

Internet Engineering Task Force (IETF)
Request for Comments: 6240
Category: Standards Track
ISSN: 2070-1721

D. Zelig, Ed.
PMC-Sierra
R. Cohen, Ed.
Resolute Networks
T. Nadeau, Ed.
CA Technologies
May 2011

Synchronous Optical Network/Synchronous Digital Hierarchy (SONET/SDH)
Circuit Emulation over Packet (CEP) MIB Using SMIV2

Abstract

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

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1. Introduction

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

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

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

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

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

2. Conventions Used in This Document

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

3. Terminology

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

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

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

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

4. The Internet-Standard Management Framework

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

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIV2, which is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580 [RFC2580].

5. Feature Checklist

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

- The MIB module is designed to work with the PW-STD-MIB [RFC5601] module.
- The MIB module is independent of the PSN type.
- The MIB module supports all the signal types as defined in [RFC4842]: SPE, fractional SPE, VT, both SONET and SDH mapping. The MIB module also supports all the optional features as defined in [RFC4842].
- The MIB module reports all the statistics as defined by [RFC4842].

6. MIB Module Description and Usage

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

6.1. PW-CEP-STD-MIB Summary

- The CEP PW Table (pwCepTable) contains the SONET/SDH path/VT ifIndex, SONET/SDH path timeslot, the pwCepCfgTable index, config error indications, and various status indications.
- The CEP PW Configuration Parameter Table (pwCepCfgTable) has objects for CEP PW configuration. In situations where sets of config objects are common amongst more than one CEP PW, a single entry here may be referenced by many pwCepTable entries.
- The CEP PW Performance Current Interval Table (pwCepPerfCurrentTable) contains CEP stats for the current 15-minute period.
- The CEP Performance 15-Minute Interval Table (pwCepPerfIntervalTable) is similar to the pwCepPerfCurrentTable. It contains historical intervals (usually 96 15-minute entries to cover a 24-hour period).

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

- The CEP Performance 1-Day Table (pwCepPerf1DayIntervalTable) contains statistics accumulated during the current day and contains previous days' historical statistics.
- The CEP Fractional Table (pwCepFracTable) adds configuration and monitoring parameters for fractional SPE PWs.

6.2. MIB Modules Required for IMPORTS

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

6.3. PW-STD-MIB Module Usage

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

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

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

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

6.4. PW-CEP-STD-MIB Module Usage

Configuring a CEP PW involves the following steps.

- (1) First, create an entry in the pwTable:
 - Follow steps as defined in [RFC5601].
- (2) Configure the PSN tunnel in the respective PSN-specific PWE3 PSN glue MIB modules and the respective PSN-specific MIB modules. Configure the SONET path parameters:
 - Set the SONET path width in the sonetPathCurrentTable [RFC3592].
 - Set the SONET path index and the SONET path starting timeslot in the pwCepTable.

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

(3) Configure the CEP PW:

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

(4) Observe the CEP PW:

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

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

In this section, we provide an example of using the MIB objects described in Section 7 to set up a CEP PW. While this example is not meant to illustrate every permutation of the MIB, it is intended as an aid to understanding some of the key concepts. It is meant to be read after going through the MIB itself. See [RFC5601] for an example of setting up PSN tunnels.

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

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

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

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

```
{
  pwCepCfgSonetPayloadLength    = 783 -- payload bytes
  pwCepCfgMinPktLength          = 0   -- no minimum
  pwCepCfgPktReorder            = true
  pwCepCfgEnabledDBA            = unequipped
}
```

```

pwCepCfgRtpHdrSuppress      = false
pwCepCfgJtrBfrDepth         = 500 -- micro-seconds

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

pwCepCfgPktErrorPlayOutValue = 0xFF -- All ones

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

pwCepCfgRowStatus            = createAndGo
}

```

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

```

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

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

```

7. Object Definitions

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

IMPORTS

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

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

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

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

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

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

HCPperfCurrentCount, HCPperfIntervalCount, HCPperfTimeElapsed,
HCPperfValidIntervals
  FROM HC-PerfHist-TC-MIB      -- [RFC3705]

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

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

-- The PW CEP MIB

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

     Ron Cohen (Ed.)
     Email: ronc@resolutenetworks.com

     Thomas D. Nadeau (Ed.)
     Email: Thomas.Nadeau@ca.com

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

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

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-- Revision history

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

::= { mib-2 200 }

-- Local textual conventions

PwCepSonetEbm ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"Equipped Bit Mask (EBM) used for fractional STS-1/Virtual Circuit 3 (VC-3). The EBM bits are the 28 least significant bits out of the 32-bit value."

SYNTAX Unsigned32

PwCepSdhVc4Ebm ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"Equipped Bit Mask (EBM) used for each Tributary Unit Group 3 (TUG-3) in fractional VC-4 circuits. The EBM bits are the 30 least significant bits out of the 32-bit value."

SYNTAX Unsigned32

PwCepSonetVtgMap ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

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

SYNTAX Unsigned32

```

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

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

-- Top-level components of this MIB module

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

-- Conformance
pwCepConformance  OBJECT IDENTIFIER
                  ::= { pwCepStdMIB 2 }

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

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

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

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

```

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

INDEX { pwIndex }

::= { pwCepTable 1 }

PwCepEntry ::= SEQUENCE {

pwCepType	INTEGER,
pwCepSonetIfIndex	InterfaceIndexOrZero,
pwCepSonetConfigErrorOrStatus	BITS,
pwCepCfgIndex	PwCfgIndexOrzero,
pwCepTimeElapsed	HCPperfTimeElapsed,
pwCepValidIntervals	HCPperfValidIntervals,
pwCepIndications	BITS,
pwCepLastEstTimeStamp	TimeStamp,
pwCepPeerCepOption	Unsigned32
}	

pwCepType OBJECT-TYPE

SYNTAX INTEGER {
 spe (1),
 vt (2),
 fracSpe (3)
 }

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Specifies the sub-type of CEP PW. Currently only structured types are supported:

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

Support of 'vt' mode or 'fracSpe' mode is optional."

