

Network Working Group
Internet Draft
Expires: Nov 2002

Dave Danenberg
Scott C. Park
Litchfield Communications, Inc.

Thomas D. Nadeau
Cisco Systems, Inc.

David Zelig
Corrigent Systems

Andrew G. Malis
Vivace Networks, Inc.

May 2002

SONET/SDH Circuit Emulation Service Over Packet (CEP) Management
Information Base Using SMIV2

[draft-danenberg-pw-cem-mib-02.txt](#)

Status of this Memo

This document is an Internet-Draft and is in full conformance with all provisions of [Section 10 of RFC2026](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

The list of current Internet-Drafts can be accessed at
<http://www.ietf.org/ietf/1id-abstracts.txt>

The list of Internet-Draft Shadow Directories can be accessed at
<http://www.ietf.org/shadow.html>.

Copyright (C) The Internet Society (2001). All rights reserved.

[1](#) Abstract

This memo defines an experimental 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 Native Service Processing of SONET/SDH circuits over a Packet Switch Network (PSN).

Table of Contents

1	Abstract.....	1
2	Introduction.....	2
3	Terminology.....	3
4	The SNMP Management Framework.....	3
4.1	Object Definitions.....	4
5	Feature Checklist.....	5
6	CEP MIB usage.....	5
6.1	Summary of CEP MIB.....	5
6.2	CEP configuration Step by Step.....	6
7	Example of CEP Setup.....	7
8	CEP MIB definitions.....	9
9	References.....	46
10	Author's Addresses.....	49
11	Full Copyright Statement.....	50

[2](#) Introduction

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

This document is closely related to [[CEP](#)], which describes the technology to encapsulate TDM signals and provide the Circuit Emulation Service over a Packet Switched Network (PSN). This document is also related to [TRANS and ENCAP], describing the transport and encapsulation of Layer 2 circuits over MPLS, respectively. NOTE: the CEP encapsulation can be used over non-MPLS PSNs as well as MPLS PSNs.

The model for CEP management is a MIB. The CEP MIB described in this document works closely with the MIBs described in [[PWMIB](#)] and the textual conventions defined in [[PWTC](#)]. In the spirit of the [[IFMIB](#)], a CEP connection will be a virtual connection (VC), and will therefore not be represented in the ifTable.

CEP is currently specified to carry "structured" SONET paths. Meaning that each SONET path within the section/line can be processed separately. The SONET section/line interface stack is modeled within [[SONETMIB](#)]. The CEP MIB will reference SONET paths as modeled within

[\[SONETMIB\]](#).

Comments should be made directly to PWE3 at pwe3@ietf.org.

This memo does not, in its draft form, specify a standard for the Internet community.

Conventions used in this document

Danenberg et al

Expires November 2002

2

Internet Draft

PW CEP MIB

May 2002

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

[3](#) Terminology

CEP terminology comes from the CEP draft that describes a mechanism for transporting SONET Time Division Multiplexed (TDM) digital signals over a packet-oriented network. The mechanism for structured (as outlined in the CEP draft) terminates the SONET section and line overhead and then breaks the SONET path's Synchronous Payload Envelope (SPE) into fragments for transmission over a PSN. 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 [\[CEP\]](#)).

"NSP" (Native Service Processing) refers to the method of adapting a "native" service such that it can be presented to the PW (Pseudo-Wire) for transmission across the packet core. In this case, the native protocol is SONET/SDH. See [\[LAYER\]](#).

"Outbound" references the traffic direction where a SONET path's payload (SPE) is received, adapted to packet, assigned a VC 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 path into the SONET section and line.

Since A SONET path is bi-directional and symmetrical, it uses the same SONET time-slot, SONET width, packet size. Inbound and outbound VC labels may differ.

CEP will normally transmit into an originating "head" end of a PSN's tunnel, and receive from a terminating "tail" end a PSN's tunnel. In

the case of an MPLS PSN, a CEP connection typically uses a VC (virtual connection) Label within a Tunnel Label [[TRANS](#)]. Multiple CEP VCs each with a unique VC Label and similar traffic engineering requirements can share the same PSN tunnel. For MPLS PSNs, the Tunnel Label is known as the "outer" Label, while the VC Label is known as the "inner" Label. An exception to this is with adjacent MPLS LSRs. In this case, there is an option for CEP VCs to connect directly without an outer Label.

[4](#) The SNMP Management Framework

The SNMP Management Framework presently consists of five major components:

- o An overall architecture, described in [RFC 2571](#) [[RFC2571](#)].

Danenberg et al

Expires November 2002

3

Internet Draft

PW CEP MIB

May 2002

- o Mechanisms for describing and naming objects and events for the purpose of management. The first version of this Structure of Management Information (SMI) is called SMIV1 and described in STD 16, [RFC 1155](#) [[RFC1155](#)], STD 16, [RFC 1212](#) [[RFC1212](#)] and [RFC 1215](#) [[RFC1215](#)]. The second version, called SMIV2, is described in STD 58, [RFC 2578](#) [[RFC2578](#)], STD 58, [RFC 2579](#) [[RFC2579](#)] and STD 58, [RFC 2580](#) [[RFC2580](#)].

- o Message protocols for transferring management information. The first version of the SNMP message protocol is called SNMPv1 and described in STD 15, [RFC 1157](#) [[RFC1157](#)]. A second version of the SNMP message protocol, which is not an Internet standards track protocol, is called SNMPv2c and described in [RFC 1901](#) [[RFC1901](#)] and [RFC 1906](#) [[RFC1906](#)]. The third version of the message protocol is called SNMPv3 and described in [RFC 1906](#) [[RFC1906](#)], [RFC 2572](#) [[RFC2572](#)] and [RFC 2574](#) [[RFC2574](#)].

- o Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in STD 15, [RFC 1157](#) [[RFC1157](#)]. A second set of protocol operations and associated PDU formats is described in [RFC 1905](#) [[RFC1905](#)].

- o A set of fundamental applications described in [RFC 2573](#) [[RFC2573](#)] and the view-based access control mechanism described in [RFC 2575](#) [[RFC2575](#)].

A more detailed introduction to the current SNMP Management Framework can be found in [RFC 2570](#) [[RFC2570](#)]. Managed objects are accessed via

a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the mechanisms defined in the SMI. This memo specifies a MIB module that is compliant to the SMIV2. A MIB conforming to the SMIV1 can be produced through the appropriate translations. The resulting translated MIB must be semantically equivalent, except where objects or events are omitted because no translation is possible (use of Counter64). Some machine readable information in SMIV2 will be converted into textual descriptions in SMIV1 during the translation process. However, this loss of machine readable information is not considered to change the semantics of the MIB.

[4.1](#) Object Definitions

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the subset of Abstract Syntax Notation One (ASN.1) defined in the SMI. In particular, each object type is named by an OBJECT IDENTIFIER, an administratively assigned name. The object type together with an object instance serves to uniquely identify a specific instantiation of the object. For human convenience, we often use a textual string, termed the descriptor, to also refer to the object type.

Danenberg et al

Expires November 2002

4

Internet Draft

PW CEP MIB

May 2002

[5](#) Feature Checklist

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

- Fits within the architecture defined [[PWMIB](#)].
- The MIB supports point-to-point CEP connections. Point-to-multipoint connections are for future study.
- The MIB configures the connection: timeslots, packet length, error actions, and many other CEP objects.
- The MIB reports: packet counts, error counts, and many other status objects.

[6](#) CEP MIB usage

[6.1](#) Summary of CEP MIB

- The CEP VC Table (pwVcCepTable) contains the SONET Path ifIndex, SONET Path Time slot, the pwVcCepCfgTable index, config error indications, and various status indications.
 - The CEP VC Configuration Parameter Table (pwVcCepCfgTable) has objects for CEP VC configuration. In situations where sets of config objects are common amongst more than 1 CEP VC, 1 entry here may be referenced by many pwVcCepTable entries.
 - The CEP Performance Current Table (pwVcCemPerfCurrentTable) contains CEP stats for the current 15-minute period.
 - The CEP Performance Interval Table (pwVcCemPerfIntervalTable) is similar to the pwVcCemPerfCurrentTable. 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. See [[SONETMIB](#)].
- The CEP Performance Total Table (pwVcCepPerfTotalTable) is similar to the pwVcCemPerfCurrentTable. It contains statistics accumulated since the CEP VC was first established.
 - The Conformance Config Table (pwVcCepConformanceCfgTable) allows the vendor to specify the extent to which certain objects are supported (or not).

Danenberg et al Expires November 2002

5

Internet Draft

PW CEP MIB

May 2002

[6.2](#) CEP configuration Step by Step

Configuring a CEP VC involves the following steps.

First create an entry in the pwVcTable and configure the PSN tunnels:

- Follow steps as defined in [[PWMIB](#)].

Configure the SONET Path parameters :

- Set the SONET path width in the sonetPathCurrentTable [[SONETMIB](#)].

- Set the SONET path index and the SONET path starting time slot in the pwVcCepTable.

NOTE: The agent will have created an entry in the pwVcCepTable based on the entry created in the pwVcTable.

Configure the CEP VC:

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

Observe the CEP VC:

- Once a CEP VC is operational, the pwVcCepPerfCurrentTable, pwVcCepPerfIntervalTable, and pwVcCepPerfTotalTable are used to monitor the various counts, indicators, and conditions of the VC.

Conforming to the CEP MIB objects:

- The pwVcCepConformanceCfgTable is used to state True/False whether certain objects are supported. An ASCII string object is available with every True/False object as a means to explain the extent of 'true' support, or perhaps explain why the 'false' was set.

