) but successfully reordered.
             Note: Some implementations may not support this feature
             (see pwCepCfgPktReorder)."
        ::= { pwCepPerf1DayIntervalEntry 14 }

    pwCepPerf1DayIntervalPktsOoRngDropped OBJECT-TYPE
        SYNTAX   Counter32
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION
            "Number of packets detected out of range (via CEP header
             sequence numbers) and could not be reordered or could not
             fit in the jitter buffer."
        ::= { pwCepPerf1DayIntervalEntry 15 }

    pwCepPerf1DayIntervalJtrBfrUnderruns OBJECT-TYPE
        SYNTAX   Counter32
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION
            "Number of times a packet needed to be played out, and the
             jitter buffer was empty."
        ::= { pwCepPerf1DayIntervalEntry 16 }

    pwCepPerf1DayIntervalPktsMalformed OBJECT-TYPE
        SYNTAX   Counter32
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION
            "Number of packets detected with unexpected size or bad
             headers stack."
        ::= { pwCepPerf1DayIntervalEntry 17 }

    pwCepPerf1DayIntervalSummaryErrors OBJECT-TYPE
        SYNTAX   Counter32
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION
            "A summary of all the packet-error types above (from
             missing packets to bad length packets)."
        ::= { pwCepPerf1DayIntervalEntry 18 }

    pwCepPerf1DayIntervalESs OBJECT-TYPE
        SYNTAX   Counter32
        UNITS   "seconds"
        MAX-ACCESS   read-only

```
        STATUS          current
        DESCRIPTION
            "The counter associated with the number of Errored
             Seconds encountered."
        ::= { pwCepPerf1DayIntervalEntry 19 }

    pwCepPerf1DayIntervalSESs OBJECT-TYPE
        SYNTAX          Counter32
        UNITS           "seconds"
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
            "The counter associated with the number of Severely
             Errored Seconds.  See pwCepCfgMissingPktsToSes."
        ::= { pwCepPerf1DayIntervalEntry 20 }

    pwCepPerf1DayIntervalUASs OBJECT-TYPE
        SYNTAX          Counter32
        UNITS           "seconds"
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
            "The counter associated with the number of
             unavailable seconds.  See pwCepCfgSesToUAS.

             NOTE: When first entering the UAS state, the number
             of SesToUas is added to this object; then, as each
             additional UAS occurs, this object increments by one.

             NOTE: Similar to [RFC3592], if the agent chooses to update
             the various performance statistics in real time, it must
             be prepared to retroactively reduce the ES and SES counts
             (by the value of pwCepCfgSesToUas) and increase the UAS
             count (by that same value) when it determines that UAS
             state has been entered."
        ::= { pwCepPerf1DayIntervalEntry 21 }

    pwCepPerf1DayIntervalFC OBJECT-TYPE
        SYNTAX          Counter32
        MAX-ACCESS      read-only
        STATUS          current
        DESCRIPTION
            "CEP Failure Counts (FC-CEP).  The number of CEP failure
             events.  A failure event begins when the LOPS failure
             is declared and ends when the failure is cleared."
        ::= { pwCepPerf1DayIntervalEntry 22 }

    -- End of CEP Performance 1-Day Table
```

    -- Conformance information

    pwCepGroups   OBJECT IDENTIFIER ::= { pwCepConformance 1 }

    pwCepCompliances OBJECT IDENTIFIER ::= { pwCepConformance 2 }

    -- Compliance statement for full compliant implementations

    pwCepModuleFullCompliance MODULE-COMPLIANCE
        STATUS   current
        DESCRIPTION
           "The compliance statement for agents that support
            full CEP PW configuration through this MIB module."

        MODULE -- this module
           MANDATORY-GROUPS { pwCepGroup,
                              pwCepCfgGroup,
                              pwCepPerfCurrentGroup,
                              pwCepPerfIntervalGroup,
                              pwCepPerf1DayIntervalGroup
                            }

       GROUP   pwCepFractionalGroup
       DESCRIPTION   "This group is only mandatory for implementations
                      that support fractional SPE."

