

Internet Draft

IPCDN Working Group

Document: [draft-ietf-ipcdn-bpiplus-mib-15](#)

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Expires: June 2004

November 2004

**Management Information Base for DOCSIS
Cable Modems and Cable Modem Termination
Systems for Baseline Privacy Plus**

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Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it defines a set of managed objects for SNMP based management of the Baseline Privacy Plus features of DOCSIS 1.1 and DOCSIS 2.0 (Data-over-Cable Service Interface Specification) compliant Cable Modems and Cable Modem Termination

Systems.

Note to RFC Editor (Remove this paragraph prior to publication)

This memo is a product of the IPCDN working group within the Internet Engineering Task Force. Comments are solicited and should be Addressed to the working group's mailing list at ipcdn@ietf.org and/or the authors.

Conventions used in this document

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [BCP 14](#), [RFC 2119](#) [[RFC2119](#)].

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[1. 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](#)].

[2. Overview](#)

This MIB module (BPI+ MIB) provides a set of objects required for the management of the Baseline Privacy Interface Plus features of DOCSIS 1.1 and DOCSIS 2.0 Cable Modem (CM) and Cable Modem Termination System (CMTS). The specification is derived from the operational model described in the DOCSIS Baseline Privacy Interface Plus Specification [[1](#)].

DOCSIS Baseline Privacy Plus is composed of four distinct functional and manageable areas:

- o Key Exchange and Data Encryption
- o Cable Modem Authentication
- o Multicast Encryption
- o Authentication of Downloaded Software Images

This MIB module is an extension of the DOCSIS 1.0 Baseline Privacy MIB module [[RFC3083](#)] (BPI MIB), which is derived from the Operational model described in the DOCSIS Baseline Privacy Interface Specification [[2](#)]. The original Baseline Privacy MIB structure has been mostly preserved in the Baseline Privacy Plus MIB. Please note that the referenced DOCSIS specifications only require Cable Modems to process IPv4 customer traffic. Design choices in this MIB module reflect those requirements. Future versions of the DOCSIS specifications are expected to require support for IPv6 as well.

[2.1 Structure of the MIB](#)

This MIB module is structured into several tables and objects:

[2.1.1. Cable Modem](#)

- o The docsBpi2CmBaseTable contains authorization key exchange information for one CM MAC interface.
- o The docsBpi2CmTEKTable contains traffic key exchange and data encryption information for a particular security association ID of the cable modem.

- o Multicast Encryption information is maintained under DocsBpi2CmMulticastObjects. There is currently one multicast table object which manages IP multicast encryption, docsBpi2CmIpMulticastMapTable.
- o Digital certificates used for cable modem authentication are accessible via docsBpi2CmDeviceCertTable.
- o Cryptographic suite capabilities for a CM MAC are maintained in the docsBpi2CmCryptoSuiteTable.

2.1.2. Cable Modem Termination System

- o The docsBpi2CmtsBaseTable contains default settings and summary counters for the cable modem termination system.
- o The DocsBpi2CmtsAuthTable contains Authorization Key Exchange information for each CM MAC interface, as well as data from CM certificates used in cable modem authentication.
- o The docsBpi2CmtsTEKTable contains traffic key exchange and data encryption information for a particular security association ID.
- o Multicast Encryption information is maintained under DocsBpi2CmtsMulticastObjects. There are currently two multicast table objects. The Table docsBpi2CmtsIpMulticastMapTable is specifically designed for IP multicast encryption, whereas docsBpi2CmtsMulticastAuthTable is meant to manage all multicast security associations.

In particular, the table docsBpi2CmtsIpMulticastMapTable defines the object docsBpi2CmtsIpMulticastMask which could be a non-contiguous netmask; this is why the object syntax is based on the INET-ADDRESS-MIB MIB Module [[RFC3291](#)] Textual Convention InetAddress instead of InetAddressPrefixLength.

This is to facilitate the assignment of same DOCSIS Security Association ID (SAID) to one or more IPv6 multicast group ID(s) matching one or more IPv6 multicast scope types within an entry in this table.

For example, multicast scopes labeled "unassigned" [[RFC3513](#)] may be allocated by administrators to a particular SAID regardless of their multicast scope; such mapping transient multicast group 'Y' to SAID 'z' for ANY multicast scope. The non-contiguous netmask will be FF10:Y, see

[RFC3513] for details on IPv6 multicast addressing.

- o DocsBpi2CmtsCertObjects contains 2 manageable tables: one for provisioned cable modem certificates and one for certification authority certificates.

2.1.3. Common

- o The docsBpi2CodeDownloadControl objects manage the authenticated software download process for a given device.

2.2 Relationship of BPI+ and BPI MIB Modules

This section describes the relationship between the BPI+ MIB module defined in this document and the BPI MIB module defined in [RFC 3083](#) [RFC3083]. The BPI+ protocol interface is an enhancement to the BPI protocol and it is a distinct protocol from BPI. The associated BPI+ managed objects should be considered separate from the BPI MIB objects defined in [RFC 3083](#).

DOCSIS 1.1 and 2.0 systems implement both the BPI+ and BPI protocols to be backward compatible with 1.0 systems. For more information regarding the interoperability between BPI and BPI+ compliant systems, refer to [appendix C](#) of the DOCSIS BPI+ specification [1] and for MIB modules requirements, refers to [section 4.6.1](#), Figure 9 of the DOCSIS 1.1 OSSI specification [3] and [section 7.6.1](#), Table 7-9 of the DOCSIS 2.0 OSSI specification [4].

2.3 BPI+ MIB module relationship with The Interfaces Group MIB

The BPI+ MIB module is the management framework of Baseline Privacy Plus Interface Specification [1], which provides the MAC layer (Media Access Control) security Services of DOCSIS through the Baseline Privacy Key Management (BPKM) protocol. The BPI+ MIB module objects are organized as extensions of the Radio Frequency (RF) Interface Management [[RFC2670](#)].

The MIB table structures of this MIB Module are extensions of the DOCSIS CATV (Community Antenna Television) MAC layer interface (DocsCableMacLayer by [[IANA](#)]). In particular the provisions of the Interface Group MIB[RFC2863] for counters discontinuities and system re-initialization apply to CM and CMTS to validate the difference between two consecutive counters polls.

All BPI+ MIB module counters are 32 bits based on the minimum time to wrap-up considerations of [[RFC2863](#)] and their possible frequency

occurrence as BPI+ FSM (Finite State Machine) event counters. see [\[1\]](#) for BPI+ FSM parameter guidelines.

3. Definitions

DOCS-IETF-BPI2-MIB DEFINITIONS ::= BEGIN

IMPORTS

```

MODULE-IDENTITY, OBJECT-TYPE,
Integer32,
Unsigned32,
Counter32,
mib-2
    FROM SNMPv2-SMI          -- [RFC2578]
SnmpAdminString
    FROM SNMP-FRAMEWORK-MIB  -- [RFC3411]
TEXTUAL-CONVENTION,
MacAddress,
RowStatus,
TruthValue,
DateAndTime,
StorageType
    FROM SNMPv2-TC          -- [RFC2579]
OBJECT-GROUP,
MODULE-COMPLIANCE
    FROM SNMPv2-CONF        -- [RFC2580]
ifIndex
    FROM IF-MIB              -- [RFC2863]
InetAddressType,
InetAddress
    FROM INET-ADDRESS-MIB;   -- [RFC3291]

```

```

docsBpi2MIB      MODULE-IDENTITY
    LAST-UPDATED "200409071700Z" -- September 7th, 2004
    ORGANIZATION "IETF IP over Cable Data Network (IPCDN)
                  Working Group"
    CONTACT-INFO "-----
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```


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Co-chairs: Richard Woundy, rwoundy@cisco.com
Jean-Francois Mule, jfm@cablelabs.com

DESCRIPTION

"This is the MIB module for the DOCSIS Baseline Privacy Plus Interface (BPI+) at cable modems (CMs) and cable modem termination systems (CMTSS).

Copyright (C) The Internet Society (2004). This version of this MIB module is part of RFC XXXX; see the RFC itself for full legal notices."


```
REVISION          "200409071700Z"
DESCRIPTION
    "Initial version of the IETF BPI+ MIB module.
    This version published as RFC XXXX."

-- Note to RFC editor:
-- RFC editor to assign yy
-- Delete this note

::= { mib-2 yy }    -- yy to be assigned by IANA
```

```
-- Textual conventions
```

```
DocsX509ASN1DEREncodedCertificate ::= TEXTUAL-CONVENTION
    STATUS      current
    DESCRIPTION
        "An X509 digital certificate encoded as an ASN.1 DER
        object."
    SYNTAX      OCTET STRING (SIZE (0..4096))
```

```
DocsSAId ::= TEXTUAL-CONVENTION
    DISPLAY-HINT "d"
    STATUS      current
    DESCRIPTION
        "Security Association identifier (SAId)"
    REFERENCE
        " DOCSIS Baseline Privacy Plus Interface
        specification, Section 2.1.3 BPI+ Security
        Associations"
    SYNTAX      Integer32 (1..16383)
```

```
DocsSAIdOrZero ::= TEXTUAL-CONVENTION
    DISPLAY-HINT "d"
    STATUS      current
    DESCRIPTION
        "Security Association identifier (SAId). The value
        zero indicates the SAId is yet to be determined"
    REFERENCE
        " DOCSIS Baseline Privacy Plus Interface
        specification, Section 2.1.3 BPI+ Security
        Associations"
    SYNTAX      Unsigned32 (0 | 1..16383)
```

```
DocsBpkmsAType ::= TEXTUAL-CONVENTION
    STATUS      current
```


DESCRIPTION

"The type of security association (SA).
The values of the named-numbers are associated
with the BPKM SA-Type attributes:
'primary' corresponds to code '1', 'static' to code '2'
'dynamic' to code '3'.
'none' value must only be used if the SA type has yet
to be determined."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface
specification, [Section 4.2.2.24](#)"

```
SYNTAX      INTEGER {  
                none(0),  
                primary(1),  
                static(2),  
                dynamic(3)  
            }
```

DocsBpkmDataEncryptAlg ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The list of data encryption algorithms defined for
the DOCSIS interface in the BPKM cryptographic-suite
parameter. The Value 'none' is indicates that the SAID
being referenced has no data encryption."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.2.2.20](#)."

```
SYNTAX      INTEGER {  
                none(0),  
                des56CbcMode(1),  
                des40CbcMode(2),  
                t3Des128CbcMode(3),  
                aes128CbcMode(4),  
                aes256CbcMode(5)  
            }
```

DocsBpkmDataAuthentAlg ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The list of data integrity algorithms defined for the
DOCSIS interface in the BPKM cryptographic-suite parameter.
The value 'none' indicates no data integrity is used for
the SAID being referenced."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.2.2.20](#)."

```
SYNTAX      INTEGER {  
                none(0),
```



```

        hmacSha196(1)
    }

docsBpi2MIBObjects OBJECT IDENTIFIER ::= { docsBpi2MIB 1 }

-- Cable Modem Group

docsBpi2CmObjects OBJECT IDENTIFIER ::= { docsBpi2MIBObjects 1 }

--
-- The BPI+ base and authorization table for CMs,
-- indexed by ifIndex
--

docsBpi2CmBaseTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF      DocsBpi2CmBaseEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "This table describes the basic and authorization
        related Baseline Privacy Plus attributes of each CM MAC
        interface."
    ::= { docsBpi2CmObjects 1 }

docsBpi2CmBaseEntry OBJECT-TYPE
    SYNTAX          DocsBpi2CmBaseEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "Each entry contains objects describing attributes of
        one CM MAC interface. An entry in this table exists for
        each ifEntry with an ifType of docsCableMacLayer(127)."
    INDEX          { ifIndex }
    ::= { docsBpi2CmBaseTable 1 }

DocsBpi2CmBaseEntry ::= SEQUENCE {
    docsBpi2CmPrivacyEnable          TruthValue,
    docsBpi2CmPublicKey              OCTET STRING,
    docsBpi2CmAuthState              INTEGER,
    docsBpi2CmAuthKeySequenceNumber Integer32,
    docsBpi2CmAuthExpiresOld         DateAndTime,
    docsBpi2CmAuthExpiresNew        DateAndTime,
    docsBpi2CmAuthReset              TruthValue,
    docsBpi2CmAuthGraceTime          Integer32,
    docsBpi2CmTEKGraceTime           Integer32,
    docsBpi2CmAuthWaitTimeout        Integer32,
    docsBpi2CmReauthWaitTimeout      Integer32,
    docsBpi2CmOpWaitTimeout          Integer32,
    docsBpi2CmRekeyWaitTimeout       Integer32,

```



```
    }
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The value of this object is the state of the CM
    authorization FSM. The start state indicates that FSM is
    in its initial state."
REFERENCE
    "DOCSIS Baseline Privacy Plus Interface Specification,
    Section 4.1.2.1."
::= { docsBpi2CmBaseEntry 3 }
```

```
docsBpi2CmAuthKeySequenceNumber OBJECT-TYPE
    SYNTAX          Integer32 (0..15)
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "The value of this object is the most recent
        authorization key sequence number for this FSM."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,
        Sections 4.2.1.2 and 4.2.2.10."
    ::= { docsBpi2CmBaseEntry 4 }
```

```
docsBpi2CmAuthExpiresOld OBJECT-TYPE
    SYNTAX          DateAndTime
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "The value of this object is the actual clock time for
        expiration of the immediate predecessor of the most recent
        authorization key for this FSM. If this FSM has only one
        authorization key, then the value is the time of activation
        of this FSM."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,
        Sections 4.2.1.2 and 4.2.2.9."
    ::= { docsBpi2CmBaseEntry 5 }
```