DEFVAL

{ spe }

::= { pwCepEntry 1 }

pwCepSonetIfIndex OBJECT-TYPE

SYNTAX InterfaceIndexOrZero
 MAX-ACCESS read-write
 STATUS current

DESCRIPTION

"This is a unique index within the ifTable. It represents the interface index for the SONET path for SPE emulation ([RFC3592], Section 3.3), an interface index for the SONET VT ([RFC3592], Section 3.4) if the VT to be emulated is extracted from a SONET signal or locally mapped from a physical interface.

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

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

::= { pwCepEntry 2 }

pwCepSonetConfigErrorOrStatus OBJECT-TYPE

SYNTAX BITS {
 other (0),
 timeslotInUse (1),
 timeslotMisuse (2),
 peerDbaincompatible (3), -- Status only
 peerEbmIncompatible (4),
 peerRtpIncompatible (5),
 peerAsyncIncompatible (6),
 peerDbasymmetric (7), -- Status only
 peerEbmAsymmetric (8),
 peerRtpAsymmetric (9),
 peerAsyncAsymmetric (10)
 }

MAX-ACCESS read-only
 STATUS current

DESCRIPTION

"This object reports a configuration mismatch inside the local node or between the local node and the peer node. Some bits indicate an error, and some are simply status reports that do not affect the forwarding process.

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

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

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

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

REFERENCE

"Malis, A., et al., 'Synchronous Optical Network/Synchronous Digital Hierarchy (SONET/SDH) Circuit Emulation over Packet (CEP)', RFC 4842, Section 12."

::= { pwCepEntry 3 }

pwCepCfgIndex OBJECT-TYPE

SYNTAX PwCfgIndexOrzero
MAX-ACCESS read-write
STATUS current

DESCRIPTION

"Index to CEP configuration table below. Multiple CEP PWs MAY share a single pwCepEntry.

The value 0 indicates that no entries are available."

::= { pwCepEntry 4 }

pwCepTimeElapsed OBJECT-TYPE

SYNTAX HCPperfTimeElapsed
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 HCPperfValidIntervals

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number (n) of previous 15-minute intervals for which data was collected.

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

::= { pwCepEntry 6 }

pwCepIndications OBJECT-TYPE

SYNTAX BITS {

missingPkt (0),

ooRngDropped(1),

jtrBfrUnder (2),

pktMalformed(3),

lops (4),

cepRdi (5),

cepAis (6),

badHdrStack (7),

cepNeFailure(8),

cepFeFailure(9)

}

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Definitions:

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

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

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

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

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

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

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

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

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

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

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

Writing a non-zero value MUST fail.

Currently, there is no hierarchy of CEP defects.

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

::= { pwCepEntry 7 }

pwCepLastEsTimeStamp OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of sysUpTime on the most recent occasion at which the CEP PW entered the Errored Seconds (ES) or Severely Errored Seconds (SES) state."

::= { pwCepEntry 8 }

pwCepPeerCepOption OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of the CEP option parameter as received from the peer by the PW signaling protocol."

::= { pwCepEntry 9 }

-- End of CEP PW Table

-- Obtain index for PW CEP Configuration Table entries

pwCepCfgIndexNext OBJECT-TYPE

SYNTAX PwCfgIndexOrzero

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

::= { pwCepObjects 2 }

-- CEP PW Configuration Table

pwCepCfgTable OBJECT-TYPE

SYNTAX SEQUENCE OF PwCepCfgEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains a set of parameters that may be referenced by one or more CEP PWs by pwCepTable."

::= { pwCepObjects 3 }

pwCepCfgEntry OBJECT-TYPE

SYNTAX PwCepCfgEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"These parameters define the characteristics of a CEP PW. They are grouped here to ease Network Management System (NMS) burden. Once an entry is created here, it may be reused by many PWs.

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

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

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

INDEX { pwCepCfgTableIndex }

::= { pwCepCfgTable 1 }

PwCepCfgEntry ::= SEQUENCE {

pwCepCfgTableIndex Unsigned32,

pwCepSonetPayloadLength Unsigned32,

pwCepCfgMinPktLength Unsigned32,

pwCepCfgPktReorder TruthValue,

```

    pwCepCfgEnabledDBA          BITS,
    pwCepCfgRtpHdrSuppress      TruthValue,

    pwCepCfgJtrBfrDepth         Unsigned32,

    pwCepCfgConsecPktsInsync    Unsigned32,
    pwCepCfgConsecMissingOutSync Unsigned32,

    pwCepCfgPktErrorPlayOutValue Unsigned32,

    pwCepCfgMissingPktsToSes     Unsigned32,
    pwCepCfgSesToUas             Unsigned32,
    pwCepCfgSecsToExitUas        Unsigned32,

    pwCepCfgName                SnmpAdminString,

    pwCepCfgRowStatus            RowStatus,
    pwCepCfgStorageType          StorageType
}

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

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

```

The default values are determined by the pwCepType:
783 for pwCepType equal to spe(2) or fracSpe(3).
For vt(3) modes, the applicable super-frame payload size
is the default value."

