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Ethernet in the First Mile Copper (EFMCu) Interfaces MIB  
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Abstract

This document defines a Management Information Base (MIB) module for use with network management protocols in TCP/IP based internets. This document proposes an extension to the Ethernet-like Interfaces MIB and MAU MIB modules with a set of objects for managing an Ethernet in the First Mile Copper (EFMCu) interfaces 10PASS-TS and 2BASE-TL, defined in IEEE Std 802.3ah-2004.

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## 1. Introduction

New Ethernet-like interfaces have been defined in the Institute of Electrical and Electronics Engineers (IEEE) Standard 802.3ah-2004 [[802.3ah](#)], a.k.a. Ethernet in the First Mile (EFM), which is now a part of the base IEEE Standard 802.3-2005 [[802.3](#)]. In particular 2BASE-TL and 10PASS-TS physical interfaces (PHYs), defined over voice-grade copper pairs, have been specified for the long and short reach respectively. These interfaces, collectively called EFMCu, are based on ITU-T G.SHDSL [[G.991.2](#)] and VDSL [[G.993.1](#)] specifications and support variable rates and optional Physical Medium Entity (PME) aggregation (a.k.a. multi-pair bonding).

2BASE-TL PHY is capable of providing at least 2Mbps over 2700 m long single copper pair with a mean Bit Error Rate (BER) of  $10^{-7}$  (using 5dB target noise margin).

10PASS-TS PHY is capable of providing at least 10Mbps over 750 m long single copper pair with a mean BER of  $10^{-7}$  (using 6dB target noise margin).

This memo defines a Management Information Base (MIB) module for use with network management protocols in the Internet community to manage EFMCu interfaces.

Note that managed objects for Operation, Administration and Management (OAM) and Ethernet over Passive Optical Networks (EPON) clauses of IEEE 802.3ah are defined in EFM-COMMON-MIB [[I-D.ietf-hubmib-efm-mib](#)] and EFM-EPON-MIB [[I-D.ietf-hubmib-efm-epon-mib](#)] respectively.

## 2. The Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to [section 7 of](#)

[RFC 3410](#) [[RFC3410](#)].

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

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",

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"SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC 2119](#) [[RFC2119](#)].

### [3.](#) Relation to other MIB modules

This section outlines the relationship of this MIB with other MIB modules described in the relevant RFCs. Specifically, Interfaces Group MIB (IF-MIB), Ethernet-Like (EtherLike-MIB), MAU (MAU-MIB), SHDSL (HDSL2-SHDSL-LINE-MIB) and VDSL (VDSL-LINE-EXT-MCM-MIB) are discussed.

#### [3.1.](#) Relation to Interfaces Group MIB module

2BASE-TL and 10PASS-TS PHY's specified in this MIB module are stacked Ethernet interfaces and as such are managed using generic interface management objects defined in the IF-MIB [[RFC2863](#)]. The stack management is done via the ifStackTable, as defined in the IF-MIB [[RFC2863](#)] and ifInvStackTable, as defined in the IF-INVERTED-STACK-MIB [[RFC2864](#)].

##### [3.1.1.](#) Layering Model

An EFMCu interface can aggregate up to 32 Physical Medium Entity (PME) sub-layer devices (modems), using so called PME Aggregation Function (PAF).

A generic EFMCu device can have a number of Physical Coding Sublayer (PCS) ports, each connected to a MAC via Medium Independent Interface

(MII) at the upper layer, and cross-connected to a number of underlying PMEs, with a single PCS per PME relationship, see clause 61.1 of [802.3ah] for more details.

Each PME in the aggregated EFMCu port is represented in the Interface table (ifTable) as a separate port with ifType of shdsl(169) for 2BASE-TL or vdsl(97) for 10PASS-TS. The ifType values are defined in [IANAifType-MIB].

ifSpeed for each PME SHALL return the actual data bitrate of the active PME (e.g. for 2BaseTL PMEs it is a multiple of 64Kbps). Zero value SHALL be returned when PME is initializing or down.

The ifSpeed of the PCS is the sum of the current operating data rates of all PMEs in the aggregation group, without the 64/65B encapsulation overhead and PAF overhead, but accounting for the Inter-Frame Gaps (IFG).

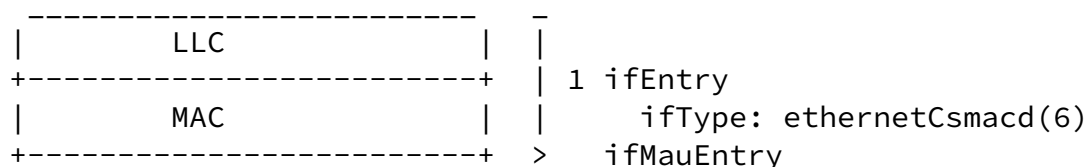
When using the stated definition of ifSpeed for the PCS, there would be no frame loss in the following configuration (the test-sets are configured to generate 100% of back to back traffic, i.e. minimal IFG, at 10 or 100Mbps, with min and max frame sizes; the EFM interfaces are aggregated, to achieve the shown speed):

```
[testset]--10BaseT--[CO]--2BaseTL--[CPE]--10BaseT--[testset]
  ifSpeed=  10Mbps          10Mbps          10Mbps
```

```
[testset]--100BaseT--[CO]--10PassTS--[CPE]--100BaseT--[testset]
  ifSpeed=  100Mbps        100Mbps        100Mbps
```

Figure 1: Example configuration with no frame loss

The following figure shows the layering diagram and corresponding use of ifTable and ifMauTable:



Reconsiliation				ifMauType: dot3MauType2BaseTL or dot3MauType10PassTS
PCS				
TC \				
PMA >	PME 1	...	PME N	> N ifEntry (N=1..32)
PMD/				ifType: shdsl(169) or vdsl(97)

Figure 2: Use of ifTable and ifMauTable for EFMCu ports

The ifStackTable is indexed by the ifIndex values of the aggregated EFMCu port (PCS) and the PMEs connected to it. ifStackTable allows a Network Management application to determine which PMEs are connected to a particular PCS and change connections (if supported by the application). The ifInvStackTable, being an inverted version of the ifStackTable, provides an efficient means for a Network Management application to read a subset of the ifStackTable and thereby determine which PCS runs on top of a particular PME.

A new table ifAvailableStackTable defined in this MIB module, specifies for each PCS a list of PMEs, which can possibly be cross-connected to that PCS, determined by the cross-connect capability of the device. This table, modeled after ifStackTable, is read only,

reflecting current cross-connect capability, which can be dynamic in some implementations (e.g. if PMEs are located on a pluggable module and the module is pulled out). Note that PME availability per PCS, described by ifAvailableStackTable, can be constrained by other parameters, for example by aggregation capacity of a PCS or by the PME in question being already connected to another PCS. So, in order to ensure that a particular PME can be connected to the PCS, all respective parameters (e.g. ifAvailableStackTable, ifStackTable and efmCuPAFCapacity) SHALL be inspected.

### 3.1.2. PME Aggregation Function (PAF)

The PME Aggregation Function (PAF) allows a number of PMEs to be aggregated onto a PCS port, by fragmenting the Ethernet frames, transmitting the fragments over multiple PMEs and assembling the

original frames at the remote port. PAF is OPTIONAL, meaning that a device with a single PME MAY perform fragmentation and re-assembly if this function is supported by the device. Note however that the agent is REQUIRED to report on the PAF capability for all EFMcu ports (2BASE-TL and 10PASS-TS).

This MIB module allows a Network Management application to query PAF capability and enable/disable it if supported. Note that enabling PAF effectively turns on fragmentation and re-assembly, even on a single-PME port.

### 3.1.3. Discovery Operation

The EFMcu ports may optionally support discovery operation, whereby PMEs, during initialization, exchange information about their respective aggregation groups (PCS). This information can then be used to detect copper misconnections or for an automatic assignment of the local PMEs into aggregation groups instead of fixed pre-configuration.

This MIB module allows a Network Management application to control EFM Discovery mechanism and query its results. Note that the Discovery mechanism can work only if PAF is supported and enabled.

Two tables are used by Discovery mechanism: ifStackTable and ifAvailableStackTable defined. The following pseudo-code defines an example of Discovery and automatic PME assignment for a generic PAF enabled multi-PCS EFMcu device, located at Central Office (CO), using objects defined in this MIB module. [Note that automatic PME assignment is only shown here for the purposes of the example. Fixed PME pre-assignment, manual assignment or auto-assignment by an alternative internal algorithm may be chosen by a particular implementation]:

```
FOREACH pcs[i] IN co_device
{ // Discover only on PAF enabled ports with room for more PMEs
  IF ( pcs[i].PAFSupported AND pcs[i].NumPMEs < pcs[i].PAFCapacity )
    { dc = pcs[i].DiscoveryCode = MAC[i]; // unique 6 Byte per PCS
      // go over all currently disconnected PMEs, which can
      // potentially be connected to PCS[i]
      FOREACH pme[j] IN ifAvailableStackTable[pcs[i]] AND
        NOT IN ifInvStackTable[pme[j]] // unassigned
```

```

    { pme[j].RemoteDiscoveryCode = dc;          // Set if Clear
      r = pme[j].RemoteDiscoveryCode;          // Get
      IF ( r == dc AND pcs[i].NumPMEs < pcs[i].PAFCapacity)
        { // Remote CPE connected via PME[j] is/was a peer for
          // PCS[i]. Connect this PME to the PCS (there's room)
          ADD pme[j] TO ifStackTable[pcs[i]];
          pcs[i].NumPMEs = pcs[i].NumPMEs + 1;
          // Discover all other currently disconnected PMEs,
          // attached to the same CPE and connect them to the PCS
          // provided there is enough room for more PMEs.
          FOREACH pme[k] IN ifAvailableStackTable[pcs[i]] and
            NOT IN ifInvStackTable[pme[k]]
            { r = pme[k].RemoteDiscoveryCode;          // Get
              IF ( r == dc AND
                  pcs[i].NumPMEs < pcs[i].PAFCapacity)
                { ADD pme[k] TO ifStackTable[pcs[i]];
                  pcs[i].NumPMEs = pcs[i].NumPMEs + 1;
                }
            }
          }
        }
      // Discovered all PMEs which lead to the same CPE and
      // connected them to PCS[i]. Go to the next PCS.
      BREAK;
    }
  }
}

```

The SNMP Agent builds efmCuStackTable according to the information contained in the Clause 45 PME\_Available\_register (see [\[802.3ah\]](#) 61.1.5.3 and 45.2.3.20).

Adding a PME to the ifStackTable row for a specific PCS, involves actual connection of the PME to the PCS, which can be done by modifying Clause 45 PME\_Aggregate\_register (see [\[802.3ah\]](#) 61.1.5.3 and 45.2.3.21).

Note that PCS port does not have to be operationally 'down' for the connection to succeed. In fact, a dynamic PME addition (and removal) MAY be implemented with an available PME being initialized first (by setting its ifAdminStatus to 'up') and then added to an operationally

'up' PCS port, by modifying a respective ifStackTable entry.



It is RECOMMENDED that a removal of the last operationally 'up' PME from an operationally 'up' PCS would be rejected by the implementation, as this action would completely drop the link.

#### [3.1.4.](#) EFMCu ports initialization

EFMCu ports being built on top of xDSL technology, require a lengthy initialization or 'training' process, before any data can pass. During this initialization both ends of a link (peers) work cooperatively to achieve required data rate on a particular copper pair. Sometimes, when the copper line is too long or the noise on the line is too high, that 'training' process may fail to achieve a specific target rate with required characteristics.

The ifAdminStatus object from the IF-MIB, controls the desired state of a PCS with all the PMEs connected to it or of an individual PME port. Setting this object to 'up' instructs a particular PCS or PME to start initialization process, which may take tens of seconds for EFMCu ports, especially if PAF is involved. The ifOperStatus object shows the operational state of an interface (extended by ifMauMediaAvailable object from MAU-MIB for PCS and efmCuPmeOperStatus defined in this MIB module for PME interfaces).

A disconnected PME may be initialized by changing the ifAdminState from 'down' to 'up'. Changing the ifAdminState to 'up' on the PCS initializes all PMEs connected to that particular PCS. Note that in case of PAF some interfaces may fail to initialize while others succeed. The PCS is considered operationally 'up' if at least one PME aggregated by its PAF is operationally 'up'. When all PMEs connected to the PCS are 'down' the PCS SHALL be considered operationally 'lowerLayerDown'. The PCS SHALL be considered operationally 'notPresent' if it is not connected to any PME. The PCS/PME interface SHALL remain operationally 'down' during initialization.

The efmCuPmeOperStatus defined in this MIB module expands PME's ifOperStatus value of 'down' to 'downReady', 'downNotReady' and 'init' values, indicating various EFMCu PME specific states.

#### [3.1.5.](#) Usage of ifTable

Both PME and PCS interfaces of the EFMCu PHY are managed using interface specific management objects defined in this MIB module and generic interface objects from the ifTable of IF-MIB, with all management table entries referenced by the interface index ifIndex.

The following table summarizes EFMCu specific interpretations for some of the ifTable objects specified by the mandatory ifGeneralInformationGroup:

IF-MIB object	EFMCu interpretation
ifIndex	Interface index. Note that each PME and each PCS in the EFMCu PHY MUST have a unique index, as there some PCS and PME specific attributes accessible only on the PCS or PME level.
ifType	ethernetCsmacd(6) for PCS, shdsl(169) for 2BASE-TL PME, vdsl(97) for 10PASS-TS PME
ifSpeed	Operating data rate for the PME. For the PCS it is the sum of the current operating data rates of all PMEs in the aggregation group, without the 64/65B encapsulation overhead and PAF overhead, but accounting for the Inter-Frame Gaps (IFG)
ifAdminStatus	Setting this object to 'up' instructs a particular PCS (with all PMEs connected to it) or PME to start initialization process
ifOperStatus	efmCuPmeOperStatus supplements the 'down' value of ifOperStatus for PMEs.

Table 1

### [3.2.](#) Relation to SHDSL MIB module

G.SHDSL.bis modems, similar to PME(s) comprising a 2BASE-TL port, are described in HDSL2-SHDSL-LINE-MIB [[RFC4319](#)]. Note that not all attributes of G.SHDSL modems reflected in HDSL2-SHDSL-LINE-MIB have adequate management objects (Clause 30 attributes and Clause 45 registers) in the EFM standard.

Because of these differences and for the purposes of simplicity, unification of attributes common to both 2BASE-TL and 10PASS-TS PMEs and name consistency (e.g. prefixing the 2BASE-TL PME related objects with 'efmCuPme2B' instead of 'hdsl2shdsl'), it was decided not to reference HDSL2-SHDSL-LINE-MIB objects, but define all the relevant objects in this MIB module.

However, if some functionality, not available in this MIB module, is required and supported by the PME, e.g. performance monitoring, relevant HDSL2-SHDSL-LINE-MIB groups MAY be included and applied for PMEs of 2BASE-TL subtype.

### [3.3.](#) Relation to VDSL MIB module

VDSL (DMT) modems, similar to the PME(s) comprising a 10PASS-TS port, are described in VDSL-LINE-EXT-MCM-MIB [[RFC4070](#)]. Note that not all attributes of VDSL modems reflected in VDSL-LINE-EXT-MCM-MIB have adequate management objects (Clause 30 attributes and Clause 45 registers) in the EFM standard.

Because of these differences and for the purposes of simplicity, unification of attributes common to both 2BASE-TL and 10PASS-TS PMEs and name consistency, it was decided not to reference VDSL-LINE-EXT-MCM-MIB objects, but define all the relevant objects in this MIB module.

