SONET/SDH Circuit Emulation Service Over Packet (CEP) Management Information Base (MIB) Using SMIv2
draft-ietf-pwe3-cep-mib-16

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 SONET/SDH
circuits over a Packet Switch Network (PSN).

Requirements Language

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 [RFC2119].

Status of this Memo

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Table of Contents

[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 provide the Circuit
    Emulation Service over a Packet Switched Network (PSN).

    The model for Circuit Emulation Service 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 the [[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/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 re-described here.

    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](#)].

[2](#). **Terminology**

    CEP terminology comes from [[RFC4842](#)] that 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. Mechanism for terminating of 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 is appended at the beginning of each fragment to provide
    information regarding where the SPE begins within the packet stream,
    a sequence number and pointer adjustment information (see [[RFC4842](#)]).

"Outbound" references the traffic direction where 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 where packets are received from the PSN, 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 bi-directional and symmetrical, CEP uses the same SONET/SDH time-slot, SONET/SDH width and packet size. Inbound and outbound PW labels may differ.

3. Co-Authors

The individuals listed below are co-authors of this document. Dave Danenberg was the editor of this document at the pre-WG versions of the PW MIB modules.

   Andrew G. Malis - Tellabs

   Dave Danenberg - Litchfield Communications

   Scott C. Park - Litchfield Communications

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 and
      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 Time slot, 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 Performance Current Table (pwCemPerfCurrentTable) contains
      CEP stats for the current 15-minute period.

   - The CEP Performance 15 Minute Interval Table
      (pwCemPerfIntervalTable) is similar to the pwCemPerfCurrentTable.
      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 (pwCepPerf1DayTable) 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 Modules 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 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 module.

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.

First create an entry in the pwTable:

- Follow steps as defined in [RFC5601].

Configure the PSN tunnel in the respective PSN specific PWE3 PSN glue
MIB module 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 time slot in
      the pwCepTable.

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

   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.

   Observe the CEP PW:

   - Once a CEP PW is operational, the pwCepPerfCurrentTable,
      pwCepPerfIntervalTable and pwCepPerf1DayTable 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 time-slot and
   associated CEP PW. In this case, an STS-3c starts at SONET time slot
   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  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 time
slot 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            -- RFC 2578

    MODULE-COMPLIANCE, OBJECT-GROUP
       FROM SNMPv2-CONF           -- RFC 2580

    TEXTUAL-CONVENTION, TruthValue, RowStatus, StorageType,
    TimeStamp
       FROM SNMPv2-TC             -- RFC 2579
```

```
    SnmpAdminString
        FROM SNMP-FRAMEWORK-MIB      -- RFC 3411

    InterfaceIndexOrZero, InterfaceIndex
        FROM IF-MIB                  -- RFC 2863

    PerfCurrentCount, PerfIntervalCount
        FROM PerfHist-TC-MIB         -- RFC 3593

    HCPerfCurrentCount, HCPerfIntervalCount, HCPerfTimeElapsed,
    HCPerfValidIntervals
        FROM HC-PerfHist-TC-MIB      -- RFC 3705

    pwIndex
        FROM PW-STD-MIB              -- RFC 5601
-- RFC Editor: Please replace PWMIB with actual RFC number and
-- remove this note

    PwCfgIndexOrzero
        FROM PW-TC-STD-MIB           -- RFC 5542
-- RFC Editor: Please replace PWTC with actual RFC number and
-- remove this note
;

-- The PW CEP MIB

pwCepStdMIB MODULE-IDENTITY
    LAST-UPDATED "201103081200Z"  -- 8 March 2011 12:00:00 GMT
    ORGANIZATION "Pseudowire Emulation Edge-to-Edge (PWE3)
                 Working Group"
    CONTACT-INFO
        "
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          The PWE3 Working Group (email distribution pwe3@ietf.org,
          http://www.ietf.org/html.charters/pwe3-charter.html)
          "

    DESCRIPTION
        "This MIB module contains managed object definitions for
         Circuit Emulation over Packet (CEP) as in: Malis, A.,
```

Prayson, P., Cohen, R. and Zelig, D. 'Synchronous Optical

          Network/Synchronous Digital Hierarchy (SONET/SDH)
          Circuit Emulation over Packet (CEP)', RFC 4842.

          Copyright (c) 2011 IETF Trust and the persons identified
          as the document authors. All rights reserved. This version
          of this MIB module is part of RFC xxxx; See the RFC itself
          for full legal notices.

-- RFC Editor: Please replace XXXX with actual RFC number and
-- remove this note
          "
    -- Revision history.
    REVISION "201103081200Z" -- 8 March 2011 12:00:00 GMT
    DESCRIPTION "Initial version published as part of RFC XXXX."
-- RFC Editor: Please replace XXXX with actual RFC number and remove
-- this note

    ::= { mib-2 XXXX } -- To be assigned by IANA
                    -- RFC Editor: Please replace the XXXX with the
                    -- IANA assigned value and remove this note

-- Local Textual conventions

PwCepSonetEbm ::= TEXTUAL-CONVENTION
    STATUS   current
    DESCRIPTION
         "Equipped Bit Mask (EBM) used for fractional STS-1/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 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 VTG/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 objects it represents a
          VTG carrying VT1.5/VC11s, while only three are set when

VT2/VC12 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 equals 'cep'.

All read-write object 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 non consistent 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
             ([RFC3593 section 3.3](#)), an interface index for the SONET
             VT ([RFC3593 section 3.4](#)) if the VT to be emulated is
             extracted 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
             report that does not affect the forwarding process.

             'timeslotInUse'(1) is set when another CEP PW has already

reserved a timeslot(s) that this CEP PW is attempting to
reserved.

        '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 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, however 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 of 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, a
       at least one packet was determined to be missing based on a
       gap in the CEP sequence number. Note: If the implementation
       supports packet re-ordering, detecting gaps SHOULD take
       place as they are played out, not as they arrive. This
       provides time for mis-ordered 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
       addresses an already occupied buffer within range.
       Whether or not packet re-ordering is supported by the
       implementation, this indication MUST be supported.
```

