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IPCablecom

IPCablecom Management Information Base (MIB) framework

ITU-T Recommendation J.166

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Summary

ITU-T Recommendation J.166 describes the framework in which IPCablecom MIBs (management information base) are defined. It provides information on the management requirements of IPCablecom-specified devices and functions and how these requirements are supported in the MIB. It is intended to support and complement the actual MIB Recommendations, which are included as annexes.

Source

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IPCablecom Management Information Base (MIB) framework

1 Scope

This Recommendation describes the framework in which IPCablecom MIBs (management information base) are defined. It provides information on the management requirements of IPCablecom-specified devices and functions and how these requirements are supported in the MIB. It is intended to support and complement the actual MIB Recommendations, which are included as annexes.

NOTE – The structure and content of this Recommendation have been organized for ease of use by those familiar with the original source material; as such, the usual style of ITU-T Recommendations has not been applied.

2 References

2.1 Normative references

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T J.112-A] ITU-T Recommendation J.112 Annex A (2001), *Digital Video Broadcasting: DVB interaction channel for cable TV (CATV) distribution systems*.
- [ITU-T J.112-B] ITU-T Recommendation J.112 Annex B (2004), *Data-over-cable service interface specifications: Radio-frequency interface specification*.
- [ITU-T J.162] ITU-T Recommendation J.162 (2007), *Network call signalling protocol for the delivery of time-critical services over cable television networks using cable modems*.
- [ITU-T J.167] ITU-T Recommendation J.167 (2007), *Media terminal adapter (MTA) device provisioning requirements for the delivery of real-time services over cable television networks using cable modems*.
- [ITU-T J.170] ITU-T Recommendation J.170 (2005), *IPCablecom security specification*.
- [ITU-T J.176] ITU-T Recommendation J.176 (2002), *IPCablecom management event mechanism MIB*.
- [ITU-T J.199] ITU-T Recommendation J.199 (2006), *Battery backup for cable based devices*.
- [IETF RFC 1907] IETF RFC 1907 (1996), *Management Information Base for Version 2 of the Simple Network Management Protocol (SNMPv2)*.
- [IETF RFC 2011] IETF RFC 2011 (1996), *SNMPv2 Management Information Base for the Internet Protocol using SMIPv2*.
- [IETF RFC 2013] IETF RFC 2013 (1996), *SNMPv2 Management Information Base for the User Datagram Protocol using SMIPv2*.

- [IETF RFC 2578] IETF RFC 2578 (1999), *Structure of Management Information Version 2 (SMIv2)*.
- [IETF RFC 2579] IETF RFC 2579 (1999), *Textual Conventions for SMIv2*.
- [IETF RFC 2863] IETF RFC 2863 (2000), *The Interfaces Group MIB*.
- [ANSI/SCTE 23-3] ANSI/SCTE 23-3 (2005), *DOCSIS 1.1 Part 3: Operations Support System Interface*.
- [ANSI/SCTE 79-2] ANSI/SCTE 79-2 (2002), *DOCS 2.0 Operations Support System Interface*.

2.2 Informative references

- [ITU-T J.160] ITU-T Recommendation J.160 (2005), *Architectural framework for the delivery of time-critical services over cable television networks using cable modems*.
- [IETF RFC 1493] IETF RFC 1493 (1993), *Definitions of Managed Objects for Bridges*.
- [IETF RFC 1643] IETF RFC 1643 (1994), *Definitions of Managed Objects for the Ethernet-like Interface Types*.
- [IETF RFC 2571] IETF RFC 2571 (1999), *An Architecture for Describing SNMP Management Frameworks*.
- [IETF RFC 2572] IETF RFC 2572 (1999), *Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)*.
- [IETF RFC 2573] IETF RFC 2573 (1999), *SNMP Applications*.
- [IETF RFC 2574] IETF RFC 2574 (1999), *User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)*.
- [IETF RFC 2575] IETF RFC 2575 (1999), *View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)*.
- [IETF RFC 4293] IETF RFC 4293 (2006), *Management Information Base for the Internet Protocol (IP)*.
- [IETF RFC 4682] IETF RFC 4682 (2006), *Multimedia Terminal Adapter (MTA) Management Information Base for PacketCable- and IPCompliant Devices*.
- [IETF RFC 5098] IETF RFC 5098 (2008), *Signaling MIB for PacketCable and IPCompliant Multimedia Terminal Adapters (MTAs)*.
- [CM-SP-OSSv3.0] *Data-Over-Cable Service Interface Specifications, DOCSIS 3.0, Operations Support System Interface Specification, CM-SP-OSSv3.0-I01-061207, December 7, 2006, Cable Television Laboratories, Inc.*
- [draft-ietf-ipcdn-pktn-eventmess-09] IETF Internet Draft, *Management Event Management Information Base (MIB) for PacketCable- and IPCompliant Devices*, (draft-ietf-ipcdn-pktn-eventmess-09), October 2006.

3 Terms and definitions

This Recommendation defines the following terms:

3.1 cable modem: A cable modem is a layer-two termination device that terminates the customer end of the ITU-T J.112/J.122 connection.

3.2 IPCablecom: An ITU-T project that includes an architecture and a series of Recommendations that enable the delivery of real-time services over the cable television networks using cable modems.

3.3 management information base (MIB): The specification of information in a manner that allows standard access through a network management protocol.

3.4 media terminal adapter (MTA): Contains the interface to a physical voice device, a network interface, CODECs, and all signalling and encapsulation functions required for VoIP transport, class features signalling and QoS signalling.

3.5 quality of service (QoS): Guarantees network bandwidth and availability for applications.

4 Abbreviations and conventions

4.1 Abbreviations

This Recommendation uses the following abbreviations:

CM	Cable Modem
MIB	Management Information Base
MTA	Media Terminal Adapter
NCS	Network Call Signalling
QoS	Quality of Service

4.2 Conventions

Throughout this Recommendation, the words that are used to define the significance of particular requirements are capitalized. These words are:

"MUST"	This word or the adjective "REQUIRED" means that the item is an absolute requirement of this Recommendation.
"MUST NOT"	This phrase means that the item is an absolute prohibition of this Recommendation.
"SHOULD"	This word or the adjective "RECOMMENDED" means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications should be understood and the case carefully weighed before choosing a different course.
"SHOULD NOT"	This phrase means that there may exist valid reasons in particular circumstances when the listed behaviour is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behaviour described with this label.
"MAY"	This word or the adjective "OPTIONAL" means that this item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because it enhances the product, for example; another vendor may omit the same.

5 Overview

IPCablecom MIB modules are designed to provide necessary functionality defined in IPCablecom Recommendations. MIBs that are developed for IPCablecom support embedded media terminal adapters (MTAs) and in most cases stand-alone MTAs and provide definitions for call signalling and MTA device provisioning functions. Future IPCablecom development phases will include other functional areas as well as requirements for other IPCablecom components, which will be considered for MIB module development. IPCablecom functional areas that are being studied for future IPCablecom MIB definition include ITU-T Rec. J.161, [ITU-T J.162], [ITU-T J.167], [ITU-T J.170] and [ITU-T J.176]. Additionally, in this specification, the term "DOCSIS" is used to refer to DOCSIS version 1.1 [ITU-T J.112], DOCSIS version 2 (ITU-T Rec. J.122) or DOCSIS version 3 (ITU-T Recs J.21x and J.22x series), unless explicitly specified otherwise.

5.1 IPCablecom reference architecture

The conceptual diagram for the IPCablecom architecture is shown in Figure 1. Please refer to [ITU-T J.160] for more detailed information concerning the IPCablecom architecture.