However, if some functionality, not available in this MIB module, is required and supported by the PME, relevant VDSL-LINE-EXT-MCM-MIB groups MAY be included and applied for PMEs of 10PASS-TS subtype.

### [3.4.](#) Relation to Ethernet-Like and MAU MIB modules

The implementation of EtherLike-MIB [[RFC3635](#)] and MAU-MIB [[I-D.ietf-hubmib-rfc3636bis](#)] is REQUIRED for the EFMCu interfaces.

Two new values of ifMauType (OBJECT-IDENTITIES of dot3MauType) and corresponding bit definitions of ifMauTypeListBits (IANAifMauTypeListBits) have been defined in the IANA-MAU-MIB [[I-D.ietf-hubmib-rfc3636bis](#)] for the EFMCu MAUs:

- o dot3MauType2BaseTL and b2BaseTL - for 2BASE-TL MAU
- o dot3MauType10PassTS and b10PassTS - for 10PASS-TS MAU

Additionally IANA-MAU-MIB defines two new values of ifMauMediaAvailable, as a textual convention IANAifMauMediaAvailable - availableReduced and ready, specifically for the EFMCu ports. Due to the PME aggregation, the EFMCu interpretation of some possible ifMauMediaAvailable values differs from other MAUs as follows:

- o unknown - the EFMCu interface (PCS with connected PMEs) is

initializing

- o ready - the interface is down, at least one PME in the aggregation group (all PMEs connected to the PCS) is ready for handshake
- o available - the interface is up, all PMEs in the aggregation group are up

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- o notAvailable - the interface is down, all PMEs in the aggregation group are down, no handshake tones are detected by any PME
- o availableReduced - the interface is up, a link fault is detected at the receive direction by one or more PMEs in the aggregation group, but at least one PME is up
- o pmdLinkFault - a link fault is detected at the receive direction by all PMEs in the aggregation group

As an EtherLike interface every EFMCu port (an ifEntry representing a consolidation of LLC, MAC and PCS (sub)layers) SHALL return an ifType of ethernetCsmacd(6). While most of the MAU characteristics are not applicable to the EFMCu ports (no auto-negotiation, false carriers or jabber), they SHALL return an appropriate ifMauType (dot3MauType2BaseTL or dot3mauType10PassTS) in order to direct the management software to look in the EFM-CU-MIB for the desired information. For example the information on the particular EFMCu flavor that an EFMCu port is running is available from efmCuOperSubType, defined in this MIB module.

Since EFMCu PMEs are not EtherLike interfaces, they cannot be instantiated as MAU interface objects.

## [4. MIB Structure](#)

### [4.1. Overview](#)

The main management objects defined in this MIB module are split into 2 groups:

- o efmCuPort - containing objects for configuration, capabilities, status and notifications, common to all EFMCu PHYs.
- o efmCuPme - containing objects for configuration, capabilities, status and notifications of EFMCu PMEs.

In addition the ifAvailableStackTable is defined at the same level.

The efmCuPme group in turn contains efmCuPme2B and efmCuPme10P groups, which define PME Profiles specific to 2BASE-TL and 10PASS-TS PMEs respectively, as well as PME specific status information.

#### [4.2.](#) PME Profiles

Since a managed node can have a large number of EFMCu PHYs, provisioning every parameter on every EFMCu PHY may become

burdensome. Moreover, most PMEs are provisioned identically with the same set of parameters. To simplify the provisioning process, this MIB module makes use of configuration profiles, similar to HDSL2-SHDSL-LINE-MIB and VDSL-LINE-EXT-MCM-MIB. A profile is a set of parameters, used either for configuration or representation of a PME. The same profile can be shared by multiple PME ports, using the same configuration.

The PME profiles are defined in efmCuPme2BProfileTable and efmCu10PProfileTable for 2BASE-TL and 10PASS-TS PMEs respectively. There are 12 predefined standard profiles for 2BASE-TL and 22 standard profiles for 10PASS-TS, defined in 802.3ah and dedicated for rapid provisioning of EFMCu PHYs in most scenarios. In addition this MIB defines two additional predefined profiles for "best-effort" provisioning of 2BASE-TL PMEs. An ability to define new configuration profiles is also provided to allow for EFMCu deployment tailored to specific copper environment and spectral regulations.

A specific configuration or administrative profile is assigned to a specific PME via efmCuPmeAdminProfile object. If efmCuPmeAdminProfile is zero, then efmCuAdminProfile object of the PCS port, connected to the PME, determines the configuration profile (or a list of possible profiles) for that PME. This mechanism allows to specify a common profile(s) for all PMEs connected to the PCS port, with an ability to change individual PME profiles by setting

efmCuPmeAdminProfile object, which overwrites profile set by efmCuAdminProfile.

A current operating PME profile is pointed to by efmCuPmeOperProfile object. Note that this profile entry, can be created automatically, to reflect achieved parameters in adaptive (not fixed) initialization.

#### 4.3. Mapping of IEEE 802.3ah Managed Objects

This section contains the mapping between relevant managed objects (attributes) defined in [802.3ah] Clause 30, and managed objects defined in this document and in associated MIB modules, i.e., the IF-MIB [RFC2863].

Note that majority of the objects defined in this MIB module do not have direct counterparts in Clause 30 and instead refer to Clause 45 registers.

IEEE 802.3 Managed Object	Corresponding SNMP Object
oMAU - Basic Package (Mandatory)	
aMAUType	ifMauType (MAU-MIB)
aMAUTypeList	ifMauTypeListBits (MAU-MIB)
aMediaAvailable	ifMediaAvailable (MAU-MIB)
oPAF - Basic Package (Mandatory)	
aPAFID	ifIndex (IF-MIB)
aPhyEnd	efmCuPhySide
aPHYCurrentStatus	efmCuStatus
aPAFSupported	efmCuPAFSupported
oPAF - PME Aggregation Package (Optional)	
aPAFAdminState	efmCuPAFAdminState
aLocalPAFCapacity	efmCuPAFCapacity

aLocalPMEAvailable	ifAvailableStackTable
aLocalPMEAggregate	ifStackTable (IF-MIB)
aRemotePAFSupported	efmCuRemotePAFSupported
aRemotePAFCapacity	efmCuRemotePAFCapacity
aRemotePMEAggregate	
oPME - 10P/2B Package (Mandatory)	
aPMEID	ifIndex (IF-MIB)
aPMEAdminState	ifAdminState (IF-MIB)
aPMEStatus	efmCuPmeStatus
aPMESNRMgn	efmCuPmeSnrMgn
aTCCodingViolations	efmCuPmeTCCodingErrors
aTCCRCErrors	efmCuPmeTCCrcErrors
aProfileSelect	efmCuAdminProfile, efmCuPmeAdminProfile
aOperatingProfile	efmCuPmeOperProfile
aPMEFECCorrectedBlocks	efmCuPme10PFECCorrectedBlocks
aPMEFECUncorrectableBlocks	efmCuPme10PFECUncorrectedBlocks

Table 2

## 5. Definitions

EFM-CU-MIB DEFINITIONS ::= BEGIN

IMPORTS

MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE, Integer32,

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Unsigned32, Counter32, mib-2

FROM SNMPv2-SMI -- [RFC 2578](#)

TEXTUAL-CONVENTION, TruthValue, RowStatus, PhysAddress

FROM SNMPv2-TC -- [RFC 2579](#)

MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP

FROM SNMPv2-CONF -- [RFC 2580](#)

SnmpAdminString

FROM SNMP-FRAMEWORK-MIB -- [RFC 3411](#)

ifIndex, ifSpeed, InterfaceIndex

FROM IF-MIB -- [RFC 2863](#)

;

efmCuMIB MODULE-IDENTITY

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DESCRIPTION

"The objects in this MIB module are used to manage the Ethernet in the First Mile (EFM) Copper (EFMCu) Interfaces 2BASE-TL and 10PASS-TS, defined in IEEE Std. 802.3ah-2004, which is now a part of IEEE Std. 802.3-2005.

The following references are used throughout this MIB module:

[802.3ah] refers to:

IEEE Std 802.3ah-2004: 'IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks -



Specific requirements -  
Part 3: Carrier Sense Multiple Access with Collision  
Detection (CSMA/CD) Access Method and Physical Layer  
Specifications -  
Amendment: Media Access Control Parameters, Physical  
Layers and Management Parameters for Subscriber Access  
Networks', 07 September 2004.

Of particular interest are Clause 61, 'Physical Coding  
Sublayer (PCS) and common specifications, type 10PASS-TS and  
type 2BASE-TL', Clause 30, 'Management', Clause 45,  
'Management Data Input/Output (MDIO) Interface', Annex 62A,  
'PMD profiles for 10PASS-TS' and Annex 63A, 'PMD profiles for  
2BASE-TL'.

[G.991.2] refers to:

ITU-T Recommendation G.991.2: 'Single-pair High-speed Digital  
Subscriber Line (SHDSL) transceivers', December 2003.

[ANFP] refers to:

NICC Document ND1602:2005/08: 'Specification of the Access  
Network Frequency Plan (ANFP) applicable to transmission  
systems used on the BT Access Network,' August 2005.

Naming Conventions:

Atn - Attenuation  
CO - Central Office  
CPE - Customer Premises Equipment  
EFM - Ethernet in the First Mile  
EFMCu - EFM Copper  
MDIO - Management Data Input/Output  
Mgn - Margin  
PAF - PME Aggregation Function  
PBO - Power Back-Off  
PCS - Physical Coding Sublayer  
PMD - Physical Medium Dependent  
PME - Physical Medium Entity  
PSD - Power Spectral Density  
SNR - Signal to Noise Ratio  
TCPAM - Trellis Coded Pulse Amplitude Modulation

Copyright (C) The Internet Society (2006). This version  
of this MIB module is part of RFC XXXX; see the RFC  
itself for full legal notices."

```
REVISION      "200606170000Z"  -- June 17, 2006
DESCRIPTION   "Initial version, published as RFC XXXX."

    -- EdNote: Replace XXXX with the actual RFC number &
    -- remove this note

 ::= { mib-2 YYY }

    -- EdNote: Replace YYY with a real OID once it is
    -- allocated & remove this note.

-- Sections of the module

efmCuObjects      OBJECT IDENTIFIER ::= { efmCuMIB 1 }
efmCuConformance OBJECT IDENTIFIER ::= { efmCuMIB 2 }

-- Groups in the module

efmCuPort         OBJECT IDENTIFIER ::= { efmCuObjects 1 }
efmCuPme          OBJECT IDENTIFIER ::= { efmCuObjects 2 }

-- Textual Conventions

ProfileIndex ::= TEXTUAL-CONVENTION
    DISPLAY-HINT "d"
    STATUS      current
    DESCRIPTION
        "A unique value, greater than zero, for each PME configuration
        profile in the managed EFMCu port. It is RECOMMENDED that
        values are assigned contiguously starting from 1. The value
        for each profile MUST remain constant at least from one
        re-initialization of the entity's network management system
        to the next re-initialization."
    SYNTAX      Unsigned32 (1..255)

ProfileIndexOrZero ::= TEXTUAL-CONVENTION
    DISPLAY-HINT "d"
    STATUS      current
    DESCRIPTION
        "This textual convention is an extension of the ProfileIndex
        convention. The latter defines a greater than zero value used
        to identify a PME profile in the managed EFMCu port. This
        extension permits the additional value of zero. The value of
        zero is object-specific and MUST therefore be defined as part
        of the description of any object which uses this syntax."
```

Examples of the usage of zero value might include situations

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where current operational profile is unknown."  
SYNTAX Unsigned32 (0..255)

ProfileIndexList ::= TEXTUAL-CONVENTION  
DISPLAY-HINT "1d:"  
STATUS current  
DESCRIPTION  
"Represents a list of up to 6 ProfileIndex's.  
The ProfileIndex textual convention defines a greater than  
zero value used to identify a PME profile in the managed EFMCu  
port. The value of this object is a concatenation of one or  
more (up to 6) octets, where each octet contains an 8-bit  
ProfileIndex value.  
The ProfileIndexList specifies a list of alternative  
profiles, any of which can be chosen for configuration of an  
PME."  
SYNTAX OCTET STRING (SIZE(1..6))

TruthValueOrUnknown ::= TEXTUAL-CONVENTION  
STATUS current  
DESCRIPTION  
"This textual convention is an extension of the TruthValue  
convention. The latter defines a boolean value with  
possible values of true(1) and false(2). This  
extension permits the additional value of unknown(0), which  
can be returned as a result of GET operation, when an exact  
true or false value of the object cannot be determined."  
SYNTAX INTEGER { unknown(0), true(1), false(2) }

-- Port Notifications Group

efmCuPortNotifications OBJECT IDENTIFIER ::= { efmCuPort 0 }

efmCuLowRateCrossing NOTIFICATION-TYPE  
OBJECTS {  
-- ifIndex is not needed here since we are under specific PCS  
ifSpeed,  
efmCuThreshLowRate  
}  
STATUS current

## DESCRIPTION

"This notification indicates that the EFMCu port' data rate has reached/dropped below or exceeded the low rate threshold, specified by efmCuThreshLowRate.

This notification MAY be send for the -0 subtype ports (2BaseTL-0/10PassTS-0) while the port is up, on the crossing event in both directions: from normal (rate is above the

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threshold) to low (rate equals the threshold or below it) and from low to normal. This notification is not applicable to the -R subtypes.

It is RECOMMENDED that a small debouncing period of 2.5 sec, between the detection of the condition and notification, is implemented to prevent simultaneous LinkUp/LinkDown and efmCuLowRateCrossing notifications to be sent.

The adaptive nature of the EFMCu technology allows the port to adapt itself to the changes in the copper environment, e.g. an impulse noise, alien crosstalk or a micro-interruption may temporarily drop one or more PMEs in the aggregation group, causing a rate degradation of the aggregated EFMCu link. The dropped PMEs would then try to re-initialize, possibly at a lower rate than before, adjusting the rate to provide required target SNR margin.