[7](#) Example of CEP Setup

In this section we provide an example of using the MIB objects described in [section 8](#) to set up a CEP VC (width of 3 STSs, starting at time slot 1). 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 [[PWMIB](#)] for an example of setting up PSN Tunnels.

First configure the SONET path width, starting time-slot, and associated CEP VC. 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 pwVcCepCfgTable index is 9.

In [[SONETMIB](#)] sonetPathCurrentEntry (ifIndex = 23) :

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

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

```
{
    pwVcCepCfgNormalPktLength      = 500 -- payload bytes
    pwVcCepCfgMinPktLength         = 0   -- no minimum
    pwVcCepCfgPktReorder           = FALSE
    pwVcCepCfgEnableDBA            = ais
    pwVcCepCfgJtrBfrDepth          = 500 -- micro-seconds

    pwVcCepCfgConsecPktsInsync     = 2   -- Exit LOPS state
    pwVcCepCfgConsecMissingOutSync = 10  -- Enter LOPS state

    pwVcCepCfgPktErrorPlayOutValue = playAllOnes

    pwVcCepCfgMissingPktsToSes     = 3   -- packets,
    pwVcCepCfgSesToUas              = 2   -- seconds,
    pwVcCepCfgSecsToExitUas        = 10  -- seconds,

    pwVcCepCfgRowStatus            = createAndGo
}
```

Check that there are no error bits set in pwVcCepConfigError.

In PW-MIB: Get a new index and create a new pwVcTable entry using pwVcIndexNext (here, the VC index = 83) and pwVcRowStatus. In this new entry, set pwVcType to 'cep'. This should create a new entry in the pwVcCepTable. Set up and the SONET path ifIndex, SONET path time slot, and Cfg Table indexes within this new pwVcCep table entry:

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

    pwVcCepSonetTimeSlot     = 1  -- Starting time slot.

    pwVcCepCfgIndex          = 9   -- Index of associated entry
                                -- in pwVcCepCfg table (above).
}
```

Check that there are no error bits set in pwVcCepSonetConfigError.

[8](#) CEP MIB definitions

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

```
IMPORTS
```

```
    MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE,  
    experimental, Integer32, Counter32, Unsigned32,  
    Counter64  
    FROM SNMPv2-SMI
```

```
    MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP  
    FROM SNMPv2-CONF
```

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

```
    InterfaceIndexOrZero  
    FROM IF-MIB
```

```
    PerfCurrentCount, PerfIntervalCount  
    FROM PerfHist-TC-MIB
```

```
    pwVcIndex, pwVcOperStatus  
    FROM PW-MIB
```

```
    SnmpAdminString  
    FROM SNMP-FRAMEWORK-MIB;
```

```
-- The CEP MIB
```

```
pwVcCepMIB MODULE-IDENTITY
```

```
    LAST-UPDATED "0205291200Z" -- May 29 2002 12:00:00 EST  
    ORGANIZATION "Pseudo-Wire Emulation Edge-to-Edge (PWE3)  
    Working Group"
```

```
    CONTACT-INFO
```

```
        " Dave Danenberg  
        Postal: Litchfield Communications, Inc.  
        27 Princeton Rd
```

Princeton Center West
Watertown, CT 06795
Tel: +1-203-591-7062
Email: dave_danenberg@litchfieldcomm.com

Thomas D. Nadeau
Postal: Cisco Systems, Inc.
250 Apollo Drive
Chelmsford, MA 01824
Tel: +1-978-244-3051
Email: tnadeau@cisco.com

David Zelig
Postal: Corrigent Systems LTD.

Danenberg et al Expires November 2002

9

Internet Draft PW CEP MIB

May 2002

126, Yigal Alon St.
Tel Aviv, ISRAEL
Phone: +972-3-6945273
E-mail: davidz@corrigent.com

Scott Park
Postal: Litchfield Communications, Inc.
27 Princeton Rd
Princeton Center West
Watertown, CT 06795
Tel: +1-203-591-7066
Email: scott_park@litchfieldcomm.com

Andrew G. Malis
Postal: Vivace Networks, Inc.
2730 Orchard Parkway
San Jose, CA 95134
Email: Andy.Malis@vivacenetworks.com

Or the PWE3 Working Group (pwe3@ietf.org) "

DESCRIPTION

"This MIB contains managed object definitions for Circuit Emulation over Packet (CEP) as in: Malis, A., Vogelsang, S., Johnson, T., and Martini, L. 'SONET/SDH Circuit Emulation Over Packet (CEP) encapsulation', Internet Draft [<draft-malis-pwe3-sonet-02.txt>](#), expires September 2002.

This MIB reports to the PW-MIB. The PW-MIB contains structures and MIB associations generic to Pseudo-Wire Virtual Circuit (VC) emulation. VC-specific MIBs (such as this) contain config and stats for specific VC types."

-- Revision history.

REVISION

"0205291200Z" -- 29 May 2002 12:00:00 EST

DESCRIPTION

- "- Renamed EsTimeStamp to LastErrorTimeStamp.
- Renamed LastDefectsAtEs to LatchedIndications.
- Renamed CurrentDefects to CurrentIndications.
- Renamed defect indications (cepAis, cepRdi).
- Renamed DBA bit settings (ais and unequipped).
- Added objects: CfgJtrBfrResetOorange and CfgJtrBfrResetOorangeCnt.
- Moved SONET Time Slot and Time Slot cfg error to CEP table from SONET extension table. Deleted SONET extension table.
- Added Failure Counts (FCs) to stats tables.
- Removed pwVcCepPerfCurrentTimeElapsed (it is a duplicate of pwVcCepTimeElapsed).
- Removed 32-bit counters that were duplicates of 64-bit (HC) counters.
- Other minor changes."

Danenberg et al

Expires November 2002

10

Internet Draft

PW CEP MIB

May 2002

REVISION

"0202271200Z" -- 27 February 2002 12:00:00 EST

DESCRIPTION

- "- Added objects pwVcCepTimeElapsed and pwVcCepValidIntervals for more accurate knowledge of interval data.
- Changed pwVcCepCfgJtrBfrDepth units from packets to microseconds, and updated description.
- Changed JtrBfrOoseqDropped to JtrBfrOoRngDropped (i.e, 'out of sequence' to 'out of range').
- Removed JtrBfrOverruns counter objects. This info is now contained within the JtrBfrOoRngDropped object.
- Changed description of JtrBfrUnderrun.
- Moved LastDefectsAtEs, LastEsTimeStamp, and DiscontinuityTime to the pwVcCepTable table. Removed them as conformance config objects.
- Created new CurrentDefects in CepTable.
- Added cepAis to and changed rdi to cepRdi (both are now in LastDefectsAtEs). Added note to cepAis - it must not (in itself) cause a cep down notification.
- Changed the pwVcCepSonetExtTable to augment

- the sonetPathCurrentTable in [RFC 2558](#). Imported sonetPathCurrentTable from the SONET-MIB.
- Renamed PktResequenece to PktReorder."

REVISION

"0111161200Z" -- 16 November 2001 12:00:00 EST

DESCRIPTION

- "- Changed CEM to CEP.
- Removed: 'unstructured' CEP type, ECC references, and signaling (CEP options) references, multiple VC instances references, and APS references.
- Improved descriptions and some improved object names.
- New conformance section. New ConformanceCfg table.
- PktResequenece is now read-only.
- ConfMaxPktLength is now ConfNormalPktLength.
- Replaced User Error Action with PlayOutValue.
- New cfg object : consecutive non-SESs to exit UAS.
- New cfg objects : elapsed time for stats intervals.
- New stats object: summary packet error.
- New object : added ConfigError to SonetExt table.
- NOTE: Many objects added, deleted, or moved - so many OIDs have been re-ordered."

REVISION

"0109071200Z" -- 07 September 2001 12:00:00 EST

DESCRIPTION

- "- Separated Top level Cfg objects from Total CEM stats.
- Removed references to VC instances."

Danenberg et al	Expires November 2002	11
Internet Draft	PW CEP MIB	May 2002

REVISION

"0107191200Z" -- 19 July 2001 12:00:00 EST

DESCRIPTION

"Based on the PWE3 Requirements/Framework, the original CEM MIB ([draft-danenberg-sonet-ces-mpls-mib-00.txt](#)) has Been split into 3 drafts:

- PW-MIB (Zelig, et al). Service-independent MIB.
- PW-TC-MIB (Nadeau, et al). Textual Conventions.
- PW-CEM-MIB (Danenberg, et al). Service-specific MIB.

Aside from the split, then PW-CEM-MIB has undergone other changes:

- Ability to define LOPS (loss of packet sync), SES and UAS.

- Support for 'unstructured' operation.
- Support for CEM-RDI.
- Many more minor changes and clarifications."

::= { experimental xxxx } -- To be assigned by IANA

-- Local Textual conventions

PwVcCepCfgIndex ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"Index into the pwVcCepCfgTable."

SYNTAX Unsigned32

-- Top level components of this MIB.

-- Traps

pwVcCepNotifications OBJECT IDENTIFIER

::= { pwVcCepMIB 0 }

pwVcCepNotifyPrefix OBJECT IDENTIFIER

::= { pwVcCepNotifications 0 }

-- Tables, Scalars

pwVcCepObjects OBJECT IDENTIFIER

::= { pwVcCepMIB 1 }

-- Conformance

pwVcCepConformance OBJECT IDENTIFIER

::= { pwVcCepMIB 2 }

-- CEP VC table

pwVcCepTable OBJECT-TYPE

SYNTAX SEQUENCE OF PwVcCepEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains the index to the entry SONET path table for this CEP VC, and the index to the CEP config table."

Danenberg et al Expires November 2002

12

Internet Draft PW CEP MIB

May 2002

::= { pwVcCepObjects 1 }

pwVcCepEntry OBJECT-TYPE

SYNTAX PwVcCepEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This MIB reports to the PW-MIB. This table is indexed by

the same index that was created for the associated entry in the PW VC Table (in the PW-MIB).

- The PwVcIndex.

An entry is created in this table by the agent for every entry in the pwVc table with a VcType of 'cep'."

INDEX { pwVcIndex }

::= { pwVcCepTable 1 }

PwVcCepEntry ::= SEQUENCE {

pwVcCepType	INTEGER,
pwVcCepSonetIfIndex	InterfaceIndexOrZero,
pwVcCepSonetTimeSlot	Unsigned32,
pwVcCepSonetConfigError	BITS,
pwVcCepCfgIndex	PwVcCepCfgIndex,
pwVcCepTimeElapsed	Integer32,
pwVcCepValidIntervals	Integer32,
pwVcCepCurrentIndications	BITS,
pwVcCepLatchedIndications	BITS,
pwVcCepLastEsTimeStamp	TimeStamp
}	

pwVcCepType OBJECT-TYPE

SYNTAX INTEGER {
 structured (1)

}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Specifies the type of CEP VC. Currently only structured types are supported. Other CEP Types may be defined in the future.

Note: This object MUST be changed to 'read-write' if other CEP types are added."

DEFVAL { structured }

::= { pwVcCepEntry 1 }

pwVcCepSonetIfIndex 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. 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 VC rows (e.g., this pwVcCep table entry). If the agent does not delete the rows, it is recommended that the agent set this object to zero."

::= { pwVcCepEntry 2 }

pwVcCepSonetTimeSlot OBJECT-TYPE

SYNTAX Unsigned32 (1..192)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"In structured CEP, this object indicates the starting time-slot for this SONET path within the SONET line and section. For OC-48, this value could range from 1 to 48. The SONET path width must be taken into consideration here. For example, in an OC-48, an STS-3c could not start at time-slot 47."

REFERENCE "[RFC 2558](#), sonetPathCurrentWidth."

::= { pwVcCepEntry 3 }

pwVcCepSonetConfigError OBJECT-TYPE

SYNTAX BITS {
 other (0),
 timeslotInUse (1),
 timeslotMisuse(2)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"timeslotInUse is when another CEP VC (via SONET ifIndex) has already reserved a timeslot(s) that this CEP VC is attempting to reserved.

timeslotMisuse is set, for example, if specifying a starting timeslot of 45 for a SONET path of an STS-12c width."

::= { pwVcCepEntry 4 }

pwVcCepCfgIndex OBJECT-TYPE

SYNTAX PwVcCepCfgIndex

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Index to CEP configuration table below. It is likely that multiple CEP VCs will share 1 CEP Cfg table entry."

::= { pwVcCepEntry 5 }

pwVcCepTimeElapsed OBJECT-TYPE

SYNTAX Integer32 (1..900)
MAX-ACCESS read-only
STATUS current

Danenberg et al Expires November 2002

14

Internet Draft

PW CEP MIB

May 2002

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."

::= { pwVcCepEntry 6 }

pwVcCepValidIntervals OBJECT-TYPE

SYNTAX Integer32 (0..96)
MAX-ACCESS read-only
STATUS current

DESCRIPTION

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

An agent with CEP capability must be capable of supporting at least n intervals. The minimum value of n is 4, The default of n is 32 and the maximum value of n is 96.

The value will be <n> unless the measurement was (re-)started within the last (<n>*15) minutes, in which case the value will be the number of complete 15 minute intervals for which the agent has at least some data. In certain cases (e.g., in the case where the agent is a proxy) it is possible that some intervals are unavailable. In this case, this interval is the maximum interval number for which data is available. "

::= { pwVcCepEntry 7 }

pwVcCepCurrentIndications OBJECT-TYPE

SYNTAX BITS {
 missingPkt (0),
 ooRngDropped(1),
 jtrBfrUnder (2),
 pktBadLength(3),
 lops (4),
 cepRdi (5),
 cepAis (6)

}

MAX-ACCESS read-only
STATUS current

DESCRIPTION

"Definitions:

missingPkt - While playing out a sequence of packets, a packet(s) 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 not take place as packets arrive, only as they are played out - this gives time for mis-ordered packets to arrive late.

Danenberg et al

Expires November 2002

15

Internet Draft

PW CEP MIB

May 2002

ooRngDropped - Packet(s) arrives that is 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 - The jitter buffer underflowed due to not enough packets arriving as packets were being played out.

pktBadLength - Non-bandwidth-saving packet arrives larger or smaller than pwVcCepCfgNormalPktLength.

lops - Loss Of Packet Sync. See malis-pwe3-sonet.

cepRdi - Circuit Emulation over Packet Remote Defect Indication. Generated by the remote CEP de-packetizer when detecting LOPS. Note: not generated by the remote SONET function. See malis-pwe3-sonet.

cepAis - Remote CEP packetizer has detected AIS on its incoming SONET stream. See malis-pwe3-sonet. Note: cepAis MUST NOT (in itself) cause a CEP down notification. This would be a layer violation.

Note: currently there is no hierarchy of CEP defects.

Note: the algorithm used to capture these indications is implementation specific."

::= { pwVcCepEntry 8 }

pwVcCepLatchedIndications OBJECT-TYPE