REFERENCE

"Malis, A., et al., 'Synchronous Optical Network/Synchronous
Digital Hierarchy (SONET/SDH) Circuit Emulation over Packet
(CEP)', RFC 4842, Sections 5.1 and 12.1"

::= { pwCepCfgEntry 2 }

pwCepCfgMinPktLength OBJECT-TYPE

SYNTAX Unsigned32
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"This object defines the minimum CEP packet length in
number of bytes (including CEP header and payload).
It applies to CEP's bandwidth-savings packets. Currently,
DBA is the only bandwidth-savings packet type (in the
future, CEP may support compression). Minimum packet
length is necessary in some systems or networks.

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

DEFVAL { 0 }

::= { pwCepCfgEntry 3 }

pwCepCfgPktReorder OBJECT-TYPE

SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"This object defines if reordering is applied for incoming
packets.

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

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

::= { pwCepCfgEntry 4 }

pwCepCfgEnabledDBA OBJECT-TYPE

```
SYNTAX BITS {
    ais          (0),
    unequipped   (1)
}
```

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object defines when DBA is applied for packets sent toward the PSN.

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

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

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

REFERENCE

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

```
::= { pwCepCfgEntry 5 }
```

pwCepCfgRtpHdrSuppress OBJECT-TYPE

```
SYNTAX TruthValue
```

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"If this object is set to 'true', an RTP header is not prepended to the CEP packet."

REFERENCE

"Malis, A., et al., 'Synchronous Optical Network/Synchronous Digital Hierarchy (SONET/SDH) Circuit Emulation over Packet (CEP)', RFC 4842, Section 5.3."

DEFVAL

```
{ true }
```

```
::= { pwCepCfgEntry 6 }
```

pwCepCfgJtrBfrDepth OBJECT-TYPE

SYNTAX Unsigned32
 UNITS "micro-seconds"
 MAX-ACCESS read-create
 STATUS current

DESCRIPTION

"This object defines the number of microseconds of expected packet delay variation for this CEP PW over the PSN.

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

If configured to a value not supported by the implementation, the agent MUST reject the SNMP Set operation."

REFERENCE

"The control of jitter and wander within digital networks which are based on the synchronous digital hierarchy (SDH), ITU-T Recommendation G.825."

::= { pwCepCfgEntry 7 }

--

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

--

pwCepCfgConsecPktsInsync OBJECT-TYPE

SYNTAX Unsigned32
 MAX-ACCESS read-create
 STATUS current

DESCRIPTION

"Consecutive packets with sequential sequence numbers required to exit the LOPS state."

REFERENCE

"Malis, A., et al., 'Synchronous Optical Network/Synchronous Digital Hierarchy (SONET/SDH) Circuit Emulation over Packet (CEP)', RFC 4842, Section 6.2.2."

DEFVAL

{ 2 }

::= { pwCepCfgEntry 8 }

pwCepCfgConsecMissingOutSync OBJECT-TYPE

SYNTAX Unsigned32
 MAX-ACCESS read-create
 STATUS current

DESCRIPTION

"Consecutive missing packets required to enter the LOPS state."

REFERENCE

"Malis, A., et al., 'Synchronous Optical Network/Synchronous Digital Hierarchy (SONET/SDH) Circuit Emulation over Packet (CEP)', RFC 4842, Section 6.2.2."

DEFVAL

{ 10 }

::= { pwCepCfgEntry 9 }

pwCepCfgPktErrorPlayOutValue OBJECT-TYPE

SYNTAX Unsigned32 (0..255)
 MAX-ACCESS read-create
 STATUS current

DESCRIPTION

"This object defines the value played when inbound packets have over/underflowed the jitter buffer or are missing for any reason. This byte pattern is sent (played) on the SONET path."

DEFVAL

{ 255 } -- Play all ones, equal to AIS indications

::= { pwCepCfgEntry 10 }

pwCepCfgMissingPktsToSes OBJECT-TYPE

SYNTAX Unsigned32
 UNITS "seconds"
 MAX-ACCESS read-create
 STATUS current

DESCRIPTION

"The number of missing packets detected (consecutive or not) within a 1-second window to cause a Severely Errored Second (SES) to be counted."

REFERENCE

"Malis, A., et al., 'Synchronous Optical Network/Synchronous Digital Hierarchy (SONET/SDH) Circuit Emulation over Packet (CEP)', RFC 4842, Section 10.1."

DEFVAL

{ 3 }

::= { pwCepCfgEntry 11 }

pwCepCfgSesToUas OBJECT-TYPE

SYNTAX Unsigned32
 UNITS "seconds"
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION

"The number of consecutive SESSs before declaring PW in Unavailable Seconds (UAS) state (at which point pwCepPerfUASs starts counting). The SesToUas default value is 10 seconds.

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

NOTE: See pwCepPerfSESSs 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 nonSESSs before declaring PW is NOT in UAS state (at which point pwCepPerfUASs stops counting)."

REFERENCE

"Malis, A., et al., 'Synchronous Optical Network/Synchronous Digital Hierarchy (SONET/SDH) Circuit Emulation over Packet (CEP)', RFC 4842, Section 10.1."

DEFVAL { 10 }

::= { pwCepCfgEntry 13 }

pwCepCfgName OBJECT-TYPE

SYNTAX SnmpAdminString
 MAX-ACCESS read-create
 STATUS current

DESCRIPTION

"This variable contains the name of the Configuration entry.
This name may be used to help the NMS to display the
purpose of the entry."

::= { pwCepCfgEntry 14 }

pwCepCfgRowStatus	OBJECT-TYPE
SYNTAX	RowStatus
MAX-ACCESS	read-create
STATUS	current

DESCRIPTION

"For creating, modifying, and deleting this row.

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

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

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

::= { pwCepCfgEntry 15 }

pwCepCfgStorageType	OBJECT-TYPE
SYNTAX	StorageType
MAX-ACCESS	read-create
STATUS	current

DESCRIPTION

"This object indicates the storage type for this row."