Generation of this notification is controlled by the efmCuLowRateCrossingEnable object."

```
::= { efmCuPortNotifications 1 }
```

-- PCS Port group

efmCuPortConfTable OBJECT-TYPE

SYNTAX SEQUENCE OF EfmCuPortConfEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Table for Configuration of EFMCu 2BASE-TL/10PASS-TS (PCS) Ports. Entries in this table MUST be maintained in a persistent manner"

```
::= { efmCuPort 1 }
```

```

efmCuPortConfEntry OBJECT-TYPE
    SYNTAX      EfmCuPortConfEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry in the EFMcu Port Configuration table.
        Each entry represents an EFMcu port indexed by the ifIndex.
        Note that an EFMcu PCS port runs on top of a single
        or multiple PME port(s), which are also indexed by ifIndex."
    INDEX { ifIndex }
    ::= { efmCuPortConfTable 1 }

```

```

EfmCuPortConfEntry ::=
    SEQUENCE {

```

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```

    efmCuPAFAdminState      INTEGER,
    efmCuPAFDiscoveryCode   PhysAddress,
    efmCuAdminProfile       ProfileIndexList,
    efmCuTargetDataRate     Unsigned32,
    efmCuTargetSnrMgn       Unsigned32,
    efmCuAdaptiveSpectra    TruthValue,
    efmCuThreshLowRate      Unsigned32,
    efmCuLowRateCrossingEnable TruthValue
}

```

```

efmCuPAFAdminState OBJECT-TYPE
    SYNTAX      INTEGER {
        enabled(1),
        disabled(2)
    }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "Administrative (desired) state of the PAF of the EFMcu port
        (PCS).
        When 'disabled', PME Aggregation will not be performed by the
        PCS. No more than a single PME can be assigned to this PCS in
        this case.
        When 'enabled', PAF will be performed by the PCS when the link
        is Up, even on a single attached PME, if PAF is supported.

```

PCS ports incapable of supporting PAF SHALL return a value of 'disabled'. Attempts to 'enable' such ports SHALL be ignored.

PAF 'enabled' port with multiple PMEs assigned cannot be 'disabled'. Attempts to 'disable' such port SHALL be rejected, until at most one PME is left assigned.

Changing PAFAdminState is a traffic disruptive operation and as such SHALL be done when the link is Down. Attempts to change this object SHALL be ignored if the link is Up or Initializing.

This object maps to the Clause 30 attribute aPAFAdminState.

If a Clause 45 MDIO Interface to the PCS is present, then this object maps to the PAF enable bit in the 10P/2B PCS control register.

This object MUST be maintained in a persistent manner."

REFERENCE

"[[802.3ah](#)] 61.2.2, 45.2.3.18.3"

::= { efmCuPortConfEntry 1 }

efmCuPAFDiscoveryCode OBJECT-TYPE

SYNTAX PhysAddress

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"PAF Discovery Code of the EFCu port (PCS).

A unique 6 Byte long code used by the Discovery function, when PAF is supported.

PCS ports incapable of supporting PAF SHALL return a value of all zeroes. Attempts to change this object SHALL be ignored in this case.

This object MUST be instantiated for the -0 subtype PCS before writing operations on the efmCuPAFRemoteDiscoveryCode (Set\_if\_Clear and Clear\_if\_Same) are performed by PMEs associated with the PCS.

The value of this object is read-only for -R port subtypes. The initial value of this object for -R ports after reset is 0. This value may be changed as a result of writing operation on efmCuPAFRemoteDiscoveryCode variable of remote

PME of -0 subtype, connected to one of the local PMEs associated with the PCS.

Discovery MUST be performed when the link is Down. Attempts to change this object MUST be rejected with the error inconsistentValue if the link is Up or Initializing.

The PAF Discovery code maps to the local Discovery code variable in PAF (note that it does not have a corresponding Clause 45 register)"

REFERENCE

"[[802.3ah](#)] 61.2.2.8.3, 61.2.2.8.4, 45.2.6.6.1"  
 ::= { efmCuPortConfEntry 2 }

efmCuAdminProfile OBJECT-TYPE

SYNTAX ProfileIndexList

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Desired configuration Profile(s), common for all PMEs in the EFMcu port. This object is a list of pointers to entries in either efmCuPme2BProfileTable or efmCuPme10PProfileTable, depending on the current operating SubType of the EFMcu port as indicated by efmCuPortSide.

The value of this object is a list of up to 6 indices of Profiles. If this list consists of a single Profile index, then all PMEs assigned to this EFMcu port SHALL be configured according to the Profile referenced by that index, unless it

is overwritten by corresponding non-zero efmCuPmeAdminProfile, which takes precedence over efmCuAdminProfile.

The list, consisting of more than one index, allows each PME in the port to be configured according to any Profile specified in the list.

By default this object has a value of 0x01, referencing 1st entry in efmCuPme2BProfileTable or efmCuPme10PProfileTable.

This object is writable and readable for the -0 subtype (2BaseTL-0 or 10PassTS-0) EFMcu ports. It is unavailable for the -R subtype (2BaseTL-R or 10PassTS-R) ports.

Note that current operational Profile value is available via efmCuPmeOperProfile object.

Modification of this object MUST be performed when the link is Down. Attempts to change this object MUST be rejected, if the link is Up or Initializing.

Attempts to set this object to a list with a member value, that is not the value of the index for an active entry in the corresponding profile table, MUST be rejected.

This object MUST be maintained in a persistent manner."

REFERENCE

"[[802.3ah](#)] 30.11.2.1.6"

DEFVAL { '01'H }

::= { efmCuPortConfEntry 3 }

efmCuTargetDataRate OBJECT-TYPE

SYNTAX Unsigned32(1..100000|999999)

UNITS "Kbps"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Desired EFMcu port 'net' (as seen across MII) Data Rate in Kbps, to be achieved during initialization, under spectral restrictions placed on each PME via efmCuAdminProfile or efmCuPmeAdminProfile, with the desired SNR Margin specified by efmCuTargetSnrMgn.

In case of PAF, this object represents a sum of individual PME data rates, modified to compensate for fragmentation and 64/65B framing overhead (e.g. target data rate of 10Mbps SHALL allow lossless transmission of full-duplex 10Mbps Ethernet frame stream with minimal inter-frame gap).

The value is limited above by 100Mbps as this is the max burst rate across MII for EFMcu ports.

The value between 1 and 100000 indicates that the total data rate (ifSpeed) of the EFMcu port after initialization SHALL be equal to the target data rate or less, if the target data rate cannot be achieved under spectral restrictions specified by efmCuAdminProfile/efmCuPmeAdminProfile and with desired SNR



margin. In case the copper environment allows to achieve higher total data rate than that specified by the target, the excess capability SHALL be either converted to additional SNR margin or reclaimed by minimizing transmit power as controlled by efmCuAdaptiveSpectra.

The value of 999999 means that the target data rate is not fixed and SHALL be set to the maximum attainable rate during initialization (Best Effort), under specified spectral restrictions and with desired SNR Margin.

This object is read-write for the -0 subtype EFMcu ports (2BaseTL-0/10PassTS-0) and not available for the -R subtypes.

Changing of the Target Data Rate MUST be performed when the link is Down. Attempts to change this object MUST be rejected with the error inconsistentValue, if the link is Up or Initializing.

Note that current Data Rate of the EFMcu port is represented by ifSpeed object of IF-MIB.

This object MUST be maintained in a persistent manner."  
 ::= { efmCuPortConfEntry 4 }

efmCuTargetSnrMgn OBJECT-TYPE  
SYNTAX Unsigned32(0..21)  
UNITS "dB"  
MAX-ACCESS read-write  
STATUS current  
DESCRIPTION

"Desired EFMcu port SNR Margin to be achieved on all PMEs assigned to the port, during initialization. (The SNR margin is the difference between the desired SNR and the actual SNR).

Note that 802.3ah recommends using default Target SNR Margin of 5dB for 2BASE-TL ports and 6dB for 10PASS-TS ports in order to achieve mean Bit Error Rate (BER) of  $10^{-7}$  at the PMA service interface.

This object is read-write for the -0 subtype EFMcu ports (2BaseTL-0/10PassTS-0) and not available for the -R subtypes.

Changing of the Target SNR Margin MUST be performed when the link is Down. Attempts to change this object MUST be rejected with the error inconsistentValue, if the link is Up or Initializing.

Note that current SNR Margin of the PMEs comprising the EFMcu port is represented by efmCuPmeSnrMgn.

This object MUST be maintained in a persistent manner."

REFERENCE

"[[802.3ah](#)] 61.1.2"

::= { efmCuPortConfEntry 5 }

efmCuAdaptiveSpectra OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Indicates how to utilize excess capacity when the copper environment allows to achieve higher total data rate than that specified by the efmCuTargetDataRate.

Value of true(1) indicates that the excess capability SHALL be reclaimed by minimizing transmit power, e.g. using higher constellations and Power Back-Off, in order to reduce interference to other copper pairs in the binder and the adverse impact to link/system performance.

Value of false(2) indicates that the excess capability SHALL be converted to additional SNR margin and spread evenly across all active PMEs assigned to the (PCS) port, to increase link robustness.

This object is read-write for the -0 subtype EFMcu ports (2BaseTL-0/10PassTS-0) and not available for the -R subtypes.

Changing of this object MUST be performed when the link is Down. Attempts to change this object MUST be rejected with the error inconsistentValue, if the link is Up or Initializing.

This object MUST be maintained in a persistent manner."

::= { efmCuPortConfEntry 6 }

efmCuThreshLowRate OBJECT-TYPE

SYNTAX Unsigned32(1..100000)

UNITS "Kbps"

MAX-ACCESS read-write

STATUS current

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## DESCRIPTION

"This object configures the EFMCu port low rate crossing alarm threshold. When the current value of ifSpeed for this port reaches/drops below or exceeds this threshold, an efmCuLowRateCrossing notification MAY be generated if enabled by efmCuLowRateCrossingEnable.

This object is read-write for the -O subtype EFMCu ports (2BaseTL-0/10PassTS-0) and not available for the -R subtypes.

This object MUST be maintained in a persistent manner."

::= { efmCuPortConfEntry 7 }

## efmCuLowRateCrossingEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

## DESCRIPTION

"Indicates whether efmCuLowRateCrossing notifications should be generated for this interface.

Value of true(1) indicates that efmCuLowRateCrossing notification is enabled. Value of false(2) indicates that the notification is disabled.

This object is read-write for the -O subtype EFMCu ports (2BaseTL-0/10PassTS-0) and not available for the -R subtypes.

This object MUST be maintained in a persistent manner."

::= { efmCuPortConfEntry 8 }

## efmCuPortCapabilityTable OBJECT-TYPE

SYNTAX SEQUENCE OF EfmCuPortCapabilityEntry

MAX-ACCESS not-accessible

STATUS current

## DESCRIPTION

"Table for Capabilities of EFMCu 2BASE-TL/10PASS-TS (PCS) Ports. Entries in this table MUST be maintained in a persistent manner"

::= { efmCuPort 2 }

efmCuPortCapabilityEntry OBJECT-TYPE  
SYNTAX EfmCuPortCapabilityEntry  
MAX-ACCESS not-accessible  
STATUS current  
DESCRIPTION  
"An entry in the EFMcu Port Capability table."

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Each entry represents an EFMcu port indexed by the ifIndex.  
Note that an EFMcu PCS port runs on top of a single  
or multiple PME port(s), which are also indexed by ifIndex."  
INDEX { ifIndex }  
 ::= { efmCuPortCapabilityTable 1 }

EfmCuPortCapabilityEntry ::=  
SEQUENCE {  
 efmCuPAFSupported TruthValue,  
 efmCuPeerPAFSupported TruthValueOrUnknown,  
 efmCuPAFCapacity Unsigned32,  
 efmCuPeerPAFCapacity Unsigned32  
}

efmCuPAFSupported OBJECT-TYPE  
SYNTAX TruthValue  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"PME Aggregation Function (PAF) Capability of the EFMcu port  
(PCS).  
This object has a value of true(1) when the PCS can perform  
PME aggregation on the available PMEs.  
Ports incapable of PAF SHALL return a value of false(2).  
  
This object maps to the Clause 30 attribute aPAFSupported.  
  
If a Clause 45 MDIO Interface to the PCS is present,  
then this object maps to the PAF available bit in the  
10P/2B capability register."  
REFERENCE  
"[[802.3ah](#)] 61.2.2, 30.11.1.1.4, 45.2.3.17.1"  
 ::= { efmCuPortCapabilityEntry 1 }

efmCuPeerPAFSupported OBJECT-TYPE

SYNTAX TruthValueOrUnknown  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION

"PME Aggregation Function (PAF) Capability of the EFMcu port (PCS) link partner.

This object has a value of true(1) when the remote PCS can perform PME aggregation on its available PMEs.

Ports whose peers are incapable of PAF, SHALL return a value of false(2).

Ports whose peers cannot be reached because of the link state, SHALL return a value if unknown(0).

This object maps to the Clause 30 attribute aRemotePAFSupported.

If a Clause 45 MDIO Interface to the PCS is present, then this object maps to the Remote PAF supported bit in the 10P/2B capability register."

REFERENCE

"[[802.3ah](#)] 61.2.2, 30.11.1.1.9, 45.2.3.17.2"  
::= { efmCuPortCapabilityEntry 2 }

efmCuPAFCapacity OBJECT-TYPE

SYNTAX Unsigned32 (1..32)  
MAX-ACCESS read-only  
STATUS current

DESCRIPTION

"Number of PMEs that can be aggregated by the local PAF. The number of PMEs currently assigned to a particular EFMcu port (efmCuNumPMEs) is never greater than efmCuPAFCapacity.

This object maps to the Clause 30 attribute aLocalPAFCapacity."

REFERENCE

"[[802.3ah](#)] 61.2.2, 30.11.1.1.6"  
::= { efmCuPortCapabilityEntry 3 }

efmCuPeerPAFCapacity OBJECT-TYPE

SYNTAX Unsigned32 (0|1..32)

MAX-ACCESS read-only  
STATUS current  
DESCRIPTION  
"Number of PMEs that can be aggregated by the PAF of the peer  
Phy (PCS port).  
Value of 0 is returned when peer PAF Capacity is unknown  
(peer cannot be reached).  
  
This object maps to the Clause 30 attribute  
aRemotePAFCapacity."  
REFERENCE  
"[[802.3ah](#)] 61.2.2, 30.11.1.1.10"  
::= { efmCuPortCapabilityEntry 4 }

efmCuPortStatusTable OBJECT-TYPE  
SYNTAX SEQUENCE OF EfmCuPortStatusEntry  
MAX-ACCESS not-accessible  
STATUS current  
DESCRIPTION

"This table provides overall status information of EFCu  
2BASE-TL/10PASS-TS ports, complementing the generic status  
information from the ifTable of IF-MIB and ifMauTable of  
MAU-MIB. Additional status information about connected PMEs  
is available from efmCuPmeStatusTable.

This table contains live data from the equipment. As such,  
it is NOT persistent."  
::= { efmCuPort 3 }

efmCuPortStatusEntry OBJECT-TYPE  
SYNTAX EfmCuPortStatusEntry  
MAX-ACCESS not-accessible  
STATUS current  
DESCRIPTION  
"An entry in the EFCu Port Status table.  
Each entry represents an EFCu port indexed by the ifIndex.  
Note that an EFCu PCS port runs on top of a single  
or multiple PME port(s), which are also indexed by ifIndex."  
INDEX { ifIndex }  
::= { efmCuPortStatusTable 1 }

```

EfmCuPortStatusEntry ::=
SEQUENCE {
    efmCuFltStatus          BITS,
    efmCuPortSide          INTEGER,
    efmCuNumPMEs           Unsigned32,
    efmCuPAFInErrors       Counter32,
    efmCuPAFInSmallFragments Counter32,
    efmCuPAFInLargeFragments Counter32,
    efmCuPAFInBadFragments Counter32,
    efmCuPAFInLostFragments Counter32,
    efmCuPAFInLostStarts  Counter32,
    efmCuPAFInLostEnds    Counter32,
    efmCuPAFInOverflows   Counter32
}

```

efmCuFltStatus OBJECT-TYPE