```

SYNTAX BITS {
    missingPkt ( 0),
    ooRngDropped( 1),
    jtrBfrUnder ( 2),
    pktBadLength( 3),
    lops        ( 4),
    cepRdi      ( 5),
    cepAis      ( 6)
}
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The state of CEP indicators when the CEP VC last declared
    an errored second (either as ES, SES or a second with
    errors inside a UAS) condition. At this time, only LOPS
    can create a failure. Since indicators other than LOPS are
    useful, all are latched here. For bit definitions, see
    pwVcCepCurrentIndications above."

```

Danenberg et al

Expires November 2002

16

Internet Draft

PW CEP MIB

May 2002

```

    Note: the algorithm used to latch these indications when
    entering an defect state is implementation specific."
 ::= { pwVcCepEntry 9 }

```

pwVcCepLastEsTimeStamp OBJECT-TYPE

```

SYNTAX          TimeStamp
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION

```

```

    "The value of sysUpTime on the most recent occasion at
    which the CEP VC entered the ES or SES state."
 ::= { pwVcCepEntry 10 }

```

-- End of PW CEP VC table

-- Obtain index for PW CEP Configuration table entries

pwVcCepCfgIndexNext OBJECT-TYPE

```

SYNTAX          PwVcCepCfgIndex
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION

```

```

    "This object contains an appropriate value to be used
    for pwVcCepCfgIndex when creating entries in the
    pwVcCepCfgTable. The value 0 indicates that no
    unassigned entries are available. To obtain the
    value of pwVcCepCfgIndex for a new entry in the

```

pwVcCepCfgTable, the manager issues a management protocol retrieval operation to obtain the current value of pwVcCepCfgIndex. 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."

::= { pwVcCepObjects 2 }

-- PW CEP VC Configuration Table

pwVcCepCfgTable OBJECT-TYPE

SYNTAX SEQUENCE OF PwVcCepCfgEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains a set of parameters that may be referenced by 1 or more CEP VCs by pwVcCepTable."

::= { pwVcCepObjects 3 }

pwVcCepCfgEntry OBJECT-TYPE

SYNTAX PwVcCepCfgEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"These parameters define the characteristics of a

Danenberg et al Expires November 2002

17

Internet Draft PW CEP MIB

May 2002

CEP VC. They are grouped here to ease NMS burden. Once an entry is created here it may be re-used by many VCs."

INDEX { pwVcCepCfgTableIndex }

::= { pwVcCepCfgTable 1 }

PwVcCepCfgEntry ::= SEQUENCE {

pwVcCepCfgTableIndex

pwVcCepConfigError

PwVcCepCfgIndex,

BITS,

pwVcCepCfgNormalPktLength

pwVcCepCfgMinPktLength

pwVcCepCfgPktReorder

pwVcCepCfgEnableDBA

Unsigned32,

Unsigned32,

TruthValue,

BITS,

pwVcCepCfgJtrBfrDepth

pwVcCepCfgJtrBfrRebuildOor

Unsigned32,

TruthValue,

```

    pwVcCepCfgJtrBfrRebuildOorCount Unsigned32,

    pwVcCepCfgConsecPktsInsync      Unsigned32,
    pwVcCepCfgConsecMissingOutSync   Unsigned32,

    pwVcCepCfgPktErrorPlayOutValue  Unsigned32,

    pwVcCepCfgMissingPktsToSes      Unsigned32,
    pwVcCepCfgSesToUas               Unsigned32,
    pwVcCepCfgSecsToExitUas          Unsigned32,

    pwVcCepCfgRowStatus              RowStatus,
    pwVcCepCfgStorageType            StorageType
}

pwVcCepCfgTableIndex OBJECT-TYPE
    SYNTAX      PwVcCepCfgIndex
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "Primary index to this table"
    ::= { pwVcCepCfgEntry 1 }

pwVcCepConfigError OBJECT-TYPE
    SYNTAX BITS {
        other          ( 0),
        dba            ( 1),
        lopsPktCount   ( 2),
        pktLength      ( 3),
        jtrBfrDepth    ( 4)
    }
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "Various configurations errors. Illegal settings within

```

Danenberg et al Expires November 2002 18

Internet Draft PW CEP MIB May 2002

```

    the pwVcCepCfg or pwVcCepSonetExt tables."
    ::= { pwVcCepCfgEntry 2 }

```

```

pwVcCepCfgNormalPktLength OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS   read-create
    STATUS      current
    DESCRIPTION
        "This is the CEP packet length in number of bytes
        (including CEP header and payload) used when the
        packet is NOT a DBA packet. 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 pwVcCepPerf...PktsBadLength.)