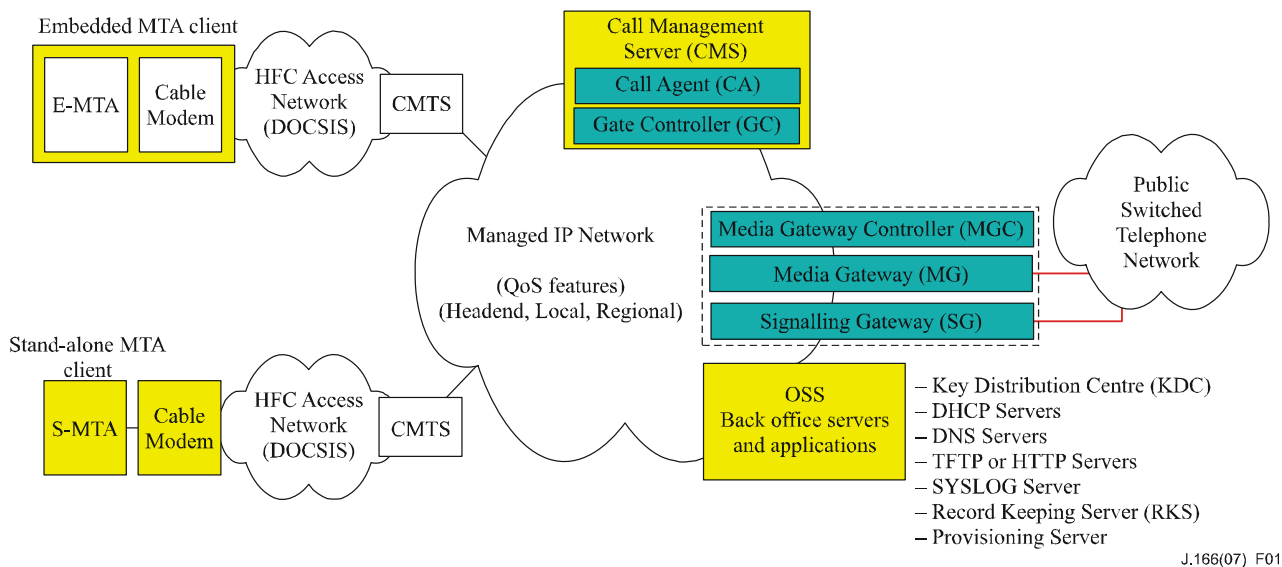


Figure 1 – IPCablecom network component reference model (partial)

5.2 General requirements

The IPCablecom MIBs Framework Recommendation follows the Internet Standard Management Framework described in IETF RFC 3410. Additionally, the following requirements have been considered in the design of IPCablecom MIB modules:

- IPCablecom devices MUST be compliant with DOCSIS; Therefore, IPCablecom devices must support DOCSIS MIBs as defined in clause 6.1;
- take a minimalist approach for design of the IPCablecom MIB modules, i.e., if other MIB modules define the same functions, then rely on these MIB modules rather than create new ones;
- organize MIB modules to support both embedded and stand-alone MTAs;
- organize MIB modules so as to allow functional partitioning of ITU-T Rec. J.112/J.122 (high-speed data) and IPCablecom (voice features);
- DOCSIS within IPCablecom applications requires support of SNMPv3; therefore IPCablecom MIB agents MUST comply with SNMPv3;

- IPCom MIBs MUST comply with SMv2 as defined in IETF STD 58.

5.2.1 Provisioning and network management service provider

A single physical device (e.g., embedded-MTA) will be completely provisioned and managed by a single business entity. In the case of multiple service providers offering different services on the same device (e.g., data by one provider, voice by another provider), a secondary service provider will act as the "contractor" for the primary provider in the areas of device provisioning and management. See Figure 2.

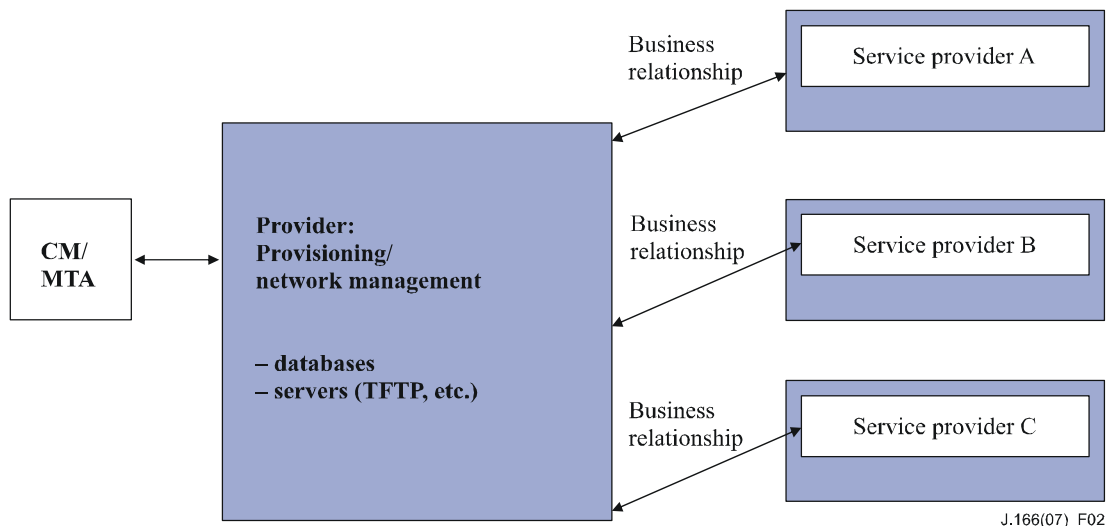


Figure 2 – Partitioning of management domains

5.2.2 Support for embedded and stand-alone MTAs

The IPCom MIBs will provide features for both embedded and stand-alone MTAs. Since stand-alone MTAs are not required to include any CM related functions, the IPCom MIBs, therefore, should be independent of CM and able to provide management support for voice communications functionalities. Cable modems with embedded MTAs must adhere to the DOCSIS or eDOCSIS specifications related to the MIBs. The CM part of the E-MTA (i.e., eCM) MUST support eDOCSIS requirements defined in ITU-T Rec. J.126.

Figure 3 describes the possible MIB module implementation for an MTA (embedded or stand-alone):

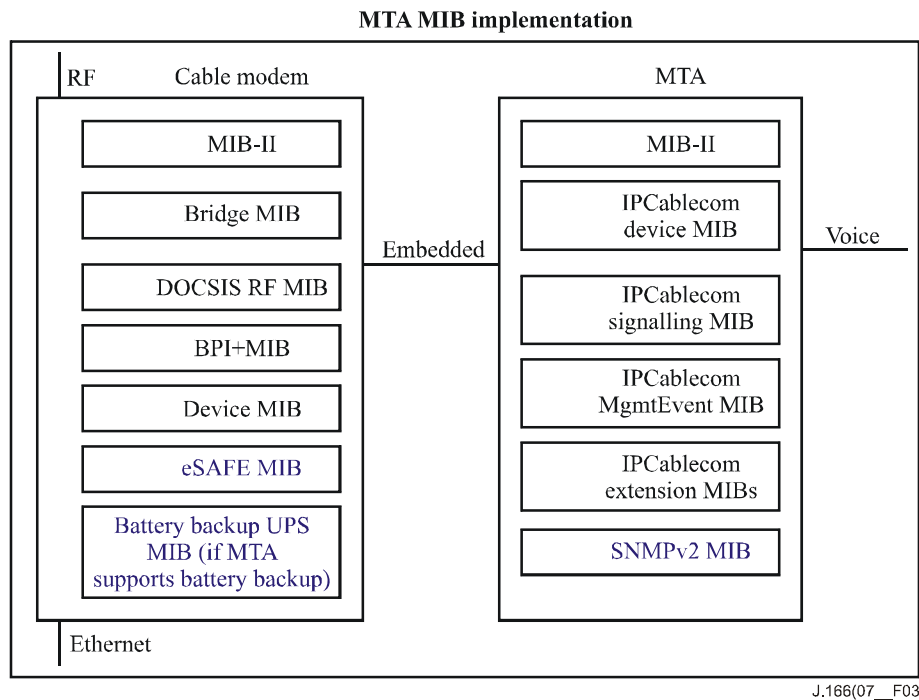


Figure 3 – Embedded and stand-alone MTA implementations

5.2.3 Simple network management protocol (SNMP) considerations

SNMPv3 provides an extended user security model which implies changes to the way SNMP packets are exchanged between agents and managers. Since MIB modules are used to define the content of the packets, the changes for SNMPv3 do not affect MIB design.