```

SYNTAX      BITS {
    noPeer(0),
    peerPowerLoss(1),
    pmeSubTypeMismatch(2),
    lowRate(3)
}

```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"EFMCu (PCS) port Fault Status. This is a bitmap of possible

conditions. The various bit positions are:

- noPeer - peer PHY cannot be reached (e.g. no PMEs attached, all PMEs are Down etc.) More info is available in efmCuPmeFltStatus.
- peerPowerLoss - peer PHY has indicated impending unit failure due to loss of local power ('Dying Gasp').
- pmeSubTypeMismatch - local PMEs in the aggregation group are not of the same sub-type, e.g. some PMEs in the local device are -0 while others are -R subtype.
- lowRate - ifSpeed of the port reached or dropped below efmCuThreshLowRate

This object is intended to supplement ifOperStatus object in IF-MIB and ifMauMediaAvailable in MAU-MIB.

Additional information is available via efmCuPmeFltStatus object for each PME in the aggregation group (single PME if PAF is disabled)."

REFERENCE

"IF-MIB, ifOperStatus; MAU-MIB, ifMauMediaAvailable;  
efmCuPmeFltStatus"  
 ::= { efmCuPortStatusEntry 1 }

efmCuPortSide OBJECT-TYPE

SYNTAX INTEGER {  
 subscriber(1),  
 office(2),  
 unknown(3)  
 }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"EFM port mode of operation (subtype).

The value of 'subscriber' indicates the port is designated as '-R' subtype (all PMEs assigned to this port are of subtype '-R').

The value of the 'office' indicates that the port is designated as '-0' subtype (all PMEs assigned to this port are of subtype '-0').

The value of 'unknown' indicates that the port has no assigned PMEs yet or that the assigned PMEs are not of the same side (subTypePMEMismatch).

This object partially maps to the Clause 30 attribute aPhyEnd"

REFERENCE

"[[802.3ah](#)] 61.1, 30.11.1.1.2"  
 ::= { efmCuPortStatusEntry 2 }

efmCuNumPMEs OBJECT-TYPE

SYNTAX Unsigned32 (0..32)

MAX-ACCESS read-only



STATUS current

DESCRIPTION

"Number of PME's that is currently aggregated by the local PAF (assigned to the EFMcu port using ifStackTable). This number is never greater than efmCuPAFCapacity.

This object SHALL be automatically incremented or decremented when a PME is added or deleted to/from the EFMcu port using ifStackTable."

REFERENCE

"[[802.3ah](#)] 61.2.2, 30.11.1.1.6"  
 ::= { efmCuPortStatusEntry 3 }

efmCuPAFInErrors OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A number of fragments that have been received across the gamma interface with RxErr asserted and discarded. This read-only counter is inactive (not incremented) when the PAF is unsupported or disabled. Upon disabling the PAF, the counter retains its previous value.

If a Clause 45 MDIO Interface to the PCS is present, then this object maps to the 10P/2B PAF RX error register."

REFERENCE

"[[802.3ah](#)] 45.2.3.21"  
 ::= { efmCuPortStatusEntry 4 }

efmCuPAFInSmallFragments OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A number of fragments smaller than minFragmentSize (64 Bytes), which have been received across the gamma interface and discarded. This read-only counter is inactive when the PAF is unsupported or disabled. Upon disabling the PAF, the counter retains its previous value.

If a Clause 45 MDIO Interface to the PCS is present, then this object maps to the 10P/2B PAF small fragments register."

REFERENCE

"[[802.3ah](#)] 45.2.3.22"

::= { efmCuPortStatusEntry 5 }

efmCuPAFInLargeFragments OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A number of fragments larger than maxFragmentSize (512 Bytes), which have been received across the gamma interface and discarded.

This read-only counter is inactive when the PAF is unsupported or disabled. Upon disabling the PAF, the counter retains its previous value.

If a Clause 45 MDIO Interface to the PCS is present, then this object maps to the 10P/2B PAF large fragments register."

REFERENCE

"[[802.3ah](#)] 45.2.3.23"

::= { efmCuPortStatusEntry 6 }

efmCuPAFInBadFragments OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A number of fragments which do not fit into the sequence expected by the frame assembly function, that have been received across the gamma interface and discarded (the frame buffer is flushed to the next valid frame start).

This read-only counter is inactive when the PAF is unsupported or disabled. Upon disabling the PAF, the counter retains its previous value.

If a Clause 45 MDIO Interface to the PCS is present, then this object maps to the 10P/2B PAF bad fragments register."

REFERENCE

"[[802.3ah](#)] 45.2.3.25"

::= { efmCuPortStatusEntry 7 }

efmCuPAFInLostFragments OBJECT-TYPE

SYNTAX Counter32

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MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A number of gaps in the sequence of fragments, which have been received across the gamma interface (the frame buffer is flushed to the next valid frame start, when fragment/fragments expected by the frame assembly function is/are not received). This read-only counter is inactive when the PAF is unsupported or disabled. Upon disabling the PAF, the counter retains its previous value.

If a Clause 45 MDIO Interface to the PCS is present, then this object maps to the 10P/2B PAF lost fragment register."

## REFERENCE

"[[802.3ah](#)] 45.2.3.26"

::= { efmCuPortStatusEntry 8 }

## efmCuPAFInLostStarts OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A number of missing StartOfPacket indicators expected by the frame assembly function.

This read-only counter is inactive when the PAF is unsupported or disabled. Upon disabling the PAF, the counter retains its previous value.

If a Clause 45 MDIO Interface to the PCS is present, then this object maps to the 10P/2B PAF lost start of fragment register."

## REFERENCE

"[[802.3ah](#)] 45.2.3.27"

::= { efmCuPortStatusEntry 9 }

## efmCuPAFInLostEnds OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"A number of missing EndOfPacket indicators expected by the frame assembly function.

This read-only counter is inactive when the PAF is unsupported or disabled. Upon disabling the PAF, the counter retains its previous value.

If a Clause 45 MDIO Interface to the PCS is present, then

this object maps to the 10P/2B PAF lost start of fragment register."

REFERENCE

"[[802.3ah](#)] 45.2.3.28"

::= { efmCuPortStatusEntry 10 }

efmCuPAFInOverflows OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A number of fragments, received across the gamma interface and discarded, which would have caused the frame assembly buffer to overflow.

This read-only counter is inactive when the PAF is unsupported or disabled. Upon disabling the PAF, the counter retains its previous value.

If a Clause 45 MDIO Interface to the PCS is present, then this object maps to the 10P/2B PAF overflow register."

REFERENCE

"[[802.3ah](#)] 45.2.3.24"

::= { efmCuPortStatusEntry 11 }

-- PME Notifications Group

efmCuPmeNotifications OBJECT IDENTIFIER ::= { efmCuPme 0 }

efmCuPmeLineAtnCrossing NOTIFICATION-TYPE

OBJECTS {

efmCuPmeLineAtn,

efmCuPmeThreshLineAtn

}

STATUS current

DESCRIPTION

"This notification indicates that the loop attenuation

threshold (as per the efmCuPmeThreshLineAtn value) has been reached/exceeded for the 2BASE-TL/10PASS-TS PME. This notification MAY be send on the crossing event in both directions: from normal to exceeded and from exceeded to normal.

It is RECOMMENDED that a small debouncing period of 2.5 sec, between the detection of the condition and notification, is implemented to prevent intermittent notifications to be sent.

Generation of this notification is controlled by the

```
efmCuPmeLineAtnCrossingEnable object."  
 ::= { efmCuPmeNotifications 1 }
```

efmCuPmeSnrMgnCrossing NOTIFICATION-TYPE

```
OBJECTS {  
    efmCuPmeSnrMgn,  
    efmCuPmeThreshSnrMgn  
}
```

```
STATUS      current
```

```
DESCRIPTION
```

```
"This notification indicates that the SNR margin threshold  
(as per the efmCuPmeThreshSnrMgn value) has been  
reached/exceeded for the 2BASE-TL/10PASS-TS PME.  
This notification MAY be send on the crossing event in  
both directions: from normal to exceeded and from exceeded  
to normal.
```

It is RECOMMENDED that a small debouncing period of 2.5 sec, between the detection of the condition and notification, is implemented to prevent intermittent notifications to be sent.

Generation of this notification is controlled by the efmCuPmeSnrMgnCrossingEnable object."

```
::= { efmCuPmeNotifications 2 }
```

efmCuPmeDeviceFault NOTIFICATION-TYPE

```
OBJECTS {  
    efmCuPmeFltStatus
```

```
}
STATUS      current
DESCRIPTION
    "This notification indicates that a fault in the PME has been
    detected by a vendor specific diagnostic or a self-test.

    Generation of this notification is controlled by the
    efmCuPmeDeviceFaultEnable object."
 ::= { efmCuPmeNotifications 3 }
```

efmCuPmeConfigInitFailure NOTIFICATION-TYPE

```
OBJECTS {
    efmCuPmeFltStatus,
    efmCuAdminProfile,
    efmCuPmeAdminProfile
}
STATUS      current
DESCRIPTION
    "This notification indicates that PME initialization has
```

failed, due to inability of the PME link to achieve requested configuration profile.

```
Generation of this notification is controlled by the
efmCuPmeConfigInitFailEnable object."
 ::= { efmCuPmeNotifications 4 }
```

efmCuPmeProtocolInitFailure NOTIFICATION-TYPE

```
OBJECTS {
    efmCuPmeFltStatus,
    efmCuPmeOperSubType
}
STATUS      current
DESCRIPTION
    "This notification indicates that peer PME was using
    incompatible protocol during initialization.

    Generation of this notification is controlled by the
    efmCuPmeProtocolInitFailEnable object."
 ::= { efmCuPmeNotifications 5 }
```

-- The PME group

efmCuPmeConfTable OBJECT-TYPE

SYNTAX SEQUENCE OF EfmCuPmeConfEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Table for Configuration of common aspects for EFMcu 2BASE-TL/10PASS-TS PME ports (modems). Configuration of aspects specific to 2BASE-TL or 10PASS-TS PME types is represented in efmCuPme2BConfTable and efmCuPme10PConfTable respectively.

Entries in this table MUST be maintained in a persistent manner."

::= { efmCuPme 1 }

efmCuPmeConfEntry OBJECT-TYPE

SYNTAX EfmCuPmeConfEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the EFMcu PME Configuration table. Each entry represents common aspects of an EFMcu PME port indexed by the ifIndex. Note that an EFMcu PME port can be stacked below a single PCS port, also indexed by ifIndex, possibly together with other PME ports if PAF is enabled."

INDEX { ifIndex }

::= { efmCuPmeConfTable 1 }

EfmCuPmeConfEntry ::=

SEQUENCE {

efmCuPmeAdminSubType	INTEGER,
efmCuPmeAdminProfile	ProfileIndexOrZero,
efmCuPAFRemoteDiscoveryCode	PhysAddress,
efmCuPmeThreshLineAtn	Integer32,
efmCuPmeThreshSnrMgn	Integer32,
efmCuPmeLineAtnCrossingEnable	TruthValue,
efmCuPmeSnrMgnCrossingEnable	TruthValue,
efmCuPmeDeviceFaultEnable	TruthValue,
efmCuPmeConfigInitFailEnable	TruthValue,
efmCuPmeProtocolInitFailEnable	TruthValue

```

}

efmCuPmeAdminSubType OBJECT-TYPE
SYNTAX      INTEGER {
    ieee2BaseTLO(1),
    ieee2BaseTLR(2),
    ieee10PassTSO(3),
    ieee10PassTSR(4),
    ieee2BaseTLor10PassTSR(5),
    ieee2BaseTLor10PassTSO(6),
    ieee10PassTSor2BaseTLO(7)
}
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "Administrative (desired) sub-type of the PME.
    Possible values are:
        ieee2BaseTLO           - PME SHALL operate as 2BaseTL-O
        ieee2BaseTLR           - PME SHALL operate as 2BaseTL-R
        ieee10PassTSO          - PME SHALL operate as 10PassTS-O
        ieee10PassTSR          - PME SHALL operate as 10PassTS-R
        ieee2BaseTLor10PassTSR - PME SHALL operate as 2BaseTL-R or
                                10PassTS-R. Actual value will be
                                set by -O link partner during
                                initialization (handshake).
        ieee2BaseTLor10PassTSO - PME SHALL operate as 2BaseTL-O
                                (preferred) or 10PassTS-O. Actual
                                value will be set during
                                initialization depending on -R
                                link partner capability (i.e. if
                                -R is incapable of the preferred
                                2BaseTL mode, 10PassTS will be
                                used).

```

```

        ieee10PassTSor2BaseTLO - PME SHALL operate as 10PassTS-O
                                (preferred) or 2BaseTL-O. Actual
                                value will be set during
                                initialization depending on -R
                                link partner capability (i.e. if
                                -R is incapable of the preferred
                                10PassTS mode, 2BaseTL will be
                                used).

```



Changing efmCuPmeAdminSubType is a traffic disruptive operation and as such SHALL be done when the link is Down. Attempts to change this object SHALL be ignored if the link is Up or Initializing. Attempts to change this object to an unsupported subtype (see efmCuPmeSubTypesSupported) SHALL be rejected.

The current operational sub type is indicated by efmCuPmeOperSubType variable.

If a Clause 45 MDIO Interface to the PMA/PMD is present, then this object combines values of the Port sub-type select bits and the PMA/PMD type selection bits in the 10P/2B PMA/PMD control register"

REFERENCE

"[[802.3ah](#)] 61.1, 45.2.1.11.4, 45.2.1.11.7"  
 ::= { efmCuPmeConfEntry 1 }

efmCuPmeAdminProfile OBJECT-TYPE

SYNTAX ProfileIndexOrZero

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Desired PME configuration Profile. This object is a pointer to an entry in either efmCuPme2BProfileTable or efmCuPme10PProfileTable, depending on the current operating SubType of the PME. The value of this object is the index of the referenced profile.

The value of zero (default) indicates that the PME is configured via efmCuAdminProfile object for the PCS port, to which this PME is assigned. That is, the profile referenced by efmCuPmeAdminProfile takes precedence over the profile(s) referenced by efmCuAdminProfile.

This object is writable and readable for the C0 subtype PMEs (2BaseTL-0 or 10PasSTS-0). It is unavailable for the CPE subtype (2BaseTL-R or 10PasSTS-R).

Note that current operational Profile value is available via

Modification of this object MUST be performed when the link is Down. Attempts to change this object MUST be rejected, if the link is Up or Initializing.

Attempts to set this object to a value that is not the value of the index for an active entry in the corresponding profile table, MUST be rejected."

REFERENCE

"[802.3ah] 30.11.2.1.6"

DEFVAL { 0 }

::= { efmCuPmeConfEntry 2 }

efmCuPAFRemoteDiscoveryCode OBJECT-TYPE

SYNTAX PhysAddress

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"PAF Remote Discovery Code of the PME port at C0.

A 6 Byte long Discovery Code of the peer PCS connected via the PME.

Reading this object results in a Discovery Get operation.

Writing a zero to this object results in a Discovery Clear\_if\_Same operation (the value of efmCuPAFDiscoveryCode at the peer PCS SHALL be the same as efmCuPAFDiscoveryCode of the local PCS associated with the PME for the operation to succeed).

Writing a non-zero value to this object results in a Discovery Set\_if\_Clear operation.

This object does not exist in CPE port subtypes. A zero length octet string SHALL be returned for CPE port subtypes and also when PAF aggregation is not enabled.

Discovery MUST be performed when the link is Down.

Attempts to change this object MUST be rejected with the error inconsistentValue, if the link is Up or Initializing.

If a Clause 45 MDIO Interface to the PMA/PMD is present, then this object is a function of 10P/2B aggregation discovery control register, Discovery operation result bits in 10P/2B aggregation and discovery status register and 10P/2B aggregation discovery code register"

REFERENCE

"[802.3ah] 61.2.2.8.4, 45.2.6.6-45.2.6.8"

::= { efmCuPmeConfEntry 3 }

efmCuPmeThreshLineAtn OBJECT-TYPE

SYNTAX Integer32(-127..128)

UNITS "dB"  
MAX-ACCESS read-write  
STATUS current  
DESCRIPTION

"Desired Line Attenuation Threshold for the 2B/10P PME.  
This object configures the line attenuation alarm threshold.  
When the current value of Line Attenuation reaches or  
exceeds this threshold, a efmCuPmeLineAtnCrossing  
notification MAY be generated, if enabled by  
efmCuPmeLineAtnCrossingEnable.

This object is writable for the CO subtype PMEs (-O).  
It is read-only for the CPE subtype (-R).

Changing of the Line Attenuation Threshold MUST be performed  
when the link is Down. Attempts to change this object MUST be  
rejected with the error inconsistentValue, if the link is Up  
or Initializing.

If a Clause 45 MDIO Interface to the PME is present, then this  
object maps to the Loop attenuation threshold bits in  
the 2B PMD line quality thresholds register"

REFERENCE

"[[802.3ah](#)] 45.2.1.36"  
 ::= { efmCuPmeConfEntry 4 }

efmCuPmeThreshSnrMgn OBJECT-TYPE

SYNTAX Integer32(-127..128)  
UNITS "dB"  
MAX-ACCESS read-write  
STATUS current  
DESCRIPTION

"Desired SNR Margin Threshold for the 2B/10P PME.  
This object configures the SNR margin alarm threshold.  
When the current value of SNR Margin reaches or exceeds this  
threshold, a efmCuPmeSnrMgnCrossing notification MAY be  
generated, if enabled by efmCuPmeSnrMgnCrossingEnable.

This object is writable for the CO subtype PMEs  
(2BaseTL-0/10PassTS-R). It is read-only for the CPE subtype  
(2BaseTL-R/10PassTS-R).

Changing of the SNR Margin Threshold MUST be performed when  
the link is Down. Attempts to change this object MUST be  
rejected with the error inconsistentValue, if the link is Up  
or Initializing.

If a Clause 45 MDIO Interface to the PME is present, then this

object maps to the SNR margin threshold bits in the 2B PMD line quality thresholds register"

REFERENCE

"[[802.3ah](#)] 45.2.1.36"

::= { efmCuPmeConfEntry 5 }

efmCuPmeLineAtnCrossingEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Indicates whether efmCuPmeLineAtnCrossing notifications should be generated for this interface.

Value of true(1) indicates that efmCuPmeLineAtnCrossing notification is enabled. Value of false(2) indicates that the notification is disabled."

::= { efmCuPmeConfEntry 6 }

efmCuPmeSnrMgnCrossingEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Indicates whether efmCuPmeSnrMgnCrossing notifications should be generated for this interface.

Value of true(1) indicates that efmCuPmeSnrMgnCrossing notification is enabled. Value of false(2) indicates that the notification is disabled."

::= { efmCuPmeConfEntry 7 }

efmCuPmeDeviceFaultEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Indicates whether efmCuPmeDeviceFault notifications should be generated for this interface.

Value of true(1) indicates that efmCuPmeDeviceFault notification is enabled. Value of false(2) indicates that the notification is disabled."  
 ::= { efmCuPmeConfEntry 8 }

efmCuPmeConfigInitFailEnable OBJECT-TYPE  
SYNTAX TruthValue  
MAX-ACCESS read-write

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STATUS current

DESCRIPTION

"Indicates whether efmCuPmeConfigInitFailure notifications should be generated for this interface.

Value of true(1) indicates that efmCuPmeConfigInitFailure notification is enabled. Value of false(2) indicates that the notification is disabled."

::= { efmCuPmeConfEntry 9 }

efmCuPmeProtocolInitFailEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Indicates whether efmCuPmeProtocolInitFailure notifications should be generated for this interface.

Value of true(1) indicates that efmCuPmeProtocolInitFailure notification is enabled. Value of false(2) indicates that the notification is disabled."

::= { efmCuPmeConfEntry 10 }

efmCuPmeCapabilityTable OBJECT-TYPE

SYNTAX SEQUENCE OF EfmCuPmeCapabilityEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Table for Configuration of common aspects for EFCu 2BASE-TL/10PASS-TS PME ports (modems). Configuration of aspects specific to 2BASE-TL or 10PASS-TS PME types is

represented in efmCuPme2BConfTable and efmCuPme10PConfTable respectively.

Entries in this table MUST be maintained in a persistent manner."