Note: DBA packets have their own (shorter) length and are not effected by this setting. If CEP payload compression were supported (future), compressed packets would have their own (shorter) length and also not effected by this setting. "

REFERENCE

"See FEC element format and Interfaces Parameters format in Martini. L, et al, <[draft-martini-l2circuit-trans-mpls-06](#)>. For use of payload bytes see Malis, A., et al, <[draft-malis-pwe3-sonet-02.txt](#)>."

::= { pwVcCepCfgEntry 3 }

pwVcCepCfgMinPktLength OBJECT-TYPE

SYNTAX Unsigned32
MAX-ACCESS read-create
STATUS current

DESCRIPTION

"This is 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."

REFERENCE

"See FEC element format and Interfaces Parameters format in Martini. L, et al, <[draft-martini-l2circuit-trans-mpls-06](#)>. For use of payload bytes see Malis, A., et al, <[draft-malis-pwe3-sonet-02.txt](#)>."

DEFVAL { 0 }

::= { pwVcCepCfgEntry 4 }

pwVcCepCfgPktReorder OBJECT-TYPE

SYNTAX TruthValue

Danenberg et al Expires November 2002

19

Internet Draft PW CEP MIB

May 2002

MAX-ACCESS read-only
STATUS current
DESCRIPTION

"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 resequencing can occur) is dependant on the depth of the jitter buffer. See pwVcCepCfgJtrBfrDepth.

NOTE: Some implementations may not support this feature. The agent is then required to set this False."

::= { pwVcCepCfgEntry 5 }

pwVcCepCfgEnableDBA OBJECT-TYPE

SYNTAX BITS {

 ais (0),

 unequipped (1)

}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Bits set here MUST enable the DBA (dynamic bandwidth allocation) feature for the specified condition. 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 path. During these conditions, 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 path.

NOTE: Some implementations may not support this feature. In these cases, if the 'ais' or 'unequipped' bits are set, then 'dba' error code MUST be set in pwVcCepConfigError."

REFERENCE

"See Malis, A., et al, <[draft-malis-pwe3-sonet-02.txt](#)>."

DEFVAL { { unequipped } }

::= { pwVcCepCfgEntry 6 }

pwVcCepCfgJtrBfrDepth OBJECT-TYPE

SYNTAX Unsigned32

UNITS "micro-seconds"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This setting configures the number of microseconds of expected packet delay variation for this CEP VC over the PSN.

The actual jitter buffer MUST be at least twice this value for proper operation, and is implementation specific.

If configured to a value not supported by the implementation, the agent MUST return an error code 'jtrBfrDepth' in 'pwVcCepConfigError '

NOTE: Like bandwidth and time-slots, jitter buffers are a limited resource to be managed."

::= { pwVcCepCfgEntry 7 }

pwVcCepCfgJtrBfrRebuildOor OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"When set TRUE, the jitter buffer will rebuild when the RebuildOorCount (consecutive out-of-range packet counter) has reached it's config'ed setting. If set FALSE, then the jitter buffer will continue to function regardless of out-of-range packets."

DEFVAL { true }

::= { pwVcCepCfgEntry 8 }

pwVcCepCfgJtrBfrRebuildOorCount OBJECT-TYPE

SYNTAX Unsigned32 (0..255)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Used by RebuildOor above. For every consecutive out-of-range packet received, a count is incremented. If it matches this value, the jitter bfr resets and rebuilds."

DEFVAL { 3 }

::= { pwVcCepCfgEntry 9 }

--

-- The following counters work together to integrate (filter)
-- errors and the lack of errors on the CEP VC. 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 is declaring whether
-- or not the CEP VC is in Loss of Packet Sync (LOPS) state.
--

pwVcCepCfgConsecPktsInsync OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-create
 STATUS current
 DESCRIPTION "Consecutive pkts with sequential sequence numbers required to exit the LOPS state."
 REFERENCE
 "See Malis, A., et al, <[draft-malis-pwe3-sonet-02.txt](#)>."
 DEFVAL { 2 }
 ::= { pwVcCepCfgEntry 10 }

Danenberg et al Expires November 2002

21

Internet Draft

PW CEP MIB

May 2002

pwVcCepCfgConsecMissingOutSync OBJECT-TYPE
 SYNTAX Unsigned32
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION "Consecutive missing pkts required to enter the LOPS state."
 REFERENCE
 "See Malis, A., et al, <[draft-malis-pwe3-sonet-02.txt](#)>."
 DEFVAL { 10 }
 ::= { pwVcCepCfgEntry 11 }

pwVcCepCfgPktErrorPlayOutValue OBJECT-TYPE
 SYNTAX Unsigned32 (0..255)
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION
 "This is 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
 ::= { pwVcCepCfgEntry 12 }

pwVcCepCfgMissingPktsToSes OBJECT-TYPE
 SYNTAX Unsigned32
 UNITS "seconds"
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION
 "Number of missing packets detected (consecutive or not) within a 1 second window to cause a Severely Errored Second (SES) to be counted."
 DEFVAL { 3 }
 ::= { pwVcCepCfgEntry 13 }

pwVcCepCfgSesToUas OBJECT-TYPE
 SYNTAX Unsigned32

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

"Number of consecutive SESSs before declaring VC in UAS state (and at which point pwVcCepPerfUASs starts counting). The SesToUas default value is 10 seconds.

NOTE: Similar to [RFC 2558](#), 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 this value and increase the UAS count by this value when it determines that UAS state has been entered.

NOTE: See pwVcCepPerfSESSs and pwVcCepPerfUASs."

DEFVAL { 10 }

Danenberg et al Expires November 2002

22

Internet Draft PW CEP MIB

May 2002

::= { pwVcCepCfgEntry 14 }

pwVcCepCfgSecsToExitUas OBJECT-TYPE

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

"Number of consecutive nonSESSs before declaring VC is NOT in UAS state (and at which point pwVcCepPerfUASs stops counting)."

DEFVAL { 10 }

::= { pwVcCepCfgEntry 15 }

pwVcCepCfgRowStatus OBJECT-TYPE

SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION

"For creating, modifying, and deleting this row."

::= { pwVcCepCfgEntry 16 }

pwVcCepCfgStorageType OBJECT-TYPE

SYNTAX StorageType
MAX-ACCESS read-create
STATUS current
DESCRIPTION

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

::= { pwVcCepCfgEntry 17 }

-- End of PW CEP VC Configuration Parameter Table

-- CEP VC Performance Current Interval Table.

pwVcCepPerfCurrentTable OBJECT-TYPE

SYNTAX SEQUENCE OF PwVcCepPerfCurrentEntry

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 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 VC 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."

Danenberg et al Expires November 2002

23

Internet Draft

PW CEP MIB

May 2002

::= { pwVcCepObjects 4 }

pwVcCepPerfCurrentEntry OBJECT-TYPE

SYNTAX PwVcCepPerfCurrentEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in this table is created by the agent for every pwVcCep entry. After 15 minutes, the contents of this table entry are copied to a new entry in the pwVcCepPerfInterval table and the counts in this entry are reset to zero."

INDEX { pwVcIndex }

::= { pwVcCepPerfCurrentTable 1 }

PwVcCepPerfCurrentEntry ::= SEQUENCE {

pwVcCepPerfCurrentDbainPacketsHC Counter64,

pwVcCepPerfCurrentDbainOutPacketsHC Counter64,

pwVcCepPerfCurrentInNegPtrAdjust Counter32,

pwVcCepPerfCurrentInPosPtrAdjust Counter32,

pwVcCepPerfCurrentInPtrAdjustSecs	Counter32,
pwVcCepPerfCurrentOutNegPtrAdjust	Counter32,
pwVcCepPerfCurrentOutPosPtrAdjust	Counter32,
pwVcCepPerfCurrentOutPtrAdjustSecs	Counter32,
pwVcCepPerfCurrentAbsPtrAdjust	Integer32,
pwVcCepPerfCurrentMissingPkts	Counter32,
pwVcCepPerfCurrentPktsOoseq	Counter32,
pwVcCepPerfCurrentPktsOoRngDropped	Counter32,
pwVcCepPerfCurrentJtrBfrUnderruns	Counter32,
pwVcCepPerfCurrentPktsBadLength	Counter32,
pwVcCepPerfCurrentSummaryErrors	Counter32,
pwVcCepPerfCurrentESs	PerfCurrentCount,
pwVcCepPerfCurrentSESS	PerfCurrentCount,
pwVcCepPerfCurrentUASS	PerfCurrentCount,
pwVcCepPerfCurrentFC	PerfCurrentCount