The only requirements imposed are that IPCablecom MIBs MUST conform to SMIV2, which is described in [IETF RFC 2578] and [IETF RFC 2579].

The following IETF RFCs provide more information on SNMPv3:

- IETF RFC 3410, Introduction and Applicability Statements for Internet Standard Management Framework.
- IETF RFC 3411, An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks.
- IETF RFC 3412, Message Processing and Dispatching for the Simple Network Management Protocol (SNMP).
- IETF RFC 3413, Simple Network Management Protocol (SNMP) Applications.
- IETF RFC 3414, User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3).
- IETF RFC 3415, View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP).

5.2.3.1 USM requirements

For IPCablecom, the usmUserTable MUST be configured immediately after the AP Reply received from the Provisioning Server with the following entries.

```
usmUserEngineID - the SNMP local engine id
usmUserName - MTA-Prov-xx:xx:xx:xx:xx:xx
usmUserSecurityName - MTA-Prov-xx:xx:xx:xx:xx:xx
usmUserCloneFrom - 0.0
```

```

usmUserAuthProtocol - usmHMACMD5AuthProtocol or
                      usmHMACSHAAuthProtocol
usmUserAuthKeyChange - ""
usmUserOwnAuthKeyChange - ""
usmUserPrivProtocol - usmDESPrivProtocol if privacy indicated in AP Reply,
usmNoPrivProtocol if no privacy is indicated in the AP Reply.
UsmUserPrivKeyChange - ""
UsmUserOwnPrivKeyChange - ""
usmUserPublic ""
usmUserStorageType - permanent
usmUserStatus - active

```

The xx:xx:xx:xx:xx:xx in the usmUserName and usmUserSecurityName represents the MAC address of the MTA.

Initial authentication and privacy keys for this user are derived from the AP Reply message.

New users MAY be created by cloning as defined in SNMPv3. This MAY be done through the config file, or later through SNMP Set operations.

5.2.3.2 VACM requirements

The following VACM entries MUST be defined for IPCablecom. Other table entries MAY be implemented at vendor or operator discretion.

VACM views MUST be defined for IPCablecom as described below.

5.2.3.2.1 VacmSecurityToGroup Table

The following configuration of the vacmSecurityToGroup table provides a read/write/create view.

```

vacmSecurityModel - USM
vacmSecurityName - "MTA-Prov-xx:xx:xx:xx:xx:xx"
vacmGroupName - 'PacketCableFullAccess'
vacmSecurityToGroupStorageType - permanent
vacmSecurityToGroupStatus - active

```

5.2.3.2.2 vacmAccessTable

The vacmAccessTable MUST be configured with the following entries. Other table entries MAY be implemented at vendor or operator discretion.

5.2.3.2.2.1 Full access

This configuration allows for read access of all MIB modules in the MTA, write access to IPCablecom MIB modules, and notifications as defined in the IPCablecom MIB modules:

```

vacmGroupName - PacketCableFullAccess
vacmAccessContextPrefix - ""
vacmAccessSecurityModel - USM
vacmAccessSecurityLevel - authPriv or authNoPriv, depending on whether privacy
has been specified
vacmAccessContextMatch - exact
vacmAccessReadViewName - ReadOnlyView
vacmAccessWriteViewName - FullAccessView
vacmAccessNotifyViewName - NotifyView
vacmAccessStorageType - permanent
vacmAccessStatus - active

```

5.2.3.2.3 MIB view requirements

The FullAccessView MUST consist of the MIB2 system group, the IFMIB, and all IPCablecom defined MIB modules. It MAY include vendor defined MIBs, VACM, USM, and Notifications MIB. The following lists the required OIDs:

```

1.3.6.1.2.1.1          /* MIB-II system group MIB tree */
1.3.6.1.2.1.2.2        /* MIB-II IF MIB tree */
1.3.6.1.4.1.4491.2.2    /* PacketCable Project MIB tree */
1.3.6.1.6.3.13         /* NOTIFY MIB tree */
1.3.6.1.6.3.15         /* USM MIB tree */
1.3.6.1.6.3.16         /* VACM MIB tree */

```

The ReadOnlyView MUST consist of the entire MIB tree contained in the MTA, including IPCablecom defined MIB modules, and vendor defined MIB modules for IPCablecom.

```

1.3.6.1                /* Full Internet MIB Tree*/

```

The NotifyView MUST consist of the MTA MIB tree, MIB-2 System MIB tree and the snmpTrapOID MIB. It MAY include vendor defined MIB modules.

```

1.3.6.1.4.1.4491.2.2.1 /*MTA mib tree*/
1.3.6.1.2.1.1          /* MIB-2 system mib tree */
1.3.6.1.6.3.1.1.4.1.0 /* snmpTrapOID mib*/

```

5.3 Functional requirements

This clause describes management functions that are supported by the IPCablecom MIB modules.

5.3.1 IPCablecom device provisioning

The IPCablecom MIB modules should provide definitions for attributes that are required in the MTA device-provisioning flows. These attributes are specified in the J.167 MTA device provisioning specification and include parameters such as CMS identifier, MTA domain name, MTA server addresses, and MTA capabilities. These attributes are defined as configuration file attributes and/or MIB objects as needed.

5.3.2 Security

The IPCablecom MIB modules provide definitions for attributes that are required for security handshake of the MTA and the provisioning server. These attributes are contained in [ITU-T J.170] and include certificates and signatures.

5.3.3 Voice interfaces (FFS)

The IPCablecom MIB modules should provide a generic external interface to voice service management attributes. This should be done so as to allow a device to implement proprietary mechanisms for internal control and management of voice interfaces.

5.3.4 Packet voice call signalling

The IPCablecom MIB modules should provide attributes that are needed for management of the packet voice call signalling protocol [ITU-T J.162]. Examples of attributes that have to be supported for packet voice call signalling include:

- dial time-outs;
- distinctive ring patterns;
- COder-DECoder (Codec) capabilities;
- signalling configuration for voice communication end points;
- call agent identifier.

5.3.5 Media packet transport

The IPCablecom MIB modules do not provide any managed objects to monitor and manage media packet transport. The RTP and RTCP protocols are used for media transport in IPCablecom. The RTP MIB (IETF RFC 2959) may be used for management of the media transport function of the MTA. Specific details are for future study.

5.3.6 Fault management (FFS)

The IPCablecom MIB modules should provide objects for the management of network faults and failures. Some of these managed objects and management functions are defined in the IPCablecom MTA MIB (Annex B) and the IPCablecom Signalling MIB (Annex C) and Management Event MIB (Annex D). In addition, these managed objects and functions can also be managed using the IETF MIB modules indicated by [IETF RFC 4682], [draft-ietf-ipcdn-pkct-eventmess-09], if implemented by the MTA.

5.3.7 Performance management (FFS)

The IPCablecom MIB modules should provide objects for the monitoring of the performance of the network when used for voice communications. Further definition of performance management is for future study.

5.3.8 Event Management

The IPCablecom Management Event MIB module provides the means to define and distribute events generated by the MTA. Refer to the Management Event MIB specification (Annex D and [draft-ietf-ipcdn-pkct-eventmess-09]) for more details.

6 MIBs available in an IPCablecom network

In designing the IPCablecom MIBs, it was necessary to consider other MIBs that are also present in the network and which can provide the required attributes and functions. This clause describes the MIBs that can be present in the IPCablecom MTA device, and which can be used for IPCablecom management functions as needed.

Table 1 lists the MIB modules that must be present in the IPCablecom MTAs. E-MTAs and S-MTAs MUST implement MIB modules present in Table 1.