```
::= { efmCuPme 2 }
```

efmCuPmeCapabilityEntry OBJECT-TYPE

SYNTAX EfmCuPmeCapabilityEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the EFMcu PME Capability table.

Each entry represents common aspects of an EFMcu PME port indexed by the ifIndex. Note that an EFMcu PME port can be stacked below a single PCS port, also indexed by ifIndex,

possibly together with other PME ports if PAF is enabled."

INDEX { ifIndex }

```
::= { efmCuPmeCapabilityTable 1 }
```

EfmCuPmeCapabilityEntry ::=

SEQUENCE {

efmCuPmeSubTypesSupported BITS

}

efmCuPmeSubTypesSupported OBJECT-TYPE

SYNTAX BITS {

ieee2BaseTLO(0),

ieee2BaseTLR(1),

ieee10PassTSO(2),

ieee10PassTSR(3)

}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"PME supported sub-types. This is a bitmap of possible sub-types. The various bit positions are:

ieee2BaseTLO - PME is capable of operating as 2BaseTL-0

ieee2BaseTLR - PME is capable of operating as 2BaseTL-R

ieee10PassTSO - PME is capable of operating as 10PassTS-0

ieee10PassTSR - PME is capable of operating as 10PassTS-R

An desired mode of operation is determined by efmCuPmeAdminSubType, while efmCuPmeOperSubType reflects the current operating mode.

If a Clause 45 MDIO Interface to the PCS is present, then this object combines the 10PASS-TS capable and 2BASE-TL capable bits in the 10P/2B PMA/PMD speed ability register and the CO supported and CPE supported bits in the 10P/2B PMA/PMD status register"

REFERENCE

"[[802.3ah](#)] 61.1, 45.2.1.4.1, 45.2.1.4.2, 45.2.1.12.2, 45.2.1.12.3"

::= { efmCuPmeCapabilityEntry 1 }

efmCuPmeStatusTable OBJECT-TYPE

SYNTAX SEQUENCE OF EfmCuPmeStatusEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table provides common status information of EFMCu 2BASE-TL/10PASS-TS PME ports. Status information specific

to 10PASS-TS PME is represented in efmCuPme10PStatusTable.

This table contains live data from the equipment. As such, it is NOT persistent."

::= { efmCuPme 3 }

efmCuPmeStatusEntry OBJECT-TYPE

SYNTAX EfmCuPmeStatusEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the EFMCu PME Status table.

Each entry represents common aspects of an EFMCu PME port indexed by the ifIndex. Note that an EFMCu PME port can be stacked below a single PCS port, also indexed by ifIndex, possibly together with other PME ports if PAF is enabled."

INDEX { ifIndex }

::= { efmCuPmeStatusTable 1 }

```

EfmCuPmeStatusEntry ::=
SEQUENCE {
    efmCuPmeOperStatus          INTEGER,
    efmCuPmeFltStatus          BITS,
    efmCuPmeOperSubType        INTEGER,
    efmCuPmeOperProfile        ProfileIndexOrZero,
    efmCuPmeSnrMgn             Integer32,
    efmCuPmePeerSnrMgn         Integer32,
    efmCuPmeLineAtn            Integer32,
    efmCuPmePeerLineAtn        Integer32,
    efmCuPmeEquivalentLength   Unsigned32,
    efmCuPmeTCCodingErrors     Counter32,
    efmCuPmeTCCrcErrors        Counter32
}

```

efmCuPmeOperStatus OBJECT-TYPE

```

SYNTAX      INTEGER {
    up(1),
    downNotReady(2),
    downReady(3),
    init(4)
}

```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Current PME link Operational Status. Possible values are:

- up(1) - link is Up and ready to pass 64/65B encoded frames or fragments.
- downNotReady(2) - link is Down and the PME does not detect

- Handshake tones from its peer. This value may indicate a possible problem with the peer PME.
- downReady(3) - link is Down and the PME detects Handshake tones from its peer.
- init(4) - link is initializing, as a result of ifAdminStatus being set to 'up' for a particular PME or a PCS the PME is connected to.

This object is intended to supplement Down state of



ifOperStatus.

This object partially maps to the Clause 30 attribute aPMEStatus.

If a Clause 45 MDIO Interface to the PME is present, then this object partially maps to PMA/PMD link status bits in 10P/2B PMA/PMD status register."

REFERENCE

"[[802.3ah](#)] 30.11.2.1.3, 45.2.1.12.4"  
 ::= { efmCuPmeStatusEntry 1 }

efmCuPmeFltStatus OBJECT-TYPE

SYNTAX BITS {  
 lossOfFraming(0),  
 snrMgnDefect(1),  
 lineAtnDefect(2),  
 deviceFault(3),  
 configInitFailure(4),  
 protocolInitFailure(5)  
 }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Current/Last PME link Fault Status. This is a bitmap of possible conditions. The various bit positions are:

lossOfFraming	- Loss of Framing for 10P or Loss of Sync word for 2B PMD or Loss of 64/65B Framing
snrMgnDefect	- SNR Margin dropped below the Threshold
lineAtnDefect	- Line Attenuation exceeds the Threshold
deviceFault	- Indicates a vendor-dependent diagnostic or self-test fault has been detected.
configInitFailure	- Configuration initialization failure, due to inability of the PME link to

protocolInitFailure - support configuration profile,  
requested during initialization.  
- Protocol initialization failure,  
due to incompatible protocol used by

the Peer PME during init (that could happen if a peer PMD is a regular G.SDHSL/VDSL modem instead of a 2BASE-TL/10PASS-TS PME).

This object is intended to supplement ifOperStatus in IF-MIB.

This object holds information about the last fault. efmCuPmeFltStatus is cleared by the device restart. In addition lossOfFraming, configInitFailure and protocolInitFailure are cleared by PME init. deviceFault is cleared by successful diagnostics/test. snrMgnDefect and lineAtnDefect are cleared by SNR Margin and line Attenuation respectively returning to norm and by PME init.

This object partially maps to the Clause 30 attribute aPMEStatus.

If a Clause 45 MDIO Interface to the PME is present, then this object consolidates information from various PMA/PMD registers, namely: Fault bit in PMA/PMD status 1 register, 10P/2B PMA/PMD link loss register, 10P outgoing indicator bits status register, 10P incoming indicator bits status register, 2B state defects register."

REFERENCE

"[[802.3ah](#)] 30.11.2.1.3, 45.2.1.2.1, 45.2.1.38, 45.2.1.39, 45.2.1.54"

::= { efmCuPmeStatusEntry 2 }

efmCuPmeOperSubType OBJECT-TYPE

SYNTAX INTEGER {

ieee2BaseTLO(1),  
ieee2BaseTLR(2),  
ieee10PassTSO(3),  
ieee10PassTSR(4)

}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Current operational sub-type of the PME.

Possible values are:

ieee2BaseTLO - PME operates as 2BaseTL-0

ieee2BaseTLR	- PME operates as 2BaseTL-R
ieee10PassTSO	- PME operates as 10PassTS-0
ieee10PassTSR	- PME operates as 10PassTS-R

The operational sub type of the PME can be configured via efmCuPmeAdminSubType variable.

If a Clause 45 MDIO Interface to the PMA/PMD is present, then this object combines values of the Port sub-type select bits, the PMA/PMD type selection bits in the 10P/2B PMA/PMD control register and the PMA/PMD link status bits in the 10P/2B PMA/PMD status register."

## REFERENCE

"[[802.3ah](#)] 61.1, 45.2.1.11.4, 45.2.1.11.7, 45.2.1.12.4"  
 ::= { efmCuPmeStatusEntry 3 }

## efmCuPmeOperProfile OBJECT-TYPE

SYNTAX ProfileIndexOrZero

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"PME current operating Profile. This object is a pointer to an entry in either efmCuPme2BProfileTable or efmCuPme10PProfileTable, depending on the current operating SubType of the PME as indicated by efmCuPmeOperSubType.

Note that a profile entry, to which efmCuPmeOperProfile is pointing to, can be created automatically, to reflect achieved parameters in adaptive (not fixed) initialization, i.e. values of efmCuPmeOperProfile and efmCuAdminProfile or efmCuPmeAdminProfile MAY differ.

The value of zero indicates that PME is down or initializing.

This object partially maps to the aOperatingProfile attribute in Clause 30."

## REFERENCE

"[[802.3ah](#)] 30.11.2.1.7"  
 ::= { efmCuPmeStatusEntry 4 }

## efmCuPmeSnrMgn OBJECT-TYPE

SYNTAX Integer32(-127..128|65535)

UNITS "dB"

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"The current Signal-to-Noise Ratio (SNR) margin with respect to the received signal as perceived by the local PME.

The value of 65535 is returned when PME is down or

initializing.

This object maps to the aPMESNRMgn attribute in Clause 30.

If a Clause 45 MDIO Interface is present, then this object maps to the 10P/2B RX SNR margin register."

REFERENCE

"[[802.3ah](#)] 30.11.2.1.4, 45.2.1.16"  
 ::= { efmCuPmeStatusEntry 5 }

efmCuPmePeerSnrMgn OBJECT-TYPE

SYNTAX Integer32(-127..128|65535)

UNITS "dB"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The current SNR margin in dB with respect to the received signal, as perceived by the remote (link partner) PME. The value of 65535 is returned when PME is down or initializing.

This object is not supported by -R PME subtypes.

If a Clause 45 MDIO Interface is present, then this object maps to the 10P/2B link partner RX SNR margin register."

REFERENCE

"[[802.3ah](#)] 45.2.1.17"  
 ::= { efmCuPmeStatusEntry 6 }

efmCuPmeLineAtn OBJECT-TYPE

SYNTAX Integer32(-127..128|65535)

UNITS "dB"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The current Line Attenuation in dB as perceived by the local PME. The value of 65535 is returned when PME is down or initializing.

If a Clause 45 MDIO Interface is present, then this object maps to the Line Attenuation register"

REFERENCE

"[[802.3ah](#)] 45.2.1.18"  
 ::= { efmCuPmeStatusEntry 7 }

efmCuPmePeerLineAtn OBJECT-TYPE

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SYNTAX Integer32(-127..128|65535)

UNITS "dB"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The current Line Attenuation in dB as perceived by the remote (link partner) PME.

The value of 65535 is returned when PME is down or initializing.

This object is not supported by CPE port subtypes.

If a Clause 45 MDIO Interface is present, then this object maps to the 20P/2B link partner Line Attenuation register."

REFERENCE

"[[802.3ah](#)] 45.2.1.19"  
 ::= { efmCuPmeStatusEntry 8 }

efmCuPmeEquivalentLength OBJECT-TYPE

SYNTAX Unsigned32(0..8192|65535)

UNITS "m"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"An estimate of the equivalent loop's Physical Length in meters, as perceived by the PME after the link is established. An equivalent loop is a hypothetical 26AWG (0.4mm) loop with a perfect square root attenuation characteristic, without any bridged taps.

The value of 65535 is returned if the link is Down or Initializing or the PME is unable to estimate the Equivalent Length.

For 10BASE-TL PME, if a Clause 45 MDIO Interface to the PME is present, then this object maps to the 10P Electrical Length register"

REFERENCE

"[[802.3ah](#)] 45.2.1.21"

::= { efmCuPmeStatusEntry 9 }

efmCuPmeTCCodingErrors OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A number of 64/65-octet encapsulation errors. This counter is incremented for each 64/65-octet encapsulation error detected

by the 64/65-octet receive function.

The value of zero SHALL be returned when PME is down or initializing.

If a Clause 45 MDIO Interface to the PME TC is present, then this object maps to the TC coding violations register (see 45.2.6.12)."

REFERENCE

"[[802.3ah](#)] 61.3.3.1, 45.2.6.12"

::= { efmCuPmeStatusEntry 10 }

efmCuPmeTCCrcErrors OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A number of TC-CRC errors. This counter is incremented for each TC-CRC error detected by the 64/65-octet receive function (see 61.3.3.3 and Figure 61-19).

The value of zero SHALL be returned when PME is down or initializing.

If a Clause 45 MDIO Interface to the PCME TC is present, then this object maps to the TC CRC error register (see 45.2.6.11)."

REFERENCE