       GROUP   pwCepFractionalSts1Vc3Group
       DESCRIPTION   "This group is only mandatory for implementations
                      that support the fractional STS-1/VC-3."

       GROUP   pwCepFractionalVc4Group
       DESCRIPTION   "This group is only mandatory for implementations
                      that support the fractional VC-4."

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

       OBJECT   pwCepType
       SYNTAX   INTEGER { spe(1) }
       MIN-ACCESS   read-only
       DESCRIPTION   "The support of the value vt(2) or fracSpe(3) is
                      optional. If either of these options are
                      supported, read-write access is not required."

```
OBJECT          pwCepSonetPayloadLength
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required for implementations
                 that support only the default values (which are
                 based on the pwCepType)."

OBJECT          pwCepCfgMinPktLength
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required for implementations
                 that support only a single predefined value."

OBJECT          pwCepCfgEnableDBA
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required for implementations
                 that support only a single predefined value."

OBJECT          pwCepCfgRtpHdrSuppress
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required for implementations
                 that do not support RTP header for CEP
                 connections."

OBJECT          pwCepCfgConsecPktsInsync
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required for implementations
                 that support only a single predefined value."

OBJECT          pwCepCfgConsecMissingOutSync
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required for implementations
                 that support only a single predefined value."

OBJECT          pwCepCfgPktErrorPlayOutValue
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required for implementations
                 that support only a single predefined value."

OBJECT          pwCepCfgMissingPktsToSes
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required for implementations
                 that support only a single predefined value."

OBJECT          pwCepCfgSesToUas
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required for implementations
                 that support only a single predefined value."

OBJECT          pwCepCfgSecsToExitUas
```

```
     MIN-ACCESS    read-only
     DESCRIPTION   "Write access is not required for implementations
                    that support only a single predefined value."

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

     OBJECT        pwCepCfgRowStatus
     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."

     OBJECT        pwCepFracMode
     MIN-ACCESS    read-only
     DESCRIPTION   "Write access is not required for implementations
                    that support only a single predefined value."

     OBJECT        pwCepFracAsync
     SYNTAX        PwCepFracAsyncMap { other(1) }
     MIN-ACCESS    read-only
     DESCRIPTION   "Support for ds3(2) or e3(3) and read-write access
                    is not required if the implementations do not
                    support these options."

     OBJECT        pwCepFracVtgMap
     MIN-ACCESS    read-only
     DESCRIPTION   "Write access is not required for implementations
                    that support only a single predefined value."

     OBJECT        pwCepFracEbm
     MIN-ACCESS    read-only
     DESCRIPTION   "Write access is not required for implementations
                    where the EBM is derived from configuration in
                    other MIB modules."

     OBJECT        pwCepFracSdhVc4Mode
     MIN-ACCESS    read-only
     DESCRIPTION   "Write access is not required for implementations
                    that support only a single predefined value."

     OBJECT        pwCepFracSdhVc4Tu3Map1
     MIN-ACCESS    read-only
     DESCRIPTION   "Write access is not required for implementations
                    that support only a single predefined value."
```

```
        OBJECT         pwCepFracSdhVc4Tu3Map2
        MIN-ACCESS     read-only
        DESCRIPTION    "Write access is not required for implementations
                        that support only a single predefined value."

        OBJECT         pwCepFracSdhVc4Tu3Map3
        MIN-ACCESS     read-only
        DESCRIPTION    "Write access is not required for implementations
                        that support only a single predefined value."

        OBJECT         pwCepFracSdhVc4Tug2Map1
        MIN-ACCESS     read-only
        DESCRIPTION    "Write access is not required for implementations
                        that support only a single predefined value."

        OBJECT         pwCepFracSdhVc4Tug2Map2
        MIN-ACCESS     read-only
        DESCRIPTION    "Write access is not required for implementations
                        that support only a single predefined value."