```
docsBpi2CmAuthExpiresNew OBJECT-TYPE
    SYNTAX          DateAndTime
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "The value of this object is the actual clock time for
        expiration of the most recent authorization key for this
        FSM."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,
```


Sections [4.2.1.2](#) and [4.2.2.9](#)."

::= { docsBpi2CmBaseEntry 6 }

docsBpi2CmAuthReset OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Setting this object to 'true' generates a Reauthorize event in the authorization FSM. Reading this object always returns FALSE.

This object is for testing purposes only and therefore it does not require to be associated with a last reset object."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.1.2.3.4](#)."

::= { docsBpi2CmBaseEntry 7 }

docsBpi2CmAuthGraceTime OBJECT-TYPE

SYNTAX Integer32 (1..6047999)

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the grace time for an authorization key in seconds. A CM is expected to start trying to get a new authorization key beginning AuthGraceTime seconds before the most recent authorization key actually expires."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Appendix A.1.1.1.3](#)."

::= { docsBpi2CmBaseEntry 8 }

docsBpi2CmTEKGraceTime OBJECT-TYPE

SYNTAX Integer32 (1..302399)

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the grace time for the TEK in seconds. The CM is expected to start trying to acquire a new TEK beginning TEK GraceTime seconds before the expiration of the most recent TEK."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Appendix A.1.1.1.6](#)."

::= { docsBpi2CmBaseEntry 9 }

docsBpi2CmAuthWaitTimeout OBJECT-TYPE

SYNTAX Integer32 (1..30)

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the Authorize Wait Timeout in second."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Appendix A.1.1.1.1](#)."

::= { docsBpi2CmBaseEntry 10 }

docsBpi2CmReauthWaitTimeout OBJECT-TYPE

SYNTAX Integer32 (1..30)

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the Reauthorize Wait Timeout in seconds."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Appendix A.1.1.1.2](#)."

::= { docsBpi2CmBaseEntry 11 }

docsBpi2CmOpWaitTimeout OBJECT-TYPE

SYNTAX Integer32 (1..10)

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the Operational Wait Timeout in seconds."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Appendix A.1.1.1.4](#)."

::= { docsBpi2CmBaseEntry 12 }

docsBpi2CmRekeyWaitTimeout OBJECT-TYPE

SYNTAX Integer32 (1..10)

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the Rekey Wait Timeout in seconds."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Appendix A.1.1.1.5.](#)"

::= { docsBpi2CmBaseEntry 13 }

docsBpi2CmAuthRejectWaitTimeout OBJECT-TYPE

SYNTAX Integer32 (1..600)

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the Authorization Reject
Wait Timeout in seconds."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Appendix A.1.1.1.7.](#)"

::= { docsBpi2CmBaseEntry 14 }

docsBpi2CmSAMapWaitTimeout OBJECT-TYPE

SYNTAX Integer32 (1..10)

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the retransmission
interval, in seconds, of SA Map Requests from the MAP Wait
state."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Appendix A.1.1.1.8.](#)"

::= { docsBpi2CmBaseEntry 15 }

docsBpi2CmSAMapMaxRetries OBJECT-TYPE

SYNTAX Integer32 (0..10)

UNITS "count"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the maximum number of
Map Request retries allowed."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Appendix A.1.1.1.9.](#)"

::= { docsBpi2CmBaseEntry 16 }

docsBpi2CmAuthentInfos OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CM has transmitted an Authentication Information message. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.9](#)."

::= { docsBpi2CmBaseEntry 17 }

docsBpi2CmAuthRequests OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CM has transmitted an Authorization Request message. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.1](#)."

::= { docsBpi2CmBaseEntry 18 }

docsBpi2CmAuthReplies OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CM has received an Authorization Reply message. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.2](#)."

::= { docsBpi2CmBaseEntry 19 }

docsBpi2CmAuthRejects OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CM has received an Authorization Reject message. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.3](#)."

::= { docsBpi2CmBaseEntry 20 }

docsBpi2CmAuthInvalids OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CM has received an Authorization Invalid message. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.7](#)."

::= { docsBpi2CmBaseEntry 21 }

docsBpi2CmAuthRejectErrorCode OBJECT-TYPE

SYNTAX INTEGER {
 none(1),
 unknown(2),
 unauthorizedCm(3),
 unauthorizedSaid(4),
 permanentAuthorizationFailure(8),
 timeOfDayNotAcquired(11)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the enumerated description of the Error-Code in most recent Authorization Reject message received by the CM. This has value unknown(2) if the last Error-Code value was 0, and none(1) if no Authorization Reject message has been received since reboot."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, Sections [4.2.1.3](#) and [4.2.2.15](#)."

::= { docsBpi2CmBaseEntry 22 }

docsBpi2CmAuthRejectErrorString OBJECT-TYPE
SYNTAX SnmpAdminString (SIZE (0..128))
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The value of this object is the text string in most recent Authorization Reject message received by the CM. This is a zero length string if no Authorization Reject message has been received since reboot."
REFERENCE
 "DOCSIS Baseline Privacy Plus Interface Specification, Sections [4.2.1.3](#) and [4.2.2.6](#)."
::= { docsBpi2CmBaseEntry 23 }

docsBpi2CmAuthInvalidErrorCode OBJECT-TYPE
SYNTAX INTEGER {
 none(1),
 unknown(2),
 unauthorizedCm(3),
 unsolicited(5),
 invalidKeySequence(6),
 keyRequestAuthenticationFailure(7)
 }
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The value of this object is the enumerated description of the Error-Code in most recent Authorization Invalid message received by the CM. This has value unknown(2) if the last Error-Code value was 0, and none(1) if no Authorization Invalid message has been received since reboot."
REFERENCE
 "DOCSIS Baseline Privacy Plus Interface Specification, Sections [4.2.1.7](#) and [4.2.2.15](#)."
::= { docsBpi2CmBaseEntry 24 }

docsBpi2CmAuthInvalidErrorString OBJECT-TYPE
SYNTAX SnmpAdminString (SIZE (0..128))
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The value of this object is the text string in most recent Authorization Invalid message received by the CM. This is a zero length string if no Authorization Invalid message has been received since reboot."
REFERENCE
 "DOCSIS Baseline Privacy Plus Interface Specification,

Sections [4.2.1.7](#) and [4.2.2.6](#)."
 ::= { docsBpi2CmBaseEntry 25 }

--

-- The CM TEK Table, indexed by ifIndex and SAID

--

docsBpi2CmTEKTable OBJECT-TYPE
 SYNTAX SEQUENCE OF DocsBpi2CmTEKEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "This table describes the attributes of each CM
 Traffic Encryption Key (TEK) association. The CM maintains
 (no more than) one TEK association per SAID per CM MAC
 interface."
 ::= { docsBpi2CmObjects 2 }

docsBpi2CmTEKEntry OBJECT-TYPE
 SYNTAX DocsBpi2CmTEKEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "Each entry contains objects describing the TEK
 association attributes of one SAID. The CM MUST create one
 entry per SAID, regardless of whether the SAID was obtained
 from a Registration Response message, from an Authorization
 Reply message, or from any dynamic SAID establishment
 mechanisms."
 INDEX { ifIndex, docsBpi2CmTEKSAId }
 ::= { docsBpi2CmTEKTable 1 }

DocsBpi2CmTEKEntry ::= SEQUENCE {
 docsBpi2CmTEKSAId DocsSAId,
 docsBpi2CmTEKSAType DocsBpkmSAType,
 docsBpi2CmTEKDataEncryptAlg DocsBpkmDataEncryptAlg,
 docsBpi2CmTEKDataAuthentAlg DocsBpkmDataAuthentAlg,
 docsBpi2CmTEKState INTEGER,
 docsBpi2CmTEKKeySequenceNumber Integer32,
 docsBpi2CmTEKExpiresOld DateAndTime,
 docsBpi2CmTEKExpiresNew DateAndTime,
 docsBpi2CmTEKKeyRequests Counter32,
 docsBpi2CmTEKKeyReplies Counter32,
 docsBpi2CmTEKKeyRejects Counter32,
 docsBpi2CmTEKInvalids Counter32,
 docsBpi2CmTEKAuthPends Counter32,


```
docsBpi2CmTEKKeyRejectErrorCode    INTEGER,
docsBpi2CmTEKKeyRejectErrorString  SnmpAdminString,
docsBpi2CmTEKInvalidErrorCode      INTEGER,
docsBpi2CmTEKInvalidErrorString    SnmpAdminString
}
```

```
docsBpi2CmTEKSAId    OBJECT-TYPE
    SYNTAX              DocsSAId
    MAX-ACCESS          not-accessible
    STATUS              current
    DESCRIPTION
        "The value of this object is the DOCSIS Security
        Association ID (SAID)."
```

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.2.2.12](#)."

```
::= { docsBpi2CmTEKEntry 1 }
```

```
docsBpi2CmTEKSAType OBJECT-TYPE
    SYNTAX              DocsBpkmSAType
    MAX-ACCESS          read-only
    STATUS              current
    DESCRIPTION
        "The value of this object is the type of security
        association."
```

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 2.1.3](#)."

```
::= { docsBpi2CmTEKEntry 2 }
```

```
docsBpi2CmTEKDataEncryptAlg OBJECT-TYPE
    SYNTAX              DocsBpkmDataEncryptAlg
    MAX-ACCESS          read-only
    STATUS              current
    DESCRIPTION
        "The value of this object is the data encryption
        algorithm for this SAID."
```

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.2.2.20](#)."

```
::= { docsBpi2CmTEKEntry 3 }
```

```
docsBpi2CmTEKDataAuthentAlg OBJECT-TYPE
    SYNTAX              DocsBpkmDataAuthentAlg
    MAX-ACCESS          read-only
    STATUS              current
    DESCRIPTION
        "The value of this object is the data authentication
        algorithm for this SAID."
```


REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.2.2.20](#)."

::= { docsBpi2CmTEKEntry 4 }

docsBpi2CmTEKState OBJECT-TYPE

SYNTAX INTEGER {
 start(1),
 opWait(2),
 opReauthWait(3),
 operational(4),
 rekeyWait(5),
 rekeyReauthWait(6)
 }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the state of the indicated TEK FSM. The start(1) state indicates that FSM is in its initial state."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.1.3.1](#)."

::= { docsBpi2CmTEKEntry 5 }

docsBpi2CmTEKKeySequenceNumber OBJECT-TYPE

SYNTAX Integer32 (0..15)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the most recent TEK key sequence number for this TEK FSM."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
 Sections [4.2.2.10](#) and [4.2.2.13](#)."

::= { docsBpi2CmTEKEntry 6 }

docsBpi2CmTEKExpiresOld OBJECT-TYPE

SYNTAX DateAndTime

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the actual clock time for expiration of the immediate predecessor of the most recent TEK for this FSM. If this FSM has only one TEK, then the value is the time of activation of this FSM."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
 Sections [4.2.1.5](#) and [4.2.2.9](#)."


```
::= { docsBpi2CmTEKEntry 7 }
```

docsBpi2CmTEKExpiresNew OBJECT-TYPE

SYNTAX DateAndTime

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the actual clock time for expiration of the most recent TEK for this FSM."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, Sections [4.2.1.5](#) and [4.2.2.9](#)."

```
::= { docsBpi2CmTEKEntry 8 }
```

docsBpi2CmTEKKeyRequests OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CM has transmitted a Key Request message.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.4](#)."

```
::= { docsBpi2CmTEKEntry 9 }
```

docsBpi2CmTEKKeyReplies OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CM has received a Key Reply message, including a message whose authentication failed.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.5](#)."

```
::= { docsBpi2CmTEKEntry 10 }
```

docsBpi2CmTEKKeyRejects OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"The value of this object is the count of times the CM has received a Key Reject message, including a message whose authentication failed. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.6.](#)"

::= { docsBpi2CmTEKEntry 11 }

docsBpi2CmTEKInvalids OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"The value of this object is the count of times the CM has received a TEK Invalid message, including a message whose authentication failed. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.8.](#)"

::= { docsBpi2CmTEKEntry 12 }

docsBpi2CmTEKAuthPends OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"The value of this object is the count of times an Authorization Pending (Auth Pend) event occurred in this FSM. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.1.3.3.3.](#)"

::= { docsBpi2CmTEKEntry 13 }


```
docsBpi2CmTEKKeyRejectErrorCode OBJECT-TYPE
    SYNTAX          INTEGER {
                        none(1),
                        unknown(2),
                        unauthorizedSaid(4)
                    }
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "The value of this object is the enumerated
        description of the Error-Code in most recent Key Reject
        message received by the CM. This has value unknown(2) if
        the last Error-Code value was 0, and none(1) if no Key
        Reject message has been received since registration."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,
        Sections 4.1.2.6 and 4.2.2.15."
    ::= { docsBpi2CmTEKEntry 14 }

docsBpi2CmTEKKeyRejectErrorString OBJECT-TYPE
    SYNTAX          SnmpAdminString (SIZE (0..128))
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "The value of this object is the text string in
        most recent Key Reject message received by the CM. This is
        a zero length string if no Key Reject message has been
        received since registration."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,
        Sections 4.1.2.6 and 4.2.2.6."
    ::= { docsBpi2CmTEKEntry 15 }

docsBpi2CmTEKInvalidErrorCode OBJECT-TYPE
    SYNTAX          INTEGER {
                        none(1),
                        unknown(2),
                        invalidKeySequence(6)
                    }
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "The value of this object is the enumerated
        description of the Error-Code in most recent TEK Invalid
        message received by the CM. This has value unknown(2) if
        the last Error-Code value was 0, and none(1) if no TEK
        Invalid message has been received since registration."
    REFERENCE
```


"DOCSIS Baseline Privacy Plus Interface Specification,
Sections [4.1.2.8](#) and [4.2.2.15](#)."

::= { docsBpi2CmTEKEntry 16 }

docsBpi2CmTEKInvalidErrorString OBJECT-TYPE

SYNTAX SnmpAdminString (SIZE (0..128))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the text string in
most recent TEK Invalid message received by the CM. This is
a zero length string if no TEK Invalid message has been
received since registration."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
Sections [4.1.2.8](#) and [4.2.2.6](#)."

::= { docsBpi2CmTEKEntry 17 }

--

-- The CM Multicast Objects Group

--

docsBpi2CmMulticastObjects OBJECT IDENTIFIER

::= { docsBpi2CmObjects 3 }

--

-- The CM Dynamic IP Multicast Mapping Table, indexed by

-- docsBpi2CmIpMulticastIndex and by ifIndex

--

docsBpi2CmIpMulticastMapTable OBJECT-TYPE

SYNTAX SEQUENCE OF DocsBpi2CmIpMulticastMapEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table maps multicast IP addresses to SAIDs per
CM MAC Interface.

It is intended to map multicast IP addresses associated
with SA MAP Request messages."

::= { docsBpi2CmMulticastObjects 1 }

docsBpi2CmIpMulticastMapEntry OBJECT-TYPE

SYNTAX DocsBpi2CmIpMulticastMapEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry contains objects describing the mapping of
one multicast IP address to one SAID, as well as

associated state, message counters, and error information.

An entry may be removed from this table upon the reception of an SA Map Reject."

INDEX { ifIndex, docsBpi2CmIpMulticastIndex }

::= { docsBpi2CmIpMulticastMapTable 1 }

```
DocsBpi2CmIpMulticastMapEntry ::= SEQUENCE {
    docsBpi2CmIpMulticastIndex          Unsigned32,
    docsBpi2CmIpMulticastAddressType    InetAddressType,
    docsBpi2CmIpMulticastAddress        InetAddress,
    docsBpi2CmIpMulticastSAId           DocsSAIdOrZero,
    docsBpi2CmIpMulticastSAMapState     INTEGER,
    docsBpi2CmIpMulticastSAMapRequests Counter32,
    docsBpi2CmIpMulticastSAMapReplies  Counter32,
    docsBpi2CmIpMulticastSAMapRejects  Counter32,
    docsBpi2CmIpMulticastSAMapRejectErrorCode INTEGER,
    docsBpi2CmIpMulticastSAMapRejectErrorString SnmpAdminString
}
```