}

pwVcCepPerfCurrentDbainPacketsHC OBJECT-TYPE

SYNTAX Counter64
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "Number of DBA packets received."
 ::= { pwVcCepPerfCurrentEntry 1 }

pwVcCepPerfCurrentDbainOutPacketsHC OBJECT-TYPE

SYNTAX Counter64
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION

Danenberg et al Expires November 2002

24

Internet Draft PW CEP MIB

May 2002

"Number of DBA packets sent."
 ::= { pwVcCepPerfCurrentEntry 2 }

-- Pointer adjustment stats

pwVcCepPerfCurrentInNegPtrAdjust 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."
 ::= { pwVcCepPerfCurrentEntry 3 }

pwVcCepPerfCurrentInPosPtrAdjust OBJECT-TYPE
 SYNTAX Counter32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "Number of postive pointer adjustments sent on the
 SONET path based on CEP pointer adjustments received."
 ::= { pwVcCepPerfCurrentEntry 4 }

pwVcCepPerfCurrentInPtrAdjustSecs OBJECT-TYPE
 SYNTAX Counter32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "Number of seconds in which a pos or neg pointer
 adjustment was sent on the SONET path."
 ::= { pwVcCepPerfCurrentEntry 5 }

pwVcCepPerfCurrentOutNegPtrAdjust 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."
 ::= { pwVcCepPerfCurrentEntry 6 }

pwVcCepPerfCurrentOutPosPtrAdjust 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."
 ::= { pwVcCepPerfCurrentEntry 7 }

pwVcCepPerfCurrentOutPtrAdjustSecs OBJECT-TYPE
 SYNTAX Counter32
 MAX-ACCESS read-only
 STATUS current

Danenberg et al Expires November 2002 25

Internet Draft PW CEP MIB May 2002

DESCRIPTION
 "Number of seconds in which a pos or neg pointer
 adjustment was seen on the SONET path."
 ::= { pwVcCepPerfCurrentEntry 8 }

pwVcCepPerfCurrentAbsPtrAdjust OBJECT-TYPE

SYNTAX Integer32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "Absolute Pointer adjustments is relative adjustment drifts between inbound and outbound streams. It is calculated as absolute value of :
 (InPosPtrAdjust - InNegPtrAdjust) -
 (OutPosPtrAdjust - OutNegPtrAdjust) "
 ::= { pwVcCepPerfCurrentEntry 9 }

pwVcCepPerfCurrentMissingPkts OBJECT-TYPE

SYNTAX Counter32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "Number of missing packets (as detected via CEP header sequence number gaps)."
 ::= { pwVcCepPerfCurrentEntry 10 }

pwVcCepPerfCurrentPktsOoseq 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 pwVcCepCfgPktReorder)."
 ::= { pwVcCepPerfCurrentEntry 11 }

pwVcCepPerfCurrentPktsOoRngDropped 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."
 ::= { pwVcCepPerfCurrentEntry 12 }

pwVcCepPerfCurrentJtrBfrUnderruns 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."

::= { pwVcCepPerfCurrentEntry 13 }

pwVcCepPerfCurrentPktsBadLength OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of normal (non-bandwidth-saving packets received)
larger or smaller than pwVcCepCfgNormalPktLength."

::= { pwVcCepPerfCurrentEntry 14 }

pwVcCepPerfCurrentSummaryErrors 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)."

::= { pwVcCepPerfCurrentEntry 15 }

pwVcCepPerfCurrentESs OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

::= { pwVcCepPerfCurrentEntry 16 }

pwVcCepPerfCurrentSESSs OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of
Severely Errored Seconds encountered."

::= { pwVcCepPerfCurrentEntry 17 }

pwVcCepPerfCurrentUASs OBJECT-TYPE

SYNTAX PerfCurrentCount

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

::= { pwVcCepPerfCurrentEntry 18 }

pwVcCepPerfCurrentFC 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

Danenberg et al Expires November 2002

27

Internet Draft

PW CEP MIB

May 2002

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."

::= { pwVcCepPerfCurrentEntry 19 }

-- End PW CEP VC Performance Current Interval Table

-- PW CEP VC Performance Interval Table.

pwVcCepPerfIntervalTable OBJECT-TYPE

SYNTAX SEQUENCE OF PwVcCepPerfIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table provides per CEP VC performance information much like the pwVcCepPerfCurrentTable 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 VCs."

::= { pwVcCepObjects 5 }

pwVcCepPerfIntervalEntry OBJECT-TYPE

SYNTAX PwVcCepPerfIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in this table is created by the agent for every pwVcCepPerfCurrentEntry 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. pwVcCepIndex is found in the pwVcCepCfg table."

INDEX { pwVcIndex, pwVcCepPerfIntervalNumber }

::= { pwVcCepPerfIntervalTable 1 }


```

PwVcCepPerfIntervalEntry ::= SEQUENCE {
    pwVcCepPerfIntervalNumber          Unsigned32,
    pwVcCepPerfIntervalValidData       TruthValue,
    pwVcCepPerfIntervalReset           INTEGER,
    pwVcCepPerfIntervalTimeElapsed     Integer32,

    pwVcCepPerfIntervalDbainPacketsHC  Counter64,
    pwVcCepPerfIntervalDboutPacketsHC  Counter64,

    pwVcCepPerfIntervalInNegPtrAdjust  Counter32,
    pwVcCepPerfIntervalInPosPtrAdjust  Counter32,
    pwVcCepPerfIntervalInPtrAdjustSecs Counter32,
    pwVcCepPerfIntervalOutNegPtrAdjust Counter32,

```

Danenberg et al Expires November 2002

28

Internet Draft

PW CEP MIB

May 2002

```

    pwVcCepPerfIntervalOutPosPtrAdjust Counter32,
    pwVcCepPerfIntervalOutPtrAdjustSecs Counter32,
    pwVcCepPerfIntervalAbsPtrAdjust    Integer32,

    pwVcCepPerfIntervalMissingPkts     Counter32,
    pwVcCepPerfIntervalPktsOoseq       Counter32,
    pwVcCepPerfIntervalPktsOoRngDropped Counter32,
    pwVcCepPerfIntervalJtrBfrUnderruns  Counter32,
    pwVcCepPerfIntervalPktsBadLength    Counter32,
    pwVcCepPerfIntervalSummaryErrors    Counter32,

    pwVcCepPerfIntervalESS              PerfIntervalCount,
    pwVcCepPerfIntervalSESS             PerfIntervalCount,
    pwVcCepPerfIntervalUASS             PerfIntervalCount,
    pwVcCepPerfIntervalFC               PerfIntervalCount
}

```

pwVcCepPerfIntervalNumber OBJECT-TYPE

```

SYNTAX      Unsigned32
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION

```

"A number (normally 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."

```

::= { pwVcCepPerfIntervalEntry 1 }

```

pwVcCepPerfIntervalValidData OBJECT-TYPE

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

pwVcCepPerfIntervalReset 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."
 ::= { pwVcCepPerfIntervalEntry 3 }

Danenberg et al Expires November 2002

29

Internet Draft PW CEP MIB

May 2002

pwVcCepPerfIntervalTimeElapsed OBJECT-TYPE

SYNTAX Integer32
 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."
 ::= { pwVcCepPerfIntervalEntry 4 }

pwVcCepPerfIntervalDbInPacketsHC OBJECT-TYPE

SYNTAX Counter64
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "Number of DBA packets received."
 ::= { pwVcCepPerfIntervalEntry 5 }

pwVcCepPerfIntervalDbOutPacketsHC OBJECT-TYPE

SYNTAX Counter64
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION

"Number of DBA packets sent."
 ::= { pwVcCepPerfIntervalEntry 6 }

-- Pointer adjustment stats

pwVcCepPerfIntervalInNegPtrAdjust 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."

::= { pwVcCepPerfIntervalEntry 7 }

pwVcCepPerfIntervalInPosPtrAdjust OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

::= { pwVcCepPerfIntervalEntry 8 }

pwVcCepPerfIntervalInPtrAdjustSecs OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of seconds in which a pos or neg pointer

Danenberg et al Expires November 2002

30

Internet Draft

PW CEP MIB

May 2002

adjustment was sent on the SONET path."
 ::= { pwVcCepPerfIntervalEntry 9 }

pwVcCepPerfIntervalOutNegPtrAdjust 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."

::= { pwVcCepPerfIntervalEntry 10 }

pwVcCepPerfIntervalOutPosPtrAdjust 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."
 ::= { pwVcCepPerfIntervalEntry 11 }

pwVcCepPerfIntervalOutPtrAdjustSecs OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "Number of seconds in which a pos or neg pointer
        adjustment was seen on the SONET path."
 ::= { pwVcCepPerfIntervalEntry 12 }

pwVcCepPerfIntervalAbsPtrAdjust OBJECT-TYPE
    SYNTAX      Integer32
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "Absolute Pointer adjustments is relative adjustment
        drifts between inbound and outbound streams. It is
        calculated as absolute value of :
            ( InPosPtrAdjust - InNegPtrAdjust) -
            (OutPosPtrAdjust - OutNegPtrAdjust)      "
 ::= { pwVcCepPerfIntervalEntry 13 }

pwVcCepPerfIntervalMissingPkts OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "Number of missing packets (as detected via CEP header
        sequence number gaps)."
 ::= { pwVcCepPerfIntervalEntry 14 }

pwVcCepPerfIntervalPktsOoseq OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS   read-only

Danenberg et al          Expires November 2002          31

Internet Draft          PW CEP MIB          May 2002

    STATUS       current
    DESCRIPTION
        "Number of packets detected out of sequence (via CEP
        header sequence numbers), but succesfully re-ordered.
        Note: some implementations mat not support this
        feature (see pwVcCepCfgPktReorder)."
 ::= { pwVcCepPerfIntervalEntry 15 }

pwVcCepPerfIntervalPktsOoRngDropped 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."
 ::= { pwVcCepPerfIntervalEntry 16 }

pwVcCepPerfIntervalJtrBfrUnderruns 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."
 ::= { pwVcCepPerfIntervalEntry 17 }

pwVcCepPerfIntervalPktsBadLength OBJECT-TYPE

SYNTAX Counter32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "Number of packets received larger or smaller than
 pwVcCepCfgNormalPktLength."
 ::= { pwVcCepPerfIntervalEntry 18 }

pwVcCepPerfIntervalSummaryErrors 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)."
 ::= { pwVcCepPerfIntervalEntry 19 }

pwVcCepPerfIntervalESs OBJECT-TYPE

SYNTAX PerfIntervalCount
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The counter associated with the number of Errored
 Seconds encountered."
 ::= { pwVcCepPerfIntervalEntry 20 }

pwVcCepPerfIntervalSESSs OBJECT-TYPE

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

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

pwVcCepPerfIntervalFC 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."
 ::= { pwVcCepPerfIntervalEntry 23 }