        OBJECT         pwCepFracSdhVc4Tug2Map3
        MIN-ACCESS     read-only
        DESCRIPTION    "Write access is not required for implementations
                        that support only a single predefined value."

        OBJECT         pwCepFracSdhVc4Ebm1
        MIN-ACCESS     read-only
        DESCRIPTION    "Write access is not required for implementations
                        where the EBM is derived from configuration in
                        other MIB modules."

        OBJECT         pwCepFracSdhVc4Ebm2
        MIN-ACCESS     read-only
        DESCRIPTION    "Write access is not required for implementations
                        where the EBM is derived from configuration in
                        other MIB modules."

        OBJECT         pwCepFracSdhVc4Ebm3
        MIN-ACCESS     read-only
        DESCRIPTION    "Write access is not required for implementations
                        where the EBM is derived from configuration in
                        other MIB modules."
```

```
      OBJECT          pwCepFracRowStatus
      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."

       ::= { pwCepCompliances 1 }

   -- Compliance requirement for read-only compliant implementations

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

        MODULE  -- this module
           MANDATORY-GROUPS { pwCepGroup,
                              pwCepCfgGroup,
                              pwCepPerfCurrentGroup,
                              pwCepPerfIntervalGroup,
                              pwCepPerf1DayIntervalGroup
                            }

      GROUP           pwCepFractionalGroup
      DESCRIPTION   "This group is only mandatory for implementations
                      that support fractional SPE."

      GROUP           pwCepFractionalSts1Vc3Group
      DESCRIPTION   "This group is only mandatory for implementations
                      that support the fractional STS-1/VC-3."

      GROUP           pwCepFractionalVc4Group
      DESCRIPTION   "This group is only mandatory for implementations
                      that support the fractional VC-4."

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

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

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


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


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


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


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


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


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


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


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


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


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


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

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

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

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

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

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

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

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

OBJECT          pwCepFracSdhVc4Mode
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required."

OBJECT          pwCepFracSdhVc4Tu3Map1
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required."

OBJECT          pwCepFracSdhVc4Tu3Map2
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required."

OBJECT          pwCepFracSdhVc4Tu3Map3
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required."

OBJECT          pwCepFracSdhVc4Tug2Map1
MIN-ACCESS      read-only
DESCRIPTION     "Write access is not required."
```

```
   OBJECT         pwCepFracSdhVc4Tug2Map2
   MIN-ACCESS    read-only
   DESCRIPTION  "Write access is not required."

   OBJECT         pwCepFracSdhVc4Tug2Map3
   MIN-ACCESS    read-only
   DESCRIPTION  "Write access is not required."

   OBJECT         pwCepFracSdhVc4Ebm1
   MIN-ACCESS    read-only
   DESCRIPTION  "Write access is not required."

   OBJECT         pwCepFracSdhVc4Ebm2
   MIN-ACCESS    read-only
   DESCRIPTION  "Write access is not required."

   OBJECT         pwCepFracSdhVc4Ebm3
   MIN-ACCESS    read-only
   DESCRIPTION  "Write access is not required."

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

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

     ::= { pwCepCompliances 2 }

-- Units of conformance

pwCepGroup OBJECT-GROUP
   OBJECTS {
           pwCepType,
           pwCepSonetIfIndex,
           pwCepSonetConfigErrorOrStatus,
           pwCepCfgIndex,
           pwCepTimeElapsed,
           pwCepValidIntervals,
           pwCepIndications,
           pwCepLastEsTimeStamp
           }
   STATUS  current
   DESCRIPTION
       "Collection of objects for basic CEP PW config and
        status."
   ::= { pwCepGroups 1 }
```