```
docsBpi2CmIpMulticastIndex      OBJECT-TYPE
    SYNTAX          Unsigned32 (1..4294967295)
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "The index of this row."
    ::= { docsBpi2CmIpMulticastMapEntry 1 }
```

```
docsBpi2CmIpMulticastAddressType OBJECT-TYPE
    SYNTAX          InetAddressType
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "The type of internet address for
        docsBpi2CmIpMulticastAddress."
    ::= { docsBpi2CmIpMulticastMapEntry 2 }
```

```
docsBpi2CmIpMulticastAddress    OBJECT-TYPE
    SYNTAX          InetAddress
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object represents the IP multicast address
        to be mapped. The type of this address is determined by
        the value of the docsBpi2CmIpMulticastAddressType object."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,
        Section 5.4."
    ::= { docsBpi2CmIpMulticastMapEntry 3 }
```



```

docsBpi2CmIpMulticastSAId          OBJECT-TYPE
    SYNTAX          DocsSAIdOrZero
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object represents the SAID to which the IP
        multicast address has been mapped.  If no SA Map Reply has
        been received for the IP address, this object should have
        the value 0."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,
        Section 4.2.2.12."
    ::= { docsBpi2CmIpMulticastMapEntry 4 }

docsBpi2CmIpMulticastSAMapState      OBJECT-TYPE
    SYNTAX          INTEGER {
                                start(1),
                                mapWait(2),
                                mapped(3)
                            }
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "The value of this object is the state of the SA
        Mapping FSM for this IP."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,
        Section 5.3.1."
    ::= { docsBpi2CmIpMulticastMapEntry 5 }

docsBpi2CmIpMulticastSAMapRequests OBJECT-TYPE
    SYNTAX          Counter32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "The value of this object is the count of times the
        CM has transmitted an SA Map Request message for this IP.
        Discontinuities in the value of this counter can occur at
        re-initialization of the management system, and at other
        times as indicated by the value of
        ifCounterDiscontinuityTime."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,
        Section 4.2.1.10."
    ::= { docsBpi2CmIpMulticastMapEntry 6 }

docsBpi2CmIpMulticastSAMapReplies  OBJECT-TYPE

```


SYNTAX Counter32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION

"The value of this object is the count of times the CM has received an SA Map Reply message for this IP. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.11](#)."

::= { docsBpi2CmIpMulticastMapEntry 7 }

docsBpi2CmIpMulticastSAMapRejects OBJECT-TYPE

SYNTAX Counter32
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION

"The value of this object is the count of times the CM has received an SA MAP Reject message for this IP. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.12](#)."

::= { docsBpi2CmIpMulticastMapEntry 8 }

docsBpi2CmIpMulticastSAMapRejectErrorCode OBJECT-TYPE

SYNTAX INTEGER {
 none(1),
 unknown(2),
 noAuthForRequestedDSFlow(9),
 dsFlowNotMappedToSA(10)
 }

MAX-ACCESS read-only
 STATUS current

DESCRIPTION

"The value of this object is the enumerated description of the Error-Code in the most recent SA Map Reject message sent in response to an SA Map Request for This IP. It has the value none(1) if no SA MAP Reject message has been received since entry creation."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, Sections [4.2.1.12](#) and [4.2.2.15](#)."


```

 ::= { docsBpi2CmIpMulticastMapEntry 9 }

docsBpi2CmIpMulticastSAMapRejectErrorString OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE (0..128))
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "The value of this object is the text string in
        the most recent SA Map Reject message sent in response to
        an SA Map Request for this IP.  It is a zero length string
        if no SA Map Reject message has been received since entry
        creation."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,
        Sections 4.2.1.12 and 4.2.2.6."
 ::= { docsBpi2CmIpMulticastMapEntry 10 }

--
-- CM Cert Objects
--

docsBpi2CmCertObjects OBJECT IDENTIFIER
    ::= { docsBpi2CmObjects 4 }

--
-- CM Device Cert Table
--

docsBpi2CmDeviceCertTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsBpi2CmDeviceCertEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "This table describes the Baseline Privacy Plus
        device certificates for each CM MAC interface."
 ::= { docsBpi2CmCertObjects 1 }

docsBpi2CmDeviceCertEntry OBJECT-TYPE
    SYNTAX      DocsBpi2CmDeviceCertEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "Each entry contains the device certificates of
        one CM MAC interface.  An entry in this table exists for
        each ifEntry with an ifType of docsCableMacLayer(127)."
    INDEX       { ifIndex }
 ::= { docsBpi2CmDeviceCertTable 1 }

```



```

DocsBpi2CmDeviceCertEntry ::= SEQUENCE {
    docsBpi2CmDeviceCmCert
        DocsX509ASN1DEREncodedCertificate,
    docsBpi2CmDeviceManufCert
        DocsX509ASN1DEREncodedCertificate
}

docsBpi2CmDeviceCmCert    OBJECT-TYPE
    SYNTAX                 DocsX509ASN1DEREncodedCertificate
    MAX-ACCESS              read-write
    STATUS                  current
    DESCRIPTION
        "The X509 DER-encoded cable modem certificate.
        Note: This object can be set only when the value is the
        zero-length OCTET STRING, otherwise an error
        'inconsistentValue' is returned. Once the object
        contains the certificate, its access MUST be read-only
        and persists after re-initialization of the
        managed system."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,
        Section 9.1."
    ::= { docsBpi2CmDeviceCertEntry 1 }

docsBpi2CmDeviceManufCert    OBJECT-TYPE
    SYNTAX                 DocsX509ASN1DEREncodedCertificate
    MAX-ACCESS              read-only
    STATUS                  current
    DESCRIPTION
        "The X509 DER-encoded manufacturer certificate which
        signed the cable modem certificate."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,
        Section 9.1."
    ::= { docsBpi2CmDeviceCertEntry 2 }

--
-- CM Crypto Suite Table
--

docsBpi2CmCryptoSuiteTable    OBJECT-TYPE
    SYNTAX                 SEQUENCE OF DocsBpi2CmCryptoSuiteEntry
    MAX-ACCESS              not-accessible
    STATUS                  current
    DESCRIPTION
        "This table describes the Baseline Privacy Plus
        cryptographic suite capabilities for each CM MAC
        interface."

```



```

 ::= { docsBpi2CmObjects 5 }

docsBpi2CmCryptoSuiteEntry    OBJECT-TYPE
    SYNTAX                    DocsBpi2CmCryptoSuiteEntry
    MAX-ACCESS                not-accessible
    STATUS                    current
    DESCRIPTION
        "Each entry contains a cryptographic suite pair
        which this CM MAC supports."
    INDEX                     { ifIndex, docsBpi2CmCryptoSuiteIndex }
    ::= { docsBpi2CmCryptoSuiteTable 1 }

DocsBpi2CmCryptoSuiteEntry ::= SEQUENCE {
    docsBpi2CmCryptoSuiteIndex          Unsigned32,
    docsBpi2CmCryptoSuiteDataEncryptAlg
                                         DocsBpkmDataEncryptAlg,
    docsBpi2CmCryptoSuiteDataAuthentAlg
                                         DocsBpkmDataAuthentAlg
}

docsBpi2CmCryptoSuiteIndex OBJECT-TYPE
    SYNTAX                    Unsigned32 (1..1000)
    MAX-ACCESS                not-accessible
    STATUS                    current
    DESCRIPTION
        "The index for a cryptographic suite row."
    ::= { docsBpi2CmCryptoSuiteEntry 1 }

docsBpi2CmCryptoSuiteDataEncryptAlg    OBJECT-TYPE
    SYNTAX                    DocsBpkmDataEncryptAlg
    MAX-ACCESS                read-only
    STATUS                    current
    DESCRIPTION
        "The value of this object is the data encryption
        algorithm for this cryptographic suite capability."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,
        Section 4.2.2.20."
    ::= { docsBpi2CmCryptoSuiteEntry 2 }

docsBpi2CmCryptoSuiteDataAuthentAlg    OBJECT-TYPE
    SYNTAX                    DocsBpkmDataAuthentAlg
    MAX-ACCESS                read-only
    STATUS                    current
    DESCRIPTION
        "The value of this object is the data authentication
        algorithm for this cryptographic suite capability."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,

```


[Section 4.2.2.20.](#)"

```
::= { docsBpi2CmCryptoSuiteEntry 3 }
```

```
-- Cable Modem Termination System Group
```

```
docsBpi2CmtsObjects OBJECT IDENTIFIER ::= { docsBpi2MIBObjects 2 }
```

```
--
```

```
-- SPECIAL NOTE: For the following CMTS tables, when a CM is
-- running
-- in BPI mode, replace SAID (Security Association ID)
-- with SID (Service ID). The CMTS is required to map SAIDs and
-- SIDs to one contiguous space.
```

```
--
```

```
--
```

```
-- The BPI+ base table for CMTSs, indexed by ifIndex
```

```
--
```

```
docsBpi2CmtsBaseTable      OBJECT-TYPE
    SYNTAX                  SEQUENCE OF      DocsBpi2CmtsBaseEntry
    MAX-ACCESS              not-accessible
    STATUS                  current
    DESCRIPTION
        "This table describes the basic Baseline Privacy
        attributes of each CMTS MAC interface."
    ::= { docsBpi2CmtsObjects 1 }
```

```
docsBpi2CmtsBaseEntry      OBJECT-TYPE
    SYNTAX                  DocsBpi2CmtsBaseEntry
    MAX-ACCESS              not-accessible
    STATUS                  current
    DESCRIPTION
        "Each entry contains objects describing attributes of
        one CMTS MAC interface. An entry in this table exists for
        each ifEntry with an ifType of docsCableMacLayer(127)."
    INDEX                   { ifIndex }
    ::= { docsBpi2CmtsBaseTable 1 }
```

```
DocsBpi2CmtsBaseEntry ::= SEQUENCE {
    docsBpi2CmtsDefaultAuthLifetime      Integer32,
    docsBpi2CmtsDefaultTEKLifetime       Integer32,
    docsBpi2CmtsDefaultSelfSignedManufCertTrust  INTEGER,
```


docsBpi2CmtsCheckCertValidityPeriods	TruthValue,
docsBpi2CmtsAuthentInfos	Counter32,
docsBpi2CmtsAuthRequests	Counter32,
docsBpi2CmtsAuthReplies	Counter32,
docsBpi2CmtsAuthRejects	Counter32,
docsBpi2CmtsAuthInvalids	Counter32,
docsBpi2CmtsSAMapRequests	Counter32,
docsBpi2CmtsSAMapReplies	Counter32,
docsBpi2CmtsSAMapRejects	Counter32

}

docsBpi2CmtsDefaultAuthLifetime OBJECT-TYPE

SYNTAX Integer32 (1..6048000)

UNITS "seconds"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The value of this object is the default lifetime, in seconds, the CMTS assigns to a new authorization key. This object value persist after re-initialization of the managed system."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Appendix A.2.](#)"

DEFVAL { 604800 }

::= { docsBpi2CmtsBaseEntry 1 }

docsBpi2CmtsDefaultTEKLifetime OBJECT-TYPE

SYNTAX Integer32 (1..604800)

UNITS "seconds"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The value of this object is the default lifetime, in seconds, the CMTS assigns to a new Traffic Encryption Key (TEK)."

This object value persist after re-initialization of the managed system."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Appendix A.2.](#)"

DEFVAL { 43200 }

::= { docsBpi2CmtsBaseEntry 2 }

docsBpi2CmtsDefaultSelfSignedManufCertTrust OBJECT-TYPE

SYNTAX INTEGER {
 trusted (1),
 untrusted (2)
 }

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This object determines the default trust of self-signed manufacturer certificate entries, contained in docsBpi2CmtsCACertTable, created after setting this object.

This object needs not to persist after re-initialization of the managed system."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 9.4.1](#)"

::= { docsBpi2CmtsBaseEntry 3 }

docsBpi2CmtsCheckCertValidityPeriods OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Setting this object to 'true' causes all chained and root certificates in the chain to have their validity periods checked against the current time of day, when the CMTS receives an Authorization Request from the CM.

A 'false' setting causes all certificates in the chain not to have their validity periods checked against the current time of day.

This object needs not to persist after re-initialization of the managed system."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 9.4.2](#)"

::= { docsBpi2CmtsBaseEntry 4 }

docsBpi2CmtsAuthentInfos OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CMTS has received an Authentication Information message from any CM.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.9](#)."


```
::= { docsBpi2CmtsBaseEntry 5 }
```

docsBpi2CmtsAuthRequests OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CMTS has received an Authorization Request message from any CM.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.1](#)."

```
::= { docsBpi2CmtsBaseEntry 6 }
```

docsBpi2CmtsAuthReplies OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CMTS has transmitted an Authorization Reply message to any CM.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.2](#)."

```
::= { docsBpi2CmtsBaseEntry 7 }
```

docsBpi2CmtsAuthRejects OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CMTS has transmitted an Authorization Reject message to any CM.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.2.1.3.](#)"

::= { docsBpi2CmtsBaseEntry 8 }

docsBpi2CmtsAuthInvalids OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CMTS has transmitted an Authorization Invalid message to any CM.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.2.1.7.](#)"

::= { docsBpi2CmtsBaseEntry 9 }

docsBpi2CmtsSAMapRequests OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CMTS has received an SA Map Request message from any CM. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.2.1.10.](#)"

::= { docsBpi2CmtsBaseEntry 10 }

docsBpi2CmtsSAMapReplies OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CMTS has transmitted an SA Map Reply message to any CM. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.2.1.11.](#)"

::= { docsBpi2CmtsBaseEntry 11 }

docsBpi2CmtsSAMapRejects OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CMTS has transmitted an SA Map Reject message to any CM. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.2.1.12.](#)"

::= { docsBpi2CmtsBaseEntry 12 }

--

-- The CMTS Authorization Table, indexed by ifIndex and CM MAC
 -- address

--

docsBpi2CmtsAuthTable OBJECT-TYPE

SYNTAX SEQUENCE OF DocsBpi2CmtsAuthEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table describes the attributes of each CM authorization association. The CMTS maintains one authorization association with each Baseline Privacy-enabled CM, registered on each CMTS MAC interface, regardless of whether the CM is authorized or rejected."

::= { docsBpi2CmtsObjects 2 }

docsBpi2CmtsAuthEntry OBJECT-TYPE

SYNTAX DocsBpi2CmtsAuthEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry contains objects describing attributes of one authorization association. The CMTS MUST create one entry per CM per MAC interface, based on the receipt of an Authorization Request message, and MUST not delete the entry until the CM loses registration."

INDEX { ifIndex, docsBpi2CmtsAuthCmMacAddress }

::= { docsBpi2CmtsAuthTable 1 }


```

DocsBpi2CmtsAuthEntry ::= SEQUENCE {
    docsBpi2CmtsAuthCmMacAddress      MacAddress,
    docsBpi2CmtsAuthCmBpiVersion      INTEGER,
    docsBpi2CmtsAuthCmPublicKey       OCTET STRING,
    docsBpi2CmtsAuthCmKeySequenceNumber Integer32,
    docsBpi2CmtsAuthCmExpiresOld      DateAndTime,
    docsBpi2CmtsAuthCmExpiresNew      DateAndTime,
    docsBpi2CmtsAuthCmLifetime        Integer32,
    docsBpi2CmtsAuthCmReset           INTEGER,
    docsBpi2CmtsAuthCmInfos           Counter32,
    docsBpi2CmtsAuthCmRequests        Counter32,
    docsBpi2CmtsAuthCmReplies         Counter32,
    docsBpi2CmtsAuthCmRejects         Counter32,
    docsBpi2CmtsAuthCmInvalids        Counter32,
    docsBpi2CmtsAuthRejectErrorCode   INTEGER,
    docsBpi2CmtsAuthRejectErrorString SnmpAdminString,
    docsBpi2CmtsAuthInvalidErrorCode  INTEGER,
    docsBpi2CmtsAuthInvalidErrorString SnmpAdminString,
    docsBpi2CmtsAuthPrimarySAId       DocsSAIdOrZero,
    docsBpi2CmtsAuthBpkmCmCertValid   INTEGER,
    docsBpi2CmtsAuthBpkmCmCert        DocsX509ASN1DEREncodedCertificate,
    docsBpi2CmtsAuthCACertIndexPtr    Unsigned32
}

```

docsBpi2CmtsAuthCmMacAddress OBJECT-TYPE

```

SYNTAX      MacAddress
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION

```

"The value of this object is the physical address of the CM to which the authorization association applies."