DEFVAL { nonVolatile }

::= { pwCepCfgEntry 16 }

-- End of CEP PW Configuration Parameter Table

-- CEP Fractional Table

```

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

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

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

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

    INDEX { pwCepFracIndex }

    ::= { pwCepFracTable 1 }

PwCepFracEntry ::= SEQUENCE {

```

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

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

pwCepFracIndex OBJECT-TYPE

SYNTAX InterfaceIndex

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This is the index of this table. It is a unique index within the ifTable. It represents the interface index for the SONET path ([RFC3592], Section 3.3) for fractional SPE emulation.

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

::= { pwCepFracEntry 1 }

pwCepFracMode OBJECT-TYPE

SYNTAX INTEGER {

notApplicable (1),

dynamic (2),

static (3),

staticWithEbm (4),

staticAsync (5)

}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Fractional mode for STS-1/VC-3 or VC-4 circuits:

notApplicable - When this object is not applicable.

dynamic - EBM carried within the CEP header. Unequipped VTs are removed from the payload on the fly.

static - EBM not carried within the CEP header. Only VTs defined in the EBM are carried within the payload.

staticWithEbm - EBM carried within the CEP header. Only VTs defined in the EBM are carried within the payload.

staticAsync - Asynchronous E3/T3 fixed byte removal only."

```

    DEFVAL
        { dynamic }

    ::= { pwCepFracEntry 2 }

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

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

    ::= { pwCepFracEntry 3 }

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

    DEFVAL { other }

    ::= { pwCepFracEntry 4 }

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

```

DESCRIPTION

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

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

::= { pwCepFracEntry 5 }

pwCepFracEbm OBJECT-TYPE

SYNTAX PwCepSonetEbm

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object holds the static Equipped Bit Mask (EBM) for STS-1/VC-3 channel.

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

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

::= { pwCepFracEntry 6 }

pwCepFracPeerEbm OBJECT-TYPE

SYNTAX PwCepSonetEbm

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object reports the Equipped Bit Mask (EBM) for STS-1/VC-3 channel as received from the peer within the CEP extension header."

::= { pwCepFracEntry 7 }

pwCepFracSdhVc4Mode OBJECT-TYPE

SYNTAX INTEGER {
 notApplicable (1),
 dynamic (2),
 static (3),
 staticWithEbm (4)
 }

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Fractional mode for VC-4 circuits:

notApplicable - When this is not VC-4 circuit.

dynamic - EBM carried within the CEP header. Unequipped
VTs are removed from the payload on the fly.

static - EBM not carried within the CEP header. Only VTs
defined in the EBM are carried within the payload.

staticWithEbm - EBM carried within the CEP header. Only
VTs defined in the EBM are carried within the
payload."

DEFVAL { notApplicable }

::= { pwCepFracEntry 8 }

pwCepFracSdhVc4Tu3Map1 OBJECT-TYPE

SYNTAX PwCepFracAsyncMap

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The type of asynchronous mapping carried inside STS-1,
VC-3, or TUG-3 containing TU-3 circuit."

DEFVAL { other }

::= { pwCepFracEntry 9 }

pwCepFracSdhVc4Tu3Map2 OBJECT-TYPE

SYNTAX PwCepFracAsyncMap

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"If the second TUG-3 within the VC-4 contains a TU-3, this
variable must be set."

DEFVAL { other }

::= { pwCepFracEntry 10 }

pwCepFracSdhVc4Tu3Map3 OBJECT-TYPE

SYNTAX PwCepFracAsyncMap

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"If the third TUG-3 within the VC-4 contains a TU-3, this
variable must be set."

DEFVAL { other }

::= { pwCepFracEntry 11 }

pwCepFracSdhVc4Tug2Map1 OBJECT-TYPE

SYNTAX PwCepSonetVtgMap

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The VC types of the seven TUG-2s within the first
TUG-3 of the VC-4."

::= { pwCepFracEntry 12 }

pwCepFracSdhVc4Tug2Map2 OBJECT-TYPE

SYNTAX PwCepSonetVtgMap

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The VC types of the seven TUG-2s within the second
TUG-3 of the VC-4."

::= { pwCepFracEntry 13 }

pwCepFracSdhVc4Tug2Map3 OBJECT-TYPE

SYNTAX PwCepSonetVtgMap

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The VC types of the seven TUG-2s within the third
TUG-3 of the VC-4."

::= { pwCepFracEntry 14 }

pwCepFracSdhVc4Ebm1 OBJECT-TYPE

SYNTAX PwCepSdhVc4Ebm

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Static Equipped Bit Mask (EBM) for the first TUG-3
within the VC-4."

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

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

::= { pwCepFracEntry 15 }

pwCepFracSdhVc4Ebm2 OBJECT-TYPE

SYNTAX PwCepSdhVc4Ebm

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Static Equipped Bit Mask (EBM) for the second TUG-3 within the VC-4.

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

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

::= { pwCepFracEntry 16 }

pwCepFracSdhVc4Ebm3 OBJECT-TYPE

SYNTAX PwCepSdhVc4Ebm

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Static Equipped Bit Mask (EBM) for the third TUG-3 within the VC-4.

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

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

::= { pwCepFracEntry 17 }

pwCepFracSdhVc4PeerEbm1 OBJECT-TYPE

SYNTAX PwCepSdhVc4Ebm

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

::= { pwCepFracEntry 18 }

pwCepFracSdhVc4PeerEbm2 OBJECT-TYPE

SYNTAX PwCepSdhVc4Ebm

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

::= { pwCepFracEntry 19 }

pwCepFracSdhVc4PeerEbm3 OBJECT-TYPE

SYNTAX PwCepSdhVc4Ebm

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

::= { pwCepFracEntry 20 }

pwCepFracRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"For creating, modifying, and deleting this row. This object MAY be changed at any time."