-- End PW CEP VC Performance Interval Table

-- PW CEP VC Total Performance Table

pwVcCepPerfTotalTable OBJECT-TYPE
 SYNTAX SEQUENCE OF PwVcCepPerfTotalEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "This table provides per CEP VC performance information
 much like the pwVcCepPerfIntervalTable above. However,
 these counts represent complete historical information.
 NOTE: Counter64 objects are used here, Counter32 is
 too small for OC-768 CEP VCs."
 ::= { pwVcCepObjects 6 }

pwVcCepPerfTotalEntry OBJECT-TYPE
 SYNTAX PwVcCepPerfTotalEntry
 MAX-ACCESS not-accessible
 STATUS current

DESCRIPTION

"An entry is created in this table by the agent for

Danenberg et al

Expires November 2002

33

Internet Draft

PW CEP MIB

May 2002

every entry in the pwVcCep table."

INDEX { pwVcIndex }

::= { pwVcCepPerfTotalTable 1 }

PwVcCepPerfTotalEntry ::= SEQUENCE {

pwVcCepPerfTotalDbInPacketsHC	Counter64,
pwVcCepPerfTotalDbOutPacketsHC	Counter64,
pwVcCepPerfTotalInNegPtrAdjust	Counter32,
pwVcCepPerfTotalInPosPtrAdjust	Counter32,
pwVcCepPerfTotalInPtrAdjustSecs	Counter32,
pwVcCepPerfTotalOutNegPtrAdjust	Counter32,
pwVcCepPerfTotalOutPosPtrAdjust	Counter32,
pwVcCepPerfTotalOutPtrAdjustSecs	Counter32,
pwVcCepPerfTotalAbsPtrAdjust	Integer32,
pwVcCepPerfTotalMissingPkts	Counter32,
pwVcCepPerfTotalPktsOoseq	Counter32,
pwVcCepPerfTotalPktsOoRngDropped	Counter32,
pwVcCepPerfTotalJtrBfrUnderruns	Counter32,
pwVcCepPerfTotalPktsBadLength	Counter32,
pwVcCepPerfTotalSummaryErrors	Counter32,
pwVcCepPerfTotalESS	Counter32,
pwVcCepPerfTotalSESS	Counter32,
pwVcCepPerfTotalUASS	Counter32,
pwVcCepPerfTotalFC	Counter32,
pwVcCepPerfTotalDiscontinuityTime	TimeStamp
}	

pwVcCepPerfTotalDbInPacketsHC OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of DBA packets received."

::= { pwVcCepPerfTotalEntry 1 }

pwVcCepPerfTotalDbOutPacketsHC OBJECT-TYPE

SYNTAX Counter64

MAX-ACCESS read-only

STATUS current
DESCRIPTION
"Number of DBA packets sent."
::= { pwVcCepPerfTotalEntry 2 }

-- Pointer adjustment stats
pwVcCepPerfTotalInNegPtrAdjust OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only

Danenberg et al Expires November 2002

34

Internet Draft PW CEP MIB

May 2002

STATUS current
DESCRIPTION
"Number of negative pointer adjustments sent on the
SONET path based on CEP pointer adjustments received."
::= { pwVcCepPerfTotalEntry 3 }

pwVcCepPerfTotalInPosPtrAdjust OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of postive pointer adjustments sent on the
SONET path based on CEP pointer adjustments received."
::= { pwVcCepPerfTotalEntry 4 }

pwVcCepPerfTotalInPtrAdjustSecs OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of seconds in which a pos or neg pointer
adjustment was sent on the SONET path."
::= { pwVcCepPerfTotalEntry 5 }

pwVcCepPerfTotalOutNegPtrAdjust 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."
::= { pwVcCepPerfTotalEntry 6 }

pwVcCepPerfTotalOutPosPtrAdjust 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."

::= { pwVcCepPerfTotalEntry 7 }

pwVcCepPerfTotalOutPtrAdjustSecs OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

::= { pwVcCepPerfTotalEntry 8 }

pwVcCepPerfTotalAbsPtrAdjust OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-only

Danenberg et al Expires November 2002

35

Internet Draft

PW CEP MIB

May 2002

STATUS current

DESCRIPTION

"Absolute Pointer adjustments is relative adjustment drifts between inbound and outbound streams. It is calculated as absolute value of :

(InPosPtrAdjust - InNegPtrAdjust) -
(OutPosPtrAdjust - OutNegPtrAdjust) "

::= { pwVcCepPerfTotalEntry 9 }

pwVcCepPerfTotalMissingPkts OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

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

::= { pwVcCepPerfTotalEntry 10 }

pwVcCepPerfTotalPktsOoseq 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 pwVcCepCfgPktReorder)."

::= { pwVcCepPerfTotalEntry 11 }

pwVcCepPerfTotalPktsOoRngDropped 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."

::= { pwVcCepPerfTotalEntry 12 }

pwVcCepPerfTotalJtrBfrUnderruns 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."

::= { pwVcCepPerfTotalEntry 13 }

pwVcCepPerfTotalPktsBadLength OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of packets received larger or smaller than

Danenberg et al Expires November 2002

36

Internet Draft PW CEP MIB

May 2002

pwVcCepCfgNormalPktLength."

::= { pwVcCepPerfTotalEntry 14 }

pwVcCepPerfTotalSummaryErrors 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)."

::= { pwVcCepPerfTotalEntry 15 }

pwVcCepPerfTotalESSs OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Errored Seconds encountered. See future versions of [draft-malis-pwe3-sonet-02.txt](#) for definition of ES."

::= { pwVcCepPerfTotalEntry 16 }

pwVcCepPerfTotalSESSs OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of Severely Errored Seconds. See pwVcCepCfgMissingPktsToSes. Also see future versions of [draft-malis-pwe3-sonet](#) for definition."

::= { pwVcCepPerfTotalEntry 17 }

pwVcCepPerfTotalUASs OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The counter associated with the number of UnAvailable Seconds. See pwVcCepCfgSesToUAS.

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 2558](#), 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 pwVcCepCfgSesToUas) and increase the UAS count (by that same value) when it determines that UAS state has been entered."

::= { pwVcCepPerfTotalEntry 18 }

pwVcCepPerfTotalFC OBJECT-TYPE

Danenberg et al Expires November 2002

37

Internet Draft

PW CEP MIB

May 2002

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."

::= { pwVcCepPerfTotalEntry 19 }

pwVcCepPerfTotalDiscontinuityTime OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

```

STATUS      current
DESCRIPTION
    "The value of sysUpTime on the most recent occasion at
    which any one or more of this segment's Counter32 or
    Counter64 suffered a discontinuity. If no such
    discontinuities have occurred since the last re-
    initialization of the local management subsystem, then
    this object contains a zero value."
 ::= { pwVcCepPerfTotalEntry 20 }

-- End of PW CEP Total Performance table

```

```

-- Notifications - CEP VC

```

```

pwVcCepGlobalNotifyEnable OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS   read-write
    STATUS      current
    DESCRIPTION
        "If this object is true, then it enables the
        generation of pwVcCepUp and pwVcCepDown
        notifications, otherwise these notifications are
        not emitted.
        Note: enabling/disabling notifications for
        individual CEP VCs is for further study."
    DEFVAL { false }
    ::= { pwVcCepObjects 8 }

```

```

pwVcCepUp NOTIFICATION-TYPE
    OBJECTS     { pwVcOperStatus }
    STATUS      current
    DESCRIPTION
        "This notification is generated when a CEP VC has
        exited the 'failure' state."
    ::= { pwVcCepNotifyPrefix 1 }

```

```

pwVcCepDown NOTIFICATION-TYPE
    OBJECTS     { pwVcCepLatchedIndications }
    STATUS      current
    DESCRIPTION

```

Danenberg et al Expires November 2002

38

Internet Draft

PW CEP MIB

May 2002

```

    "This notification is generated when a CEP VC has
    entered the 'failure' state. See description of
    LastIndications object."
    ::= { pwVcCepNotifyPrefix 2 }

```

-- End of notifications.

-- Conformance Configuration table

pwVcCepConformanceCfgTable OBJECT-TYPE

SYNTAX SEQUENCE OF PwVcCepConformanceCfgEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table provides the means for the agent to declare whether certain CEP VC statistics objects are supported (conformed to) or not. If not supported, then the object MUST be return 0."

::= { pwVcCepObjects 9 }

pwVcCepConformanceCfgEntry OBJECT-TYPE

SYNTAX PwVcCepConformanceCfgEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The agent MUST create a single entry in this table."