```
 ::= { docsBpi2CmtsAuthEntry 1 }
```

docsBpi2CmtsAuthCmBpiVersion OBJECT-TYPE

```

SYNTAX      INTEGER {
                bpi (0),
                bpiPlus (1)
            }

```

```

MAX-ACCESS  read-only
STATUS      current
DESCRIPTION

```

"The value of this object is the version of Baseline Privacy for which this CM has registered. The value 'bpiplus' represents the value of BPI-Version Attribute of the Baseline Privacy Key Management BPKM attribute BPI-Version (1). The value 'bpi' is used to represent the CM registered using DOCSIS 1.0 Baseline Privacy."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification
[Section 4.2.2.22](#); ANSI/SCTE 22-2 2002(formerly DSS 02-03)
 Data-Over-Cable Service Interface Specification DOCSIS 1.0
 Baseline Privacy Interface (BPI)"

::= { docsBpi2CmtsAuthEntry 2 }

docsBpi2CmtsAuthCmPublicKey OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (0..524))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is a DER-encoded
 RSAPublicKey ASN.1 type string, as defined in the RSA
 Encryption Standard (PKCS #1), corresponding to the
 public key of the CM. This is the zero-length OCTET
 STRING if the CMTS does not retain the public key."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.2.2.4](#)."

::= { docsBpi2CmtsAuthEntry 3 }

docsBpi2CmtsAuthCmKeySequenceNumber OBJECT-TYPE

SYNTAX Integer32 (0..15)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the most recent
 authorization key sequence number for this CM."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
 Sections [4.2.1.2](#) and [4.2.2.10](#)."

::= { docsBpi2CmtsAuthEntry 4 }

docsBpi2CmtsAuthCmExpiresOld OBJECT-TYPE

SYNTAX DateAndTime

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the actual clock time
 for expiration of the immediate predecessor of the most
 recent authorization key for this FSM. If this FSM has only
 one authorization key, then the value is the time of
 activation of this FSM.

Note: This object has no meaning for CMs running in BPI
 mode, therefore this object is not instantiated for entries
 associated to those CMs."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
Sections [4.2.1.2](#) and [4.2.2.9](#)."

::= { docsBpi2CmtsAuthEntry 5 }

docsBpi2CmtsAuthCmExpiresNew OBJECT-TYPE

SYNTAX DateAndTime

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the actual clock time for expiration of the most recent authorization key for this FSM."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
Sections [4.2.1.2](#) and [4.2.2.9](#)."

::= { docsBpi2CmtsAuthEntry 6 }

docsBpi2CmtsAuthCmLifetime OBJECT-TYPE

SYNTAX Integer32 (1..6048000)

UNITS "seconds"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The value of this object is the lifetime, in seconds, the CMTS assigns to an authorization key for this CM."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.2.1.2](#) and [Appendix A.2](#)."

::= { docsBpi2CmtsAuthEntry 7 }

docsBpi2CmtsAuthCmReset OBJECT-TYPE

SYNTAX INTEGER {
noResetRequested(1),
invalidateAuth(2),
sendAuthInvalid(3),
invalidateTeks(4)
}

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Setting this object to invalidateAuth(2) causes the CMTS to invalidate the current CM authorization key(s), but not to transmit an Authorization Invalid message nor to invalidate the primary SAID's TEKs. Setting this object to sendAuthInvalid(3) causes the CMTS to invalidate the current CM authorization key(s), and to transmit an Authorization Invalid message to the CM, but not to invalidate the primary SAID's TEKs. Setting this object to invalidateTeks(4) causes the CMTS to invalidate the current

CM authorization key(s), to transmit an Authorization Invalid message to the CM, and to invalidate the TEKs associated with this CM's primary SAID.

For BPI mode, substitute all of the CM's unicast TEK(s) for the primary SAID's TEKs in the previous paragraph.

Reading this object returns the most recently set value of this object, or returns noResetRequested(1) if the object has not been set since entry creation."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, Sections [4.1.2.3.4](#), [4.1.2.3.5](#), and [4.1.3.3.5](#)."

::= { docsBpi2CmtsAuthEntry 8 }

docsBpi2CmtsAuthCmInfos OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CMTS has received an Authentication Information message from this CM.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.9](#)."

::= { docsBpi2CmtsAuthEntry 9 }

docsBpi2CmtsAuthCmRequests OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CMTS has received an Authorization Request message from this CM.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.1](#)."

::= { docsBpi2CmtsAuthEntry 10 }

docsBpi2CmtsAuthCmReplies OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CMTS has transmitted an Authorization Reply message to this CM.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.2.](#)"

::= { docsBpi2CmtsAuthEntry 11 }

docsBpi2CmtsAuthCmRejects OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CMTS has transmitted an Authorization Reject message to this CM.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.3.](#)"

::= { docsBpi2CmtsAuthEntry 12 }

docsBpi2CmtsAuthCmInvalids OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CMTS has transmitted an Authorization Invalid message to this CM.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.7.](#)"

::= { docsBpi2CmtsAuthEntry 13 }


```
docsBpi2CmtsAuthRejectErrorCode OBJECT-TYPE
    SYNTAX INTEGER {
        none(1),
        unknown(2),
        unauthorizedCm(3),
        unauthorizedSaid(4),
        permanentAuthorizationFailure(8),
        timeOfDayNotAcquired(11)
    }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The value of this object is the enumerated
        description of the Error-Code in most recent Authorization
        Reject message transmitted to the CM. This has value
        unknown(2) if the last Error-Code value was 0, and none(1)
        if no Authorization Reject message has been transmitted to
        the CM, since entry creation."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,
        Sections 4.2.1.3 and 4.2.2.15."
    ::= { docsBpi2CmtsAuthEntry 14 }
```

```
docsBpi2CmtsAuthRejectErrorString OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE (0..128))
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "The value of this object is the text string in
        most recent Authorization Reject message transmitted to the
        CM. This is a zero length string if no Authorization
        Reject message has been transmitted to the CM, since entry
        creation."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,
        Sections 4.2.1.3 and 4.2.2.6."
    ::= { docsBpi2CmtsAuthEntry 15 }
```

docsBpi2CmtsAuthInvalidErrorCode	OBJECT-TYPE
SYNTAX	INTEGER { none(1), unknown(2), unauthorizedCm(3), unsolicited(5), invalidKeySequence(6), keyRequestAuthenticationFailure(7) }
MAX-ACCESS	read-only

STATUS current

DESCRIPTION

"The value of this object is the enumerated description of the Error-Code in most recent Authorization Invalid message transmitted to the CM. This has value unknown(2) if the last Error-Code value was 0, and none(1) if no Authorization Invalid message has been transmitted to the CM since entry creation."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, Sections [4.2.1.7](#) and [4.2.2.15](#)."

::= { docsBpi2CmtsAuthEntry 16 }

docsBpi2CmtsAuthInvalidErrorString OBJECT-TYPE

SYNTAX SnmpAdminString (SIZE (0..128))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the text string in most recent Authorization Invalid message transmitted to the CM. This is a zero length string if no Authorization Invalid message has been transmitted to the CM since entry creation."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, Sections [4.2.1.7](#) and [4.2.2.6](#)."

::= { docsBpi2CmtsAuthEntry 17 }

docsBpi2CmtsAuthPrimarySAId OBJECT-TYPE

SYNTAX DocsSAIdOrZero

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the Primary Security Association identifier. For BPI mode, the value must be any unicast SID."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 2.1.3](#)."

::= { docsBpi2CmtsAuthEntry 18 }

docsBpi2CmtsAuthBpkmCmCertValid OBJECT-TYPE

SYNTAX INTEGER {
 unknown (0),
 validCmChained (1),
 validCmTrusted (2),
 invalidCmUntrusted (3),
 invalidCAUntrusted (4),
 invalidCmOther (5),


```

        invalidCAOther (6)
    }
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "Contains the reason why a CM's certificate is deemed
    valid or invalid.
    Return unknown(0) if the CM is running BPI mode.
    ValidCmChained(1) means the certificate is valid
    because it chains to a valid certificate.
    ValidCmTrusted(2) means the certificate is valid
    because it has been provisioned (in the
    docsBpi2CmtsProvisionedCmCert table) to be trusted.
    InvalidCmUntrusted(3) means the certificate is invalid
    because it has been provisioned (in the
    docsBpi2CmtsProvisionedCmCert table) to be untrusted.
    InvalidCAUntrusted(4) means the certificate is invalid
    because it chains to an untrusted certificate.
    InvalidCmOther(5) and InvalidCAOther(6) refer to
    errors in parsing, validity periods, etc, which are
    attributable to the CM certificate or its chain
    respectively; additional information may be found
    in docsBpi2AuthRejectErrorString for these types
    of errors."
REFERENCE
    "DOCSIS Baseline Privacy Plus Interface Specification,
    Section 9.4.2."
 ::= { docsBpi2CmtsAuthEntry 19 }

```

```

docsBpi2CmtsAuthBpkmCmCert    OBJECT-TYPE
    SYNTAX                      DocsX509ASN1DEREncodedCertificate
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION
        "The X509 CM Certificate sent as part of a BPKM
        Authorization Request.
        Note: The zero-length OCTET STRING must be returned if the
        Entire certificate is not retained in the CMTS."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,
        Section 9.2."
 ::= { docsBpi2CmtsAuthEntry 20 }

```

```

docsBpi2CmtsAuthCACertIndexPtr OBJECT-TYPE
    SYNTAX                      Unsigned32 (0..4294967295)
    MAX-ACCESS                  read-only
    STATUS                      current
    DESCRIPTION
        "A row index into docsBpi2CmtsCACertTable.

```


Returns the index in docsBpi2CmtsCACertTable which
CA certificate this CM is chained to. A value of
0 means it could not be found or not applicable."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 9.2.](#)"

::= { docsBpi2CmtsAuthEntry 21 }

--

-- The CMTS TEK Table, indexed by ifIndex and SAID

--

docsBpi2CmtsTEKTable OBJECT-TYPE
 SYNTAX SEQUENCE OF DocsBpi2CmtsTEKEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "This table describes the attributes of each
Traffic Encryption Key (TEK) association. The CMTS
Maintains one TEK association per SAID on each CMTS MAC
interface."
 ::= { docsBpi2CmtsObjects 3 }

docsBpi2CmtsTEKEntry OBJECT-TYPE
 SYNTAX DocsBpi2CmtsTEKEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "Each entry contains objects describing attributes of
one TEK association on a particular CMTS MAC interface. The
CMTS MUST create one entry per SAID per MAC interface,
based on the receipt of a Key Request message, and MUST not
delete the entry before the CM authorization for the SAID
permanently expires."
 INDEX { ifIndex, docsBpi2CmtsTEKSAId }
 ::= { docsBpi2CmtsTEKTable 1 }

DocsBpi2CmtsTEKEntry ::= SEQUENCE {
 docsBpi2CmtsTEKSAId DocsSAId,
 docsBpi2CmtsTEKSAType DocsBpkmSAType,
 docsBpi2CmtsTEKDataEncryptAlg DocsBpkmDataEncryptAlg,
 docsBpi2CmtsTEKDataAuthentAlg DocsBpkmDataAuthentAlg,
 docsBpi2CmtsTEKLifetime Integer32,
 docsBpi2CmtsTEKKeySequenceNumber Integer32,
 docsBpi2CmtsTEKExpiresOld DateAndTime,
 docsBpi2CmtsTEKExpiresNew DateAndTime,
 docsBpi2CmtsTEKReset TruthValue,
 docsBpi2CmtsKeyRequests Counter32,