::= { pwCepFracEntry 21 }

pwCepFracStorageType OBJECT-TYPE

SYNTAX StorageType

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This variable indicates the storage type for this object."

```

DEFVAL { nonVolatile }
 ::= { pwCepFracEntry 22 }

-- End CEP Fractional Table

-- CEP PW Performance Current Interval Table

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

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

    ::= { pwCepObjects 5 }

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

    INDEX       { pwIndex }

    ::= { pwCepPerfCurrentTable 1 }

PwCepPerfCurrentEntry ::= SEQUENCE {
    pwCepPerfCurrentDbInPacketsHC      HCPerfCurrentCount,
    pwCepPerfCurrentDbOutPacketsHC     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 }

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

-- Pointer adjustment stats

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

```

pwCepPerfCurrentInPosPtrAdjust OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of positive pointer adjustments sent on the
SONET path based on CEP pointer adjustments received."

::= { pwCepPerfCurrentEntry 4 }

pwCepPerfCurrentInPtrAdjustSecs OBJECT-TYPE

SYNTAX PerfCurrentCount

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of seconds in which a positive or negative pointer
adjustment was sent on the SONET path."

::= { pwCepPerfCurrentEntry 5 }

pwCepPerfCurrentOutNegPtrAdjust OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of negative pointer adjustments seen on the
SONET path and encoded onto sent CEP packets."

::= { pwCepPerfCurrentEntry 6 }

pwCepPerfCurrentOutPosPtrAdjust OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of positive pointer adjustments seen on the
SONET path and encoded onto sent CEP packets."

::= { pwCepPerfCurrentEntry 7 }

pwCepPerfCurrentOutPtrAdjustSecs OBJECT-TYPE

SYNTAX PerfCurrentCount

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of seconds in which a positive or negative pointer
adjustment was seen on the SONET path."

::= { pwCepPerfCurrentEntry 8 }

pwCepPerfCurrentAbsPtrAdjust OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Indicates the relative adjustment drift between inbound and outbound streams.

It is calculated as absolute value of:

(InPosPtrAdjust - InNegPtrAdjust) -

(OutPosPtrAdjust - OutNegPtrAdjust)"

::= { pwCepPerfCurrentEntry 9 }

pwCepPerfCurrentMissingPkts OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of missing packets (as detected via CEP header sequence number gaps)."

::= { pwCepPerfCurrentEntry 10 }

pwCepPerfCurrentPktsOoseq OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of packets detected out of sequence (via CEP header sequence numbers) but successfully reordered.

Note: Some implementations may not support this feature (see pwCepCfgPktReorder)."

::= { pwCepPerfCurrentEntry 11 }

pwCepPerfCurrentPktsOoRngDropped OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of packets detected out of range (via CEP header sequence numbers) and could not be reordered or could not fit in the jitter buffer."

::= { pwCepPerfCurrentEntry 12 }

pwCepPerfCurrentJtrBfrUnderruns OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of times a packet needed to be played out and the jitter buffer was empty."

::= { pwCepPerfCurrentEntry 13 }

pwCepPerfCurrentPktsMalformed OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of packets detected with unexpected size or bad headers stack."

::= { pwCepPerfCurrentEntry 14 }

pwCepPerfCurrentSummaryErrors OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A summary of all the packet-error types above (from missing packets to bad length packets)."

::= { pwCepPerfCurrentEntry 15 }

pwCepPerfCurrentESSs 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 }

pwCepPerfCurrentSESSs 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 }

pwCepPerfCurrentUASSs OBJECT-TYPE

SYNTAX PerfCurrentCount

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of
Unavailable Seconds encountered."

::= { pwCepPerfCurrentEntry 18 }

pwCepPerfCurrentFC OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"CEP Failure Counts (FC-CEP). The number of CEP failure events. A failure event begins when the LOPS failure is declared and ends when the failure is cleared. A failure event that begins in one period and ends in another period is counted only in the period in which it begins."

::= { pwCepPerfCurrentEntry 19 }

-- End CEP PW Performance Current Interval Table

-- CEP Performance 15-Minute Interval Table

pwCepPerfIntervalTable OBJECT-TYPE

SYNTAX SEQUENCE OF PwCepPerfIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table provides per-CEP PW performance information, much like the pwCepPerfCurrentTable above. However, these counts represent historical 15-minute intervals. Typically, this table will have a maximum of 96 entries for a 24-hour period but is not limited to this.

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

::= { pwCepObjects 6 }

pwCepPerfIntervalEntry OBJECT-TYPE

SYNTAX PwCepPerfIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in this table is created by the agent for every pwCepPerfCurrentEntry that is 15 minutes old. The contents of the Current entry are copied to the new