Table 1 – MIB modules implemented by E-MTA and S-MTA

IF MIB
MIB II
Ethernet MIB
Bridge MIB
IPCablecom MTA Device MIB
IPCablecom Signalling MIB
IPCablecom Management Event MIB
SNMP V2 MIB group
IPCablecom Extension MIBs
eDOCSIS eSAFE MIB
Battery Backup UPS MIB

As mentioned before, partitioning of voice and data services and support of both S-MTA and E-MTA has been part of the requirements for design of the IPCablecom MIBs Framework.

Figure 3 in the "General Requirements" clause describes possible organizations of the MIB modules in order to meet these requirements.

6.1 DOCSIS MIB modules

As described in clause 5.2, the IPCablecom Embedded MTA must support the DOCSIS ([ITU-T J.112] or ITU-T Rec. J.122) MIB requirements. Refer to the following documents for the normative DOCSIS MIB requirements:

- For J.112, the MIB module requirements are defined in section 3 of [ANSI/SCTE 23-3].
- For J.122, the MIB module requirements are defined in section 6 of [ANSI/SCTE 79-2].
- For DOCSIS 3.0, the MIB module requirements are defined in [IETF RFC 4293].
- For eDOCSIS, the MIB module requirements are defined in ITU-T Rec. J.126.

6.2 IF MIB

This is the interfaces section of the MIB II [IETF RFC 2863], and is needed for definitions of multiple interfaces in the MTA.

6.3 MIB II

[IETF RFC 1907], [IETF RFC 2011] and [IETF RFC 2013] define the second version of the management information base (MIB-II) for use with network management protocols in TCP/IP-based Internets. Not all objects in this MIB are deemed necessary for the IPCablecom MTA device. This MIB module only requires the system, interfaces, IP, and transmission objects of MIB II to be present in the MTA.

The system object group contact, administrative, location, and service information regarding the managed node.

6.3.1 sysDescr requirements

The MTA's MIB II sysDescr object MUST conform to the format specified in DOCSIS [ANSI/SCTE 23-3].

6.3.2 sysObjectID requirements

sysObjectID is defined as follows:

```
sysObjectID OBJECT-TYPE
SYNTAX  OBJECT IDENTIFIER
ACCESS  read-only
STATUS  mandatory
DESCRIPTION
```

```
"The vendor's authoritative identification of the network
management subsystem contained in the entity.  This
value is allocated within the SMI enterprises subtree
(1.3.6.1.4.1) and provides an easy and unambiguous
means for determining 'what kind of box' is being
managed.  For example, if vendor 'Flintstones, Inc.'
was assigned the subtree 1.3.6.1.4.1.4242, it could
assign the identifier 1.3.6.1.4.1.4242.1.1 to its 'Fred
Router'."
```

```
::= { system 2 }
```

By using sysObjectID the manager will be able to determine any enterprise specific MIBs which must be used to manage the embedded MTA.

6.3.3 "iftable" requirements

IPCablecom ifTable MUST contain information about all IPCablecom endpoints. IfIndex, in case of IPCablecom MTAs, MUST start with value of 9 for telephony endpoints and MUST be

incremented sequentially and match the physical numbering of the telephony endpoints (Indices 2 through 8 are reserved for future use and the usage of index 1 is defined later in this clause). Each instance of the end-point in an E-MTA MUST have a corresponding entry ("conceptual row") in the "ifTable" MIB Table.

The CableModem part of an embedded MTA MUST adhere to DOCSIS and eDOCSIS requirements for MIB compliancy.

For each "conceptual row" in the "ifTable" table that corresponds to a Telephony Endpoint, the following conceptual columns MUST be used:

- "ifIndex"
- "ifDescr"
- "ifType"
- "ifAdminStatus"
- "ifOperStatus"

Each conceptual row in "ifTable" MUST conform to the "IANAifType-MIB" definition for the IPCablecom interface type:

- "ifType" – voiceOverCable (198)
- "ifDescr" – "Voice Over Cable Interface"

IfIndex 1 is used to recognize the DOCSIS Cable Modem behind which an MTA is connected and the MIB modules involved are indicated in Tables 2 and 3. In the case of an embedded MTA, the tables MUST be adhered to. For stand-alone MTAs, the MTA MAY choose to follow the same. In case a stand-alone MTA cannot display the information, ifIndex 1 MUST be left unused. If the stand-alone MTA is behind a CableHome or other device for its data connectivity, it MAY change the ifDescr to reflect the same.

IPCablecom E-MTAs MUST implement [ANSI SCTE 23-3], IETF STD 5 and [IETF RFC 2011]. An IPCablecom MTA MUST conform to the ifTable and ipNetToMediaTable defined in Tables 2 and 3, respectively. If an E-MTA is embedded with an eCM that supports IPv6, it MUST also support the ipNetToPhysicalTable as specified in Table 4.

Table 2 – RFC 2863 ifTable, MIB-Object details for embedded MTA device interfaces

RFC 2863 MIB-Object details for MTA device interface	MTA device
IfIndex	1
ifDescr: MUST match the text provided in the next column.	"DOCSIS Embedded Interface"
IfType	other(1)
IfMtu	0
IfSpeed	0
ifPhysAddress	eMTA MAC address
IfAdminStatus: Only up control is required for this interface, down(2) and testing(3) is out of the scope of this specification.	up(1)
ifOperStatus: only up report is required for this object, other options are out of the scope of this specification.	up(1)
IfLastChange	per RFC 2863
ifInOctets: This object is optional, if not implemented, it MUST return 0	(n), 0
ifInNUCastPkts	Deprecated
ifInDiscards	0
ifInErrors	0
ifUnknownProtos	0
ifOutOctets: This object is optional, if not implemented, it MUST return 0	(n), 0
ifOutUCastPkts: This object is optional, if not implemented, it MUST return 0	(n), 0
ifOutNUCastPkts	Deprecated
ifOutDiscards	0
ifOutErrors	0
ifOutQlen	Deprecated
ifSpecific	Deprecated
ifXTable: entries in ifXtable for this type of interface are not required	NA

Table 3 – RFC 2011 ipNetToMedia MIB-Object details for eMTA device interfaces

RFC 2011 MIB-Object details for MTA device interfaces	CM device
IpNetToMediaIfIndex	1
IpNetToMediaPhysAddress	CM MAC Address or a value of '0.0.0.0' if the eCM address cannot be represented (e.g., IPv6 eCM)
IpNetToMediaNetAddress	Acquired CM IP address
IpNetToMediaType	Static(4) or invalid(2) if ipNetToMediaPhyAddress is set to a value of '0.0.0.0'
IfIndex	1

Table 4 – ipNetToPhysicalTable MIB object details

MIB object name	CM device
ipNetToPhysicalIfIndex	1
ipNetToPhysicalPhysAddress	eCM MAC Address
ipNetToPhysicalNetAddressType	ipv4(1) or ipv6(2)
ipNetToPhysicalNetAddress	eCM IP Address
ipNetToPhysicalLastUpdated	<refer to RFC 4293>
ipNetToPhysicalType	static(4)
ipNetToPhysicalState	<refer to RFC 4293>
ipNetToPhysicalRowStatus	'active'

6.4 Ethernet MIB

The Ethernet MIB specifies the definitions of managed objects for the Ethernet-like interfaces (IETF RFC 3665).

6.5 Annex C

Annex C contains Network Call Signalling information for provisioning. The data is derived from the IPCablecom NCS Recommendation [ITU-T J.162].

The IPCablecom Signalling MIB module contains general configuration information that applies to the network call signalling (NCS) protocol on a per MTA device basis. This data only provides the means to provision call signalling parameters on a device basis.

The IPCablecom Signalling MIB module also defines managed objects applicable on a per endpoint basis. The NCS endpoint table (pkcSigEndPntConfigTable) contains specific NCS endpoint configuration information. This data only provides the means to provision network call signalling per endpoint.

6.5.1 Annex C general configuration information

Annex C contains general configuration information that applies to network call signalling on a device basis. This information is also contained in [ITU-T J.162].

This data only provides the means to provision network call signalling on a device basis.