```
docsBpi2CmtsKeyReplies      Counter32,
docsBpi2CmtsKeyRejects      Counter32,
docsBpi2CmtsTEKInvalids     Counter32,
docsBpi2CmtsKeyRejectErrorCode  INTEGER,
docsBpi2CmtsKeyRejectErrorString SnmpAdminString,
docsBpi2CmtsTEKInvalidErrorCode  INTEGER,
docsBpi2CmtsTEKInvalidErrorString SnmpAdminString
}

docsBpi2CmtsTEKSAId OBJECT-TYPE
    SYNTAX      DocsSAId
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "The value of this object is the DOCSIS Security
        Association ID (SAID)."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,
        Section 4.2.2.12."
    ::= { docsBpi2CmtsTEKEntry 1 }

docsBpi2CmtsTEKSAType OBJECT-TYPE
    SYNTAX      DocsBpkmSAType
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "The value of this object is the type of security
        association. 'dynamic' does not apply to CMs running in
        BPI mode. Unicast BPI TEKs must utilize the 'primary'
        encoding and multicast BPI TEKs must utilize the 'static'
        encoding."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,
        Section 2.1.3."
    ::= { docsBpi2CmtsTEKEntry 2 }

docsBpi2CmtsTEKDataEncryptAlg OBJECT-TYPE
    SYNTAX      DocsBpkmDataEncryptAlg
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "The value of this object is the data encryption
        algorithm for this SAID."
    REFERENCE
        "DOCSIS Baseline Privacy Plus Interface Specification,
        Section 4.2.2.20."
    ::= { docsBpi2CmtsTEKEntry 3 }

docsBpi2CmtsTEKDataAuthentAlg OBJECT-TYPE
```


SYNTAX DocsBpkmDataAuthentAlg
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The value of this object is the data authentication
algorithm for this SAID."
REFERENCE
 "DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.2.2.20](#)."
::= { docsBpi2CmtsTEKEntry 4 }

docsBpi2CmtsTEKLifetime OBJECT-TYPE
SYNTAX Integer32 (1..604800)
UNITS "seconds"
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "The value of this object is the lifetime, in
seconds, the CMTS assigns to keys for this TEK
association."
REFERENCE
 "DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.2.1.5](#) and [Appendix A.2](#)."
::= { docsBpi2CmtsTEKEntry 5 }

docsBpi2CmtsTEKKeySequenceNumber OBJECT-TYPE
SYNTAX Integer32 (0..15)
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The value of this object is the most recent TEK
key sequence number for this SAID."
REFERENCE
 "DOCSIS Baseline Privacy Plus Interface Specification,
Sections [4.2.2.10](#) and [4.2.2.13](#)."
::= { docsBpi2CmtsTEKEntry 6 }

docsBpi2CmtsTEKExpiresOld OBJECT-TYPE
SYNTAX DateAndTime
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The value of this object is the actual clock time
for expiration of the immediate predecessor of the most
recent TEK for this FSM. If this FSM has only one TEK, then
the value is the time of activation of this FSM."
REFERENCE
 "DOCSIS Baseline Privacy Plus Interface Specification,

Sections [4.2.1.5](#) and [4.2.2.9](#)."
 ::= { docsBpi2CmtsTEKEntry 7 }

docsBpi2CmtsTEKExpiresNew OBJECT-TYPE
SYNTAX DateAndTime
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The value of this object is the actual clock time
 for expiration of the most recent TEK for this FSM."
REFERENCE
 "DOCSIS Baseline Privacy Plus Interface Specification,
 Sections [4.2.1.5](#) and [4.2.2.9](#)."
 ::= { docsBpi2CmtsTEKEntry 8 }

docsBpi2CmtsTEKReset OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "Setting this object to 'true' causes the CMTS to
 invalidate all currently active TEK(s) and to generate new
 TEK(s) for the associated SAID; the CMTS MAY also generate
 unsolicited TEK Invalid message(s), to optimize the TEK
 synchronization between the CMTS and the CM(s). Reading
 this object always returns FALSE."
REFERENCE
 "DOCSIS Baseline Privacy Plus Interface Specification,
 [Section 4.1.3.3.5](#)."
 ::= { docsBpi2CmtsTEKEntry 9 }

docsBpi2CmtsKeyRequests OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The value of this object is the count of times the
 CMTS has received a Key Request message.
 Discontinuities in the value of this counter can occur at
 re-initialization of the management system, and at other
 times as indicated by the value of
 ifCounterDiscontinuityTime."
REFERENCE
 "DOCSIS Baseline Privacy Plus Interface Specification,
 [Section 4.2.1.4](#)."
 ::= { docsBpi2CmtsTEKEntry 10 }

docsBpi2CmtsKeyReplies OBJECT-TYPE
SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CMTS has transmitted a Key Reply message.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.5.](#)"

::= { docsBpi2CmtsTEKEntry 11 }

docsBpi2CmtsKeyRejects OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CMTS has transmitted a Key Reject message.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.6.](#)"

::= { docsBpi2CmtsTEKEntry 12 }

docsBpi2CmtsTEKInvalids OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CMTS has transmitted a TEK Invalid message.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 4.2.1.8.](#)"

::= { docsBpi2CmtsTEKEntry 13 }

docsBpi2CmtsKeyRejectErrorCode OBJECT-TYPE

SYNTAX INTEGER {
none(1),


```

        unknown(2),
        unauthorizedSaid(4)
    }
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The value of this object is the enumerated
    description of the Error-Code in the most recent Key Reject
    message sent in response to a Key Request for this SAID.
    This has value unknown(2) if the last Error-Code value
    was 0, and none(1) if no Key Reject message has been
    received since registration."
REFERENCE
    "DOCSIS Baseline Privacy Plus Interface Specification,
    Sections 4.2.1.6 and 4.2.2.15."
 ::= { docsBpi2CmtsTEKEntry 14 }

```

```

docsBpi2CmtsKeyRejectErrorString  OBJECT-TYPE
SYNTAX      SnmpAdminString (SIZE (0..128))
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The value of this object is the text string in
    the most recent Key Reject message sent in response to a
    Key Request for this SAID. This is a zero length string if
    no Key Reject message has been received since
    registration."
REFERENCE
    "DOCSIS Baseline Privacy Plus Interface Specification,
    Sections 4.2.1.6 and 4.2.2.6."
 ::= { docsBpi2CmtsTEKEntry 15 }

```

```

docsBpi2CmtsTEKInvalidErrorCode  OBJECT-TYPE
SYNTAX      INTEGER {
        none(1),
        unknown(2),
        invalidKeySequence(6)
    }
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The value of this object is the enumerated
    description of the Error-Code in the most recent TEK
    Invalid message sent in association with this SAID. This
    has value unknown(2) if the last Error-Code value was 0,
    and none(1) if no TEK Invalid message has been received
    since registration."
REFERENCE
    "DOCSIS Baseline Privacy Plus Interface Specification,

```


Sections [4.2.1.8](#) and [4.2.2.15](#)."

::= { docsBpi2CmtsTEKEntry 16 }

docsBpi2CmtsTEKInvalidErrorString OBJECT-TYPE
SYNTAX SnmpAdminString (SIZE (0..128))
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The value of this object is the text string in
the most recent TEK Invalid message sent in association
with this SAID. This is a zero length string if no TEK
Invalid message has been received since registration."
REFERENCE
"DOCSIS Baseline Privacy Plus Interface Specification,
Sections [4.2.1.8](#) and [4.2.2.6](#)."
::= { docsBpi2CmtsTEKEntry 17 }

--
-- The CMTS Multicast Objects Group
--

docsBpi2CmtsMulticastObjects OBJECT IDENTIFIER
::= { docsBpi2CmtsObjects 4 }

--
-- The CMTS IP Multicast Mapping Table, indexed by
-- docsBpi2CmtsIpMulticastIndex, and by ifIndex
--

docsBpi2CmtsIpMulticastMapTable OBJECT-TYPE
SYNTAX SEQUENCE OF DocsBpi2CmtsIpMulticastMapEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"This table maps multicast IP addresses to SAIDs.
If a multicast IP address is mapped by multiple rows
in the table, the row with the lowest
docsBpi2CmtsIpMulticastIndex must be utilized for the
mapping."
::= { docsBpi2CmtsMulticastObjects 1 }

docsBpi2CmtsIpMulticastMapEntry OBJECT-TYPE
SYNTAX DocsBpi2CmtsIpMulticastMapEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"Each entry contains objects describing the mapping of

a set of multicast IP address and mask to one SAID associated to a CMTS MAC Interface, as well as associated message

counters and error information."

INDEX { ifIndex, docsBpi2CmtsIpMulticastIndex }

::= { docsBpi2CmtsIpMulticastMapTable 1 }

```
DocsBpi2CmtsIpMulticastMapEntry ::= SEQUENCE {
    docsBpi2CmtsIpMulticastIndex      Unsigned32,
    docsBpi2CmtsIpMulticastAddressType InetAddressType,
    docsBpi2CmtsIpMulticastAddress    InetAddress,
    docsBpi2CmtsIpMulticastMask       InetAddress,
    docsBpi2CmtsIpMulticastSAId       DocsSAIdOrZero,
    docsBpi2CmtsIpMulticastSAType     DocsBpkmSAType,
    docsBpi2CmtsIpMulticastDataEncryptAlg
                                     DocsBpkmDataEncryptAlg,
    docsBpi2CmtsIpMulticastDataAuthentAlg
                                     DocsBpkmDataAuthentAlg,
    docsBpi2CmtsIpMulticastSAMapRequests Counter32,
    docsBpi2CmtsIpMulticastSAMapReplies Counter32,
    docsBpi2CmtsIpMulticastSAMapRejects Counter32,
    docsBpi2CmtsIpMulticastSAMapRejectErrorCode
                                     INTEGER,
    docsBpi2CmtsIpMulticastSAMapRejectErrorString
                                     SnmpAdminString,
    docsBpi2CmtsIpMulticastMapControl RowStatus,
    docsBpi2CmtsIpMulticastMapStorageType StorageType
}
```

```
docsBpi2CmtsIpMulticastIndex      OBJECT-TYPE
    SYNTAX      Unsigned32 (1..4294967295)
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "The index of this row.
        Conceptual rows having the value 'permanent' need not allow
        write-access to any columnar objects in the row."
    ::= { docsBpi2CmtsIpMulticastMapEntry 1 }
```

```
docsBpi2CmtsIpMulticastAddressType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The type of internet address for
        docsBpi2CmtsIpMulticastAddress
        and docsBpi2CmtsIpMulticastMask."
    DEFVAL { ipv4 }
    ::= { docsBpi2CmtsIpMulticastMapEntry 2 }
```


docsBpi2CmtsIpMulticastAddress OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object represents the IP multicast address to be mapped, in conjunction with docsBpi2CmtsIpMulticastMask. The type of this address is determined by the value of the object docsBpi2CmtsIpMulticastAddressType."

```
::= { docsBpi2CmtsIpMulticastMapEntry 3 }
```

docsBpi2CmtsIpMulticastMask OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object represents the IP multicast address mask for this row.

An IP multicast address matches this row if the logical AND of the address with docsBpi2CmtsIpMulticastMask is identical to the logical AND of docsBpi2CmtsIpMulticastAddr with docsBpi2CmtsIpMulticastMask. The type of this address is determined by the value of the object docsBpi2CmtsIpMulticastAddressType.

Note: For IPv6 this object needs not to represent a contiguous netmask, e.g. to associate an SAID to a multicast group matching 'any' multicast scope. The TC InetAddressPrefixLength is not used because it only represents contiguous netmask."

```
::= { docsBpi2CmtsIpMulticastMapEntry 4 }
```

docsBpi2CmtsIpMulticastSAId OBJECT-TYPE

SYNTAX DocsSAIdOrZero

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object represents the multicast SAID to be used in this IP multicast address mapping entry."

```
::= { docsBpi2CmtsIpMulticastMapEntry 5 }
```

docsBpi2CmtsIpMulticastSAType OBJECT-TYPE

SYNTAX DocsBpkmSAType

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The value of this object is the type of security association. 'dynamic' does not apply to CMS running in BPI mode. Unicast BPI TEKs must utilize the 'primary' encoding and multicast BPI TEKs must utilize the 'static' encoding. SNMP created entries set this object by default to 'static' if not set at row creation."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 2.1.3.](#)"

::= { docsBpi2CmtsIpMulticastMapEntry 6 }

docsBpi2CmtsIpMulticastDataEncryptAlg OBJECT-TYPE

SYNTAX DocsBpkmDataEncryptAlg

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The value of this object is the data encryption algorithm for this IP."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.2.2.20.](#)"

DEFVAL { des56CbcMode }

::= { docsBpi2CmtsIpMulticastMapEntry 7 }

docsBpi2CmtsIpMulticastDataAuthentAlg OBJECT-TYPE

SYNTAX DocsBpkmDataAuthentAlg

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The value of this object is the data authentication algorithm for this IP."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.2.2.20.](#)"

DEFVAL { none }

::= { docsBpi2CmtsIpMulticastMapEntry 8 }

docsBpi2CmtsIpMulticastSAMapRequests OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CMTS has received an SA Map Request message for this IP. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.2.1.10.](#)"

::= { docsBpi2CmtsIpMulticastMapEntry 9 }

docsBpi2CmtsIpMulticastSAMapReplies OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CMTS has transmitted an SA Map Reply message for this IP. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.2.1.11.](#)"

::= { docsBpi2CmtsIpMulticastMapEntry 10 }

docsBpi2CmtsIpMulticastSAMapRejects OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the count of times the CMTS has transmitted an SA Map Reject message for this IP. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 4.2.1.12.](#)"

::= { docsBpi2CmtsIpMulticastMapEntry 11 }

docsBpi2CmtsIpMulticastSAMapRejectErrorCode OBJECT-TYPE

SYNTAX INTEGER {
 none(1),
 unknown(2),
 noAuthForRequestedDSFlow(9),
 dsFlowNotMappedToSA(10)
 }

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the enumerated description of the Error-Code in the most recent SA Map

Reject message sent in response to a SA Map Request for This IP. It has value unknown(2) if the last Error-Code Value was 0, and none(1) if no SA MAP Reject message has been received since entry creation."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, Sections [4.2.1.12](#) and [4.2.2.15](#)."

::= { docsBpi2CmtsIpMulticastMapEntry 12 }

docsBpi2CmtsIpMulticastSAMapRejectErrorString OBJECT-TYPE

SYNTAX SnmpAdminString (SIZE (0..128))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object is the text string in the most recent SA Map Reject message sent in response to an SA Map Request for this IP. It is a zero length string if no SA Map Reject message has been received since entry creation."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, Sections [4.2.1.12](#) and [4.2.2.6](#)."

::= { docsBpi2CmtsIpMulticastMapEntry 13 }

docsBpi2CmtsIpMulticastMapControl OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object controls and reflects the IP multicast address mapping entry. There is no restriction on the ability to change values in this row while the row is active.

A created row can be set to active only after the Corresponding instances of docsBpi2CmtsIpMulticastAddress, docsBpi2CmtsIpMulticastMask, docsBpi2CmtsIpMulticastSAId and docsBpi2CmtsIpMulticastSAType have all been set."

::= { docsBpi2CmtsIpMulticastMapEntry 14 }

docsBpi2CmtsIpMulticastMapStorageType OBJECT-TYPE

SYNTAX StorageType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The storage type for this conceptual row. Conceptual rows having the value 'permanent' need not allow write-access to any columnar objects in the row."

::= { docsBpi2CmtsIpMulticastMapEntry 15 }


```

--
-- The CMTS Multicast SAID Authorization Table,
-- indexed by ifIndex by
-- multicast SAID by CM MAC address
--

docsBpi2CmtsMulticastAuthTable          OBJECT-TYPE
    SYNTAX          SEQUENCE OF DocsBpi2CmtsMulticastAuthEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "This table describes the multicast SAID
        authorization for each CM on each CMTS MAC interface."
    ::= { docsBpi2CmtsMulticastObjects 2 }

docsBpi2CmtsMulticastAuthEntry          OBJECT-TYPE
    SYNTAX          DocsBpi2CmtsMulticastAuthEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "Each entry contains objects describing the key
        authorization of one cable modem for one multicast SAID
        for one CMTS MAC interface.
        Row entries persist after re-initialization of
        the managed system."
    INDEX           { ifIndex, docsBpi2CmtsMulticastAuthSAId,
                     docsBpi2CmtsMulticastAuthCmMacAddress }
    ::= { docsBpi2CmtsMulticastAuthTable 1 }