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

INDEX { pwIndex, pwCepPerfIntervalNumber }

::= { pwCepPerfIntervalTable 1 }

PwCepPerfIntervalEntry ::= SEQUENCE {

pwCepPerfIntervalNumber	Integer32,
pwCepPerfIntervalValidData	TruthValue,
pwCepPerfIntervalReset	INTEGER,
pwCepPerfIntervalTimeElapsed	HCPperfTimeElapsed,
pwCepPerfIntervalDbInPacketsHC	HCPperfIntervalCount,
pwCepPerfIntervalDbOutPacketsHC	HCPperfIntervalCount,
pwCepPerfIntervalInNegPtrAdjust	PerfIntervalCount,
pwCepPerfIntervalInPosPtrAdjust	PerfIntervalCount,
pwCepPerfIntervalInPtrAdjustSecs	PerfIntervalCount,
pwCepPerfIntervalOutNegPtrAdjust	PerfIntervalCount,
pwCepPerfIntervalOutPosPtrAdjust	PerfIntervalCount,
pwCepPerfIntervalOutPtrAdjustSecs	PerfIntervalCount,
pwCepPerfIntervalAbsPtrAdjust	Integer32,
pwCepPerfIntervalMissingPkts	PerfIntervalCount,
pwCepPerfIntervalPktsOoseq	PerfIntervalCount,
pwCepPerfIntervalPktsOoRngDropped	PerfIntervalCount,
pwCepPerfIntervalJtrBfrUnderruns	PerfIntervalCount,
pwCepPerfIntervalPktsMalformed	PerfIntervalCount,
pwCepPerfIntervalSummaryErrors	PerfIntervalCount,
pwCepPerfIntervalESS	PerfIntervalCount,
pwCepPerfIntervalSESS	PerfIntervalCount,
pwCepPerfIntervalUASS	PerfIntervalCount,
pwCepPerfIntervalFC	PerfIntervalCount

pwCepPerfIntervalNumber OBJECT-TYPE

SYNTAX Integer32 (1..96)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A number (between 1 and 96 to cover a 24-hour period) that identifies the interval for which the set of statistics is available. The interval identified by 1 is the most recently completed 15-minute interval, and

the interval identified by N is the interval immediately preceding the one identified by N-1. The minimum range of N is 1 through 4. The default range is 1 through 32. The maximum range of N is 1 through 96."

::= { pwCepPerfIntervalEntry 1 }

pwCepPerfIntervalValidData OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This variable indicates if the data for this interval is valid."

::= { pwCepPerfIntervalEntry 2 }

pwCepPerfIntervalReset OBJECT-TYPE

SYNTAX INTEGER {

reset (1),

normal(2)

}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Used in cases where the user knows that the errors within this interval should not be counted. Writing 'reset' sets all error counts to zero. The value of 0 is not used here due to issues with implementations."

::= { pwCepPerfIntervalEntry 3 }

pwCepPerfIntervalTimeElapsed OBJECT-TYPE

SYNTAX HCPperfTimeElapsed

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 }

pwCepPerfIntervalDbInPacketsHC OBJECT-TYPE

SYNTAX HCPperfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of DBA packets received."

::= { pwCepPerfIntervalEntry 5 }

pwCepPerfIntervalDbasOutPacketsHC OBJECT-TYPE

SYNTAX HCPerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of DBA packets sent."

::= { pwCepPerfIntervalEntry 6 }

-- Pointer adjustment stats

pwCepPerfIntervalInNegPtrAdjust OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of negative pointer adjustments sent on the
SONET path based on CEP pointer adjustments received."

::= { pwCepPerfIntervalEntry 7 }

pwCepPerfIntervalInPosPtrAdjust OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of positive pointer adjustments sent on the
SONET path based on CEP pointer adjustments received."

::= { pwCepPerfIntervalEntry 8 }

pwCepPerfIntervalInPtrAdjustSecs OBJECT-TYPE

SYNTAX PerfIntervalCount

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of seconds in which a positive or negative
pointer adjustment was sent on the SONEt path."

::= { pwCepPerfIntervalEntry 9 }

pwCepPerfIntervalOutNegPtrAdjust OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of negative pointer adjustments seen on the
SONET path and encoded onto sent CEP packets."

```
::= { pwCepPerfIntervalEntry 10 }

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

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

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

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

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

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

DESCRIPTION

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

::= { pwCepPerfIntervalEntry 15 }

pwCepPerfIntervalPktsOoRngDropped OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of packets detected out of range (via CEP header sequence numbers) and could not be reordered or could not fit in the jitter buffer."

::= { pwCepPerfIntervalEntry 16 }

pwCepPerfIntervalJtrBfrUnderruns OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of times a packet needed to be played out and the jitter buffer was empty."

::= { pwCepPerfIntervalEntry 17 }

pwCepPerfIntervalPktsMalformed OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of packets detected with unexpected size or bad headers stack."

::= { pwCepPerfIntervalEntry 18 }

pwCepPerfIntervalSummaryErrors OBJECT-TYPE

SYNTAX PerfIntervalCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A summary of all the packet-error types above (from missing packets to bad length packets)."

::= { pwCepPerfIntervalEntry 19 }

pwCepPerfIntervalESs OBJECT-TYPE

SYNTAX PerfIntervalCount

UNITS "seconds"

MAX-ACCESS read-only