      pwCepSignalingGroup OBJECT-GROUP
         OBJECTS {
                 pwCepPeerCepOption
                }
         STATUS current
         DESCRIPTION
             "Collection of objects required if the network element
              support CEP connections signaling."
         ::= { pwCepGroups 2 }

      pwCepCfgGroup OBJECT-GROUP
         OBJECTS {
                 pwCepCfgIndexNext,

                 pwCepSonetPayloadLength,
                 pwCepCfgMinPktLength,
                 pwCepCfgPktReorder,
                 pwCepCfgEnableDBA,

                 pwCepCfgRtpHdrSuppress,

                 pwCepCfgJtrBfrDepth,

                 pwCepCfgConsecPktsInsync,
                 pwCepCfgConsecMissingOutSync,

                 pwCepCfgPktErrorPlayOutValue,

                 pwCepCfgMissingPktsToSes,
                 pwCepCfgSesToUas,
                 pwCepCfgSecsToExitUas,

                 pwCepCfgName,

                 pwCepCfgRowStatus,

                 pwCepCfgStorageType
         }
         STATUS current
         DESCRIPTION
             "Collection of detailed objects needed to
              configure CEP PWs."
         ::= { pwCepGroups 3 }

    pwCepPerfCurrentGroup OBJECT-GROUP
       OBJECTS {
               pwCepPerfCurrentDbaInPacketsHC,
               pwCepPerfCurrentDbaOutPacketsHC,

```
                pwCepPerfCurrentInNegPtrAdjust,
                pwCepPerfCurrentInPosPtrAdjust,
                pwCepPerfCurrentInPtrAdjustSecs,
                pwCepPerfCurrentOutNegPtrAdjust,
                pwCepPerfCurrentOutPosPtrAdjust,
                pwCepPerfCurrentOutPtrAdjustSecs,
                pwCepPerfCurrentAbsPtrAdjust,
                pwCepPerfCurrentMissingPkts,
                pwCepPerfCurrentPktsOoseq,
                pwCepPerfCurrentPktsOoRngDropped,
                pwCepPerfCurrentJtrBfrUnderruns,
                pwCepPerfCurrentPktsMalformed,
                pwCepPerfCurrentSummaryErrors,

                pwCepPerfCurrentESs,
                pwCepPerfCurrentSESs,
                pwCepPerfCurrentUASs,
                pwCepPerfCurrentFC
                }
        STATUS   current
        DESCRIPTION
            "Collection of statistics objects for CEP PWs."
        ::= { pwCepGroups 4 }

   pwCepPerfIntervalGroup OBJECT-GROUP
        OBJECTS {
                pwCepPerfIntervalValidData,
                pwCepPerfIntervalReset,
                pwCepPerfIntervalTimeElapsed,

                pwCepPerfIntervalDbaInPacketsHC,
                pwCepPerfIntervalDbaOutPacketsHC,

                pwCepPerfIntervalInNegPtrAdjust,
                pwCepPerfIntervalInPosPtrAdjust,
                pwCepPerfIntervalInPtrAdjustSecs,
                pwCepPerfIntervalOutNegPtrAdjust,
                pwCepPerfIntervalOutPosPtrAdjust,
                pwCepPerfIntervalOutPtrAdjustSecs,
                pwCepPerfIntervalAbsPtrAdjust,

                pwCepPerfIntervalMissingPkts,
                pwCepPerfIntervalPktsOoseq,
                pwCepPerfIntervalPktsOoRngDropped,
                pwCepPerfIntervalJtrBfrUnderruns,
                pwCepPerfIntervalPktsMalformed,
                pwCepPerfIntervalSummaryErrors,
```

```
             pwCepPerfIntervalESs,
             pwCepPerfIntervalSESs,
             pwCepPerfIntervalUASs,
             pwCepPerfIntervalFC

     }
     STATUS  current
     DESCRIPTION
         "Collection of statistics objects for CEP PWs."
     ::= { pwCepGroups 5 }

  pwCepPerf1DayIntervalGroup OBJECT-GROUP
     OBJECTS {
             pwCepPerf1DayIntervalValidData,
             pwCepPerf1DayIntervalMoniSecs,

             pwCepPerf1DayIntervalDbaInPacketsHC,
             pwCepPerf1DayIntervalDbaOutPacketsHC,

             pwCepPerf1DayIntervalInNegPtrAdjust,
             pwCepPerf1DayIntervalInPosPtrAdjust,
             pwCepPerf1DayIntervalInPtrAdjustSecs,
             pwCepPerf1DayIntervalOutNegPtrAdjust,
             pwCepPerf1DayIntervalOutPosPtrAdjust,
             pwCepPerf1DayIntervalOutPtrAdjustSecs,
             pwCepPerf1DayIntervalAbsPtrAdjust,

             pwCepPerf1DayIntervalMissingPkts,
             pwCepPerf1DayIntervalPktsOoseq,
             pwCepPerf1DayIntervalPktsOoRngDropped,
             pwCepPerf1DayIntervalJtrBfrUnderruns,
             pwCepPerf1DayIntervalPktsMalformed,
             pwCepPerf1DayIntervalSummaryErrors,

             pwCepPerf1DayIntervalESs,
             pwCepPerf1DayIntervalSESs,
             pwCepPerf1DayIntervalUASs,
             pwCepPerf1DayIntervalFC
             }
     STATUS  current
     DESCRIPTION
         "Collection of statistics objects for CEP PWs."
     ::= { pwCepGroups 6 }
```