INDEX { pwVcCepConformanceCfgIndex }

::= { pwVcCepConformanceCfgTable 1 }

PwVcCepConformanceCfgEntry ::= SEQUENCE {

pwVcCepConformanceCfgIndex	INTEGER,
pwVcCepPerfDbInPacketsHCTruth	TruthValue,
pwVcCepPerfDbInPacketsHCDesc	SnmpAdminString,
pwVcCepPerfDbOutPacketsHCTruth	TruthValue,
pwVcCepPerfDbOutPacketsHCDesc	SnmpAdminString,
pwVcCepPerfPktsOoseqTruth	TruthValue,
pwVcCepPerfPktsOoseqDesc	SnmpAdminString,
pwVcCepPerfPktsOoRngDroppedTruth	TruthValue,
pwVcCepPerfPktsOoRngDroppedDesc	SnmpAdminString,
pwVcCepPerfSummaryErrorsTruth	TruthValue,
pwVcCepPerfSummaryErrorsDesc	SnmpAdminString

}

pwVcCepConformanceCfgIndex OBJECT-TYPE

SYNTAX INTEGER (0..128)

MAX-ACCESS not-accessible

STATUS current
DESCRIPTION
"Any arbitrary number"
 ::= { pwVcCepConformanceCfgEntry 1 }

pwVcCepPerfDbInPacketsHCTruth OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Tells whether the pwVcCepPerf...DbInPacketsHC
in the pwVcCepPerf...Table is supported."
 ::= { pwVcCepConformanceCfgEntry 2 }

pwVcCepPerfDbInPacketsHCDesc OBJECT-TYPE
SYNTAX SnmpAdminString
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Explanation for pwVcCepPerf...DbInPacketsHC
support in the pwVcCepPerf...Table."
 ::= { pwVcCepConformanceCfgEntry 3 }

pwVcCepPerfDbOutPacketsHCTruth OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Tells whether the pwVcCepPerf...DbOutPacketsHC
in the pwVcCepPerf...Table is supported."
 ::= { pwVcCepConformanceCfgEntry 4 }

pwVcCepPerfDbOutPacketsHCDesc OBJECT-TYPE
SYNTAX SnmpAdminString
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Explanation for pwVcCepPerf...DbOutPacketsHC
support in the pwVcCepPerf...Table."
 ::= { pwVcCepConformanceCfgEntry 5 }

pwVcCepPerfPktsOoseqTruth OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Tells whether the pwVcCepPerf...PktsOoseq

in the pwVcCepPerf...Table is supported."
 ::= { pwVcCepConformanceCfgEntry 6 }

pwVcCepPerfPktsOoseqDesc OBJECT-TYPE
SYNTAX SnmpAdminString
MAX-ACCESS read-only
STATUS current

Danenberg et al Expires November 2002

40

Internet Draft

PW CEP MIB

May 2002

DESCRIPTION

"Explanation for pwVcCepPerf...PktsOoseq
support in the pwVcCepPerf...Table."
 ::= { pwVcCepConformanceCfgEntry 7 }

pwVcCepPerfPktsOoRngDroppedTruth OBJECT-TYPE

SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"Tells whether the pwVcCepPerf...PktsOoRngDropped
in the pwVcCepPerf...Table is supported."
 ::= { pwVcCepConformanceCfgEntry 8 }

pwVcCepPerfPktsOoRngDroppedDesc OBJECT-TYPE

SYNTAX SnmpAdminString
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"Explanation for pwVcCepPerf...PktsOoRngDropped
support in the pwVcCepPerf...Table."
 ::= { pwVcCepConformanceCfgEntry 9 }

pwVcCepPerfSummaryErrorsTruth OBJECT-TYPE

SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"Tells whether the pwVcCepPerf...SummaryError
in the pwVcCepPerf...Table is supported."
 ::= { pwVcCepConformanceCfgEntry 10 }

pwVcCepPerfSummaryErrorsDesc OBJECT-TYPE

SYNTAX SnmpAdminString
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"Explanation for pwVcCepPerf...SummaryError

```

        support in the pwVcCepPerf...Table."
 ::= { pwVcCepConformanceCfgEntry 11 }

-- End of CEP VC Conformance Configuration table


-- Conformance Information

-- Note: Conformance at the object access and values level is
-- still FFS, therefore current conformance is defined at the
-- object existence level only.

pwVcCepGroups      OBJECT IDENTIFIER ::= { pwVcCepConformance 1 }
pwVcCepCompliances OBJECT IDENTIFIER ::= { pwVcCepConformance 2 }


Danenberg et al      Expires November 2002                        41

Internet Draft      PW CEP MIB                                    May 2002


pwCepModuleCompliance MODULE-COMPLIANCE
    STATUS    current
    DESCRIPTION
        "The compliance statement for agent that support PW
        over CEP PSN operation."

    MODULE -- this module
        MANDATORY-GROUPS { pwVcCepGroup,
                            pwVcCepCfgGroup,
                            pwVcCepPerfCurrentGroup,
                            pwVcCepPerfIntervalGroup,
                            pwVcCepPerfTotalGroup,
                            pwVcCepEventGroup,
                            pwVcCepConformanceCfgGroup
                            }

        ::= { pwVcCepCompliances 1 }

-- Units of conformance.

pwVcCepGroup OBJECT-GROUP
    OBJECTS {
        pwVcCepType,
        pwVcCepSonetIfIndex,
        pwVcCepSonetTimeSlot,
        pwVcCepSonetConfigError,
        pwVcCepCfgIndex,
        pwVcCepTimeElapsed,
        pwVcCepValidIntervals,
        pwVcCepCurrentIndications,

```



```

        pwVcCepLatchedIndications,
        pwVcCepLastEsTimeStamp
    }
    STATUS    current
    DESCRIPTION
        "Collection of objects for basic CEP VC config and
        status."
    ::= { pwVcCepGroups 1 }

```

```

pwVcCepCfgGroup OBJECT-GROUP
    OBJECTS {
        pwVcCepCfgIndexNext,

        pwVcCepConfigError,

        pwVcCepCfgNormalPktLength,
        pwVcCepCfgMinPktLength,
        pwVcCepCfgPktReorder,
        pwVcCepCfgEnableDBA,

        pwVcCepCfgJtrBfrDepth,
        pwVcCepCfgJtrBfrRebuildOor,

```

Danenberg et al Expires November 2002

42

Internet Draft PW CEP MIB

May 2002

```

        pwVcCepCfgJtrBfrRebuildOorCount,

        pwVcCepCfgConsecPktsInsync,
        pwVcCepCfgConsecMissingOutSync,

        pwVcCepCfgPktErrorPlayOutValue,

        pwVcCepCfgMissingPktsToSes,
        pwVcCepCfgSesToUas,
        pwVcCepCfgSecsToExitUas,

        pwVcCepCfgRowStatus,
        pwVcCepCfgStorageType
    }
    STATUS    current
    DESCRIPTION
        "Collection of detailed objects needed to
        configure CEP VCs."
    ::= { pwVcCepGroups 2 }

```

```

pwVcCepPerfCurrentGroup OBJECT-GROUP
    OBJECTS {

```

```

pwVcCepPerfCurrentDbainPacketsHC,
pwVcCepPerfCurrentDbainOutPacketsHC,

pwVcCepPerfCurrentInNegPtrAdjust,
pwVcCepPerfCurrentInPosPtrAdjust,
pwVcCepPerfCurrentInPtrAdjustSecs,
pwVcCepPerfCurrentOutNegPtrAdjust,
pwVcCepPerfCurrentOutPosPtrAdjust,
pwVcCepPerfCurrentOutPtrAdjustSecs,
pwVcCepPerfCurrentAbsPtrAdjust,

pwVcCepPerfCurrentMissingPkts,
pwVcCepPerfCurrentPktsOoseq,
pwVcCepPerfCurrentPktsOoRngDropped,
pwVcCepPerfCurrentJtrBfrUnderruns,
pwVcCepPerfCurrentPktsBadLength,
pwVcCepPerfCurrentSummaryErrors,

pwVcCepPerfCurrentESs,
pwVcCepPerfCurrentSESSs,
pwVcCepPerfCurrentUASs,
pwVcCepPerfCurrentFC
}
STATUS    current
DESCRIPTION
    "Collection of statistics objects for CEP VCs."
 ::= { pwVcCepGroups 3 }

```

```

pwVcCepPerfIntervalGroup OBJECT-GROUP
    OBJECTS {

```

Danenberg et al Expires November 2002

43

Internet Draft

PW CEP MIB

May 2002

```

pwVcCepPerfIntervalValidData,
pwVcCepPerfIntervalReset,
pwVcCepPerfIntervalTimeElapsed,

pwVcCepPerfIntervalDbainPacketsHC,
pwVcCepPerfIntervalDbainOutPacketsHC,

pwVcCepPerfIntervalInNegPtrAdjust,
pwVcCepPerfIntervalInPosPtrAdjust,
pwVcCepPerfIntervalInPtrAdjustSecs,
pwVcCepPerfIntervalOutNegPtrAdjust,
pwVcCepPerfIntervalOutPosPtrAdjust,
pwVcCepPerfIntervalOutPtrAdjustSecs,
pwVcCepPerfIntervalAbsPtrAdjust,

```

```

        pwVcCepPerfIntervalMissingPkts,
        pwVcCepPerfIntervalPktsOoseq,
        pwVcCepPerfIntervalPktsOoRngDropped,
        pwVcCepPerfIntervalJtrBfrUnderruns,
        pwVcCepPerfIntervalPktsBadLength,
        pwVcCepPerfIntervalSummaryErrors,

        pwVcCepPerfIntervalESs,
        pwVcCepPerfIntervalSESSs,
        pwVcCepPerfIntervalUASSs,
        pwVcCepPerfIntervalFC,

        pwVcCepGlobalNotifyEnable
    }
    STATUS    current
    DESCRIPTION
        "Collection of statistics objects for CEP VCs."
    ::= { pwVcCepGroups 4 }