6.5.2 Annex C per endpoint data

Annex C contains a per endpoint table. This table contains general configuration information that applies to network call signalling on a per endpoint basis. This information is also found in the configuration file defined in [ITU-T J.162]. This data only provides the means to provision network call signalling per endpoint.

6.6 Annex B

Annex B contains data for provisioning the MTA device and supporting the provisioned functions, specifically Syslog. The data is derived from the IPCablecom [ITU-T J.167], and the CM Device MIB.

Annex B contains general configuration information to provision the MTA on a device basis. These objects support provisioning required servers, and security information.

6.7 Event Management MIB

The IPCablecom Management Event MIB module is defined in Annex D. It provides a common data and format definition for events (informative, alarm, etc.). It also specifies by what means

events are transmitted. Use of a common event mechanism facilitates management of the MTA in a multi-vendor environment and provides a standard means to implement IPCablecom specified events.

6.8 SNMP MIB

The SNMPv2 MIB module defines the functionality to configure the endpoint in SNMPv2 mode and helps in managing all the MIB objects using SNMPv2 functionality.

6.9 IPCablecom Extension MIB

The IPCablecom Extension MIB is defined in Annex A. These MIBs extend the existing IPCablecom MIB functionality. The extensions are in the areas of MTA MIB and Signalling MIB.

6.9.1 MTA MIB Extension

The IPCablecom MTA MIB Extension is defined in Annex E. This provides the additional functionality for controlling new functionality like multiple grants per interval (MGPI) on the endpoint.

6.9.2 Signalling MIB Extension

The IPCablecom Signalling MIB Extension is defined in Annex F. This provides additional control and reporting functionality for endpoints in the areas of DTMF relay, Quarantine handling, Hookstate, etc.

6.9.3 Syslog MIB

This Syslog MIB is defined in Annex D. This provides a better granularity for control of syslog messages by the endpoint.

6.10 eDOCSIS eSAFE MIB

The eDOCSIS eSAFE MIB is defined in ITU-T Rec. J.126. It describes the various management objects necessary to configure functionality of eSAFE components of a device implementing an eDOCSIS compliant cable modem and one or more eSAFE elements. This MIB MUST be accessible via the eCM interface.

6.11 Battery backup UPS MIB

The battery backup UPS MIB is defined in [ITU-T J.199]. It MUST be implemented by the E-MTAs which support battery backup functionality. Battery backup UPS MIB describes the various management objects necessary to control the battery backup UPS functionality implemented by the E-MTA. The MIB MUST be accessible via the eCM interface.

7 IPCablecom MIB module implementation

This clause describes a reference implementation of the MIBs in an IPCablecom device. Only E-MTA type implementations are considered here.

7.1 MTA components

Figure 4 shows the components of a typical MTA.

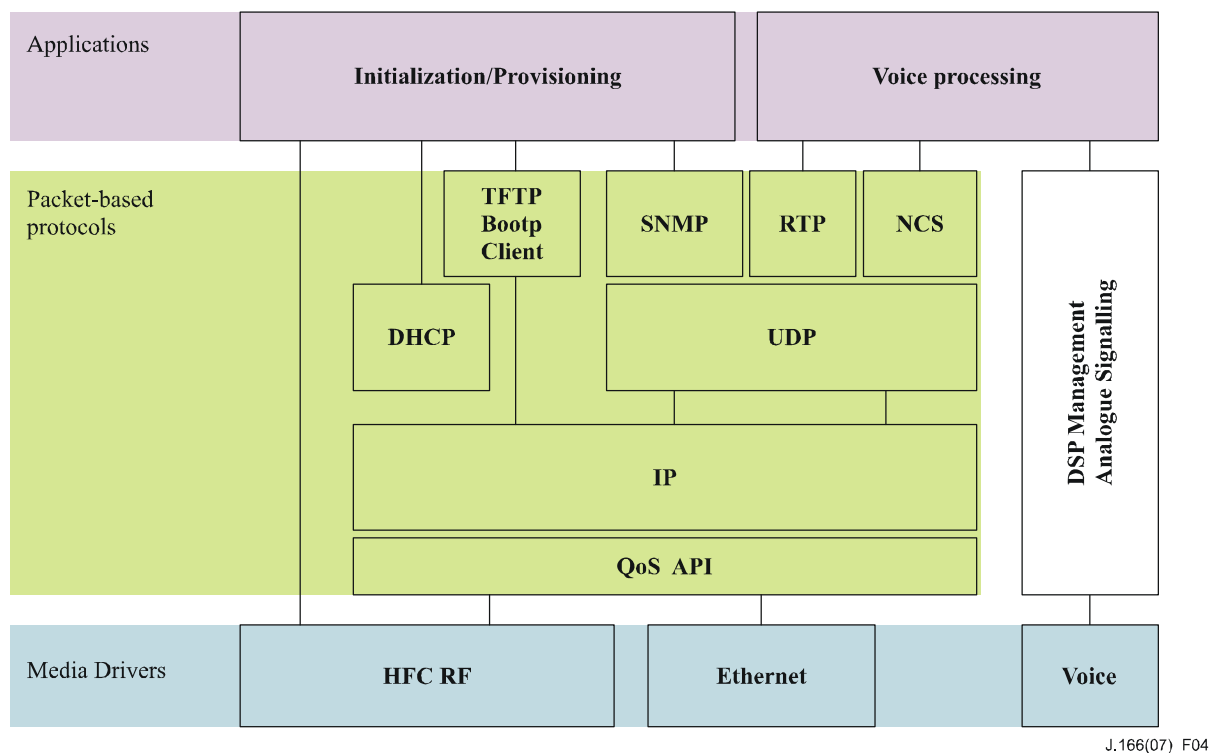


Figure 4 – MTA components

As shown here, the MTA components can be organized into separate areas, i.e., packet-based protocols, which run on top of IP and the voice subsystem which consists of DSP engines and their associated software. MIBs that are implemented in the MTA have to be organized so as to facilitate this separation. IPCablecom MIB specifies functions for the packet-based protocol section of the MTA. No analogue voice MIBs are specified for the MTA.

NOTE – Please refer to the IPCablecom Security Specification [ITU-T J.170] for the security protocols.

7.2 MIB layering

Figure 5 describes the MIB layering model. The two stacks represent the packet network and analogue voice sections of the MTA. On the packet network side, MIB layering follows the same layering model as the protocol stacks.