DocsBpi2CmtsMulticastAuthEntry ::= SEQUENCE
    {
        docsBpi2CmtsMulticastAuthSAId          DocsSAId,
        docsBpi2CmtsMulticastAuthCmMacAddress   MacAddress,
        docsBpi2CmtsMulticastAuthControl       RowStatus
    }

docsBpi2CmtsMulticastAuthSAId OBJECT-TYPE
    SYNTAX          DocsSAId
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "This object represents the multicast SAID for
        authorization."
    ::= { docsBpi2CmtsMulticastAuthEntry 1 }

docsBpi2CmtsMulticastAuthCmMacAddress    OBJECT-TYPE
    SYNTAX          MacAddress
    MAX-ACCESS      not-accessible

```


STATUS current

DESCRIPTION

"This object represents the MAC address of the CM to which the multicast SAID authorization applies."

::= { docsBpi2CmtsMulticastAuthEntry 2 }

docsBpi2CmtsMulticastAuthControl OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The status of this conceptual row for the authorization of multicast SAIDs to CMs. "

::= { docsBpi2CmtsMulticastAuthEntry 3 }

--

-- CMTS Cert Objects

--

docsBpi2CmtsCertObjects OBJECT IDENTIFIER

::= { docsBpi2CmtsObjects 5 }

--

-- CMTS Provisioned CM Cert Table

--

docsBpi2CmtsProvisionedCmCertTable OBJECT-TYPE

SYNTAX SEQUENCE OF

DocsBpi2CmtsProvisionedCmCertEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table of CM certificate trust entries provisioned to the CMTS. The trust object for a certificate in this table has an overriding effect on the validity object of a certificate in the authorization table, as long as the entire contents of the two certificates are identical."

::= { docsBpi2CmtsCertObjects 1 }

docsBpi2CmtsProvisionedCmCertEntry OBJECT-TYPE

SYNTAX DocsBpi2CmtsProvisionedCmCertEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the CMTS's provisioned CM certificate table. Row entries persist after re-initialization of the managed system."

REFERENCE

"Data-Over-Cable Service Interface Specifications:
Operations Support System Interface Specification
SP-OSSIV2.0-I05-040407, [Section 6.2.14](#)"

INDEX { docsBpi2CmtsProvisionedCmCertMacAddress }
::= { docsBpi2CmtsProvisionedCmCertTable 1 }

DocsBpi2CmtsProvisionedCmCertEntry ::= SEQUENCE
{
docsBpi2CmtsProvisionedCmCertMacAddress MacAddress,
docsBpi2CmtsProvisionedCmCertTrust INTEGER,
docsBpi2CmtsProvisionedCmCertSource INTEGER,
docsBpi2CmtsProvisionedCmCertStatus RowStatus,
docsBpi2CmtsProvisionedCmCert
DocsX509ASN1DEREncodedCertificate
}

docsBpi2CmtsProvisionedCmCertMacAddress OBJECT-TYPE
SYNTAX MacAddress
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The index of this row."
::= { docsBpi2CmtsProvisionedCmCertEntry 1 }

docsBpi2CmtsProvisionedCmCertTrust OBJECT-TYPE
SYNTAX INTEGER {
trusted(1),
untrusted(2)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"Trust state for the provisioned CM certificate entry.
Note: Setting this object need only override the validity
of CM certificates sent in future authorization requests;
instantaneous effect need not occur."
REFERENCE
"DOCSIS Baseline Privacy Plus Interface Specification,
[Section 9.4.1](#)."
DEFVAL { untrusted }
::= { docsBpi2CmtsProvisionedCmCertEntry 2 }

docsBpi2CmtsProvisionedCmCertSource OBJECT-TYPE
SYNTAX INTEGER {
snmp(1),
configurationFile(2),
externalDatabase(3),
other(4)
}

MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "This object indicates how the certificate reached the
CMTS. Other(4) means is originated from a source not
identified above."
REFERENCE
 "DOCSIS Baseline Privacy Plus Interface Specification,
[Section 9.4.1.](#)"
::= { docsBpi2CmtsProvisionedCmCertEntry 3 }

docsBpi2CmtsProvisionedCmCertStatus OBJECT-TYPE
 SYNTAX RowStatus
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION
 "The status of this conceptual row. Values in this row
cannot be changed while the row is 'active'."
 ::= { docsBpi2CmtsProvisionedCmCertEntry 4 }

docsBpi2CmtsProvisionedCmCert OBJECT-TYPE
 SYNTAX Docsx509ASN1DEREncodedCertificate
 MAX-ACCESS read-create
 STATUS current
 DESCRIPTION
 "An X509 DER-encoded Certificate Authority
certificate.
Note: The zero-length OCTET STRING must be returned, on
reads, if the entire certificate is not retained in the
CMTS."
 REFERENCE
 "DOCSIS Baseline Privacy Plus Interface Specification,
[Section 9.2.](#)"
 ::= { docsBpi2CmtsProvisionedCmCertEntry 5 }

--
-- CMTS CA Cert Table
--

docsBpi2CmtsCACertTable OBJECT-TYPE
 SYNTAX SEQUENCE OF DocsBpi2CmtsCACertEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "The table of known Certificate Authority certificates
acquired by this device."
 ::= { docsBpi2CmtsCertObjects 2 }

docsBpi2CmtsCACertEntry OBJECT-TYPE

SYNTAX DocsBpi2CmtsCACertEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A row in the Certificate Authority certificate table. Row entries with trust status 'trusted', 'untrusted', or 'root' persist after re-initialization of the managed system."

REFERENCE

"Data-Over-Cable Service Interface Specifications:
Operations Support System Interface Specification
SP-OSSiv2.0-I05-040407, [Section 6.2.14](#)"

INDEX { docsBpi2CmtsCACertIndex }

::= {docsBpi2CmtsCACertTable 1 }

DocsBpi2CmtsCACertEntry ::= SEQUENCE {

docsBpi2CmtsCACertIndex Unsigned32,

docsBpi2CmtsCACertSubject SnmpAdminString,

docsBpi2CmtsCACertIssuer SnmpAdminString,

docsBpi2CmtsCACertSerialNumber OCTET STRING,

docsBpi2CmtsCACertTrust INTEGER,

docsBpi2CmtsCACertSource INTEGER,

docsBpi2CmtsCACertStatus RowStatus,

docsBpi2CmtsCACert

DocsX509ASN1DEREncodedCertificate,

docsBpi2CmtsCACertThumbprint OCTET STRING

}

docsBpi2CmtsCACertIndex OBJECT-TYPE

SYNTAX Unsigned32 (1.. 4294967295)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The index for this row."

::= { docsBpi2CmtsCACertEntry 1 }

docsBpi2CmtsCACertSubject OBJECT-TYPE

SYNTAX SnmpAdminString

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The subject name exactly as it is encoded in the X509 certificate.

The organizationName portion of the certificate's subject name must be present. All other fields are optional. Any optional field present must be pre pended with <CR> (carriage return, U+000D) <LF> (line feed, U+000A). Ordering of fields present must conform to:


```

organizationName <CR> <LF>
countryName <CR> <LF>
stateOrProvinceName <CR> <LF>
localityName <CR> <LF>
organizationalUnitName <CR> <LF>
organizationalUnitName=<Manufacturing Location> <CR> <LF>
commonName"
REFERENCE
    "DOCSIS Baseline Privacy Plus Interface Specification,
Section 9.2.4"
 ::= { docsBpi2CmtsCACertEntry 2 }

```

docsBpi2CmtsCACertIssuer OBJECT-TYPE

```

SYNTAX          SnmpAdminString
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The issuer name exactly as it is encoded in the
    X509 certificate.
    The commonName portion of the certificate's issuer
    name must be present. All other fields are optional. Any
    optional field present must be pre pended with <CR>
    (carriage return, U+000D) <LF> (line feed, U+000A).
    Ordering of fields present must conform to:

    CommonName <CR><LF>
    countryName <CR><LF>
    stateOrProvinceName <CR><LF>
    localityName <CR><LF>
    organizationName <CR><LF>
    organizationalUnitName <CR><LF>
    organizationalUnitName=<Manufacturing Location>"
REFERENCE
    "DOCSIS Baseline Privacy Plus Interface Specification,
Section 9.2.4"
 ::= { docsBpi2CmtsCACertEntry 3 }

```

docsBpi2CmtsCACertSerialNumber OBJECT-TYPE

```

SYNTAX          OCTET STRING (SIZE (1..32))
MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "This CA certificate's serial number represented as
    an octet string."
REFERENCE
    "DOCSIS Baseline Privacy Plus Interface Specification,
Section 9.2.2"
 ::= { docsBpi2CmtsCACertEntry 4 }

```


docsBpi2CmtsCACertTrust OBJECT-TYPE

```
SYNTAX      INTEGER {
                trusted (1),
                untrusted (2),
                chained (3),
                root (4)
            }
```

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

```
STATUS          current
```

DESCRIPTION

"This object controls the trust status of this certificate. Root certificates must be given root(4) trust; manufacturer certificates must not be given root(4) trust. Trust on root certificates must not change. Note: Setting this object need only affect the validity of CM certificates sent in future authorization requests; instantaneous effect need not occur."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 9.4.1](#)"

```
DEFVAL { chained }
```

```
::= { docsBpi2CmtsCACertEntry 5 }
```

docsBpi2CmtsCACertSource OBJECT-TYPE

```
SYNTAX      INTEGER {
                snmp (1),
                configurationFile (2),
                externalDatabase (3),
                other (4),
                authentInfo (5),
                compiledIntoCode (6)
            }
```

```
MAX-ACCESS      read-only
```

```
STATUS          current
```

DESCRIPTION

"This object indicates how the certificate reached the CMTS. Other(4) means it originated from a source not identified above."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 9.4.1](#)"

```
::= { docsBpi2CmtsCACertEntry 6 }
```

docsBpi2CmtsCACertStatus OBJECT-TYPE

```
SYNTAX      RowStatus
```

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

```
STATUS          current
```

DESCRIPTION

"The status of this conceptual row. An attempt to set writable columnar values while this row is active behaves as follows:

- Sets to the object docsBpi2CmtsCACertTrust are allowed.
- Sets to the object docsBpi2CmtsCACert will return an error inconsistentValue'.

A newly create entry cannot be set to active until the value of docsBpi2CmtsCACert is being set."

::= { docsBpi2CmtsCACertEntry 7 }

docsBpi2CmtsCACert OBJECT-TYPE

SYNTAX Docsx509ASN1DEREncodedCertificate

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"An X509 DER-encoded Certificate Authority certificate.

To help identify certificates, either this object or docsBpi2CmtsCACertThumbprint must be returned by a CMTS for self-signed CA certificates.

Note: The zero-length OCTET STRING must be returned, on reads, if the entire certificate is not retained in the CMTS."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 9.2](#)."

::= { docsBpi2CmtsCACertEntry 8 }

docsBpi2CmtsCACertThumbprint OBJECT-TYPE

SYNTAX OCTET STRING (SIZE (20))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The SHA-1 hash of a CA certificate.

To help identify certificates, either this object or docsBpi2CmtsCACert must be returned by a CMTS for self-signed CA certificates.

Note: The zero-length OCTET STRING must be returned, on reads, if the CA certificate thumb print is not retained in the CMTS."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, [Section 9.4.3](#)"

::= { docsBpi2CmtsCACertEntry 9 }

-- Authenticated Software Download Objects

--

--

-- Note: the authenticated software download objects are a

-- CM requirement only.

--

docsBpi2CodeDownloadControl OBJECT IDENTIFIER

::= { docsBpi2MIBObjects 4 }

docsBpi2CodeDownloadStatusCode OBJECT-TYPE

SYNTAX INTEGER {

configFileCvcVerified (1),

configFileCvcRejected (2),

snmpCvcVerified (3),

snmpCvcRejected (4),

codeFileVerified (5),

codeFileRejected (6),

other (7)

}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value indicates the result of the latest config file CVC verification, SNMP CVC verification, or code file verification."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, Section D.3.3.2 & D.3.5.1."

::= { docsBpi2CodeDownloadControl 1 }

docsBpi2CodeDownloadStatusString OBJECT-TYPE

SYNTAX SnmpAdminString

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of this object indicates the additional information to the status code. The value will include the error code and error description which will be defined separately."

REFERENCE

"DOCSIS Baseline Privacy Plus Interface Specification, Section TBD (see D.3.7)"

::= { docsBpi2CodeDownloadControl 2 }

docsBpi2CodeMfgOrgName OBJECT-TYPE

SYNTAX SnmpAdminString

MAX-ACCESS read-only

STATUS current
DESCRIPTION
 "The value of this object is the device manufacturer's
organizationName."
REFERENCE
 "DOCSIS Baseline Privacy Plus Interface Specification,
Section D.3.2.2."
::= { docsBpi2CodeDownloadControl 3 }

docsBpi2CodeMfgCodeAccessStart OBJECT-TYPE
SYNTAX DateAndTime (SIZE(11))
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The value of this object is the device manufacturer's
current codeAccessStart value. This value always be
referenced to Greenwich Mean Time (GMT) and the value
format must contain TimeZone information (fields 8-10)."
REFERENCE
 "DOCSIS Baseline Privacy Plus Interface Specification,
Section D.3.2.2."
::= { docsBpi2CodeDownloadControl 4 }

docsBpi2CodeMfgCvcAccessStart OBJECT-TYPE
SYNTAX DateAndTime (SIZE(11))
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The value of this object is the device manufacturer's
current cvcAccessStart value. This value always be
referenced to Greenwich Mean Time (GMT) and the value
format must contain TimeZone information (fields 8-10)."
REFERENCE
 "DOCSIS Baseline Privacy Plus Interface Specification,
Section D.3.2.2."
::= { docsBpi2CodeDownloadControl 5 }

docsBpi2CodeCoSignerOrgName OBJECT-TYPE
SYNTAX SnmpAdminString
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The value of this object is the Co-Signer's
organizationName. The value is a zero length string if
the co-signer is not specified."
REFERENCE
 "DOCSIS Baseline Privacy Plus Interface Specification,
Section D.3.2.2."
::= { docsBpi2CodeDownloadControl 6 }

`docsBpi2CodeCoSignerCodeAccessStart` OBJECT-TYPE`SYNTAX` `DateAndTime (SIZE(11))``MAX-ACCESS` `read-only``STATUS` `current``DESCRIPTION`

"The value of this object is the Co-Signer's current `codeAccessStart` value. This value always be referenced to Greenwich Mean Time (GMT) and the value format must contain `TimeZone` information (fields 8-10).

If `docsBpi2CodeCoSignerOrgName` is a zero length string, the value of this object is meaningless."

`REFERENCE`

"DOCSIS Baseline Privacy Plus Interface Specification, Section D.3.2.2."

::= { docsBpi2CodeDownloadControl 7 }

`docsBpi2CodeCoSignerCvcAccessStart` OBJECT-TYPE`SYNTAX` `DateAndTime (SIZE(11))``MAX-ACCESS` `read-only``STATUS` `current``DESCRIPTION`

"The value of this object is the Co-Signer's current `cvcAccessStart` value. This value always be referenced to Greenwich Mean Time (GMT) and the value format must contain `TimeZone` information (fields 8-10).

If `docsBpi2CodeCoSignerOrgName` is a zero length string, the value of this object is meaningless."

`REFERENCE`

"DOCSIS Baseline Privacy Plus Interface Specification, Section D.3.2.2."

::= { docsBpi2CodeDownloadControl 8 }

`docsBpi2CodeCvcUpdate` OBJECT-TYPE`SYNTAX` `DocsX509ASN1DEREncodedCertificate``MAX-ACCESS` `read-write``STATUS` `current``DESCRIPTION`

"Setting a CVC to this object triggers the device to verify the CVC and update the `cvcAccessStart` values, then the content of this object is discarded..

If the device is not enabled to upgrade codefiles, or the CVC verification fails, the CVC will be rejected. Reading this object always returns the zero-length OCTET STRING."

`REFERENCE`

"DOCSIS Baseline Privacy Plus Interface Specification, Section D.3.3.2.2."

::= { docsBpi2CodeDownloadControl 9 }


```
--
-- The BPI+ MIB Conformance Statements (with a placeholder for
-- notifications)
--

docsBpi2Notification      OBJECT IDENTIFIER
    ::= { docsBpi2MIB 0 }
docsBpi2Conformance      OBJECT IDENTIFIER
    ::= { docsBpi2MIB 2 }
docsBpi2Compliances      OBJECT IDENTIFIER
    ::= { docsBpi2Conformance 1 }
docsBpi2Groups           OBJECT IDENTIFIER
    ::= { docsBpi2Conformance 2 }


docsBpi2CmCompliance MODULE-COMPLIANCE
    STATUS          current
    DESCRIPTION
        "This is the compliance statement for CMs which
        implement the DOCSIS Baseline Privacy Interface Plus."