```

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

```

```

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

```

```

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

```

```

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

```

```
-- End CEP Performance 15-Minute Interval Table
```

```
-- CEP Performance 1-Day Table
```

```

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

```

DESCRIPTION

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

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

::= { pwCepObjects 7 }

pwCepPerf1DayIntervalEntry OBJECT-TYPE

SYNTAX PwCepPerf1DayIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry is created in this table by the agent for every entry in the pwCepTable and for each day interval up to the number of supported historical intervals."

INDEX { pwIndex, pwCepPerf1DayIntervalNumber }

::= { pwCepPerf1DayIntervalTable 1 }

PwCepPerf1DayIntervalEntry ::= SEQUENCE {

pwCepPerf1DayIntervalNumber	Unsigned32,
pwCepPerf1DayIntervalValidData	TruthValue,
pwCepPerf1DayIntervalMoniSecs	HCPperfTimeElapsed,
pwCepPerf1DayIntervalDbInPacketsHC	Counter64,
pwCepPerf1DayIntervalDbOutPacketsHC	Counter64,
pwCepPerf1DayIntervalInNegPtrAdjust	Counter32,
pwCepPerf1DayIntervalInPosPtrAdjust	Counter32,
pwCepPerf1DayIntervalInPtrAdjustSecs	Counter32,
pwCepPerf1DayIntervalOutNegPtrAdjust	Counter32,
pwCepPerf1DayIntervalOutPosPtrAdjust	Counter32,
pwCepPerf1DayIntervalOutPtrAdjustSecs	Counter32,
pwCepPerf1DayIntervalAbsPtrAdjust	Integer32,
pwCepPerf1DayIntervalMissingPkts	Counter32,
pwCepPerf1DayIntervalPktsOoseq	Counter32,
pwCepPerf1DayIntervalPktsOoRngDropped	Counter32,
pwCepPerf1DayIntervalJtrBfrUnderruns	Counter32,
pwCepPerf1DayIntervalPktsMalformed	Counter32,
pwCepPerf1DayIntervalSummaryErrors	Counter32,

pwCepPerf1DayIntervalESS	Counter32,
pwCepPerf1DayIntervalSESS	Counter32,
pwCepPerf1DayIntervalUASS	Counter32,
pwCepPerf1DayIntervalFC	Counter32
}	

pwCepPerf1DayIntervalNumber OBJECT-TYPE

SYNTAX Unsigned32(1..31)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"History Data Interval number. Interval 1 is the current day measurement period; interval 2 is the most recent previous day; and interval 30 is 31 days ago."

::= { pwCepPerf1DayIntervalEntry 1 }

pwCepPerf1DayIntervalValidData OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This variable indicates if the data for this interval is valid."

::= { pwCepPerf1DayIntervalEntry 2 }

pwCepPerf1DayIntervalMoniSecs OBJECT-TYPE

SYNTAX HCPerfTimeElapsed

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The amount of time in the 1-day interval over which the performance monitoring information is actually counted. This value will be the same as the interval duration except in situations where performance monitoring data could not be collected for any reason or the agent clock was adjusted."

::= { pwCepPerf1DayIntervalEntry 3 }

pwCepPerf1DayIntervalDbInPacketsHC OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of DBA packets received."

::= { pwCepPerf1DayIntervalEntry 4 }

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

-- Pointer adjustment stats

pwCepPerflDayIntervalInNegPtrAdjust 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."
    ::= { pwCepPerflDayIntervalEntry 6 }

pwCepPerflDayIntervalInPosPtrAdjust 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."
    ::= { pwCepPerflDayIntervalEntry 7 }

pwCepPerflDayIntervalInPtrAdjustSecs 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."
    ::= { pwCepPerflDayIntervalEntry 8 }

pwCepPerflDayIntervalOutNegPtrAdjust 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."
    ::= { pwCepPerflDayIntervalEntry 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:

$$(\text{InPosPtrAdjust} - \text{InNegPtrAdjust}) -$$

$$(\text{OutPosPtrAdjust} - \text{OutNegPtrAdjust})"$$

::= { pwCepPerf1DayIntervalEntry 12 }

pwCepPerf1DayIntervalMissingPkts OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of missing packets (as detected via CEP header
sequence number gaps)."

::= { pwCepPerf1DayIntervalEntry 13 }

pwCepPerf1DayIntervalPktsOoseq OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

::= { pwCepPerflDayIntervalEntry 14 }

pwCepPerflDayIntervalPktsOoRngDropped OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of packets detected out of range (via CEP header sequence numbers) and could not be reordered or could not fit in the jitter buffer."

::= { pwCepPerflDayIntervalEntry 15 }

pwCepPerflDayIntervalJtrBfrUnderruns 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."

::= { pwCepPerflDayIntervalEntry 16 }

pwCepPerflDayIntervalPktsMalformed OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of packets detected with unexpected size or bad headers stack."

::= { pwCepPerflDayIntervalEntry 17 }

pwCepPerflDayIntervalSummaryErrors 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)."

::= { pwCepPerflDayIntervalEntry 18 }

pwCepPerflDayIntervalESs OBJECT-TYPE

SYNTAX Counter32

UNITS "seconds"

MAX-ACCESS read-only

```

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

```

pwCepPerf1DayIntervalSEss OBJECT-TYPE

```

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

```

pwCepPerf1DayIntervalUASs OBJECT-TYPE

```

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

```

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

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

```

 ::= { pwCepPerf1DayIntervalEntry 21 }

```

pwCepPerf1DayIntervalFC OBJECT-TYPE

```

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

```

-- End of CEP Performance 1-Day Table

```
-- Conformance information

pwCepGroups      OBJECT IDENTIFIER ::= { pwCepConformance 1 }

pwCepCompliances OBJECT IDENTIFIER ::= { pwCepConformance 2 }

-- Compliance statement for full compliant implementations

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

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

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

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

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

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

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

OBJECT	pwCepSonetPayloadLength
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required for implementations that support only the default values (which are based on the pwCepType)."
OBJECT	pwCepCfgMinPktLength
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required for implementations that support only a single predefined value."
OBJECT	pwCepCfgEnabledBA
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required for implementations that support only a single predefined value."
OBJECT	pwCepCfgRtpHdrSuppress
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required for implementations that do not support RTP header for CEP connections."
OBJECT	pwCepCfgConsecPktsInsync
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required for implementations that support only a single predefined value."
OBJECT	pwCepCfgConsecMissingOutSync
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required for implementations that support only a single predefined value."
OBJECT	pwCepCfgPktErrorPlayOutValue
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required for implementations that support only a single predefined value."
OBJECT	pwCepCfgMissingPktsToSes
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required for implementations that support only a single predefined value."
OBJECT	pwCepCfgSesToUas
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required for implementations that support only a single predefined value."
OBJECT	pwCepCfgSecsToExitUas

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

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

OBJECT pwCepCfgRowStatus
SYNTAX RowStatus { active(1), notInService(2),
notReady(3) }
WRITE-SYNTAX RowStatus { active(1), notInService(2),
createAndGo(4), destroy(6)
}
DESCRIPTION "Support for createAndWait is not required."