'jtrBfrUnder'(2) - The jitter buffer underflowed because

         not enough packets arriving 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. RDI is Generated by the remote CEP de-packetizer
         when LOPS is detected.

         'cepAis'(6) - Remote CEP packetizer has detected AIS

         on its incoming SONET stream. cepAis MUST NOT (in
         itself) cause a CEP PW down notification.

         'badHdrStack'(7) - This indication is 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 ES or SES state."

```
     ::= { pwCepEntry 8 }
```

pwCepPeerCepOption OBJECT-TYPE
    SYNTAX   Unsigned32
    MAX-ACCESS read-only
    STATUS   current
    DESCRIPTION
        "The value of 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 }

-- PW 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 NMS burden.
          Once an entry is created here it may be re-used
          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
          wish 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
          re-boot, the agent MUST ensure the integrity of those
          entries. If the set of entries of a specific row are found to
          be non consistent 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, value of 783 bytes indicates that each packet
        carries 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. 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 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 re-ordered. The
        maximum sequence number differential (i.e., the range in
        which re-sequencing can occur) is dependant on the depth
        of the jitter buffer.

        If the local agent support packet re-ordering, 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 (dynamic bandwidth
         allocation) 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 un-equipped 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 un-equipped) 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
           pre-pended 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 packet 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 pkts 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 pkts 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 UAS
         state (and at which point pwCepPerfUASs starts counting).
         The SesToUas default value is 10 seconds.

         NOTE: Similar to RFC 3592, If the agent chooses to update
         the various performance statistics in real time it MUST
         be prepared to retroactively reduce the ES, 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 (and 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 need 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

         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

-- Fractional CEP Configuration 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
        "An entry of this table can be created in two options:
         - By the 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 an 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 (RFC 3592 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 Static Async while the
             VtgMap indicate that the STS-1/VC-3 carries VTs, or in
             fractional VC-4 circuits where both async1 and Tug2Map are
             set."

        ::= { pwCepFracEntry 3 }
```

pwCepFracAsync OBJECT-TYPE

        SYNTAX PwCepFracAsyncMap
        MAX-ACCESS   read-create
        STATUS   current
            DESCRIPTION
              "This object defines the The asynchronous payload carried
               within the STS-1/VC-3. This object is applicable when
               pwCepFracMode equals 'staticAsync' and MUST equals 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:

         notApllicable - 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-2 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-2 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-2 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 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 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 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 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 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 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 Fractional CEP Configuration 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 don't 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.
           HC (high capacity) 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 re-ordered.
            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 re-ordered, 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 PW Performance 15-Minutes 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) which identifies the interval for which the set
       of statistics is available. The interval identified by 1
       is the most recently completed 15-minute interval and
       the interval identified by N is the interval immediately
       preceding the one identified by N-1. The minimum range of
       N is 1 through 4. The default range is 1 through 32. The
       maximum value 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 was 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 re-ordered.
         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 re-

         ordered, 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 PW Performance 15 Minutes Interval Table

-- CEP PW Day Performance 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 measurement and the previous days interval.

        On the extreme cases 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; 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 a situation where performance monitoring data could not
         be collected for any reason or agent clock adjustments."
      ::= { 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 re-ordered.
           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 re-ordered, 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 RFC 3592, if the agent chooses to update
the various performance statistics in real time then it must

        be prepared to retroactively reduce the ES, 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 PW CEP 1 Day Interval Performance 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 agent 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 pre-defined value."

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

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

that support only a single pre-defined value."

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


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


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


OBJECT        pwCepCfgSecsToExitUas
MIN-ACCESS    read-only
DESCRIPTION "Write access is not required for implementations
             that support only a single pre-defined 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 pre-defined 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 implementation do not support
             these options."


OBJECT        pwCepFracVtgMap
MIN-ACCESS    read-only
```

DESCRIPTION "Write access is not required for implementations

                    that support only a single pre-defined 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 pre-defined value."

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

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

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

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

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

        OBJECT   pwCepFracSdhVc4Tug2Map3
        MIN-ACCESS   read-only
        DESCRIPTION "Write access is not required for implementations
                    that support only a single pre-defined 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 PW CEP MIB Module. Such devices can
             then 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 contains 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
            pwCepPerf1DayTable 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),
        even then, there is no control as to who on the secure network is
        allowed to access and GET/SET (read/change/create/delete) the objects
        in this MIB module.

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

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

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 XXXX }

        Editor's Note (to be removed prior to publication): The IANA is
        requested to assign a value for "XXXX" under the 'mib-2' subtree and
        to record the assignment in the SMI Numbers registry. When the
        assignment has been made, the RFC Editor is asked to replace "XXXX"

        (here and in the MIB module) with the assigned value and to remove
        this note.

10.   References

10.1. **Normative References**

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Acknowledgment