    MODULE -- docsBpi2MIB

    -- unconditionally mandatory group
    MANDATORY-GROUPS {
        docsBpi2CmGroup,
        docsBpi2CodeDownloadGroup
    }


-- constrain on Encryption algorithms
OBJECT docsBpi2CmTEKDataEncryptAlg
    SYNTAX      DocsBpkmDataEncryptAlg {
        none(0),
        des56CbcMode(1),
        des40CbcMode(2)
    }
    DESCRIPTION
        "It is compliant to support des56CbcMode(1) and
        des40CbcMode(2) for data encryption algorithms."


-- constrain on Integrity algorithms
OBJECT docsBpi2CmTEKDataAuthentAlg
    SYNTAX      DocsBpkmDataAuthentAlg {
        none(0)
    }
```


DESCRIPTION

"It is compliant to not support data message authentication algorithms."

-- constrain on IP addressing

OBJECT docsBpi2CmIpMulticastAddressType

SYNTAX InetAddressType { ipv4(1) }

DESCRIPTION

"An implementation is only required to support IPv4 addresses. Other address types support may be defined in future versions of this MIB module."

-- constrain on IP addressing

OBJECT docsBpi2CmIpMulticastAddress

SYNTAX InetAddress (SIZE(4))

DESCRIPTION

"An implementation is only required to support IPv4 addresses Other address types support may be defined in future versions of this MIB module."

-- constrain on Encryption algorithms

OBJECT docsBpi2CmCryptoSuiteDataEncryptAlg

SYNTAX DocsBpkmDataEncryptAlg {
none(0),
des56CbcMode(1),
des40CbcMode(2)
}

DESCRIPTION

"It is compliant to only support des56CbcMode(1) and des40CbcMode(2) for data encryption algorithms."

-- constrain on Integrity algorithms

OBJECT docsBpi2CmCryptoSuiteDataAuthentAlg

SYNTAX DocsBpkmDataAuthentAlg {
none(0)
}

DESCRIPTION

"It is compliant to not support data message authentication algorithms."

::= { docsBpi2Compliances 1 }

docsBpi2CmtsCompliance MODULE-COMPLIANCE

STATUS current

DESCRIPTION

"This is the compliance statement for CMTSs which implement the DOCSIS Baseline Privacy Interface Plus."


```
MODULE -- docsBpi2MIB
-- unconditionally mandatory group
MANDATORY-GROUPS {
    docsBpi2CmtsGroup
}

-- unconditionally optional group
GROUP docsBpi2CodeDownloadGroup
DESCRIPTION
    "This group is optional for CMTSS. The implementation
    decision of this group is left to the vendor"

-- constrain on mandatory range
OBJECT docsBpi2CmtsDefaultAuthLifetime
SYNTAX Integer32 (86400..6048000)
DESCRIPTION
    "The refined range corresponds to the minimum and
    maximum values in operational networks."

-- constrain on mandatory range
OBJECT docsBpi2CmtsDefaultTEKLifetime
SYNTAX Integer32 (1800..604800)
DESCRIPTION
    "The refined range corresponds to the minimum and
    maximum values in operational networks."

-- constrain on mandatory range
OBJECT docsBpi2CmtsAuthCmLifetime
SYNTAX Integer32 (86400..6048000)
DESCRIPTION
    "The refined range corresponds to the minimum and
    maximum values in operational networks."

-- constrain on Encryption algorithms
OBJECT docsBpi2CmtsTEKDataEncryptAlg
SYNTAX DocsBpkmDataEncryptAlg {
    none(0),
    des56CbcMode(1),
    des40CbcMode(2)
}
DESCRIPTION
    "It is compliant to only support des56CbcMode(1)
    and des40CbcMode(2) for data encryption."

-- constrain on Integrity algorithms
```



```
OBJECT docsBpi2CmtsTEKDataAuthentAlg
    SYNTAX      DocsBpkmDataAuthentAlg {
                                none(0)
                        }
    DESCRIPTION
        "It is compliant to not support data message
        authentication algorithms."

-- constrain on mandatory range
OBJECT      docsBpi2CmtsTEKLifetime
    SYNTAX      Integer32 (1800..604800)
    DESCRIPTION
        "The refined range corresponds to the minimum and
        maximum values in operational networks."

-- constrain on access
-- constrain on IP Addressing

OBJECT      docsBpi2CmtsIpMulticastAddressType
    SYNTAX      InetAddressType { ipv4(1) }
    MIN-ACCESS  read-only
    DESCRIPTION
        "Write access is not required.
        An implementation is only required to support IPv4
        addresses. Other address types support may be defined in
        future versions of this MIB module."

OBJECT      docsBpi2CmtsIpMulticastAddress
    SYNTAX      InetAddress (SIZE(4))
    MIN-ACCESS  read-only
    DESCRIPTION
        "Write access is not required.
        An implementation is only required to support IPv4
        addresses. Other address types support may be defined in
        future versions of this MIB module."

OBJECT      docsBpi2CmtsIpMulticastMask
    SYNTAX      InetAddress (SIZE(4))
    MIN-ACCESS  read-only
    DESCRIPTION
        "Write access is not required.
        An implementation is only required to support IPv4
        addresses. Other address types support may be defined in
        future versions of this MIB module."

-- constrain on access

OBJECT      docsBpi2CmtsIpMulticastSAId
    MIN-ACCESS  read-only
```



```
DESCRIPTION
    "Write access is not required."

OBJECT      docsBpi2CmtsIpMulticastSAType
    MIN-ACCESS read-only
    DESCRIPTION
        "Write access is not required."

-- constrain on access
-- constrain on Encryption algorithms

OBJECT      docsBpi2CmtsIpMulticastDataEncryptAlg
    SYNTAX      DocsBpkmDataEncryptAlg {
                                none(0),
                                des56CbcMode(1),
                                des40CbcMode(2)
                        }
    MIN-ACCESS read-only
    DESCRIPTION
        "Write access is not required.
        It is compliant to only support des56CbcMode(1)
        and des40CbcMode(2) for data encryption"

-- constrain on access
-- constrain on Integrity algorithms
OBJECT      docsBpi2CmtsIpMulticastDataAuthentAlg
    SYNTAX      DocsBpkmDataAuthentAlg {
                                none(0)
                        }
    MIN-ACCESS read-only
    DESCRIPTION
        "Write access is not required.
        It is compliant to not support data message
        authentication algorithms."

-- constrain on access
OBJECT      docsBpi2CmtsMulticastAuthControl
    MIN-ACCESS read-only
    DESCRIPTION
        "Write access is not required."

        ::= { docsBpi2Compliances 2 }

docsBpi2CmGroup      OBJECT-GROUP
    OBJECTS      {
        docsBpi2CmPrivacyEnable,
```


docsBpi2CmPublicKey,
docsBpi2CmAuthState,
docsBpi2CmAuthKeySequenceNumber,
docsBpi2CmAuthExpiresOld,
docsBpi2CmAuthExpiresNew,
docsBpi2CmAuthReset,
docsBpi2CmAuthGraceTime,
docsBpi2CmTEKGraceTime,
docsBpi2CmAuthWaitTimeout,
docsBpi2CmReauthWaitTimeout,
docsBpi2CmOpWaitTimeout,
docsBpi2CmRekeyWaitTimeout,
docsBpi2CmAuthRejectWaitTimeout,
docsBpi2CmSAMapWaitTimeout,
docsBpi2CmSAMapMaxRetries,
docsBpi2CmAuthentInfos,
docsBpi2CmAuthRequests,
docsBpi2CmAuthReplies,
docsBpi2CmAuthRejects,
docsBpi2CmAuthInvalids,
docsBpi2CmAuthRejectErrorCode,
docsBpi2CmAuthRejectErrorString,
docsBpi2CmAuthInvalidErrorCode,
docsBpi2CmAuthInvalidErrorString,
docsBpi2CmTEKSAType,
docsBpi2CmTEKDataEncryptAlg,
docsBpi2CmTEKDataAuthentAlg,
docsBpi2CmTEKState,
docsBpi2CmTEKKeySequenceNumber,
docsBpi2CmTEKExpiresOld,
docsBpi2CmTEKExpiresNew,
docsBpi2CmTEKKeyRequests,
docsBpi2CmTEKKeyReplies,
docsBpi2CmTEKKeyRejects,
docsBpi2CmTEKInvalids,
docsBpi2CmTEKAuthPends,
docsBpi2CmTEKKeyRejectErrorCode,
docsBpi2CmTEKKeyRejectErrorString,
docsBpi2CmTEKInvalidErrorCode,
docsBpi2CmTEKInvalidErrorString,
docsBpi2CmIpMulticastAddressType,
docsBpi2CmIpMulticastAddress,
docsBpi2CmIpMulticastSAId,
docsBpi2CmIpMulticastSAMapState,
docsBpi2CmIpMulticastSAMapRequests,
docsBpi2CmIpMulticastSAMapReplies,
docsBpi2CmIpMulticastSAMapRejects,
docsBpi2CmIpMulticastSAMapRejectErrorCode,
docsBpi2CmIpMulticastSAMapRejectErrorString,


```
docsBpi2CmDeviceCmCert,
docsBpi2CmDeviceManufCert,
docsBpi2CmCryptoSuiteDataEncryptAlg,
docsBpi2CmCryptoSuiteDataAuthentAlg
}
STATUS          current
DESCRIPTION
    "This collection of objects provides CM BPI+ status
    and control."
::= { docsBpi2Groups 1 }

docsBpi2CmtsGroup OBJECT-GROUP
    OBJECTS {
        docsBpi2CmtsDefaultAuthLifetime,
        docsBpi2CmtsDefaultTEKLifetime,
        docsBpi2CmtsDefaultSelfSignedManufCertTrust,
        docsBpi2CmtsCheckCertValidityPeriods,
        docsBpi2CmtsAuthentInfos,
        docsBpi2CmtsAuthRequests,
        docsBpi2CmtsAuthReplies,
        docsBpi2CmtsAuthRejects,
        docsBpi2CmtsAuthInvalids,
        docsBpi2CmtsSAMapRequests,
        docsBpi2CmtsSAMapReplies,
        docsBpi2CmtsSAMapRejects,
        docsBpi2CmtsAuthCmBpiVersion,
        docsBpi2CmtsAuthCmPublicKey,
        docsBpi2CmtsAuthCmKeySequenceNumber,
        docsBpi2CmtsAuthCmExpiresOld,
        docsBpi2CmtsAuthCmExpiresNew,
        docsBpi2CmtsAuthCmLifetime,
        docsBpi2CmtsAuthCmReset,
        docsBpi2CmtsAuthCmInfos,
        docsBpi2CmtsAuthCmRequests,
        docsBpi2CmtsAuthCmReplies,
        docsBpi2CmtsAuthCmRejects,
        docsBpi2CmtsAuthCmInvalids,
        docsBpi2CmtsAuthRejectErrorCode,
        docsBpi2CmtsAuthRejectErrorString,
        docsBpi2CmtsAuthInvalidErrorCode,
        docsBpi2CmtsAuthInvalidErrorString,
        docsBpi2CmtsAuthPrimarySAId,
        docsBpi2CmtsAuthBpkmCmCertValid,
        docsBpi2CmtsAuthBpkmCmCert,
        docsBpi2CmtsAuthCACertIndexPtr,
        docsBpi2CmtsTEKSAType,
        docsBpi2CmtsTEKDataEncryptAlg,
        docsBpi2CmtsTEKDataAuthentAlg,
        docsBpi2CmtsTEKLifetime,
```



```

docsBpi2CmtsTEKKeySequenceNumber,
docsBpi2CmtsTEKExpiresOld,
docsBpi2CmtsTEKExpiresNew,
docsBpi2CmtsTEKReset,
docsBpi2CmtsKeyRequests,
docsBpi2CmtsKeyReplies,
docsBpi2CmtsKeyRejects,
docsBpi2CmtsTEKInvalids,
docsBpi2CmtsKeyRejectErrorCode,
docsBpi2CmtsKeyRejectErrorString,
docsBpi2CmtsTEKInvalidErrorCode,
docsBpi2CmtsTEKInvalidErrorString,
docsBpi2CmtsIpMulticastAddressType,
docsBpi2CmtsIpMulticastAddress,
docsBpi2CmtsIpMulticastMask,
docsBpi2CmtsIpMulticastSAId,
docsBpi2CmtsIpMulticastSAType,
docsBpi2CmtsIpMulticastDataEncryptAlg,
docsBpi2CmtsIpMulticastDataAuthentAlg,
docsBpi2CmtsIpMulticastSAMapRequests,
docsBpi2CmtsIpMulticastSAMapReplies,
docsBpi2CmtsIpMulticastSAMapRejects,
docsBpi2CmtsIpMulticastSAMapRejectErrorCode,
docsBpi2CmtsIpMulticastSAMapRejectErrorString,
docsBpi2CmtsIpMulticastMapControl,
docsBpi2CmtsIpMulticastMapStorageType,
docsBpi2CmtsMulticastAuthControl,
docsBpi2CmtsProvisionedCmCertTrust,
docsBpi2CmtsProvisionedCmCertSource,
docsBpi2CmtsProvisionedCmCertStatus,
docsBpi2CmtsProvisionedCmCert,
docsBpi2CmtsCACertSubject,
docsBpi2CmtsCACertIssuer,
docsBpi2CmtsCACertSerialNumber,
docsBpi2CmtsCACertTrust,
docsBpi2CmtsCACertSource,
docsBpi2CmtsCACertStatus,
docsBpi2CmtsCACert,
docsBpi2CmtsCACertThumbprint
}
STATUS          current
DESCRIPTION
    "This collection of objects provides CMTS BPI+ status
    and control."
::= { docsBpi2Groups 2 }

docsBpi2CodeDownloadGroup OBJECT-GROUP
    OBJECTS {
        docsBpi2CodeDownloadStatusCode,

```



```
docsBpi2CodeDownloadStatusString,
docsBpi2CodeMfgOrgName,
docsBpi2CodeMfgCodeAccessStart,
docsBpi2CodeMfgCvcAccessStart,
docsBpi2CodeCoSignerOrgName,
docsBpi2CodeCoSignerCodeAccessStart,
docsBpi2CodeCoSignerCvcAccessStart,
docsBpi2CodeCvcUpdate
}
STATUS          current
DESCRIPTION
    "This collection of objects provide authenticated
software
download support."
::= { docsBpi2Groups 3 }

END
```

4. Acknowledgments

Kaz Ozawa - Authenticated Software Download objects and
general suggestions
Rich Woundy - BPI MIB and general MIB expertise
Mike St Johns - BPI MIB and 1st draft of BPI+ MIB
Bert Wijnen - Extensive comments in MIB syntax and accuracy
Thanks to Mike Sabin and Manson Wong for reviewing early BPI+
MIB Drafts and to Jean-Francois Mule for contributing to the
last versions.

5. Normative References

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[RFC2021] Waldbusser, S "Remote Network Monitoring Management Information Base Version 2 using SMIV2", [RFC 2021](#), January 1997.