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

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

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

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

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

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

OBJECT	pwCepFracSdhVc4Tu3Map2
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required for implementations that support only a single predefined value."
OBJECT	pwCepFracSdhVc4Tu3Map3
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required for implementations that support only a single predefined value."
OBJECT	pwCepFracSdhVc4Tug2Map1
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required for implementations that support only a single predefined value."
OBJECT	pwCepFracSdhVc4Tug2Map2
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required for implementations that support only a single predefined value."
OBJECT	pwCepFracSdhVc4Tug2Map3
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required for implementations that support only a single predefined value."
OBJECT	pwCepFracSdhVc4Ebm1
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required for implementations where the EBM is derived from configuration in other MIB modules."
OBJECT	pwCepFracSdhVc4Ebm2
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required for implementations where the EBM is derived from configuration in other MIB modules."
OBJECT	pwCepFracSdhVc4Ebm3
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required for implementations where the EBM is derived from configuration in other MIB modules."

```

OBJECT      pwCepFracRowStatus
SYNTAX      RowStatus { active(1), notInService(2),
                        notReady(3) }
WRITE-SYNTAX RowStatus { active(1), notInService(2),
                        createAndGo(4), destroy(6)
                        }
DESCRIPTION "Support for createAndWait is not required."

 ::= { pwCepCompliances 1 }

-- Compliance requirement for read-only compliant implementations

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

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

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

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

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

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

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

```

OBJECT	pwCepSonetIfIndex
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	pwCepCfgIndex
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	pwCepSonetPayloadLength
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	pwCepCfgMinPktLength
MIN-ACCESS	read-only
DESCRIPTION	"Write access is not required."
OBJECT	pwCepCfgEnabledDBA
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,
 pwCepLastEstTimeStamp
 }

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,
    pwCepCfgEnabledDBA,

    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,
    pwCepPerfCurrentDbainOutPacketsHC,
```

```

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

```

```

pwCepPerfCurrentESs,
pwCepPerfCurrentSESSs,
pwCepPerfCurrentUASs,
pwCepPerfCurrentFC
}

```

STATUS current

DESCRIPTION

"Collection of statistics objects for CEP PWs."

::= { pwCepGroups 4 }

pwCepPerfIntervalGroup OBJECT-GROUP

OBJECTS {

```

pwCepPerfIntervalValidData,
pwCepPerfIntervalReset,
pwCepPerfIntervalTimeElapsed,

pwCepPerfIntervalDbainPacketsHC,
pwCepPerfIntervalDbainOutPacketsHC,

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

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

```

```

        pwCepPerfIntervalESs,
        pwCepPerfIntervalSESSs,
        pwCepPerfIntervalUASSs,
        pwCepPerfIntervalFC
    }
    STATUS current
    DESCRIPTION
        "Collection of statistics objects for CEP PWs."
    ::= { pwCepGroups 5 }

pwCepPerf1DayIntervalGroup OBJECT-GROUP
    OBJECTS {
        pwCepPerf1DayIntervalValidData,
        pwCepPerf1DayIntervalMoniSecs,

        pwCepPerf1DayIntervalDbInPacketsHC,
        pwCepPerf1DayIntervalDbOutPacketsHC,

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

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

        pwCepPerf1DayIntervalESs,
        pwCepPerf1DayIntervalSESSs,
        pwCepPerf1DayIntervalUASSs,
        pwCepPerf1DayIntervalFC
    }
    STATUS current
    DESCRIPTION
        "Collection of statistics objects for CEP PWs."
    ::= { pwCepGroups 6 }

```

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

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

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

DESCRIPTION

"Collection of fractional VC4 objects. These objects are optional and should be supported only if fractional VC4 is supported within the network element."

::= { pwCepGroups 9 }

END

8. Security Considerations

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

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

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

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

- o The pwCepTable, pwCepPerfCurrentTable, pwCepPerfIntervalTable, and pwCepPerf1DayIntervalTable collectively show the CEP pseudowire connectivity topology and its performance characteristics. If an Administrator does not want to reveal this information, then these tables should be considered sensitive/vulnerable.

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

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

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

9. IANA Considerations

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

Descriptor -----	OBJECT IDENTIFIER value -----
pwCepStdMIB	{ mib-2 200 }

10. References

10.1. Normative References

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10.2. Informative References

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- [RFC3985] Bryant, S., Ed., and P. Pate, Ed., "Pseudo Wire Emulation Edge-to-Edge (PWE3) Architecture", RFC 3985, March 2005.

11. Contributors

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

Andrew G. Malis - Tellabs

Dave Danenberg - Litchfield Communications

Scott C. Park - Litchfield Communications

Authors' Addresses

David Zelig (editor)
PMC-Sierra
4 Hasadnaot St.
Herzliya Pituach
Israel, 46120

Phone: +972-9-962-8000
Email: david_zelig@pmc-sierra.com

Ron Cohen (editor)
Resolute Networks
2480 Sand Hill Road, Suite 200
Menlo Park, CA 94025
USA

EMail: ronc@resolutenetworks.com

Thomas D. Nadeau (editor)
CA Technologies
273 Corporate Dr
Portsmouth, NH 03801
USA

Phone: +1 800 225-5224
EMail: Thomas.Nadeau@ca.com