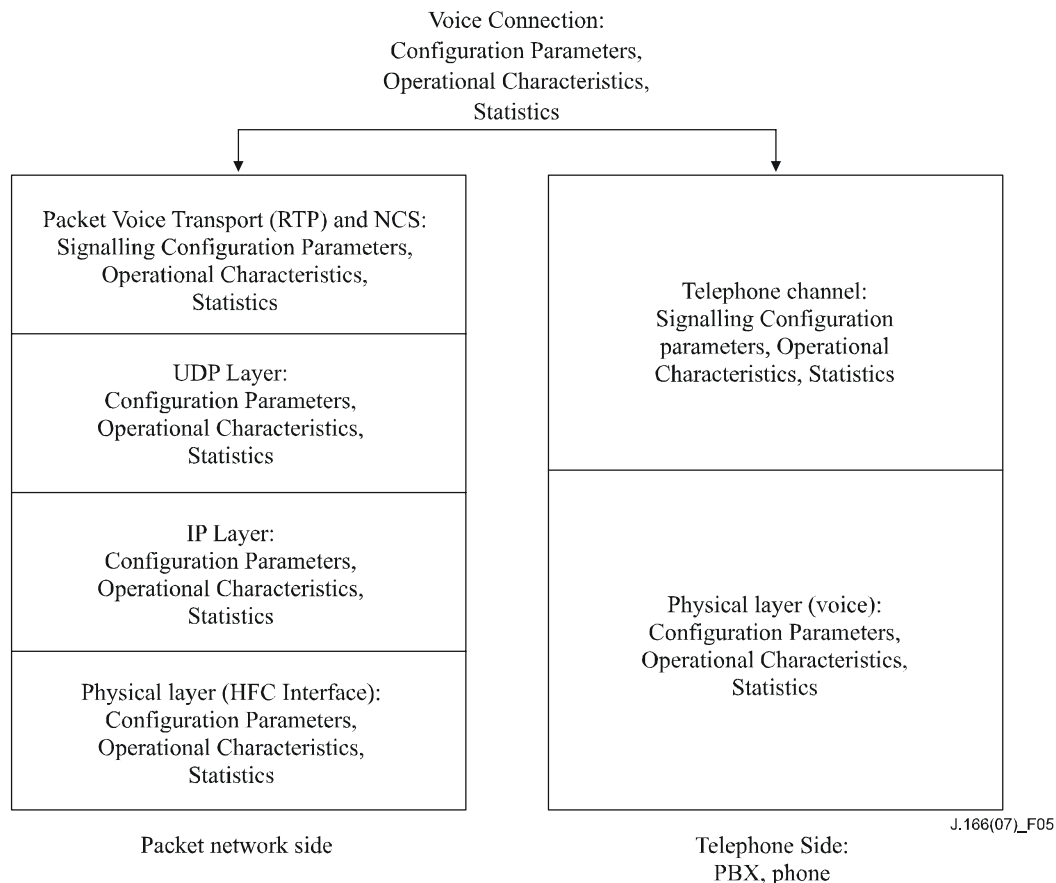


Figure 5 – MIB layering model

In the context of voice communications, MIBs can be layered into the physical layer attributes which deal with the voice interface and the telephone channel attributes which deal with voice signalling. MIBs for the telephone side of the MTA are for further study.

8 Organization of the MIBs

The IPCablecom MIBs have been gathered together as annexes to this Recommendation so as to keep them all together in one place.

MIBs represent lines of computer code that must be implemented as written. As such, the MIBs MUST NOT be translated into other languages.

8.1 Definition MIB

The definition MIB, contained in Annex A, is referenced by several projects including DOCSIS, IPCable2Home, and IPCablecom. It defines the OID registry from which each project assigns its own MIB information modules.

8.2 MTA MIB

The MTA MIB is contained in Annex B. It supersedes ITU-T Rec. J.168. This MIB has been submitted to the IETF for standardization. Once RFC status is achieved, this annex will be deleted and the MIB incorporated by reference.

8.3 Signalling MIB

The signalling MIB is contained in Annex C. It supersedes ITU-T Rec. J.169. This MIB has been submitted to the IETF for standardization. Once RFC status is achieved, this annex will be deleted and the MIB incorporated by reference.

8.4 MEM MIB

The Management Event Mechanism MIB is contained in Annex D. It supersedes ITU-T Rec. J.176.

8.5 MTA Extension MIB

The Media Terminal Adapter Extension MIB is contained in Annex E.

8.6 Signalling Extension MIB

The Signalling Extension MIB is contained in Annex F.

8.7 Battery backup MIB

The battery backup MIB is contained in a separate Recommendation to be approved later. It is a separate document because it is applicable to other cable technologies besides IP-Cablecom.

Annex A

MIB import data

(This annex forms an integral part of this Recommendation)

The Definition MIB MUST be implemented as defined below.

```
CLAB-DEF-MIB DEFINITIONS ::= BEGIN
IMPORTS
    MODULE-IDENTITY,
    OBJECT-TYPE,
    enterprises
        FROM SNMPv2-SMI
    DocsX509ASN1DEREncodedCertificate
        FROM DOCS-IETF-BPI2-MIB;

cableLabs MODULE-IDENTITY
    LAST-UPDATED "200504081700Z" -- April 8, 2005
    ORGANIZATION "Cable Television Laboratories, Inc."
    CONTACT-INFO
        "Editor: Jean-Francois Mule
        Postal: Cable Television Laboratories, Inc.
            858 Coal Creek Circle
            Louisville, Colorado 80027-9750
            U.S.A.
        Phone: +1 303-661-9100
        Fax: +1 303-661-9199
        E-mail: jfm@cablelabs.com
            mibs@cablelabs.com"

    DESCRIPTION
        "This MIB module defines the namespace organization for the
        CableLabs enterprise OID registry.

        Copyright 1999-2005 Cable Television Laboratories, Inc.
        All rights reserved."

    REVISION "200504081700Z" -- April 8, 2005
    DESCRIPTION
        "This revision, published as CL-SP-MIB-CLABDEF-I05."
        ::= { enterprises 4491 }

-- Sub-tree for Registrations
clabFunction OBJECT IDENTIFIER ::= { cableLabs 1 }
clabFuncMib2 OBJECT IDENTIFIER ::= { clabFunction 1 }
clabFuncProprietary OBJECT IDENTIFIER ::= { clabFunction 2 }

-- Sub-tree for Project Definitions
clabProject OBJECT IDENTIFIER ::= { cableLabs 2 }
clabProjDocsis OBJECT IDENTIFIER ::= { clabProject 1 }
clabProjPacketCable OBJECT IDENTIFIER ::= { clabProject 2 }
clabProjOpenCable OBJECT IDENTIFIER ::= { clabProject 3 }
clabProjCableHome OBJECT IDENTIFIER ::= { clabProject 4 }

-- Sub-tree for Global Security Definitions
clabSecurity OBJECT IDENTIFIER ::= { cableLabs 3 }
clabSecCertObject OBJECT IDENTIFIER ::= { clabSecurity 1 }

-- Sub-tree for CableLabs cross project common MIB definitions
clabCommonMibs OBJECT IDENTIFIER ::= { cableLabs 4 }
```

```

--
-- CableLabs DOCSIS Project Sub-tree Definitions
--
dsgMIB OBJECT IDENTIFIER
-- DOCSIS Set-top Gateway (DSG) MIB module
-- This object identifier points to the MIB module
-- DOCSIS-SETTOP-GATEWAY-MIB, which is being deprecated by
-- DSG-IF-MIB MIB module (dsgIfMib).
-- Reference:
-- CableLabs DOCSIS Set-top Gateway (DSG) Interface Specification
::= { clabProjDocsis 1 }

docsLoadBalMib OBJECT IDENTIFIER
-- DOCSIS MIB module defining the CMTS configuration parameters to
-- support Load Balancing requirements."
::= { clabProjDocsis 2 }

dsgIfMIB OBJECT IDENTIFIER
-- DOCSIS Set-top Gateway (DSG) MIB module
-- Obsoletes DOCSIS-SETTOP-GATEWAY-MIB Module (dsgMib)
-- defined initially in DOCSIS Set-top Gateway (DSG) Interface
-- Specification SP-DSG-I01-020228.
-- Reference:
-- CableLabs DOCSIS Set-top Gateway (DSG) Interface Specification
::= { clabProjDocsis 3 }

dsgIfStdMib OBJECT IDENTIFIER
-- DOCSIS Set-top Device (DSG) MIB module.
-- Reference:
-- CableLabs DOCSIS Set-top Gateway (DSG) Interface Specification
::= { clabProjDocsis 4 }

docsIfExt2Mib OBJECT IDENTIFIER
-- This MIB module contains the management objects that enhance
-- DOCSIS RFI Interface Extensions. Contains Enhancements to
-- DOCSIS RFI interface MIB module.
-- Reference:
-- CableLabs DOCSIS RFI Interface Specification.
::= { clabProjDocsis 5 }

docsTestMIB OBJECT IDENTIFIER
-- DOCSIS Test MIB module supporting programmable test features
-- for DOCSIS 2.0 compliant Cable Modems (CM) and Cable Modems
-- Termination Systems (CMTS).
-- Reference:
-- CableLabs DOCSIS 2.0 Testing MIB Specification
::= { clabProjDocsis 12 }

sledMib OBJECT IDENTIFIER
-- eDOCSIS MIB module supporting the Software Loopback Application
-- for eDOCSIS (SLED).
-- Reference:
-- CableLabs eDOCSIS Specification
::= { clabProjDocsis 13 }

--
-- CableLabs CableHome Project Sub-tree Definitions
-- Reference
-- CableLabs CableHome Specification
--
cabhPsDevMib OBJECT IDENTIFIER
-- CableHome MIB module defining the basic management objects for
-- the Portal Services logical element of a CableHome compliant
-- Residential Gateway device. The PS device parameters describe