```
"[802.3ah] 61.3.3.3, 45.2.6.11"
 ::= { efmCuPmeStatusEntry 11 }
```

```
-- 2BASE-TL specific PME group
```

```
efmCuPme2B      OBJECT IDENTIFIER ::= { efmCuPme 5 }
```

```
efmCuPme2BProfileTable OBJECT-TYPE
```

```
SYNTAX          SEQUENCE OF EfmCuPme2BProfileEntry
```

```
MAX-ACCESS      not-accessible
```

```
STATUS          current
```

```
DESCRIPTION
```

```
"This table supports definitions of administrative and
operating Profiles for 2BASE-TL PMEs.
```

```
First 14 entries in this table SHALL always be defined as
follows (see 802.3ah Annex 63A):
```

```
-----+-----+-----+-----+-----+-----
Profile MinRate MaxRate Power Region Constellation
index  (Kbps)  (Kbps)  (dBm)
-----+-----+-----+-----+-----+-----
   1    5696    5696    13.5    1   32-TCPAM (default)
   2    3072    3072    13.5    1   32-TCPAM
```

```
   3    2048    2048    13.5    1   16-TCPAM
   4    1024    1024    13.5    1   16-TCPAM
   5     704     704    13.5    1   16-TCPAM
   6     512     512    13.5    1   16-TCPAM
   7    5696    5696    14.5    2   32-TCPAM
   8    3072    3072    14.5    2   32-TCPAM
   9    2048    2048    14.5    2   16-TCPAM
  10    1024    1024    13.5    2   16-TCPAM
  11     704     704    13.5    2   16-TCPAM
  12     512     512    13.5    2   16-TCPAM
  13     192    5696     0     1   0          (best effort)
  14     192    5696     0     2   0          (best effort)
```

These default entries SHALL be created during agent initialization and MUST NOT be deleted.

Entries following the first 14, can be dynamically created and deleted, to provide custom administrative (configuration) profiles and automatic operating profiles.

This table MUST be maintained in a persistent manner."

REFERENCE

"[802.3ah] Annex 63A, 30.11.2.1.6"

::= { efmCuPme2B 2 }

efmCuPme2BProfileEntry OBJECT-TYPE

SYNTAX EfmCuPme2BProfileEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry corresponds to a single 2BASE-TL PME profile. Each profile contains a set of parameters, used either for configuration or representation of a 2BASE-TL PME. In case a particular profile is referenced via efmCuPmeAdminProfile object (or efmCuAdminProfile if efmCuPmeAdminProfile is zero), it represent the desired parameters the 2BaseTL-0 PME initialization. If a profile is referenced via efmCuPmeOperProfile object, it represents current operating parameters of the operational PME.

Profiles may be created/deleted using the row creation/deletion mechanism via efmCuPme2BProfileRowStatus. If an active entry is referenced, the entry MUST remain 'active' until all references are removed.

Default entries MUST NOT be removed."

INDEX { efmCuPme2BProfileIndex }

::= { efmCuPme2BProfileTable 1 }

EfmCuPme2BProfileEntry ::=

SEQUENCE {

efmCuPme2BProfileIndex	ProfileIndex,
efmCuPme2BProfileDescr	SnmpAdminString,
efmCuPme2BRegion	INTEGER,
efmCuPme2BsMode	ProfileIndexOrZero,
efmCuPme2BMinDataRate	Unsigned32,
efmCuPme2BMaxDataRate	Unsigned32,
efmCuPme2BPower	Unsigned32,
efmCuPme2BConstellation	INTEGER,
efmCuPme2BProfileRowStatus	RowStatus

}



```

efmCuPme2BProfileIndex OBJECT-TYPE
    SYNTAX      ProfileIndex
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "2BASE-TL PME Profile index.
        This object is the unique index associated with this profile.
        Entries in this table are referenced via efmCuAdminProfile
        or efmCuPmeAdminProfile objects."
    ::= { efmCuPme2BProfileEntry 1 }

efmCuPme2BProfileDescr OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "A textual string containing information about 2BASE-TL PME
        Profile. The string MAY include information about data rate
        and spectral limitations of this particular profile."
    ::= { efmCuPme2BProfileEntry 2 }

efmCuPme2BRegion OBJECT-TYPE
    SYNTAX      INTEGER {
        region1(1),
        region2(2)
    }
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "Regional settings for 2BASE-TL PME, as specified in the
        relevant Regional Annex of [G.991.2].
        Regional settings specify Power Spectral Density (PSD) mask,
        Power Back-Off (PBO) values and place limitations on the max
        allowed data rate, power and constellation.

```

Possible values for this object are:

- region1 - Annexes A and F (e.g. North America)
- region2 - Annexes B and G (e.g. Europe)

Annex A/B specify regional settings for data rates 192-2304

Kbps using 16-TCPAM encoding.  
Annex F/G specify regional settings for rates 2320-3840 Kbps using 16-TCPAM encoding and 768-5696 Kbps using 32-TCPAM encoding.

If a Clause 45 MDIO Interface to the PME is present, then this object partially maps to the Region bits in the 2B general parameter register."

REFERENCE

"[802.3ah] 45.2.1.42; [G.991.2] Annexes A, B, F and G"  
 ::= { efmCuPme2BProfileEntry 3 }

efmCuPme2BsMode OBJECT-TYPE

SYNTAX ProfileIndexOrZero

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Desired custom Spectral Mode for 2BASE-TL PME. This object is a pointer to an entry in efmCuPme2BsModeTable and a block of entries in efmCuPme2BRateReachTable, which together define (country-specific) reach dependent rate limitations in addition to those defined by efmCuPme2BRegion.

The value of this object is the index of the referenced spectral mode.

The value of zero (default) indicates that no specific spectral mode is applicable.

Attempts to set this object to a value that is not the value of the index for an active entry in the corresponding spectral mode table, MUST be rejected."

REFERENCE

"efmCuPme2BsModeTable, efmCuPme2BRateReachTable"

DEFVAL { 0 }

::= { efmCuPme2BProfileEntry 4 }

efmCuPme2BMinDataRate OBJECT-TYPE

SYNTAX Unsigned32(192..5696)

UNITS "Kbps"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Minimum Data Rate for the 2BASE-TL PME.

This object can take values of (n x 64)Kbps, where n=3..60 for 16-TCPAM and n=12..89 for 32-TCPAM encoding.

The data rate of the 2BASE-TL PME is considered 'fixed' when the value of this object equals that of efmCuPme2BMaxDataRate. If efmCuPme2BMinDataRate is less than efmCuPme2BMaxDataRate in the administrative profile, the data rate is considered 'adaptive', and SHALL be set to the maximum attainable rate not exceeding efmCuPme2BMaxDataRate, under the spectral limitations placed by the efmCuPme2BRegion and efmCuPme2BsMode.

Note that current operational data rate of the PME is represented by ifSpeed object of IF-MIB.

If a Clause 45 MDIO Interface to the PME is present, then this object maps to the Min Data Rate1 bits in the 2B PMD parameters register.

This object MUST be maintained in a persistent manner."

#### REFERENCE

"[[802.3ah](#)] 45.2.1.43"  
 ::= { efmCuPme2BProfileEntry 5 }

efmCuPme2BMaxDataRate OBJECT-TYPE

SYNTAX Unsigned32(192..5696)

UNITS "Kbps"

MAX-ACCESS read-create

STATUS current

#### DESCRIPTION

"Maximum Data Rate for the 2BASE-TL PME.

This object can take values of (n x 64)Kbps, where n=3..60 for 16-TCPAM and n=12..89 for 32-TCPAM encoding.

The data rate of the 2BASE-TL PME is considered 'fixed' when the value of this object equals that of efmCuPme2BMinDataRate. If efmCuPme2BMinDataRate is less than efmCuPme2BMaxDataRate in the administrative profile, the data rate is considered 'adaptive', and SHALL be set to the maximum attainable rate not exceeding efmCuPme2BMaxDataRate, under the spectral limitations placed by the efmCuPme2BRegion and efmCuPme2BsMode.

Note that current operational data rate of the PME is represented by ifSpeed object of IF-MIB.

If a Clause 45 MDIO Interface to the PME is present, then this object maps to the Max Data Rate1 bits in the 2B PMD

parameters register.

This object MUST be maintained in a persistent manner."

## REFERENCE

"[[802.3ah](#)] 45.2.1.43"  
 ::= { efmCuPme2BProfileEntry 6 }

## efmCuPme2BPower OBJECT-TYPE

SYNTAX Unsigned32(0|10..42)

UNITS "0.5 dBm"

MAX-ACCESS read-create

STATUS current

## DESCRIPTION

"Signal Transmit Power. Multiple of 0.5dBm.

The value of 0 in the administrative profile means that the signal transmit power is not fixed and SHALL be set to maximize the attainable rate, under the spectral limitations placed by the efmCuPme2BRegion and efmCuPme2BsMode.

If a Clause 45 MDIO Interface to the PME is present, then this object maps to the Power1 bits in the 2B PMD parameters register"

## REFERENCE

"[[802.3ah](#)] 45.2.1.43"  
 ::= { efmCuPme2BProfileEntry 7 }

## efmCuPme2BConstellation OBJECT-TYPE

SYNTAX INTEGER {

adaptive(0),

tcpam16(1),

tcpam32(2)

}

MAX-ACCESS read-create

STATUS current

## DESCRIPTION

"TCPAM Constellation of the 2BASE-TL PME.

The possible values are:

adaptive(0) - either 16- or 32-TCPAM

tcpam16(1) - 16-TCPAM

tcpam32(2) - 32-TCPAM

The value of adaptive(0) in the administrative profile means

that the constellation is not fixed and SHALL be set to maximize the attainable rate, under the spectral limitations placed by the efmCuPme2BRegion and efmCuPme2BsMode.

If a Clause 45 MDIO Interface to the PME is present, then this object maps to the Constellation1 bits in the 2B general

```
parameter register."
REFERENCE
  "[802.3ah] 45.2.1.43"
 ::= { efmCuPme2BProfileEntry 8 }
```

efmCuPme2BProfileRowStatus OBJECT-TYPE

```
SYNTAX      RowStatus
MAX-ACCESS  read-create
STATUS      current
```

DESCRIPTION

"This object controls creation/deletion of the associated entry in efmCuPme2BProfileTable per the semantics of RowStatus.

If an 'active' entry is referenced via efmCuAdminProfile or efmCuPmeAdminProfile, the entry MUST remain 'active' until all references are removed."

```
::= { efmCuPme2BProfileEntry 9 }
```

efmCuPme2BsModeTable OBJECT-TYPE

```
SYNTAX      SEQUENCE OF EfmCuPme2BsModeEntry
MAX-ACCESS  not-accessible
STATUS      current
```

DESCRIPTION

"This table, together with efmCu2BReachRateTable, supports definition of administrative custom spectral modes for 2BASE-TL PMEs, describing spectral limitations in addition to those specified by efmCuPme2BRegion.

Some countries spectral regulations (e.g. UK ANFP) limit the length of the loops for certain data rates. This table allows these country-specific limitations to be specified.

Entries in this table referenced by the efmCuPme2BsMode MUST NOT be deleted until all the active references are

removed.

This table MUST be maintained in a persistent manner."  
REFERENCE

"efmCu2BReachRateTable"  
::= { efmCuPme2B 3 }

efmCuPme2BsModeEntry OBJECT-TYPE

SYNTAX EfmCuPme2BsModeEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry specifies spectral mode description and its index,

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which is used to reference corresponding entries in the  
efmCu2BReachRateTable.

Entries may be created/deleted using the row creation/  
deletion mechanism via efmCuPme2BsModeRowStatus."

INDEX { efmCuPme2BsModeIndex }  
::= { efmCuPme2BsModeTable 1 }

EfmCuPme2BsModeEntry ::=

SEQUENCE {  
    efmCuPme2BsModeIndex                   ProfileIndex,  
    efmCuPme2BsModeDescr                 SnmAdminString,  
    efmCuPme2BsModeRowStatus             RowStatus  
}

efmCuPme2BsModeIndex OBJECT-TYPE

SYNTAX ProfileIndex

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"2BASE-TL PME Spectral Mode index.

This object is the unique index associated with this spectral  
mode.

Entries in this table are referenced via efmCuPme2BsMode  
object."

::= { efmCuPme2BsModeEntry 1 }

efmCuPme2BsModeDescr OBJECT-TYPE

SYNTAX SnmpAdminString  
 MAX-ACCESS read-create  
 STATUS current  
 DESCRIPTION  
 "A textual string containing information about 2BASE-TL PME spectral mode. The string MAY include information about corresponding (country-specific) spectral regulations and rate/reach limitations of this particular spectral mode."  
 ::= { efmCuPme2BsModeEntry 2 }

efmCuPme2BsModeRowStatus OBJECT-TYPE

SYNTAX RowStatus  
 MAX-ACCESS read-create  
 STATUS current  
 DESCRIPTION  
 "This object controls creation/deletion of the associated entry in efmCuPme2BsModeTable per the semantics of RowStatus.  
 If an 'active' entry is referenced via efmCuPme2BsMode, the entry MUST remain 'active' until all references are removed."

::= { efmCuPme2BsModeEntry 3 }

efmCuPme2BReachRateTable OBJECT-TYPE

SYNTAX SEQUENCE OF EfmCuPme2BReachRateEntry  
 MAX-ACCESS not-accessible  
 STATUS current  
 DESCRIPTION

"This table supports definition of administrative custom spectral modes for 2BASE-TL PMEs, providing spectral limitations in addition to those specified by efmCuPme2BRegion.

The spectral regulations in some countries (e.g. UK ANFP) limit the length of the loops for certain data rates. This table allows these country-specific limitations to be specified.

Below is an example of this table for [\[ANFP\]](#):

```
-----+-----+-----+
Equivalent MaxRate MaxRate
```

Length (m)	PAM16 (Kbps)	PAM32 (Kbps)
975	2304	5696
1125	2304	5504
1275	2304	5120
1350	2304	4864
1425	2304	4544
1500	2304	4288
1575	2304	3968
1650	2304	3776
1725	2304	3520
1800	2304	3264
1875	2304	3072
1950	2048	2688
2100	1792	2368
2250	1536	0
2400	1408	0
2550	1280	0
2775	1152	0
2925	1152	0
3150	1088	0
3375	1024	0

Entries in this table referenced by the efmCuPme2BsMode MUST NOT be deleted until all the active references are

removed.

This table MUST be maintained in a persistent manner."

REFERENCE

"[ANFP]"

::= { efmCuPme2B 4 }

efmCuPme2BReachRateEntry OBJECT-TYPE

SYNTAX EfmCuPme2BReachRateEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry specifies maximum 2BASE-TL PME data rates allowed for a certain equivalent loop length, when using



16-TCPAM or 32-TCPAM encoding.

When 2BASE-TL PME is initialized, its data rate MUST NOT exceed one of the following limitations:

- the value of efmCuPme2BMaxDataRate
- maximum data rate allowed by efmCuPme2BRegion and efmCuPme2BPower
- maximum data rate for a given encoding specified in the efmCuPme2BsModeEntry, corresponding to the equivalent loop length, estimated by the PME.

It is RECOMMENDED that the efmCuPme2BEquivalentLength values are assigned in the increasing order, starting from the minimum value.

Entries may be created/deleted using the row creation/deletion mechanism via efmCuPme2ReachRateRowStatus."