```

```

pwVcCepPerfTotalGroup OBJECT-GROUP
    OBJECTS {
        pwVcCepPerfTotalDbInPacketsHC,
        pwVcCepPerfTotalDbOutPacketsHC,

        pwVcCepPerfTotalInNegPtrAdjust,
        pwVcCepPerfTotalInPosPtrAdjust,
        pwVcCepPerfTotalInPtrAdjustSecs,
        pwVcCepPerfTotalOutNegPtrAdjust,
        pwVcCepPerfTotalOutPosPtrAdjust,
        pwVcCepPerfTotalOutPtrAdjustSecs,
        pwVcCepPerfTotalAbsPtrAdjust,

        pwVcCepPerfTotalMissingPkts,
        pwVcCepPerfTotalPktsOoseq,
        pwVcCepPerfTotalPktsOoRngDropped,
        pwVcCepPerfTotalJtrBfrUnderruns,
        pwVcCepPerfTotalPktsBadLength,
        pwVcCepPerfTotalSummaryErrors,
    }

```

```

        pwVcCepPerfTotalESs,
        pwVcCepPerfTotalSESSs,
        pwVcCepPerfTotalUASSs,
        pwVcCepPerfTotalFC,
        pwVcCepPerfTotalDiscontinuityTime
    }

```

```

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

pwVcCepEventGroup NOTIFICATION-GROUP
    NOTIFICATIONS {
        pwVcCepUp,
        pwVcCepDown
    }
STATUS    current
DESCRIPTION
    "Collection of event objects for CEP VCs."
 ::= { pwVcCepGroups 7 }

pwVcCepConformanceCfgGroup OBJECT-GROUP
    OBJECTS {
        pwVcCepPerfDbInPacketsHCTruth,
        pwVcCepPerfDbInPacketsHCDesc,

        pwVcCepPerfDbOutPacketsHCTruth,
        pwVcCepPerfDbOutPacketsHCDesc,

        pwVcCepPerfPktsOoseqTruth,
        pwVcCepPerfPktsOoseqDesc,

        pwVcCepPerfPktsOoRngDroppedTruth,
        pwVcCepPerfPktsOoRngDroppedDesc,

        pwVcCepPerfSummaryErrorsTruth,
        pwVcCepPerfSummaryErrorsDesc
    }
STATUS    current
DESCRIPTION
    "Collection of objects declaring conformance to
    other objects."
 ::= { pwVcCepGroups 8 }

END

```

9 References

- [CEP] Malis, A., Jeremy Brayley, S., Martini, L., and Johnson, T., "SONET/SDH Circuit Emulation Over Packet (CEP)", Internet Draft <[draft-malis-pwe3-sonet-02.txt](#)>, March 2002.
- [LAYER] Bryant, S., Wood, L., Townsend, M., "Protocol Layering in PWE3", Internet Draft <[draft-bryant-pwe3-protocol-layer-01.txt](#)>, February 2002.
- [TRANS] Martini et al, "Transport of Layer 2 Frames Over MPLS" <[draft-martini-l2circuit-trans-mpls-09.txt](#)>, April 2002.
- [ENCAP] Martini et al, "Encapsulation Methods for Transport of Layer 2 Frames Over MPLS", <[draft-martini-l2circuit-encap-mpls-04.txt](#)>, November 2001.
- [PWMIB] Zelig, D. <[draft-zelig-pw-mib-02.txt](#)>, Feb 2002.
- [PWTC] Nadeau, T. <[draft-nadeau-pw-tc-mib-02.txt](#)>, Feb 2002.
- [SONETMIB] Tesink, K. "Definitions of Managed objects for the SONET/SDH Interface Type", [RFC 2558](#).
- [Assigned] Reynolds, J., and J. Postel, "Assigned Numbers", [RFC 1700](#), October 1994. See also: <http://www.isi.edu/in-notes/iana/assignments/smi-numbers>
- [IANAFamily] Internet Assigned Numbers Authority (IANA), ADDRESS FAMILY NUMBERS, (<http://www.isi.edu/in-notes/iana/assignments/address-family-numbers>), for MIB see: <ftp://ftp.isi.edu/mib/ianaaddressfamilynumbers.mib>
- [SNMPArch] Harrington, D., Presuhn, R., and B. Wijnen, "An Architecture for Describing SNMP Management Frameworks", [RFC 2271](#), January 1998.
- [SMIv1] Rose, M., and K. McCloghrie, "Structure and Identification of Management Information for TCP/IP-based Internets", [RFC 1155](#), May 1990.
- [SNMPv1MIBDef] Rose, M., and K. McCloghrie, "Concise MIB Definitions", [RFC 1212](#), March 1991.

[SNMPv1Traps] M. Rose, "A Convention for Defining Traps for use with the SNMP", [RFC 1215](#), March 1991.

Danenberg et al

Expires November 2002

46

Internet Draft

PW CEP MIB

May 2002

[RFC2572] Case, J., Harrington D., Presuhn R., and B. Wijnen, "Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)", [RFC 2572](#), April 1999.

[RFC2574] Blumenthal, U., and B. Wijnen, "User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)", [RFC 2574](#), April 1999.

[RFC1905] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Protocol Operations for Version 2 of the Simple Network Management Protocol (SNMPv2)", [RFC 1905](#), January 1996.

[RFC2573] Levi, D., Meyer, P., and B. Stewart, "SNMPv3 Applications", [RFC 2573](#), April 1999.

[RFC2575] Wijnen, B., Presuhn, R., and K. McCloghrie, "View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)", [RFC 2575](#), April 1999.

[RFC2570] Case, J., Mundy, R., Partain, D., and B. Stewart, "Introduction to Version 3 of the Internet-standard Network Management Framework", [RFC 2570](#), April 1999.

[SMIv2] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Structure of Management Information for Version 2 of the Simple Network Management Protocol (SNMPv2)", [RFC 1902](#), January 1996.

[SNMPv2TC] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Textual Conventions for Version 2 of the Simple Network Management Protocol (SNMPv2)", [RFC 1903](#), SNMP Research, Inc., Cisco Systems, Inc., January 1996.

[SNMPv2Conf] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Conformance Statements for Version 2 of the Simple Network Management Protocol

	(SNMPv2)", RFC 1904 , January 1996.	
[SNMPv1]	Case, J., Fedor, M., Schoffstall, M., and J. Davin, "Simple Network Management Protocol", RFC 1157 , May 1990.	
[SNMPv2c]	Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Introduction to Community-based SNMPv2", RFC 1901 , January 1996.	
[SNMPv2TM]	Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Transport Mappings for Version 2 of	
Danenberg et al	Expires November 2002	47
Internet Draft	PW CEP MIB	May 2002
	the Simple Network Management Protocol (SNMPv2)", RFC 1906 , January 1996.	
[SNMPv3MP]	Case, J., Harrington D., Presuhn R., and B. Wijnen, "Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)", RFC 2272 , January 1998.	
[SNMPv3USM]	Blumenthal, U., and B. Wijnen, "User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)", RFC 2574 , April 1999.	
[SNMPv2P0]	Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Protocol Operations for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1905 , January 1996.	
[SNMPv3App]	Levi, D., Meyer, P., and B. Stewart, "SNMPv3 Applications", RFC 2273 , January 1998.	
[SNMPv3VACM]	Wijnen, B., Presuhn, R., and K. McCloghrie, "View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)", RFC 2575 , April 1999.	
[IPSEC]	Kent, S., and Atkinson, R., "Security Architecture for the Internet Protocol", RFC 2401 , November 1998.	
[IFMIB]	McCloghrie, K., and F. Kastenholz, "The Interfaces Group MIB using SMiv2", RFC 2233 , Nov. 1997	
[ATOMMIB]	Tesink, K., "Definitions of Managed Objects for ATM	

Management", [RFC 2515](#), Feb. 1999

[BCP14] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.

Danenberg et al Expires November 2002

48

Internet Draft

PW CEP MIB

May 2002

[10](#) Author's Addresses

Dave Danenberg
Litchfield Communications, Inc.
27 Princeton Rd
Princeton Center West
Watertown, CT 06795-2779 USA
Email: dave_danenberg@litchfieldcomm.com

David Zelig
Corrigent Systems LTD.
126, Yigal Alon st.
Tel Aviv, ISRAEL
Phone: +972-3-6945273
Email: davidz@corrigent.com

Thomas D. Nadeau
Cisco Systems, Inc.
250 Apollo Drive
Chelmsford, MA 01824 USA
Email: tnadeau@cisco.com

Andrew G. Malis
Vivace Networks, Inc.
2730 Orchard Parkway
San Jose, CA 95134 USA

Email: Andy.Malis@vivacenetworks.com

Scott C. Park
Litchfield Communications, Inc.
27 Princeton Rd
Princeton Center West
Watertown, CT 06795-2779 USA
Email: scott_park@litchfieldcomm.com

Danenberg et al Expires November 2002

49

Internet Draft PW CEP MIB

May 2002

[11](#) Full Copyright Statement

"Copyright (C) The Internet Society (2001). All Rights Reserved. This document and translations of it may be copied and furnished to others, and derivative works that comment on or otherwise explain it or assist in its implementation may be prepared, copied, published and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice and this paragraph are included on all such copies and derivative works. However, this document itself may not be modified in any way, such as by removing the copyright notice or references to the Internet Society or other Internet organizations, except as needed for the purpose of developing Internet standards in which case the procedures for copyrights defined in the Internet Standards process must be followed, or as required to translate it into languages other than English.

The limited permissions granted above are perpetual and will not be

revoked by the Internet Society or its successors or assigns.

This document and the information contained herein is provided on an "AS IS" basis and THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Acknowledgement

Funding for the RFC Editor function is currently provided by the Internet Society.