      pwCepFractionalGroup OBJECT-GROUP
         OBJECTS {
                   pwCepFracRowStatus,
                   pwCepFracStorageType
         }
         STATUS current
         DESCRIPTION
             "Collection of fractional SPE objects. These objects
              are optional and should be supported only if
              fractional SPE is supported within the network
              element."
         ::= { pwCepGroups 7 }

      pwCepFractionalSts1Vc3Group OBJECT-GROUP
         OBJECTS {
                   pwCepFracMode,
                   pwCepFracConfigError,
                   pwCepFracAsync,
                   pwCepFracVtgMap,
                   pwCepFracEbm,
                   pwCepFracPeerEbm
         }
         STATUS current
         DESCRIPTION
             "Collection of fractional STS-1/VC3 objects. These
              objects are optional and should be supported only if
              fractional STS-1/VC3 is supported within the network
              element."
         ::= { pwCepGroups 8 }

      pwCepFractionalVc4Group OBJECT-GROUP
         OBJECTS {
                   pwCepFracSdhVc4Mode,
                   pwCepFracSdhVc4Tu3Map1,
                   pwCepFracSdhVc4Tu3Map2,
                   pwCepFracSdhVc4Tu3Map3,
                   pwCepFracSdhVc4Tug2Map1,
                   pwCepFracSdhVc4Tug2Map2,
                   pwCepFracSdhVc4Tug2Map3,
                   pwCepFracSdhVc4Ebm1,
                   pwCepFracSdhVc4Ebm2,
                   pwCepFracSdhVc4Ebm3,
                   pwCepFracSdhVc4PeerEbm1,
                   pwCepFracSdhVc4PeerEbm2,
                   pwCepFracSdhVc4PeerEbm3
         }
         STATUS current

```
        DESCRIPTION
            "Collection of fractional VC4 objects.  These objects
             are optional and should be supported only if
             fractional VC4 is supported within the network
             element."
        ::= { pwCepGroups 9 }

    END
```

8. Security Considerations

   It is clear that this MIB module is potentially useful for monitoring
   CEP PWs. This MIB 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 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:

   o The pwCepTable, pwCepCfgTable, and pwCepFracTable contain objects
      to CEP PW parameters on a Provider Edge (PE) device. Unauthorized
      access to objects in these tables could result in disruption of
      traffic on the network. The use of stronger mechanisms such as
      SNMPv3 security should be considered where possible.
      Specifically, SNMPv3 VACM and USM MUST be used with any v3 agent
      which implements this MIB module. Administrators should consider
      whether read access to these objects should be allowed, since read
      access may be undesirable under certain circumstances.

   Some of the readable objects in this MIB module (i.e., objects with a
   MAX-ACCESS other than not-accessible) may be considered sensitive or
   vulnerable in some network environments. It is thus important to
   control even GET and/or NOTIFY access to these objects and possibly
   to even encrypt the values of these objects when sending them over
   the network via SNMP. These are the tables and objects and their
   sensitivity/vulnerability:

   o The pwCepTable, pwCepPerfCurrentTable, pwCepPerfIntervalTable, and
      pwCepPerf1DayIntervalTable collectively show the CEP 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),
   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
   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.

9. IANA Considerations

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

      Descriptor   OBJECT IDENTIFIER value
      ----------   -----------------------

      pwCepStdMIB   { mib-2 200 }

10. References

10.1. Normative References

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