```

```

-- general PS Device attributes and behaviour characteristics
::= { clabProjCableHome 1 }

cabhSecMib OBJECT IDENTIFIER
-- CableHome MIB module defining the basic management objects for
-- the firewall and other security features of the Portal Services
-- element.
::= { clabProjCableHome 2 }

cabhCapMib OBJECT IDENTIFIER
-- CableHome MIB module defining the basic management objects for
-- the CableHome Addressing Portal (CAP) function of the Portal
-- Services element.
::= { clabProjCableHome 3 }

cabhCdpMib OBJECT IDENTIFIER
-- This MIB module supplies the basic management objects for the
-- CableHome DHCP Portal (CDP) function of the Portal Services
-- element.
::= { clabProjCableHome 4 }

cabhCtpMib OBJECT IDENTIFIER
-- CableHome MIB module supporting the remote LAN diagnostic
-- features provided by the CableHome Test Portal (CTP) function
-- of the Portal Services element.
::= { clabProjCableHome 5 }

cabhQosMib OBJECT IDENTIFIER
-- CABLEHOME QOS MIB Module (cabhQosMib).
-- This object identifier points to the MIB module
-- CABH-QOS-MIB, which is being deprecated by
-- CABH-QOS2-MIB module (cabhQos2Mib).
-- Reference:
-- CableLabs CableHome 1.1 Specification
::= { clabProjCableHome 6 }

cabhCsaMib OBJECT IDENTIFIER
-- CableHome MIB module defining management objects for the
-- configuration and monitoring of CableHome Commercial Services
-- Annex.
-- Reference:
-- CableLabs CableOffice Commercial Services Annex MIB
-- Specification
::= { clabProjCableHome 7 }

cabhQos2Mib OBJECT IDENTIFIER
-- Obsoletes CABH-QOS-MIB module (cabhQosMib)
-- defined initially in CABLEHOME 1.1 Interface Specification.
-- This MIB module defines the Quality of Service Management
-- Information Base (MIUB) for CableHome UPnP QOS-compliant
-- devices.
-- Reference:
-- CableLabs CableHome 1.1 Specification
::= { clabProjCableHome 8 }

--
-- CableLabs PacketCable Project Sub-tree Definitions
--
pktcMtaMib OBJECT IDENTIFIER
-- PacketCable MIB module defining the basic management object for
-- the Multimedia Terminal Adapter (MTA) devices compliant with
-- PacketCable requirements.
-- Reference
-- CableLabs PacketCable MTA Device Provisioning Specification

```

```

::= { clabProjPacketCable 1 }

pktcSigMib OBJECT IDENTIFIER
-- PacketCable MIB module defining the basic management object for
-- the PacketCable MTA Signalling protocols. This version of the MIB
-- includes common signalling and Network Call Signalling (NCS)
-- related signalling objects.
-- Reference
-- CableLabs PacketCable MTA Device Provisioning Specification
::= { clabProjPacketCable 2 }

pktcEventMib OBJECT IDENTIFIER
-- PacketCable MIB module defining the basic management objects for
-- event reporting.
-- Reference
-- CableLabs PacketCable Management Event Specification
::= { clabProjPacketCable 3 }

pktcSecurity OBJECT IDENTIFIER
-- CableLabs OID reserved for security and used to specify errors
-- that can be returned for the Kerberos KDC - Provisioning
-- Server interface, or the MTA-CMS Kerberized IPsec interface, or
-- the MTA-Provisioning Server Kerberized SNMPv3 interface.
-- CableLabs PacketCable Security Specification
::= { clabProjPacketCable 4 }

pktcLawfulIntercept OBJECT IDENTIFIER
-- CableLabs OID reserved for the PacketCable Electronic
-- Surveillance Protocol (PCESP) between the Delivery Function
-- and Collection Function. This OID is used to define the ASN.1
-- PCESP messages.
-- CableLabs PacketCable Electronic Surveillance Protocol
-- Specification
::= { clabProjPacketCable 5 }

--
-- Sub-tree for PacketCable MIB Enhancements
--

pktcEnhancements OBJECT IDENTIFIER ::= { clabProjPacketCable 6 }

-- The following MIB OBJECTS are being introduced for
-- incorporation of new MIB objects (MIB enhancements)
-- proposed to the PacketCable MIB group.
-- This includes new MIB objects being introduced
-- as part of the PacketCable MIB Enhancement efforts
-- and as a place holder for future revisions.
-- This sub-division would facilitate easier incorporation
-- of proposed IETF Drafts/RFCs by keeping enhancements
-- independent of RFC/Draft changes.
-- For new MIB tables that use previously used indices, it is
-- recommended that the AUGMENT CLAUSE be used to aid SNMP Operations,
-- as deemed necessary.

pktcEnMtaMib OBJECT IDENTIFIER
-- PacketCable MIB module enhancements to the basic management
-- objects defined by the MIB group pktcMtaMib for the Multimedia
-- Terminal Adapter (MTA) devices compliant with PacketCable
-- requirements.
-- Reference:
-- CableLabs PacketCable MTA Device Provisioning Specification.
::= { pktcEnhancements 1 }

```

```

pktcEnSigMib OBJECT IDENTIFIER
-- PacketCable MIB module enhancements to the basic management
-- objects defined by the MIB group pktcSigMib for the
-- PacketCable MTA Signalling protocols.
-- Reference:
-- CableLabs PacketCable MTA Device Provisioning Specification.
::= { pktcEnhancements 2 }

pktcEnEventMib OBJECT IDENTIFIER
-- PacketCable MIB module enhancements to the basic management
-- objects defined by the MIB group pktcEventMib for event reporting.
-- Reference:
-- CableLabs PacketCable Management Event Specification.
::= { pktcEnhancements 3 }

pktcEnSecurityMib OBJECT IDENTIFIER
-- PacketCable MIB module enhancements to the basic management
-- objects defined by the reserved MIB group pktcSecurity.
-- Reference:
-- CableLabs PacketCable Security Specification.
::= { pktcEnhancements 4 }

--
--
-- Definition of CableLabs Security Certificate Objects
--
clabSrvCPrvdrRootCACert OBJECT-TYPE
    SYNTAX      DocsX509ASN1DEREncodedCertificate
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "The X509 DER-encoded CableLabs Service Provider Root CA
        Certificate."
    REFERENCE
        "CableLabs CableHome Specification;
        CableLabs PacketCable Security Specification."
    ::= { clabSecCertObject 1 }

clabCVCRootCACert OBJECT-TYPE
    SYNTAX      DocsX509ASN1DEREncodedCertificate
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "The X509 DER-encoded CableLabs CVC Root CA Certificate."
    REFERENCE
        "CableLabs CableHome Specification;
        CableLabs PacketCable Security Specification."
    ::= { clabSecCertObject 2 }

clabCVCCACert OBJECT-TYPE
    SYNTAX      DocsX509ASN1DEREncodedCertificate
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "The X509 DER-encoded CableLabs CVC CA Certificate."
    REFERENCE
        "CableLabs CableHome Specification;
        CableLabs PacketCable Security Specification."
    ::= { clabSecCertObject 3 }

clabMfgCVCCert OBJECT-TYPE
    SYNTAX      DocsX509ASN1DEREncodedCertificate
    MAX-ACCESS   read-only
    STATUS       current

```


Annex B

MTA MIB

(This annex forms an integral part of this Recommendation)