```
INDEX { efmCuPme2BsModeIndex, efmCuPme2BEquivalentLength }  
 ::= { efmCuPme2BReachRateTable 1 }
```

```
EfmCuPme2BReachRateEntry ::=  
 SEQUENCE {  
     efmCuPme2BEquivalentLength      Unsigned32,  
     efmCuPme2BMaxDataRatePam16     Unsigned32,  
     efmCuPme2BMaxDataRatePam32     Unsigned32,  
     efmCuPme2BReachRateRowStatus    RowStatus  
 }
```

```
efmCuPme2BEquivalentLength OBJECT-TYPE  
 SYNTAX      Unsigned32(0..8192)  
 UNITS       "m"  
 MAX-ACCESS  read-create  
 STATUS      current  
 DESCRIPTION
```

"Maximum allowed Equivalent loop's Physical Length in meters for the specified data rates.

An equivalent loop is a hypothetical 26AWG (0.4mm) loop with a perfect square root attenuation characteristic, without any bridged taps."

REFERENCE

""

```
::= { efmCuPme2BReachRateEntry 1 }
```

```
efmCuPme2BMaxDataRatePam16 OBJECT-TYPE
```

```
SYNTAX      Unsigned32(0|192..5696)
```

```
UNITS       "Kbps"
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

```
DESCRIPTION
```

```
  "Maximum data rate for 2BASE-TL PME at the specified  
  Equivalent loop's Length using TC-PAM16 encoding.
```

```
  The value of zero means that TC-PAM16 encoding should not be  
  used at this distance."
```

```
REFERENCE
```

```
  ""
```

```
::= { efmCuPme2BReachRateEntry 2 }
```

```
efmCuPme2BMaxDataRatePam32 OBJECT-TYPE
```

```
SYNTAX      Unsigned32(0|192..5696)
```

```
UNITS       "Kbps"
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

```
DESCRIPTION
```

```
  "Maximum data rate for 2BASE-TL PME at the specified  
  Equivalent loop's Length using TC-PAM32 encoding.
```

```
  The value of zero means that TC-PAM32 encoding should not be  
  used at this distance."
```

```
REFERENCE
```

```
  ""
```

```
::= { efmCuPme2BReachRateEntry 3 }
```

```
efmCuPme2BReachRateRowStatus OBJECT-TYPE
```

```
SYNTAX      RowStatus
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

```
DESCRIPTION
```

```
  "This object controls creation/deletion of the associated  
  entry in efmCuPme2BReachRateTable per the semantics of  
  RowStatus.
```

```
  If an 'active' entry is referenced via efmCuPme2BsMode, the  
  entry MUST remain 'active' until all references are removed."
```

```
::= { efmCuPme2BReachRateEntry 4 }
```

-- 10PASS-TS specific PME group

efmCuPme10P OBJECT IDENTIFIER ::= { efmCuPme 6 }

efmCuPme10PProfileTable OBJECT-TYPE

SYNTAX SEQUENCE OF EfmCuPme10PProfileEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table supports definitions of configuration profiles for 10PassTL PMEs.

First 22 entries in this table SHALL always be defined as follows (see 802.3ah Annex 62B.3):

```
-----+-----+-----+-----+-----+-----+
Profile Bandplan UPBO BandNotch DRate URate
Index PSDMask# p# p# p# p#
-----+-----+-----+-----+-----+-----+
  1      1      3  2,6,10,11  20  20(default)
  2     13      5      0      20  20
  3      1      1      0      20  20
  4     16      0      0     100  100
  5     16      0      0      70  50
  6      6      0      0      50  10
  7     17      0      0      30  30
  8      8      0      0      30   5
  9      4      0      0      25  25
 10      4      0      0      15  15
 11     23      0      0      10  10
 12     23      0      0       5   5
 13     16      0  2,5,9,11  100  100
 14     16      0  2,5,9,11   70  50
 15      6      0  2,6,10,11   50  10
 16     17      0  2,5,9,11   30  30
 17      8      0  2,6,10,11   30   5
 18      4      0  2,6,10,11   25  25
 19      4      0  2,6,10,11   15  15
 20     23      0  2,5,9,11   10  10
 21     23      0  2,5,9,11    5   5
 22     30      0      0     200  50
```

These default entries SHALL be created by during agent initialization and MUST NOT be deleted.

Entries following the first 22, can be dynamically created and deleted, to provide custom administrative (configuration) profiles and automatic operating profiles.

This table MUST be maintained in a persistent manner."

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## REFERENCE

"[[802.3ah](#)] Annex 62B.3, 30.11.2.1.6"  
 ::= { efmCuPme10P 1 }

## efmCuPme10PProfileEntry OBJECT-TYPE

SYNTAX EfmCuPme10PProfileEntry

MAX-ACCESS not-accessible

STATUS current

## DESCRIPTION

"Each entry corresponds to a single 10PASS-TS PME profile.

Each profile contains a set of parameters, used either for configuration or representation of a 10PASS-TS PME.

In case a particular profile is referenced via efmCuPmeAdminProfile object (or efmCuAdminProfile if efmCuPmeAdminProfile is zero), it represent the desired parameters the 10PasSTS-0 PME initialization.

If a profile is referenced via efmCuPmeOperProfile object, it represents current operating parameters of the PME.

Profiles may be created/deleted using the row creation/deletion mechanism via efmCuPme10PProfileRowStatus. If an 'active' entry is referenced, the entry MUST remain 'active' until all references are removed.

Default entries MUST NOT be removed."

INDEX { efmCuPme10PProfileIndex }

::= { efmCuPme10PProfileTable 1 }

## EfmCuPme10PProfileEntry ::=

SEQUENCE {

efmCuPme10PProfileIndex	ProfileIndex,
efmCuPme10PProfileDescr	SnmpAdminString,
efmCuPme10PBandplanPSDMskProfile	INTEGER,
efmCuPme10PUPB0ReferenceProfile	INTEGER,
efmCuPme10PBandNotchProfiles	BITS,
efmCuPme10PPayloadURateProfile	INTEGER,
efmCuPme10PPayloadDRateProfile	INTEGER,
efmCuPme10PProfileRowStatus	RowStatus

}

## efmCuPme10PProfileIndex OBJECT-TYPE

SYNTAX ProfileIndex

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"10PASS-TS PME Profile Index.

This object is the unique index associated with this profile.

Entries in this table are referenced via efmCuAdminProfile or

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efmCuPmeAdminProfile."

::= { efmCuPme10PPProfileEntry 1 }

efmCuPme10PPProfileDescr OBJECT-TYPE

SYNTAX SnmpAdminString

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"A textual string containing information about 10PASS-TS PME

Profile. The string MAY include information about data rate

and spectral limitations of this particular profile."

::= { efmCuPme10PPProfileEntry 2 }

efmCuPme10PBandplanPSDMskProfile OBJECT-TYPE

SYNTAX INTEGER {

profile1(1),

profile2(2),

profile3(3),

profile4(4),

profile5(5),

profile6(6),

profile7(7),

profile8(8),

profile9(9),

profile10(10),

profile11(11),

profile12(12),

profile13(13),

profile14(14),

profile15(15),

profile16(16),

profile17(17),

profile18(18),

profile19(19),

profile20(20),

profile21(21),

```

profile22(22),
profile23(23),
profile24(24),
profile25(25),
profile26(26),
profile27(27),
profile28(28),
profile29(29)
}
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION

```

"10PASS-TS PME Bandplan and PSD Mask profile,  
as specified in 802.3ah Annex 62A. Possible values are:

Profile Name	PSD Mask	Bands	Bandplan
profile1(1)	- T1.424/T-U P1 FTTCab.M1	x/D/U/D/U	A
profile2(2)	- T1.424/T-U P1 FTTEEx.M1		
profile3(3)	- T1.424/T-U P1 FTTCab.M2		
profile4(4)	- T1.424/T-U P1 FTTEEx.M2		
profile5(5)	- T1.424/T-U P1 FTTCab.M1	D/D/U/D/U	
profile6(6)	- T1.424/T-U P1 FTTEEx.M1		
profile7(7)	- T1.424/T-U P1 FTTCab.M2		
profile8(8)	- T1.424/T-U P1 FTTEEx.M2		
profile9(9)	- T1.424/T-U P1 FTTCab.M1	U/D/U/D/x	
profile10(10)	- T1.424/T-U P1 FTTEEx.M1		
profile11(11)	- T1.424/T-U P1 FTTCab.M2		
profile12(12)	- T1.424/T-U P1 FTTEEx.M2		
profile13(13)	- TS1 101 270-1 Pcab.M1.A	x/D/U/D/U	B
profile14(14)	- TS1 101 270-1 Pcab.M1.B		
profile15(15)	- TS1 101 270-1 Pex.P1.M1		
profile16(16)	- TS1 101 270-1 Pex.P2.M1		
profile17(17)	- TS1 101 270-1 Pcab.M2		
profile18(18)	- TS1 101 270-1 Pex.P1.M2		
profile19(19)	- TS1 101 270-1 Pex.P2.M2		
profile20(20)	- TS1 101 270-1 Pcab.M1.A	U/D/U/D/x	
profile21(21)	- TS1 101 270-1 Pcab.M1.B		
profile22(22)	- TS1 101 270-1 Pex.P1.M1		
profile23(23)	- TS1 101 270-1 Pex.P2.M1		
profile24(24)	- TS1 101 270-1 Pcab.M2		

profile25(25) - TS1 101 270-1 Pex.P1.M2  
profile26(26) - TS1 101 270-1 Pex.P2.M2  
profile27(27) - G.993.1 F.1.2.1 (VDSL0POTS) x/D/U/D/U F  
profile28(28) - G.993.1 F.1.2.2 (VDSL0TCM-ISDN)  
profile29(29) - G.993.1 F.1.2.3 (PSD reduction)

This object maps to the aBandplanPSDMaskProfile attribute in Clause 30."

REFERENCE

"[[802.3ah](#)] Annex 62A, 30.5.1.1.22"  
 ::= { efmCuPme10PPProfileEntry 3 }

efmCuPme10PUPB0ReferenceProfile OBJECT-TYPE

SYNTAX INTEGER {

profile1(1),  
profile2(2),  
profile3(3),  
profile4(4),  
profile5(5),

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profile6(6),  
profile7(7),  
profile8(8),  
profile9(9)  
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"10PASS-TS PME Upstream Power Back-Off (UPB0) Reference PSD Profile, as specified in 802.3ah Annex 62A. Possible values are:

profile1(1)	- T1.424/T-U	Noise A M1
profile2(2)	- T1.424/T-U	Noise A M2
profile3(3)	- T1.424/T-U	Noise F M1
profile4(4)	- T1.424/T-U	Noise F M2
profile5(5)	- ETSI TS 101 270-1	Noise A&B
profile6(6)	- ETSI TS 101 270-1	Noise C
profile7(7)	- ETSI TS 101 270-1	Noise D
profile8(8)	- ETSI TS 101 270-1	Noise E
profile9(9)	- ETSI TS 101 270-1	Noise F

This object maps to the aUPB0ReferenceProfile attribute

in Clause 30."  
 REFERENCE  
 "[802.3ah] Annex 62A.3.4, 30.5.1.1.23"  
 ::= { efmCuPme10PProfileEntry 4 }

efmCuPme10PBandNotchProfiles OBJECT-TYPE

```
SYNTAX BITS {
  profile0(0),
  profile1(1),
  profile2(2),
  profile3(3),
  profile4(4),
  profile5(5),
  profile6(6),
  profile7(7),
  profile8(8),
  profile9(9),
  profile10(10),
  profile11(11)
}
```

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"10PASS-TS PME Egress Control Band Notch Profile bitmap,  
 as specified in 802.3ah Annex 62A. Possible values are:

-----+-----+-----+-----+-----+-----

Profile Name	G.991.3 Table	T1.424/T-U Table	TS101 270-1 Table	StartF (MHz)	EndF (MHz)
profile0(0)	- no profile				
profile1(1)	- F-5 #01	-	-	1.810	1.825
profile2(2)	- 6-2	15-1	17	1.810	2.000
profile3(3)	- F-5 #02	-	-	1.907	1.912
profile4(4)	- F-5 #03	-	-	3.500	3.575
profile5(5)	- 6-2	-	17	3.500	3.800
profile6(6)	- -	15-1	-	3.500	4.000
profile7(7)	- F-5 #04	-	-	3.747	3.754
profile8(8)	- F-5 #05	-	-	3.791	3.805
profile9(9)	- 6-2	-	17	7.000	7.100
profile10(10)	- F-5 #06	15-1	-	7.000	7.300
profile11(11)	- 6-2	15-1	1	10.100	10.150



Any combination of profiles can be specified by ORing individual profiles, for example value of 0x0622 selects profiles 2,6,10 and 11.

This object maps to the aBandNotchProfile attribute in Clause 30."

REFERENCE

"[[802.3ah](#)] Annex 62A.3.5, 30.5.1.1.19"  
 ::= { efmCuPme10PPProfileEntry 5 }

efmCuPme10PPayloadURateProfile OBJECT-TYPE

SYNTAX INTEGER {

profile5(5),  
profile10(10),  
profile15(15),  
profile20(20),  
profile25(25),  
profile30(30),  
profile50(50),  
profile70(70),  
profile100(100)

}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"10PASS-TS PME Upstream Payload Rate Profile,  
as specified in 802.3ah Annex 62A. Possible values are:

profile5(5)	- 2.5 Mbps
profile10(10)	- 5 Mbps
profile15(15)	- 7.5 Mbps
profile20(20)	- 10 Mbps
profile25(25)	- 12.5 Mbps

profile30(30)	- 15 Mbps
profile50(50)	- 25 Mbps
profile70(70)	- 35 Mbps
profile100(100)	- 50 Mbps

Each value represents a target for the PME's Upstream Payload Bitrate as seen at the MII. If the payload rate of the selected profile cannot be achieved based on the loop

environment, bandplan and PSD mask, the PME initialization SHALL fail.

This object maps to the aPayloadRateProfileUpstream attribute in Clause 30."

REFERENCE

"[[802.3ah](#)] Annex 62A.3.6, 30.5.1.1.20"  
 ::= { efmCuPme10PPProfileEntry 6 }

efmCuPme10PPayloadDRateProfile OBJECT-TYPE

SYNTAX INTEGER {

profile5(5),  
profile10(10),  
profile15(15),  
profile20(20),  
profile25(25),  
profile30(30),  
profile50(50),  
profile70(70),  
profile100(100),  
profile140(140),  
profile200(200)

}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"10PASS-TS PME Downstream Payload Rate Profile,  
as specified in 802.3ah Annex 62A. Possible values are:

profile5(5)	- 2.5 Mbps
profile10(10)	- 5 Mbps
profile15(15)	- 7.5 Mbps
profile20(20)	- 10 Mbps
profile25(25)	- 12.5 Mbps
profile30(30)	- 15 Mbps
profile50(50)	- 25 Mbps
profile70(70)	- 35 Mbps
profile100(100)	- 50 Mbps
profile140(140)	- 70 Mbps
profile200(200)	- 100 Mbps

Payload Bitrate as seen at the MII. If the payload rate of the selected profile cannot be achieved based on the loop environment, bandplan and PSD mask, the PME initialization SHALL fail.

This object maps to the aPayloadRateProfileDownstream attribute in Clause 30."

REFERENCE

"[802.3ah] Annex 62A.3.6, 30.5.1.1.21"

::= { efmCuPme10PProfileEntry 7 }

efmCuPme10PProfileRowStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object controls creation/deletion of the associated entry in efmCuPme10PProfileTable per the semantics of RowStatus.

If an active entry is referenced via efmCuAdminProfile or efmCuPmeAdminProfile, the entry MUST remain 'active' until all references are removed."

::= { efmCuPme10PProfileEntry 8 }

efmCuPme10PStatusTable OBJECT-TYPE

SYNTAX SEQUENCE OF EfmCuPme10PStatusEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Table reflecting status of EFMcu 10PASS-TS PMEs (modems)."