```
*****
* NOTES TO RFC Editor (to be removed prior to publication) *
*
*   The I-D <draft-ietf-rmonmib-rmon2-v2-00.txt> (or a
* successor) is expected to eventually replace RFC 2021
* If that draft (or a successor) is published as a RFC
* prior to or concurrently with this document, then the
* normative reference [RFC2021] should be updated to
* point to the replacement RFC.
*
*****
```

[RFC3291] Daniele, M., Haberman, B., Routhier, S., Schoenwaelder, J., "Textual Conventions for Internet Network Addresses", [RFC 3291](#), May 2002.

```
*****
* NOTES TO RFC Editor (to be removed prior to publication) *
*
* 1.) The I-D <draft-ietf-ops-rfc3291bis-05.txt> (or a
* successor) is expected to eventually replace RFC 3291.
* If that draft (or a successor) is published as an RFC
* prior to or concurrently with this document, then the
* normative reference [RFC3291] should be updated to
* point to the replacement RFC, and the reference tag
* [RFC3291] should be updated to match.
*
*****
```

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6. Informative References

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<http://www.cablelabs.com/specifications/archives>.

7. Security Considerations

There are a number of management objects defined in this MIB module with a MAX-ACCESS clause of read-write and/or read-create.

Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations. These are the tables and objects and their sensitivity/vulnerability:

- The following objects, if SNMP SET maliciously could constitute a denial of service, theft of service attacks or compromise the intended data privacy of users:

Objects related to the Baseline Privacy Key Management (BPKM)

docsBpi2CmAuthReset,
docsBpi2CmtsAuthCmReset,
docsBpi2CmtsTEKReset:

These objects are used for initiating a re-key process.
A malicious massive SET attack may cause CMTS processing overload and may compromise the service.

docsBpi2CmtsDefaultAuthLifetime,
docsBpi2CmtsDefaultTEKLifetime,
docsBpi2CmtsAuthCmLifetime,
docsBpi2CmtsTEKLifetime:

Implementers are encouraged to follow these objects range constraints defined in docsBpi2CmtsCompliance MODULE-COMPLIANCE clause for operational deployments to minimize the risk of malicious or unintended short periods of time for keys updates that may lead into degradation or denial of service.

docsBpi2CmtsDefaultSelfSignedManufCertTrust:

A malicious SET in a self-signed certificate as 'untrusted' may cause CM to receive an authorization reject message which may constitute denial of service. This object is designed for testing purposes, Therefore is not RECOMMENDED to be used for commercial Deployments [1]. Administrators can make usage of View-based Access Control (VACM) introduced in [section 7.9 of \[RFC3410\]](#) to restrict write access to this object.

docsBpi2CmtsCheckCertValidityPeriods:

A malicious SET in this object enabling the period validity plus a wrong clock time in the CMTS, could cause denial of service as CM authorization requests will be rejected.

For more details in the validation of CM certificates, refer to section 9 of [1].

Objects related to the CM only:

Objects in docsBpi2CmDeviceCertTable

docsBpi2CmDeviceCmCert:

This object is not harmful considering that a CM received a Certificate during the manufacturing process. Therefore the object access becomes read-only. See the object DESCRIPTION clause in [section 3](#) for details.

Objects for Secure Software Download in table

docsBpi2CodeDownloadControl:

docsBpi2CodeCvcUpdate:

A malicious SET on this object may not constitute a risk since the CM holds the DOCSIS root key to verified the CVC authenticity. Operator if configured, could receive a notification for those events occurrences that may lead to detect the source of the attack. Moreover, [\[1\]](#) recommends that CMs CVC are regularly updated to minimize the risk of potential code-signing keys being (e.g. by configuration file)

Objects related to the CMTS only:

Objects in docsBpi2CmtsProvisionedCmCertTable and docsBpi2CmtsCACertTable containing CM Certificates and Certificate Authority information respectively:

docsBpi2CmtsProvisionedCmCertTrust,
docsBpi2CmtsProvisionedCmCertStatus,
docsBpi2CmtsProvisionedCmCert,
docsBpi2CmtsCACertStatus,
docsBpi2CmtsCACert:

Malicious SET on these objects may constitute a denial of service attack that will be experienced after the CMs perform authorization requests. It does not affect CMs in the authorized state.

Objects in multicast tables docsBpi2CmtsIpMulticastMapTable and docsBpi2CmtsMulticastAuthTable:

docsBpi2CmtsIpMulticastAddressType,
docsBpi2CmtsIpMulticastAddress,
docsBpi2CmtsIpMulticastMaskType,
docsBpi2CmtsIpMulticastMask,
docsBpi2CmtsIpMulticastSAId,
docsBpi2CmtsIpMulticastSAType:

Malicious SET on these objects may cause mis-configuration causing interruption of the users

active multicast applications.

docsBpi2CmtsIpMulticastDataEncryptAlg,
docsBpi2CmtsIpMulticastDataAuthentAlg:

Malicious SETs on these objects may create service mis-configuration causing service interruption or theft of service if encryption algorithms are removed for the multicast groups.

docsBpi2CmtsIpMulticastMapControl,
docsBpi2CmtsMulticastAuthControl:

Malicious SETs on these objects may remove and/or disable customers and/or multicast groups causing service disruption. Also may constitute theft of service by authorizing non subscribed user to multicast groups or by adding other multicast groups in the forward path.

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

Objects in docsBpi2CmBaseTable, docsBpi2CmTEKTable,
docsBpi2CmtsBaseTable, docsBpi2CmtsAuthTable,
docsBpi2CmtsTEKTable, docsBpi2CmtsProvisionedCmCertTable and
docsBpi2CmtsCACertTable

If accessible, attackers may use this information to discriminate users configured to work without data encryption (e.g. docsBpi2CmPrivacyEnable) and to know current Baseline Privacy parameters in the network.

Objects in docsBpi2CmIpMulticastMapTable and
docsBpi2CmtsMulticastAuthTable

In addition to the vulnerabilities around BPI plus multicast objects described in a previous apart, the read-only objects of this table may help attackers to monitor the status of the intrusion

Objects in docsBpi2CodeDownloadControl

In addition to the vulnerability of the read-write object docsBpi2CodeCvcUpdate, Attackers may be able to monitor the status of a denial of service using Secure Software Download.

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.

BPI+ Encryption Algorithms:

BPI+ Traffic Encryption Keys TEK (see [\[1\]](#)) uses DES

(Data Encryption Standard) 56 or 40 bits encryption ciphers.

Due DES cryptographic strength weakness, future revisions of BPI+ specification [\[1\]](#) should introduce advanced encryption algorithms to overcome the progress in cheaper and faster decryption tools.

Traffic Encryption Keys (TEK) are configured per CM and per BPI+ multicast group which may reduce the threat of the DES weakness for the overall system. The time to crack DES could be additionally mitigated by a compromised value for the TEK lifetime and Grace Time (up to a minimum of 30 minutes for the TEK lifetime, see [Appendix A \[1\]](#)).

Not exempt of the same recommendations as above, The CM BPI+ Authorization protocol uses triple DES encryption, which offers improved robustness compared to DES for CM Authorization and TEK re-key management.

8. IANA Considerations

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

Descriptor	OBJECT IDENTIFIER Value
-----	-----
docsBpi2MIB	{ mib-2 yy }

Editor's Note (to be removed prior to publication): the IANA is requested to assign a value for yy under the mib-2 subtree and

to record the assignment in the SMI Numbers registry. When the assignment has been made, the RFC Editor is asked to replace yy (here and in the MIB module) with the assigned value and to remove this note.

9. Authors' Addresses

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Acknowledgment

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

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-- Note to RFC editor:
-- delete text below between the start delete and stop
-- delete marks when publishing the RFC
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-- [start delete]

drafts Revision History

REVISION "200409070000Z"

DESCRIPTION

Reverted Counters to Counter32 instead of a mix of Counter32 and ZeroBasedCounter32.

Used generic MIB sentence for row entries with 'permanent' StorageType objects

Updated text for non-contiguous netmask."

REVISION "200408020000Z"

DESCRIPTION

"Details and explanation of selection of non-contiguous netmask instead of InetAddressPrefixLength syntax for docsBpi2CmtsIpMulticastMapTable: sections [2.1.2](#) and object docsBpi2CmtsIpMulticastMask

Added [section 2.3](#) 'BPI+ MIB module relationship with The Interfaces Group MIB' to explain the ZeroBasedCounter32 Usage. Updated discontinuity requirements in all counter objects

Clarifications for the Zero-length OCTET STRING of docsBpi2CmtsCACertThumbprint, similar to docsBpi2CmtsCACert. Requirement of no instantiation of docsBpi2CmtsAuthCmExpiresOld for entries with associated CM in BPI mode.

Added writable requirements for read-write and read-create objects within a row entry with StorageType 'permanent' status

Small updates in objects docsBpi2CmtsIpMulticastMapControl entries docsBpi2CmtsIpMulticastMapStorageType

REVISION "200407190000Z"

DESCRIPTION

"Comments received from Area Advisor incorporated and other Updates:

Added persistent requirements for read-create and read-write objects.

Added object docsBpi2CmtsIpMulticastMapStorageType with syntax read-only

Correction in descriptions of objects of ZeroBasedCounter32 And added discontinuity statements.

Syntax for docsBpi2CmtsAuthCACertIndexPtr, docsBpi2CmtsCACertIndex, docsBpi2CmIpMulticastIndex and docsBpi2CmtsIpMulticastIndex refined as Unsigned32 (1..4294967295).

Clarified the use of Address Mask instead of prefixLength

Deleted object docsBpi2CmtsIpMulticastMaskType, instead use docsBpi2CmtsIpMulticastAddressType for both docsBpi2CmtsIpMulticastAddress and

docsBpi2CmtsIpMulticastMask.
Corrections and details for RowStatus objects considerations
based on MIB review Guidelines
[draft-ietf-ops-mib-review-guidelines-03.txt](#).
Changed OIDs for docsBpi2Notification and
docsBpi2Conformance.
Better handling of Unicode representation for <CR> <LF>
Characters.
Added return error message for invalid set of
docsBpi2CmDeviceCmCert.
Added note in security section for usage of DES considered
Weak.
Clarification in description of object
docsBpi2CmtsDefaultSelfSignedManufCertTrust."

REVISION "200310270000Z"

DESCRIPTION

"Added [section 2.2](#) Relationship between BPI+ and BPI MIBs
and added informative references
Aligned Description and Syntax of TC DocsBpkmSAType
Removed obsolete Group docsBpi2CmtsCompliance and its
obsolete objects, OIDs sequence adjustments.
Cleared used References and updated BPI 1.0 refs to SCTE
Added TC DocsSAId and DocsSAIdOrZero
Added Text to Ipv4 compliances
Removed docsBpi2ObsoleteObjectsGroup OBJECT-GROUP and
OBJECTS docsBpi2CmtsAuthCmGraceTime and
docsBpi2CmtsTEKGraceTime"

REVISION "200308010000Z"

DESCRIPTION

"Defined TEXTUAL-CONVENTION for SAType related objects:
docsBpi2CmTEKSAType, docsBpi2CmtsTEKSAType and
docsBpi2CmtsIpMulticastSAType
Refined definition of docsBpi2CmtsAuthCmBpiVersion to
clarify the usage of named-value bpi(0)
Compliances statements for CM and CMTS in separated
Modules and additional syntax corrections
Updated SNMPv3 references
More detail in [section 7](#). Security Considerations for
object or group of objects."

REVISION "200306240000Z"

DESCRIPTION

"Modified security section and updated author's contact
info"

REVISION "200302090000Z"

DESCRIPTION

"Removed extraneous CRL references in text and MIB.
Modified encodings for docsBpi2CodeDownloadStatusCode
Modified encodings for docsBpi2CmtsAuthBpkmCmCertValid.
Added a new object docsBpi2CmtsAuthCACertIndexPtr into
the docsBpi2CmtsAuthTable.
Made modifications to object descriptions for
docsBpi2CodeMfgCodeAccessStart
docsBpi2CodeMfgCvcAccessStart
docsBpi2CodeCoSignerCodeAccessStart
docsBpi2CodeCoSignerCvcAccessStart.
Changed several object descriptions in docsBpi2CmTEKTable
and docsBpi2CmtsTEKTable."

REVISION "200211010000Z"

DESCRIPTION

"Added encodings for docsBpi2CodeDownloadStatusCode,
removed CRL object, table, & group, and made minor
modifications to some object descriptions."

REVISION "200111210000Z"

DESCRIPTION

"Added encodings for docsBpi2CmtsAuthBpkmCmCertValid,
added CRL object, table, & group, and made minor
modifications to many object descriptions."

REVISION "200104170000Z"

DESCRIPTION

"Modified CM and CMTS IP Multicast table indexing in
preparation for IPV6. Obsoleted grace time objects
from the CMTS portion of the MIB."

REVISION "200011171930Z"

DESCRIPTION

"Replaced DisplayString type with SnmpAdminString type.
Several object descriptions were also changed."

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