The MTA MIB MUST be implemented as defined below.

```
PKTC-MTA-MIB DEFINITIONS ::= BEGIN
    IMPORTS
        MODULE-IDENTITY,
        OBJECT-TYPE,
        Integer32, Counter32,
        BITS,IpAddress, NOTIFICATION-TYPE
        TruthValue, RowStatus, DisplayString,
        MacAddress, TEXTUAL-CONVENTION
        OBJECT-GROUP, MODULE-COMPLIANCE,
        NOTIFICATION-GROUP
        clabProjPacketCable
        ifIndex
        SnmpAdminString
        sysDescr
        FROM SNMPv2-SMI
        FROM SNMPv2-TC
        FROM SNMPv2-CONF
        FROM CLAB-DEF-MIB
        FROM IF-MIB
        FROM SNMP-FRAMEWORK-MIB
        FROM SNMPv2-MIB;

pktcMtaMib MODULE-IDENTITY
    LAST-UPDATED      "200501280000Z" -- January 28, 2005
    ORGANIZATION      "Packet Cable OSS Group"
    CONTACT-INFO
        "Sumanth Channabasappa
        Postal: Cable Television Laboratories, Inc.
        858 Coal Creek Circle
        Louisville, Colorado 80027-9750
        U.S.A.
        Phone:  +1 303-661-9100
        Fax:    +1 303-661-9199
        E-mail:  mibs@cablelabs.com"

    DESCRIPTION
        "This MIB module supplies the basic management objects
        for the MTA Device
        Acknowledgements:
        Angela Lyda           -   Arris Interactive
        Chris Melle           -   AT&T Broadband Labs
        Sasha Medvinsky       -   Motorola
        Roy Spitzer           -   Telogy Networks, Inc.
        Rick Vetter           -   Motorola
        Eugene Nechamkin      -   BroadCom Corp.
        Satish Kumar          -   Texas Instruments
        Copyright 1999-2005 Cable Television Laboratories, Inc.
        All rights reserved."
    REVISION "200501280000Z "
    DESCRIPTION
        "This revision, published as part of the PacketCable 1.5
        MIB MTA Specification I01."
    ::= { clabProjPacketCable 1 }

-- Textual conventions
X509Certificate ::= TEXTUAL-CONVENTION
    STATUS current
    DESCRIPTION
        "An X509 digital certificate encoded as an ASN.1 DER object."
    SYNTAX OCTET STRING (SIZE (0..4096))

--
```

```

-- PacketCable 1.5 only supports Embedded MTAs
--
-----
-- The MTA MIB only supports a single provisioning server.
--
-----

pktcMtaMibObjects      OBJECT IDENTIFIER ::= { pktcMtaMib 1 }
pktcMtaDevBase         OBJECT IDENTIFIER ::= { pktcMtaMibObjects 1 }
pktcMtaDevServer       OBJECT IDENTIFIER ::= { pktcMtaMibObjects 2 }
pktcMtaDevSecurity     OBJECT IDENTIFIER ::= { pktcMtaMibObjects 3 }

--
-- The following group describes the base objects in the MTA
--
pktcMtaDevResetNow  OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS   read-write
    STATUS      current
    DESCRIPTION
        "Setting this object to true(1) causes the device to reset.
        Reading this object always returns false(2).  When
        pktcMtaDevResetNow is set to true, the following actions
        occur:
        1. All connections (if present) are flushed locally
        2. All current actions such as ringing immediately
           terminate
        3. Requests for notifications such as notification based
           on digit map recognition are flushed
        4. All endpoints are disabled.
        5. The provisioning flow is started at step MTA - 1."
        ::= { pktcMtaDevBase 1 }

pktcMtaDevSerialNumber  OBJECT-TYPE
    SYNTAX      SnmpAdminString(SIZE (0..128))
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "This object specifies the manufacturer's serial number
        for this MTA. The value of this object MUST be identical
        to the value specified in DHCP option 43 sub-option 4. "
    REFERENCE
        "PacketCable MTA Device Provisioning Specification;
        RFC 2132, DHCP Options and BOOTP Vendor Extensions"
        ::= { pktcMtaDevBase 2 }

pktcMtaDevHardwareVersion  OBJECT-TYPE
    SYNTAX      SnmpAdminString(SIZE (0..48))
    MAX-ACCESS   read-only
    STATUS      obsolete
    DESCRIPTION
        "The manufacturer's hardware version for this MTA."
        ::= { pktcMtaDevBase 3 }

pktcMtaDevMacAddress  OBJECT-TYPE
    SYNTAX      MacAddress
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "This object specifies the telephony MAC address for
        this device. The value of this object MUST be identical
        to the value specified in DHCP option 43 sub-option 11. "

```

REFERENCE

"PacketCable MTA Device Provisioning Specification;
RFC 2132, DHCP Options and BOOTP Vendor Extensions"
::= { pktcMtaDevBase 4 }

pktcMtaDevFQDN OBJECT-TYPE
SYNTAX SnmpAdminString
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The Fully Qualified Domain Name for this MTA."
::= { pktcMtaDevBase 5 }

pktcMtaDevEndPntCount OBJECT-TYPE
SYNTAX Integer32 (1..255)
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The physical end points for this MTA."
::= { pktcMtaDevBase 6 }

pktcMtaDevEnabled OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"This object contains the MTA Admin Status of this device.
If this object is set to 'true', the MTA is
administratively enabled and the MTA MUST be able to
interact with PacketCable entities such as CMS,
Provisioning Server, KDC, other MTAs and MGs on all
PacketCable interfaces.
If this object is set to 'false', the MTA is
administratively disabled and the MTA MUST perform the
following actions for all endpoints:
- Shut down all media sessions if present,
- Shut down NCS signalling by following the Restart in
Progress procedures in the PacketCable NCS
specification.
Additionally, the MTA MUST maintain the SNMP Interface for
management. Also, the MTA MUST NOT continue Kerberized Key
Management with CMSes until this object is set to 'true'.
Note: MTAs MUST renew the CMS kerberos tickets according
to the PacketCable Security Specification"

REFERENCE

"PacketCable Security Specification;
PacketCable MTA Device Provisioning Specification"
::= { pktcMtaDevBase 7 }

pktcMtaDevTypeIdIdentifier OBJECT-TYPE
SYNTAX SnmpAdminString
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This is a copy of the device type identifier used in the
DHCP option 60 exchanged between the MTA and the DHCP
server."
::= { pktcMtaDevBase 8 }

pktcMtaDevProvisioningState OBJECT-TYPE
SYNTAX INTEGER {
pass (1),
inProgress (2),
failConfigFileError (3),

```

        passWithWarnings          (4),
        passWithIncompleteParsing (5),
        failureInternalError      (6),
        failOtherReason           (7)
    }
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
    "This object indicates the completion state of the
    MTA device provisioning process.

```

pass:
If the configuration file could be parsed successfully and the MTA is able to reflect the same in its MIB, the MTA MUST return the value 'pass'.

inProgress:
If the MTA is in the process of being provisioned, the MTA MUST return the value 'inProgress'.

failConfigFileError:
If the configuration file was in error due to incorrect values in the mandatory parameters, the MTA MUST reject the configuration file and the MTA MUST return the value 'failConfigFileError'.

passWithWarnings:
If the configuration file had proper values for all the mandatory parameters but has errors in any of the optional parameters (this includes any vendor specific OIDs which are incorrect or not known to the MTA), the MTA MUST return the value 'passWithWarnings'.

passWithIncompleteParsing:
If the configuration file is valid, but the MTA cannot reflect the same in its configuration (for example, too many entries caused memory exhaustion), it must accept the CMS configuration entries related and the MTA MUST return the value 'passWithIncompleteParsing'.

failureInternalError:
If the configuration file cannot be parsed due to an internal error, the MTA MUST return the value 'failureInternalError'.

failureOtherReason:
If the MTA cannot accept the configuration file for any other reason than the ones stated above, the MTA MUST return the value 'failureOtherReason'.

When a final SNMP INFORM is sent as part of Step 25 of the MTA Provisioning process, this parameter is also included in the final INFORM message."

REFERENCE

```

    "PacketCable MTA Device Provisioning Specification"
 ::= { pktcMtaDevBase 9 }

```

pktcMtaDevHttpAccess OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This indicates whether HTTP file access is supported for MTA configuration file transfer."