::= { efmCuPme10P 2 }

efmCuPme10PStatusEntry OBJECT-TYPE

SYNTAX EfmCuPme10PStatusEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the EFMcu 10PASS-TS PME Status table."

AUGMENTS { efmCuPmeStatusEntry }

::= { efmCuPme10PStatusTable 1 }

EfmCuPme10PStatusEntry ::=

SEQUENCE {

efmCuPme10PFECCorrectedBlocks Counter32,

efmCuPme10PFECUncorrectedBlocks Counter32

}

---

```
efmCuPme10PFECCorrectedBlocks OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "A count of received and corrected FEC codewords in 10PASS-TS
        PME.

        This object maps to aPMEFECCorrectedBlocks attribute in
        clause 30.

        If a Clause 45 MDIO Interface to the PMA/PMD is present,
        then this object maps to the 10P FEC correctable errors
        register"
    REFERENCE
        "[802.3ah] 45.2.1.22"
    ::= { efmCuPme10PStatusEntry 1 }

efmCuPme10PFECUncorrectedBlocks OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "A count of received FEC codewords in 10PASS-TS PME, which are
        uncorrectable.

        This object maps to aPMEFECUncorrectableBlocks attribute in
        clause 30.

        If a Clause 45 MDIO Interface to the PMA/PMD is present,
        then this object maps to the 10P FEC uncorrectable errors
        register"
    REFERENCE
        "[802.3ah] 45.2.1.23"
    ::= { efmCuPme10PStatusEntry 2 }

-- ifAvailableStackTable for use in Discovery

ifAvailableStackTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF IfAvailableStackEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This table, modeled after ifStackTable from IF-MIB,
        contains information on the possible 'on-top-of'
        relationships between the multiple sub-layers of network
```

interfaces (as opposed to actual relationships in ifStackTable). In particular, it contains information on

which PCS ports (sublayers) can possibly run 'on top of' which PMEs (sublayers), as determined by cross-connect capability of the EFMCu device, where each sub-layer corresponds to a conceptual row in the ifTable. For example, when the PCS port with ifIndex value x can be connected to run on top of the PME with ifIndex value y, then this table contains:

```
ifAvailableStackStatus.x.y=capable
```

Note that there's always at least one PCS for each PME and at least one PME for each PCS in the EFMCu devices, with efmCuPAFCapacity and efmCuPeerPAFCapacity indicating maximum number of PMEs which can be aggregated by local and remote PCS port respectively.

This table is read only as it describes device capability"

REFERENCE

```
"IF-MIB, ifStackTable"  
 ::= { efmCuObjects 3 }
```

ifAvailableStackEntry OBJECT-TYPE

```
SYNTAX      IfAvailableStackEntry  
MAX-ACCESS  not-accessible  
STATUS      current
```

DESCRIPTION

"Information on a particular relationship between two sub-layers, specifying that one sub-layer (PCS) runs on 'top' of the other sub-layer (PME). Each sub-layer corresponds to a conceptual row in the ifTable (interface index for PCS and PME respectively)."

```
INDEX {  
  ifAvailableStackHigherLayer,  
  ifAvailableStackLowerLayer  
}  
 ::= { ifAvailableStackTable 1 }
```

IfAvailableStackEntry ::=

```
SEQUENCE {  
  ifAvailableStackHigherLayer  InterfaceIndex,
```



connected to run 'below' the PCS sub-layer interface, identified by the ifAvailableStackLowerLayer.  
outOfService(2) - the PME sub-layer interface cannot be connected due to unavailability of the interface.

Note that PME availability per PCS, indicated by 'capable' value, can be constrained by other parameters, for example by aggregation capacity of a PCS or by the PME in question being already connected to another PCS. So, in order to ensure that a particular PME can be connected to the PCS, all respective parameters (e.g. ifAvailableStackTable, ifStackTable and efmCuPAFCapacity) SHALL be inspected.

This object is read only, unlike ifStackStatus, as it

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describes the device capability."  
::= { ifAvailableStackEntry 3 }

--  
-- Conformance Statements  
--

efmCuGroups OBJECT IDENTIFIER ::= { efmCuConformance 1 }

efmCuCompliances OBJECT IDENTIFIER ::= { efmCuConformance 2 }

-- Object Groups

efmCuBasicGroup OBJECT-GROUP

OBJECTS {  
efmCuPAFSupported,  
efmCuAdminProfile,  
efmCuTargetDataRate,  
efmCuTargetSnrMgn,  
efmCuAdaptiveSpectra,  
efmCuPortSide,  
efmCuFltStatus

}  
STATUS current

DESCRIPTION

"A collection of objects required for all of EFMcu ports."  
 ::= { efmCuGroups 1 }

efmCuPAFGroup OBJECT-GROUP

OBJECTS {  
 efmCuPeerPAFSupported,  
 efmCuPAFCapacity,  
 efmCuPeerPAFCapacity,  
 efmCuPAFAdminState,  
 efmCuPAFDiscoveryCode,  
 efmCuPAFRemoteDiscoveryCode,  
 efmCuNumPMEs,  
 ifAvailableStackStatus  
}

STATUS current

DESCRIPTION

"A collection of objects required for OPTIONAL PME  
Aggregation Function (PAF) and PAF discovery in EFMcu ports."  
 ::= { efmCuGroups 2 }

ifStackCapabilityGroup OBJECT-GROUP

OBJECTS {

ifAvailableStackStatus  
}

STATUS current

DESCRIPTION

"A collection of objects providing information on  
the stacking capability of MIB-II interfaces."  
 ::= { efmCuGroups 3 }

efmCuPAFErrorsGroup OBJECT-GROUP

OBJECTS {  
 efmCuPAFInErrors,  
 efmCuPAFInSmallFragments,  
 efmCuPAFInLargeFragments,  
 efmCuPAFInBadFragments,  
 efmCuPAFInLostFragments,  
 efmCuPAFInLostStarts,  
 efmCuPAFInLostEnds,  
 efmCuPAFInOverflows



```
}
STATUS      current
DESCRIPTION
  "A collection of objects supporting OPTIONAL error counters
  of PAF on EFMcu ports."
 ::= { efmCuGroups 4 }
```

efmCuPmeGroup OBJECT-GROUP

```
OBJECTS {
  efmCuPmeAdminProfile,
  efmCuPmeOperStatus,
  efmCuPmeFltStatus,
  efmCuPmeSubTypesSupported,
  efmCuPmeAdminSubType,
  efmCuPmeOperSubType,
  efmCuPAFRemoteDiscoveryCode,
  efmCuPmeOperProfile,
  efmCuPmeSnrMgn,
  efmCuPmePeerSnrMgn,
  efmCuPmeLineAtn,
  efmCuPmePeerLineAtn,
  efmCuPmeEquivalentLength,
  efmCuPmeTCCodingErrors,
  efmCuPmeTCCrcErrors,
  efmCuPmeThreshLineAtn,
  efmCuPmeThreshSnrMgn
}
```

```
STATUS      current
DESCRIPTION
  "A collection of objects providing information about
```

```
  a 2BASE-TL/10PASS-TS PME."
 ::= { efmCuGroups 5 }
```

efmCuAlarmConfGroup OBJECT-GROUP

```
OBJECTS {
  efmCuThreshLowRate,
  efmCuLowRateCrossingEnable,
  efmCuPmeThreshLineAtn,
  efmCuPmeLineAtnCrossingEnable,
  efmCuPmeThreshSnrMgn,
  efmCuPmeSnrMgnCrossingEnable,
```

```

    efmCuPmeDeviceFaultEnable,
    efmCuPmeConfigInitFailEnable,
    efmCuPmeProtocolInitFailEnable
}
STATUS      current
DESCRIPTION
    "A collection of objects required for configuration of alarm
    thresholds and notifications in EFMcu ports."
 ::= { efmCuGroups 6 }

efmCuNotificationGroup NOTIFICATION-GROUP
NOTIFICATIONS {
    efmCuLowRateCrossing,
    efmCuPmeLineAtnCrossing,
    efmCuPmeSnrMgnCrossing,
    efmCuPmeDeviceFault,
    efmCuPmeConfigInitFailure,
    efmCuPmeProtocolInitFailure
--     efmCuPmeDeviceFault,
--     efmCuPmeLocalPowerLoss
}
STATUS      current
DESCRIPTION
    "This group supports notifications of significant conditions
    associated with EFMcu ports."
 ::= { efmCuGroups 7 }

efmCuPme2BProfileGroup OBJECT-GROUP
OBJECTS {
    efmCuPme2BProfileDescr,
    efmCuPme2BRegion,
    efmCuPme2BsMode,
    efmCuPme2BMinDataRate,
    efmCuPme2BMaxDataRate,
    efmCuPme2BPower,
    efmCuPme2BConstellation,
    efmCuPme2BProfileRowStatus

```

```

}
STATUS      current
DESCRIPTION
    "A collection of objects that constitute a configuration

```

```
    profile for configuration of 2BASE-TL ports."
 ::= { efmCuGroups 8 }
```

```
efmCuPme10PProfileGroup OBJECT-GROUP
```

```
OBJECTS {
    efmCuPme10PProfileDescr,
    efmCuPme10PBandplanPSDMskProfile,
    efmCuPme10PUPB0ReferenceProfile,
    efmCuPme10PBandNotchProfiles,
    efmCuPme10PPayloadURateProfile,
    efmCuPme10PPayloadDRateProfile,
    efmCuPme10PProfileRowStatus
}
```

```
STATUS current
```

```
DESCRIPTION
```

```
"A collection of objects that constitute a configuration
profile for configuration of 10PASS-TS ports."
```

```
::= { efmCuGroups 9 }
```

```
efmCuPme10PStatusGroup OBJECT-GROUP
```

```
OBJECTS {
    efmCuPme10PFECCorrectedBlocks,
    efmCuPme10PFECUncorrectedBlocks
}
```

```
STATUS current
```

```
DESCRIPTION
```

```
"A collection of objects providing status information
specific to 10PASS-TS PMEs."
```

```
::= { efmCuGroups 10 }
```

```
-- Compliance Statements
```

```
efmCuCompliance MODULE-COMPLIANCE
```

```
STATUS current
```

```
DESCRIPTION
```

```
"The compliance statement for 2BASE-TL/10PASS-TS interfaces.
Compliance with the following external compliance statements
is REQUIRED:
```

MIB Module	Compliance Statement
-----	-----
IF-MIB	ifCompliance3
IF-INVERTED-STACK-MIB	ifInvCompliance
EtherLike-MIB	dot3Compliance2

MAU-MIB                                    mauModIfCompl3"

```
MODULE -- this module
MANDATORY-GROUPS {
    efmCuBasicGroup,
    efmCuPmeGroup,
    efmCuAlarmConfGroup,
    efmCuNotificationGroup
}

GROUP            efmCuPme2BProfileGroup
DESCRIPTION
    "Support for this group is only required for implementations
    supporting 2BASE-TL Phy."

GROUP            efmCuPme10PProfileGroup
DESCRIPTION
    "Support for this group is only required for implementations
    supporting 10PASS-TS Phy."

GROUP            efmCuPAFGroup
DESCRIPTION
    "Support for this group is only required for
    implementations supporting PME Aggregation Function (PAF)."

GROUP            ifStackCapabilityGroup
DESCRIPTION
    "Support for this group is OPTIONAL for implementations
    supporting layered interfaces architecture with
    flexible cross-connect between the layers."

GROUP            efmCuPAFErrorsGroup
DESCRIPTION
    "Support for this group is OPTIONAL for implementations
    supporting PME Aggregation Function (PAF)."

GROUP            efmCuPme10PStatusGroup
DESCRIPTION
    "Support for this group is OPTIONAL for implementations
    supporting 10PASS-TS Phy."

OBJECT           efmCuPmeSubTypesSupported
SYNTAX           BITS {
    ieee2BaseTL0(0),
    ieee2BaseTLR(1),
    ieee10PassTS0(2),
    ieee10PassTSR(3)
```

}

DESCRIPTION

"Support for all subtypes is not required. However at least one value SHALL be supported"

OBJECT efmCuPmeAdminSubType

MIN-ACCESS read-only

DESCRIPTION

"Write access is not required (needed only for PMEs supporting more than a single subtype, e.g. ieee2BaseTLO and ieee2BaseTSR or ieee2BaseTLR and ieee10PassTSR)"

OBJECT efmCuTargetSnrMgn

MIN-ACCESS read-only

DESCRIPTION

"Write access is OPTIONAL. For PHYs without write access the target SNR margin SHALL be fixed at 5dB for 2BASE-TL and 6dB for 10PASS-TS."

OBJECT efmCuAdaptiveSpectra

MIN-ACCESS read-only

DESCRIPTION

"Write access is OPTIONAL. For PHYs without write access the default value SHOULD be false."

::= { efmCuCompliances 1 }

END

## 6. Security Considerations

There is a number of managed objects defined in this MIB module that have a MAX-ACCESS clause of read-write or read-create. Most objects are writeable only when the link is Down. Writing to these objects can have potentially disruptive effects on network operation, for example:

- o Changing of efmCuPmeAdminSubType MAY lead to a potential locking

of the link, as peer PMEs of the same sub-type cannot exchange handshake messages.

- o Changing of efmCuPAFAdminState to enabled MAY lead to a potential locking of the link, if the peer Phy does not support PAF.
- o Changing of efmCuPAFDiscoveryCode, before the discovery operation, MAY lead to a wrongful discovery, for example when two -0 ports

are connected to the same multi-PME -R port and both -0 ports have the same Discovery register value.

- o Changing PCS or PME configuration parameters (e.g. profile of a PCS or PME via efmCuAdminProfile or efmCuPmeAdminProfile) MAY lead to anything from link quality and rate degradation to a complete link initialization failure, as ability of an EFMCu port to support a particular configuration depends on the copper environment.
- o Activation of a PME can cause a severe degradation of service for another EFMCu Phy, whose PME(s) MAY be affected by the cross-talk from the newly activated PME.
- o Removal of a PME from an operationally 'up' EFMCu port, aggregating several PMEs, MAY cause port's rate degradation

The user of this MIB module must therefore be aware that support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations.

The readable objects in this MIB module (i.e., those with MAX-ACCESS other than not-accessible) may be considered sensitive in some environments since, collectively, they provide information about the performance of network interfaces and can reveal some aspects of their configuration. In particular since EFMCu can be carried over Unshielded Twisted Pair (UTP) voice grade copper in a bundle with other pairs belonging to another operator/customer, it is theoretically possible to evasdrop to an EFMCu transmission simply by "listening" to a cross-talk from an EFMCu pair, especially if the parameters of the EFMCu link in question are known. In such environments it is important to control even GET and NOTIFY access to these objects and possibly even to encrypt their values when sending

them over the network via SNMP.

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

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

Further, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to

enable cryptographic security. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an instance of this MIB module is properly configured to give access to the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

## [7.](#) IANA Considerations

The two new values of dot3MauType (dot3MauType2BaseTL and dot3MauType10PassTS) and corresponding IANAifMauTypeListBits bit definitions (b2BaseTL and b10PassTS), as well as the new values for IANAifMauMediaAvailable (availableReduced and ready) SHALL be defined by the IANA in the IANA-MAU-MIB module (see [I-D.ietf-hubmib-rfc3636bis]) before this document is published as an RFC.

## [8.](#) Acknowledgments

This document was produced by the IETF Ethernet Interfaces and Hub MIB Working Group, whose efforts were greatly advanced by the contributions of the following people (in alphabetical order):

Dan Romascanu

Marina Popilov

Mathias Riess

Matt Squire

Mike Heard

Udi Ashkenazi

## [9.](#) References

### [9.1.](#) Normative References

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